



U.S. Department
of Transportation
**Federal Highway
Administration**

South Carolina

May 20, 2019

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In Reply Refer To:
HDA-SC

ELECTRONIC CORRESPONDENCE ONLY

Mr. Chad Long
Director Environmental Services Office
South Carolina Department of Transportation (SCDOT)
955 Park Street, P.O. Box 191
Columbia, South Carolina 29202

Subject: Environmental Assessment (EA) for the Proposed Palmetto Commerce Parkway Interchange, Charleston County, South Carolina (Federal Project Number P030753)

Dear Mr. Long:

The Federal Highway Administration (FHWA) has reviewed the Environmental Assessment (EA) for the Proposed Palmetto Commerce Parkway and finds that it adequately addresses the potential impacts of the proposal. Based on the analysis provided in the EA and supporting documents we have determined that an Environmental Impact Statement (EIS) is not required. The EA is approved and acceptable for public availability and comment. The EA shall be made available for public review for a minimum of thirty (30) days before FHWA makes its final determination. The public availability shall be announced by a notice similar to a public hearing notice. Also, please provide Notice of Availability of the EA to the affected units of government, and to the State intergovernmental review contacts as specified in 23 CFR 771.119(d).

All project commitments documented in the EA are binding and the SCDOT will need to ensure that they are ultimately carried out. The public hearing may be scheduled fifteen (15) days after the document is made available for public review. Enclosed is a copy of the signed document. Please address any questions you may have concerning this project to Mr. J. Shane Belcher at 803-253-3187 or jeffrey.belcher@dot.gov.

Sincerely,

**J. Shane
Belcher**

Digitally signed by J.
Shane Belcher
Date: 2019.05.20
15:43:35 -04'00'

(for) Emily O. Lawton
Division Administrator

Enclosure

ec: Mr. David Kelly, SCDOT RPG 1 NEPA Coordinator
Ms. Joy Riley, SCDOT Program Manager
Mr. Lyle Lee, SCDOT Assistant Program Manager
Mr. Rickele Gennie, FHWA Operations Engineer



*Palmetto Commerce Interchange
at Interstate 26*

**Environmental Assessment for:
Palmetto Commerce Interchange Project
Charleston County, South Carolina**

Submitted in accordance with 42 U.S.C. § 4332(2) (C) by:

U.S. Department of Transportation Federal Highway Administration (FHWA)

South Carolina Department of Transportation (SCDOT)

Charleston County Transportation Development, South Carolina



5/20/2019
Approval Date

Joy Riley
South Carolina Department of Transportation

5/20/2019
Approval Date

Shane Belcher
Federal Highway Administration

The following persons may be contacted for additional information concerning this document:

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Date: 05/06/2019



Project ID: P030753 County: Charleston District: District 1 Doc Type: EA Total # of Commitments: 11

Project Name: Palmetto Commerce Interchange

The Environmental Commitment **Contractor Responsible** measures listed below **are to be included in the contract and must be implemented**. It is the responsibility of the Program Manager to make sure the Environmental Commitment **SCDOT Responsible** measures are adhered to. If there are questions regarding the commitments listed please contact:

CONTACT NAME: David Kelly **PHONE #:** (803)737-1645

ENVIRONMENTAL COMMITMENTS FOR THE PROJECT

USTs/Hazardous Materials NEPA Doc Ref: Page: 94 Section: 4.9 Responsibility: SCDOT

If avoidance of hazardous materials is not a viable alternative and soils that appear to be contaminated are encountered during construction, the South Carolina Department of Health and Environmental Control (SCDHEC) will be informed. Hazardous materials will be tested and removed and/or treated in accordance with the United States Environmental Protection Agency and the SCDHEC requirements, if necessary.

Water Quality NEPA Doc Ref: Page: 98 Section: 4.10 Responsibility: COUNTY

The contractor will be required to minimize possible water quality impacts through implementation of BMPs, reflecting policies contained in 23 CFR 650B and the Department's Supplemental Specification on Erosion Control Measures (latest edition) and Supplemental Technical Specifications on Seeding (latest edition). Other measures including seeding, silt fences, sediment basins, etc. as appropriate will be implemented during construction to minimize impacts to water quality.

Stormwater NEPA Doc Ref: Page: 98 Section: 4.10 Responsibility: COUNTY

Stormwater control measures, both during construction and post-construction, are required for SCDOT projects with land disturbance and/or constructed in the vicinity of 303(d), TMDL, ORW, tidal, and other sensitive waters in accordance with the SCDOT's MS4 Permit. The selected contractor would be required to minimize potential stormwater impacts through implementation of construction best management practices, reflecting policies contained in 23 CFR 650 B and SCDOT's Supplemental Specifications on Seed and Erosion Control Measures (latest edition).

Project ID: P030753

SCDOT
NEPA ENVIRONMENTAL COMMITMENTS
FORM



ENVIRONMENTAL COMMITMENTS FOR THE PROJECT

Cultural Resources

NEPA Doc Ref: Page: 49 Section: 4.3

Responsibility: CONTRACTOR

The contractor and subcontractors must notify their workers to watch for the presence of any prehistoric or historic remains, including but not limited to arrowheads, pottery, ceramics, flakes, bones, graves, gravestones, or brick concentrations during the construction phase of the project, if any such remains are encountered, the Resident Construction Engineer (RCE) will be immediately notified and all work in the vicinity of the discovered materials and site work shall cease until the SCDOT Archaeologist directs otherwise.

Noise

NEPA Doc Ref: Page: 87 Section: 4.7

Responsibility: SCDOT

SCDOT will inform local planning officials of future, generalized noise levels expected to occur in the project vicinity after FHWA has made a final decision on the Environmental document.

Individual Permit

NEPA Doc Ref: Page: 104 Section: 4.12

Responsibility: COUNTY

Impacts to jurisdictional waters will be permitted under a Department of the Army Section 404 permit from the U.S. Army Corps of Engineers. Based on preliminary design, it is anticipated that the proposed project would be permitted under an Individual Army Corps of Engineers Permit (IP). SCDOT will provide the Army Corps with information regarding any proposed demolition activities during the Section 404 permitting process. The required mitigation for this project will be determined through consultation with the USACE and other resource agencies.

Project ID: P030753

SCDOT
NEPA ENVIRONMENTAL COMMITMENTS
FORM



ENVIRONMENTAL COMMITMENTS FOR THE PROJECT

Non-Standard Commitment

NEPA Doc Ref: Page: 61 Section: 4.6

Responsibility: COUNTY

Displacements

Charleston County will acquire all new right-of-way and process any relocations in compliance with the Uniform Relocation Assistance and Real Property Acquisition policies of 1970, as amended (42 U.S. C. 4601 et seq.). The purpose of these regulations is to ensure that owners of real property to be acquired for Federal and federally-assisted projects are treated fairly and consistently, to encourage and expedite acquisition by agreements with such owner, to minimize litigation and relieve congestion in the courts, and to promote public confidence in Federal and Federally-assisted land acquisition programs.

Non-Standard Commitment

NEPA Doc Ref: Page: 99 Section: 4.11

Responsibility: CONTRACTOR

Floodplains

A detailed hydrologic study would be completed during future design phases of the project, as required by 23 CFR 650, Subpart A. Prior to construction, the selected contractor will send a set of final plans and request for floodplain management compliance to the local County Floodplain Administrator and to SCDOT.

Non-Standard Commitment

NEPA Doc Ref: Page: 93 Section: 4.8.2

Responsibility: CONTRACTOR

Air Quality

To minimize potential air quality impacts during construction, the contractor will be required to maintain construction equipment in satisfactory condition to meet minimum exhaust emission standards. In accordance with Section 107.7 of the South Carolina Highway Department Standard Specifications for Highway Construction

1. The contractor will comply with South Carolina Air Pollution Control Laws, Regulations and Standards
2. The contractor will also comply with county and other local air pollution regulations.

Project ID: P030753

SCDOT
NEPA ENVIRONMENTAL COMMITMENTS
FORM



ENVIRONMENTAL COMMITMENTS FOR THE PROJECT

Non-Standard Commitment

NEPA Doc Ref: Page: 64 Section: 4.6

Responsibility: COUNTY/SCDOT

Vegetative Screening

To provide visual relief from the proposed new interchange, a landscape plan consisting of a vegetative buffer between the existing Deerhaven Manufactured Home Community and the proposed new interchange will be included in the final project design. This plan will prescribe the selection of plant material that allows for the mix of trees and shrubs, as appropriate, to provide variable height and density. In combination, the plant materials selected shall create a buffer with screening capability within 3 to 5 years of planting. This plan will be coordinated with the Deerhaven community during the Public Hearing process

Non-Standard Commitment

NEPA Doc Ref: Page: 73 Section: 4.7

Responsibility: CONTRACTOR

Construction Noise

Contractor will adhere to all specifications in the 2007 Standard Specifications for Highway Construction Manual relating to construction noise. Specifically, references to construction noise, including Sections 107.6-paragraph 3, 606.3.1.6.3-paragraph 1, 607.3.1.6.3-paragraph 1, 607.3.2.6.3-paragraph 1, and 702.4.15-paragraph 3 will be followed to effectively minimize nuisance construction noise.

NEPA Doc Ref:

Responsibility:

Environmental Assessment for:

Palmetto Commerce Interchange Project

May 2019

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Environmental Assessment for:
Palmetto Commerce Interchange Project
May 2019

Chapter 01 – Project Overview

1.0 Introduction

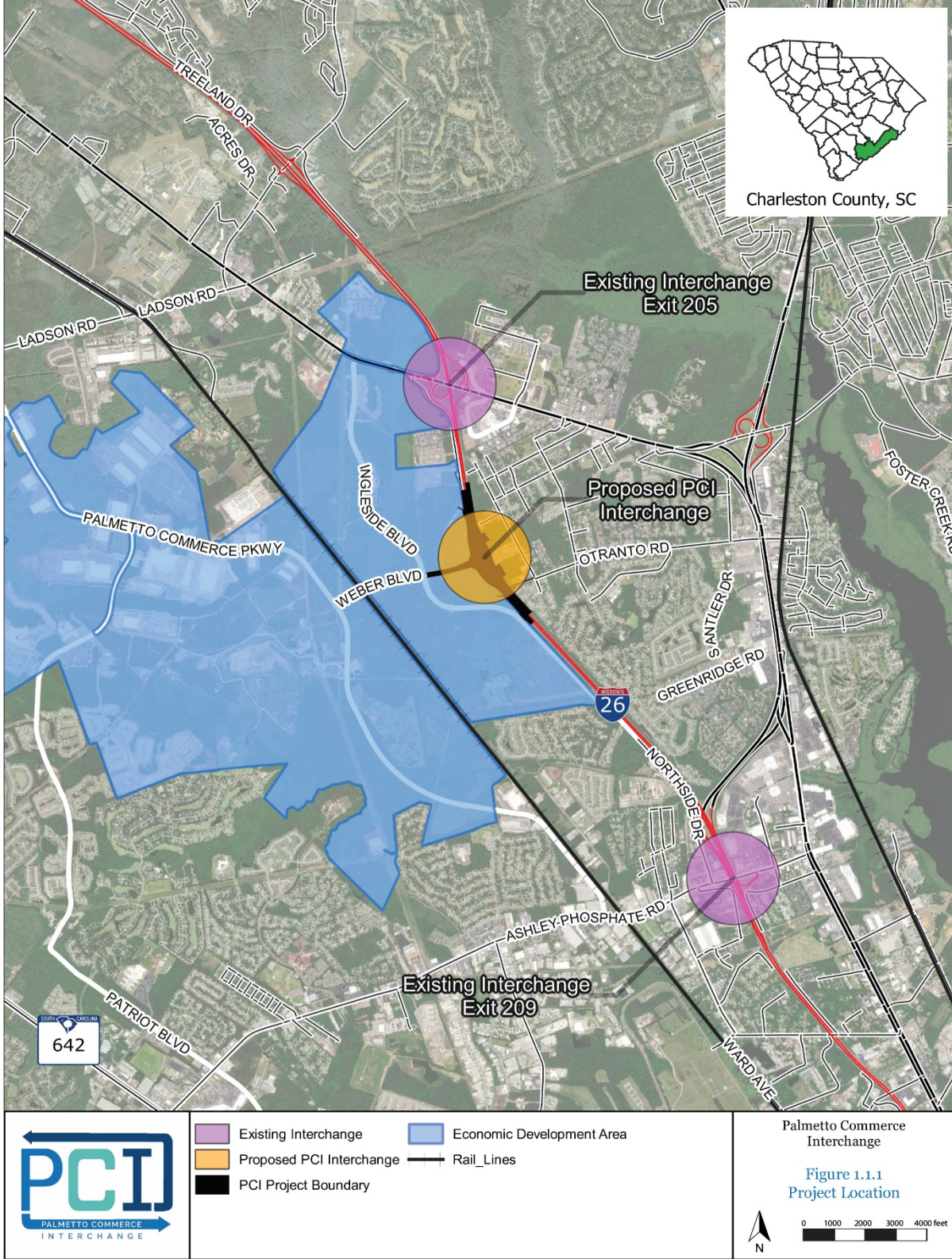
This Environmental Assessment has been prepared pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended, in accordance with Federal Highway Administration (FHWA) regulations in 23 CFR Part 771, and Council on Environmental Quality (CEQ) regulations in 40 CFR Part 1500. Environmental Assessments evaluate the potential environmental, social, and economic impacts of the proposed action and alternatives under consideration; documents the analysis; makes all findings available to decision makers; and provides opportunity for local, state and other agencies, and the public to provide feedback in the transportation decision making process.

