

CH. 7 INDIRECT AND CUMULATIVE EFFECTS



Chapter 7 describes a qualitative assessment of potential indirect and cumulative land use changes and environmental effects associated with the Detailed Study Alternatives. The assessment was conducted in accordance with North Carolina Department of Transportation guidance.

7.1 DEFINITIONS AND ANALYSIS METHODOLOGY

This chapter is a summary of the *Indirect and Cumulative Effects Assessment for the Gaston East-West Connector* (Louis Berger Group, Inc., March 2009), incorporated by reference, and available on the NCTA Web site (www.ncturnpike.org/projects/gaston). This qualitative assessment was performed in accordance with North Carolina Department of Transportation (NCDOT) guidance titled, *Assessing Indirect and Cumulative Effects of Transportation Projects in North Carolina* (November 2001), referred to in this chapter as the *ICI Guidance*.

7.1.1 DEFINITIONS

The following is a listing of definitions as accepted by the NCDOT in their *ICI Guidance*, which follow the Council on Environmental Quality (CEQ) definitions as well as the Code of Federal Regulations (40 CFR 1500-1508).

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” (40 CFR 1508). The terms effects and impacts are used synonymously in the CEQ regulations (40 CFR 1508.8(b)).

Indirect Effects

Indirect effects considered during the NEPA process must be reasonably foreseeable. Not every conceivable scenario should be evaluated.

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.” (40 CFR 1500-1508).

It is important to emphasize that indirect effects considered during the National Environmental Policy Act (NEPA) process must be reasonably foreseeable; not every conceivable scenario should be evaluated (*Dubois v. US Department of Agriculture*, 102 F.3d 1273, 1286 [1st Circuit 1996]).

7.1.2 ANALYSIS METHODOLOGY

The general approach to defining indirect and cumulative effects is defined by the *ICI Guidance* (November 2001), the CEQ (*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.

This qualitative analysis was undertaken in five steps based on the NCDOT guidance, including:

- Definition of Indirect and Cumulative Effects (ICE) Study Areas (Step 1)
- Identification of the ICE Study Area's Direction and Goals (Step 2)
- Inventory of Notable Features (Step 3)
- Identification of Impact-Causing Activities (Step 4)
- Identification and Analysis of Potential Indirect and Cumulative Effects (Step 5)

A quantitative assessment, involving Steps 6-8 in the *ICI Guidance*, would be conducted on the Preferred Alternative following the approval of the Draft Environmental Impact Statement (Draft EIS) if it is determined by the Federal Highway Administration (FHWA) and the North Carolina Turnpike Authority (NCTA) that such analysis is needed.

To aid in defining the scope of the ICE assessment, meetings were offered with the following agencies: FHWA, NCTA, North Carolina Department of Transportation (NCDOT), US Army Corps of Engineers (USACE), US Fish and Wildlife Service (USFWS), NC Wildlife Resources Commission (NCWRC), US Environmental Protection Agency (USEPA), North Carolina Department of Environment and Natural Resources - Division of Water Quality (NCDWQ), State Historic Preservation Office (HPO), Gaston Urban Area Metropolitan Planning Organization (GUAMPO), and Mecklenburg-Union Metropolitan Planning Organization (MUMPO). The USFWS, NCWRC, and NCDWQ offered assistance. Representatives from the FHWA, NCTA, and NCDOT met with representatives from US Fish and Wildlife Service and NC Wildlife Resources Commission (NCWRC) on June 29, 2007 (meeting minutes included in **Appendix A-5**). The purpose of the meeting was to collaboratively identify the sensitive resources, identify the study methodologies, define the ICE study area boundaries, and confirm the timeframe for the assessment. Based on input from the NCWRC, the ICE assessment includes a section addressing potential indirect effects on upland wildlife habitat, including habitat fragmentation.

A similar scoping meeting was held with North Carolina Department of Environment and Natural Resources - Division of Water Quality (NCDWQ) on July 26, 2007 (meeting minutes included in **Appendix A-5**). NCDWQ agreed with the proposed multi-county qualitative approach of assessing potential ICEs associated with the proposed project, and the boundaries based on local watersheds.

Interviews also were held with local agency staff and local experts to gather information on notable features considered in this ICE assessment. They included representatives from GUAMPO, City of Gastonia Planning Department, Town of Belmont Planning Department, Gaston Economic Development Commission, Bessemer City Planning Department, Gaston County Chamber of Commerce, Charlotte-Mecklenburg Planning Department, Charlotte-Douglas International Airport, York County, Real Estate and Building Industry Coalition, Catawba Riverkeeper, Crowders Mountain State Park, and Allen Tate Realty. Interview summaries are

included in Appendix C of the *Indirect and Cumulative Effects Assessment for the Gaston East-West Connector* (Louis Berger Group, Inc., March 2009).

7.2 STUDY AREAS FOR INDIRECT AND CUMULATIVE EFFECTS (STEP 1)

Three types of geographic study areas (ICE Study Area, Districts, and Interchange Areas) and one temporal study area were identified to describe indirect and cumulative effects of the proposed Gaston East-West Connector. These are described below. The geographic ICE Study Areas also are shown in **Figure 7-1a-b**.

It should be noted that in addition to the three basic types of geographic study areas, there are also some discussions of effects at the county level of geography, as well as for the Detailed Study Alternatives (DSAs).

ICE Study Areas

Three geographic study areas were used. The largest, the ICE Study Area includes most of Gaston County and parts of Mecklenburg, Cleveland and York counties. The ICE Study Area was divided into ten Districts to better describe impacts. The smallest study areas were Interchange Areas, used to describe changes that may occur in the immediate vicinity of new access points created by the project.

ICE Study Area. The ICE Study Area includes most of Gaston and parts of Cleveland, Mecklenburg, and York (South Carolina) counties (**Figure 7-1a**). The purpose of the ICE Study Area was to provide a basic level of geography that would encompass any reasonably 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 are more sharply described at the District and Interchange Areas levels.

