COMPLETE 540

Triangle Expressway
Southeast Extension

Final

Environmental Impact Statement

Complete 540 - Triangle Expressway Southeast Extension

December 2017

U.S. Department of Transportation
Federal Highway Administration

NORTH CAROLINA
Turnpike Authority

FHWA-EIS-15-02-F
Federal Highway Administration
North Carolina Division

Complete 540 Triangle Expressway Southeast Extension
Wake and Johnston Counties, North Carolina

STIP Project Nos. R-2721, R-2828, and R-2829
State Project Nos. 6.401078, 6.401079, and 6.401080
Federal Aid Project Nos. STP-0540(19), STP-0540(20), and STP-0540(21)
WBS Nos. 37673.1.TA2, 35516.1.TA2, and 35517.1.TA1

FINAL ENVIRONMENTAL IMPACT STATEMENT

Submitted Pursuant to the National Environmental Policy Act, 42 USC 4332 (2)(c) and 49 USC 303
by the US Department of Transportation, Federal Highway Administration,
and the North Carolina Department of Transportation

Cooperating Agency: US Army Corps of Engineers

12/20/17
Date of Approval

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Date of Approval

for Edward T. Parker
Assistant Division Administrator,
Federal Highway Administration

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Document prepared by H.W. Lochner, Inc.

12-20-17
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PROJECT COMMITMENTS

Complete 540 Triangle Expressway Southeast Extension
Wake and Johnston Counties, North Carolina

STIP Project Nos. R-2721, R-2828, and R-2829
State Project Nos. 6.401078, 6.401079, and 6.401080
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This "Green Sheet" identifies the project commitments made to avoid, minimize, or mitigate project impacts beyond those required to comply with applicable federal and state requirements and regulations.

During the National Environmental Policy Act (NEPA) process, commitments are made to avoid, minimize, or mitigate project impacts. Commitments result from public comment or through the requirements of, or agreements with, environmental resource and regulatory agencies.

In addition to compliance with applicable federal and state requirements and regulations, such as Section 404 Individual Permit Conditions, Nationwide Permit Conditions, Regional Conditions, and State Consistency Conditions; North Carolina Department of Transportation (NCDOT) Guidelines for Best Management Practices for the Protection of Surface Waters; General Certification Conditions and Section 401 Conditions of Certification, and the Endangered Species Act, the following table lists special project commitments that have been agreed to by the NCDOT.

Item	Resource	Final EIS Page	Project Commitment	Project Stage	Applicable TIP Project
1	Historic Architectural Resources	Page 49	NCDOT will coordinate with the NC State Historic Preservation Office and the property owner(s) relative to potential retaining wall design to eliminate the need for permanent easement or right-of-way from the Panther Branch School.	Final Design	R-2828
2	Archaeological Resources	Page 49	NCDOT will conduct an archaeological survey of the Preferred Alternative and will coordinate the results with the NC State Historic Preservation Office and the NC Office of State Archaeology.	Completed	R-2721, R-2828, and R-2829

PROJECT COMMITMENTS (continued)

3	Archaeological Resources	Page 49	NCDOT will establish a Memorandum of Agreement with the NC State Historic Preservation Office in order to take into account the project's effect on archaeological resources.	Final Design and Construction	R-2828
4	Archaeological Resources	Page 49	NCDOT will coordinate with the NC Office of State Archaeology relative to data recovery of materials in the one site determined eligible for the *National Register of Historic Places* based on the information contained at the site.	Final Design and Construction	R-2828
5	Community Resources & Section 4(f)	Page 50	NCDOT will coordinate with the Town of Cary relative to a potential Section 4(f) *de minimis* use finding for the Middle Creek School Park.	Completed	R-2721
6	Community Resources & Section 4(f)	Page 50	NCDOT will coordinate with the City of Raleigh relative to a potential Section 4(f) *de minimis* use finding for the Neuse River Trail.	Completed	R-2829
7	Recreation Facility	Page 50	During construction, NCDOT will accommodate trail users along the Neuse River Trail through the project construction zone.	Final Design and Construction	R-2829
8	Noise	Pages 51-52	NCDOT will prepare a Design Noise Report for the selected alternative during final design. All feasible and reasonable noise abatement measures will be constructed.	Final Design	R-2721, R-2828, and R-2829
9	Stormwater Management	Pages 53-54, 61	NCDOT will utilize Design Standards in Sensitive Watersheds in the Swift Creek and the Lower Middle Creek watersheds.	Final Design and Construction	R-2721, R-2828, and R-2829
10	Migratory Birds	Page 56	NCDOT will comply with requirements set forth in the Migratory Bird Treaty Act of 1918.	Final Design and Construction	R-2721, R-2828, and R-2829

PROJECT COMMITMENTS (continued)

11	Major Drainage Structures	Pages 61	NCDOT will perform a more detailed hydrologic and hydraulic analysis for each major drainage crossing for the Preferred Alternative.	Final Design	R-2721, R-2828, and R-2829
12	Utilities	Pages 61	NCDOT will coordinate with the appropriate utility owners during design of the Preferred Alternative for all utility conflicts, including means to avoid or minimize impacts to utilities.	Final Design	R-2721, R-2828, and R-2829
13	Indirect Effects & Cumulative Impacts	Pages 62-63	NCDOT will prepare a quantitative assessment for indirect and cumulative effects and impacts for the Preferred Alternative.	Completed	R-2721, R-2828, and R-2829
14	Protected Species	Document incorporated by reference	NCDOT will carry out all activities for which it has been assigned responsibility in the Biological Assessment of Potential Impacts to Federally Listed Species (Dec 2017).	Final Design and Construction	R-2721, R-2828, and R-2829
15	Protected Species	Document incorporated by reference	Prior to contracting for design and construction of the portion of the project that crosses the Neuse River, NCDOT will consult with National Marine Fisheries Service to satisfy the requirements associated with the critical habitat designation for the Atlantic Sturgeon, as specified in the Biological Assessment for Atlantic Sturgeon Critical Habitat (Dec 2017).	Final Design and Construction	R-2829

SUMMARY INFORMATION

The NCDOT and the Federal Highway Administration (FHWA) propose to build a new, limited-access highway from NC 55 Bypass in Apex, to US 64/US 264 (I-495) in Knightdale—a distance of approximately 27 miles. The proposed highway, known as Complete 540–Triangle Expressway Southeast Extension, is being proposed as a toll facility.

This proposed highway has been shown to be the most practical solution for meeting the purposes of the project, which are to improve mobility and reduce traffic congestion south and east of the Raleigh area during peak travel periods. A secondary purpose of the project is to improve system linkage in the regional roadway network by completing the 540 outer loop around the greater Raleigh area, which would benefit commuters living south and east of Raleigh, as well as motorists making longer trips through the Triangle Region.

This Final Environmental Impact Statement (EIS) includes all topics specified by the Council on Environmental Quality in Title 40 of the Code of Federal Regulations (sections 1502.10 to 1502.18). The emphasis is on the main findings of the study conducted for the proposed project, which include: purpose and need, alternatives, and characteristics of the affected environment, environmental consequences, and the selection of a Preferred Alternative. While thorough in its description of these items, this Final EIS is meant to be a summary of the work that has been done. More detailed technical reports are incorporated by reference throughout this document and are contained on a companion media disk enclosed on the back cover and online at www.ncdot.gov/projects/complete540. Those technical reports are considered to be part of this document and are the building blocks from which this document was constructed. This Final EIS also includes documentation of the proposed project's Final Section 4(f) effects.

The following individuals may be contacted for additional information concerning this Final EIS:

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Raleigh, North Carolina 27699-1578

Comments on the findings contained in this Final EIS are due on February 1, 2018. Written comments should be sent to Mr. Rodger D. Rochelle, P.E. at the above address or emailed to complete540@ncdot.gov. Other comments on the project will be solicited through public meetings and a hearing, the dates of which will be announced to the public via local newspapers, the project website, and other media outlets. Oral comments will be received at the public meetings and hearing.

EXECUTIVE SUMMARY

Final Environmental Impact Statement

This Final Environmental Impact Statement (EIS) is an important milestone in the project planning and development process for the Complete 540 project. Its objective is to provide the public and decision-makers with appropriate and relevant information about the project's Preferred Alternative (the "federal action"). NCDOT and the Federal Highway Administration (FHWA) have evaluated the Preferred Alternative for environmental effects (including the human and natural environments), engineering constraints, transportation benefits, and cost. This Final EIS describes the results of that evaluation.

This Final EIS is a continuation of the project development process that in November 2015 produced a Draft EIS, which was distributed for government agency and public review. The Draft EIS provides the basis for this Final EIS. Together, the Draft EIS, the Final EIS, and the technical reports prepared for the project, form the environmental documentation required to comply with the National Environmental Policy Act (NEPA). The final step in the process will be the publication of a Record of Decision (ROD), and a notice of its availability, in the *Federal Register*. This environmental process includes opportunities for all interested parties to participate in the process and contribute comments, questions, and suggestions.

Final EIS Organization

This Final EIS summarizes the materials contained in the Draft EIS and presents the information about the new and updated analyses that were completed after the Draft EIS was distributed. Chapter 1 provides information on how the study for the Complete 540 project is being conducted. Chapter 2 includes a summary of the material contained in the Draft EIS. In Chapter 3, the involvement of agencies and the public in the study process since the release of the Draft EIS is presented. Chapter 4 focuses on the Preferred Alternative: its selection, its modifications, and its effects. In Chapter 5, each of the technical reports that were prepared for the Draft EIS and the Final EIS are summarized and referenced. Chapter 6 contains the credentials for the professionals that conducted the study and the distribution of the Final EIS. Also included in the Final EIS is a list of references, an index, and an errata sheet relative to the Draft EIS.

Draft EIS Functions

The Draft EIS served to tell the project story from its beginning through the evaluation of Detailed Study Alternatives (DSAs), presenting information used by NCDOT and FHWA to make a decision on the Preferred Alternative for the project. The Draft EIS described: (1) the purpose and need for the proposed action; (2) the broad range of alternatives examined for meeting the project purposes; (3) the process NCDOT used to select the DSAs; and, (4) the methods used to assess the effects of the DSAs on the human and natural environments.

Purpose and Need—There are two primary purposes for the Complete 540 project: to improve mobility within and through the study area during peak travel periods, and to reduce congestion on the study area's existing roadway network. A secondary purpose, or "other desired outcome," of the project was also identified: to improve system linkage in the regional roadway network by completing the 540 outer loop around the Raleigh metropolitan area—an infrastructure improvement that has been sought by local communities and planners for more than 40 years.

Alternatives—The Draft EIS presented information on the reasonable range of possible alternatives examined to meet the two primary purposes. A multi-tiered screening process was used to narrow those alternatives to those FHWA and NCDOT determined to be most reasonable and feasible. Through this process, 17 DSAs were identified as possible routes for the Complete 540 project.

Impact Assessment—The effects the DSAs would have on the human, natural, and built environments were studied in detail, based on fieldwork, research, and the involvement of local governments, governmental agencies, and the public. The results of those efforts are contained in several technical reports, which formed the basis for the Draft EIS.

Project Activities Since the Draft EIS was Completed

The Draft EIS was made available for agency and public review in November 2015. A Public Hearing was held on December 9, 2015, during the Draft EIS review period, to receive comments from interested parties concerning the information in the Draft EIS and the study in general. The official Draft EIS comment period ended on January 8, 2016.

Following the Corridor Public Hearing, all comments received on the Draft EIS were analyzed and evaluated. Coordination with resource and regulatory agencies took place in early 2016 concerning the Draft EIS, the comments received, and the identification of a Preferred Alternative. In April 2016, NCDOT and FHWA officially identified a Preferred Alternative from the project's 17 DSAs. The decision was documented in the project's Preferred Alternative Report and is the basis for this Final EIS.

Once the Preferred Alternative was selected, the project focused on refining the Preferred Alternative and minimizing its impacts on the environment. These efforts were documented in new technical reports or in updates to reports previously prepared. As the design of the Preferred Alternative was advanced to a greater level of detail, efforts were made to minimize its adverse effects and to enhance the beneficial effects of the project.

Key Project Issues

Several concerns or issues have been raised over the course of the study, which are summarized as follows.

Protected mussel species—The Preferred Alternative crosses Swift Creek, which supports a population of the federally endangered Dwarf Wedgemussel, as well as the Yellow Lance mussel species, which has been proposed for listing as a protected species. NCDOT carried out an extensive process to research, understand, and evaluate how the project might affect these species and to provide the information necessary for the preparation of a Biological Assessment for these species. At the time of this writing, formal consultation is underway between FHWA and the US Fish and Wildlife Service relative to protected species. As part of this consultation, specific measures are being considered that would offset the potential adverse effects on these species, and possibly aid in recovery efforts for them.

Indirect and Cumulative Effects—NCDOT expanded the qualitative assessment of indirect and cumulative effects by carrying out a process to quantify those effects and allow comparisons to be made between future conditions with and without the Preferred Alternative in place. Indirect effects on land development, water quality, and protected species were analyzed. This effort is documented in the various technical memoranda on this subject, which conclude that the Preferred Alternative would trigger little additional indirect impact beyond those expected to occur over time without the project.

Updated Traffic Data—The traffic information used in the Draft EIS was based on the Triangle Regional Model (TRM) in place at the time and which extended through 2035. Because the currently adopted TRM now extends through 2040, NCDOT carried out updates to the previous traffic information developed for the Draft EIS. These updates are documented in a series of traffic-related technical reports. In general, the new traffic analyses confirmed that the conclusions and traffic-related decisions reached in the earlier technical documents and Draft EIS are still valid.

Effects of the Preferred Alternative

This Final EIS contains information on the effects of the Preferred Alternative, which is summarized in the table below.

Environmental Factors	Effect/Impact
Environmental Justice	None
Land (acres)	1,825
Parcels (each)	858
Relocations (residential, business, non-profit)	217
Business Relocations	5
Bisected Neighborhoods	2 (Woodcreek and Deerfield Park)
Churches (land only impacts)	6
Historic Resources	None that would have adverse effects
Archaeological Resources	1 site with adverse effects
Section 4(f) Resources	2 parks, both *de minimis* impacts
Noise	818 receptors
Air Quality	None
Communication Towers	2
Private Recreation Areas	1
Streams (linear feet)	59,533
Streams (number of crossings)	140
Stream Buffer Zone 1 (acres)	87.0
Stream Buffer Zone 2 (acres)	58.1
Wetlands (acres)	69.5
Wetlands (number affected)	156
Riparian Wetlands (acres)	65.2
Non-Riparian Wetlands (acres)	4.3
Ponds (acres)	24.6
Ponds (number affected)	39
Floodway (acres)	15.4
100 Year Floodplain (acres)	61.2
500 Year Floodplain (acres)	76.2
Underhill Wetland Mitigation Site (acres)	0.5
Bald Eagle	None
Red-Cockaded Woodpecker	No Effect
Michaux's Sumac	*(see note 1)*
Rough-leaved Loosestrife	No Effect
Tar River Spinymussel	No Effect
Cape Fear Shiner	*(see note 1)*
Dwarf Wedgemussel	*(see note 2)*
Yellow Lance	*(see note 2)*
Northern Long-Eared Bat	*(see note 2)*
Atlantic Sturgeon	*(see note 1)*
Potential Contamination Sites	4
Cost (billion dollars)	2.24

Note 1: May Affect, Not Likely to Adversely Affect
Note 2: May Affect, Likely to Adversely Affect

Project Activities After the Final EIS is Completed

Interested individuals and organizations, local governments, and governmental agencies, will have the opportunity to review and comment on this Final EIS for 30 days, once its Notice of Availability is published in the *Federal Register*. After the review period ends, FHWA will issue a ROD that responds to substantive comments on this Final EIS and will announce its final decision on the Selected Alternative. Publication of the ROD and notification in the *Federal Register* completes the NEPA planning process. Should the Build alternative be selected, the next step would include final design activities, right-of-way acquisition, and construction of the Selected Alternative.

NCDOT expects to continue to hold public information meetings and other public involvement opportunities as the project progresses.

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CHAPTER 1

Introduction

This chapter provides information on how the study for the Complete 540 project is being conducted. It describes the proposed project and explains the requirements that guide the environmental study.

This Final Environmental Impact Statement (EIS) concerns the proposed Complete 540 project. This project would be a new, six-lane, limited-access highway connecting NC 55 Bypass near Apex to US 64/US 264 in the Knightdale area. This project would complete what is currently a partial circumferential highway, or outer beltline around greater Raleigh (see Exhibit 1 on the following page).

The draft version of this document—the Draft EIS—was prepared in 2015 and released for review and comment in November of that year. This current document is the official final version—the Final EIS. Pending any potential need to supplement the information contained in this Final EIS, the North Carolina Department of Transportation (NCDOT) and the Federal Highway Administration (FHWA) will publish a formal Record of Decision (ROD) in the *Federal Register*, which will allow final design to continue and right-of-way acquisition and construction to begin.

This introductory chapter is intended to help readers understand the study being conducted for the proposed project by placing it in its broader context. The chapter explains why the study is required, what it contains, and how local government and resource and regulatory agencies work together to help ensure that decisions about whether to approve the described project are based on accurate information. It is intended for those who are not familiar with environmental studies for transportation projects; readers familiar with this subject may choose to begin at Chapter 2.

PLANNING IN ADVANCE

In most cases, the need for major highway projects in an urban area or region is identified through long-range land use and transportation planning. Land use planning is carried out by specialists at local and regional governments. Transportation plans are developed by metropolitan planning organizations (MPOs), which are regional in scope and include representation from the individual governments in the region. Such planning is a condition for receiving federal funding, and must be based on a "continuing, comprehensive transportation planning process carried out cooperatively by states and local communities."[1] This is known as the "3C" planning process. The MPO for the greater Raleigh area is the Capital Area Metropolitan Planning Organization

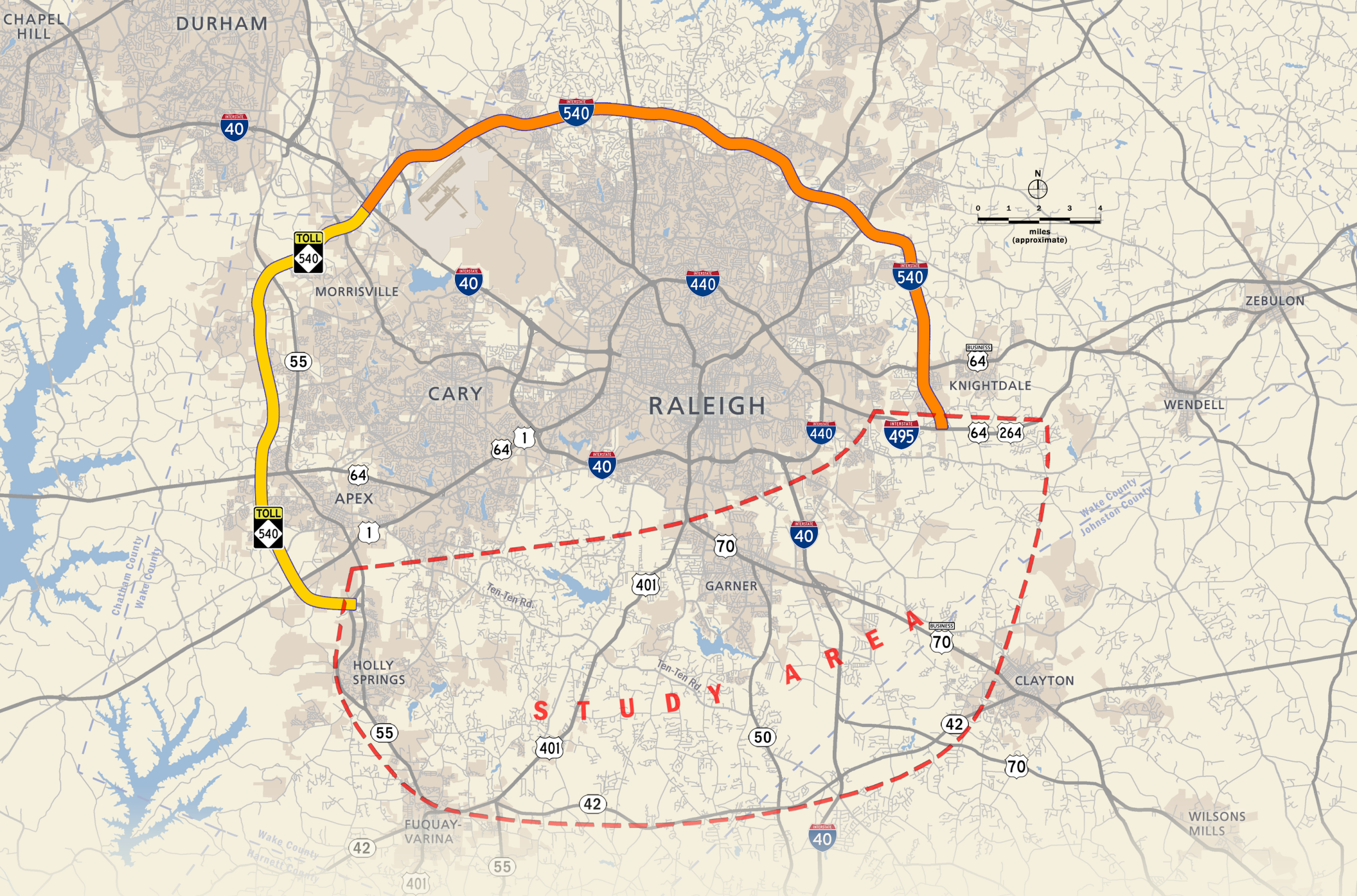


Exhibit 1 **The Location of the Proposed Project**

The proposed project is located generally south and east of Raleigh. It is intended to complete an outer loop or beltway around the Raleigh area by completing the remaining link of NC 540, also known as the Triangle Expressway.

(CAMPO). CAMPO works with the NCDOT and other transportation organizations to collect and analyze traffic data and land use information for use in assessing future transportation needs in the region. These needs, and the projects identified to meet them, are documented in the area's comprehensive long-range transportation plan.

CAMPO is responsible for preparing the *Metropolitan Transportation Plan* (MTP)[2], which is the fiscally-constrained long range regional transportation planning effort for the greater Raleigh region. It provides a framework for the investment of anticipated federal, state and local funds, based on anticipated needs and regional goals and objectives over a 30-year time frame. The currently adopted 2040 MTP lists future highway, bus transit, light rail, bicycle, pedestrian and other transportation projects to be implemented through the year 2040. The proposed Complete 540 project is included in the 2040 MTP and is divided into three projects in the NCDOT State Transportation Improvement Program (STIP):

- Project R-2721 (from NC 55 Bypass to US 401),
- Project R-2828 (from US 401 to I-40), and
- Project R-2829 (from I-40 to US 64/US 264 (I-495)).

COMPLIANCE WITH ENVIRONMENTAL POLICY AND OTHER REGULATIONS

Several state and federal regulations have been created to ensure that a project's effects on the natural environment and human communities are understood and made public before the project is carried out. Many of these regulations are intended to adhere to the United States' policy on the environment, established in 1969 through the passage of the National Environmental Policy Act (NEPA).

The National Environmental Policy Act — The United States' policy on protection of the natural and human environment became official on January 1, 1970, when President Nixon signed into law the National Environmental Policy Act of 1969.[3] In its "Declaration of National Environmental Policy," Congress declared

"it is the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man [humans] *and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans."*

This is the official policy of the United States, created in recognition of

"the profound impact of man's [human] *activity on the interrelations of all components of the natural environment, particularly the profound influences of population growth, high-density urbanization, industrial expansion, resource exploitation, and new and expanding technological advances and recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man*[kind] *…"*

Congress recognized that these statements would be nothing more than lofty aspirations if NEPA did not include an action-forcing provision to compel federal agencies to incorporate this policy when carrying out their missions. As a result, Congress included in NEPA a requirement that a "detailed statement" be prepared for every recommendation on proposals for major federal actions that would significantly affect the environment. These Environmental Impact Statements are to be prepared by the proposed project's responsible official (the "lead agency") and must include five specific topics:

1. the environmental impact of the proposed action,
2. any adverse environmental effects that could not be avoided if the proposal were to be implemented,
3. alternatives to the proposed action,

4. the relationship between local short-term uses of man's [the human] environment and the maintenance and enhancement of long-term productivity, and
5. any irreversible and irretrievable commitments of resources that would be involved if the proposed action is implemented.

NEPA also requires that the federal agency preparing the impact statement consult with and obtain the comments of any other Federal agency that has jurisdiction by law or special expertise with respect to any environmental impact involved. Furthermore, copies of the impact statement and the comments and views of the appropriate Federal, State, and local agencies that are authorized to develop and enforce environmental standards, are to be made available to the public and are to "accompany" the proposal through the agency review processes.

In preparing the analyses documented in the impact statement, NEPA requires use of "a systematic, interdisciplinary approach which will ensure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision-making which may have an impact on man's [the human] environment."

The environmental impact analyses required under NEPA, and their documentation in a written statement, are intended to serve a "discovery function" for calculating the range of risks and benefits of proposals that have major environmental consequences.[4] Although the impact assessment process and statement do not mandate a particular agency decision, the process is intended to "force agencies to discover and disclose the environmental effects of their proposed projects, thereby opening ill-conceived projects to challenge."[5]

In short, NEPA requires that we "look before we leap" with respect to large projects. As noted by one of NEPA's principal authors, "... in a world of rapidly expanding new technologies and developments, ascertaining the probable outcomes of action may not be easy and forecasts may not be certain, but they are safer than unrestrained ignorance."[6]

Other Protections for People and the Environment — In addition to the protections and procedures contained in NEPA, several other federal laws and Executive Orders have been implemented over the years that have a direct bearing on how highways are planned and constructed. Particularly relevant examples include: protection of parks and wildlife areas (Department of Transportation Act of 1966); protection of historic sites (National Historic Preservation Act of 1966); requirements for public hearings on the effects of highway projects (Federal Aid Highway Act of 1968); maintaining or improving water quality ("Clean Water Act" of 1972); regulation of damage to the natural environment (creation of the Environmental Protection Agency, 1970); identification and protection of endangered species (Endangered Species Act of 1973); fair treatment of residents or business owners who must relocate ("Uniform Relocation Assistance Act" of 1987); identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects on minority populations and low-income populations (Executive Order 12898 [1994] "Environmental Justice"); and others. These and other regulations have had the effect of creating and guiding the kind of study being carried out for large projects such as Complete 540.

"In a world of rapidly expanding new technologies and developments, ascertaining the probable outcomes of a project may not be easy, and forecasts may not be certain, but they are safer than unrestrained ignorance."

– Lynton Caldwell, principal author of NEPA

Complete 540 Study Compliance — Although most large-scale highway projects are carried out by state and local governments, they must still comply with NEPA if they include any federal funding. Such

projects are considered federal actions, and become the responsibility of FHWA. The process established to ensure compliance with NEPA also ensures compliance with the many other regulations, including the North Carolina Environmental Policy Act, intended to protect humans and the natural environment, as listed above.

Because it would include federal funding, the Complete 540 project is considered a federal action, with the FHWA maintaining oversight and approval authority. The FHWA formally approved the Draft EIS and will continue to ensure that NEPA's regulations are adhered to until the end of the study, when a formal Record of Decision about the outcome of the study is completed and its Notice of Availability is published in the United States' *Federal Register.*

COORDINATION WITH LOCAL, STATE, AND FEDERAL AGENCIES

Coordination between federal agencies is an important part of the NEPA process. First, the legislation itself requires all federal agencies to use "a systematic, inter-disciplinary approach which will insure the integrated use of the natural and social sciences"[7] for all federally funded projects and actions. Additionally, NEPA requires that the agency proposing the project "consult with and obtain the comments of any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved."[8]

Because NEPA applies to all federal agencies, when one agency proposes a significant project or action, some agencies need to ensure their own compliance with NEPA for that project. For example, when a highway project will involve filling a wetland area, the US Army Corps of Engineers (USACE) must also comply with NEPA before issuing a permit to fill the wetland. To avoid duplication of effort and unnecessary delays, coordination between the two agencies is required.

For the Complete 540 project, an official coordination agreement was reached at the beginning of the study between the federal, state, and local agencies that would be involved in the project. As documented in a written project coordination plan, the agencies agreed to the process for coordination and public involvement in the project development process. The project coordination plan was approved in August 2010 and has been updated periodically, with the most recent update occurring in November 2013.

PUBLIC INVOLVEMENT

NEPA and other federal and state regulations require that members of the public who might be affected by the project or who might otherwise have an interest in it be notified of the proposal and be given the opportunity to comment on the findings contained in the EIS. This is a minimum requirement. Over the years, public involvement objectives have been expanded and now the proposing agency engages the public early and in a variety of ways—long before the Draft EIS has been prepared.

This expanded public involvement effort ensures that the public has a basic awareness of the proposed project and the goals and objectives of the study process. Public interaction is also important in collecting information from study area residents and businesses about what is valuable to them and how the project could affect those valued resources. The public involvement process also ensures that members of the public have adequate and appropriate ability to review the findings of the study, to ask questions about the project, and, to understand—and possibly challenge—the methods and findings of the study.