This Environmental Assessment evaluates the Proposed Action, the Palmetto Commerce Interchange (PCI), along Interstate 26 (I-26) in the City of North Charleston, South Carolina. If it is determined that the Proposed Action results in no significant impacts, a Finding of No Significant Impact (FONSI) document will be issued by the Federal Highway Administration (FHWA). If it is determined that impacts resulting from the Proposed Action will be significant, an Environmental Impact Statement (EIS) document will be prepared.

1.1 Project Overview

Charleston County, in cooperation with the South Carolina Department of Transportation (SCDOT) and FHWA, proposes to add a new interchange between the existing interchanges at University Boulevard (US Highway 78) and Ashley Phosphate Road. The proposed project, known as the Palmetto Commerce Interchange (Project), would provide a new southerly connection from I-26 to Weber Boulevard, Ingleside Boulevard and Palmetto Commerce Parkway in Charleston County, South Carolina (see Figure 1.1.1). This connection will allow direct access and improved mobility to a growing employment center in the City of North Charleston.

The proposed improvements include a new full-movement, three-way interchange providing connection with the interstate from only the south side via Weber Boulevard. From the intersection of Blue House Road and Weber Boulevard to the new interchange, approximately 0.5 miles of a new five-lane roadway is being proposed to tie the new interchange into the existing roadway network. In addition, a pedestrian and bicycle facility is proposed on the interchange to provide connectivity over I-26.



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Figure 1.1.1 - Project Location

1.2 Existing Facility

Recognizing the importance of the interstate for national defense, economic value, and mobility; the U.S. Department of Defense has designated I-26 as part of the National Interstate System (NIS) and National Highway System (NHS). I-26 provides connectivity between three states - South Carolina, North Carolina, and Tennessee - and a number of major cities in the southeast region, including Charleston, Columbia, and Spartanburg, South Carolina; Asheville, North Carolina; and Johnson City and Kingsport, Tennessee.

I-26 serves as a major corridor and provides convenient and cost-effective access to the Charleston region (including the Port of Charleston). I-26 connections to Interstate 95, Interstate 77, Interstate 20, Interstate 85 (see Figure 1.1.2 graphic inset) provide access beyond the southeast region. The portion of I-26 within the study area is a six-lane divided roadway with paved shoulders, ditches, and a posted speed limit of 65 miles per hour.

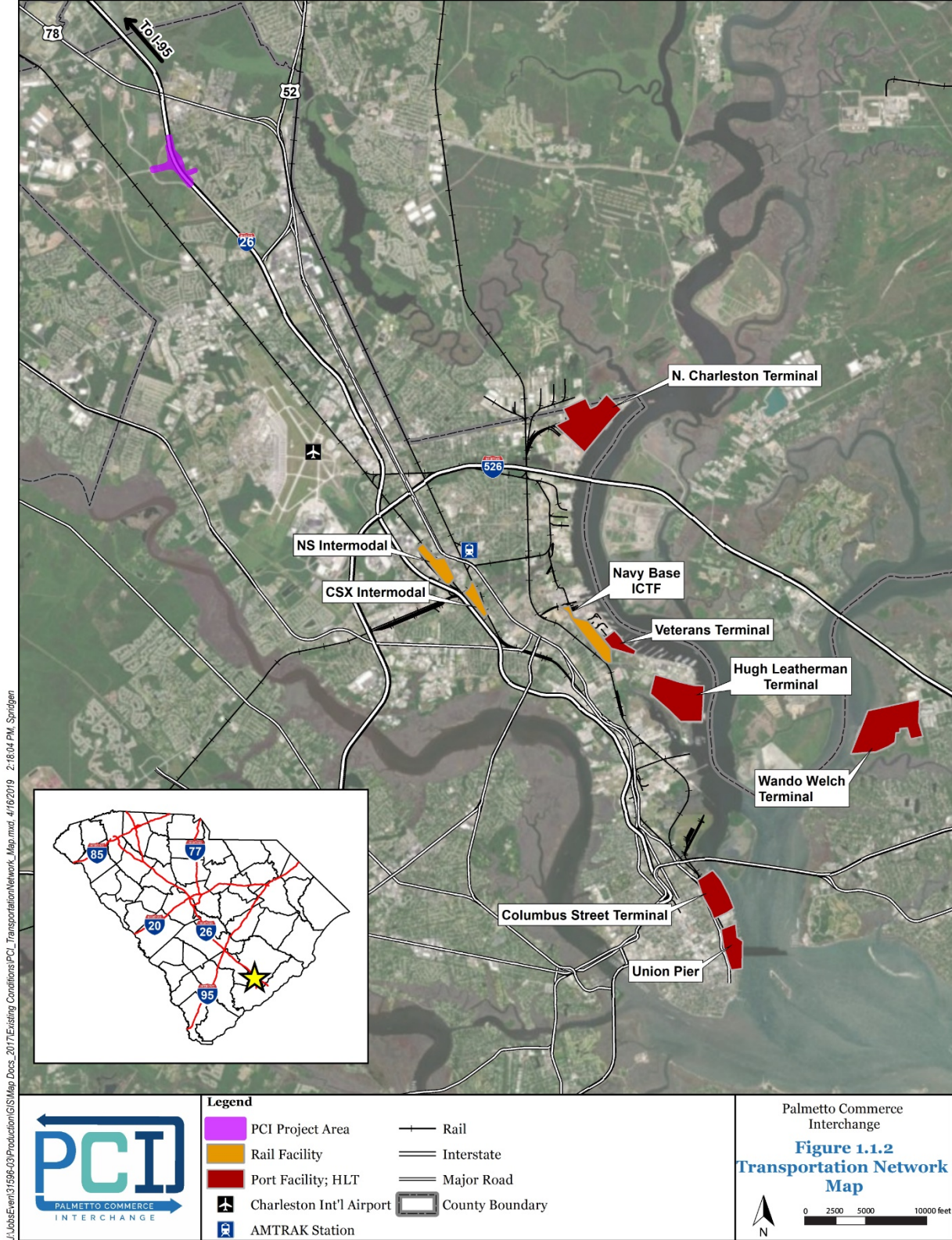
Adjacent Area

The area south of the proposed project between the existing interchanges of University Boulevard (Exit 205) and Ashley Phosphate Road (Exit 209), shown in Figure 1.1.1, is a growing area with over 2,000 acres of commercial, industrial, manufacturing, and warehouse/distribution areas that are existing, planned, or under development. This area is served by a relatively new network of roads between Ladson Road and Ashley Phosphate Road that have been constructed to provide improved access to this growing employment center in the City of North Charleston.

The main east/west thoroughfares generally run parallel to I-26 and include both Palmetto Commerce Parkway and Ingleside Boulevard/Northside Drive. Weber Boulevard provides a vital north/south connection between these two roadways, as well as a grade separated crossing over the Norfolk Southern Railroad (NSRR). Additionally, in 2018, the existing frontage road along the south side of I-26 (Blue House Road) and Weber Boulevard was extended to provide a new four-way intersection to help improve traffic mobility in this area.

Prior Improvements

In September 2005, major improvements to the I-26/Ashley Phosphate Road Interchange and I-26/US-52 Connector ramps (Exit 209) were completed by the SCDOT. These improvements included widening Ashley Phosphate Road from five (5) to seven (7) lanes, adding a new collector-distributor road along I-26 westbound, and the construction of new entrance and exit ramps at this interchange.



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Figure 1.1.2 – Transportation Network Map

1.3 Project History and Planning

The proposed project was initiated by Charleston County in order to provide the transportation infrastructure necessary to improve mobility and reduce travel times for both the existing and future traffic conditions in the area. The proposed project has been reviewed by the Berkeley-Charleston-Dorchester Council of Governments (BCDCOG), the designated Metropolitan Planning Organization (MPO) responsible for carrying out the urban transportation planning process for the Charleston Area Transportation Study (CHATS). The proposed project has been included in the “Ranked List of Candidate Transportation Projects” contained in the (CHATS) Long Range Transportation Plan. In addition, this proposed project has been submitted to the SCDOT and subsequently added to the Statewide Transportation Improvement Program (STIP) on November 17, 2017.¹

Logical Termini

In accordance with 23 CFR 771.111(f), projects should “connect logical termini [...], have independent utility or independent significance [...], and not restrict consideration of Alternatives for other reasonably foreseeable transportation improvements”ⁱ. According to the Federal Highway Administration (FHWA), “logical termini for project development are defined as (1) rational endpoints for a transportation improvement, and (2) rational endpoints for a review of the environmental impacts”.

As shown in Figure 1.1.1, the proposed project is located between University Boulevard (US 78) (Exit 205) and Ashley Phosphate Road (Exit 209). The proposed project would provide a new full-movement, three-way interchange on I-26 and connect to the existing roadway network located to the west of I-26 via Weber Boulevard. This existing network is part of the larger Charleston County plan of development in this region and has been designed to support a connection to the interstate. The location of the interchange was determined based on many factors. In order to provide proper advance guide signage and sufficient spacing for entrance and exit maneuvers, the FHWA requires a minimum of 1 mile spacing between urban interchanges. The proposed interchange location is approximately 1.1 mile east of Exit 205, Highway 78 and 2.5 miles west of Exit 209, Ashley Phosphate Rd. In addition to meeting this spacing requirement, the interchange location was chosen to limit the number of impacts to existing residential and commercial developments in place and planned. The termini were also evaluated to identify what additional improvements other than the interchange would be required to meet both the purpose and the need (To be discussed in Chapter 2). While this proposed project would require widening approximately five-hundred (500) linear feet of Weber Boulevard between Ingleside Boulevard and Blue House Road, no other improvements are anticipated since the existing newly constructed roadway network has sufficient capacity for the anticipated future traffic conditions. This use of existing roadways to the maximum extent possible limits additional new roadway construction in this rapidly growing area.