Districts. The ICE Study Area was divided into ten districts (Districts 1 through 10) 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 follow major roadway features as well as political boundaries to facilitate policy differentiations among the various units of government that were examined.

Interchange Areas. The Interchange Areas are the third (and smallest) study area type 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 (**Figure 7-1b**).

The sizes and shapes of the Interchange Area boundaries were 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 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.

Temporal Boundary. A timeframe for analysis 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. The year 1989 is the year the Gaston East-West Connector concept was first identified on the Gaston Urban Area Thoroughfare Plan. The

year 2030 is the horizon year for the Gaston Urban Area Metropolitan Planning Organization (GUAMPO) *2030 Long Range Transportation Plan (2030 LRTP)* (May 2005), and the Mecklenburg-Union MPO (MUMPO) *2030 LRTP* (Amended September 2005).

7.3 DIRECTIONS AND GOALS FOR STUDY AREAS FOR INDIRECT AND CUMULATIVE EFFECTS (STEP 2)

In order to determine study area directions and goals, plans adopted by the local jurisdictions were reviewed. Reviews also were conducted of development policies, guidelines, utility provisions, and other actions that specifically provide information on the approach that local governments take toward managing growth. Meeting minutes from Planning Commissions, Boards of Commissioners, and City and Town Councils were reviewed and considered as well.

Jurisdictions in the ICE Study Area include four counties and four municipalities:

- Gaston County
- Mecklenburg County
- City of Gastonia (Gaston County)
- City of Charlotte (Mecklenburg County)
- City of Bessemer City (Gaston County)
- Cleveland County
- City of Belmont (Gaston County)
- York County, SC

Gaston County. Gaston County, 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 (UDO - a combined subdivision and zoning 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 Catawba River and Catawba River. The growth has led to the conversion of farmland and forested areas to more urbanized land uses.

The goals and objectives of the GUAMPO *2030 LRTP* are consistent with development and growth desires for the jurisdictions that comprise GUAMPO. According to the *2030 LRTP*, the Gaston East-West Connector is considered to be the most significant infrastructure project currently under consideration in Gaston County. GUAMPO has consistently supported the project's concept since its inception around 1989.

City of Gastonia. Gastonia markets a "pro-business" permit process for new subdivision and commercial properties. The City uses the UDO to manage existing and anticipated development. The City of Gastonia regularly extends utilities in an attempt to meet the needs of new development. According to the 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.

To address development activity and improve quality, Gastonia recently created a *Resource Guidebook for Residential and Commercial Development* (August 2007) to provide guidance to developers and staff on aesthetic and design treatments. Gastonia has taken other proactive steps to manage development, such as agreeing to create a Phase II stormwater management ordinance as part of their Phase II National Pollutant Discharge Elimination System (NPDES) program, which will affect all new developments. This ordinance establishes minimum

requirements and procedures to control the adverse effects of stormwater runoff associated with new development.

City of Bessemer. According to the City, the *1995 Land Use Plan* is obsolete and outdated (Telephone interview, City of Bessemer Planning Director, July 12, 2007). The City is working on an update to its plan, which is scheduled to be completed in late 2009 (Telephone interview, City of Bessemer Planning Director, October 2, 2008). Bessemer City is actively embracing residential, commercial, and industrial development, and like most municipalities in Gaston County, they follow the land use ordinance of the UDO.

City of Belmont. The City of Belmont currently is in a mode of residential and commercial growth. To better manage this growth, Belmont adopted the *City of Belmont Comprehensive Land Use Plan* in August 2007, and they adhere to the UDO. The City has extended water service along NC 273 to the south end of the Belmont peninsula in order to serve new subdivisions. Other areas along the peninsula can tap into the new line if they are annexed into the City.

Mecklenburg County and City of Charlotte. Mecklenburg County is in the midst of a tremendous growth cycle. Mecklenburg County's *2015 Plan, Planning for Our Future* (November 1997) predicts that by the year 2015, most available land within Mecklenburg County will likely be annexed by the City of Charlotte and other municipalities. The western portion of the County is currently experiencing land use changes in the vicinity of the Charlotte-Douglas International Airport as the airport continues with its expansion. The completion of the I-485 Outer Loop in western Mecklenburg County has also precipitated growth in the ICE Study Area, particularly waterfront properties near the Catawba River and its tributaries.

Cleveland County. 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, as well as attracting business entities that would support economic development.

York County, SC. York County has experienced continued growth and economic vitality, particularly along the I-77 commuting corridor. Over the past decade, York County has experienced unprecedented suburban sprawl characterized mainly 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* (April 2004), 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.

7.4 INVENTORY OF NOTABLE FEATURES (STEP 3)

A variety of third-party data resources was used to gather information on notable features considered in the qualitative assessment of ICEs. 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 (*ICI Guidance Volume II*, NCDOT, November 2001).

The types of data used to help define notable features included information on data elements such as land cover and land use, designated growth areas, wildlife corridors, wetlands, floodplains, watersheds and water resources, impaired waterways, water quality, Natural Heritage Program elements, threatened and endangered species occurrences, open spaces, parks/recreational areas/tourist attractions, infrastructure (including roads, airports, railroads, and utilities), community facilities (including schools, churches, hospitals, etc.), locations of minority and low-income populations, farmland, historic resources, and areas designated as nonattainment or maintenance for the National Ambient Air Quality Standards (NAAQS).

The *Indirect and Cumulative Effects Assessment* considered and assessed a wide range of notable features, including growth and land use, wildlife habitat, water resources, protected species, farmland, noise, air quality, and cultural resources. As part of that analysis, the *Indirect and Cumulative Effects Assessment* included a detailed table that summarized the potential indirect and cumulative effects of each DSA, based on sixteen separate factors. A copy of this table from the ICE assessment is included in **Appendix P**. In that table, the potential indirect and cumulative effects of each DSA were rated from "very weak" (or none) to "very strong" with regard to each of the sixteen factors. These ratings are measures of the DSAs' potential to have or influence an effect, not a measure of the severity of the effect or the sensitivity of the resource. Therefore, a "strong" rating does not necessarily imply that there would be a large or severe impact on the resource. The table in **Appendix P** was used to help draw conclusions regarding the potential indirect and cumulative effects on a wide range of notable features.