The Complete 540 Draft EIS included a chapter explaining how the public has been, and will continue to be, involved in the proposed project. This Final EIS incorporates by reference a summary of all comments made on the Draft EIS, along with responses to each substantive comment made. For more information, see the study's 2015 Stakeholder Involvement Report and its 2017 update.

CHAPTER 2

Summary of the Draft Environmental Impact Statement

This chapter provides a summary of the material contained in the project's Draft Environmental Impact Statement (EIS).

This chapter provides a summary of the information contained in the project's Draft EIS, which was released for review and comment in November 2015. The full content of the Draft EIS are considered to be included as part of this Final EIS. The disk included on the back cover contains a copy of the Draft EIS; it can also be found on the Complete 540 website (www.ncdot.gov/projects/complete540/).

DRAFT EIS CHAPTER 1: STUDY OVERVIEW

The Draft EIS began with an overview chapter that explained the nature of the study and how it is being pursued. A summary of similar material is contained in the preceeding chapter of this Final EIS.

DRAFT EIS CHAPTER 2: PURPOSE OF THE COMPLETE 540 PROJECT

Primary Purposes — Two primary purposes have been established for the Complete 540 project, based on general transportation problems in the Raleigh area and specific, more localized needs. The first purpose is to improve mobility within or through the study area during peak travel periods. The second purpose is to reduce forecast congestion on the existing roadway network within the project study area.

A secondary purpose of the project is to improve system linkage in the regional roadway network by completing the 540 outer loop around the greater Raleigh area—a goal that has been sought by area planners for more than 40 years. It is expected that construction of this remaining 540 link would benefit local commuters living south and east of Raleigh, as well as motorists making longer trips through the Triangle Region to and from points south and east.

The transportation problems that form the basis for these project purposes are the need for more route choices in the area and the need to reduce traffic congestion on the existing roadway network.

More Route Choices—Much of the growth that has occurred in the Triangle Region over the past few decades has been in developments that include mostly low-density, single-family residences. One outcome of this kind of land use is the heavy burden it places on local roads. These

developments often have few connection points to the area's larger roadway network, meaning that the traffic they generate is all funneled onto the same limited number of roads. The traffic congestion this creates becomes worse when residential areas are far removed from major employment locations, with several of these developments all needing to access the same roadways. The result is a need to improve mobility by providing additional route choices for those who live or work in, or travel through, the study area.

Reducing Congestion on the existing roadway network—Many of the roads south and east of Raleigh are moderately to severely congested during the morning and evening peak travel times. CAMPO (the Capital Area Metropolitan Planning Organization) predicts that congestion in this area will worsen over the next several years,[1] meaning an increasing number of roadway segments and intersections will provide unacceptably low levels of service. CAMPO's 2040 Metropolitan Transportation Plan identifies several future transportation projects that would help ease this increase in traffic congestion. One of those is the proposed Complete 540 project.

For more information

In addition to the Draft EIS document itself, more detailed information on the study's purpose and need analyses can be found in the following technical report:

- Purpose and Need Statement (May 2011)

Chapter 5 contains a summary of each technical report incorporated as part of the Draft EIS and this Final EIS, including the document listed here.

DRAFT EIS CHAPTER 3: THE STUDY AREA AND ITS FEATURES

The Study Area — As the rate of growth in the greater Raleigh area began to increase, 20 to 30 years ago, suburban-style residential developments increasingly replaced agricultural or vacant land. Today, suburban residential, commercial, and office development predominate, although there are small areas of light industrial land uses in the study area as well. These non-residential areas are located near the I-40 interchange at US 70 Business, along US 401, and near the western project terminus area, at NC 55 Bypass. Much of the suburban development has occurred west of US 401 in the vicinity of the existing communities of Holly Springs, Fuquay-Varina, Apex, and Cary. In the north-central portion of the study area, in and around the town of Garner, there are pockets of older, higher density development, generally north of Timber Drive. There are also pockets of farming and undeveloped tracts, generally located near NC 42 between US 401 and NC 50, and throughout the area east of I-40. The Complete 540 study area is shown in Exhibit 1 (on page 2).

Economic Characteristics — The Raleigh area has a robust and diversified economy and is the location of many of the State's largest employers. The North Carolina Department of Commerce, Division of Employment Security projects that the greater Raleigh area, including Wake and Johnston counties, will gain a substantial number of jobs in the next several years. Likewise, local planners are predicting continued job growth in the project area, with many jurisdictions predicting that commercial land uses will increase, relative to other land uses.[2]

Public or Semi-Public Land Uses — The study area contains several public or semi-public land uses and facilities that could influence the location of a new highway. Notable properties in these categories include:

- The main campus of Wake Technical Community College, which is located on US 401 in unincorporated Wake County, between the towns of Garner and Fuquay-Varina.

An increasingly developed area

The Raleigh-Durham-Chapel Hill metropolitan area is one of the fastest growing regions in the country, with much of this growth occuring in the area immediately south of Raleigh. Since the 1990s, older rural land uses have been steadily converting to the kinds of land uses typically associated with suburban development.

Single Family, Detached Homes

As in many parts of the US, the dominant type of residential growth is single family detached housing in suburban style developments.

Higher Density Clusters

Another trend is the development of higher density residential projects that use less land and allow more walking and other non-motorized forms of transportation.

Mixed Use Developments

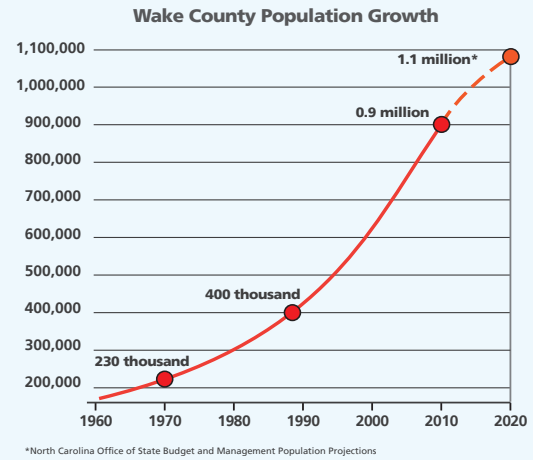
The number of mixed-use projects being built in the area is increasing. These typically include residential units, retail space, office space, and parking facilities.

Businesses Along Major Roads

In older suburban areas, businesses tend to be spread out along major roadways. In newer areas, the tendency is for businesses to be clustered at major intersections.

Automobile Dominance

A common characteristic of suburban growth is that the private auto is often the only transportation option available to access jobs, shopping, medical facilities, and other important destinations.



*North Carolina Office of State Budget and Management Population Projections

Rapid Growth Rates

The Raleigh-Cary area has grown by over 52% since 2000.

- A large tract on Battle Bridge Road called Randleigh Farm. This is jointly owned by Wake County and the City of Raleigh and is intended for use as a planned development.
- A large area owned by the City of Raleigh east of Randleigh Farm, which includes a police training facility and the Neuse River Wastewater Treatment Plant.
- NC State University/US Department of Agriculture property, a planned development located along US 70 Business, near the Wake/Johnston county line (this property is currently the NC Central Crop Research Station).
- The Dempsey E. Benton Water Treatment Plant, on NC 50 in Garner.

Parks and Recreation Facilities — There are several notable park facilities in the study area. A string of linked smaller parks in the community of Garner together comprise a large area of parkland. The Town of Cary's Middle Creek School Park, which connects to several existing and planned greenways, comprises another large area of parkland in the study vicinity. Another valuable public resource is Clemmons Educational State Forest, located on Old US 70 at the Wake/Johnston county line, northeast of Clayton. The Neuse River Trail is a 28-mile long greenway trail adjacent to the Neuse River, to the east of Raleigh. A notable planned facility is Southeast Regional Park, a county park that Wake County plans to construct near NC 42 and Barber Bridge Road, in the Willow Springs area. Another notable planned facility is Sunset Oaks Park, which the Town of Holly Springs plans to construct in the Sunset Oaks neighborhood. Each of these facilities are or have the potential to be protected by Section 4(f) of the Department of Transportation Act[a] (see Exhibit 2).

Historic Properties and Districts — Other than the downtown areas of Fuquay-Varina and Garner, there is only one large-sized historic district in the study area that is listed on the *National Register of Historic Places*—a 338 acre rural historic district located on both sides of Sunset Lake Road in Fuquay-Varina. Several other, smaller properties are currently listed on the *National Register*, but they are scattered throughout the study area, with no concentrated locations.

Area Rivers, Streams, Lakes — There are no natural lakes in the region; all water bodies with substantial surface areas are "impounded," formed by dams on rivers and streams. The principal rivers and streams in the study area include the Neuse River, Swift Creek, Middle Creek, and Little Creek. Large expanses of floodplain are not present in the study area, although narrow bands of floodplain areas are present along stream edges (see Exhibit 3).

Neuse River—The Neuse River is the largest river in the study area and is an important water resource. Development within the Neuse River basin is subject to the Neuse River Buffer Rules, administered by the NC Department of Environmental Quality (NCDEQ). These rules require development within the Neuse River basin to maintain a minimum 50-foot buffer along each side of the stream. On the Final 2014 303(d)[b] list, the Neuse River in the project area is classified as impaired due to high levels of PCBs (polychlorinated biphenyls) in fish tissue and high copper concentrations. The part of the Neuse River from Beddingfield Creek (near the Wake/Johnston county line) to the Wilson's Mills area is also listed, due to high zinc concentrations. On the Draft 2016 303(d) list, copper and zinc are no longer listed as impairment factors for the Neuse River, meaning PCBs in fish tissue is the only remaining impairment factor.

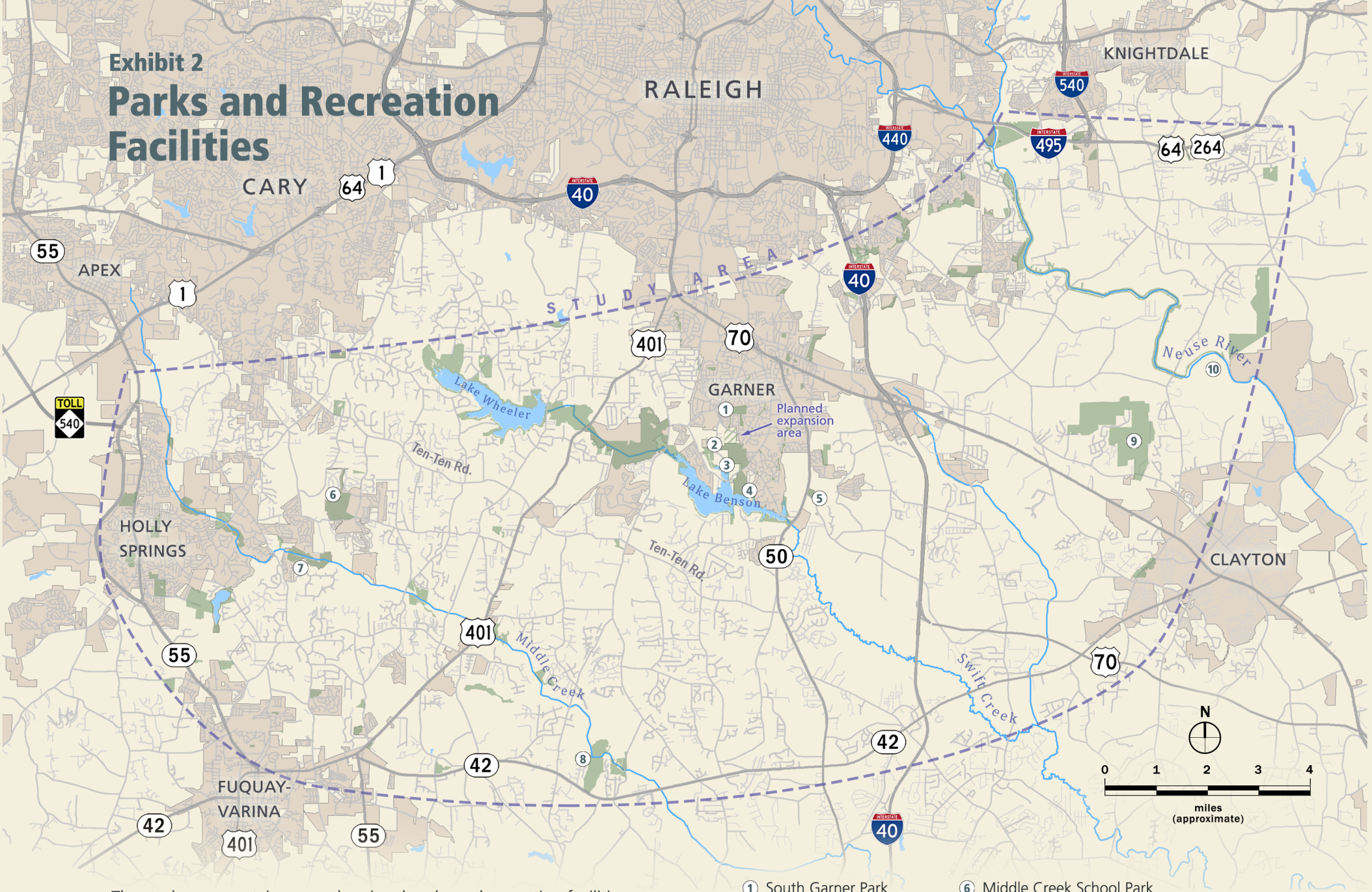
Swift Creek (including Lake Benson and Lake Wheeler)—Swift Creek is an important water body in the study area and includes two impounded areas that form Lake Benson and Lake Wheeler. Swift Creek has been

(a) Section 4(f) of the U.S. Department of Transportation Act of 1966 established the requirement for consideration of park and recreational lands, wildlife and waterfowl refuges, and historic sites in transportation project development.

(b) The term "303(d) list" is short for a state's list of impaired and threatened waters (e.g. stream/river segments, lakes). For each water on the list, the state identifies the pollutant causing the impairment, when known. In addition, the state assigns a priority for development of Total Maximum Daily Loads (TMDL) based on the severity of the pollution and the sensitivity of the uses to be made of the waters, among other factors.

Exhibit 2

Parks and Recreation Facilities

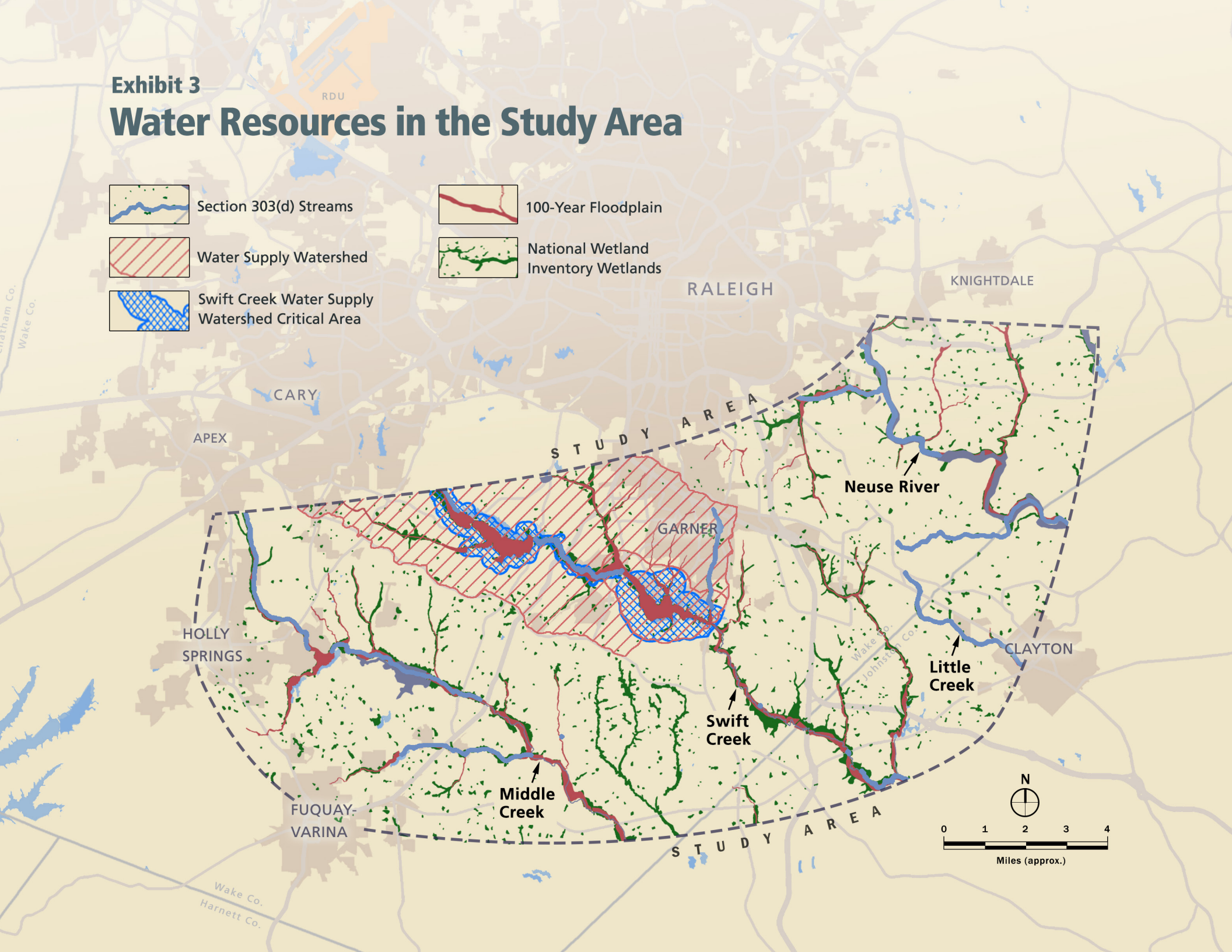


The study area contains several regional parks and recreation facilities. There are also many smaller, neighborhood-sized parks and recreation areas associated with residential developments. The larger parks and recreation parcels are shown here.

1. South Garner Park
2. Thompson Park
3. White Deer Park
4. Lake Benson Park
5. Centennial Park
6. Middle Creek School Park
7. Sunset Oaks Park (planned)
8. Southeast Regional Park (planned)
9. Clemmons Educational State Forest
10. Neuse River Trail

Exhibit 3

Water Resources in the Study Area



classified as Water Supply III (WS-III), which is defined as waters used as sources of water supply for drinking, culinary, or food processing purposes. A management plan is in place for Swift Creek (including Lake Wheeler and Lake Benson). This plan established the boundaries of the Swift Creek Watershed Critical Area and includes strict limitations on development within its Watershed Critical Area. Swift Creek is impaired due to degraded benthic integrity.

Little Creek—Little Creek is located near Clayton, in northern Johnston County, where it flows into Swift Creek. It is classified as having impaired benthic integrity and a poor fish community.

Middle Creek and Terrible Creek—Middle Creek and Terrible Creek are two streams in the western part of the study area. Portions of both are listed as impaired waters. Middle Creek is listed because of impaired benthic integrity and a poor fish community; Terrible Creek, which flows into Middle Creek, is listed because of impaired benthic integrity.

Beddingfield Creek—Beddingfield Creek is in the eastern part of the study area, where it flows into the Neuse River. It is listed as having impaired benthic integrity.

Wetlands — Wetland areas are scattered throughout the study area (see Exhibit 3). An initial analysis of wetland type, quality, and location was made for the entire study area by consulting the National Wetlands Inventory database, which is maintained by the US Fish and Wildlife Service (USFWS). More precise mapping of potentially affected wetlands was done through on-the-ground field work, conducted by qualified scientists and professional land surveyors to determine the precise location of jurisdictional wetlands.

Protected Species —Several federally threatened and endangered plant and animal species are listed as known to occur or are believed to occur in either Wake or Johnston counties. These include:

Michaux's Sumac (*Rhus Michauxii*)—This federally endangered plant is found in the inner Coastal Plain and Piedmont regions of North Carolina. It grows best in areas where disturbances have created open areas.

Red-Cockaded Woodpecker (*Picoides borealis*)—This federally endangered bird typically occupies open, mature stands of southern pines, particularly longleaf pine. It excavates cavities for nesting and roosting in living pine trees, aged 60 years or older.

Northern Long-Eared Bat (*Myotis septentrionalis*)—This species was listed as a federally threatened species in April 2015. It is found primarily in western North Carolina but has recently been discovered in the eastern part of the state. Studies are underway by the US Fish and Wildlife Service to determine its presence in central North Carolina.

Tar River Spinymussel (*Elliptio steinstansana*)—In North Carolina, this federally endangered species is found in the rivers and streams of the Neuse River and Tar River basins.

Dwarf Wedgemussel (*Alasmidonta heterodon*)—This federally endangered species is found in the rivers and streams of the Neuse River watershed in the study area.

> Note: Subsequent to the release of the Draft EIS, another mussel species, the Yellow Lance (*Elliptio lanceolata*), was proposed for listing as a threatened species by the USFWS. Its habitat is similar to that of the Dwarf Wedgemussel.

Highways — Because the proposed 540 project would be a limited-access highway, with access to and from it only allowed at interchanges, the location of other major roads that would intersect with 540 is an important consideration. These include the following:

- NC 55 Bypass
- Holly Springs Road
- Bells Lake Road
- US 401
- Old Stage Road
- NC 50
- US 70
- Interstate 40
- White Oak Road
- Rock Quarry Road
- US 70 Business
- Auburn Knightdale Road
- Poole Road
- US 64/US 264 (I-495)

These intersecting roads are important because constructing interchanges can result in changes to traffic patterns and land uses in close proximity to them.

Drinking Water and Waste Water Treatment Facilities — There are six major water and waste water treatment facilities in the study area: 1) the City of Raleigh's Dempsey E. Benton Water Treatment Plant is located on NC 50 in Garner (it also has an associated bio-solids treatment facility on Wrenn Road near I-40); 2) the City of Raleigh Neuse River Wastewater Treatment Plant is located on Battle Bridge Road, in the far eastern portion of the study area; 3) the Western Wake Regional Water Reclamation Facility is located just west of study area and is jointly operated by Cary, Apex, Holly Springs, and Morrisville; 4) the South Cary Water Reclamation Facility is located on West Lake Road, east of Holly Springs; 5) the Town of Apex Water Reclamation Facility is located on Pristine Water Drive, near the western edge of the study area; and 6) the Town of Clayton Little Creek Water Reclamation Facility, located on Durham Street, in Clayton.

Electricity and Fuels Generation and Distribution — The Complete 540 study area contains two electric power substations—one on Battle Bridge Road and another on Ten Ten Road near Sauls Road. Several large powerlines also traverse the study area, as well as two underground natural gas pipelines. The study area also includes the Neuse River Solar Farm, a solar field managed by the City of Raleigh. This facility is located on a 30 acre tract at the corner of Battle Bridge Road and Brownfield Road in the eastern part of the study area.

Communications Facilities and Distribution Lines — The Complete 540 study area contains a group of three large communication towers located along US 70 Business, just north of Clayton. These are important because they include television, radio, emergency (911), federal/state police, and weather communications. A smaller tower that provides warning sirens for the Shearon Harris Nuclear Power Plant is located just north of US 70 Business, along Rock Quarry Road. This tower also provides Federal Aviation Administration air traffic control communications equipment and cell phone transmission facilities.

Contamination Sites, Hazardous Materials, and Landfills — Facilities that store hazardous materials are located throughout the study area, mainly along major roads. These include gas stations, former gas stations, auto repair and salvage facilities, and dry cleaners. No large-scale contamination sites are known to exist in the study area.

Landfills in the study area include the South Wake Landfill, just south of the existing end of NC 540, at NC 55 Bypass in Apex, and the Buffaloe Landfill, on the west side of US 401, one mile south of US 70 Business. There is also a construction and demolition debris landfill on Brownfield Road south of Battle Bridge Road.

For more information

In addition to the Draft EIS document itself, more detailed information about the study area and its features can be found in the following technical reports:

- Community Characteristics Report (May 2011)
- GeoEnvironmental Report for Planning (June 2014)

Chapter 5 contains a summary of each technical report incorporated as part of the Draft EIS and this Final EIS, including the documents listed here.

DRAFT EIS CHAPTER 4: ALTERNATIVES FOR MEETING THE PROJECT PURPOSE

The development of alternative ways of meeting the project purpose began with the exploration of non-highway solutions or "concepts," along with initial identification of possible highway alternatives.

Initial Concepts — Transportation Demand Management (TDM) Concept —TDM includes strategies designed to reduce the need or "demand" that individuals have to use the roadway system itself.

Transportation System Management (TSM) Concept—TSM measures typically consist of low-cost, minor improvements to roadways to increase the capacity or efficiency of the overall roadway system.

Mass Transit/Multi-Modal Concept—The Mass Transit option would expand bus and rail passenger service in the project area.

In addition to these non-roadway alternatives, several different roadway options were considered. These included:

Making upgrades and other improvements to existing roadways—This alternative would involve major reconstruction of extensive portions of existing roads in the study area. Three combinations of improving existing roadways having the greatest potential to meet the project purposes were examined.

Combination, or "hybrid," options—This concept would combine upgrading certain existing roadways with some degree of completely new construction in other areas. Three hybrid options having the greatest possibility of meeting the project purposes were examined.

Construction of an entirely new highway—This option would construct a completely new, limited-access facility. It would be similar in design to the existing segments of 540, with access to and from the highway provided using on and off ramps at interchanges.

A "No-Build" alternative was also considered. This option is based on the assumption that the transportation network in the study area will continue to develop as called for in CAMPO's Long-Range Transportation Plan, but without the Complete 540 project included.

Using both qualitative and quantitative methods, these concepts were screened to determine if they would meet the primary purposes of the project. The result was that only two of these were found to both improve mobility and reduce traffic congestion according to the criteria established to measure these purposes: one hybrid concept, and building an entirely new highway. Those options were then developed in greater detail.

Development of Preliminary Corridor Alternatives — Having established that these two concepts would meet the primary purposes of the project, a large number of new alternative design concepts and three hybrid alternatives were developed using corridors drawn at width of 1,000 feet. Within these corridors, 300-foot wide bands were drawn to represent the basic "footprint" of the conceptual improvements, allowing impact calculations at a more detailed level. Based on the more detailed information that was collected about the study area's social, environmental, and physical features, these corridors were drawn so as to avoid affecting the natural and human environment as much as possible.

In the fall of 2010, the study team presented the resulting set of alternatives to resource and regulatory agencies, local governments and to the public and received several comments and suggestions about them. Some of these comments resulted in changes to the corridor alternatives, with various new segments being added to avoid or minimize impacts to resources and other segments being dropped from further consideration. Also dropped was the hybrid concept because it would have required a very large number of residential relocations and substantial wetland involvement without offering an offsetting relative advantage over the other options considered.

The set of corridors that emerged was then subject to additional review and analysis. Based on the comments and suggestions made during additional agency, government, and public reviews, including a round of public information meetings in the fall of 2013, the corridors were further modified and the impact assessments updated. The resulting alternatives became the study's "detailed study alternatives," or DSAs.

Detailed Study Alternatives — Seventeen DSAs were identified, each consisting of a unique combination of two or more "corridor segments." In total, ten individual corridor segments were developed, and each was assigned an identifying color. They are described as follows:

Corridor Segments West of I-40

Orange Corridor Segment—The main advantage of this segment is that it contains little or no development because it follows a corridor

set aside as protected by NCDOT in the mid-1990s. A disadvantage is that it would cross a portion of Swift Creek that is important for the continued survival of the federally protected Dwarf Wedgemussel in this waterbody.

Lilac Corridor Segment—This option diverges from the Orange Corridor segment near Sauls Road. It was developed to reduce potential effects on wetlands. DSAs using the Lilac Corridor segment were found to have a somewhat smaller total effect on jurisdictional wetlands than those using the Orange Corridor segment. It would also offer the advantage of crossing a narrower section of Swift Creek than the Orange Corridor segments. A disadvantage of this segment is that it would require a large number of relocations and would directly affect a biosolids sprayfield that treats water from the Dempsey E. Benton Water Treatment Plant. Like the Orange Corridor segment, it would cross the portion of Swift Creek important to the continued survival of the Dwarf Wedgemussel in this waterbody.

Purple and Blue Corridor Segments—Although these segments have been assigned two different colors, they function as one corridor segment. They are farther south than the other options and for this reason may serve traffic better in growing areas near Fuquay-Varina, which is a potential advantage of this corridor segment. Also, the route created by connecting the Purple and Blue Corridor segments to the Lilac Corridor segment would affect fewer acres of wetlands than a similar route using the Orange Corridor segment to connect to the Lilac Corridor segment, which is another advantage of this option. Despite these benefits, these segments would cross heavily developed areas in eastern Holly Springs, incurring high numbers of relocations. Also, by bringing the project's route this far south in the study area, these corridors may create pressure to approve new development in rural southern Wake County and in Harnett County, some of which could be in conflict with local, approved land use plans. Although the Purple and Blue segments would not themselves cross Swift Creek, they would connect to the Lilac segment, which would cross this creek.

Red Corridor Segment—The Red Corridor segment forms a potential route that is the farthest north of all the corridor segments. There are two reasons why this option was developed. First, it is the only segment that would cross Swift Creek upstream of the Lake Benson dam, meaning it would be upstream of the habitat area for the federally endangered Dwarf Wedgemussel. Second, it would cross fewer acres of wetlands than any of the other options. This segment, however, also has substantial disadvantages. It would cross a heavily developed area in the town of Garner, including several established subdivisions. It also would cross several park and recreational resources in this area and is the only corridor that would cross the Swift Creek Water Supply Watershed Critical Area. This Corridor segment also has substantial opposition from area residents, businesses, and Town of Garner officials.