Independent Utility

Independent Utility is defined by the FHWA as a project that “[...] can be usable and be a reasonable expenditure even if no additional transportation improvements in the area are made and not restrict consideration of alternatives for other reasonably foreseeable transportation improvements”. The proposed project satisfies this criterion in that:

1. The project would be usable and helpful to increase traffic mobility for the study area network between the University Boulevard (US 78), Ashley Phosphate Road and surrounding roadways regardless of

whether additional transportation improvements in the area are made (Traffic Study, Appendix A). Details of these improvements are described in Chapter 3.

2. The project would not limit the consideration of alternatives for other reasonably foreseeable transportation improvements which could occur in the study area or adjacent interchanges:
 - a. The project segment is currently part of an on-going I-26 Corridor Study plan sponsored by SCDOT to evaluate potential future needs and recommend improvements to include capacity and interchange improvements, between mile markers 187 (SC 27) and 220 (Meeting Street).
 - The proposed improvements meet the minimum interchange spacing guidelines and are not expected to limit future improvements to the University Boulevard (US 78) (Exit 205) or Ashley Phosphate Road (Exit 209) interchanges.
 - b. The span of the bridge over I-26 for the project has been designed to accommodate any future widening of I-26 by providing space for one additional travel lane in both directions.

Reasonable Availability of Funding

As indicated in the SCDOT Statewide Transportation Improvement Program (STIP), the proposed project has an allocated budget of \$54 million, which includes approximately \$5 million for engineering design and environmental analysis, \$12 million for Right-of-Way acquisition, and an additional \$37 million for construction phases.³ All funding for the proposed project would be provided through local funding secured by Charleston County (County). The funding sources include revenue from the County’s half-cent sales tax referendum, approved in 2016, as well as Special Source Revenue Bonds secured in 2014. No state or federal funding would be used for this proposed project.

1.4 Design Criteria

Design Criteria used to develop the project Build Alternatives are based upon the design criteria outlined by the SCDOT and the American Association of State Highway and Transportation Officials (AASHTO).

Chapter 01 Footnote References

¹ http://206.74.144.42/ESTIP/downloads/Charleston.html?_id=1552352561420

² FHWA, “NEPA and Transportation Decision-making: The Development of Logical Project Termini,” November 5, 1993, <http://environment.fhwa.dot.gov/projdev/tdmtermini.asp> (December 5, 2017).

³ http://206.74.144.42/ESTIP/downloads/Charleston.html?_id=1552352561420

Environmental Assessment for:
Palmetto Commerce Interchange Project
May 2019

Chapter 02 – Purpose and Need

2.0 Project Purpose and Need

2.1 Project Purpose

The primary purpose of the proposed project is to provide the transportation infrastructure necessary to improve mobility and reduce travel times for both existing and anticipated future traffic conditions in a rapidly developing area of Charleston County. This area is bounded by I-26 to the east, University Boulevard (US Highway 78) and Ladson Road to the north, Palmetto Commerce Parkway (and land adjacent to the west side of Palmetto Commerce Parkway) to the west, and Ashley Phosphate Road to the south.

The study area extends beyond this area over to Rivers Avenue (US Highway 78/52) and can be seen on Figure 2.1.1. Specifically, the purpose of the proposed project is to:

- Provide improved travel times and access options to the rapidly growing, high density employment centers along Palmetto Commerce Parkway and Ingleside Boulevard,
- Improve traffic mobility for the area served by the Ashley Phosphate Road/I-26 Interchange, and
- Provide more efficient commute options within the portion of the regional network that relies on access to I-26 by increasing the number of trips allowed and decreasing delays.

A secondary goal of the proposed project is to complement economic development in the area by improving access and mobility to the nearby existing and planned commercial, industrial, and mixed-use high-employment areas. These major employment areas under development are discussed in more detail in Section 2.3.

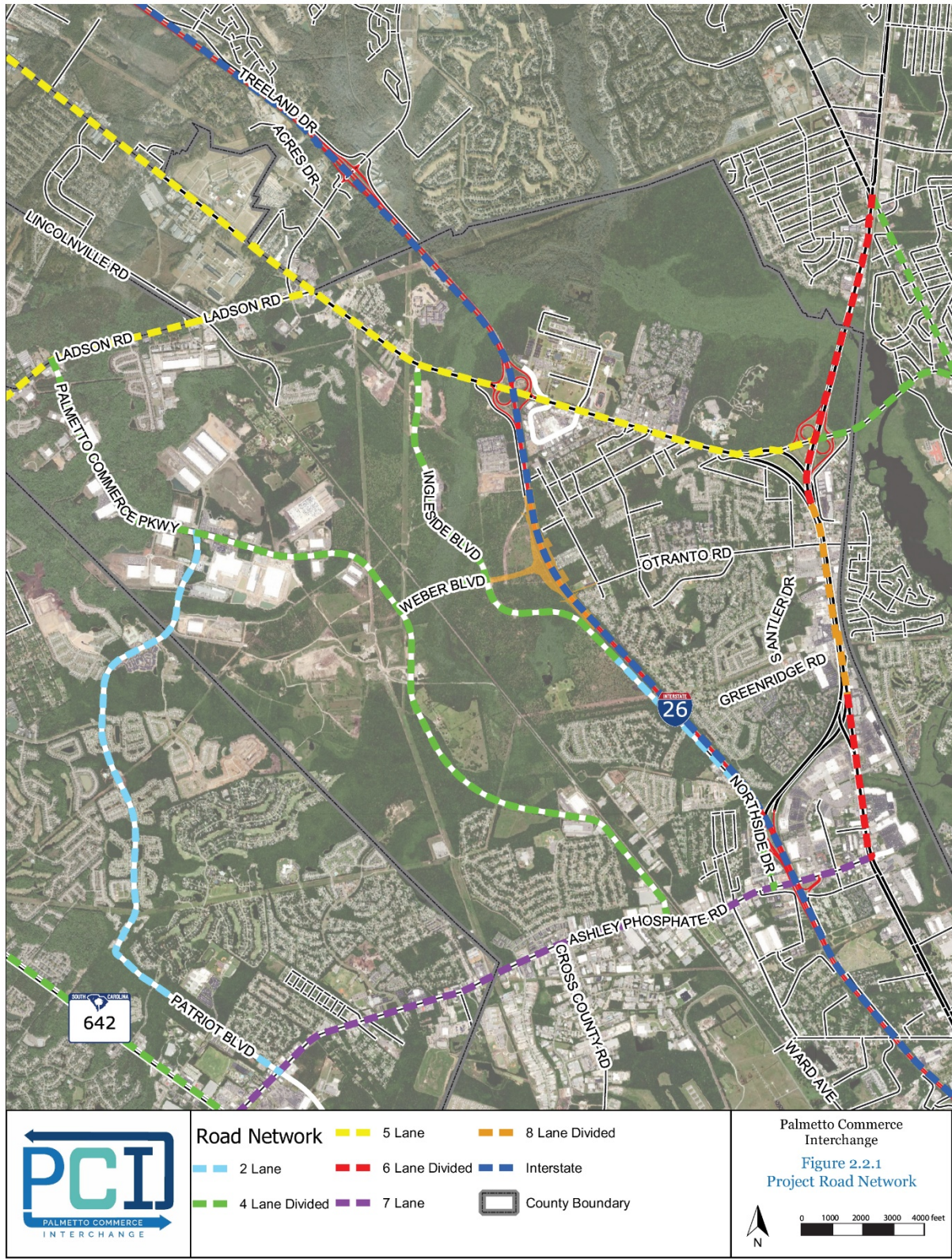
2.2 Project Need

The road network in the study area, shown in Figure 2.2.1, consists of an interstate highway (I-26); two major U.S. highways (US Highways 78 and 52); a secondary route S-75 (Ashley Phosphate Road); a City of North Charleston road (Palmetto Commerce Parkway); Ingleside Boulevard/Northside Drive, and a series of interconnecting roads. There are two interchanges with I-26 within the study area, one at Ashley Phosphate Road and another at US Highway 78/52. The US Highway 78/52 and I-26 corridors serve as primary routes for commuters traveling from Summerville and North Charleston to the Greater Charleston Area. Ashley Phosphate Road is a state road designated as a minor arterial route feeding I-26, while Palmetto Commerce Parkway and Ingleside Boulevard/Northside Drive are the main throughways for industrial development in the area.



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Figure 2.1.1 - Study area



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Figure 2.2.1 - Project Road Network

The needs for the stated purposes of the proposed PCI project are as follows:

Purpose 1:

Provide improved travel times and access options to the rapidly growing, high density employment centers along Palmetto Commerce Parkway and Ingleside Boulevard.

Need 1:

Access to I-26 is limited in the area because the adjacent interchanges are four miles apart and each is currently congested by traffic serving nearby high density employment centers. Because of the amount of future travel demand to the Ingleside Boulevard/Northside Drive and Palmetto Commerce Parkway roadways, a more direct or additional access to I-26 is needed. These areas have been designated by the City of North Charleston for economic development and to serve as high employment centers along Palmetto Commerce Parkway and Ingleside Boulevard/Northside Drive. These developments include many new industrial, distribution, and manufacturing facilities in the Palmetto Commerce Park and Ingleside Industrial Center. These major employment areas under development are discussed in more detail in Section 2.3.

The improved access provided by the interchange is needed for employees and contractors/service providers, travel to port terminals and rail yards, and distribution of supplies and products. The existing interchanges in this segment of I-26 are already heavily congested and are expected to grow worse in the future. Travel times and speeds are anticipated to degrade in the future causing more delays for commuters and other users by 2040. The roadways within the Study area have limited access to the interstate system and experience delays from the lack of mobility under existing traffic conditions. Based on recent CHATS and VISSIM traffic modeling,(Appendix A) the traffic volumes are expected to reach levels where the entire regional network is anticipated to have decreased mobility and unmet travel demand by the 2040 horizon year. The extent of these delays and congestion is summarized in Table 2.2.1 below, which shows the Travel Measures of Effectiveness (MOE) for the modelled network for existing and future conditions.

Table 2.2.1 – Travel Measures of Effectiveness

Measure of Effectiveness	AM Peak		PM Peak	
	2020 No Build	2040 No Build	2020 No Build	2040 No Build
Average Delay Per Vehicle-network-wide (sec/veh)	413.1	425.4	33.5	165.5
* Average Freeway Speed I-26 EB (mph)	16.4	10.9	61.5	60.4
* Average Freeway Speed I-26 WB (mph)	62.5	61.8	55.1	40.3
Vehicle Miles Traveled I-26 EB	50601	51067	42965	53241
Vehicle Miles Traveled I-26 WB	34587	42450	65470	68447
** Latent Demand- network-wide	3054	8534	0	705

*Average freeway speed measured along the entire length of I26 in the VISSIM model, just west of US 78 to just east of Ashley Phosphate Road

source: Stantec, VISSIM analysis conducted for Palmetto Commerce Interchange, January 2019

**Latent Demand is the number of vehicles which could not immediately enter the network due to traffic operational conditions.

Purpose 2:

Improve traffic mobility for the area served by the Ashley Phosphate Road/I-26 Interchange.

Need 2:

Ashley Phosphate Road is a seven-lane minor arterial roadway which provides a vital east-west connection between Dorchester Road and I-26. In addition to serving commuter traffic from the Summerville area destined for Charleston, it also provides a vital connection from I-26 to the numerous residential areas located between Joint Base Charleston and the Ashley River. The existing traffic volumes along Ashley Phosphate Road are at levels where many of the intersections between Palmetto Commerce Parkway and I-26 experience a failing Level of Service (LOS) during the AM and PM peak traffic hours. This congestion is expected to increase as developments in the Palmetto Commerce Park and Ingleside area are constructed, with delays exceeding 100 seconds by 2040. Table 2.2.2 shows the projected 2040 LOS at the major intersections of the area roadways within the network, including those intersections that are projected to experience significant delays in 2040. Although the Ashley Phosphate Road/I-26 interchange was improved in September 2005, the interchange ramps and adjacent intersections currently experience failing LOS during the peak traffic hours.