Based on the information in **Appendix P**, interviews with representatives from local governments and agencies, and input received from resource and regulatory agencies in the scoping process (described in **Section 7.1.2**), FHWA and NCTA decided to highlight three notable features in this chapter of the Draft EIS: (1) growth and land use, (2) habitat fragmentation, and (3) water quality and aquatic habitat. These features each encompass several of the factors covered in the table in **Appendix P**. Brief summaries of these features are provided in **Section 7.4.1** (Growth and Land Use), **Section 7.4.2** (Wildlife Habitat), and **Section 7.4.3** (Water Resources). Details on all the evaluated notable features and the assessments of indirect and cumulative effects to these features are included in the *Indirect and Cumulative Effects Assessment for the Gaston East-West Connector* (Louis Berger Group, Inc., March 2009).

The direct and indirect impacts of the DSAs on notable features included in the *Indirect and Cumulative Effects Assessment for the Gaston East-West Connector* are addressed in **Chapters 3-6** of this Draft EIS (air quality, cultural resources, noise, farmland, known populations of protected species, water quality, etc.). **Table S-2** in the **Summary** section of this Draft EIS is a summary of the environmental impacts.

7.4.1 GROWTH AND LAND USE

Demographics of the ICE Study Area. Table 7-1 provides information on the historical and projected populations and employment figures of the counties included in the ICE Study Area. Details on the demographics of Gaston and Mecklenburg counties also are provided in Section 3.2.1.

TABLE 7-1: Population of Counties 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	229,967	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%	131,4978	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: 2000 data -2000 US Census; 2007 data – ESRI Business Center (data service license maintained by The Louis Berger Group, Inc.); Employment Projection: Metrolina Regional Travel Demand Model Traffic Analysis Zones, 2006 ; North Carolina State Office of Budget and Management, Projected Annual County Population Totals 2020-2029, Web site:www.osbm.state.nc.us/ncosbm/facts_and_figures/socioeconomic_data/population_estimates/demog/cpa2020p.html; South Carolina Office of Research and Statistics, South Carolina State and County Population Projections 2020-2025, Web site:www.sccommunityprofiles.org/census/proj2025.php

Within the ICE Study Area, the largest percentage increases in population in recent years (between 2000 and 2007) 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 Gaston and York counties is believed to be related to the proximity of these counties to Charlotte.

Gaston County. Land use mapping of Gaston County reveals a pattern of development along major roadway corridors with infill development between the roads. Residential growth continues to occur in southern Gaston County. In particular, the southeastern portion of the County is projected to see a higher percentage of Gaston County's growth over the next 10-20 years. Large subdivisions with one acre or larger lots are being developed, and most of these developments do not have public water and sewer services.

Several municipalities in Gaston County, including Belmont, Cramerton, Gastonia, and Mount Holly have excess wastewater treatment capacity. However, many areas in the County that are not incorporated do not have access to municipal wastewater services (*Cleveland-Gaston Comprehensive Economic Development Strategy*, Lawrimore Communications, Inc. and the Corporation for Enterprise Development, July 2003, pg. 19). As shown in **Figure 4-4**, sewer and/or water service is planned to be extended into the area around Linwood Road in southwestern Gaston County, south of the Gastonia Municipal Airport in south-central Gaston County, and the Belmont peninsula in southeastern Gaston County.

The City of Gastonia. Future growth in Gastonia is anticipated to be a mix of residential, commercial, and industrial 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. 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.

The City of Belmont. Belmont is located in the eastern portion of Gaston County. 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. Future growth is anticipated in Belmont with the proposed Gaston East-West Connector (*Gaston County Hazard Mitigation Plan, Appendix E – Government Profiles*, Gaston County, December 2004).

The City of Bessemer City. Bessemer City is located in west central Gaston County, primarily north of I-85. 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 (*Gaston County Hazard Mitigation Plan, Appendix E – Government Profiles*, Gaston County, December 2004).

Mecklenburg County. 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. Recently, however, the Southwestern District of the County has been experiencing rapid growth. According to Mecklenburg County's *2015 Plan, Planning for Our Future* (November 1997), 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.

York County, SC. Approximately 80 percent of York County's unincorporated land remains as agricultural land, or developed land at very low intensities as agricultural residential use (*York County 2025 Comprehensive Plan*, York County, April 2004). Residential growth is disproportionately outpacing commercial and industrial growth despite efforts to diversify the employment base (*York County Industry Cluster & Target Market Study*, Whittaker Associates, Inc., February 2006).

Also evident in the County's land use patterns 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. According to the *York County 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.

In northern York County, the *2025 Comprehensive Plan's* 2025 Land Use Map shows most of the area bordering the North Carolina/South Carolina state line retained as agricultural and rural residential. Denser land uses are shown around existing municipalities.

Currently, water and sewer service in York County is provided by municipalities and private water service providers (York County Web site: www.yorkcountygov.com/Departments/DepartmentsNZ/PublicWorks/Divisions/WaterandSewer/tabid/159/Default.aspx) in and around municipalities and developments, including the Town of Clover. Future expansions would occur outward from these systems.

7.4.2 WILDLIFE HABITAT

Over the large four-county ICE Study Area, upland wildlife habitat was identified as forest cover and grassland/shrub areas. Data on these land cover types was obtained from the National Land Cover Database 2001 (US Geological Survey Web site:

<http://landcover.usgs.gov/natl/landcover.php>). The forested layer from this database was updated using aerial photographs from 2005 for Gaston and Mecklenburg counties and 2006 for York and Cleveland counties. The updates took into account new development that had occurred between the original National Land Cover Database satellite images to the date of the newer aerial photographs.

A map showing the forested and grassland/shrub areas is included as Figure 12.16 in the *Indirect and Cumulative Effects Assessment for the Gaston East-West Connector* (Louis Berger Group, Inc., March 2009). Approximately 40 percent of the land area in Gaston County and the southwestern portion of Mecklenburg County remain undisturbed as forest or grassland/shrub.