Corridor Segments East of I-40

Green and Mint Corridor Segment —The key advantage of both of these segments is that they would avoid the Clemmons Educational State Forest, which is an important publicly-owned natural resource. Their principal disadvantage is that they would require relocation of a relatively small communications tower and may require special treatment to avoid affecting one of three larger communications towers near US 70 Business. The Green and Mint segments differ in their potential effects on the Randleigh Farm property, which is a development being pursued jointly by the City of Raleigh and Wake County. The Green Corridor segment would bisect the property, while the Mint segment would shift to the east, closer to the edge of the property.

Tan Corridor Segment—The Tan Corridor segment was developed in an attempt to avoid the disadvantages associated with the Green and Mint segments. It would shift the encroachment on the Randleigh Farm property farther to the east than the Mint segment and would avoid the large communication towers near US 70 Business. Because this segment would cross existing subdivisions, it has the potential to relocate a larger number of property owners than other options under consideration in this area. It would also cross the northwest corner of Clemmons Educational State Forest.

Brown Corridor Segment—This segment would have the advantage of completely avoiding the Randleigh Farm property and avoiding the large communication towers near US 70 Business. It would cross the Neuse

River at a more favorable location than the other options, possibly reducing potential effects on the river and associated natural features. The angle at which it would cross Auburn Knightdale Road, means it would require fewer acres of land acquisition than the other segments in this area. The key disadvantages of this segment are that it would directly affect a biosolids sprayfield that is part of the Neuse River Wastewater Treatment Plant and would directly affect a City of Raleigh police training facility located on Battle Bridge Road. It would also need to cross the northwest corner of Clemmons Educational State Forest.

Teal Corridor Segment—This is a short segment that would connect the southern part of the Green Corridor segment to the northern part of the Brown Corridor segment. The resulting combination of segments would have several advantages: it would completely avoid the Randleigh Farm property, would cross the Neuse River in a more favorable location, would require a smaller interchange footprint at Auburn Knightdale Road, and would avoid crossing the Clemmons Educational State Forest. The key disadvantages are that it would likely disrupt the large communication towers near Business US 70, would affect the Neuse River Wastewater Treatment Plant bio-solids sprayfield, and would affect the City of Raleigh police training facility.

These Detailed Study Alternatives are shown on Exhibit 4 on the following page.

For more information

In addition to the Draft EIS document itself, more detailed information about the corridor alternatives can be found in the following technical report:

- Alternatives Development and Analysis Report (May 2014)

Chapter 5 contains a summary of each technical report incorporated as part of the Draft EIS and this Final EIS, including the document listed here.

DRAFT EIS CHAPTER 5: EXPECTED EFFECTS OF EACH ALTERNATIVE

Information collected about the important features of the human, natural, and physical environments was used to help establish the locations of the project's Build alternatives. Once established, the alternatives' effects on those features were calculated and placed in a comparative evaluation matrix. Detailed information about the methods used to make those calculations, and their outcomes, was presented in the Draft EIS and its referenced technical reports.

A description of each of those reports is contained in Chapter 5; all of those reports are contained on the disk attached to this document and on the project website (www.ncdot.gov/projects/complete540/). These documents are considered to be included as part of this Final EIS.

> Note that Information about DSA 2 (the Preferred Alternative) has been updated and is described in Chapter 4.

The sections below summarize the Detailed Study Alternatives' effects on each of the important human, natural, and physical features as presented in the Draft EIS.

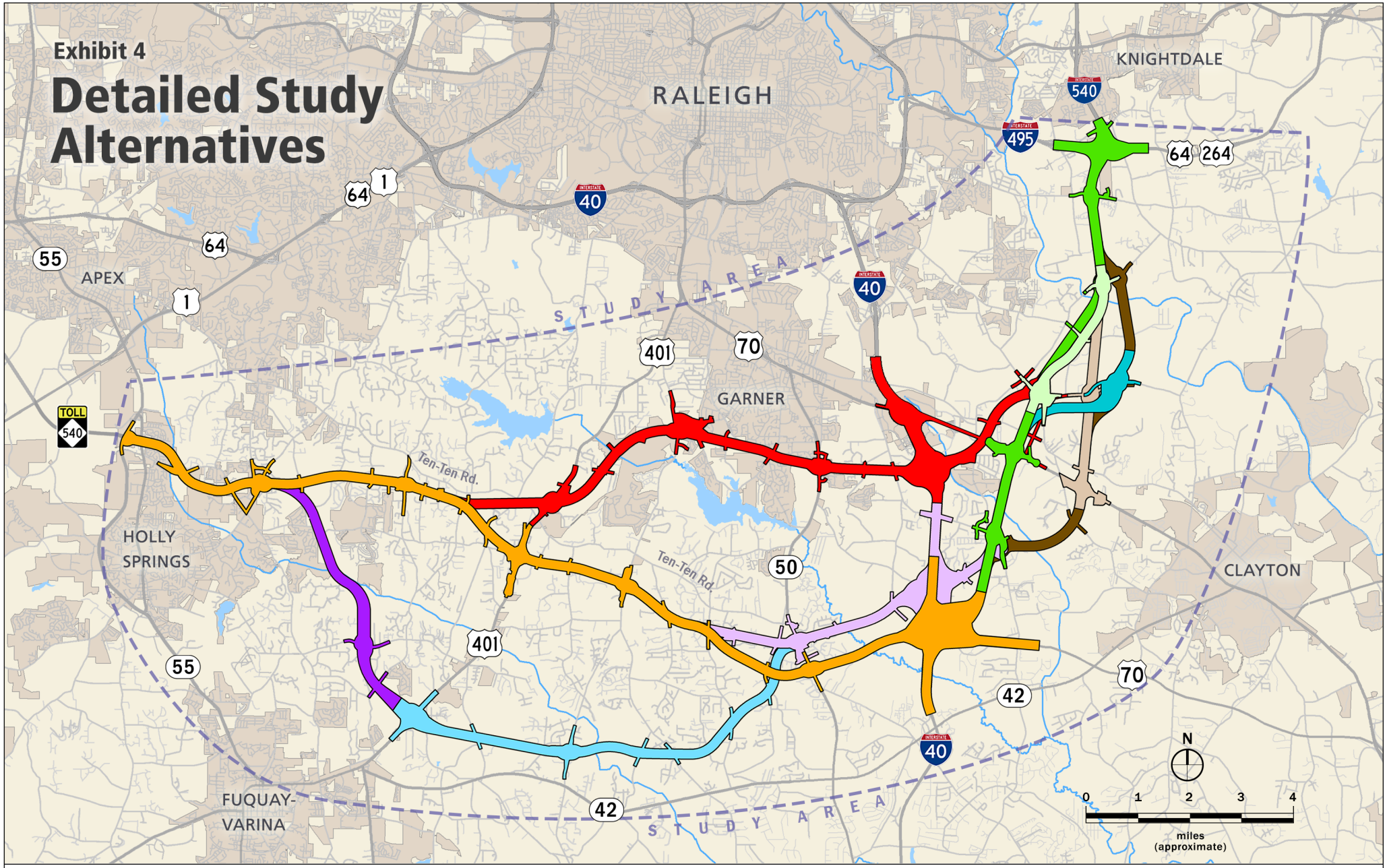
Environmental Justice — Under Executive Order 12898, issued in 1994 and titled "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," federal agencies must identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on minority populations and low-income populations.

The study team reviewed available data and conducted a field review to determine the potential for issues related to environmental justice in the study area. While Census data show that low-income, minority, and elderly individuals live in various locations across the study area, they do not appear to be concentrated in areas near any of the DSAs.

The study of potential relocations for each DSA included an assessment of the likely household income level for residential relocations. The assessment concluded that a relatively small number of required

Exhibit 4

Detailed Study Alternatives



Segment Colors

O	Orange	L	Lilac	B	Brown
Pu	Purple	G	Green	M	Mint
Bl	Blue	Tl	Teal		
R	Red	T	Tan		

Segment Combinations for the 17 Detailed Study Alternatives

1	O G	5	O G Tl B G	9	O Pu Bl L G M G	13	O L G	17	O L G Tl B G
2	O G M G	6	O R G	10	O Pu Bl L B T G	14	O L G M G		
3	O B T G	7	O R M G	11	O Pu Bl L B G	15	O L B T G		
4	O B G	8	O Pu Bl L G	12	O Pu Bl L G Tl B G	16	O L B G		

displacements would affect low-income residents. For each alternative, the proportion of residential relocations affecting low-income residents compared to all relocations would be smaller than the proportion of all residents with low incomes throughout the study area as a whole. This suggests that none of the DSAs would result in a disproportionate relocation effect on low-income individuals.

Potential Relocations on the Complete 540 Project — Although NCDOT places a high priority on avoidance of neighborhoods and disruption of households in developing alternatives, each of the DSAs for the Complete 540 project would require some displacement of residences, businesses, and community facilities.

A large portion of what is now the Orange Corridor segment does not contain large-scale development because NCDOT designated it as a protected corridor in the mid-1990s. For this reason, the DSAs that include the full Orange Corridor segment would require substantially fewer residential relocations than the other DSAs.[c] Those using the Red Corridor segment would average 69 percent more total relocations than Orange Corridor segment alternatives. DSAs using the full Lilac Corridor segment would average 76 percent more relocations. DSAs using Purple-Blue Corridor segment would average 108 percent more total relocations than those using the Orange Corridor segment.

Business relocations tend to follow the same pattern: the DSAs that use the full Orange Corridor segment would have the fewest, and the DSAs that use the Purple-Blue Corridor segment would have the most.

With respect to non-profit and community facilities, the number of relocations is very low, with DSAs using the full Orange Corridor segment requiring three such relocations and the other DSAs requiring only one or two.

Barrier, Access, and Neighborhood Effects — The barrier effect refers to a separation between people or places. Communities can become separated when a new highway is built through them and local streets are closed. This kind of separation can also affect businesses, recreational facilities, and other public facilities by reducing the number of clients or users of a facility.

The term "access" refers to the ability to efficiently connect to the roadway system. New highway projects can cause changes in access by cutting off or rerouting local streets.

NCDOT places a high priority on keeping disruption of neighborhoods to a minimum, but some disruption would result, regardless of the DSA selected. There are a number of developments that could potentially experience barrier or access effects throughout the study area.

Effects on Community Facilities — Although not actual relocations, some of the DSAs would affect various educational, religious, and park and recreation facilities.

Educational facilities—The campus of Wake Technical Community College is the only site that would be directly affected. The Orange Corridor segment would cross the northwest corner of the Wake Tech property but would not affect any campus buildings.

Places of worship—Two places of worship would be affected. The first is The Word of Truth Church of God, located on Eddie Creek Drive, just off NC 55 near the western edge of the study area. Each DSA would require the acquisition of approximately 1 acre from the church's 1.5 acre parcel, although the church building likely would be able to remain. The second is the Springfield Baptist Church, located on Auburn Knightdale Road. The two DSAs that include the Red Corridor segment would affect this relatively large parcel. The church building would not be affected, and access would remain the same, but the DSAs would require the acquisition of property through the middle of this parcel, splitting it into a 20 acre piece to the north and a 19 acre piece to the south. In total, 11 acres would be required from the 50 acre parcel.

Middle Creek School Park—The DSAs that include the Orange Corridor segment would each require part of a small strip of land that is currently

(c) In 2016, the NC General Assembly repealed the legislation allowing NCDOT to protect corridors for future transportation projects.

in public ownership and is associated with the Town of Cary's Middle Creek School Park complex.

Sunset Oaks Park (planned facility)—The DSAs that include the Purple Corridor segment would cross this planned Holly Springs park, which is located in the Sunset Oaks neighborhood.

Southeast Regional Park (planned facility)—The DSAs that include the Blue Corridor segment would directly affect privately-owned parcels that Wake County intends to purchase for development as part of this planned park.

White Deer Park planned expansion area—The DSAs that include the Red Corridor segment would directly affect about nine acres of a parcel intended for the expansion of White Deer Park by the Town of Garner.

Bryan Road Nature Park (planned facility)—The two DSAs that include the Red Corridor segment would bisect the property to be used for the planned Bryan Road Nature Park.

Clemmons Educational State Forest—The DSAs that include the Tan or the complete Brown Corridor segments would each directly affect the northwest corner of the Clemmons Forest property.

Neuse River Trail—DSAs using the complete Green Corridor segment would cross this City of Raleigh trail facility on the same bridge that would cross the Neuse River. DSAs using the Mint or Tan Corridor segments would accommodate a crossing of the trail with a box culvert under the road. The remaining DSAs, which all use the Brown Corridor segment in this area, would affect the trail in two places where the trail runs parallel to two existing roads. Under this scenario, the existing trail could be modified as part of the project design to maintain public use of the trail. All of these scenarios would allow continued use of the trail unhindered by the proposed road.

Note: The design has been changed at the request of the City of Raleigh. The trail would now be under the Neuse River bridge for the Preferred Alternative.

Police, Fire, and Emergency Services—The direct negative effect the DSAs would have on these services would be with DSAs using the Brown Corridor segment, which would cross a portion of a City of Raleigh police training facility located on Battle Bridge Road, affecting about nine acres of the site. It is anticipated that the site could still function in its current use.

Historic Architectural Resources—Historic sites that are listed on the federal *National Register of Historic Places*, or are determined to be eligible for listing on the *Register*, are protected under Section 106 of the Historic Preservation Act. A survey of the "Area of Potential Effects" for the proposed project resulted in 25 individual properties being identified as on or eligible for the *Register*. In addition, one rural area was found to be eligible for the *Register* as a historic agricultural district and two properties in the study area identified during a different NCDOT project were found to be individually eligible.

Located on Sunset Lake Road in Fuquay-Varina, the Jones-Johnson-Ballentine Historic District is listed on the *National Register of Historic Places*. It is an example of a land use that is protected under both Section 106 of the Historic Preservation Act and Section 4(f) of the US Department of Transportation Act.

The NC State Historic Preservation Office has concurred that most of the DSAs would have No Effect on the majority of the listed or eligible resources. The properties that would be affected received a designation of "Adverse Effect," "No Adverse Effect," or "No Adverse Effect with Environmental Commitments" (meaning the finding of No Adverse Effect is contingent on various commitments being made to reduce or mitigate impacts to the property). Alternatives using the Red Corridor segment would have adverse effects on two eligible resources (Dr. L. J. Faulhaber Farm and Bryan Farms Historic District). Alternatives using the Tan Corridor segment would have adverse effects on one eligible resource (Baucom-Stallings House). Several DSAs would require environmental commitments to reduce or mitigate impacts (and thus be regarded as having no adverse effect) at three other sites: the Panther Branch School, Britt's Store, and the Mount Auburn School.

Archaeological Resources — Archaeological sites are also protected by the Historic Preservation Act and other regulations. The Office of State Archaeology (OSA) and NCDOT reached an agreement that archaeological investigations would be conducted after the study's Preferred Alternative was selected. (Archaeological investigations are documented in Chapter 4.)

Effect on Section 4(f) Properties — Historic sites, parks and recreational lands, and wildlife refuges are protected under Section 4(f) of the US Department of Transportation Act. In addition to the historic resources described above, Section 4(f) is potentially applicable to several of the existing and planned parks and recreation properties in the study area.

Middle Creek School Park—The Orange Corridor segment would affect this property but is not expected to adversely affect its recreational activities, features, and attributes.

Planned Sunset Oaks Park—The Purple Corridor segment would cross this planned 78 acre park, directly affecting about 10 acres. It would also split the parcel in two, leaving about 5 acres east of the road right-of-way and the remainder to the west.

White Deer Park planned expansion area—The Red Corridor segment would directly affect about 9 acres of the 35 acre parcel that the Town of Garner plans to develop as an extension of the adjacent White Deer Park. This effect would also leave a 12 acre portion of the planned expansion parcel isolated north of the road right-of-way.

Planned Bryan Road Nature Park—The Red Corridor segment would bisect this planned park, directly affecting approximately 6 acres and separating the remaining parcel into a 10 acre section north of the road right-of-way and a 4 acre section to the south.

Clemmons Educational State Forest—While there is a recreation function associated with this property, its primary purpose is for forest resource management. According to applicable regulations, if recreation has not been established as the primary purpose of a resource, it does not qualify as a recreational resource under Section 4(f). Both the Tan and Brown Corridor segments would affect small areas of managed forest at the northwest corner of the property but these effects would not be considered "use" under Section 4(f). Hiking trails within this forest do, however, qualify as a recreational resource under Section 4(f). The Brown Corridor segment would directly affect approximately 500 feet of the three-mile long Watershed Extension Loop Trail. Because this trail could likely be reconfigured to maintain its use, the DSAs affecting it are not expected to adversely affect its recreational activities, features, or attributes. The Tan Corridor would not affect any trails in the State Forest.

Neuse River Trail—All of the DSAs would cross the Neuse River Trail. All except those using the Brown Corridor segment would accommodate the trail under the road using a bridge or a box culvert (depending on the DSA). DSAs using the Brown Corridor segment in this area would affect the trail in two locations: where the trail parallels Old Baucom Road and where it runs parallel to Brownfield Road. It is expected that the trail could be modified as part of the project design to maintain its current use. While all the DSAs would affect this property, these effects are not anticipated to be adverse with respect to its recreational activities, features, or attributes.

Visual Character and Aesthetics — It is expected that visual changes experienced by those living or working along the DSAs would be intermittent, with some subjected to a view of the roadway and others shielded from the roadway by topography and vegetation. In addition, a large roadway facility like Complete 540 could spur additional development that would change the surrounding visual environment from its current open and fairly rural views.

Noise Impacts — Because increases in noise levels can affect community activities and reduce the quality of life for residents, a detailed process was followed for predicting the proposed project's potential noise impacts.

The study team examined 1000-foot wide corridors for each of the seventeen DSAs, identifying all land uses within the corridors that might be sensitive to traffic noise (e.g., residences, schools and parks, etc.). Out of the 4,189 noise receptors identified, 30 were determined, for study purposes, to be representative of the broader area.

Field measurements were then taken at each of the 30 sites to determine existing noise levels, and other data were collected such as terrain characteristics, traffic volumes, traffic speeds, roadway factors, and similar conditions that could affect noise levels. This information was used as input to the standard traffic noise computer model to predict future noise levels with and without the proposed project.

The modeling effort predicted substantial noise impacts at between 454 and 804 of the 4,189 receptors found along the seventeen DSAs. Measures for reducing or eliminating impacts were considered for all affected receptors. The primary noise abatement measure considered was noise barriers, which were investigated at 91 locations. The number of noise barriers found to be preliminarily feasible and reasonable ranged from 16 to 24, depending on the DSA.

Note: An updated noise analysis has been undertaken for the Preferred Alternative and is documented in Chapter 4.

Air Quality — The results of computer modeling for carbon monoxide indicated that the project is not expected to result in air pollutant concentrations that would be above the national air quality standards. As a result, the project is not expected to create a local air quality impact.

Note: Carbon monoxide "hot spot" analyses are no longer required in Wake County and have never been required in Johnston County.

Under FHWA guidelines, this project does not require a detailed study for particulate matter, nor does it require a detailed analysis of "Mobile Source Air Toxics." For possible air quality concerns during construction, no substantial long-term effects would occur if currently adopted rules for open burning and dust control are followed. As a result, the project is not expected to cause or contribute to any violation of USEPA's National Ambient Air Quality Standards.

Potential Effect on Area Traffic Patterns — Growth and development under either the Build (i.e., one of the seventeen DSAs) or No-Build scenarios will result in travel pattern changes on freeways and major and minor arterial roads, and will affect the associated traffic operations along each of these roads. These effects, which include changes in traffic volumes and patterns, could be somewhat different under a Build scenario because the new freeway's interchanges may redistribute traffic, compared to the No-Build condition. For example, a Build alternative could redistribute traffic to the new Complete 540 freeway interchanges and away from existing major and minor roads near the freeway such as Ten Ten Road, NC 42, and US 70.

The Build scenario was established in a manner that addresses the anticipated travel pattern changes and associated traffic operations by providing level of service D or better on Complete 540 and nearby intersections during peak travel hours. The effects under the No-Build scenario include increased pressure on existing capacity, degraded road and intersection levels of service, and reduced mobility in southern and eastern Wake County.

Under base year conditions with the proposed project there are several roadway locations where traffic volumes or patterns could be affected.

The analysis conducted for these locations showed that each DSA would provide at least a level of service of D or better. This can be interpreted as meaning that the project would not cause any unacceptable problems on the study area's roadway network and would result in improved conditions on the overall network in the base year.

Under future, "design year" conditions, the locations affected by the DSAs include approximately 19 existing or future interchanges and 36 existing or future at-grade intersections or entrance/exit ramp intersections. As with the base year conclusions, the analysis conducted for the design year showed that each of these locations would provide at least a level of service of D or better, again meaning that the project would provide acceptable levels of service on the study area's future roadway network during peak travel hours.

In summary, each of the DSAs is predicted to meet the need for the project by improving mobility and providing better connections between other transportation routes in and near the project study area over the No-Build alternative. The No-Build alternative would result in worse operations at existing intersections and along segments of existing highway in the design year. The details that led to these conclusions can be found in the study's Purpose and Need Statement, Alternatives Development and Analysis Report, various traffic analysis reports, and in the Draft EIS, all of which can be found on the disk attached to the back cover of this document and on the Complete 540 website (www.ncdot.gov/projects/complete540/).

Land Use and Economics — As noted previously, most local governments in the study area have adopted land use plans that include completion of the 540 Outer Loop. Some of these plans include land use policies that explicitly support the project and most assume that the project will be located along the protected corridor (the Orange Corridor segment), between NC 55 Bypass and I-40. In interviews conducted by the NCDOT study team, representatives from six different local governments stated their current planning objectives require construction along the protected corridor and that any other alternative corridor west of I-40 would be in conflict with their plans.

The Red Corridor segment would have substantial negative effects on local land use planning objectives and desired development patterns.

The Purple-Blue Corridor segment would also negatively affect local land use planning objectives. In particular, it would conflict with Town of Holly Springs and Wake County land use planning objectives.

In the portion of the study area east of I-40, most of the DSAs would at least partially support local planning objectives. One exception is the Green Corridor's effect on the Randleigh Farm property. This property is a 417 acre tract owned jointly by Wake County and the City of Raleigh and planned as a mixed-use community. The Green Corridor segment would conflict with those plans. The Mint and Tan Corridor segments would also affect this development, but would shift the effects closer to the eastern edge of the property boundaries. The Brown and Teal Corridor segments would avoid the Randleigh property but would have effects on other City of Raleigh-owned properties in the area.

With respect to economic effects, the DSAs that use Orange Corridor segment would have the fewest business relocations; DSAs using the Purple-Blue Corridor segment would have the most. In addition, the Red Corridor segment would affect the Greenfield South Business Park, which is a 416 acre commercial and industrial complex located in the town of Garner.

Streams — DSAs using the Red Corridor segment west of I-40 would require the fewest stream crossings and would have the lowest total length of streams that would need to be shifted (measured in linear feet). DSAs using the Purple-Blue Corridor segment would have the highest total linear feet of stream impact, averaging 44 percent greater total length than DSAs using the Red Corridor segment. The DSAs using the Purple-Blue Corridor segment cross Middle Creek twice, while the other options cross Middle Creek once. Within each group of DSAs using a particular alignment west of I-40, those using the full length of the Brown Corridor segment east of I-40 would affect streams less than those following the other options east of I-40. There is relatively

little variation in the effect on streams among the other alignments east of I-40 (Alternatives using the Green, Mint, or Tan Corridor segments).

Wetlands — The Complete 540 study team's scientists identified 543 wetland sites that are under the jurisdiction of the US Army Corps of Engineers (USACE) within or near the DSAs.

DSAs using the Red Corridor segment would have the least total effect on jurisdictional wetlands, each affecting slightly less than 52 acres. DSAs using the Purple-Blue Corridor segment would have the next lowest total, averaging about 59 acres each, which is approximately 14 percent greater than the average for DSAs that include the Red Corridor segment. DSAs using the Lilac Corridor segment would have a slightly greater effect on wetlands, averaging about 68 acres each. DSAs using the Orange Corridor segment would have the greatest effect on wetlands, averaging about 74 acres each—which is approximately 43 percent greater than the average for DSAs using the Red Corridor segment. The portions of the DSAs located east of I-40 have very little difference in their effect on wetlands.

Ponds — A total of 105 ponds within or near DSAs fall under the jurisdiction of the USACE. The DSAs' effect on these ponds ranges from approximately 18 acres (for alternatives using the Red and Mint Corridor segments) to about 28 acres (for alternatives using the portion of the Orange Corridor segment west of I-40, and Teal to Brown east of I-40).

The Swift Creek Watershed Critical Area — The only DSAs that cross the Swift Creek Watershed Critical Area are the two that include the Red Corridor segment. For this reason, the North Carolina Department of Environmental Quality, Division of Water Resources (NCDEQ-DWR) and the USEPA have expressed concern about these DSAs. Construction of the project along either of these DSAs would require extensive coordination with these officials to reach an agreement about the best way to protect this water resource.

Neuse River Buffer Zones — To protect water quality in the Neuse River, streamside buffer or "riparian" zones have been established along the river and many of its tributaries. These areas are subject to the Neuse River Buffer Rules administered by NCDEQ-DWR. Each of the DSAs would affect these zones to some extent. DSAs using the Red Corridor segment would have a smaller total effect on them than the other DSAs.

Floodplains — Because DSAs that include the Purple-Blue Corridor segment cross and run parallel to Middle Creek in the Holly Springs and Fuquay-Varina areas, these DSAs would have the greatest effect on floodplains, ranging from 102 to 103 acres. Additional floodplain encroachments occur with these DSAs because they would cross the Neuse River at a less perpendicular angle than DSAs using the Brown or Teal to Brown Corridor segments, east of I-40.

DSAs using either the Orange Corridor segment or the Orange-Lilac segment west of I-40 and then the Brown or Teal to Brown segments east of I-40 would have the lowest floodplain encroachment, ranging from 49 to 65 acres. These numbers are lower because these alternatives cross a narrower section of the floodplain along the Neuse River than other options east of I-40.

Terrestrial Habitat — A key consideration with respect to terrestrial habitat is fragmentation, and it has been determined that each of the DSAs would contribute to habitat fragmentation to some extent. In general, existing fragmentation is more severe in the northern and western portions of the study area, where development is more highly concentrated. Farther south and east, it is still possible to find larger tracts of relatively undisturbed land. As a result, the farther south or east a DSA is located, the more likely it is to fragment relatively undisturbed habitat. In particular, the DSAs that use the Purple-Blue Corridor segment are both farthest to the south and also cross Middle Creek twice—two factors that would cause greater fragmentation.

For large tracts of land that would be divided, wildlife crossings can be considered to reduce the effect of fragmentation. At the request of natural resource agencies, NCDOT has incorporated a bridge into the preliminary design for the Blue Corridor segment in one location in order to provide a crossing for wildlife—this was the only location where the agencies requested a bridge for this purpose.

Protected Species — The following federally threatened or endangered species are listed as occurring in either Wake or Johnston counties.

Red-Cockaded Woodpecker—Study team biologists searched for suitable Red-Cockaded Woodpecker habitat along each DSA corridor. Although suitable foraging habitat was found, subsequent surveys within a half mile of the DSAs did not reveal any pine trees with cavities, that would provide nesting habitat for this species. Records from the NC Natural Heritage Program (NCNHP) indicate that there have been no recorded occurrences of this species within one mile of any of the DSA study corridors. As a result, the Biological Conclusion for this species is *No Effect* for all DSAs.

Dwarf Wedgemussel—The length of Swift Creek downstream from Lake Benson is important habitat for the long-term survival of the Dwarf Wedgemussel (see Exhibit 5). Study team biologists surveyed Swift Creek and located Dwarf Wedgemussels below the Lake Benson dam. The USFWS requested that a detailed habitat viability study be conducted for the Dwarf Wedgemussel in Swift Creek. Preliminary findings showed that while population numbers are in decline for most mussel species in Swift Creek, there is evidence that the Dwarf Wedgemussel is persisting and reproducing. The study has also concluded that while continued Dwarf Wedgemussel viability in Swift Creek will be a challenge, targeted efforts to propagate the species and increase its numbers in Swift Creek could improve the chances of maintaining its viability there. All DSAs except those using the Red Corridor segment cross Swift Creek below Lake Benson and therefore have the potential to affect this species.

> Note: At the time the Draft EIS was prepared, the Biological Conclusion for the Dwarf Wedgemussel is unresolved. NCDOT has worked with the USFWS to develop feasible strategies to offset the project's potential effects on the species and is in the formal Section 7 consultation process to obtain a Biological Opinion for the Preferred Alternative. The results are described in Chapter 4.

Tar River Spinymussel—Habitat for the Tar River Spinymussel consists of relatively silt-free gravel or coarse sand along the bottom of fast-flowing, well-oxygenated streams. While suitable habitat for this species exists in the project area, according to NCNHP records, the only documented occurrence of this species was in the Little River, a tributary of the Neuse River in Johnston County. Study team biologists surveyed streams in the study area but did not find this species.