Along I-26 between the existing University Boulevard Interchange and Ashley Phosphate Road Interchange, the current average daily traffic volume is 102,600 vehicles per day (vpd) with average daily traffic volumes estimated to increase to 134,600 vpd by 2040. With this increase in volume of traffic, the traffic congestion and delays along Ashley Phosphate Road are expected to worsen and intersections along Palmetto Commerce Parkway, US Highway 78, and Ashley Phosphate Road are also expected to degrade to a failing LOS, therefore negatively affecting traffic operations along I-26. Additionally, LOS along Ladson Road from Palmetto Commerce Parkway to University Boulevard (US Highway 78) and along University Boulevard from Ladson Road to I-26 are projected to fail based on the increase in traffic due to the development in the area.

Table 2.2.2 shows the LOS for major intersections in the study area, as modelled for existing and 2040 conditions. As noted above, many of the major intersections along University Boulevard (US 78), Ashley Phosphate Road, and Ladson Road are projected to have failing levels-of-service by 2040.


Table 2.2.2 – Peak Hour Levels of Service (LOS)

Surrounding Intersections	AM Peak Hour Levels of Service	
	2020 No-Build	2040 No Build
US 78/Ladson Rd	F	F
US 7 8 / Medical Plaza Dr. / Excellence Way	C	D
US 7 8 / Medical Plaza Drive / BUC Club Blvd.	B	C
Ladson Rd. / Lincolnville Rd.	D	D
Palmetto Comm. Pkwy. / Ladson Rd.	C	D
Palmetto Comm. Pkwy. / Patriot Blvd.	F	F
Ashley Phosphate Rd. / Stall Rd.	C	D
Ashley Phosphate Rd. / Northside Dr.	D	D
Ashley Phosphate Rd. / Rivers Ave.	F	F
Ashley Phosphate Rd. / I-26 EB Ramps	D	E

Surrounding Intersections	PM Peak Hour Levels of Service	
	2020 No-Build	2040 No Build
US 78/Ladson Rd	F	F
US 7 8 / Medical Plaza Dr. / Excellence Way	D	F
US 7 8 / Medical Plaza Drive / BUC Club Blvd.	C	D
Ladson Rd. / Lincolnville Rd.	D	F
Palmetto Comm. Pkwy. / Ladson Rd.	D	F
Palmetto Comm. Pkwy. / Patriot Blvd.	F	F
Ashley Phosphate Rd. / Stall Rd.	C	E
Ashley Phosphate Rd. / Northside Dr.	C	C
Ashley Phosphate Rd. / Rivers Ave.	E	F
Ashley Phosphate Rd. / I-26 EB Ramps	D	E

Source: Stantec, VISSIM analysis conducted for the PCI Project, January, 2019

Signalized Intersection Levels of Service (LOS)

- 
- LOS A**
Free flow – most vehicles travel through green light without stopping.
 - LOS B**
Stable flow (slight delays) – vehicles move through the intersection very well, but more have to stop for red light.
 - LOS C**
Stable flow (acceptable delays) – a substantial number of vehicles will have to stop for red light.
 - LOS D**
Approaching unstable flow – many vehicles have to stop for red light and traffic starts stacking at the intersection. Vehicles will occasionally have to wait through more than one signal cycle before proceeding.
 - LOS E**
Unstable flow – traffic volumes are higher than the intersection can handle with lines of stopped vehicles. Delays are intolerable.
 - LOS F**
Forced flow – traffic flow has broken down. Traffic volumes are high and there are long backups at intersections. Most vehicles have to wait through one or more signal cycles.

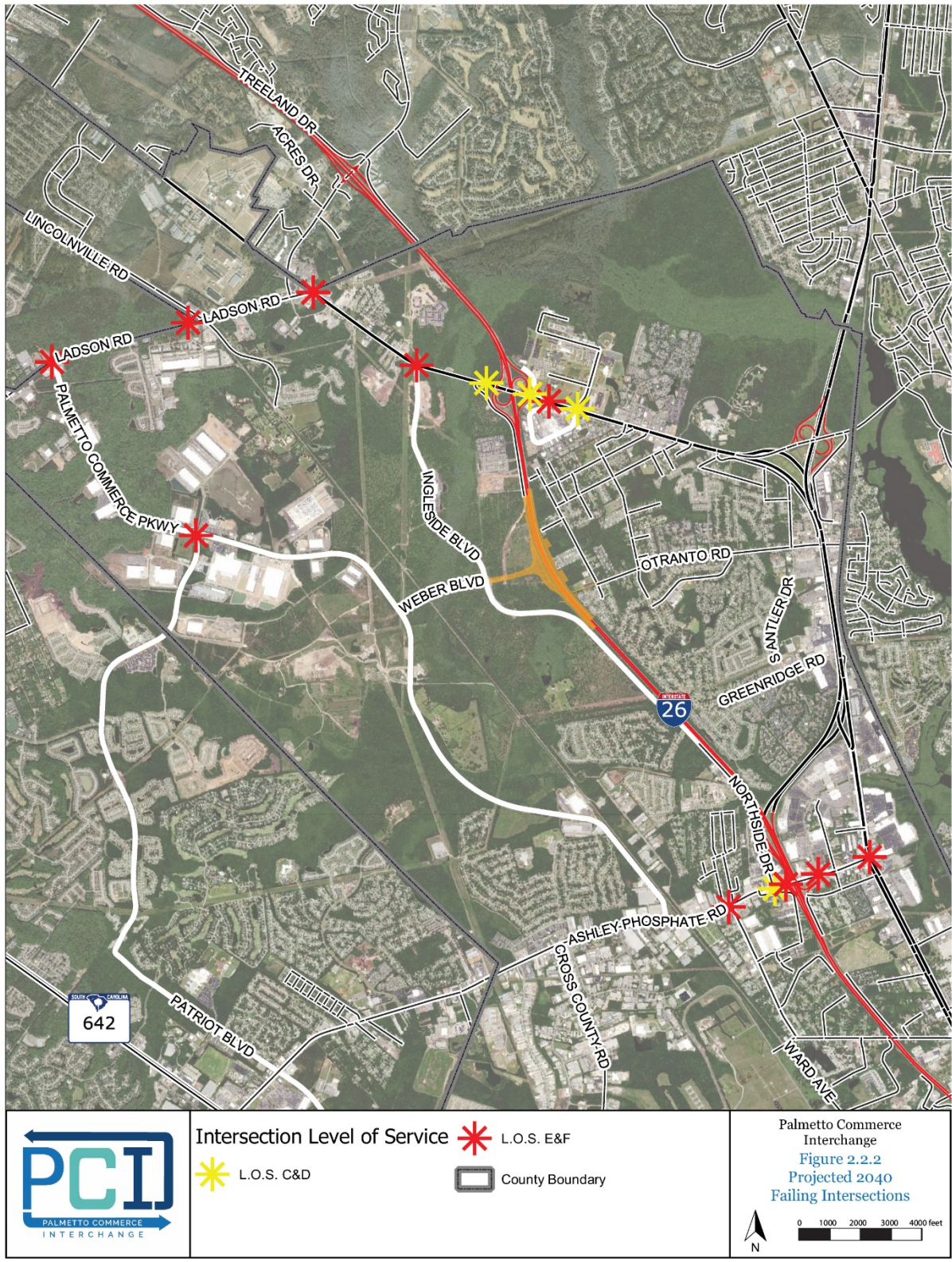


Figure 2.2.2 - Projected 2040 Failing Intersections

Purpose 3:

Provide more efficient commute options within the portion of the regional network that relies on access to I-26 by increasing the number of trips allowed and decreasing delays.

Need 3:

Based on SCDOT 2015 ADT traffic counts, the distribution of traffic along the three main roadways between Summerville/Moncks Corner/Goose Creek communities and North Charleston is as follows:

- I-26 69% of total traffic
- Rivers Avenue (US 52) 15% of total traffic
- Dorchester Road (SC 642) 16% of total traffic

This section of the I-26 corridor serves approximately two-thirds of the traffic volume for the region living west of Ashley Phosphate Road. The rapid residential development in the area is projected to increase the demand by regional commuters. Travel times, delays, and congestion at the existing interchanges along the corridor, especially at Ashley Phosphate Road and University Boulevard (US Highway 78), are expected to increase in the future. The worst conditions are expected to occur for eastbound traffic during the AM peak and westbound during the PM peak. The lack of adequate access points to the interstate is likely to create bottlenecks and cause delays entering and exiting the mainline I-26 in the future.

Table 2.2.3 on the next page shows the LOS for segments along I-26 under existing and 2040 projected conditions. At the I-26 & Ashley Phosphate Road interchange, the I-26 westbound off-ramp to Ashley Phosphate Road currently queues to the I-26 westbound collector-distributor road in the PM peak hour. This queuing is projected to increase in the horizon year project design year, 2040, with queues extending to the I-26 westbound mainline, which is projected to result in additional traffic congestion and reduced mobility in all westbound lanes of I-26 during peak PM hours.

2.3 Secondary Goals and Objectives

The proposed project was initiated by Charleston County “to provide an improved quality of life for citizens through better traffic operations and to enhance the economic development competitiveness for business in the Charleston region”¹. The primary purpose and need for the proposed project is driven by the previously approved development in the region and especially in the surrounding study area. When I-26 was originally constructed, land adjacent to the interstate was primarily undeveloped in this area. Since that time, land use patterns have changed, and a significant amount of industrial development has already occurred along Palmetto Commerce Parkway, beginning at Ladson Road and continuing southeast towards Weber Boulevard.

Figure 2.3.1 shows areas designated by the City of North Charleston for economic development that are expected to serve as high employment centers along Palmetto Commerce Parkway and Ingleside Boulevard/Northside Drive. These developments include many new industrial, distribution, and manufacturing facilities in the Palmetto Commerce Park and Ingleside Industrial Center.

Table 2.2.3 - LOS Segments along I-26 – Existing and Projected Conditions

Freeway Segments	AM Peak Hour			
	2020 (Existing)		2040 No Build	
	LOS	Density*	LOS	Density*
I-26 WB				
East of Ashley Phosphate Rd	B	18	C	22
Ashley Phosphate Rd- US 78	B	15	B	18
West of US 78	A	11	B	14
I-26 EB				
West of US 78	F	70	F	118
US 78 - Ashley Phosphate Rd	F	125	F	131
East of Ashley Phosphate Rd	F	96	F	94

Freeway Segments	PM Peak Hour			
	2020 (Existing)		2040 No Build	
	LOS	Density*	LOS	Density*
I-26 WB				
East of Ashley Phosphate Rd	D	31	F	83
Ashley Phosphate Rd- US 78	E	39	E	44
West of US 78	D	34	E	39
I-26 EB				
West of US 78	B	17	C	21
US 78 - Ashley Phosphate Rd	C	19	C	24
East of Ashley Phosphate Rd	B	18	C	23

* **Density** is a measure of congestion on the freeway, expressed as the number of vehicles per mile per lane per hour. The greater number of vehicles that pass through a mile segment in an hour, the more closely they are spaced, and the higher the level of congestion. Parameters are set in the model to reflect the observed density as well as driver behavior, including the length of time needed for lane changes, and the following distance, or headway. This behavior is translated to the future build or no-build conditions

The following land uses are characteristic of the Palmetto Commerce Park:

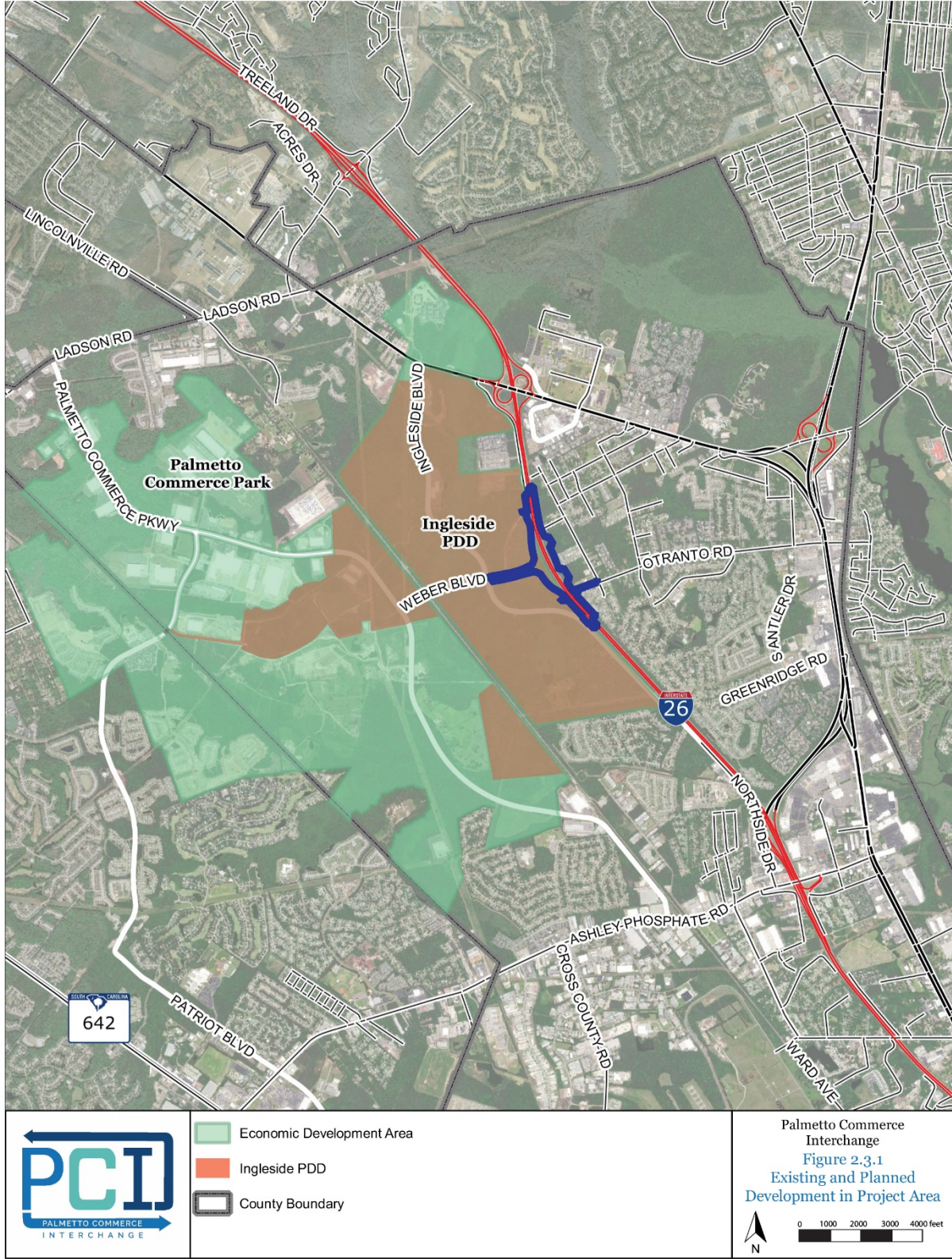
- Approximately 1,120 acres located in the City of North Charleston
- Zoned light industrial
- Class “A” commerce park
- Foreign Trade Zone status

The 1,527-acre Ingleside Planned Density Development (PDD) with industrial and mixed-use development is already underway. The Ingleside PDD was approved by the City of North Charleston in January 2016. The approved PDD includes the following land uses:

- Assembly /Light Manufacturing - (687 acres)
- Commercial / Office / Accommodations - (321 acres)
- Residential (maximum of 5,425 units) – 183 acres
- Mixed use – (153 acres)
- Public Facilities (including rights-of-way) – (183 acres)

Traffic volumes associated with the existing developments have led to significant delays, reduced mobility, and failing levels-of-service on the adjacent roadway network during the peak traffic hours, particularly along the Ashley Phosphate Road and University Boulevard corridors. Without any improvements to the road network, the planned development is expected to worsen these conditions, as exhibited in the above tables and previously referenced figures.

The internal local road network serving the Palmetto Commerce Park and Ingleside developments has been constructed. The roadways recently completed by the City of North Charleston and Charleston County include Palmetto Commerce Parkway, Ingleside Boulevard, Northside Drive, Weber Boulevard, and Patriot Boulevard.



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Figure 2.3.1 - Development Area Map

Chapter 02 Footnote References

¹ <https://www.palmettocommerceinterchange.com/>

Environmental Assessment for:
Palmetto Commerce Interchange Project

May 2019

Chapter 03 – Alternatives

3.0 Alternatives

This section discusses the Alternatives considered and evaluated to address the purpose and need for the proposed project. The Alternatives considered included a No-Build scenario, a Transportation System Management Alternative, as well as eight (8) Build Alternatives with varying alignments, interchange types, and typical sections. A summary of the process undertaken for considering and eliminating Alternatives is discussed in the following subsections.

3.1 Preliminary Interchange Alternatives

3.1.1 No-Build Alternative

The No-Build Alternative is defined as the continuation of existing conditions for the study area. This alternative establishes a baseline against which Build Alternatives can be compared. The No-Build Alternative assumes that no roadway improvements would be made to the existing facility and the study area would remain in its current condition. The No-Build Alternative further assumes that current and future industrial and commercial facilities would be accessed from existing interchanges on I-26 at University Boulevard (US 78) and Ashley Phosphate Road.

The No-Build Alternative would not improve traffic mobility or connectivity and therefore would not meet the project Purpose and Need. The No-Build Alternative, however, is retained as a baseline for use in the evaluation of additional design Alternatives.

3.1.2 Transportation System Management Alternative

In addition to the Build Alternatives, a Transportation System Management (TSM) Alternative was considered for the proposed project and evaluated based on the project Purpose and Need. Transportation System Management (TSM) can include intersection improvements, carpooling, reversible lanes, traffic signal coordination, and high-occupancy vehicle lanes to maximize the capacity and efficiency of the existing roadway network. Ideally, the TSM Alternative would be implemented to reduce or eliminate the need for new facility construction.

Improvements to area intersections, traffic signal timings, and carpooling/ridesharing initiatives were not sufficient to address the traffic congestion and mobility concerns and were therefore deemed inadequate to address the project Purpose and Need as a viable stand-alone alternative for this project. However, some TSM measures such as intersection improvements and traffic signal coordination are included in the Preferred Alternative for this project.

3.1.3 Build Alternatives

Eight preliminary interchange alternative designs intended to satisfy the proposed project Purpose and Need were evaluated. Each of these alternatives met the project purpose of providing improved travel times and access options, improved traffic mobility for the area and more efficient commute options within the portion of the regional network that relies on access to I-26. These Alternatives were then evaluated regarding engineering factors, economic factors, and potential impacts to the natural and human environment. Alternatives evaluations also include input from local agencies and the general public.

Alternatives providing connections to the north side of the interstate via Otranto Road to Highway 78 were considered, however, this connection proved unreasonable and failed to obtain the support from the City of North Charleston. Causing significant impacts on the adjacent communities, this north side connection would also require relocation of homes and widening of the existing roadway to accommodate the future traffic volumes. Therefore, the Build Alternatives developed for consideration provide access to only the south side, connecting I-26 with Ingleside Boulevard and Palmetto Commerce Parkway through Weber Boulevard.

Eight preliminary interchange alternative designs (Build Alternatives)¹ were developed for consideration and can be found in Appendix A with associated figures. These Build Alternatives were evaluated by the County in coordination with FHWA/SCDOT and are described as follows¹:

Build Alternative # 1 – Trumpet Interchange with Tangent Bridge

Alternative 1 is a trumpet-type interchange with directional entrance and exit ramps serving I-26 eastbound, a loop type entrance ramp serving I-26 westbound, and a semi-directional exit ramp serving I-26 westbound. The westbound entrance and exit ramps cross over I-26 as one tangent bridge. This interchange permits free-flow operation on all ramps.

Build Alternative # 2 – Trumpet Interchange with Tangent Bridge – Mirrored #1

Alternative 2 is a trumpet-type interchange and is a mirror image of Alternative 1. It consists of directional entrance and exit ramps serving I-26 eastbound, a semi-directional entrance ramp serving I-26 westbound, and a loop type exit ramp serving I-26 westbound. The westbound entrance and exit ramps cross over I-26 as one tangent bridge. This interchange permits free-flow operation on all ramps with no traffic signals required.

Build Alternative # 3 – Trumpet Interchange with Curved Bridge

Alternative 3 is a trumpet-type interchange, similar to Alternative 1, with directional entrance and exit ramps serving I-26 eastbound, a loop type entrance ramp serving I-26 westbound, and a semi-directional exit ramp serving I-26 westbound. The difference between this Alternative and Alternative 1 is that the westbound entrance and exit ramps cross over I-26 as one curved bridge instead of a tangent bridge, which results in slightly different impacted areas. This interchange permits free-flow operation on all ramps.

Build Alternative # 4 – Trumpet Interchange with Curved Bridge – Mirrored #3

Alternative 4 is a trumpet-type interchange, similar to Alternative 2, with directional entrance and exit ramps serving I-26 eastbound, a semi-directional entrance ramp serving I-26 westbound, and a loop type exit ramp serving I-26 westbound. The difference between this Alternative and Alternative 2 is that the westbound entrance and exit ramps cross over I-26 as one curved bridge instead of a tangent bridge, which results in slightly different impacted areas. This interchange permits free-flow operation on all ramps.

Build Alternative # 5 – Diamond Interchange

Alternative 5 is a diamond-type interchange with directional entrance and exit ramps serving both I-26 eastbound and westbound. The westbound entrance and exit ramps cross over I-26 as one tangent bridge. This interchange requires a traffic signal where the westbound entrance and exit ramps meet, on the north side of I-26.

Build Alternative # 6 – Free-Flow Directional Interchange

Alternative 6 is a T-type interchange with directional entrance and exit ramps serving both I-26 eastbound and westbound. This alternative would require the construction of three separate bridges – a curved bridge over I-26 for the westbound entrance ramp, a curved bridge over I-26 for the westbound exit ramp, and a tangent bridge for the westbound exit ramp that would pass over the westbound entrance ramp. This interchange permits free-flow operation on all ramps with no traffic signals required.

Build Alternative # 7 – Diverging Diamond Interchange

Alternative 7 is a partial diverging diamond-type interchange with directional entrance and exit ramps serving both I-26 eastbound and westbound. The westbound entrance and exit ramps cross to the opposite side before passing over I-26 as one tangent bridge. Where the westbound ramps cross sides, on the south side of I-26, a 2-phase traffic signal would be required to control the maneuver.

Build Alternative # 8 – Tight Urban Diamond Interchange

Alternative 8 is a diamond-type interchange like Alternative 5 with a revised geometry to provide a smaller project footprint by incorporating retaining walls. It consists of directional entrance and exit ramps serving both I-26 eastbound and westbound. The westbound entrance and exit ramps cross over I-26 as one tangent bridge. This interchange requires a traffic signal where the westbound entrance and exit ramps meet on the east side of I-26.