Habitat fragmentation occurs when intact forest landscapes are divided into smaller pieces. Upland wildlife habitat in the Project Study Area has been fragmented by development, easements, and roadways. Existing fragmentation in the Project Study Area occurs within the developed, municipal areas of Gaston County.

7.4.3 WATER RESOURCES

The ICE Study Area is within the Catawba River Basin. The Catawba River is composed mainly of a series of impoundments (the Catawba chain lakes), which are managed by Duke Energy Corporation for the purposes of hydropower generation. Lake Wylie and Mountain Island Lake also are designated water supplies.

Lake Wylie's water quality is being threatened due to numerous sources of non-point pollution that have contributed to water quality degradation in the main stem of the river and its tributaries. The primary sources of pollution are urban runoff and wastewater treatment plant discharges (*Protecting Our Lake Watersheds*, Mecklenburg County Land Use and Environmental Services Agency, January 2004).

Section 303(d) of the Clean Water Act requires states to develop a list of waters not meeting water quality standards or which have impaired uses. There are six streams in the ICE Study Area in North Carolina and two in South Carolina listed as having impaired biological integrity on the states' 303(d) lists. In North Carolina, these streams are Abernethy Creek, McGill Branch, Crowders Creek, Sugar Creek, Dallas Branch and Catawba Creek (Final 2006 303(d) list, NCDWQ Web site: http://h2o.enr.state.nc.us/tmdl/documents/303d_Report.pdf). In the ICE Study Area, the Draft 2008 303(d) List for North Carolina also includes the Catawba River and South Fork Catawba River (NCDWQ website:

<http://h2o.enr.state.nc.us/tmdl/documents/B.Draft2008303dList.pdf>). In South Carolina, the listed streams include Crowders Creek and Lake Wylie (South Carolina 2008 303(d) List, SC Department of Health and Environmental Control Web site:

http://www.scdhec.net/environment/water/tmdl/docs/tmdl_08-303d.xls).

The Catawba River is considered to be a nutrient sensitive management river basin, and riparian buffer rules apply (Section 6.4.2 and Section 6.4.4.2). New development must either treat the

runoff from new impervious areas to remove nitrogen to specified levels, or design stormwater discharge outside of a 50-foot riparian buffer so the stormwater flow will not re-concentrate pollutants before entering the stream.

The NPDES program, administered by the US Environmental Protection Agency (USEPA), was created to control the discharge of pollutants into Waters of the United States (USEPA NPDES Program Web site: www.epa.gov/npdes). Under Phase I, NPDES permits cover storm sewer systems located in incorporated places or counties with populations of 100,000 or more. Phase II NPDES permits cover certain small municipal storm sewer systems in urbanized areas and on a case-by-case basis outside of urbanized areas (USEPA Web site: <http://cfpub.epa.gov/npdes/stormwater/swphases.cfm>).

The State of North Carolina is authorized to administer the program for the USEPA. Gaston County is a Phase II stormwater community under the NPDES program. This means that all water from proposed developments must be collected by drains or pipes and discharged into vegetated areas and/or silt basin where pollutants are filtered out naturally before entering streams. Gaston County's Stormwater Ordinance (adopted April 12, 2007) establishes minimum requirements and procedures to control the adverse effects of stormwater runoff associated with new development.

Because it has more than 100,000 residents, the City of Charlotte obtained a Phase I NPDES permit in 1993 to manage stormwater in the City. Mecklenburg County and its other municipalities were granted a NPDES Phase I permit in 2005 to manage stormwater outside of the Charlotte City limits. In addition, the Mecklenburg County Surface Water Improvement and Management Ordinance establishes buffer requirements along streams.

York County is a federally-designated NPDES Phase II community and received its Individual Stormwater Permit August 1, 2008 from the South Carolina Department of Health and Environmental Control (Certificate #SCR039104) (York County Web site: www.yorkcountygov.com).

7.5 IDENTIFY IMPACT-CAUSING ACTIVITIES AND IDENTIFY POTENTIAL INDIRECT AND CUMULATIVE IMPACTS FOR ANALYSIS (STEPS 4 AND 5)

The indirect and cumulative impacts discussion below is divided by county: Gaston County (**Section 7.5.1**), Mecklenburg County (**Section 7.5.2**), Cleveland County (**Section 7.5.3**), then York County, SC (**Section 7.5.4**). **Section 7.5.5** is an overall summary of indirect and cumulative effects. Each section provides findings on a county level, District Area level, and where applicable, on Interchange Area levels, and by DSA. Differences between the DSAs are noted where applicable, and the Draft EIS section where the corresponding direct impacts are addressed also is referenced.

The notable features described in **Section 7.4** are the focus of this summary. Additional details on the indirect and cumulative impacts on these and other notable features are addressed in the *Indirect and Cumulative Effects Assessment for the Gaston East-West Connector* (Louis Berger Group, Inc., March 2009).

The notable features are discussed at the applicable geographic study area level (or levels). The potential for accelerated growth or changes in land use is addressed at the ICE Study Area level, District level, and Interchange level. Habitat fragmentation is addressed at the ICE Study Area level and the District level (where differences in DSAs are noted). Water resources are addressed at the ICE Study Area level, and by specific major water resource (e.g., Lake Wylie, Crowders Creek, etc.) since these water resources may cross County and District lines.

Projects and activities that were considered in the cumulative effects discussed below include:

- Charlotte-Douglas International Airport third runway project (Mecklenburg County).
- Major transportation projects planned and programmed in the NCDOT *2009-2015 STIP* and/or included in the GUAMPO *2030 LRTP* and the MUMPO *2030 LRTP*.
- Residential, commercial, and light industrial developments in Gaston County, Mecklenburg County, and York County, South Carolina. These include recently constructed or approved residential developments near the waterfront and coves of the Catawba River and South Fork Catawba River, and light industrial development planned near Bessemer City.
- Water and sewer infrastructure expansion plans in Gaston County, Mecklenburg County, and York County, South Carolina.