> Note: At the time the Draft EIS was prepared, project consultation for mussel species is not complete, and the Biological Conclusion for this species was unresolved. The current status is described in Chapter 4.

Michaux's Sumac—Surveys were conducted within the May to October time frame, which is the optimal time of year for identification of this species. Although suitable habitat was found, the biologists did not locate any actual specimens of this plant. A review of the NCNHP records indicated no recorded occurrences of this species within one mile of any of the DSAs. As a result, the Biological Conclusion is *No Effect* for all of the DSAs.

> Note: Subsequent to the release of the Draft EIS, additional surveys for this species were completed, as described in Chapter 4.

Northern Long-Eared Bat—This species was added to the federal list of threatened species in Wake County in April 2015. On May 4, 2015, the USFWS adopted a programmatic Biological Opinion for this species in eastern North Carolina (including the Complete 540 study area), and the Biological Conclusion for this species for the NCDOT program is *May Affect, Likely to Adversely Affect*. The Biological Opinion provides what is known as an "incidental take"[(d)] statement for all NCDOT projects in eastern North Carolina (including Complete 540) for the next five

(d) The Endangered Species Act prohibits the "take" of listed species through direct harm or habitat destruction. In the 1982, Congress authorized the U.S Fish and Wildlife Service to issue permits for the "incidental take" of endangered and threatened wildlife species, whereby permit holders can proceed with an activity that is legal in all other respects, but that results in the "incidental" taking of a listed species.

Exhibit 5

The Dwarf Wedgemussel

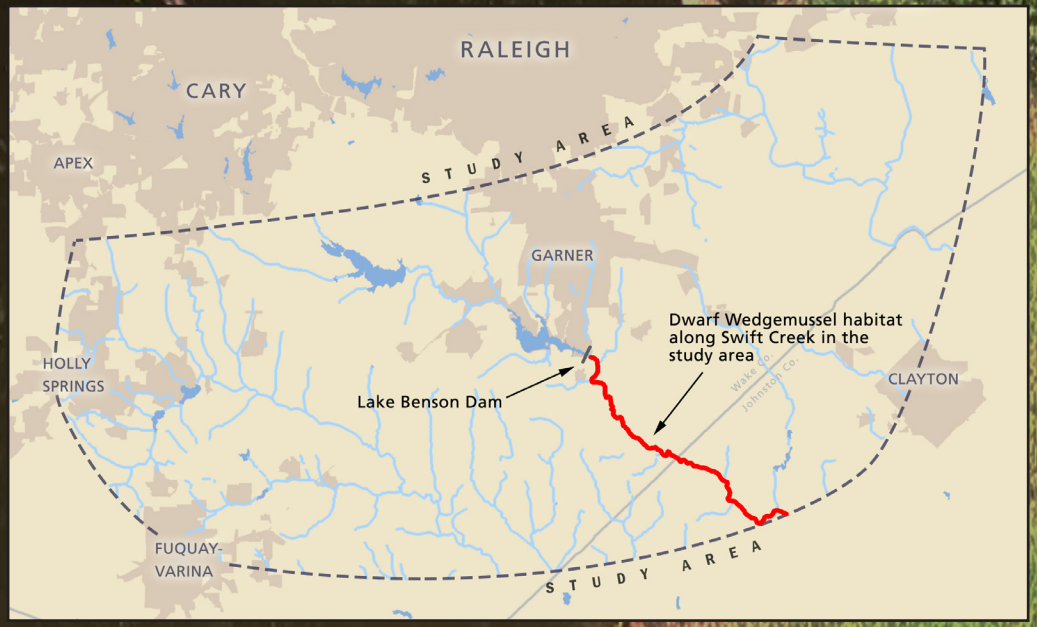
The Dwarf Wedgemussel (*Alasmidonta heterodon*) is a freshwater mussel classified by the US Fish and Wildlife Service (USFWS) as a federally endangered species. Under the Endangered Species Act of 1973, all federal agencies (including the US Department of Transportation) must ensure that any action authorized, funded, or carried out by them is not likely to jeopardize the continued existence of listed species or modify their critical habitat.

As part of its work to ensure the continued viability of the Dwarf Wedgemussel, the USFWS published a Recovery Plan for this species in 1993. In this plan, the habitat provided by Swift Creek is identified as essential for the recovery of the species in the Neuse River basin (USFWS, 1993).

Although suitable habitat is found along the entire length of Swift Creek, the dam on the southeast side of Lake Benson has the effect of dividing the creek into two separate sections. Because mussels cannot travel back and forth across the dam, any individuals that might occur upstream of the dam would be isolated from individuals found downstream.

Downstream from the Lake Benson dam, Swift Creek is part of a larger, contiguous area of mussel habitat — a location where actual specimens of the Dwarf Wedgemussel have been found. As a result, the length of Swift Creek downstream from Lake Benson is particularly important for the long-term survival of this species in the region.

Although the Dwarf Wedgemussel Recovery Plan has been in place for more than 20 years, the species continues to be imperiled. This is due, in part, to increased sedimentation levels in Swift Creek as a result of runoff from land development in the Swift Creek watershed. In keeping with federal regulations, the USFWS is working closely with NCDOT and the Federal Highway Administration to ensure the Complete 540 project would not imperil the continued survival of this mussel population.



years. As a condition of the incidental take, NDOT has agreed to conservation measures designed to minimize adverse effects and benefit or promote the recovery of the species.

Note: Subsequent to the release of the Draft EIS, the USFWS proposed for listing as federally threatened an additional freshwater mussel species (the Yellow Lance). USFWS is currently evaluating three other aquatic species for listing in the near future (Atlantic Pigtoe, Carolina Madtom, Neuse River Waterdog). The study team has completed additional field surveys for these species and for the Dwarf Wedgemussel in parts of the study area not previously surveyed. These efforts are documented in the Complete 540 study's Aquatic Species Survey Report (June 2017).

Farmlands — Identification of farmlands and land with the potential to become farmland is based on soil types. The project's potential to affect these areas was calculated using a standard Farmland Conversion Impact Rating system, which produces a score for each alternative. For "corridor type" projects such as the proposed Complete 540, the possible maximum total score is 260 points. Alternatives with a total score of 160 or more are given additional consideration for protection. In carrying out this scoring procedure, it was found that none of the DSAs scored above the 160 threshold. As a result, mitigation for farmland loss would not be required. Although the scores did not exceed the threshold for required mitigation, the rating process revealed that a substantial portion of each DSA's total acreage consists of soil types classified as prime, unique, or local or statewide important farmland soils. While the overall percentages of acres in these categories is high, there is little difference between the total acreage in each DSA.

Major Drainage Structures — Hydraulic analyses conducted for the project indicated there are 81 sites along DSAs where a major drainage structure would be needed. This analysis initially showed that 17 of these sites would require bridges. Working with applicable resource and regulatory agencies, study team engineers determined locations where additional bridges or longer bridges would reduce direct effects on streams and wetlands. As a result of this coordination, it was agreed that 27 of the 81 sites would be crossed with bridges, as opposed to the use of pipes or culverts.

Hazardous Materials and Contamination Sites — In reviewing data from the NCDEQ, 26 potential contamination sites were found along the DSAs. No hazardous waste sites or landfills were found in the study area. The two DSAs using the Red Corridor segment would affect twelve of these sites, while DSAs using the Orange Corridor segment would each affect between three and five sites. Despite their presence along these DSAs, the storage tank sites are not expected to have a substantial effect on anticipated project costs or schedules.

Sprayfields — Two sprayfields would be affected by the DSAs. One is associated with the Dempsey E. Benton Water Treatment Plant. The Lilac Corridor segment would cross sprayfields that treat water piped to this site from the City of Raleigh and would also affect one of the two 25 acre holding ponds on the property, requiring acquisition of about 89 acres of the 600 acre site. The Orange Corridor segment would affect about 11 acres of this site. The other sprayfield is associated with the Neuse River Wastewater Treatment Plant. The Brown Corridor segment would cross a portion of this sprayfield, affecting either 87 or 81 acres of the site, depending on whether the alignment uses the full length of the Brown Corridor segment or follows the Teal Corridor segment to the Brown Corridor segment. The City of Raleigh has indicated that all available sprayfields that are currently in operation are needed to accommodate the demand for waste water treatment.

Major Utility Installations — Two types of utility installations would be affected by one or more of the DSAs: major pipelines and communication towers.

Pipelines—Several petroleum and natural gas transmission pipelines are located along the Orange and Lilac Corridor segments. Shifting the alignment of the Orange or Lilac Corridor segments to reduce potential conflicts with these pipelines was considered, but doing so would increase impacts to neighborhoods and environmental resources

and it was therefore concluded that these alignments should not be shifted. As a result, the DSAs using the Orange and Lilac Corridor segments would incur the additional cost involved with relocating pipelines. This expense would be lower for the DSAs that connect to the Red or Purple-Blue segments because much of the pipeline infrastructure is located east of where these other DSAs connect to the Orange segment, or west of where the Purple-Blue segments connect to the Lilac segment.

Communications Towers—A group of three large communications towers is located along Business US 70, just north of Clayton. These towers are important because they include television communications, radio communications, emergency (911) communications, federal/state police communications, and weather data collection. The Green Corridor segment is located very close to one of these three towers. It is also very near a stream and wetland area opposite the tower. While the tower itself is outside of the Green Corridor segment, affecting just one of these anchors would require relocation of the entire tower, which would be a large expense. As a result, a more detailed examination of this location was conducted, and a slight shift to avoid the cable's anchor point was determined to be feasible, without further affecting nearby streams and wetlands. Concerns remain, however, about the proximity of some of the DSAs to the cable's anchor point.

Indirect Effects — The method for estimating a project's indirect effects includes gathering insights from urban planners and other development professionals at local and regional governments in the area. Interviews conducted by the study team with several of these individuals for the Draft EIS indicated they all anticipate a continued strong market for development, regardless of whether the Complete 540 study concludes with a Build or No-Build decision. These individuals acknowledged, however, that the Build scenario could lead to more rapid growth than would otherwise be the case, and more intense development near the project's interchanges. Factoring the expertise of these area professionals, coupled with research about other similar projects, the study team concluded that each of the DSAs would likely lead to induced land development and higher concentrations of high-density and more intense land uses in the vicinity of the DSAs, especially near interchange areas. The study team further concluded that the DSAs could differ in their potential to trigger these indirect effects, as described below.

West of I-40, DSAs using the Orange Corridor segment may have a greater potential to support growth and development in accordance with local plans in part because large portions of the Orange Corridor segment include the protected corridor, and the protected corridor has long been a factor in the development of local plans. DSAs using the Orange and Lilac Corridor segments also may have a greater potential to support growth and development in accordance with local plans because the Lilac Corridor segment is located near the protected corridor.

DSAs using the Red Corridor segment may influence development farther to the north, in a pattern different from what is sought by local planners. Local plans call for mixed-use activity centers developing in southern Wake County (generally south of Lake Benson), but the DSAs that include the Red Corridor segment would be less likely to support that development pattern.

DSAs using the Purple-Blue Corridor segment may shift development slightly farther to the south, into areas that are more rural, possibly increasing the overall potential for the project to induce land development in locations that conflict with local planning goals. The Purple-Blue Corridor segment would shift several of the project's interchanges much farther south, into areas without underlying plans in place to achieve the mixed use activity centers desired by area planners. Instead, these interchange areas could trigger more typical strip commercial development in a less concentrated, more scattered pattern—a type of land use that is discouraged by local planners.

East of I-40 there is relatively little variation in the various corridors' effect on local land use planning goals.

Continued development under either the Build or the No-Build scenarios may result in indirect effects to Swift Creek and its surrounding Watershed Critical Area, to Middle Creek, and to the associated natural

features along each of these streams. These effects could be somewhat greater under a Build scenario, due to induced growth that may not occur otherwise.

Note: A quantitative evalution of indirect effects was completed for the Preferred Alternative subsequent to the release of the Draft EIS; details are contained in Chapter 4.

Cumulative Effects — Several past infrastructure projects have influenced development in portions of the project area, including road projects such as NC 55 Bypass and the Clayton Bypass, and water treatment facilities including the Dempsey E. Benton Water Treatment Plant, the Neuse River Wastewater Treatment Plant, and the South Cary Water Reclamation Facility.

Several planned development and infrastructure projects are also expected to influence growth in portions of the project area. These include the Veridea mixed-use development in Apex, the new Western Wake Regional Wastewater Treatment Plant, and major retail development near US 70 and White Oak Road in Garner.

Anticipated growth and development in various areas within the project area will continue to affect water quality and aquatic habitat. These effects are likely under either the Build or No-Build scenario. Construction of any of the DSAs would have the potential to affect water quality and to contribute to aquatic habitat degradation.

Continued development in the lower Swift Creek watershed, below the Lake Benson dam, may threaten the long-term viability of Dwarf Wedgemussel habitat in this area, under either the Build or the No-Build scenarios. The addition of the Complete 540 project to this area has the potential to add to the cumulative effects of other past and planned future projects on the long-term viability of the species in the lower Swift Creek watershed.

For more information (expected effects)

In addition to the Draft EIS document itself, more detailed information about the expected effects of each alternative can be found in the following technical reports:

- Community Impact Assessment (June 2015)
- Historic Architectural Resources Survey Report (November 2014)
- Traffic Noise Analysis Report (May 2015)
- Right-of-Way and Relocation Report (March 2015)
- Air Quality Analysis Report (October 2015)
- Natural Resources Technical Report (August 2014)
- Waters Report (September 2014)
- Freshwater Mussel Survey Report (February 2012)
- Dwarf Wedgemussel Viability Study; Phase I (March 2014)
- Northern Long-Eared Bat Section 7 Documentation (July 2014)
- Preliminary Hydraulics Study and Addendum (February 2015)
- GeoEnvironmental Report for Planning (June 2014)
- Utility Impact Report (November 2014)
- Build Traffic Analysis Report (December 2009)
- No-Build Traffic Analysis Report (December 2009)
- Traffic Forecast Technical Memorandum (April 2014)
- Detailed Study Alternative Traffic Analysis Technical Memorandum (February 2015)
- Indirect and Cumulative Effects Report (December 2014)

Chapter 5 contains a summary of each technical report incorporated as part of the Draft EIS and this Final EIS, including the documents listed here.

DRAFT EIS CHAPTER 6: GOVERNMENT, AGENCY, AND PUBLIC INVOLVEMENT

Environmental Agency Involvement — Resource and regulatory agency involvement is an essential part of this study, and the NCDOT study team has prepared a detailed plan to guide the required coordination with federal, state, and local agencies that are authorized to develop and enforce environmental standards or otherwise have jurisdiction over some aspect of the project.

The plan identifies the Federal Highway Administration (FHWA) as the project's "lead agency," and the USACE as a formal cooperating agency. Cooperating agencies have the authority to adopt a study's EIS as their own. This is particularly beneficial to the USACE, which has the responsibility for issuing a permit for the project under the provisions of the Clean Water Act.

Agencies with important roles in the project are identified as participating agencies. These include:

- the US Army Corps of Engineers
- the US Environmental Protection Agency
- the US Fish and Wildlife Service
- the NC Division of Cultural Resources
- the NC Department of Environmental Quality, Division of Water Resources
- the North Carolina Wildlife Resources Commission
- the Capital Area Metropolitan Planning Organization

For all agencies, the plan identifies roles and responsibilities at key steps in the NEPA process and spells out procedures for agencies to raise formal issues of concern[e] and for resolving those issues.

(e) An issue of concern is defined as an issue that in the agency's judgment could result in denial of a permit or substantial delay in issuing a permit.

Formal "Scoping" Process—The study team sent formal letters of invitation to resource and regulatory agencies in January 2010 and to local agencies and local government officials in February 2010. The scoping meeting itself took place on February 16, 2010. The key issues raised as a result of the meeting included the project's potential effect on the Dwarf Wedgemussel population in Swift Creek; on water quality, particularly in Swift Creek; and on jurisdictional wetlands and streams. The emphasis placed on these topics was not, however, meant to dismiss from the study many of the other community and environmental resources in the study area.

Interagency Meetings—The main method for all the various government representatives and agencies to stay informed about the study's progress and to provide comments and responses to the study team is through interagency meetings. These face-to-face meetings are scheduled at key points in the study, when agency coordination is needed.

Twelve such meetings were held prior to the release of the Draft EIS. During those meetings, FHWA and NCDOT received comments, suggestions, and formal requests on topics such as the project's statement of purpose, the development and analysis of alternative corridors, and decisions about the elimination or addition of various alternatives.

While no official issues of concern were identified at any of the twelve meetings, one concern led to the expansion of the project's alternative corridors. Early in the study, the agencies requested a northward expansion of the project's study area to allow consideration of shorter corridor lengths, ones that could be located closer to more heavily developed areas and farther from less developed areas at the southern edge of the study area. This would also allow the study team to evaluate more potential locations for the project to cross Swift Creek, including a location outside the habitat area for the Dwarf Wedgemussel in Swift Creek, which is south of the Lake Benson dam. This request resulted in the project's study area being expanded to the north (north of Lake Wheeler and Lake Benson), and the development of what became the Red Corridor segment, which traverses this area.

PUBLIC INVOLVEMENT — The Complete 540 study includes many different opportunities for the public to become engaged with the study including public meetings, project newsletters, a project website, a telephone information line, and small group meetings.

Public meetings—An initial series of public meetings took place in September 2010. Three meetings were held on consecutive afternoons and evenings at three locations in the study area, with the same information presented at each. The purpose was to present the status of the Complete 540 study and provide an opportunity for members of the public to ask questions, discuss the study, and to provide comments to the study team about the project's purposes and the preliminary corridor alternatives. A Spanish translator was present at one of these meetings to accommodate the needs of the local Spanish-speaking population.

Approximately 1,200 individuals attended these meetings, in total, and approximately 2,100 public comments were submitted during or following the meetings. The most common subjects of these comments were:

- Widespread, strong support for the Orange Corridor segment between NC 55 Bypass and I-40.
- Opposition to many of the other segments, in particular the Blue, Purple, and Red Corridor segments.
- Concern about the perceived inequity of placing tolls on the southern and eastern portion of 540 (the Complete 540 project segment) when existing segments of I-540 in the north are not tolled. (Note: the western segment—NC 540—is a toll facility.)

In response to local government and public comments about possible effects in the eastern portion of the study area, the study team developed the Tan Corridor segment. This segment was included in the study in late 2010. A public meeting for this segment was held in December 2010. About 250 comments were received during or after this meeting. Many expressed opposition to this segment because of its potential effect on neighborhoods.

A second series of public meetings was held in October 2013 to present the corridors selected as Detailed Study Alternatives and to provide an opportunity for the public to ask questions and provide comments. As with the 2010 meetings, three events were held on consecutive afternoons and evenings at three different study area locations, with the same information presented at each. A Spanish translator was again present to accommodate the needs of the local Spanish-speaking population.

Approximately 1,700 individuals attended these meetings, in total, and some 1,000 comments were received during or following these meetings. The main subjects of these comments were:

- Continued strong opposition to Purple, Blue and Lilac Corridor segments
- Continued strong opposition to Red Corridor segment
- Continued support for Orange Corridor segment

The release of the Draft EIS in the fall of 2015 triggered three public information meetings and one formal public hearing in December of 2015 (described more fully in Chapter 3).

Newsletters—The study team has published several editions of a project newsletter. These have introduced the study, presented the preliminary alternatives, announced public meetings, presented the DSAs, and announced the public hearing. Each edition has been sent to all addresses in the study area and to others who have requested to be on the mailing list, totaling more than 56,000 addresses. Each edition has also been prepared in Spanish and distributed at Hispanic-oriented businesses and churches in the project area. Both the English and Spanish versions have been made available for downloading on the study's website.

Note: With the selection of a Preferred Alternative after the end of the Draft EIS comment period, another edition of the newsletter was sent, announcing this selection.

Project Website and Telephone Information Line—A project website was established early in the study as a place for the public to access various project maps, reports and other documents, and to provide a way to submit comments and questions to the study team using an online submittal form. A toll-free information line was also established, allowing members of the public to speak directly with a member of the study team.

Small group meetings—Throughout the project, the study team has made itself available to meet with small groups such as homeowners associations and civic groups. These smaller gatherings allow the study team to explain specific aspects of the project at a level of detail not always possible at larger meetings or through written material. These gatherings also provide a forum for extended informal discussions that are not always possible otherwise.

LOCAL GOVERNMENT OUTREACH — There are several local governments and non-governmental organizations in or near the study area whose involvement is an important part of the study. These include all the incorporated cities and towns, as well as the Capital Area Metropolitan Planning Organization (CAMPO), and the area's Regional Transportation Alliance (RTA).

The study team has provided project updates at many of CAMPO's Executive Board and Technical Coordinating Committee meetings. In addition, in 2014 CAMPO established the "540 Working Group," which includes individuals from many of the jurisdictions noted above. Several Working Group meetings have been held since that time, leading up to the selection of the Preferred Alternative. The study team has also met several times with local government staff and elected officials to provide more detailed information about the study and to answer questions and receive comments.

OTHER NOTABLE PUBLIC AND GOVERNMENT INVOLVEMENT — While most of the public outreach activities that have taken place over the course of the study have been initiated by the study team, some activities have been the result of community or local government actions.

The study team has received several local government resolutions and written comments from local government staff members. The majority of these documents have expressed formal support for the selection of alternatives that use the Orange Corridor segment as the preferred route, or expressed opposition to one or more of the other corridors that do not use the Orange Corridor segment.

The study team has also received petitions from various neighborhood groups and other local organizations, each with statements expressing either opposition to or support of a particular corridor segment.

Note: Eighteen such petitions had been received by the time of the release of the Draft EIS.

For more information

In addition to the Draft EIS document itself, more detailed information about the study's public and agency involvement can be found in the following technical report:

- Stakeholder Involvement Report (March 2015)

Chapter 5 contains a summary of each technical report incorporated as part of the Draft EIS and this Final EIS, including the document listed here.

CHAPTER 3

Comments and Coordination on the Draft Environmental Impact Statement

This chapter provides a summary of how state and federal agencies, local governments, and the public have been involved in the study since the Draft EIS was released, and the comments they provided about the Detailed Study Alternatives.

"Public involvement is more than simply following legislation and regulations. In a democratic society, people have opportunities to debate issues, frame alternative solutions, and affect final decisions. Knowledge is the basis of such participation. The public needs to know details about a plan or action in order to evaluate its importance or anticipated costs and benefits."

~ Federal Highway Administration[1]

As expressed in the quotation above, the public has an expectation that opportunities will be provided to review information about large public infrastructure projects, and to formally submit comments and to receive meaningful responses. The Complete 540 study team has worked to meet those expectations throughout every stage of the study.

The Complete 540 study's Draft Environmental Impact Statement (EIS) included information about the stakeholder involvement that occurred from the beginning of the study to the time the Draft EIS was released for public review. This current chapter explains how the study team has continued those activities, including a summary of the comments received on the Draft EIS and NCDOT's responses to those comments.

DRAFT EIS REVIEW, PUBLIC MEETINGS, AND PUBLIC HEARING

As explained in Chapter 1, the Draft EIS for the Complete 540 project is a formal document, one that received official review and approval by the Federal Highway Administration. Once approved, a period of time was allocated for other government agencies and the public and to read the document and submit comments about it.

An official "Notice of Availability" of the Draft EIS was published in the *Federal Register* on November 20, 2015. Beginning on November 7,

2015, printed copies of the Draft EIS were distributed for public review at public libraries and local government offices in the project area. The Draft EIS was also posted to the official project website (www.ncdot.gov/projects/complete540/).

Copies of the Draft EIS were distributed to the cooperating and participating agencies involved in the environmental review process for this project, along with local governments and area organizations.

It is during the Draft EIS comment period that a study's formal corridor public hearing takes place. Public hearings provide an opportunity for members of the public to review the Draft EIS, discuss its contents with the project's sponsors, and to make formal comments about the project and the document. They include detailed maps showing the proposed route alternatives and other display materials to aid in understanding the project and the content of the Draft EIS. Various methods for commenting on the project are provided, including oral statements made during a formal assembly of attendees, written comments submitted at or followng the hearing, and oral comments recorded at individual recording stations before and during the hearing.

The public hearing for the Complete 540 Draft EIS was held on December 9, 2015, at Wake Technical Community College. This location is inside the study area boundaries, on US 401, just south of Ten Ten Road.

Three public meetings were held in conjunction with the public hearing. These informal meetings provided additional opportunities for the public to review study details and discuss the project with NCDOT study team members. The first was held from 6 to 8 PM on Monday, December 7, at Barwell Elementary School, which is located in the eastern part of the study area. The second was held from 6 to 8 PM on Tuesday, December 8, at Holly Springs High School, which is in the western part of the study area. The third was held just prior to the formal public hearing at Wake Technical Community College. This informal meeting began at 4 PM, followed by the formal hearing at 7 PM. Based on sign-in records, attendance at these three locations was as follows:

Barwell Elementary School	210
Holly Springs High School	264
Wake Technical Community College	532
Total for the three events	1006

Announcements about the availability of the Draft EIS and the public meetings and hearing were made in several ways: through distribution of a study newsletter to all property owners in the study area and those who requested to be included on the project mailing list; through placement of printed advertisements in area newspapers; by submitting press releases to area news media; and, by posting a notice on the project website. State and federal agencies and local governments were notified during meetings with the study team.

In addition to the *Federal Register* Notice of Availability published by the USEPA for the Draft EIS, the USACE issued a Public Notice, on November 16, 2015, relative to the anticipated Section 404 permit application for the project. Like the USEPA notice, the USACE notice provided information to the public about opportunities to comment on the project.

COMMENTS AND RESPONSES ON THE DRAFT EIS

Comments were received on the Draft EIS from state and federal agencies, local governments and interest groups, and members of the public. Summaries of the comments made by these four categories of stakeholders, and responses to those comments, are presented in detail in the study's Stakeholder Involvement Report.

State and Federal Agencies — Letters in response to the Draft EIS were received from several state and federal agencies. Table 1 summarizes the comments made on the DSAs.

Local Governments and Interest Groups — Several local governments and other stakeholder groups submitted formal comments following release of the Draft EIS. The City of Raleigh's Mayor and Office of Transportation expressed support for DSA 2 and opposition to the Red,

Table 1

Federal and State Agency Review Comments on the Detailed Study Alternatives

(as presented in the Draft EIS)

Agency	Comments
US Fish & Wildlife Service (11/25/15)	DSAs 6 and 7 (Red Corridor) have lowest impacts on wetlands & streams and the least direct and indirect effects on the Dwarf Wedgemussel (DWM). USFWS understands the intense opposition to the Red Corridor due to its disproportionate impacts on the human environment. DSAs 1 through 5 (Orange Corridor) greatly minimize impacts to human environment; however, they have great potential to adversely affect the DWM. USFWS finds the Orange Corridor very problematic. DSAs 8 through 17 (Lilac Corridor) would have very similar, albeit somewhat lesser adverse effects on the DWM. The ability to propagate DWM and augment the population in Swift Creek will factor significantly in the analysis to determine whether the Complete 540 project will jeopardize the continued existence of the species. USFWS would prefer that the Clemmons Educational State Forest not be impacted.
US Environmental Protection Agency (1/4/16)	The USEPA environmentally prefers DSAs 6 and 7 as the alternatives having the least impacts on jurisdictional streams and wetlands. DSAs 1-4 and 8-17 have the highest stream impacts, while DSAs 1-5 and 15-17 have the highest wetland impacts. Further avoidance and minimization during final design should be considered to reduce impacts to aquatic resources.
National Marine Fisheries Service (12/15/15)	The NMFS prefers DSAs 6 and 7 because they would avoid impacts to shad and striped bass and their habitats in Swift Creek, would have smaller impacts to the Neuse River, and would impact the smallest amount of wetlands and streams.
North Carolina Wildlife Resources Commission (12/9/15)	Indirect and cumulative effects of the project on induced land development will be a key aspect in selecting the Least Environmentally Damaging Practicable Alternative (LEDPA). NCWRC has concerns about the effect of continued development in the lower Swift Creek watershed, below the Lake Benson dam, on long-term viability of the DWM and other sensitive aquatic species.

Note: NCDOT also received comment letters from the U.S. Department of the Interior, U.S. Department of Agriculture, North Carolina Division of Water Resources, and North Carolina Division of Waste Management. These comment letters did not specifically address support for, or opposition to, project DSAs; they are summarized in the Complete 540 study's December 2017 Stakeholder Involvement Report and the Preferred Alternative Report.

Public Involvement

The NCDOT team has met with local governments; held formal meetings with environmental agencies; and has communicated with the public through information meetings, neighborhood meetings, newsletters, a study website, and an information line. Pictured here: the study's formal public hearing.

Lilac, Green, Brown, and Tan Corridors, and also noted various design- and infrastructure-related issues. The Town of Cary commented about greenway accommodations. The Town of Garner reiterated its support for the Orange Corridor segment and opposition to the Red and Lilac Corridor segments. The Town of Benson expressed support for the Orange Corridor segment.

The RTA and the Morrisville Chamber of Commerce both submitted comments expressing strong support for the project overall. The Triangle Greenways Council commented about the project's potential effects on greenways and natural resources.