3.2 Preliminary Alternatives Elimination

3.2.1 Screening of the Preferred Alternative

In order to reduce the preliminary Build Alternative options to those deemed most reasonable, a two-tiered evaluation was conducted by focusing on the resources in the study area that were likely to be impacted by the proposed project. The preliminary Alternatives were evaluated based on impacts on the surrounding environment (Tier 1) and community (Tier 2). The environmental screening included impacts to wetland and stream locations that were estimated using available US Army Corps of Engineers Jurisdictional Determination (JD) documentation from a previous project, US Fish and Wildlife Service National Wetland Inventory (NWI) data, US Geological Survey and LiDAR topographic mapping information overlapped in the project's study area. The community screening included evaluating impacts to residential areas and relocation needs based on preliminary designs and estimated right of way footprints. The resulting assessment is provided in Table 3.2.2, on the next page.

Table 3.2.1 – Alternative Eliminations

Resources	Preliminary Alternatives Screening							
	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7	Alternative 8
Tier 1 Screening								
Wetland Impacts (ac)	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4
Perennial Stream/ Ditch Impacts (lf)	267	662	324	416	664	957	509	479
Carry forward to Tier 2 Screening?	Yes	No	Yes	Yes	No	No	Yes	Yes
Tier 2 Screening								
Residential Relocations	47		15	17			17	5
Parcels Impacted	15		13	20			10	10
Total ROW Acquisition (ac)	26.4		22	25			19.9	18.5
Carry forward to Tier 3 Screening?	No		Yes	No			Yes	Yes
Tier 3 Screening								
Reasonable Build Alternative			Yes				Yes	Yes

* Wetlands and stream estimates based on NWI Data

As shown in the table above, five Alternatives (1, 2, 4, 5, and 6) were eliminated from further consideration due to potential impacts to environmental and community resources. Alternatives 2, 5 and 6 were eliminated following the Tier 1 Screening due to greater wetland and perennial stream impacts. Alternatives 1 and 4, were eliminated following the Tier 2 Screening based upon their impacts to private properties (especially residential relocations). For further information on the preliminary alternatives screening, please refer to Appendix A. The remaining alternatives (3,7, and 8) were carried forward for further evaluation in this chapter as the Reasonable Alternatives.

3.2.2 Additional Considerations

Alternative roadway sections were also considered to connect the proposed interchange to Weber Boulevard. Due to the traffic demands and close proximity of the existing intersections of Blue House Road and Ingleside Boulevard, narrower roadway sections were not considered feasible and a five-lane roadway section with additional turning lanes at the intersections was carried forward for the detailed traffic modeling studies.

Each Reasonable Build Alternative evaluated in this document consists of the combination of constructing the proposed project as a new bridge over I-26, entrance and exit ramps connecting to I-26 eastbound and westbound, and the construction of a five-lane roadway between the proposed entrance/exit ramps and the intersection of study area Boulevard /Ingleside Boulevard. Dedicated pedestrian/bike facilities were also included, at the request of the County, after comments received from a Public Information Meeting. Pedestrian access was deemed necessary due to the suburban nature of the neighborhoods to the north of I-26 and the mixed use residential and commercial components anticipated to be included with the planned developments to the south.

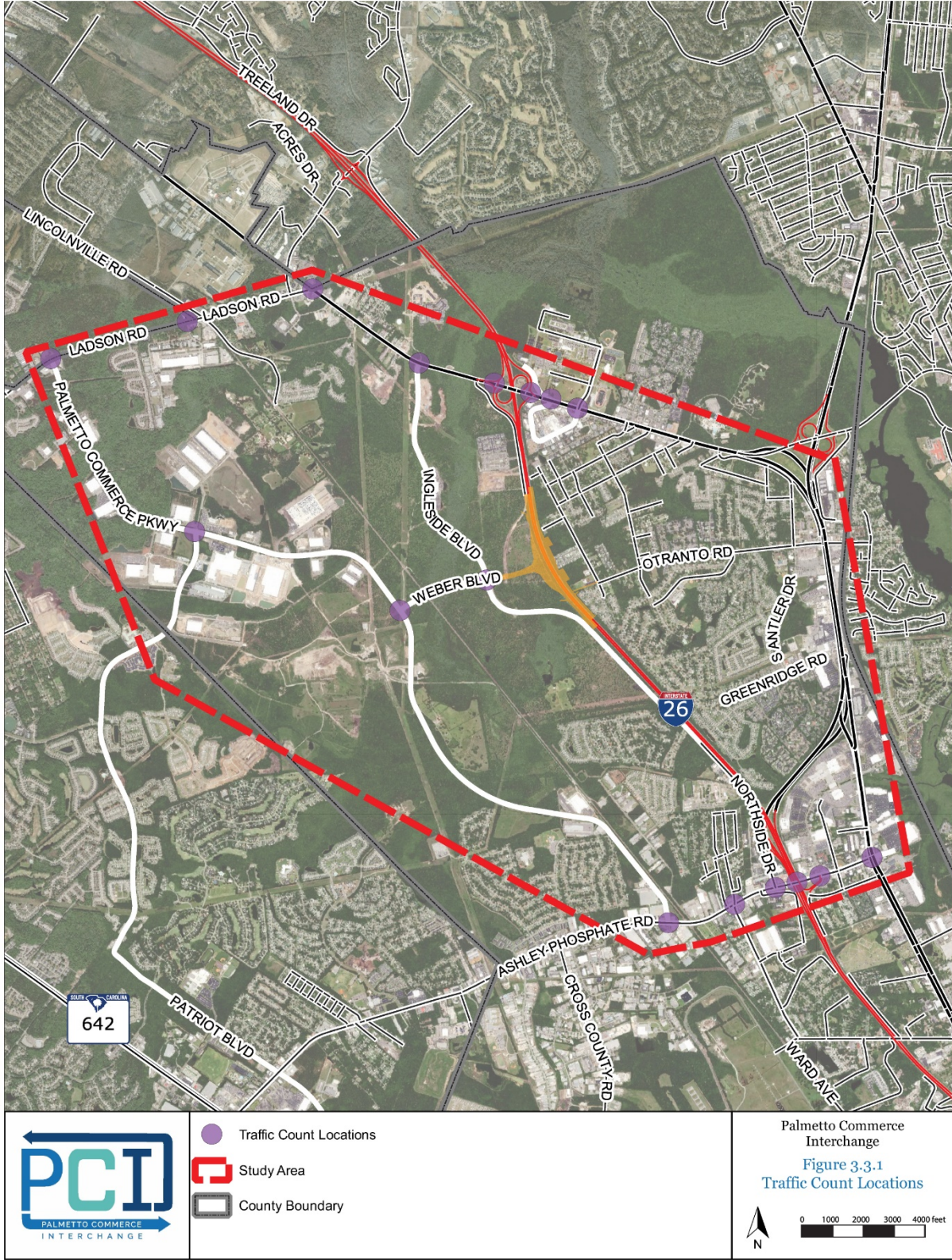
3.3 Traffic Analysis

3.3.1 Traffic Study Area

The study area evaluated in the traffic analysis includes approximately 7 miles of the I-26 corridor, from west of US 78 (Exit 205) to east of Ashley Phosphate Road (Exit 209) including all interstate ramps and collector-distributor roads. Traffic volume counts were performed at seventeen (17) cross-street intersections in the study area and are summarized as follows:

- Six (6) intersections on US 78 between Ladson Road and Medical Plaza Drive
- Six (6) intersections on Ashley Phosphate Road between Palmetto Commerce Parkway and US 52 (Rivers Ave.)
- Ladson Road and Palmetto Commerce Parkway
- Ladson Road and Lincolnville Road
- Palmetto Commerce Parkway and Patriot Boulevard
- Palmetto Commerce Parkway and Weber Boulevard
- Weber Boulevard and Ingleside Boulevard

The study area and intersections presented above are shown graphically in Figure 3.3.1.



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Figure 3.3.1 – Traffic Count Locations

3.3.2 Traffic Analysis

Analysis of the current and future No-Build and Build conditions was performed using the morning (AM) and afternoon (PM) peak hour volumes developed from the CHATS model to determine how the proposed project would impact traffic in the study area. The proposed project's impact was evaluated using the following measures of effectiveness:

- Intersection Delay (LOS)
- Freeway Traffic Density (LOS)
- Average Freeway Speed (I-26 eastbound/westbound)
- Unserved Demand (I-26 eastbound/westbound and network-wide)
- Vehicle Miles Traveled (I-26 eastbound/westbound and network-wide)
- Average Delay time per vehicle (network-wide)

Due to the high level of congestion and the existence of collector-distributor roads within the study network, it was determined that a microsimulation model would be the appropriate tool for evaluating and comparing No-Build and Build performance of the freeway system. Microsimulation software utilizes mathematical and logical models of real-world systems to emulate the behavior of traffic in a network over time and space. The model is calibrated using current traffic counts and observations of traffic operations, including queues. This calibrated model is then used to predict traffic performance when a change such as PCI is made in the traffic network. This modeling was completed using *VISSIM*, Version 7. The *VISSIM* model network, consisting of the I-26 corridor and cross streets extending to one intersection beyond the I-26 interchange ramps, was created and calibrated for the 2015 AM and PM peak periods, and then run for 2040 No-Build and 2040 Build conditions.

The results of the *VISSIM* analysis indicated that each of the three proposed Reasonable Build Alternatives (Alternatives 3, 7, and 8) were determined to operate effectively, with no discernable difference in the level of service, refer to traffic studies in Appendices A and B for further information.

Intersections in the roadway network surrounding PCI were evaluated for 2020 and 2040 AM and PM, no-build and build conditions using Synchro software. The results are shown in Tables 3.3.1 and 3.3.2. Note that all intersections with a LOS of E or F are noted in red text. The proposed project will reduce the average delay at some of these intersections and increased it at others. Since traffic demand at some of these intersections exceeds the volume that can be served within a reasonable signal cycle length, the average delay reported by Synchro software in Tables 3.3.1 and 3.3.2 is not always accurate. This is true when average delay reaches 120 seconds or more per vehicle. In order to provide a consistent measure of comparison between the no-build and build options for PCI, the total demand volumes for AM and PM peak hours are shown in these respective tables.

Table 3.3.1 – AM Peak Hour Study Area Intersection LOS & Delay – No-Build and Build Conditions

Intersection	AM Peak Hour LOS/Delay								Peak Hour Volume Comparison		
	2020 No-Build		2020 Build		2040 No-Build		2040 Build		Total Demand Volume All Approaches (vph)		
	LOS	Delay ¹ (sec)	LOS	Delay ¹ (sec)	LOS	Delay ¹ (sec)	LOS	Delay ¹ (sec)	2040 No-Build	2040 Build	% Increase/ (% Decrease)
US 78 & Ladson Rd	F	246.7	F	278.2	F	344.7	F	384.6	4,505	3,977	-11.72%
US 78 & Ingleside Blvd	D	52.9	E	59.5	F	129.3	F	96.3	5,196	4,519	-13.03%
US 78 & Blue House Rd	F	75.9	E	44.2	F	285.5	F	111.7	5,233	3,957	-24.38%
US 78 & I-26 EB Ramps	B	14.9	A	7.5	B	17.5	A	10	3,890	4,137	6.35%
US 78 & I-26 WB Ramps	A	9.3	A	9.3	A	9.6	A	9.5	4,774	4,536	-4.99%
US 78 & Medical Plaza Dr (W)	C	29.4	C	29.6	D	49.5	D	49.3	5,854	5,551	-5.18%
US 78 & Medical Plaza Dr (E)	B	11	B	11.3	C	25.1	C	25.3	5,158	4,902	-4.96%
Ladson Road & Lincolnville Rd	D	39.6	D	38.5	D	53.5	D	50.3	4,566	4,245	-7.03%
Palmetto Commerce Pkwy & Ladson Rd	C	25.6	C	25.6	D	41.4	D	41.6	3,744	4,718	26.01%
Palmetto Commerce Pkwy & Patriot Blvd	F	205.7	F	205.7	F	480.6	F	480.6	3,875	3,682	-4.98%
Palmetto Commerce Pkwy & Weber Blvd	B	11.8	F	86.8	B	15.9	F	175.4	2,926	4,170	42.52%
Weber Blvd & Ingleside Blvd	B	18.1	C	27.1	F	315.6	C	34.2	3,675	3,502	-4.71%
Weber Blvd & Blue House Rd	A	8.7	A	9.6	A	10	A	8.6	620	2,694	334.52%
Weber Blvd & I-26 WB Ramps	N/A	N/A	A	2.1	N/A	N/A	A	1.7	N/A	785	N/A
Palmetto Commerce Pkwy & Ashley Phosphate Rd	D	54.9	E	55.9	E	68.9	E	68.3	6,622	5,589	-15.60%
Ashley Phosphate Rd & Stall Rd	C	24.7	B	17.4	D	51.7	D	36.2	6,530	5,557	-14.90%
Ashley Phosphate Rd & Northside Dr	D	38.4	C	30	D	47.7	C	35	7,165	5,290	-26.17%
Ashley Phosphate Rd & I-26 EB Ramps	D	40.5	C	24	E	73.9	C	26.3	7,193	5,271	-26.72%
Ashley Phosphate Rd & Northwood Blvd	E	55.8	D	44.3	D	59.5	D	54.6	4,140	4,121	-0.46%
Ashley Phosphate Rd & Rivers Ave	F	127.2	F	124.8	F	184.7	F	182.2	5,516	5,241	-4.99%

¹ Excessive delays from Synchro results (above 120 sec +/-) may not be accurate since the demand exceeds that volume which can be served by the intersection within an acceptable cycle length. The change in the total demand volume at the intersection is a more accurate indication of the effect of the build options, with a reduction in demand representing a positive effect.