In analyzing the potential for indirect and cumulative land use effects, a number of information sources were considered, including local expert interviews, local land use policies, the inventory of notable features, and spatial grid analysis and mapping. The spatial grid analysis, created using GIS, aided in addressing two key elements of indirect and cumulative effects: sensitivity of the human and natural environment to change and cumulative potential for future growth. A brief summary of the components of the spatial grid mapping is provided below. A detailed technical discussion of the spatial grid analysis methodology and data is included in the *Indirect and Cumulative Effects Assessment for the Gaston East-West Connector* (Louis Berger Group, Inc., March 2009).

The spatial grid mapping divided the study area into a grid (each square one mile per side), and the grid cells were used to summarize various data layers to capture sensitivity and cumulative growth potential. Data layers for human and natural environment sensitivity represented aspects of the community to which negative impacts should be minimized (for example: schools, churches, historic sites, low-income areas, minority population areas, floodplains, wetlands, etc). In total, there were 17 data layers combined to develop this aspect of the spatial grid. Data layers for cumulative, general growth potential (not specifically related to the proposed project) included availability of public water and sewer, the amount of developable land, projected population growth, presence of major roadways, and the age of nearby development. Other layers representing the potential for growth specifically or indirectly related to the proposed project included results from interviews and modeled reductions in future travel times. Overall, growth potential in areas farther from the proposed project was more influenced by the data related to general growth potential.

7.5.1 POTENTIAL INDIRECT AND CUMULATIVE EFFECTS IN GASTON COUNTY

Indirect Effects. All DSAs would provide equal access across the Catawba River in the southeast portion of Gaston County, potentially facilitating faster growth and different kinds of development in the southeast and southern portions of Gaston County than under the No-Build Alternative. The project also would provide better access to the west and northwest portions of Gaston County, potentially changing the existing primarily residential and commercial growth pattern to more light industrial growth. The No-Build Alternative would not offer any accessibility benefits for Gaston County.

Figure 7-2 shows the average travel time savings in 2030 that may result from the proposed project compared to the No-Build Alternative. These values were generated from the Metrolina Regional Travel Demand Model as average changes in travel times within each modeled traffic analysis zone (TAZ). To calculate the average travel time savings for a TAZ, the travel times for all trips originating in a TAZ were calculated by the model under two scenarios: with the project (the Build scenario) and without the project (the No Build scenario). The average travel time difference for each trip was then calculated, and the differences between the Build and No-Build travel times were then averaged across all trips. The result was a calculation of the average travel time savings for all trips in each TAZ. All trips in each TAZ were included when determining this average, regardless of whether the trip included travel on the Gaston East-West Connector. For example, the availability of the Gaston East-West Connector could increase or decrease travel times for trips on existing roads: differences in travel times for those trips were included when computing the average travel time savings depicted in **Figure 7-2**.

The calculations of average travel time savings provide a basis for assessing the overall effects of the project on travel times in each TAZ within the ICE Study Area. The travel time savings experienced by individual drivers for specific trips could be greater or less than the average travel time savings shown in **Figure 7-2**. The average travel time savings were used in this analysis because they help to show the locations in the ICE Study Area that would experience increased mobility. They do not represent travel time savings for specific origins and destinations. Estimated travel time savings for specific origin/destination pairs with and without the Gaston East-West Connector are discussed in **Appendix C, Section C.2**.

As shown in **Figure 7-2**, average travel time savings would be greatest for areas immediately surrounding the project in Gaston and Mecklenburg counties, then areas extending south into York County. Please note that travel time effects are likely overstated in York County somewhat since this area is located at the limits of the Regional Travel Demand modeled area.

The Gaston East-West Connector is consistent with the stated need in the GUAMPO 2030 LRTP to provide substantial infrastructure in Gaston County to accommodate existing and future growth. The proposed Gaston East-West Connector is included in Gaston County's *Comprehensive Plan* (July 2002) and is consistent with land use strategies to manage existing and anticipated new growth in the county. However, as the county population continues to grow, there will be more of a burden placed on local school systems and emergency management services.

Habitat fragmentation within the ICE Study Area is anticipated to continue correspondingly with land use change. Each DSA has the potential to indirectly affect terrestrial communities through fragmentation. The degree of effect would vary depending upon the various species-specific factors, including their modes of mobility and range of habitat. Fragmentation is

anticipated to be the product of road construction and associated land use change. The degree of effect associated with fragmentation is based upon the amount of habitat edge 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, it can be detrimental to other species and may lead to the loss of foraging and breeding habitats. Effects are anticipated to be both long term and short term. The proposed project and indirect development are anticipated to affect terrestrial communities to a greater degree than what would be expected to occur with the No-Build Alternative. Direct impacts to natural communities and wildlife are discussed in **Section 6.3**.

DSAs using Corridor Segments H1C, J1c, K1A, and K4A (DSAs 5, 23, 27, 58, 64, 68, 77, and 81) have a greater potential to indirectly affect upland species due to habitat fragmentation in that these corridor segments are located the farthest distance away from previously fragmented forestland. DSAs 4, 9, 22, and 76, would have comparable levels of lesser indirect effects due to existing habitat fragmentation.

Indirect effects to water resources and water quality in Gaston County may occur from any of the DSAs, since all cross numerous streams. These indirect impacts, and mitigation measures, are discussed in **Sections 6.2.3 and 6.2.4**. Direct impacts to wetlands, streams, and Catawba River buffers are discussed in **Section 6.4.4**.

The potential indirect land use effects in each District in Gaston County (Districts 2, 3, 4, 7, and 8) (**Figure 7-1a-b**), with and without the proposed project, are discussed below. Direct impacts to land uses are discussed in **Sections 3.1.4, 3.2.3, 3.2.4, and 3.2.6**.