The Southern Environmental Law Center (SELC) expressed concerns about the analyses used in the project, stating its opposition to constructing a new roadway and suggesting that NCDOT give greater consideration to options such as improving existing roadways. Later, in a joint letter sent on March 7, 2016, SELC and RTA requested additional information and clarifications about certain project details. (NCDOT replied on April 28, 2016 with a letter containing the requested information and clarifications.) A second letter from SELC, dated July 5, 2016, referenced the 2016 NC Supreme Court decision in *Kirby v. North Carolina Department of Transportation* (which declared that property restrictions under State's Transportation Corridor Official Map Act constitute the taking of private property without just compensation). In its letter, SELC stated that NCDOT must prepare a Supplemental DEIS in the wake of the *Kirby* ruling because the ruling could influence the project's cost estimates. (In response, FHWA reviewed the cost estimates and concluded that a Supplemental DEIS is not required.) These SELC letters, and NCDOT's responses, can be found in the Complete 540 project's December 2017 Stakeholder Involvement Report.

Members of the Public — During the comment period for the Draft EIS, written comments addressing the DSAs, the Draft EIS, or other substantive project issues were received from 1,476 individuals. These were in the form of emailed comments, letters, photocopied letters, and a petition. In addition, 40 oral comments were made; 35 during the formal hearing, and 5 made individually at a recording station.

The members of the public who made these comments tended to refer to individual corridor segments rather than end-to-end DSAs when indicating preferences and opposition. Key conclusions from a review of expressed preferences and opposition in all of the comments included the following:

- There was a very high level of support for the Orange Corridor segment. About 93 percent of comments that mentioned a segment west of I-40 expressed a strong preference for the Orange Corridor segment.
- Support for the Red, Purple-Blue, and Lilac Corridor segments was at 2 percent, 4 percent, and 2 percent, respectively.
- There was widespread opposition to the Red (58 percent of those stating opposition to a color corridor west of I-40) and Purple-Blue Corridor segments (34 percent of those stating opposition to a color corridor west of I-40).
- There was also notable opposition to the Lilac Corridor segment, with 7 percent of those stating opposition to a color corridor west of I-40.
- Only 1 percent of those stating opposition to a color corridor west of I-40 were opposed to the Orange Corridor segment.
- There was less of a clear pattern of support and opposition to corridors east of I-40, with most comments not specifically addressing these options. However, among comments that specifically addressed the corridors east of I-40, the Green Corridor segment was most commonly preferred. The Brown Corridor segment and the Tan Corridor segment were most commonly opposed.

While some individuals did not cite reasons for their route preferences, those that did often mentioned concern about potential effects on their neighborhoods, communities, and homes. This was especially the case for those indicating support for the Orange Corridor segment and opposition to other segments. Many noted that area communities have based their land use plans on the assumption that what is now the Orange Corridor segment—which was protected from devel-

opment from the late 1990s until recently—would eventually be built. Additionally, individuals stated that they made residential location decisions based on the presence of the protected corridor, dating back as far as its initial protection, in 1996. Often these comments contained statements to the effect that minimizing impacts on homes, businesses, and neighborhoods should take precedence over minimizing impacts to the natural environment. For the smaller number of individuals that specifically expressed interest in corridor segments east of I-40, many stated that since a route similar to the Green Corridor segment has been shown on planning maps for the past two decades, they have made residential location decisions based on the assumption that the route that is now the Green Corridor segment would eventually be built.

While the majority of public comments were limited to expressing support for, or opposition to, certain DSAs or corridor segments, others went further and discussed various concerns or comments about the proposed project in general. Some of the more common issues raised included:

- Questions about whether traffic volumes and toll revenues on the existing portions of NC 540 is meeting the levels predicted by NCDOT.
- Concern about the perceived unfairness of tolling the extension of the 540 Outer Loop into southern Wake County when the northern sections of the Outer Loop are not tolled.
- Statements citing that since the mid-1990s the decisions local residents have been making about where to live, and local governments have been making about future land use plans, have been based on the belief that the project would be constructed along the protected corridor (Orange Corridor segment).
- Questions about why the project has taken as long as it has to proceed and why NCDOT didn't start the environmental documentation process immediately after the protected corridor was established, in the late 1990s.
- Questions about why NCDOT can't simply widen existing roads (NC 55, NC 42, or Ten Ten Road, for example) instead of building a new road.
- Questions about where noise barriers would be constructed and when a noise impact study will be done.

There were also more specific comments that addressed aspects of the project design, the project development process, or information included in the Draft EIS.

OTHER STAKEHOLDER INVOLVEMENT ACTIVITIES

Stakeholder involvement has continued in the time since the Draft EIS was released. During that time, the NCDOT met with representatives of state and federal agencies and stakeholder groups, continued discussing project details with local governments, and has maintained the study's information phone line and online comment form page.

For more information

More detailed information about public and agency involvement for the Draft EIS be found in the following technical reports:

- Stakeholder Involvement Report (December 2017)
- Preferred Alternative Report (April 2016)

Chapter 5 contains a summary of each technical report incorporated as part of the Draft EIS and this Final EIS, including the documents listed here.

CHAPTER 4

The Study's Preferred Alternative

This chapter describes the study's Preferred Alternative, how it was selected, refinements made to it, and the updates to its impact data.

INTRODUCTION

The National Environmental Policy Act (NEPA) requires that alternative ways of achieving the stated purpose of a project be identified and their environmental effects compared. The objective is to produce information that will allow for sound, knowledge-based decisions about the best option for achieving the purpose of the project and whether that option's benefits would justify the costs and environmental impact it would require.[1]

The Complete 540 study team has carried out a process intended to systematically consider and narrow down a large number of options to a Preferred Alternative for comparison with the "No-Build" alternative. The study's technical analyses for seventeen Detailed Study Alternatives (DSAs) were summarized in a Draft Environmental Impact Statement (EIS), which was made available to local governments, agencies, and the public for review and comment. It was during this period that the December 2015 public meetings and formal public hearing took place.

After careful consideration of the technical information summarized in the Draft EIS and the comments received during development and after release of the document, and after considering the professional judgment of NCDOT and Federal Highway Administration officials (FHWA), NCDOT and FHWA selected DSA 2 as the Preferred Alternative (see Exhibit 6 on the following page). The key factors that led to this selection are described below.

Relocations — Between NC 55 Bypass and I-40, the Preferred Alternative follows the Orange Corridor segment. The Orange Corridor segment would require between 60 percent and 100 percent fewer relocations (as calculated for the Draft EIS) than the other corridors between NC 55 Bypass and I-40.

Protected Properties — The Preferred Alternative would avoid adversely affecting any historic sites that qualify for protection under Section 106

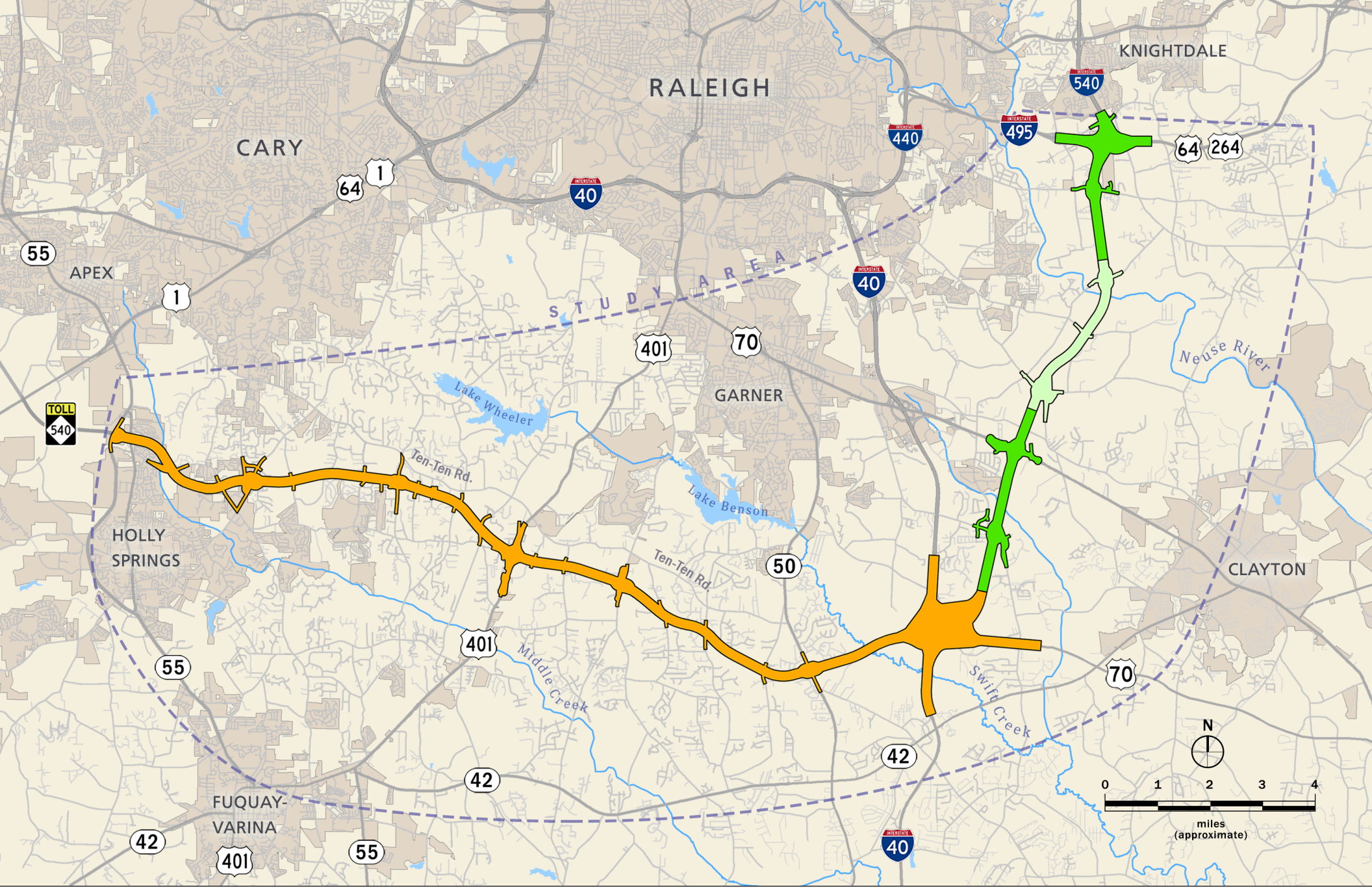


Exhibit 6

Preferred Alternative

Detailed Study Alternative 2

Of the 17 Detailed Study Alternatives under consideration, DSA 2 was selected by the Federal Highway Administration and the North Carolina Department of Transportation as the Preferred Alternative. This alternative consists of the Orange segment from NC 55 Bypass to east of I-40, and the Green segment from east of I-40 to US 64/US 264 Bypass (I-495). The Green segment shifts to the Mint segment for a portion of its length, as shown here.

of the Historic Preservation Act and would avoid recreational properties and other land uses protected under Section 4(f) of the US Department of Transportation Act (other than those considered *de minimis* effects, i.e., extremely minor effects).

Environmentally-Sensitive Areas — The Preferred Alternative would avoid the Swift Creek Critical Watershed Area, and would affect a shorter length of streams than many of the other DSAs.

Other Sensitive Properties — The Preferred Alternative would avoid affecting the Neuse River Wastewater Treatment Plant sprayfields, avoid affecting the City of Raleigh police training center, and would shift the highway to the edge of the City's Randleigh Farm property (compared to DSAs using the entire Green Corridor segment in this area, which would bisect this public property).

Indirect Effects — The Preferred Alternative is expected to be less likely to induce development that would be in conflict with local land use plans.

Environmental Agency Input — None of the environmental resource and regulatory agencies has identified any "issues of concern" with respect to selecting DSA 2 as the Preferred Alternative. Because of the absence of issues of concern, the assumption is that the Preferred Alternative is the Least Environmentally Damaging Practicable Alternative.

Public Support — The Orange Corridor segment has broad public support and has been formally endorsed by most local governments in the study area. The Mint Corridor segment is the only segment east of I-40 that has not been formally opposed by any of the local governments in the study area and is formally supported by the City of Raleigh.

Cost — The Preferred Alternative would be the least costly of the seventeen DSAs.

The above list presents the key elements that differentiate the Preferred Alternative from the other DSAs. This list does not include all the benefits or impacts of DSA 2.

It is important to note that the selection of a Preferred Alternative does not determine the outcome of the project. The ultimate decision about whether to approve the project is made only after this alternative has been refined to ensure its impacts are kept to a minimum, and after the resulting data summarized in this Final EIS has been made available for public review. The final decision is influenced, therefore, not only by NCDOT's and FHWA's statutory mission and priorities, but also by the weight of organized interests and other variables beyond the assessment of specific impacts.[2]

DESCRIPTION OF THE PREFERRED ALTERNATIVE

The Preferred Alternative consists of the Orange Corridor segment, the southern portion of the Green Corridor segment, the Mint Corridor segment, and the northern portion of the Green Corridor segment (see Exhibit 6). It would be 28.4 miles in length, from NC 55 Bypass to US 64/US 264 (I-495), with six lanes, a 70-foot wide median, and a posted speed limit of 70 miles per hour. Interchanges would be located at NC 55 Bypass, Holly Springs Road, Bells Lake Road, US 401, Old Stage Road, NC 50, I-40/US 70 (Clayton Bypass), White Oak Road, Rock Quarry Road, US 70 Business, Auburn Knightdale Road, Poole Road, and US 64/US 264 (I-495).

Independent Utility and Logical Termini — To ensure meaningful evaluation of alternatives, FHWA regulations require that: (1) projects have logical limits (known as "logical termini") and be long enough that the environmental analysis has a sufficiently broad scope; (2) projects are usable even if no additional transportation improvements in the area are made (known as "independent utility"); and, (3) approval of a project would not restrict consideration of alternatives for other foreseeable transportation improvements.[3]

The western project terminus is at NC 55 Bypass in Apex, where the existing Triangle Expressway (NC 540) ends. The eastern project terminus is at US 64/US 264 (I-495) in Knightdale, where the existing I-540 ends. These two end points are necessary for development of alternatives that would enhance the transportation connections between

the rapidly growing communities south and east of Raleigh to major employment and activity centers in the vicinity of the 540 outer loop. Providing enhanced transportation connections would improve system linkage in the regional roadway network, a secondary purpose of the project. This would provide continuity for the 540 outer loop system.

In addition to enhancing connections to locations along the existing segments of the 540 outer loop, the Complete 540 project would also have independent utility. The project as a whole would allow an option for travelers to bypass I-40/I-440 south of Raleigh, providing direct connections between I-40 in southwest Durham to I-40 near the Wake/Johnston County line and to US 64/US 264 east of Raleigh.

Approval of the Complete 540 project would not restrict consideration of alternatives for other reasonably foreseeable transportation improvements. The project has been developed in coordination with CAMPO and the local governments in the project area.

PREFERRED ALTERNATIVE SELECTION PROCESS

The process for identifying a Preferred Alternative was established in the project's Section 6002 Coordination Plan[(a)]—a document prepared at the beginning of the study to establish the process for environmental resource and regulatory agency coordination and public involvement. The plan outlined several steps for selecting a Preferred Alternative. Once the Draft EIS was prepared and the study's corridor public hearing was held, these steps were completed, as described below.

Step 1: Prepare a Draft Preferred Alternative Report to include: (a) a summary of each DSA's effect on environmental features in the project study area; (b) an overview of the comments and information provided by resource and regulatory agencies, local governments, and the public; (c) a summary of the impact minimization efforts carried out for the DSAs; (d) NCDOT's and FHWA'S recommendation for a Preferred Alternative; and (e) an explanation of how information in the Draft EIS, past comments on the alternatives, and comments made on the Draft EIS during the formal comment period, were used in reaching this decision.

Step 2: Submit a Draft Preferred Alternative Report to the project's cooperating and participating agencies for review and comment.

Step 3: Hold a meeting with the cooperating and participating agencies to discuss the Draft Preferred Alternative Report and the Preferred Alternative recommendation.

Step 4: Review all comments from the cooperating and participating agencies on the draft report and the recommended Preferred Alternative.

Step 5: Prepare the final version of the Preferred Alternative Report, documenting the Preferred Alternative selection.

The NCDOT study team carried out these steps in the months following the formal comment period for the Draft EIS and the comment period associated with the USACE Public Notice.

REFINEMENTS TO THE PREFERRED ALTERNATIVE

The DSAs were developed at a level of detail that allowed accurate comparisons of their benefits and impacts and ensured that impacts were avoided or kept to a minimum. While this level was appropriate for selecting a Preferred Alternative, additional refinements have been made to the Preferred Alternative in an attempt to respond to public and agency comments, to further reduce impacts, and to establish the basis for right-of-way acquisition, and to prepare construction plans. These refinements include the following:

Property Access — A key refinement involves access to properties that would be affected by the project. When a new, limited-access highway is built, properties are often affected such that their size would not be

(a) The Section 6002 Coordination Plan is a document established at the beginning of the study to document procedures for involvement of local, state, and federal agencies, local governments, and the public. The name refers to the section in Public Law 109-59 that applies to this topic.

substantially reduced but their access to the existing road network would be changed. In these cases, it is typically necessary to construct dedicated service roads to replace the loss in access. The other option is for the state to purchase these parcels in their entirety.

Several such instances existed along the Preferred Alternative alignment. To determine which would be the better solution in each case—construct a service road or purchase the parcel—a detailed service road study was carried out to establish the cost difference between these two options on a parcel by parcel basis. Based on the results of this study, NCDOT examined 597 parcels along the Preferred Alternative's path, making adjustments to its alignment where economically justified to minimize or mitigate access impacts..

Accommodating Traffic Volumes — Other refinements were made to the Preferred Alternative to ensure that design features such as turning lanes and other interchange and intersection configurations best accommodate the anticipated future traffic volumes, based on the latest traffic forecasts.

Additional Minimization of Impacts — Another category of refinement concerns attempts to further minimize the project's potential effect on natural systems and community resources. This included examining locations along the Preferred Alternative where the "footprint" of the project could be narrowed or shifted to avoid or reduce impacts at various locations.

Changes were made at the following locations:

US 401 interchange area — The roadway's alignment was shifted to the north by 110 feet to reduce impacts to two streams and one wetland. This also reduced the impact to a cemetery adjacent to the interchange and Donny Brook Road.

Turner Farms subdivision/Swift Creek — By shifting the alignment slightly in this area, property impacts along Fantasy Moth Drive were avoided. This shift also allowed a more perpendicular crossing of Swift Creek, which reduced wetland and stream impacts in this area.

I-40 interchange area—The proposed design of the I-40 ramps at this interchange was refined to reduce impacts to a wetland and a stream in this area.

Auburn Knightdale Road interchange area — The ramps at this interchange were revised to reduce impacts to three wetlands, one stream, and the surrounding floodplain area.

Neuse River crossing — Functional designs included a culvert crossing for the existing Neuse River Trail, adjacent to the Neuse River. The City of Raleigh has since requested relocating the trail under the proposed bridge for the Neuse River crossing, in lieu of a culvert. The project design was modified accordingly.

In addition to these changes, the basis for measurement of impacts has been modified for the Preferred Alternative's design using the more detailed mapping that is developed for the Preferred Alternative. The impact calculations for the functional designs developed for the Draft EIS were based on those designs' construction limits, plus a 40-foot buffer zone. For the refined designs developed for the Preferred Alternative, the calculations were based on that design's construction limits, plus a 25-foot buffer zone.

For more information

In addition to the documents referenced in the Draft EIS, more detailed information on the factors that led to the selection and refinement of the Preferred Alternative can be found in the following technical reports:

- Preferred Alternative Report (April 2016)
- Service Road Study (May 2017)

Chapter 5 contains a summary of each technical report incorporated as part of the Draft EIS and this Final EIS, including the documents listed here.

EXPECTED EFFECTS OF THE PREFERRED ALTERNATIVE

Environmental Justice and Civil Rights — The analyses conducted for the Draft EIS indicated there would be no environmental justice concerns with any of the seventeen DSAs, nor would any concentrated pockets of low income individuals be disproportionately affected. These same conclusions remain valid for the Preferred Alternative.

Potential Relocations — The refined design for the Preferred Alternative resulted in changes to the estimated number of properties affected and the number of relocations reported in the Draft EIS. The Preferred Alternative, based on the preliminary plans for the project, would affect 1,825 acres of land on 858 parcels and would require 217 relocations. The relocations include 209 residences, 5 businesses, and 3 non-profit organizations.

Barrier, Access, and Neighborhood Effects — Two residential developments would be bisected by the Preferred Alternative, resulting in the creation of a barrier. The first would occur at Woodcreek, near Sunset Lake Road, and the other at Deerfield Park, located west of Johnson Pond Road. It should be noted that in the case of Woodcreek, the community was developed with the knowledge that 540 could bisect it.

Three other neighborhoods would experience substantial access changes or a relatively large number of property relocations: (1) Fairview Wooded Acres, located on the east side of Holly Springs, near Sunset Lake Road; (2) Blue Skies Mobile Home Park, located on Rhodes Road; and (3) Oxford Green, located west of Bells Lake Road. While NCDOT has attempted to avoid and minimize these effects as much as possible, other types of constraints near these communities have made these effects unavoidable. Other residential developments would experience relatively minor effects, such as right-of-way acquisition along the edge of the community or minor changes in access.

Community Facility Impacts — The Preferred Alternative would require the acquisition of about 3.3 acres of land from the northwest corner of Wake Technical Community College but would not affect any campus buildings. NCDOT has coordinated with representatives of the college during the project development process.

The Preferred Alternative would also affect land at six churches, as described below. Church functions would not be affected at any of these locations.

(1) There would be a 0.6 acre impact to the Hope Community Church property on East Williams Street (NC 55). The impact is along a wooded area at the rear of the property, beyond the existing parking lot.

(2) About one acre would need to be acquired from the Word of Truth Church of God, located on Eddie Creek Drive, just off NC 55 near the western project terminus. Acquisition would be from a wooded part of the property.

(3) A small, 0.05 acre land acquisition would be required from the Triangle Community Church, located off Kildaire Farm Road. This impact area is at the extreme edge of the parcel, near Ness Drive.

(4) At Triangle Baptist Church, the project would require that overhead powerlines in the vicinity of the church be moved closer to the parking lot along Old Stage Road. This would require about 0.2 acres of land acquisition for a utility easement.

(5) Approximately 0.16 acres of easement would be required from the Juniper Level Missionary Baptist Church, located off Sauls Road, to accommodate a temporary detour alignment. This would revert back to the church after construction.

(6) The Preferred Alternative would require a portion of the front driveway area at the Mount Herman Christian Church, located off White Oak Road, along with land from an area behind the church's baseball field. About 1.23 acres of property would need to be acquired and 0.2 acres of temporary construction easement would be required.

In addition to these land acquisition effects, the Preferred Alternative might result in slight alterations to some existing school bus routes,

some of which would be temporary changes that would occur only during project construction. The Preferred Alternative may also shorten response times for emergency vehicles in some locations by decreasing the number of indirect, circuitous routes currently required using local roads.

Historic Architecture Resources — On December 10, 2014, the State Historic Preservation Office (HPO) concurred with NCDOT's finding that the Preferred Alternative would have no effect on 23 of the 25 properties in the Area of Potential Effect that are listed on or eligible for listing on the *National Register of Historic Places* (NRHP). The two properties that would be affected are the John Strain House (located on the west side of Lake Wheeler Road, north of the Preferred Alternative), and the Panther Branch School, (located on the east side of Sauls Road, south of the Preferred Alternative). For these two properties, the HPO concurred with NCDOT and FHWA that the Preferred Alternative will result in "no adverse effect" to each property. The basis of the no adverse effect determination for these properties was that "noise impacts do not show substantial increase in decibel (noise) levels at the properties.

At Panther Branch School, the HPO required that NCDOT commit to building a retaining wall along the property to avoid the need for a permanent easement and to ensure that this property would receive no substantial increase in noise levels as a result of the project. With this commitment, the HPO concurred with the finding that the Complete 540 project would have no adverse effect on this property.

The Preferred Alternative's preliminary designs include a retaining wall in front of the Panther Branch School, on Sauls Road. The wall would be built in the existing road right-of-way and the HPO will be given the opportunity to review it, prior to completion of the designs.

The draft Traffic Noise Analysis Report Addendum confirms that neither the John Strain House nor the Panther Branch School would experience a noise impact from the Preferred Alternative. At each site, the predicted noise levels are below the Federal Noise Abatement Criteria and neither shows a substantial increase in noise over existing levels.

Archaeological Resources — Professional archaeologists have conducted archival research and have conducted field investigations to determine if the Preferred Alternative would affect any archaeological resources. This archaeological investigation has been documented in the Archaeological Survey Report included with this Final EIS.

As a result of this investigation, one prehistoric archaeological site was identified that qualifies for the NRHP under Criterion D only. (Criterion D is defined as a site that has yielded, or may be likely to yield, information important in history or prehistory.) The identified site is of importance for the data that it contains and does not require preservation in place. The eligibility of this site for the NRHP has been confirmed through coordination with the HPO.

NCDOT investigated shifting the highway alignment to avoid this site but found that such a change would result in additional direct impacts to wetlands, streams, and existing residential neighborhoods. While bridging the site could potentially avoid direct effects on this site, a review of the proposed designs and the topography in this area showed that bridging the site would require significant design revisions if nearby wetlands and a nearby subdivision were to be avoided. Because these design revisions would increase the overall project footprint in this area and result in an undesirable partial vertical curve on the bridge, NCDOT concluded they should not be implemented.

Prior to any construction activity in the area of this site, NCDOT will recover the data from this site and document this recovery to the satisfaction of the HPO.

In accordance with Section 106 of the Historic Preservation Act, a Memorandum of Agreement (MOA) is under development relative to this site, and will be completed prior to the Record of Decision on the project. The Advisory Council on Historic Preservation and the Catawba Indian Nation have been notified of the project's potential effect on this site and have been invited to participate in the Section 106 process for developing the MOA.

Final Section 4(f) Evaluation — Section 4(f) of the Department of Transportation Act of 1966 is intended to protect specific types of recreational, historic, and wildlife areas from intrusion by highway projects unless certain conditions are met. In situations where such properties may be only slightly affected by a transportation project, FHWA may determine that a provision called a "*de minimis*" effect applies, allowing many Section 4(f) restrictions to be relaxed—provided that active recreational, historic, or wildlife functions are not involved on the portion of the parcel that would be affected. Two parcels qualifying for protection under Section 4(f) would be affected by the Preferred Alternative, but FHWA has determined they would be *de minimis* impacts.

Middle Creek School Park—The Preferred Alternative would cross a narrow strip of land along the northern edge of a parcel owned by the Town of Cary and associated with Middle Creek School Park, affecting about 2.8 acres of this 105 acre parcel. Because the affected area is wooded open space, with no formal park functions (i.e., no active recreational uses), the Preferred Alternative would not adversely affect the park's recreational activities, features, or attributes. Because the affected land is only a small percentage of the total parcel, and because the function and use of the park would not be altered, FHWA has determined that it would be a *de minimis* impact.

Neuse River Trail—The Preferred Alternative would cross the Neuse River Trail, a 28-mile pedestrian and bicycle path that is part of Raleigh's Capital Area Greenway System. It is located adjacent to the Neuse River in eastern Wake County. Prior to preparation of the Draft EIS, NCDOT proposed installing a culvert as the method for trail users to cross the new highway. Since that time, the City of Raleigh has requested that instead of using a culvert, the trail be shifted so that it passes under the Preferred Alternative's bridge over the Neuse River. NCDOT has since incorporated that request into the project's design. While there would be temporary construction impacts on the trail during construction of the Preferred Alternative, after construction the trail would return to its pre-construction condition. With the currently proposed design, the Preferred Alternative would not permanently affect access to the trail, nor would it adversely affect the trail's recreational activities, features, or attributes, and trail use would be accommodated during construction. For these reasons, FHWA has determined that it would be a *de minimis* impact.

Information about the evaluation of the potential impacts of the project on these recreational resources, and about FHWA's determination that their recreational activities, features, and attributes would not be adversely affected by the project, was included in an appendix to the Draft EIS. The public, local governments, and resource and regulatory agencies had the opportunity to review and comment on the potential effects of the project on these resources during the comment period for the Draft EIS. There was no expressed opposition by citizens to the proposed *de minimis* determinations for these resources.

Before making *de minimis* determinations for these properties, NCDOT and FHWA consulted with the officials who have jurisdiction over these properties to ensure such determinations could be made. The City of Raleigh has concurred with the FHWA *de minimis* determination relative to the Neuse River Trail. Likewise, the Town of Cary has concurred with the *de minimis* determination for the Middle Creek School Park. Copies of concurrence letters to this effect can be found in the project's Stakeholder Involvement Report.

In addition to the two park facilities, the Preferred Alternative would affect one archaeological site that has been determined to be eligible for the NRHP. As noted previously, the HPO has determined that the archaeological site is of importance only for the data it contains and does not require preservation in place. Because the site does not warrant preservation in place, Section 4(f) does not apply to it. The Preferred Alternative would not result in "use" of any NRHP-eligible or listed historic architectural sites under Section 4(f).