Table 3.3.2 – PM Peak Hour Study Area Intersection LOS & Delay – No-Build and Build Conditions

Intersection	PM Peak Hour LOS/Delay								Peak Hour Volume Comparison		
	2020 No-Build		2020 Build		2040 No-Build		2040 Build		Total Demand Volume All Approaches (vph)		
	LOS	Delay ¹ (sec)	LOS	Delay ¹ (sec)	LOS	Delay ¹ (sec)	LOS	Delay ¹ (sec)	2040 No-Build	2040 Build	% Increase/ (% Decrease)
US 78 & Ladson Rd	F	200.2	F	233.3	F	261.3	F	306.9	5,151	4,346	-15.63%
US 78 & Ingleside Blvd	C	25.7	D	36.8	D	39.6	D	46.4	5,050	4,633	-8.26%
US 78 & Blue House Rd	C	21.4	C	16.4	D	32.7	C	20.7	5,261	3,763	-28.47%
US 78 & I-26 EB Ramps	B	13.1	A	4.8	B	14.8	A	5.5	4,544	4,048	-10.92%
US 78 & I-26 WB Ramps	B	11.3	B	11.2	C	18.4	C	18.1	5,157	4,892	-5.14%
US 78 & Medical Plaza Dr (W)	D	37.3	D	37.3	F	84.7	F	84.7	5,624	5,354	-4.80%
US 78 & Medical Plaza Dr (E)	C	32.7	C	32.5	D	54.8	D	54.5	5,328	5,059	-5.05%
Ladson Road & Lincolnville Rd	D	48.6	D	47.3	F	83.6	F	82.1	5,487	5,215	-4.96%
Palmetto Commerce Pkwy & Ladson Rd	D	50.2	D	50.1	F	85.8	F	85.8	4,793	5,805	21.11%
Palmetto Commerce Pkwy & Patriot Blvd	F	1871	F	1871	F	2934	F	2934	4,246	3,947	-7.04%
Palmetto Commerce Pkwy & Weber Blvd	B	19.4	F	147.5	C	31.3	F	253.2	2,673	3,744	40.07%
Weber Blvd & Ingleside Blvd	C	20	C	25.3	C	22.1	C	33.4	1,183	3,296	178.61%
Weber Blvd & Blue House Rd	A	8.3	A	7.6	A	8.9	A	9.6	528	2,622	396.59%
Weber Blvd & I-26 WB Ramps	N/A	N/A	A	3.1	N/A	N/A	A	3.3	N/A	1051	N/A
Palmetto Commerce Pkwy & Ashley Phosphate Rd	C	33.8	C	27.8	E	57.8	D	36.2	5,928	5,006	-15.55%
Ashley Phosphate Rd & Stall Rd	C	32.1	C	28.5	E	58.3	D	39.3	5,884	4,962	-15.67%
Ashley Phosphate Rd & Northside Dr	C	27.2	C	25.6	C	28.6	C	27	6,454	4,991	-22.67%
Ashley Phosphate Rd & I-26 EB Ramps	D	36.1	C	20.1	E	68.1	C	25.4	7,218	5,327	-26.20%
Ashley Phosphate Rd & Northwood Blvd	F	107.6	F	105.8	F	128.4	F	120.9	5,330	5,489	2.98%
Ashley Phosphate Rd & Rivers Ave	E	75	E	75.3	F	92.3	F	92.9	7,273	6,916	-4.91%

¹. Excessive delays from Synchro results (above 120 sec +/-) may not be accurate since the demand exceeds that volume which can be served by the intersection within an acceptable cycle length. The change in the total demand volume at the intersection is a more accurate indication of the effect of the build options, with a reduction in demand representing a positive effect.

Table 3.3.3 – Synchro Network Matrix

Intersection	AM	PM
US 78 & Ladson Rd	Red	Red
US 78 & Ingleside Blvd	Green	Red
US 78 & Blue House Rd	Green	Green
US 78 & I-26 EB Ramps	Green	Green
US 78 & I-26 WB Ramps	Green	Green
US 78 & Medical Plaza Dr (W)	Green	Yellow
US 78 & Medical Plaza Dr (E)	Red	Green
Ladson Road & Lincolnville Rd	Green	Green
Palmetto Commerce Pkwy & Ladson Rd	Red	Yellow
Palmetto Commerce Pkwy & Patriot Blvd	Yellow	Yellow
Palmetto Commerce Pkwy & Weber Blvd	Red	Red
Weber Blvd & Ingleside Blvd	Green	Red
Weber Blvd & Blue House Rd	Green	Red
Palmetto Commerce Pkwy & Ashley Phosphate Rd	Green	Green
Ashley Phosphate Rd & Stall Rd	Green	Green
Ashley Phosphate Rd & Northside Dr	Green	Green
Ashley Phosphate Rd & I-26 EB Ramps	Green	Green
Ashley Phosphate Rd & Northwood Blvd	Green	Green
Ashley Phosphate Rd & Rivers Ave	Green	Red

Legend	
PCI Reduces Delay	Green
PCI No Effect on Delay	Yellow
PCI Increases Delay	Red

Palmetto Commerce Interchange provides access to a large developing area of the regional roadway network, including Palmetto Commerce Parkway and Ingleside Boulevard, both parallel routes to I-26. PCI creates additional congestion for eastbound traffic in the AM peak hour between the US 78 interchange and the PCI interchange, but reduces congestion at the Ashley Phosphate interchange. The additional congestion occurs because of the weave created between eastbound entering traffic from US 78 and exiting traffic to PCI. PCI has similar effects in the westbound direction, increasing congestion in the opening year at the merge from the collector distributor road from Ashley Phosphate Road merges back into the mainline. This is prominent in the opening year, but the difference between no-build and build dissipates under design year volumes. The congestion is significantly reduced in the PM peak hour in the vicinity of PCI and US 78. Additional capacity is needed on I-26. The PCI project is an integral part of meeting that demand, as a connection to the Palmetto Commerce Parkway corridor. Further, PCI is being designed to accommodate an additional general-purpose lane on I-26 in each direction in order to provide options for mainline capacity improvements in the future. Refer to traffic studies in Appendices A and B for further information.

3.4 Reasonable Alternatives

3.4.1 Selection of Preferred Alternative

Although the No-Build Alternative would not meet the purpose and need of the proposed project, it has been evaluated as a baseline and in accordance with the Council on Environmental Quality (CEQ) regulations for NEPA. Alternatives 3, 7, and 8 (identified in Section 3.2) were evaluated as reasonable Build Alternatives.

Each of the three Reasonable Build Alternatives meet the proposed project purpose and need and would provide a new interchange with a direct connection to Weber Boulevard and a grade-separated crossing of the Norfolk Southern Railroad (NSRR) line. This interstate connection and railroad crossing would become a major traffic corridor and provide additional access options for emergency vehicles, since it is the only grade-separated crossing for over 6 miles in both directions. None of the alternatives are expected to impact cultural/historic resources, Section 4(f) resources, federally protected species, or existing hazardous material sites. These reasonable alternatives were screened in more detail than the original analysis based on an increased level of available design and the completed wetland delineation for the study area. Variations in the impacts of each reasonable alternative are realized upon evaluation of traffic operations, impact to the surrounding community/natural environment, and proposed project cost. Impacts from each alternative were calculated through the evaluation of the total anticipated right-of-way footprint required.

Differences in the alternatives are evident through comparison of the following criteria:

- Traffic Operations
 - Meets Minimum Access Spacing
 - Ramp Storage Capacity (ft)
- Community Impacts
 - Private Property Acquisition
 - Number of Parcels Impacted
 - Number of Homes Relocated
- Environmental Impacts
 - Jurisdictional Wetland Impacts
 - Jurisdictional Stream / Ditch Impacts
 - 100-Yr Flood Plain Impacted (Ac.)-Preliminary FEMA FIRM (Zone AE)
- Total Project Cost

Table 3.4.1, shown on the next page, provides a summary of the comparative impacts of the Reasonable Build Alternatives for each of the proposed project evaluation criteria identified above.

Table 3.4.1- Reasonable Alternatives Impact Matrix

Category	Evaluation Criteria	Alternative 3			Alternative 7			Alternative 8		
Traffic Operations	Meets Minimum Access Spacing for Interchange Area (Ramp to first signalized intersection)	No	Yes	Yes						
	Ramp Storage Capacity (ft)	3700	1850	1500						
Community Impacts	Residential Relocations	15	17	5						
	Parcels Impacted	13	10	10						
	Total ROW Acquisition (ac)	22	20	19						
Environmental Impacts	Potential Jurisdictional Wetland Impacts (ac) *	3.65	3.97	4.04						
	Potential Jurisdictional Stream/ Ditch Impacts (lf) *	1183	1582	1468						
	100 Year Floodplain Impacts (ac)	0.36	0.25	0.37						
	Cultural/Historic Resources	No Known Impacts	No Known Impacts	No Known Impacts						
	Section 4(f) Resources	No Known Impacts	No Known Impacts	No Known Impacts						
	Federally Protected Species	May Affect, but not Likely to Adversely Affect	May Affect, but not Likely to Adversely Affect	May Affect, but not Likely to Adversely Affect						
	Potential Hazardous Material Sites	No Known Impacts	No Known Impacts	No Known Impacts						
	Total Estimated Project Costs	\$ 47,100,000	\$ 42,100,000	\$ 46,300,000						

* Potential Jurisdictional wetlands based on field delineations, NWI, prior JD's, and GIS data

3.4.2 Alternative 3

Traffic Operations

Alternative 3 (Figure 3.4.1) is comprised of the I-26 trumpet interchange improvement with directional exit ramps. Alternative 3 is designed to have free-flow traffic movements for both the eastbound and westbound entrance and exit ramps. While this geometry does provide for the most efficient flow of traffic to and from the westbound lanes of the interstate, the eastbound entrance and exit ramps are the same as the other alternatives. The effect of the new interchange is more critical in the eastbound direction, given its proximity to the existing interchange with US 78. Alternative 3 also provides the least separation distance between the exit ramps and the adjacent intersection along Weber Boulevard. This limited distance between the interstate ramps and local intersection, combined with the high design speed of the exit ramp, are expected to make the merge/weave operation the least efficient of three alternatives.