District 2 (north of I-85, including Bessemer City) is an area characterized by high residential and commercial development. 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 Bessemer 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, including Lowell, McAdenville, Ranlo, and Spencer Mountain) has high residential potential, especially in the vicinity of Spencer Mountain. The proposed Gaston East-West Connector may influence more development in this District to locate in the areas immediately surrounding I-85 and US 29-74. 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 constrained 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 constrained 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 the proximity of Crowders Mountain State Park and the desire of community leaders to keep this area more pristine. Other natural resources in this area include Crowders Creek, a Section 303(d)-listed stream, and wetlands which could restrict future development. This area is anticipated to continue to grow without the construction of the proposed project, but not as rapidly.

The potential indirect effects in each Interchange Area (**Figure 7-1a-b**) along the DSAs, with and without the proposed project, are discussed below. Local agencies and local experts interviewed for this study did not provide much distinction between interchanges for each DSA in most cases, which allowed for the grouping of interchanges when assessing potential effects. The potential indirect effects associated with the proposed interchanges follows, from west to east.

- **Interchange Area A (I-85 interchange).** This area has some existing commercial land use and areas that are being redeveloped. If the proposed project is constructed, this interchange area is anticipated to develop more commercially than it is currently.
- **Interchange Area B (US 29-74 interchange).** This interchange has experienced some recent residential development. The Gaston East-West Connector could change land use in the future from predominantly 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. **Section 6.4.4** provides a summary of the estimated direct impacts to wetlands and streams surrounding the proposed US 29-74 interchange.
- **Interchange Area C (Linwood Road interchange).** This interchange has some residential development and adequate utility infrastructure. 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. 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 Area D (Lewis Road interchange – DSAs 58, 64, and 68 only).** This interchange has high-end residential development. 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, and it would improve access to Crowders Mountain State Park.

- **Interchange Area E (US 321 interchange).** The land use in this interchange area consists of some single family residential developments, numerous mobile home parks, and industrial development, with much of the existing development adjacent to US 321. Areas in the vicinity of the proposed Gaston East-West Connector/US 321 interchange south of Gastonia are suitable for infill development and redevelopment that enhances existing industrial uses. New development that includes a variety of office, distribution, and light industrial space could strengthen this area as an employment center. 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 in which development occurs due to improved access.
- **Interchange Area F (Robinson Road interchange).** This interchange is located amongst developable land parcels. The potential for residential development is moderate due to sewer pumping issues, which may limit residential and commercial development. Construction of the proposed Gaston East-West Connector may accelerate the rate in which residential development occurs due to improved access.
- **Interchange Area G (Bud Wilson Road interchange).** This interchange area is sparsely developed for residential use. Development in the future, with or without the Gaston East-West Connector, is limited due to difficulty in getting public water and sewer services provided in the area.
- **Interchange Area H (NC 274 [Union Road] interchange).** This interchange is experiencing rapid growth with mixed use, including residential and commercial land uses. Gaston County recently approved a large site plan (residential) in the proposed DSAs. The development trend is anticipated to continue in the future with or without the proposed project.
- **Interchange Area I (NC 279 [New Hope Road] interchange).** This interchange is experiencing a notable amount of new residential development, especially adjacent to NC 279. A small portion of this development is believed to be in anticipation of the proposed East-West Connector. According to the interviewees, the recent residential development trends in this area have been partly spurred by other transportation improvements, such as the recent completion of I-485 in western Mecklenburg County. 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 would improve access to Daniel Stowe Botanical Garden. Construction of an interchange in this area also has the potential to affect water resources, including wetland areas and Catawba Creek, a Section 303(d)-listed stream.
- **Interchange Area J (NC 273 [Southpoint Road] interchange).** This area is experiencing rapid residential development adjacent to NC 273. With or without the Gaston East-West Connector, future development is anticipated to be mixed-use.

Cumulative Effects. The northwest, south, and southeast portions of Gaston County have historically grown in a low-density development pattern branching out from the City of Gastonia. Recent growth along NC 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 Gaston County. If constructed, the Gaston East-West Connector would substantially reduce travel times from those potentially developable parcels of land to the Charlotte region, and hence is anticipated to attract more residential development to Gaston 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 sites for at least one new school in the southern portion of the county (**Section 3.2.2.3**).

Actions including residential and infrastructure improvements in Gaston County have the potential to cumulatively impact water quality through erosion and stream sedimentation. 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. Direct impacts to water resources are discussed in **Sections 6.2** and **6.4**.

Water resources having the potential to be cumulatively affected by non-point source pollution include the Catawba River, South Fork Catawba River, Abernethy Creek, Catawba Creek, Crowders Creek, and Blackwood Creek. However, these effects can be minimized through implementation of local stormwater ordinances and Best Management Practices (BMP).

DSAs 58, 64, 68, 76, 77, and 81 would have comparable levels of indirect and cumulative effects to water quality and aquatic habitat as a result of induced development. DSAs that use Corridor Segments H2A, H3, and H2B (DSAs 4, 5, 9, 22, 23, and 27) would be expected to have the greatest amount of stormwater runoff effects due to their proximity to Crowders Creek.

Construction of the proposed project also has the potential to add to cumulative forest fragmentation and wildlife habitat loss and disturbance in the southern and western portions of Gaston County. Other actions contributing to cumulative habitat loss and fragmentation include development, timber harvesting, and agricultural conversion.

Future growth in the ICE Study Area has the potential to convert farmlands to non-agricultural uses. These effects are projected to occur with or without the DSAs, but at a higher rate with the DSAs. Direct impacts to farmland are discussed in **Section 4.3.4**.

7.5.2 POTENTIAL INDIRECT AND CUMULATIVE EFFECTS IN 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 Charlotte-Douglas International Airport. Growth induced 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 Mecklenburg County's *2015 Plan, Planning for Our Future* (November 1997) and *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.