Visual Character and Aesthetic Effects — A few neighborhoods were developed along what is now the Orange Corridor segment of the Preferred Alternative, prior to the time it was set aside as a protected cor-

ridor. Many of the other developments in the Orange Corridor segment area were developed with the assumption that the road would eventually be built along the protected path. For this reason, there are wooded buffers shielding many of these neighborhoods from the proposed right-of-way within this corridor segment.

Overall, visual changes experienced by those living (or in some cases working) along the Preferred Alternative would be intermittent, with some residents subjected to a view of the roadway and others shielded from the roadway by topography and vegetation. In addition, area planners interviewed during the qualitative and the quantitative Indirect and Cumulative Effects analyses predicted that development will continue, regardless of the outcome of the Complete 540 project, causing a reduction in the amount of open, rural areas.

Traffic Noise — NCDOT has updated the May 2015 Traffic Noise Analysis to evaluate the preliminary designs associated with the Preferred Alternative. The analysis accounts for a change in the project's design year, from 2035 to 2040, and the availability of traffic data for the 2016 existing condition and the 2040 Build condition. Also, minor revisions to the preliminary design of the Preferred Alternative have occurred to reduce impacts, and NCDOT has updated its noise policy since the 2015 report was prepared.

The 2017 update was completed using the October 6, 2016 versions of the NCDOT Traffic Noise Policy and NCDOT Traffic Noise Manual. The policy establishes criteria for determining at what point the highway project is considered to have a noise impact on an adjacent land use.

There are two types of traffic noise impacts: Noise Abatement Criteria (NAC) and "substantial increase." The NAC is a federal standard that represents noise levels at which abatement must be considered for a given type of land use. If, for a given activity, the design year noise levels "approach or exceed the NAC," then the activity is considered to be impacted by noise, in which case noise abatement measures must be considered. NCDOT policy defines "approach" as one decibel less than the NAC.

Impacts designated as "substantial increase" are based on federal regulations for situations when a highway project would cause a large increase in noise levels over existing conditions, even if the levels do not reach the NAC. NCDOT's noise policy defines a "substantial increase" as 10 decibels (dB(A)) or more. When this is the case, a noise impact results, and noise abatement measures must be considered.

As part of NCDOT's collection efforts for the noise analysis, long duration noise measurements were recorded at three locations and short duration measurements were recorded at twenty locations. This was carried out in September 2013. In May 2014, an additional seven short duration measurements were recorded. The noise measurements were used to identify loudest-hour ambient noise levels and to validate the FHWA Traffic Noise Model® (version 2.5). The model was then used to predict traffic noise levels for the base year (2016) and design year (2040).

In total, 2,660 receptors were evaluated along the Preferred Alternative (2,639 residences, four schools, eight recreational facilities, eight churches, and one business). Overall 132 receptors are predicted to experience only NAC impacts, 473 receptors are predicted to experience only a substantial increase impact, and 213 receptors will experience both types of impact. With the exception of four recreational areas, all of the receptors that would be impacted are residences. No schools, churches, or commercial properties are predicted to experience traffic noise impacts as a result of construction of the Preferred Alternative.

The updated analysis resulted in 279 additional impacted receptors being identified along the Preferred Alternative, compared to the May 2015 analysis. This increase is attributable to two factors. The first is the change that occurred in the NCDOT noise policy relative to "substantial increase." This change is the cause for most of the added impacted

receptors. The second factor is the land development that occurred in the project area in the interval between the two studies. Because both of these factors would apply to any of the DSAs previously evaluated, with impacts similarly affected for all the DSAs, FHWA has concluded that these factors would not have substantially influenced the Preferred Alternative decision.

NCDOT examined various forms of noise abatement (including traffic management, alteration of roadway alignments, creation of buffer zones, and installation of building insulation) and found that none would be a feasible solution. Abatement in the form of noise barriers was considered at 42 locations where traffic noise impacts were predicted. Of these, 22 barriers were preliminarily found to be both feasible and reasonable and are, therefore, likely to be constructed. Another 20 barriers were evaluated and preliminarily found to not be feasible and reasonable. Of the 818 impacted receptors, 497 would benefit[(b)] from the implementation of these 22 barriers, including two of the four affected recreational areas and 495 impacted residences. These barriers would also benefit 222 additional receptors that did not have an identified noise impact. Of the other 20 barriers, three were preliminarily found to be not feasible and 17 not reasonable. These 20 barriers are not likely to be constructed. In summary, by constructing the 22 feasible and reasonable barriers, 323 residences and two recreation areas would remain with projected traffic noise related impacts. A final determination of noise barrier feasibility and reasonableness will be made upon completion of the Preferred Alternative's design and the public involvement process.

While the preliminary findings of the Traffic Noise Report Addendum are sufficiently accurate to identify the general scope and location of noise impacts and likely noise abatement, some activities required for the report remained to be completed at the time of this writing, due to the size and complexity of the project. These include minor adjustments to noise model inputs and re-executions of the model. The Traffic Noise Report Addendum will be completed prior to the issuance of the project's Record of Decision, and any changes in traffic noise impacts and likely noise abatement locations reported in the Final EIS (based on the draft study) will be disclosed in the Record of Decision. Additionally, a Design Noise Report will be prepared prior to construction of the project.

Air Quality — Both Wake County and Johnston County are in attainment with respect to the USEPA's National Ambient Air Quality Standards. Because carbon monoxide (CO) regional and project-level conformity requirements in North Carolina have ended, a project level CO microscale analysis is no longer required in North Carolina as part of the NEPA process. As noted in the Draft EIS, the project does not require a detailed study for particulate matter.

A qualitative analysis of Mobile Source Air Toxics (MSATs) was completed for the Preferred Alternative. This analysis predicted that constructing the Preferred Alternative would result in reduced MSAT emissions in the immediate area of the project, compared to a No-Build scenario, as a result of USEPA's MSAT reduction programs. For possible air quality concerns during construction, no substantial long-term effects would occur if currently adopted rules for open burning and dust control are followed. The project is not expected to create any adverse effects on the air quality of this attainment area.

Land Use and Economics — Because the corridor now identified as the Orange Corridor segment was, in the 1990s, set aside as the path of a future highway and protected from development, most local governments in the area have written their land use plans in anticipation of this roadway being built. As a result, planners representing the towns in the study area have stated that the Preferred Alternative, which includes the Orange Corridor segment, would not conflict with their future growth and development objectives. Because the Preferred Alternative also includes the majority of the Green Corridor segment, which was also identified in the 1990s as a potential future highway route, the Preferred Alternative would not conflict with local land use plans.

(b) A benefit is defined as occurring when a noise barrier reduces predicted traffic noise levels by 5 decibels (dB(A)) or more.

Along with the project's potential conflict with applicable land use plans, business relocations are also a component in the project's overall economic effects. The Preferred Alternative would require five businesses to relocate. One is a greenhouse on Benson Road in STIP project R-2828. The other four are in STIP project R-2829. Three are on US 70 Business and include a manufactured home sales office, an auto collision repair shop, and a metal/parts salvage operation. The fourth is a stormwater management business along White Oak Road.

In addition to these businesses, the Preferred Alternative would affect operations at a private rugby facility on Poole Road and two communication towers. One of the towers, also on Poole Road, is used for cellular communications. The other tower, on Rock Quarry Road, includes several different communications functions.

Water Resources — The potential effects of the Preferred Alternative on water resources include: (1) increased sediment loading and siltation due to watershed vegetation removal, erosion, and/or construction; (2) decreased light penetration and water clarity from increased turbidity; (3) reduced habitat suitability for Dwarf Wedgemussel and other aquatic species due to increases in sediment; (4) reduced ability of mussels and other aquatic species to feed because of increased suspended sediment in the water; (5) changes in water temperature with vegetation removal; (6) increased concentration of pollutants from highway runoff, construction activities, and construction equipment; and (7) alteration of water levels and flows as a result of interruptions or additions to surface and groundwater flow from construction.

To keep these effects to a minimum, a sediment and erosion control plan will be developed and elements would be implemented during construction. This plan will be prepared in accordance with NCDEQ and NCDOT guidance and accepted design standards for sensitive watersheds. Examples of Best Management Practices for sedimentation and erosion control that would be used during construction include: (1) the use of dikes, berms, silt basins, and silt fencing; (2) locating construction staging areas outside of floodplains and away from streams and tributaries; and (3) rapid re-seeding of sites where vegetation is disturbed to help alleviate erosion and reduce sediment loading and runoff.

Streams — After minimization measures were incorporated into the Preferred Alternative's design, the total length of streams affected was reduced from 65,810 linear feet to 59,533—a 9.5 percent reduction.

Wetlands — As a result of new traffic volume data prepared for this Final EIS, modifications were required in the US 64/US 264 interchange area so it could better accommodate future traffic. This modification increased the overall footprint of the interchange, which increased the overall impact on wetlands and streams in this area. After this modification, and after minimization techniques were applied throughout its length, the Preferred Alternative's effect on total wetland acreage was reduced from 74.3 acres to 69.5 acres—a reduction of 4.8 percent.

The Preferred Alternative would not directly affect the Swift Creek Watershed Critical Area.

Avoidance, Minimization, and Mitigation for Water Resources — Through the use of minimization techniques, NCDOT has eliminated or reduced impacts to streams and wetlands to the greatest extent practicable at the current stage of design. This included examining the use of bridges instead of culverts over some of the larger streams and bridging some of the larger and higher quality wetlands.

Mitigation policy for jurisdictional Waters of the United States has been established by USEPA and USACE regulations.[c] Unavoidable impacts of the Preferred Alternative to wetlands and streams will be offset using the strategies described below.

For the portion of the project between NC 55 Bypass and US 401 (STIP Project R-2721), NCDOT would follow the provisions of a 2016 Memorandum of Agreement between NCDOT and the NC Division of Mit-

(c) Waters of the United States are protected by many statutes and regulations, principal among these being the federal Clean Water Act. Mitigation policy for jurisdictional Waters of the US has been established by USEPA and USACE regulations in 33 CFR Part 332 and 40 CFR Part 230, Subpart J.

igation Services (NCDMS) for off-site mitigation of wetland, stream, and riparian buffer impacts. NCDOT also investigated opportunities for on-site mitigation and found no suitable sites available within the project limits.

For the portion of the project between US 401 and I-40 (STIP Project R-2828), NCDOT would use NCDMS for mitigation of impacts to wetlands and riparian buffers. Both NCDMS and private mitigation banks would be used for impacts to streams with private mitigation banks being the preferred option. Opportunities for on-site mitigation will also be investigated.

For the portion of the project between I-40 and US 64/US 264 (STIP Project R-2829), NCDOT anticipates that impacts would be offset by compensatory mitigation, most likely through NCDMS. No specific approach has been established because the current anticipated construction start date (2027) is more than five years in the future.

Underhill Wetland Mitigation Site — This 84.5 acre parcel, which is located adjacent to and south of Swift Creek in the Complete 540 project area, was purchased by NCDOT in 1998 as part of the wetland mitigation efforts for the US 70 Clayton Bypass project. The parcel has a small arm, adjacent to Swift Creek, that extends northward, crossing most of the right-of-way width of the Preferred Alternative.

The Preferred Alternative would span this portion of the property with dual bridges, which would be built approximately 20 feet above ground level and designed to prohibit direct stormwater drainage into the mitigation site and Swift Creek. The total impact to this parcel would be about 0.5 acres. To further aid in the protection of the Underhill Site and Swift Creek, NCDOT would follow the design standards established in the NC Design Standards for Sensitive Watersheds.

Wetland Finding — Presidential Executive Order 11990 (issued in May 1977) addresses protection and preservation of the Nation's wetlands. Federal agencies are directed to avoid construction in wetlands unless there is no practicable alternative, and to include in each project all practicable measures to minimize harm to wetlands.

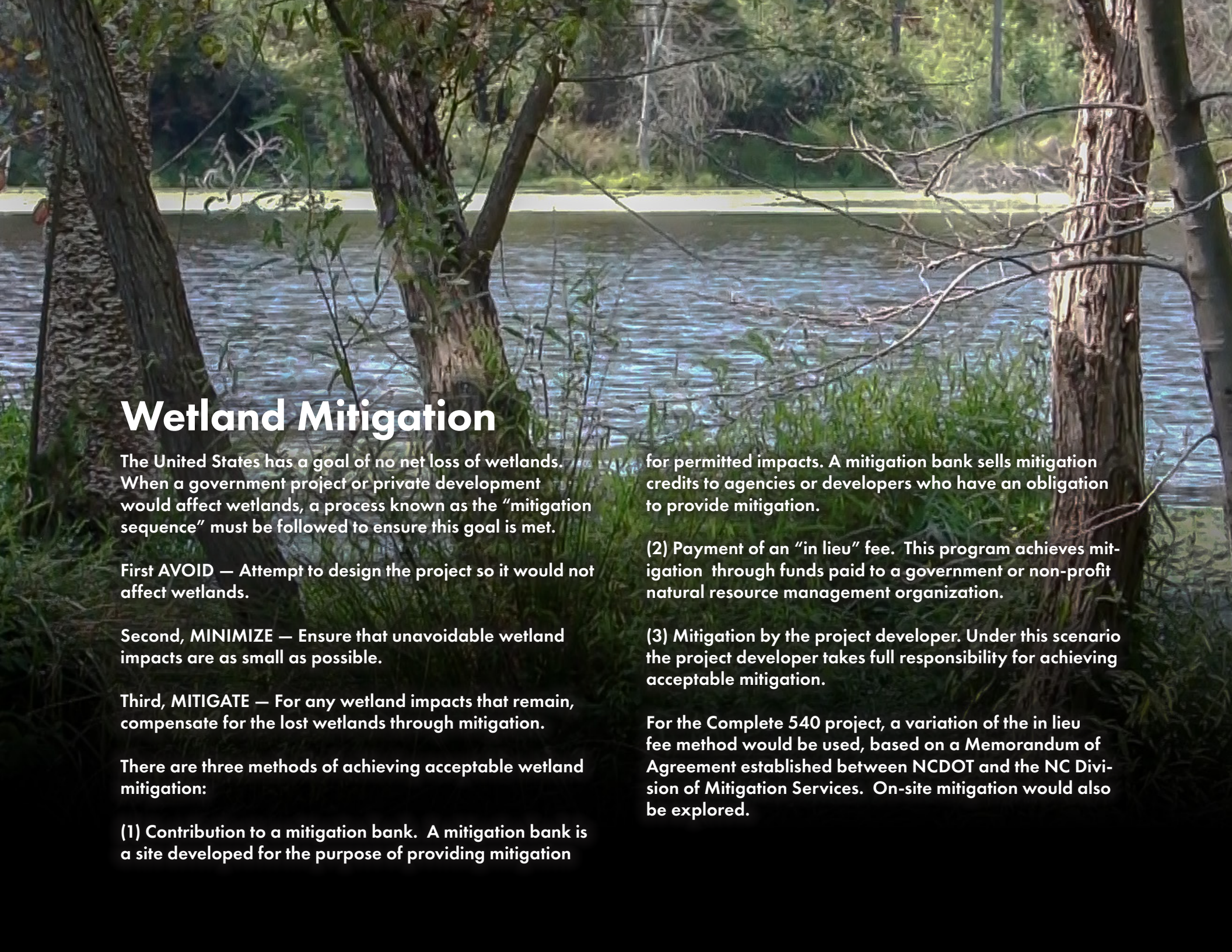
The rationale for the selection of the Preferred Alternative was based on many factors, including its impact on wetlands, streams, and ponds. Measures to minimize harm to wetlands have been incorporated into the project through the use of horizontal and vertical alignment refinements and bridging across sensitive wetland areas. Even though service roads have now been established for the Preferred Alternative and have been incorporated into its impact calculations, the minimization techniques applied to the Preferred Alternative's design have lowered total wetland and stream impacts from those estimated in the Draft EIS.

Based on the analysis for the project, there is no practicable alternative to completely avoid impacts to wetlands. The Preferred Alternative includes all practicable measures to minimize harm to wetlands. These findings have been coordinated with environmental resource and regulatory agencies without any stated issues of concern.

Floodplains and Floodways — After minimization techniques were applied, the Preferred Alternative's effect on 100-year floodplain areas was reduced from 65.9 acres to 61.2 acres. Encroachment on 500-year floodplain areas (an impact category that was added after the Draft EIS stage) went from 81.7 acres to 76.2 acres. With respect to floodway areas, the impact was reduced from 17.6 acres to 15.4 acres.

Floodplain Finding — Presidential Executive Order 11988 (issued in May 1977) directs federal agencies to refrain from conducting, supporting, or allowing project activities in floodplains unless there is no practicable alternative. FHWA has determined that a federally funded transportation project with significant floodplain encroachments will not be approved unless FHWA finds that the proposed significant encroachment is the only practicable alternative.

The study area's floodplains are associated with its three principal streams: Middle Creek, Swift Creek, and the Neuse River. Although efforts have been made to minimize effects on these floodplains, the Preferred Alternative will unavoidably impact 100-year and 500-year floodplains where it crosses these streams or their tributaries. Efforts have been made to minimize the effects on floodplains through bridging



Wetland Mitigation

The United States has a goal of no net loss of wetlands. When a government project or private development would affect wetlands, a process known as the "mitigation sequence" must be followed to ensure this goal is met.

First AVOID — Attempt to design the project so it would not affect wetlands.

Second, MINIMIZE — Ensure that unavoidable wetland impacts are as small as possible.

Third, MITIGATE — For any wetland impacts that remain, compensate for the lost wetlands through mitigation.

There are three methods of achieving acceptable wetland mitigation:

(1) Contribution to a mitigation bank. A mitigation bank is a site developed for the purpose of providing mitigation for permitted impacts. A mitigation bank sells mitigation credits to agencies or developers who have an obligation to provide mitigation.

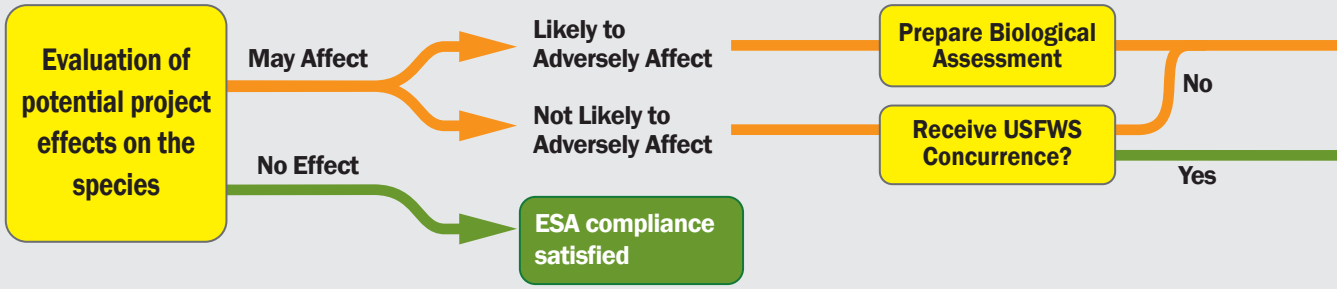
(2) Payment of an "in lieu" fee. This program achieves mitigation through funds paid to a government or non-profit natural resource management organization.

(3) Mitigation by the project developer. Under this scenario the project developer takes full responsibility for achieving acceptable mitigation.

For the Complete 540 project, a variation of the in lieu fee method would be used, based on a Memorandum of Agreement established between NCDOT and the NC Division of Mitigation Services. On-site mitigation would also be explored.

Section 7 Consultation

The Endangered Species Act (ESA) of 1973 was enacted to protect and recover imperiled species and the ecosystems upon which they depend. Section 7 of this law may require federal project sponsors to engage in consultation with the US Fish and Wildlife Service (USFWS) to ensure proposed projects do not jeopardize the continued existence of any federally endangered or threatened species.



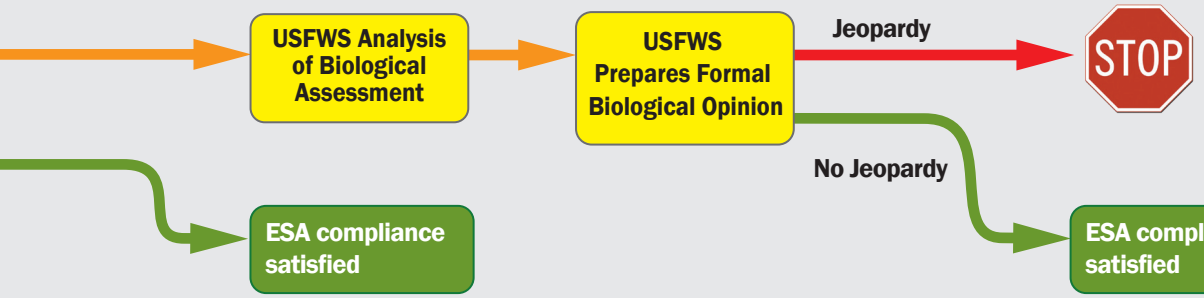
at the more substantial floodplain crossings. Additionally, stream crossings would be perpendicular or nearly perpendicular to each stream, which would minimize impacts to the associated floodplains. Bridges and culverts along the project will be sized to ensure compliance with FEMA requirements or NC floodplain requirements.

The selection of the Preferred Alternative was based on a consideration of the effects it would have on natural, human, and physical environments, compared to the other alternatives, and on comments received on the Draft EIS. NCDOT and FHWA have determined that there is no other practicable alternative that would further reduce impacts to floodplains.

Terrestrial Habitat — The Preferred Alternative would contribute to habitat fragmentation in places where it crosses larger tracts of undeveloped land. For larger streams and some larger tracts of vegetated wetland areas that would be divided, bridges are planned that can serve to support wildlife movement. In addition, forested uplands, which are also present along the Preferred Alternative's location, often provide important habitat for migratory birds. To comply with requirements set forth in the Migratory Bird Treaty Act of 1918, NCDOT will coordinate with USFWS during project implementation to avoid incidental effects on migratory birds. The USFWS Migratory Bird Program is working to develop a list of standard conservation measures that can be employed for transportation activities to help avoid and minimize impacts to migratory birds. NCDOT would consider those measures, should they become available prior to construction.

Protected Species — Following selection of the Preferred Alternative, NCDOT carried out the project's quantitative indirect and cumulative effects analysis within the Preferred Alternative's Future Land Use Study Area (FLUSA). The FLUSA was then used to determine "action areas" for federally protected species that could be affected by the Preferred Alternative. As defined in the Endangered Species Act, action areas are to include "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action" (50 CFR §402.02).

The FLUSA for Complete 540 defines the area that could potentially experience development influenced by construction of the project.



A Jeopardy finding means the project cannot proceed unless a different alternative can be found that avoids the conditions that led to the jeopardy finding.

A No Jeopardy finding can allow the project to proceed with the original alternative, but certain conditions, including issuance of an "incidental take" permit, may be required.

Because this development could, in turn, affect threatened and endangered species, an analysis of the possible effect on threatened and endangered species in their respective action areas was required.

The FLUSA includes portions of Wake, Johnston, and Harnett Counties. And because threatened and endangered species are listed by county, the possible project effects on species listed for Harnett County were also examined.

The potential effect on threatened and endangered species within the action areas is included in the projects's Biological Assessment, which establishes whether the project is likely to jeopardize the survival of any of the protected species in the project area. At the time of this writing, the Biological Assessment has been submitted to USFWS by FHWA, along with a request to enter into formal consultation on the species covered in the document. FHWA expects this consultation will be completed, and the USFWS Biological Opinion will be issued, prior to the publication of the Record of Decision for the project.

The status of the analysis for each protected species is as follows:

Red-Cockaded Woodpecker—The analysis summarized in the Draft EIS remains applicable. The Biological Conclusion for the species is *No Effect*.

Michaux's Sumac—At the time the Draft EIS was written, the Biological Conclusion for this species was *No Effect*, based on field surveys conducted in each of the study's corridor segments. NCDOT has since completed additional surveys and conducted additional research for this species. While no occurrences of this species were found, the Biological Conclusion was revised to *May Affect, Not Likely To Adversely Affect* to account for the possibility that the species could exist within the action area and thus be affected by development in that area. In general, NCDOT and FHWA have concluded that the effects would likely be discountable.

Rough-leaved Loosestrife—This plant species was not mentioned in the Draft EIS because it is not known to occur within Wake or Johnston Counties. It is, however, listed for Harnett County by the USFWS, and the action area established for the Preferred Alternative encompasses areas in Harnett County that could be affected by the project's potential

indirect and cumulative effects. Surveys conducted by NCDOT for the project revealed that there are no known occurrences of this species in the action area that extends into Harnett County. Because there will be no direct or indirect effects in any areas known to support Rough-leaved Loosestrife, and because there are no records noting any occurrences within or near the action area, the Biological Conclusion for this species is *No Effect*.

Northern Long-Eared Bat—As described in the Draft EIS, the USFWS has in place a programmatic Biological Opinion for this species for NCDOT projects in eastern North Carolina. Under this Biological Opinion, the Biological Conclusion for this species is *May Affect, Likely to Adversely Affect*. In response, NCDOT has programmatically agreed to conservation measures designed to minimize adverse effects and benefit or promote the recovery of this species, where applicable. Because the USFWS has not listed this species as protected in Wake, Johnston, or Harnett Counties, it does not need to be addressed in the Biological Assessment and the Biological Conclusion for this project.

Bald Eagle—As stated in the Draft EIS, while the Bald Eagle is no longer federally listed as endangered, it is still protected by the Bald Eagle and Golden Eagle Protection Act of 1962. After a review of existing information about the presence of this species in the study area, and after field surveys were conducted along the Preferred Alternative, NCDOT has concluded the project would be in compliance with the protections established in this Act and the Bald Eagle would not be affected.

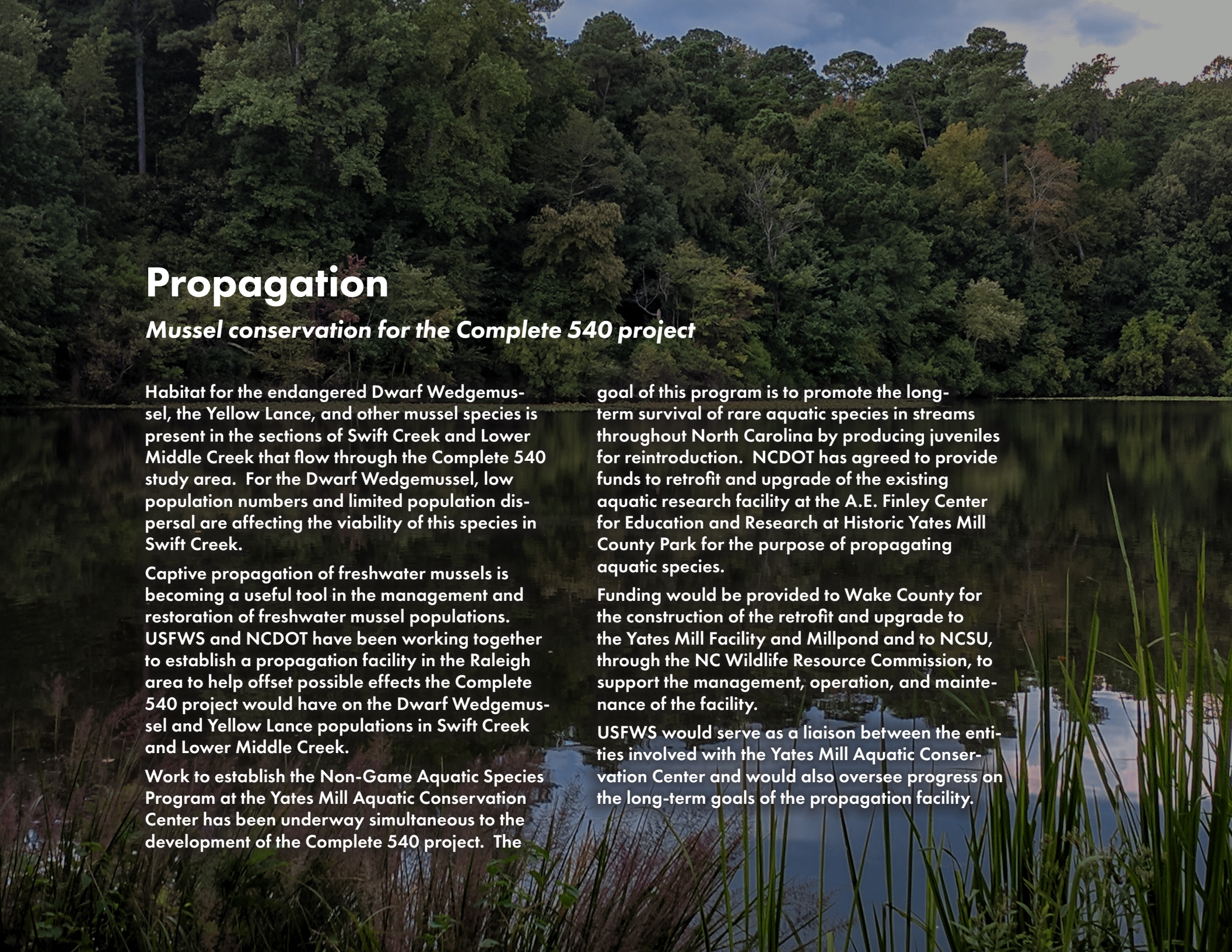
Tar River Spinymussel—Although the Draft EIS indicated that the Biological Conclusion for this species was unresolved, the species is not known to occur and has not been found in the action area for the Preferred Alternative. Additionally, NCDOT conducted surveys for this species, and none were found. The Biological Conclusion is *No Effect*.