Districts 5 and 6 are both in Mecklenburg County. District 5 is north of I-85 and US 29-74 and District 6 is south of I-85 and US 29-74. District 5 was cited as an area of current 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. 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 Area K includes the Dixie River Road interchange and I-485 interchange. The interviewees did not provide much distinction between the interchange options for each DSA; however, the additional access clearly would serve non-residential development beginning to occur in the area, 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 growth to the formerly slow-growing west side. An important generator of cumulative effects is the Charlotte-Douglas International Airport, which is currently expanding roadway access points; adding a third runway on the west side of the facility; and 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, although there are stormwater management programs in place to help minimize these effects. Construction of the proposed project also has the potential to add to forest fragmentation and wildlife habitat disturbance in the southwest section of Mecklenburg County.

7.5.3 POTENTIAL INDIRECT AND CUMULATIVE EFFECTS IN CLEVELAND COUNTY

Indirect Effects. Rates of development in Cleveland County are not anticipated to change as a result of 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 DSAs and the No-Build Alternative. No notable indirect effects are expected in Cleveland County as a result of the proposed project.

District 1 is in Cleveland County. The DSAs' proposed interchanges are too distant to have much influence on land use in District 1, yet they may offer somewhat more in regards to accessibility

than the No-Build Alternative. The level of traffic modeling conducted under the scope of the qualitative ICE assessment did not indicate any conspicuous differences between the proposed DSAs, yet it is reasonable to assume, due to proximity, that DSAs 58, 64, 68, 76, 77, and 81 may have the potential to influence perceived accessibility, followed by DSAs 4, 5, 9, 22, 23, and 27. These small improvements in accessibility are not expected to induce growth or land use changes in Cleveland County.

Cumulative Effects. The proposed project, under any of the DSAs, is not anticipated to contribute to cumulative effects in Cleveland County. Interviewees did not expect the project to induce growth, there are low growth rates in Cleveland County, and there is low potential for new growth associated with the proposed project.

7.5.4 POTENTIAL INDIRECT AND CUMULATIVE EFFECTS IN YORK COUNTY, SOUTH CAROLINA

Indirect Effects. The potential for the project to influence the rate of land development in **Districts 9 and 10** in York County were estimated to be low/moderate primarily due to the moderate potential for travel time savings. On a more local level, the DSAs' proposed interchanges are too distant to have influence in York County. The project has potential to influence regional travel times in some areas with time savings in excess of ten minutes. The No-Build Alternative would not offer any travel time savings nor improve accessibility for those traveling from or to portions of York County included in the ICE Study Area.

However, those interviewed in York County generally stated the project was not expected substantially alter the pace or character of development, even though regional travel times may improve. York County staff noted that other roadway projects, such as improvements to US 321 and SC 49 in South Carolina, were more responsible for influencing and contributing to secondary development in the area. A surplus of water and sewer capacity has focused the location of growth into the few areas where public utilities are available (e.g., Clover, SC). Other attractors of growth noted included York County's low tax rate and quality of life aspects.

Indirect impacts to water quality may occur in York County. The proposed DSAs cross streams that flow into South Carolina. The proximity of Corridor Segments H3 and H2B-H2C to Crowders Creek (DSAs 4, 5, 9, 22, 23, and 27) may result in greater indirect effects to water quality in York County than DSAs using Corridor Segments H1A-H1B-H1C (DSAs 58, 64, 68, 76, 77 and 81) from stormwater runoff. Likewise, DSAs that use Corridor Segment K4A across the Catawba River (DSAs 5, 23, 64, and 77) are closer to York County than the other DSAs. The proposed project will include stormwater management and control features, and during construction, BMPs will be implemented to control erosion and sedimentation. As discussed in **Section 7.4.3**, York County, Gaston County, and Mecklenburg County have stormwater programs in place to manage sediment and flooding from development.

Cumulative Effects. Large areas of undeveloped land in York County could receive large quantities of new residential development, but the potential for the DSAs to contribute to a cumulative effect on new development is curtailed based upon the distance from the Gaston East-West Connector. The Gaston East-West Connector has a low to moderate potential (due to increase accessibility and travel time savings) to influence growth in York County, SC. York County's average travel time savings is occasionally greater than 10 minutes with the proposed project in place. However, other data gathered from local sources did not indicate a significant

anticipated influence from the Gaston East-West Connector on growth and land use changes. The potential for cumulative effects in York County, SC are primarily due to planned provisions for water and sewer service and residential development anticipated with or without the project.

Cumulative effects to water quality in York County are anticipated to be greater with the construction of any one of the proposed DSAs than with the No-Build Alternative. However, Gaston County, Mecklenburg County, and York County have stormwater management programs that would help minimize impacts. 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 (minimized through implementation 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 Section 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 Crowders Creek and Lake Wylie, which are Section 303(d)-listed streams in South Carolina. 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.

Regarding the differentiation of impacts from individual DSAs, DSAs 58, 64, 68, 76, 77, and 81 would have comparable levels of indirect effects and cumulative effects to water quality and aquatic habitat in York County 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 DSAs 4, 5, 9, 22, 23, and 27. DSAs 4, 5, 9, 22, 23, and 27 are closer to Crowders Creek upstream of York County, and would be expected to have a greater amount of stormwater runoff effects. However, these can be minimized through implementation of local stormwater ordinances and BMPs.

7.5.5 SUMMARY OF FINDINGS

Table 7-2 presents an overall summary of the potential for indirect and cumulative effects to occur in Gaston County, Mecklenburg County, Cleveland County, and York County, SC as a result of the Gaston East-West Connector. **Table S-2** in the **Summary** section of this Draft EIS compares the DSAs in relation to direct impacts, indirect, and cumulative effects.

In **Table 7-2**, the column describing the potential for the project to improve mobility, access, and connectivity relates to travel time savings that would occur as a result of any of the DSAs. The column describing the potential for indirect effects relates to the potential for the project to influence growth rates and types and to affect notable features in the portions of each County that are part of the ICE Study Area. The column describing the potential for cumulative effects relates to how much the project would contribute to the overall factors that would drive land use change. For example, in York County, SC, growth and land use would be more heavily influenced by availability of water and sewer service and by implementation of their land use plans, than it would be by the project. Therefore, the potential for the project to contribute to cumulative

effects related to land use change was rated low for the York County, SC portion of the ICE Study Area.

TABLE 7-2: Summary of Potential for Indirect and Cumulative Effects by County

Portion of County in ICE Study Area	Potential for Project to Improve Mobility, Access and Connectivity*	Potential for Accelerated Growth and Other Indirect Effects as a Result of the Project*	Potential for Project to Contribute to Cumulative Effects Related to Land Use Change*	DSAs which Contribute to Indirect and Cumulative Effects
Gaston	High	High	Moderate	All DSAs (4, 5, 9, 22, 23, 27, 58, 64, 68, 76, 77, 81)
Mecklenburg	High	Moderate	Moderate	All DSAs (4, 5, 9, 22, 23, 27, 58, 64, 68, 76, 77, 81)
Cleveland	Low	Low	Low	None
York, SC	Low/Moderate	Moderate	Low	All DSAs (4, 5, 9, 22, 23, 27, 58, 64, 68, 76, 77, 81)

Source: *Indirect and Cumulative Effects Assessment for the Gaston East-West Connector*, Louis Berger Group, Inc., March 2009

* Low – there would be some change from current or expected future No-Build condition, but the change would be minor and likely not noticeable.

Moderate – there would be a noticeable change from current or expected future No-Build conditions.

High – there would be a substantial change from current or expected future No-Build conditions.

There are some minor differences between the DSAs, but overall there are no significant differences between the DSAs in terms of their general potential for indirect and cumulative effects to all the notable features assessed at the ICE Study Area level, District level, and Interchange level (Gaston and Mecklenburg Counties only).

The following sections summarize the indirect and cumulative effects on the three notable features that have been highlights in this chapter; growth and land use, habitat fragmentation, and water quality and aquatic habitat. Discussions of the indirect and cumulative effects to all notable features assessed are included in the *Indirect and Cumulative Effects Assessment for the Gaston East-West Connector* (Louis Berger Group, Inc., March 2009).

Indirect and Cumulative Effects on Growth and Land Use (ICE Study Area). As shown in **Table 7-2**, the Gaston East-West Connector has a low potential to cause indirect or cumulative effects in Cleveland County. As shown in **Figure 7-2**, average travel time savings would be small for areas in Cleveland County. There would be no distinguishable differences in development rates in Cleveland County anticipated between the construction of any one of the proposed DSAs and the No-Build Alternative.

There is a low/moderate potential for the project to improve mobility and access in York County, SC. York County’s average travel time savings is occasionally greater than 10 minutes with the proposed project in place. However, other data gathered from local sources did not indicate a significant anticipated influence from the Gaston East-West Connector on growth and land use changes. Therefore, the potential for accelerated growth and indirect effects to notable features in York County as a result of the project are moderate. The potential for cumulative effects in York County, SC are primarily due to planned provisions for water and sewer service and residential development anticipated with or without the project.

Gaston County has a high potential to experience accelerated growth and indirect effects to notable features as a result of the project, and Mecklenburg County has a moderate potential. Both Gaston County and Mecklenburg County have a moderate potential to experience

cumulative effects related to land use changes as a result of the project. In addition, Gaston and Mecklenburg counties have a high potential to experience improved mobility, access and connectivity, which is the purpose and need of the project. Growth and land use changes, along with the proposed project, are anticipated in the *Gaston County Comprehensive Plan* (July 2002) and Mecklenburg County's *2015 Plan: Planning for Our Future* (November 1997) and *2008-2010 Strategic Business Plan*.

The additional new runway at Charlotte-Douglas International Airport will increase that facility's passenger and freight capacities, as well as increase rail shipping capacity at this location and in the eastern section of the ICE Study Area. Residential development in western Mecklenburg County and throughout southeastern and south-central Gaston County, with some mixed uses, will be the predominant form of future development. Interchanges with the Gaston East-West Connector are physically within both Gaston and Mecklenburg counties, and notable for development potential during the analysis were the interchanges at US 321 and NC 274 (both in Gaston County). The cumulative impact of these activities 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.

Additionally, cumulative effects from increased residential and 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. Unique descriptions of development activities within each of the small towns in Gaston County are provided in the *Indirect and Cumulative Effects Assessment for the Gaston East-West Connector* (Louis Berger Group, March 2009).

The indirect and cumulative effects associated with the DSAs may vary somewhat in regards to effects on habitat fragmentation and water quality and aquatic habitat. These potential effects are summarized below. A more detailed table listing specific indirect and cumulative effect factors at the DSA level, and the differences amongst the DSAs, is provided in **Appendix P**. The table in **Appendix P** is a summary of a variety of factors used to draw conclusions regarding notable features. For additional information regarding **Appendix P**, refer to **Section 7.4**.

Indirect and Cumulative Effects on Habitat Fragmentation (Gaston County and Mecklenburg County). All DSAs would have the potential to add to forest fragmentation and wildlife disturbance in the southwest section of Mecklenburg County. DSAs using Corridor Segments H1C, J1c, K1A, and K4A (DSAs 5, 23, 27, 58, 64, 68, 77, and 81) have a greater potential to indirectly affect upland species in Gaston County due to habitat fragmentation because these corridor segments are located the farthest distance away from previously fragmented forestland. DSAs 4, 9, 22, and 76, would have comparable levels of lesser indirect effects due to existing habitat fragmentation. Direct impacts to natural communities are discussed in **Section 6.3.6**.

Indirect and Cumulative Effects on Water Quality and Aquatic Habitat (ICE Study Area). Regarding the differentiation of impacts from individual Detailed Study Alternatives, DSAs 58, 64, 68, 76, 77, 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 DSAs 4, 5, 9, 22, 23, and 27. DSAs 4, 5, 9, 22, 23, and 27 are closer to Crowders Creek, and would be expected to have a greater amount of stormwater runoff

effects. However, these can be minimized through implementation of local stormwater ordinances and BMPs. Direct and indirect impacts to water quality and water resources would occur in Gaston and Mecklenburg counties and these are discussed in **Sections 6.2.2** and **6.2.3**.