Cape Fear Shiner—This species was not mentioned in the Draft EIS because it is not known to occur within Wake or Johnston Counties. The action area established for this species does, however, encompass additional watershed areas that could potentially be affected by the project's indirect and cumulative effects, including locations in Harnett County, where historic occurrences of this species have been recorded and the species is listed by the USFWA. The project's Biological Assessment concluded that the potential effects of the Preferred Alternative would be insignificant in the Harnett County portion of the action area and, for this reason, the Biological Conclusion is *May Affect, Not Likely to Adversely Affect*.

Dwarf Wedgemussel—At the time the Draft EIS was written, the Biological Conclusion for this species was unresolved. Through coordination with USFWS, NCDOT agreed to complete additional freshwater mussel studies to help provide information needed to assess the species' viability in the Swift Creek Watershed. These studies noted that while the relative abundance of freshwater mussel species in the Swift Creek watershed has been declining, there is evidence that this decline has leveled off and that the Dwarf Wedgemussel may be reproducing in the watershed. The studies further noted that while rapid urbanization in the Swift Creek watershed has led to relatively rapid habitat degradation in the Creek, some areas of Swift Creek continue to provide high quality mussel habitat. Also, as noted in the discussion of indirect and cumulative effects, there are concerns about concentrations of copper in Swift Creek at levels that may be harmful to freshwater mussels. At the time of this writing, the effectiveness of existing conservation measures to protect mussel viability in the Swift Creek watershed is unclear because they have not been in place long enough for their effectiveness to be determined.

The species viability study conducted for the Complete 540 project concluded that while there is potential for the Dwarf Wedgemussel to persist in Swift Creek, its long-term viability is tenuous. The Biological Conclusion for the Dwarf Wedgemussel is *May Affect, Likely to Adversely Affect*. It is important to note, however, that many of the factors threatening long-term Dwarf Wedgemussel viability in Swift Creek will remain, regardless of whether the project is constructed. Ongoing management and propagation efforts (as explained in the graphic on the next page) are proposed to help achieve long term viability of this species.

To achieve the propagation activities that are proposed for the Dwarf Wedgemussel, NCDOT has agreed to provide funding to retrofit and



Propagation

Mussel conservation for the Complete 540 project

Habitat for the endangered Dwarf Wedgemussel, the Yellow Lance, and other mussel species is present in the sections of Swift Creek and Lower Middle Creek that flow through the Complete 540 study area. For the Dwarf Wedgemussel, low population numbers and limited population dispersal are affecting the viability of this species in Swift Creek.

Captive propagation of freshwater mussels is becoming a useful tool in the management and restoration of freshwater mussel populations. USFWS and NCDOT have been working together to establish a propagation facility in the Raleigh area to help offset possible effects the Complete 540 project would have on the Dwarf Wedgemussel and Yellow Lance populations in Swift Creek and Lower Middle Creek.

Work to establish the Non-Game Aquatic Species Program at the Yates Mill Aquatic Conservation Center has been underway simultaneous to the development of the Complete 540 project. The goal of this program is to promote the long-term survival of rare aquatic species in streams throughout North Carolina by producing juveniles for reintroduction. NCDOT has agreed to provide funds to retrofit and upgrade of the existing aquatic research facility at the A.E. Finley Center for Education and Research at Historic Yates Mill County Park for the purpose of propagating aquatic species.

Funding would be provided to Wake County for the construction of the retrofit and upgrade to the Yates Mill Facility and Millpond and to NCSU, through the NC Wildlife Resource Commission, to support the management, operation, and maintenance of the facility.

USFWS would serve as a liaison between the entities involved with the Yates Mill Aquatic Conservation Center and would also oversee progress on the long-term goals of the propagation facility.

upgrade an existing research facility in the A.E. Finley Center at the Historic Yates Mill County Park. This facility is currently owned by Wake County and leased and operated by North Carolina State University for the purpose of propagating aquatic species and conducting research. The purpose of this new facility, which would be called the Yates Mill Aquatic Conservation Center (YMACC), would be to promote the long-term survival of rare aquatic species in streams throughout North Carolina by producing juveniles for reintroduction to the wild. NCDOT would provide Wake County with approximately $2 million in funding for the retrofitting and upgrading of the existing research facility in the A.E. Finley Center and Wake County would oversee and manage the construction of the new Conservation Center. In addition, NCDOT would provide approximately $3 million to North Carolina Wildlife Resource Commission (NCWRC) to support the North Carolina Non-Game Aquatic Species Program. These funds would be earmarked for NCSU, which would provide a facility manager and an assistant at the YMACC to oversee the propagation research and outreach, and for other expenses needed to operate and maintain the facility for five years.

NCDOT's responsibility for the propagation facility project would be limited to providing the initial funding. NCDOT would not be responsible for the construction, management, or success of the YMACC or its propagation goals. NCDOT has committed to provide the aforementioned funding and would enter into a funding agreement with Wake County for construction of the YMACC. NCDOT would enter into a separate funding agreement with NCWRC for operation of the North Carolina Non-Game Aquatic Species Program. These funding agreements are being prepared and would be in place prior to permitting for the Complete 540 project.

Yellow Lance—Although this mussel species was not under federal protection when the Draft EIS was written, the USFWS subsequently proposed listing this species as federally endangered. In response, NCDOT conducted field surveys for this species in the project area, the results of which are documented in the Complete 540 Aquatic Species Survey Report. The Yellow Lance has also been evaluated in the Biological Assessment. The effects information described above for the Dwarf Wedgemussel also applies to the Yellow Lance, and the Biological Conclusion for this species is also *May Affect, Likely to Adversely Affect*, if or when it is formally listed. Conservation measures similar to those for the Dwarf Wedgemussel, including propagation, will also be used to offset the project's potential effects on the Yellow Lance.

Atlantic Sturgeon—On April 6, 2012, the National Marine Fisheries Service (NMFS) listed the Atlantic Sturgeon as endangered. While this species is currently not on the USFWS species list for Wake, Johnston, or Harnett Counties, designated critical habitat for this species is present in the Neuse River in Johnston and Wake Counties.

On September 18, 2017, the NMFS designation of critical habitat for the Atlantic Sturgeon in the Neuse River became effective. The critical habitat extends along the Neuse from the confluence with Pamlico Sound at river kilometer 0, below New Bern, to the base of the recently demolished Milburnie Dam at river kilometer 349 (217 river miles), just east of Raleigh. This designation includes the entire length of the Neuse River within the project study area. Because all DSAs, including the Preferred Alternative, must cross the Neuse River, avoidance of this critical habitat is not possible.

An assessment of the potential effects of the Preferred Alternative's crossing of the Neuse River was carried out and documented in the Biological Assessment for this species and its critical habitat. The assessment noted that the Neuse River Atlantic Sturgeon population is considered to be small compared to other populations in North Carolina and that there are no recorded occurrences of the Atlantic Sturgeon within the project crossing area or the action area, with all recorded occurrences in the basin being further downriver.

Following NMFS critical habitat designation, NCDOT conducted a physical and biological features survey of critical habitat for the Atlantic Sturgeon in the vicinity of the proposed project's crossings of the Neuse River. The survey found that there are no concentrations of physical and biological features within the footprint or immediate vicinity of the crossing locations. Likewise, no such features were found within the 850-foot-wide survey area, neither upstream nor downstream of the crossing location.

The Biological Assessment for this species indicates that potential direct or indirect impacts to the Atlantic Sturgeon or its critical habitat from construction of the project are insignificant or discountable. Therefore, NCDOT and FHWA have assigned a determination of *May Affect, Not Likely to Adversely Affect* for the Atlantic Sturgeon and its critical habitat in the study area.

In August 2017, NMFS and FHWA collaborated on draft project design criteria to avoid or reduce the potential effects of transportation activities on protected anadramous fish species (such as the Atlantic Sturgeon) and their critical habitat. Appropriate criteria will be outlined in the Biological Assessment and incorporated into the project's design plans.

NCDOT will submit the Biological Assessment to NMFS, along with a request to enter into informal consultation on the Atlantic Sturgeon and its critical habitat. This consultation is expected to be completed prior to the publication of the Record of Decision for the project.

Two activities required under Section 7 of the Endangered Species Act remain to be completed at the time of this writing. The first is the formal consultation process between FHWA and the USFWS for federally listed species that could potentially be affected by the proposed project. The second is the informal consultation process between NCDOT and the NMFS regarding critical habitat for the endangered Atlantic Sturgeon that could potentially be affected by the project. Both of these consultation processes are underway and are expected to be completed before the project's Record of Decision is published.

Farmlands — While much of the land in the study area comprises soil types classified as prime, unique, local or of statewide importance, the Farmland Conservation Impact Rating score for the Preferred Alternative did not exceed the threshold for required mitigation of farmland impacts.

One Voluntary Agriculture District (VAD) farm would be affected, located on New Bethel Church Road, just north of the Clayton Bypass. This 45 acre wooded parcel is part of a large, multi-parcel, multi-location VAD. It extends into an adjacent 53 acre parcel in Johnston County. Approximately 23 acres would be required for project right-of-way at the northern edge of the property.

Major Drainage Structures — There are 39 locations along the Preferred Alternative where a major drainage structure would be needed. Culverts would be used at 26 of these and bridges at the remaining 13. Of those bridges, 8 are either longer than would otherwise be necessary, or are bridges instead of culverts, to avoid or minimize impacts. The final hydraulic design would be prepared such that it complies with all applicable design standards for construction in sensitive watersheds.

Hazardous Materials and Contamination Sites — The Preferred Alternative would require right-of-way acquisition at two gas stations, an automotive salvage yard, and an auto repair shop. Because the project would not affect the underground storage tank fields at either gas station, NCDOT does not anticipate the need for relocation or remediation at these locations. The Preferred Alternative would require acquisition of a portion of the automotive salvage yard for right-of-way, and it is possible there could be some degree of ground contamination at this property. The auto repair shop would need to be acquired in its entirety. The GeoEnvironmental Report prepared for the project states each of these four properties has a low risk for hazardous materials and none are expected to have a substantial effect on anticipated project costs or schedules. Additionally, the project would not require acquisition of any known hazardous waste sites or landfills.

Sprayfields — The right-of-way for the Preferred Alternative would affect approximately 11 acres of a 600 acre City of Raleigh sprayfield on Wrenn Road. This site treats wastewater from the Dempsey E. Benton Water Treatment Plant, located on NC 50. An additional 6 acres of this site, along Swift Creek, would be landlocked by the project and would be acquired.

Major Utility Installations — There are underground gas pipelines and overhead electrical transmission lines at various locations along the Preferred Alternative's corridor. NCDOT will coordinate with representatives of these facilities to discuss options for relocating these pipelines and electric lines in locations where avoidance is not feasible. NCDOT

expects that all affected pipelines and electric lines would be relocated prior to starting construction activities.

Communications Towers — The Preferred Alternative would require the relocation of two communications towers; one near Rock Quarry Road and another near Poole Road. NCDOT will coordinate with representatives of these towers as the Preferred Alternative's plans are being developed to discuss options for relocation.

Indirect and Cumulative Effects —The Draft EIS summarized a general, qualitative-level analysis of the DSAs for their potential indirect effects on development and land use patterns and the indirect and cumulative effects on project-area natural resources. To more closely analyze the potential indirect and cumulative effects (ICE) of the Preferred Alternative, the project team completed a quantitative analysis of those effects based on comprehensive new data, which included a new 2040 No Build land use forecast. The results of these analyses are contained in a series of ICE technical reports. These are described in Chapter 5 and are contained on the disk attached to this document and on the study's website.

The quantitative ICE analysis began with additional interviews with local planners, who stated, as they had in earlier coordination, that growth is anticipated with or without the project, but that the completion of 540 has the potential to influence the specific locations and density of development. While local planners did not believe the project would affect the overall level of growth in the project area, the study team deliberately took a more conservative approach. The 2040 No-Build scenario was designed to assess the greatest reasonable effect of the project on future land use. To more closely evaluate the potential effects of the project on overall growth, the project team used computer modeling tools currently used in regional land use forecasting by CAMPO and the Triangle J Council of Governments (TJCOG) to forecast the future land use patterns in various parts of the project area under 2040 Build and No-Build scenarios.

The results of the computer modeling continued to predict substantial new development by 2040 under the No-Build scenario, with about 73,000 additional acres in a large area encompassing southern Wake County and parts of Johnston and Harnett Counties converted from undeveloped or agricultural uses to uses classified as developed by 2040. Under this scenario, the proportion of developed land in the area studied would increase from 39 percent under current conditions to about 66 percent by 2040.

The model results also suggest that the project would lead to about 1,400 additional acres being converted to developed land uses under the Build scenario as compared to the No-Build scenario—a relatively small increase in the level of development by 2040 when compared to the No-Build scenario. The key difference between forecast future land use patterns under the Build and No-Build scenarios is that the model results suggest that the Build scenario would lead to a higher likelihood of medium density residential development and commercial development in some areas, particularly near proposed interchanges along the project, while those areas would instead be developed with low density residential uses under the No-Build scenario. This supports the finding of the qualitative ICE analysis, suggesting that constructing the project would lead to land use patterns more consistent with those envisioned in local land use plans.

Another component of the quantitative ICE analysis was to use the modeled future land use patterns under the Build and No-Build scenarios to predict the relative amounts of impervious surface under the two scenarios. Greater impervious surface coverage in an area can lead to increased stormwater runoff and negative effects on surface water quality. This is a particularly important consideration because the viability of protected freshwater mussel species is influenced by water quality. The model results suggest that there would be small differences in the 2040 Build and No-Build scenarios for most of the water quality indicators examined. Watersheds in the study area that currently contain populations of Dwarf Wedgemussel or Yellow Lance are experiencing, and will continue to experience, growth pressures that may lead to negative effects on water quality, with or without the Complete 540 project. While the model results suggest that the project could lead to increased concentrations of suspended solids and copper, two contaminants that can be harmful to freshwater mussels, the predicted increases are small

in comparison to the overall anticipated increases by 2040 that would result from growth predicted to occur without the project.

A further conclusion reached as a result of the quantitative ICE analysis concerned the effect that the project's induced development could have on traffic conditions in the FLUSA. Because the amount of development and other land use changes actually induced by the project is expected to be very small compared to the overall development expected to occur in the FLUSA, it follows that changes in traffic volumes, travel times, and travel distances caused by this induced development would be quite small as well. This conclusion is borne out by the quantitative ICE results. For example, when comparing trip productions and attractions between the Base Year and the 2040 Build and No-Build Scenarios, the compounded annual growth rate varies by one-tenth of one percent (ICE Memo No. 4).

A three-tiered approach was used within the quantitative ICE analysis. Tier One examined traffic and mobility conditions at the FLUSA level; Tier Two examined conditions at a more refined, corridor level; and Tier Three examined conditions at a detailed, individual link level. This approach allowed for macro level, meso (intermediate) level, and micro level examinations of the differences between the 2040 No-Build and 2040 Build model runs. For each Tier, traffic and mobility conditions were screened at various levels using CAMPO's regional traffic model (TRM version 5). A summary of the tiers used to assess the differences between the model runs within the FLUSA boundary is provided below.

The Tier One analysis of FLUSA-level traffic conditions showed that even though the amount of travel slightly increased in the 2040 Build scenario, the level of congestion decreased.

The Tier Two analysis of aggregate corridor-level traffic conditions within the FLUSA resulted in the same general findings. Overall, the majority of corridors experienced compounded annual growth rates of less than one percent difference when comparing the 2015 to 2040 No-Build and 2015 to 2040 Build scenario results. The analysis showed increased traffic and congestion in the 2040 Build scenario on corridors that connect with the project and reduced congestion on roads that parallel it.

The Tier Three analysis focused on roadway segments projected to be heavily congested in the 2040 Build scenario. The results indicated that compared with the 2040 No-Build, these congested conditions would develop regardless of whether the Complete 540 project is built.

Costs—The Preferred Alternative is estimated to cost between $2.0 billion and $2.3 billion, with a planning level estimate of $2.24 billion in anticipated year-of-expenditure dollars. This represents an increase of approximately 2.7 percent, or $58 million, over the estimated cost of $2.18 billion reported in the Draft EIS for DSA 2. The change is the result of updated design plans, which led to updated cost estimates for construction, right-of-way, utility relocations, and environmental mitigation.

The project implementation schedules for all phases have also been adjusted to meet current expectations. The total project cost estimate includes construction of the project ($1.58 billion), right-of-way acquisition and relocation ($322 million), utility relocation ($61 million), agency expenses and reserve funds ($156 million), environmental mitigation ($65 million), and prior expenditures ($53 million).

Toll Revenues — NCDOT estimated the anticipated toll revenue that the proposed project would generate and the effect the project would have on toll revenues from the existing Triangle Expressway.

Irretrievable and Irreversible Commitment of Resources — Implementation of the Preferred Alternative would require the irretrievable and irreversible commitment of a wide range of natural, physical, human, and fiscal resources.

Land used for the construction of the proposed project is considered an irreversible commitment during the time period that the land is used for highway purposes. If, however, a greater need arises, or if the highway is no longer needed, the land could be converted to another use. At present, there is no reason to believe such a conversion would be necessary or desirable.

Considerable amounts of fossil fuels, labor, and highway construction materials such as cement, aggregate, and bituminous material would be expended in constructing the project. Additionally, a large amount of labor and natural resources would be required in the fabrication and preparation of construction materials. While these resources are generally irretrievable, they are not in short supply and their use would not have an adverse effect on their continued availability.

The commitment to expend these resources is weighed against the knowledge that residents in the immediate area, region, and state would benefit from the resulting improvements to the transportation system. These benefits would consist of improved accessibility and connectivity, shorter travel times, and increased availability of services—all of which are seen as outweighing the irretrievable use of resources.

Relationship between Short-Term and Long-Term Impacts—The most disruptive short-term impacts associated with the proposed project would occur during land acquisition and project construction and would include the short-term uses of human, physical, and natural resources. However, because the project would contribute to long-term productivity in the region, the short-term impacts are seen as required to achieve the longer-term benefits.

The project is consistent with the long range transportation goals and objectives of the NCDOT 2018-2027 STIP and the CAMPO *2040 Metropolitan Transportation Plan*, and NCDOT and FHWA expect that it would enhance long-term access and connectivity opportunities in the area and would support local, regional, and statewide commitments to transportation improvement and economic viability.

For more information (environmental impacts)

In addition to the documents referenced in the Draft EIS, more detailed information on the environmental impacts of the Preferred Alternative can be found in the following technical reports:

- Utility Analysis and Routing Report (preliminary) (July 2017)
- Archaeological Survey Report (September 2017)
- Traffic Noise Report Addendum (December 2017)
- Right-of-Way and Relocation Report (December 2017)
- Air Quality Analysis Report Addendum (December 2017)
- Dwarf Wedgemussel Viability Study (May 2016)
- Lower Swift Creek Water Quality Report (February 2016)
- Aquatic Species Survey Report (June 2017)
- Biological Assessment of Potential Effects to Federally Listed Species (December 2017)
- Biological Assessment for Potential Effects to the Atlantic Sturgeon and Critical Habitat (under development).
- Jurisdictional Resources and Protected Species Review of Access Roads Memorandum (September 2017)
- Michaux's Sumac Survey Memorandum (June 2017)
- Historic Growth Memorandum (November 2017)
- Memorandum on Local Jurisdiction Outreach and Methodology Updates (Quantitative ICE Assessment Memo #1)(November 2017)
- Memorandum on Land Use Scenario Methodology and Results (Quantitative ICE Assessment Memo #2) (November 2017)
- Memorandum on Water Quality Modeling Methodology and Results (Quantitative ICE Assessment Memo #3) (November 2017)
- Indirect and Cumulative Effects Memorandum (Quantitative ICE Assessment Memo #4) (November 2017)
- Planning Level Traffic and Revenue Study (May 2017)

Chapter 5 contains a summary of each technical report incorporated as part of the Draft EIS and this Final EIS, including the documents listed here.

TRAFFIC FORECAST AND ANALYSIS UPDATE

The screening of alternatives and the project-level traffic forecast were updated in light of a new version of the Triangle's regional travel demand model and the new 2040 No-Build land use scenario prepared for the quantitative ICE analysis. The ability of each of the alternative concepts to meet the project's primary purposes was subsequently re-examined. In addition, the effects on traffic conditions in the study area and environmental impacts re-examined, based on the revised traffic forecast.

Project Purposes and Screening Alternative Concepts — Early in the study several different concepts were screened using measures of effectiveness from the regional model to see if they could adequately meet the two primary purposes of the project: improving mobility and reducing traffic congestion. The result of that screening was that most of these alternative concepts were found not to adequately meet the project purposes. Once the study's quantitative indirect and cumulative effects analysis was completed, this screening process was carried out again, as a check to see if these revised regional model inputs would alter the previous conclusions. The screening examined the following alternative concepts:

No-Build (ICE)—Also includes all future CAMPO roadway and transit projects without Complete 540, but, for this concept only, the socio-economic data from the project's quantitative indirect and cumulative effects study was used in place of the CAMPO model's official socio-economic data.

No-Build—Includes all future CAMPO roadway and transit projects, but without Complete 540.

New Location Highway—Includes all CAMPO roadway and transit networks with Complete 540 included, as a toll facility.

Hybrid Concepts 1, 2, and 3—These concepts include all future CAMPO roadway and transit projects, with various portions of the Complete 540 project in place, used in conjunction with upgrades to existing facilities.

Upgrade Existing Roadway Concepts 1, 2, and 3—These concepts include all future CAMPO roadway and transit projects, along with improvements to additional existing transportation facilities beyond those in the long-range transportation plan, but not the Complete 540 project.

Mass Transit—Attempting to meet the project's primary purposes through the use of bus or rail facilities.

Travel Demand Management (TDM)—Attempting to meet the project's primary purposes by seeking to reduce travel on (demand for) the local roadway network during peak travel times.

Transportation System Management (TSM)—Attempting to meet the project's primary purposes by implementing various techniques intended to increase the efficiency of the existing roadway network during peak travel times.

Using the new No-Build ICE data as a baseline, the updated screening showed that only the New Location Highway concept would adequately meet both of the project's primary purposes.

Preferred Alternative Traffic Analysis — The updated project-level traffic forecast was also used to assess how well the proposed project's interchanges would function, and if there would be any problems or deficiencies on existing or future major roadways and intersections caused by the proposed project. The results of this assessment are presented below.

Roadway segments—The assessment showed that nearly all major roadway segments in and near the project study area would operate at acceptable levels of service. This includes all new segments along the Complete 540 project.

Intersections—The vast majority of the intersections analyzed would operate at acceptable levels of service. For the few underperforming intersections, improvements were considered as part of the Preferred Alternative's preliminary design.

Interchanges—Except at one interchange, all interchange ramps and merge-diverge conditions would operate at an acceptable level of service. For this one interchange, improvements were considered as part of the Preferred Alternative's preliminary design.

For more information

In addition to the documents referenced in the Draft EIS, more detailed information on study's traffic forecasting and analyses can be found in the following technical reports:

- Project Level Traffic Forecast (October 2016)
- Preferred Alternative Traffic Analysis Technical Memorandum (July 2017)
- First Tier Alternative Concepts Screening & Traffic Reassessment (December 2017)

Chapter 5 contains a summary of each technical report incorporated as part of the Draft EIS and this Final EIS, including the documents listed here.

IMPACT TABLES

Once the various avoidance and minimization techniques were applied to the Preferred Alternative (DSA 2 in the Draft EIS), NCDOT updated the impact calculations for it. The resulting information was divided into groups that correspond to the three segments listed in the current STIP for this project:

- Project R-2721 (from NC 55 Bypass to US 401),
- Project R-2828 (from US 401 to I-40), and
- Project R-2829 (from I-40 to US 64/US 264 (I-495)).

The resource categories for natural systems are shown in an impact table prepared for the Preferred Alternative, organized around these three STIP projects.

Two NCDOT projects that would widen and improve portions of I-40 (I-5111 and I-4739) would overlap parts of the Complete 540 project. Because NCDOT expects these two projects to be constructed prior to Complete 540, some of the improvements along I-40 needed for the 540 project would already be in place, and their associated impacts already addressed, by the time construction would begin for Complete 540. While Table 2 shows the overall impacts of Complete 540 in its entirety, Table 3 shows what the Complete 540 impacts would be with the two other projects' impacts subtracted.

Table 2

Preferred Alternative Impacts on Natural Systems

(organized by STIP projects)

STIP Project and ID Number	Category	Streams (Linear Feet)	Streams (Each)	Buffer Zone 1 (Acres)	Buffer Zone 2 (Acres)	Wetlands (Acres)	Wetlands (Each)	Riparian (Acres)	Non-Riparian (Acres)	Ponds (Acres)	Ponds (Each)	Floodway (Acres)	100 Yr Flood (Acres)	500 Yr Flood (Acres)
NC 55 Bypass to US 401 (R-2721)	**Func. Design**	18,891	45	26.33	16.72	28.96	47	24.28	4.68	5.18	8	9.14	17.16	18.76
	Prelim. Design	**19,057**	**48**	**27.36**	**17.71**	**29.67**	**50**	**27.21**	**2.46**	**5.46**	**7**	**8.47**	**15.70**	**17.27**
	Difference	167	3	1.03	0.99	0.71	3.00	2.93	-2.22	0.28	-1	-0.67	-1.46	-1.49
	Percent Difference	0.88%	6.67%	3.91%	5.92%	2.45%	6.38%	12.07%	-47.44%	5.41%	-12.50%	-7.34%	-8.48%	-7.94%
US 401 to I-40 (R-2828)	**Func. Design**	29,850	55	43.83	28.22	25.79	58	24.68	1.11	9.12	15	0.23	14.27	18.48
	Prelim. Design	**23,929**	**47**	**34.40**	**22.72**	**20.87**	**53**	**20.22**	**0.64**	**8.84**	**14**	**0.08**	**11.40**	**15.00**
	Difference	-5,921	-8	-9.43	-5.50	-4.92	-5.00	-4.46	-0.47	-0.28	-1	-0.15	-2.87	-3.48
	Percent Difference	-19.84%	-14.55%	-21.52%	-19.49%	-19.09%	-8.62%	-18.06%	-42.08%	-3.07%	-6.67%	-64.79%	-20.13%	-18.85%
I-40 to US 64/US 264 Bypass (I-495) (R-2829)	**Func. Design**	17,069	39	24.99	17.35	19.58	44	18.28	1.31	6.74	15	8.20	34.43	44.44
	Prelim. Design	**16,547**	**45**	**25.19**	**17.64**	**18.96**	**53**	**17.74**	**1.22**	**10.34**	**18**	**6.83**	**34.10**	**43.90**
	Difference	-522	6	0.20	0.29	-0.62	9.00	-0.54	-0.09	3.60	3	-1.37	-0.33	-0.54
	Percent Difference	-3.06%	15.38%	0.80%	1.67%	-3.17%	20.45%	-2.95%	-6.87%	53.41%	20.00%	-16.69%	-0.95%	-1.21%
Totals														
	Func. Design	65,810	139	95.15	62.29	74.33	149.00	67.24	7.10	21.04	38	17.57	65.86	81.69
	Prelim. Design	**59,533**	**140**	**86.95**	**58.07**	**69.50**	**156.00**	**65.17**	**4.32**	**24.64**	**39**	**15.38**	**61.21**	**76.18**
	Difference	-6,277	1	-8.20	-4.22	-4.83	7.00	-2.07	-2.78	3.60	1	-2.19	-4.66	-5.51
	Percent Difference	-9.54%	0.72%	-8.62%	-6.77%	-6.50%	4.70%	-3.07%	-39.11%	17.11%	2.63%	-12.45%	-7.07%	-6.75%

Note: Functional Design impacts were computed using slope stakes +40 ft; Preliminary Design impacts were computed using slope stakes +25 ft.

Note: This table shows the difference in project impacts between the earlier functional design and the current preliminary design. A negative number indicates a reduction in impacts, a positive delta is an increase in impacts.

Table 3

Preferred Alternative Impacts on Natural Systems, (Excluding Impacts of Overlapping Projects)

(organized by STIP projects)

STIP Project and ID number	Category	Streams (Linear Feet)	Streams (Each)	Buffer Zone 1 (Acres)	Buffer Zone 2 (Acres)	Wetlands (Acres)	Wetlands (Each)	Riparian (Acres)	Non-Riparian (Acres)	Ponds (Acres)	Ponds (Each)	Floodway (Acres)	100 Yr Flood (Acres)	500 Yr Flood (Acres)
NC 55 Bypass to US 401 (R-2721)	**Func. Design**	18,891	45	26.33	16.72	28.96	47	24.28	4.68	5.18	8	9.14	17.16	18.76
	Prelim. Design	**19,057**	**48**	**27.36**	**17.71**	**29.67**	**50**	**27.21**	**2.46**	**5.46**	**7**	**8.47**	**15.70**	**17.27**
	Difference	167	3	1.03	0.99	0.71	3.00	2.93	-2.22	0.28	-1	-0.67	-1.46	-1.49
	Percent Difference	0.88%	6.67%	3.91%	5.92%	2.45%	6.38%	12.07%	-47.44%	5.41%	-12.50%	-7.34%	-8.48%	-7.94%
US 401 to I-40 (R-2828)	**Func. Design**	29,850	55	43.83	28.22	25.79	58	24.68	1.11	9.12	15	0.23	14.27	18.48
	Prelim. Design	**20,070**	**45**	**29.20**	**19.19**	**20.61**	**47**	**20.00**	**0.61**	**8.84**	**14**	**0.08**	**11.40**	**15.00**
	Difference	-9,780	-10	-14.63	-9.03	-5.18	-11.00	-4.68	-0.50	-0.28	-1	-0.15	-2.87	-3.48
	Percent Difference	-32.76%	-18.18%	-33.38%	-32.00%	-20.10%	-18.97%	-18.98%	-45.09%	-3.07%	-6.67%	-64.79%	-20.13%	-18.85%
I-40 to US 64/US 264 Bypass (I-495) (R-2829)	**Func. Design**	17,069	39	24.99	17.35	19.58	44	18.28	1.31	6.74	15	8.20	34.43	44.44
	Prelim. Design	**16,547**	**45**	**25.19**	**17.64**	**18.96**	**53**	**17.74**	**1.22**	**10.34**	**18**	**6.83**	**34.10**	**43.90**
	Difference	-522	6	0.20	0.29	-0.62	9.00	-0.54	-0.09	3.60	3	-1.37	-0.33	-0.54
	Percent Difference	-3.06%	15.38%	0.80%	1.67%	-3.17%	20.45%	-2.95%	-6.87%	53.41%	20.00%	-16.69%	-0.95%	-1.21%
Totals														
	Func. Design	65,810	139	95.15	62.29	74.33	149.00	67.24	7.10	21.04	38	17.57	65.86	81.69
	Prelim. Design	**55,674**	**138**	**81.75**	**54.54**	**69.24**	**150.00**	**64.95**	**4.29**	**24.64**	**39**	**15.38**	**61.21**	**76.18**
	Difference	-10,136	-1	-13.40	-7.75	-5.09	1.00	-2.29	-2.81	3.60	1	-2.19	-4.66	-5.51
	Percent Difference	-15.40%	-0.72%	-14.08%	-12.44%	-6.85%	0.67%	-3.41%	-39.58%	17.11%	2.63%	-12.45%	-7.07%	-6.75%

Note: Functional Design impacts were computed using slope stakes +40 ft; Preliminary Design impacts were computed using slope stakes +25 ft.

Note: This table shows the difference in project impacts between the earlier functional design and the current preliminary design. A negative number indicates a reduction in impacts, a positive delta is an increase in impacts.

Note: Overlapping projects include I-5111 and I-4739 along Interstate 40.

CHAPTER 5

Summary of Technical Reports

This chapter presents more detail about the documents that have been referenced throughout this Final EIS. It also provides information about the ways those documents can be accessed, either in paper or electronic form.

The primary purpose of this Final EIS is to explain how decisions about the project were made and to present the information that was used to make those decisions. The main body of this document is a summary of this information; greater detail is contained in individual technical reports prepared for this study. While those reports are considered to be a part of this current document, they are not included in the main body of text. Instead, they are incorporated by reference. The complete set of reports can be found on the companion disk attached to printed copies of this document and on the project's website, www.ncdot.gov/projects/complete540/.

Each of the reports have been reviewed and approved by NCDOT and FHWA. As provided in the Council on Environmental Quality's guidance on incorporation by reference, this Chapter identifies the referenced materials and indicates the organization that prepared the documents.

Note: The documents listed below are grouped by topic. Those prepared after selection of the Preferred Alternative are noted with a "New" symbol (NEW).

PURPOSE, ALTERNATIVES, AND DESIGN ELEMENTS

Purpose and Need Statement

Completed by H.W. Lochner, Inc. in May 2011

This report describes the proposed project and presents information about why the project is needed, explaining the existing transportation problems in the study area and the needs that the project will address.

Alternatives Development and Analysis Report

Completed by H.W. Lochner, Inc. in May 2014

This report summarizes the process the study team used to develop and evaluate potential solutions to the needs identified in the Purpose and Need Statement. These potential solutions are called alternatives. This report also describes the identification of the set of alternatives selected for detailed study in the project's Draft EIS.

Preferred Alternative Report NEW

Completed by H.W. Lochner, Inc. in April 2016

This report documents the selection of the Preferred Alternative, with sections describing (1) agency, government, and public involvement as it related to the selection process, (2) a summary of comments relevant to the selection, and (3) efforts taken after the selection to minimize impacts.

Service Road Study NEW

Completed by H.W. Lochner, Inc. in May 2017

This report documents a study of the parcels along the Preferred Alternative that could lose access to existing roadways as a result of the project. For each affected parcel, the study compared the anticipated cost of providing property access with an estimate of the cost of parcel acquisition.

HUMAN ENVIRONMENT

Community Characteristics Report

Completed by H.W. Lochner, Inc. in May 2011

This report summarizes baseline conditions and trends in the communities within the project study area. This information provides the foundation for the project's community impact assessment.

Community Impact Assessment

Completed by H.W. Lochner, Inc. in June 2015

This report evaluates the potential effects of the project and each of the DSAs on the surrounding communities and on quality of life in those communities. More specifically, this assessment documents the potential direct effects of the project on several aspects of the human environment, including social, physical and visual characteristics; land use patterns and economic trends; mobility and access patterns; and area neighborhoods. This report also includes recommendations for avoiding, minimizing, and mitigating these potential effects. This report includes information about the preliminary determination of Section 4(f) applicability to historic resources, parks and recreation areas in the study area.

Historic Architectural Resources Survey Report

Completed by Mattson, Alexander and Associates in November 2014

This report documents the surveys completed for all the properties within the Area of Potential Effects (APE) for the project that were identified as either already listed on the *National Register of Historic Places* (NRHP) or as potentially eligible for listing. NCDOT and the NC State Historic Preservation Office (HPO) used this information to identify the properties meeting eligibility criteria for the NRHP and to determine the potential effects of each of the project's DSAs on the listed and eligible historic properties.

Intensive Archaeological Survey and Evaluation of the Preferred Alternative NEW

Completed by Commonwealth Heritage Group in September 2017

The archaeological survey and evaluation for the Preferred Alternative gave full consideration to the approximately 6,000 acres within the project's Area of Potential Effect. The intensive investigations used a combination of pedestrian surface survey, subsurface shovel testing, and test unit excavation. This document reports on the various archae-

ological sites identified and an assessment of their significance. Within the Preferred Alternative, one site has been recommended as eligible for the NRHP.

Traffic Noise Analysis

Completed by H.W. Lochner, Inc. in May 2015

This report documents the analysis of the potential effects the traffic anticipated for the project will have on noise conditions along each of the DSAs. This analysis included a preliminary assessment of noise abatement along the DSAs.

Traffic Noise Report Addendum NEW

Completed by H.W. Lochner, Inc. in December 2017

This report documents the analysis of the effects of the project's anticipated traffic on noise conditions along the Preferred Alternative. The previous traffic noise analysis, completed for all the DSAs, was revised to incorporate design refinements along the Preferred Alternative, new traffic data, revised NCDOT traffic noise policy, and additional development in the project area. The report also documents a more detailed analysis of noise abatement along the Preferred Alternative, identifying locations where noise barriers were found to be both feasible and reasonable and likely to be recommended for further consideration.

Right-of-Way and Relocation Report

Completed by HDR and H.W. Lochner, Inc. in March 2015

This reports summarizes the findings of the right-of-way and relocation study completed for the project DSAs. This technical study identified the number and type of parcels that will be involved in the right-of-way acquisition process for each DSA, based on preliminary functional designs, the number and type of relocations, and an estimate of the right-of-way and relocation costs.

Right-of-Way and Relocation Report (update) NEW

Completed by Carolina Land Acquisitions in December 2017

This reports summarizes the findings of the right-of-way and relocation study completed for the Preferred Alternative. It identifies the number and type of parcels that will be involved in the right-of-way acquisition process, based on: the preliminary design plans, the number and type of relocations, and an estimate of the right-of-way and relocation costs. It updates the previous Right-of-Way and Relocation Report to reflect the changes in the project since the previous evaluation was completed.

NATURAL ENVIRONMENT

Air Quality Analysis Report

Completed by H.W. Lochner, Inc. in October 2015

This report documents the analysis of the potential air quality effects of the traffic anticipated for the project's DSAs. This analysis was completed in compliance with the federal Clean Air Act, in accordance with federal regulations and guidelines.

Air Quality Analysis Report (update) NEW

Completed by H.W. Lochner, Inc. in December 2017

This report builds upon the Air Quality Analysis Report completed in 2015 for the Draft EIS, summarizing the updated evaluation of the potential air quality effects of traffic anticipated for the Preferred Alternative. The evaluation incorporated new traffic data and the redesignation of both Wake and Johnston Counties to attainment for all criteria air pollutants.

Natural Resources Technical Report

Completed by Mulkey (now Calyx) Engineers and Consultants in August 2014

The purpose of this report is to inventory, catalog, and describe the various natural resources likely to be impacted by each of the DSAs

under consideration. The report documents the results of various field surveys completed to gather necessary information on natural resources in the vicinity of the DSAs. Natural resources addressed in the report include water resources, terrestrial habitat, and protected species.

Waters Report
Completed by Mulkey (now Calyx) Engineers and Conslutants in September 2014

This report documents the field delineation of jurisdictional water resources in the vicinity of the DSAs. These resources include wetlands, streams, and ponds.

Freshwater Mussel Survey Report
Completed by The Catena Group (now Three Oaks Engineering, Inc.) in February 2012

This report documents the field surveys completed for the Dwarf Wedgemussel and other rare freshwater mussel species in the streams in the project study area. It also documents habitat evaluations completed during these field surveys.

Dwarf Wedgemussel Viability Study: Phase I
Completed by The Catena Group (now Three Oaks Engineering, Inc.) in March 2014

This report documents the first phase of a study being conducted to assess the long-term viability of the Dwarf Wedgemussel in Swift Creek. This work included three main elements: (1) describing existing conditions in Swift Creek, (2) summarizing existing conservation measures for the Dwarf Wedgemussel in Swift Creek, and (3) assessing historic trends and future viability of the Dwarf Wedgemussel.

Northern Long-Eared Bat Section 7 Documentation
Prepared by USFWS, USACE, FHWA, and NCDOT in July 2015

This document is a compliation of materials related to coordination efforts concerning the recently protected (April 2015) Northern Long-Eared Bat. These materials include a Programmatic Biological Opinion for this bat species in eastern North Carolina (NCDOT Divisions 1 - 8).

Dwarf Wedgemussel Viability Study NEW
Completed by Three Oaks Engineering, Inc. in May 2016

This report documents a technical study with three key purposes: (1) to characterize existing water quality and Dwarf Wedgemussel habitat conditions of the Swift Creek watershed, (2) to summarize conservation measures that have already been implemented to protect the Dwarf Wedgemussel in the Swift Creek watershed, and (3) to assess historic trends and future viability of the Dwarf Wedgemussel population and habitat conditions in Swift Creek.

Lower Swift Creek Water Quality Report NEW
Completed by Three Oaks Engineering, Inc. in February 2016

This report documents a study of existing water quality conditions in the Swift Creek watershed. It was a component of the larger Dwarf Wedgemussel viability study described above.

Aquatic Species Survey Report NEW
Completed by Three Oaks Engineering, Inc. in June 2017

After publication of the Draft EIS for Complete 540, USFWS proposed adding the Yellow Lance (a freshwater mussel) to the federally protected species list as a threatened species. USFWS is also currently evaluating whether to propose adding three additional aquatic species to the federal protected species list: the Atlantic Pigtoe (a freshwater mussel), Carolina Madtom (a fish), and Neuse River Waterdog (a salamander).

This report documents the results of field surveys for these species in the project's FLUSA and for Dwarf Wedgemussel in parts of the FLUSA not previously surveyed.

Jurisdictional Resources and Protected Species Review of Access Roads NEW

Completed by HDR, Inc. in September 2017

The purpose of this memorandum is to inventory, catalog, and describe the various jurisdictional resources potentially effected by service roads associated with the Preferred Alternative for the Complete 540 project. The memorandum serves as an addendum to the Natural Resources Technical Report and the Waters Report for the project. Jurisdictional resources addressed in this memorandum include water resources, wetlands, and protected species.

Michaux's Sumac Survey NEW

Completed by HDR, Inc. in June 2017

The purpose of this memorandum is to update the status of this federally protected species in the Preferred Alternative. The memorandum serves as an addendum to the Natural Resources Technical Report for the project.

Biological Assessment of Potential Effects to Federally Listed Species NEW

Completed by Three Oaks Engineering, Inc. in December 2017

This document is a component of the Endangered Species Act, Section 7, consultation process with USFWS for protected species in the species' action area. The report documents NCDOT's and FHWA's conclusions about the potential effects of the Preferred Alternative on each of the protected species in the project's action area.

Biological Assessment of Potential Effects to the Atlantic Sturgeon and Critical Habitat NEW

Under development by Three Oaks Engineering, Inc.

This document is a component of the Endangered Species, Section 7, consultation process with NMFS for Atlantic Sturgeon designated critical habitat in the species' action area. The report documents NCDOT's and FHWA's conclusions about the potential effects of the Preferred Alternative on this protected species.

PHYSICAL ENVIRONMENT

Preliminary Hydraulics Study for Environmental Impact and Addendum

Completed by Mulkey (now Calyx) Engineers and Consultants in September 2014; Addendum completed by Mulkey (now Calyx) Engineers and Consultants in February 2015

These reports document the findings of the preliminary hydraulic study completed for the project DSAs. This included identification of all locations along the DSAs that would require hydraulic structures 72 inches in diameter or greater, based on hydrologic conditions and requirements. The reports indicate the size and type of hydraulic structure needed at each site to convey water across the DSAs.

GeoEnvironmental Report for Planning

Completed by NCDOT in June 2014

This report documents the results of a hazardous material evaluation conducted along the project's DSAs. The purpose was to identify properties along the DSAs that are or may be contaminated by hazardous materials. Hazardous material impacts include, but are not limited to,

active and abandoned underground storage tank sites, vehicle repair and salvage sites, hazardous waste sites, regulated landfills, and unregulated dumpsites.

Utility Impact Report

Completed by Hinde Engineering in November 2014

This report summarizes the general location, dimension and characteristics of major utilities found within the vicinity of the project DSAs. The report documents individual utility and some non-utility conflicts where the potential relocation cost was anticipated to exceed $250,000.

Utility Analysis and Routing Report (preliminary) NEW

Completed by Hinde Engineering in July 2017

This report documents the potential conflicts of the Preferred Alternative with existing utility infrastructure. It also provides utility contact information and potential utility relocation routing. Cost estimates for utility impacts are included in this report.

TRAFFIC ANALYSES

Build Traffic Capacity Analysis Report

Completed by HNTB North Carolina, P.C. in December 2009

This report documents the planning-level traffic capacity analysis completed to predict conditions on the area roadway network under the Build scenario for this project. The report identifies existing and projected roadway facility operations and deficiencies for the major roadways surrounding the Complete 540 project under existing and future (2035) Build conditions. This analysis used a representative alignment for the Complete 540 project.

No-Build Traffic Capacity Analysis Report

Completed by HNTB North Carolina, P.C. in December 2009

This report documents the planning-level traffic capacity analysis completed to predict conditions on the area roadway network under the No-Build scenario. The report identifies existing and projected roadway facility operations and deficiencies for the major roadways surrounding the Complete 540 project under existing and future (2035) No-Build conditions.

First Tier Screening Traffic Memorandum

Completed by HNTB North Carolina, P.C. in June 2011

This memorandum provided future (2035) traffic data for use in the first tier screening of alternative concepts. It can be found in Appendix A fo the Alternatives Development and Analysis Report.

Traffic Forecast Technical Memorandum

Completed by HNTB North Carolina, P.C. in April 2014

This report documents traffic forecasts completed for the seventeen DSAs under existing and future (2035) conditions. The purpose of this report was to provide forecast traffic volumes and other traffic characteristics under each of the DSA scenarios.

Detailed Study Alternatives Traffic Analysis Technical Memorandum

Completed by HNTB North Carolina, P.C. in February 2015

This report documents the traffic capacity analysis completed for the 17 DSAs under existing and future (2035) conditions. The purpose of this analysis was to identify projected operations and potential deficiencies for the major roadways surrounding and intersecting each of the DSAs.

Project Level Traffic Forecast

Completed by HNTB North Carolina, P.C. in October 2016 NEW

This report documents the traffic forecast completed for the Preferred Alternative, which included forecasts of existing (base year No-Build and base year Build) and future (future year Build) traffic conditions. The previous forecast, documented in the April 2014 Traffic Forecast Technical Memorandum, was prepared using the year 2035 as the "future" condition for projected traffic. The October 2016 document

used the year 2040 as the "future" condition and used the CAMPO TRM, version 5.

Preferred Alternative Traffic Analysis Technical Memorandum NEW

Completed by HNTB North Carolina, P.C. in July 2017

This report documents the traffic capacity analysis completed for the Preferred Alternative under existing and future (2040) conditions. The previous traffic analysis, completed in February 2015, examined all the DSAs with forecast 2035 traffic as the future condition. The analysis documented in the July 2017 technical memorandum used the traffic forecasts generated for the October 2016 Project Level Traffic Forecast, with forecast 2040 traffic as the future condition. The purpose of this analysis was to identify projected operations for the major roadways surrounding the Preferred Alternative under the Build scenario.

First Tier Alternative Concepts Screening and Traffic Reassessment NEW

Completed by HNTB North Carolina, P.C. in December 2017

This report updates previous first tier screening of alternatives based on the updated Triangle Regional Model for 2040, version 5. Prior screening was based on version 4 for 2035. The updated first tier alternative concepts screening was performed using new information from the quantitative indirect and cumulative effects memos, and the updated model, to refresh the previous evaluation.

INDIRECT AND CUMULATIVE EFFECTS

Indirect and Cumulative Effects Report

Completed by H.W. Lochner, Inc. in December 2014

This report qualitatively evaluates the project's potential to cause environmental effects as a result of induced growth, as well as the potential incremental impacts of the project when added to other past, present, or reasonably foreseeable public and private projects. Note: a quantitative assessment of indirect and cumulative effects was later completed for the Preferred Alternative.

Historic Growth Memorandum NEW

Completed by Michael Baker International in November 2017

To supplement the qualitative assessment of indirect and cumulative effects conducted prior to publishing the Draft EIS, this study, reported in a series of memorandums, includes a quantitative assessment of the potential indirect and cumulative effects of the project on land use and water quality in the surrounding area. This memo examines historic demographic trends that may influence existing or future regional population and employment growth trends.

Memorandum on Local Jurisdiction Outreach and Methodology Updates (Quantitative ICE Assessment Memo #1) NEW

Completed by Michael Baker International in November 2017

This memo outlines the methodology used in the Quantitative ICE analysis to forecast land use changes in the FLUSA between 2010 and 2040 with and without the Complete 540 project. The outputs of the land use forecasts were used in the quantitative ICE assessment and the water quality indirect and cumulative Impacts (ICI) assessment for the Preferred Alternative.

Memorandum on Land Use Scenario Methodology and Results (Quantitative ICE Assessment Memo #2) NEW

Completed by Michael Baker International in November 2017

The purpose of this memorandum is to follow up on approaches summarized in Quantative ICE Assessment Memo #1 and describe how those outputs were used to forecast land use and land cover changes between base year and future year 2040 Build and No-Build scenarios. This memo calculates the potential land use and land cover changes in the FLUSA using the data from the CommunityViz analyses.

Memorandum on Water Quality Modeling Methodology and Results (Quantitative ICE Assessment Memo #3) NEW

Completed by Michael Baker International in November 2017

This memo describes the methodology and results of the water quality ICI, including the inputs and methods used in the water quality modeling. The ICI combines collected data with CommunityViz model output from Quantitative ICE Assessment Memo #2, via a watershed model, to estimate the water quality impacts that may occur as indirect and cumulative effects from planned and anticipated development in the FLUSA with and without the construction of the proposed facility.

Indirect and Cumulative Effects Memorandum (Quantitative ICE Assessment Memo #4) NEW

Completed by Michael Baker International in November 2017

This memo describes the indirect and cumulative effects to land use, traffic, and water quality based on the development of 2040 No-Build and 2040 Build land use scenarios. This memo consolidates and synthesizes the results of Quantitative ICE Assessment Memoranda #1, 2, and 3.

TOLL REVENUE STUDY

Planning Level Traffic and Revenue Study NEW

Completed by CDM Smith in May 2017

This report provides the data necessary for NCDOT to prepare an updated traffic and toll revenue forecast for the existing Triangle Expressway and to forecast toll revenues for Complete 540 under the Build scenario.

STAKEHOLDER INVOLVEMENT

Stakeholder Involvement Report

Completed by H.W. Lochner, Inc. in March 2015

The purpose of this report is to document coordination with the public, local governments, and the resource and regulatory agencies during the course of the project, up to publication of the Draft EIS. The report summarizes public involvement techniques used during the study and input received from the public and local governments, and also documents interagency coordination and agency input.

Stakeholder Involvement Report (update) NEW

Updated by H.W. Lochner, Inc. in December 2017

This is an update and expansion of the Stakeholder Involvement Report published at the time of the Draft EIS. The purpose of this report is to document coordination with the public, local governments, and the resource and regulatory agencies during the course of the project. The report summarizes input received from the public and local governments, describes interagency coordination and agency input, and provides responses to comments received relative to the Draft EIS.

CHAPTER 6

List of Preparers and EIS Distribution

The purpose of this chapter is to identify the study team members, their qualifications, and their roles on the Complete 540 study. This chapter also documents the agencies that have received a copy of this Final EIS for review and comment.

LIST OF PREPARERS

This document was prepared by the FHWA and NCDOT, with assistance from a team of consulting engineers, scientists, and planners led by H.W. Lochner, Inc. and HNTB North Carolina, P.C. This team includes the individuals listed on the following pages, using the format shown below.

Format for Preparer Information

Name
Study Team Title
Education
Years of Experience
Role in Complete 540 Study
Asterisk (*) denotes that the individual is no longer an employee of the organization listed

FEDERAL HIGHWAY ADMINISTRATION

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M.S. Transportation Engineering
B.S. Civil Engineering
25 years
Project management; document review (Draft EIS)

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Project management; document review (Draft and Final EIS)

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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Natural systems review

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Indirect and cumulative effects review

Jared Gray
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B.S. Environmental Science
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Protected species review

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Indirect and cumulative effects assessment

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Traffic forecasting and analysis

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Senior Transportation Engineer
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Project cost estimating

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Air quality and traffic noise analysis document review

H.W. LOCHNER, INC.

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Project management; document preparation; impact analysis

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Project management; document preparation; impact analysis

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Roadway design; impact analysis

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Roadway design; impact analysis

David Shannon, P.E.
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Noise and air quality impact analysis

Erica Salutz, P.E.*
Engineer
B.S. Civil Engineering
12 years
Noise and air quality impact analysis

Christina Yokeley, EI
Engineer
B.S. Civil Engineering
5 years
Roadway design

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Architectural Historian
Ph.D. Geography
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24 years
Historic architectural surveys and analysis; document preparation

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Historic architectural surveys and analysis; document preparation

COMMONWEALTH HERITAGE GROUP, INC.

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7 years
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CALYX (FORMERLY MULKEY) ENGINEERS AND CONSULTANTS

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ORGANIZATIONS RECEIVING COPIES OF THIS FINAL EIS

Federal Agencies

- US Army Corps of Engineers
- US Environmental Protection Agency
- US Department of Transportation
- US Department of the Interior
- US Department of the Interior – US Fish and Wildlife Service
- US Department of Commerce – National Marine Fisheries Service
- US Department of Agriculture
- US Department of Energy
- Federal Railroad Administration
- Federal Emergency Management Agency
- Office of Management and Budget

State Agencies

- NC Department of Commerce
- NC Department of Cultural Resources
- NC Department of Economic and Community Development
- NC Department of Environmental Quality
- NC Department of Public Instruction
- NC Wildlife Resources Commission
- NC Attorney General
- NC State Clearinghouse

Local Governments and Agencies

- Capital Area Metropolitan Planning Organization
- City of Raleigh
- Greater Raleigh Chamber of Commerce
- Harnett County Board of Commissioners
- Johnston County Board of Commissioners
- Johnston County Schools
- Regional Transportation Alliance
- Town of Angier
- Town of Apex
- Town of Cary
- Town of Clayton
- Town of Fuquay-Varina
- Town of Garner
- Town of Knightdale
- Town of Holly Springs
- Town of Wendell
- Triangle J Council of Governments
- Wake County Board of Commissioners
- Wake County Public School System

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[3] National Environmental Policy Act of 1969. 42 U.S.C. §§4321-4370h.

[4] Caldwell, Lynton
The National Environmental Policy Act: An Agenda for the Future (1998). Indiana University Press, Bloomington and Indianapolis.

[5] ibid.

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[7] National Environmental Policy Act of 1969. 42 U.S.C. §§4321-4370h.

[8] ibid.

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[1] CAMPO
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[2] North Carolina Department of Transportation
Indirect and Cumulative Effects Report. Prepared as part of the Complete 540 study by H.W. Lochner, Inc. July 2014.

Chapter 3

[1] Federal Highway Administration
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Chapter 4

[1] Federal Highway Administration, NC Division
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[2] Caldwell, Lynton
The National Environmental Policy Act: An Agenda for the Future (1998). Indiana University Press, Bloomington and Indianapolis.

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Appendix 1

FINAL EIS REVIEW COPY LOCATIONS

Printed copies of the Final EIS are available for public review at the locations listed below. Electronic copies are available on the project website at www.ncdot.gov/projects/complete540/.

NCDOT District Office–Wake County
4009 District Drive
Raleigh, NC 27607
919-733-9499

Capital Area Metropolitan Planning Organization
421 Fayetteville Street, Suite 203
Raleigh, NC 27601
919-996-4400

Holly Springs Community Library
300 W. Ballentine Street
Holly Springs, NC 27540
919-577-1660

Holly Springs Dept. of Planning & Zoning
128 South Main Street
Holly Springs, NC 27540
919-557-3908

Fuquay-Varina Community Library
133 S. Fuquay Avenue
Fuquay-Varina, NC 27526
919-557-2788

Fuquay-Varina Planning Department
401 Old Honeycutt Road
Fuquay-Varina, NC 27526
919-552-1429

Garner Planning Department
900 7th Avenue
Garner, NC 27529
919-773-4449

Southeast Regional Library
908 7th Avenue
Garner, NC 27529
919-662-2250

Knightdale Planning Department
950 Steeple Square Court
Knightdale, NC 27545
919-217-2241

Clayton Planning Department
111 East Second Street
Clayton, NC 27520
919-553-1545

Hocutt-Ellington Library
100 S. Church Street
Clayton, NC 27520
919-553-5542

Appendix 2

Draft EIS Errata

Some of the formal review comments from environmental agencies and local governments pointed out errors in the Draft EIS text. Those comments are listed below, along with a description of the corrected information.

Commenter	Location in Draft EIS	Comment	Corrected Text
USFWS	Page 29, right column,"Protected Species" section	The Draft EIS states "…the dwarf wedgemussel…could be directly affected by the proposed project." USFWS believes that indirect effects from road-induced development are the greater concern.	"…the dwarf wedgemussel (*Alasmidonta heterodon*) which is found in the rivers and streams of the Neuse River watershed ~~and~~. It could be directly affected by the proposed project and it could also be indirectly affected by land development induced by the presence of a new highway."
USFWS	Page 97, first paragraph in right column, third sentence	"Incidental take" is incorrectly defined.	Replace sentence with "Incidental take refers to any direct harm to a protected species or habitat loss affecting a protected species due to an otherwise lawful activity."
City of Raleigh	Page 15, second paragraph	Indicate what scenario the 2035 network figure represents.	Replace the second sentence with "The top map shows conditions in 2011. The bottom map shows the projected conditions in 2035, without the Complete 540 project in place, but with all the other projects included in the CAMPO 2035 LRTP in place."
City of Raleigh	Page 40, first paragraph, second complete sentence	Discussion of costs transit not being fully funded by fares should consider that construction, operations, and maintenance of toll road will require gap funding in addition to toll revenues.	Update sentence: "It is unlikely that these expansion and ongoing operation costs could be met by bus fares alone, although it is also true that construction, operation, and maintenance of a toll highway would require gap funding in addition to toll revenue."
Town of Cary	Page 73, right column, second paragraph	Use a dash instead of a period after the word "Services."	Modify beginning of paragraph: "Police, Fire, and Emergency Services~~.~~ -- Regardless of…"
Town of Cary	Page 81, last paragraph	The word "are" should be "area."	Modify second sentence: "…like the Complete 540 project through the study ~~are~~ area would likely alter local perceptions…"
Town of Cary	Page 87, right column, beginning of section	Heading is missing the word "on."	Modify heading: "More Information on the Human Environment Effects."

When the Draft EIS was prepared, the name of North Carolina's State environmental agency was the NC Department of Environment and Natural Resources (NCDENR), so the Draft EIS refers to this agency by that name. Subsequent to publication of the Draft EIS, this agency's name was changed to the NC Department of Environmental Quality (DEQ). The Final EIS refers to the agency by the new name.