Community Impacts

In order to provide space for free-flow access to and from I-26 eastbound and westbound, Alternative 3 requires the largest physical footprint and the longest bridge over I-26 of the three Alternatives being considered. Due to this large footprint, Alternative 3 is expected to have the highest overall impacts to private property requiring 22 acres of new Right of Way and requiring the re-location of fifteen (15) homes on thirteen (13) different parcels.

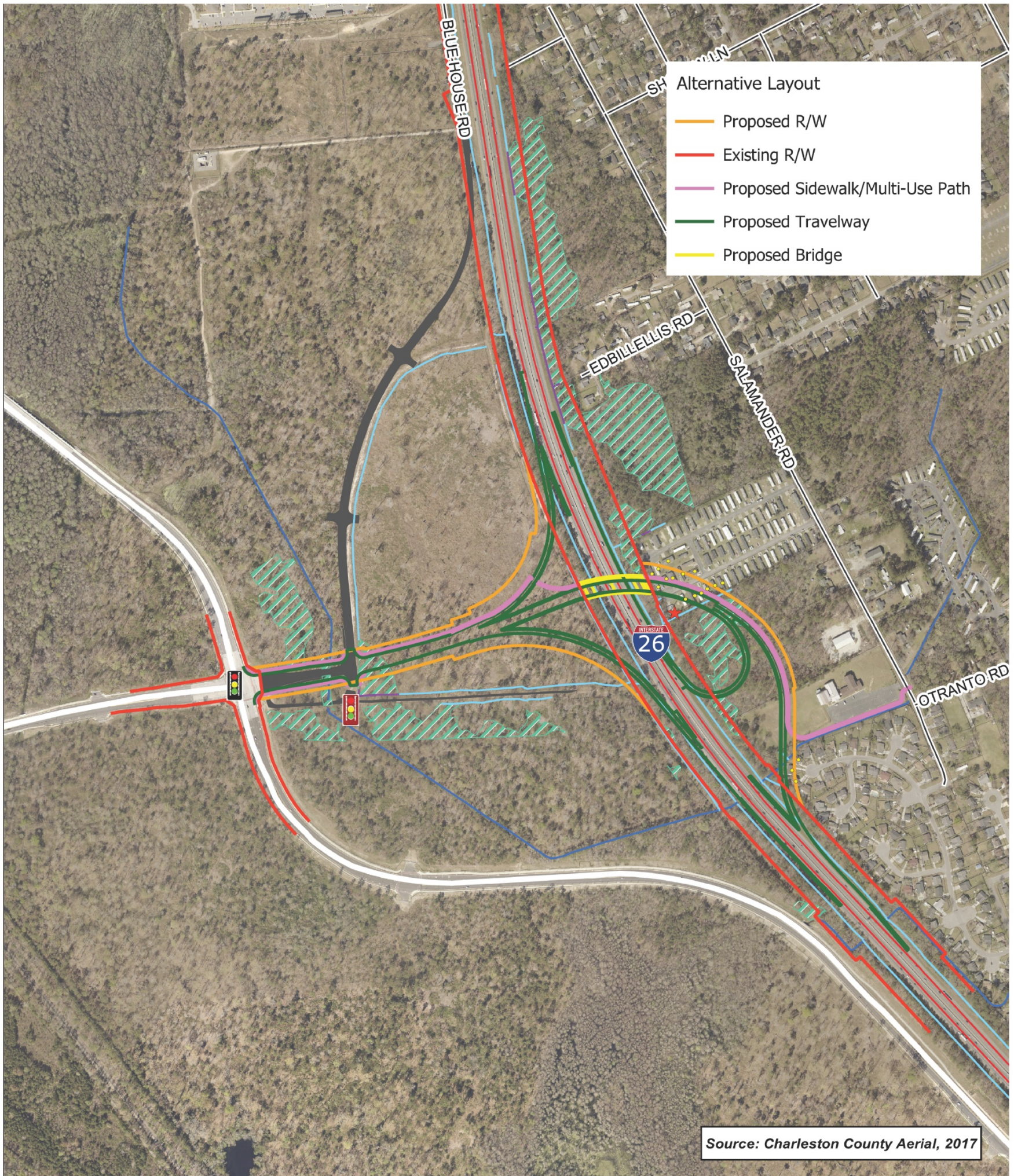
The proposed alignment and geometry for Alternative 3 does accommodate bicycle and pedestrian facilities.

Environmental Impacts

Although Alternative 3 is expected to have the largest overall footprint, the alignment of the proposed improvements are expected to result in the lowest impact to potentially jurisdictional wetlands and streams/ditches of the three alternatives. The potential impacts to the 100-yr. floodplain are slightly less than those for Alternative 7 and 8.

Total Project Cost

Due to the impacts discussed in the sections above and the impacts to the existing cell tower, Alternative 3 is the most expensive of the three alternatives at an estimated cost of \$47.1 M.



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	Legend Wetland Areas Potential JD Ditch Displacement Blue House Road Potential JD Perennial Cell Tower Parcel Lines Potential Non-JD Ditch Existing Traffic Signal Proposed Traffic Signal		Palmetto Commerce Interchange Figure 3.4.1 Alternative 3
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Figure 3.4.1 – Alternative 3

3.4.3 Alternative 7

Traffic Operations

Alternative 7 (Figure 3.4.2) is designed to provide free-flow movements for the eastbound entrance and exit ramps. The I-26 westbound entrance and exit ramps will be controlled by a two-phase traffic signal which would be located on the south side of I-26 near the proposed eastbound ramps. The signal placement would provide significantly less queuing storage at the adjacent intersections on Weber Boulevard for the westbound exit ramp traffic than that provided in Alternatives 3 and 8, but storage exceeds the minimum design requirements. The available spacing between the I-26 eastbound exit ramp and the adjacent intersections on Weber Boulevard is comparable to Alternative 8, and the speed of vehicles in this area is lower than that of Alternative 3. The lower speed is expected to provide safer merge/weave operations than Alternative 3 and is comparable to Alternative 8 within the distance provided.

Community Impacts

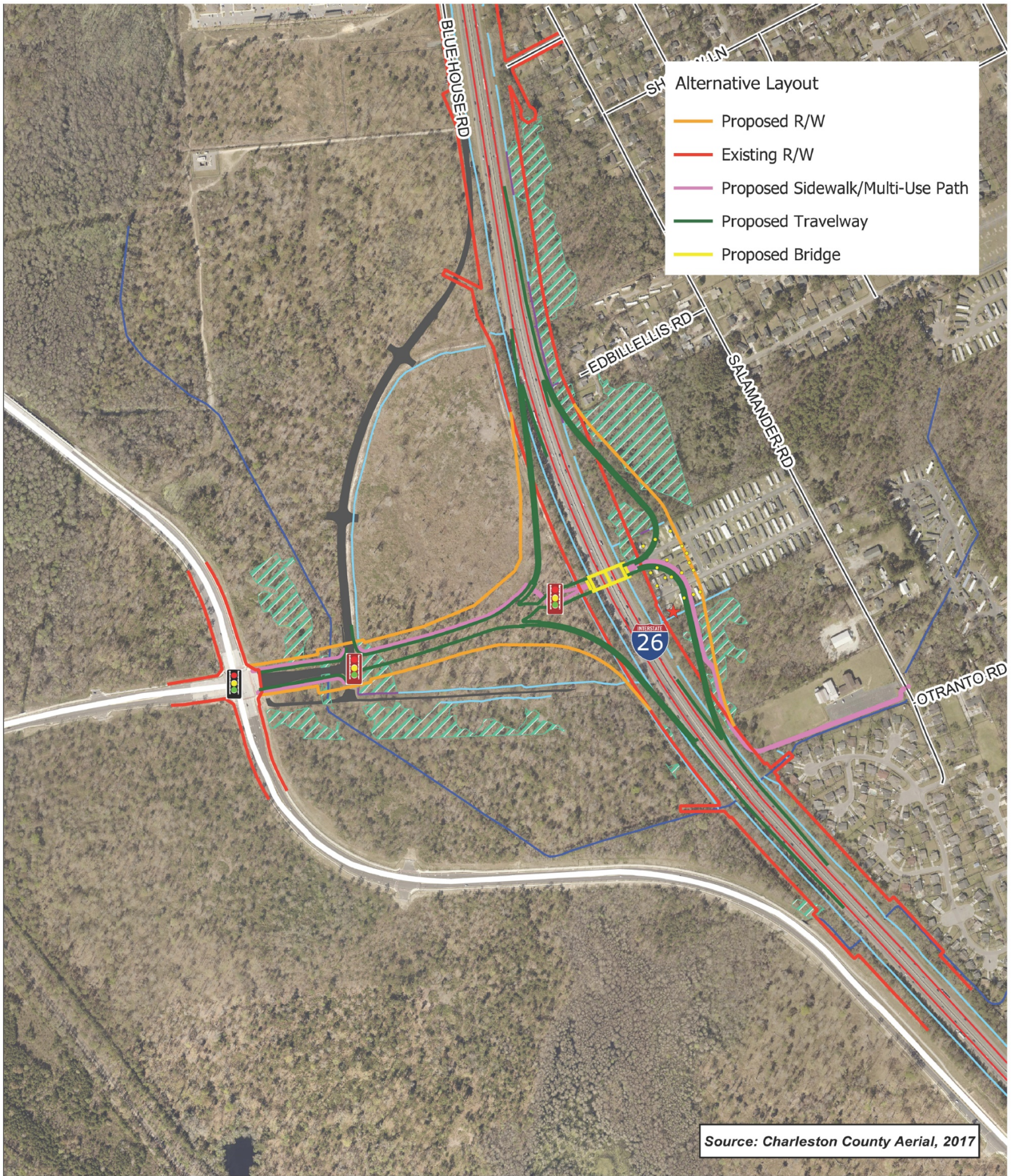
Alternative 7 is expected to require the re-location of seventeen (17) residences on ten (10) parcels. This alternative is expected to accommodate bicycle and pedestrian facilities but would have the second highest impacts to private property with 20 acres of ROW impacts.

Environmental Impacts

Alternative 7 is proposed to impact 3.97 acres of potentially jurisdictional wetlands and 1582 linear ft. of potentially jurisdictional streams/ ditches. This is the second highest wetland impact and the highest stream impacts of the three alternatives. The potential impacts to the 100-yr. floodplain are the least of the three alternatives at only .25 acres.

Total Project Cost

Although Alternative 7 is expected to impact the adjacent cell tower, this alternative is expected to be the least expensive of the three alternatives at an estimated cost of \$42.1 M.



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	Legend Wetland Areas Blue House Road Parcel Lines Potential JD Ditch Potential JD Perennial Potential Non-JD Ditch Displacement Cell Tower Existing Traffic Signal Proposed Traffic Signal		Palmetto Commerce Interchange Figure 3.4.2 Alternative 7
	Source: Charleston County Aerial, 2017		

Figure 3.4.2 – Alternative 7

3.4.4 Alternative 8

Traffic Operations

Alternative 8 (Figure 3.4.3) is designed to provide free-flow traffic movements for the I-26 eastbound entrance and exit ramps. The I-26 westbound entrance and exit ramps would intersect at a T-intersection on the south side of I-26 and will be controlled by a two-phase traffic signal. The signal placement would provide a satisfactory level of service and sufficient storage for queuing on the westbound exit ramp to avoid conflicts with traffic on the interstate. The available spacing between the I-26 eastbound exit ramp and the adjacent intersections was also evaluated. This alternative provides storage for queuing from these adjacent intersections that is comparable to Alternative 7, with an acceptable level of service that does not conflict with the traffic on the interstate.

Community Impacts

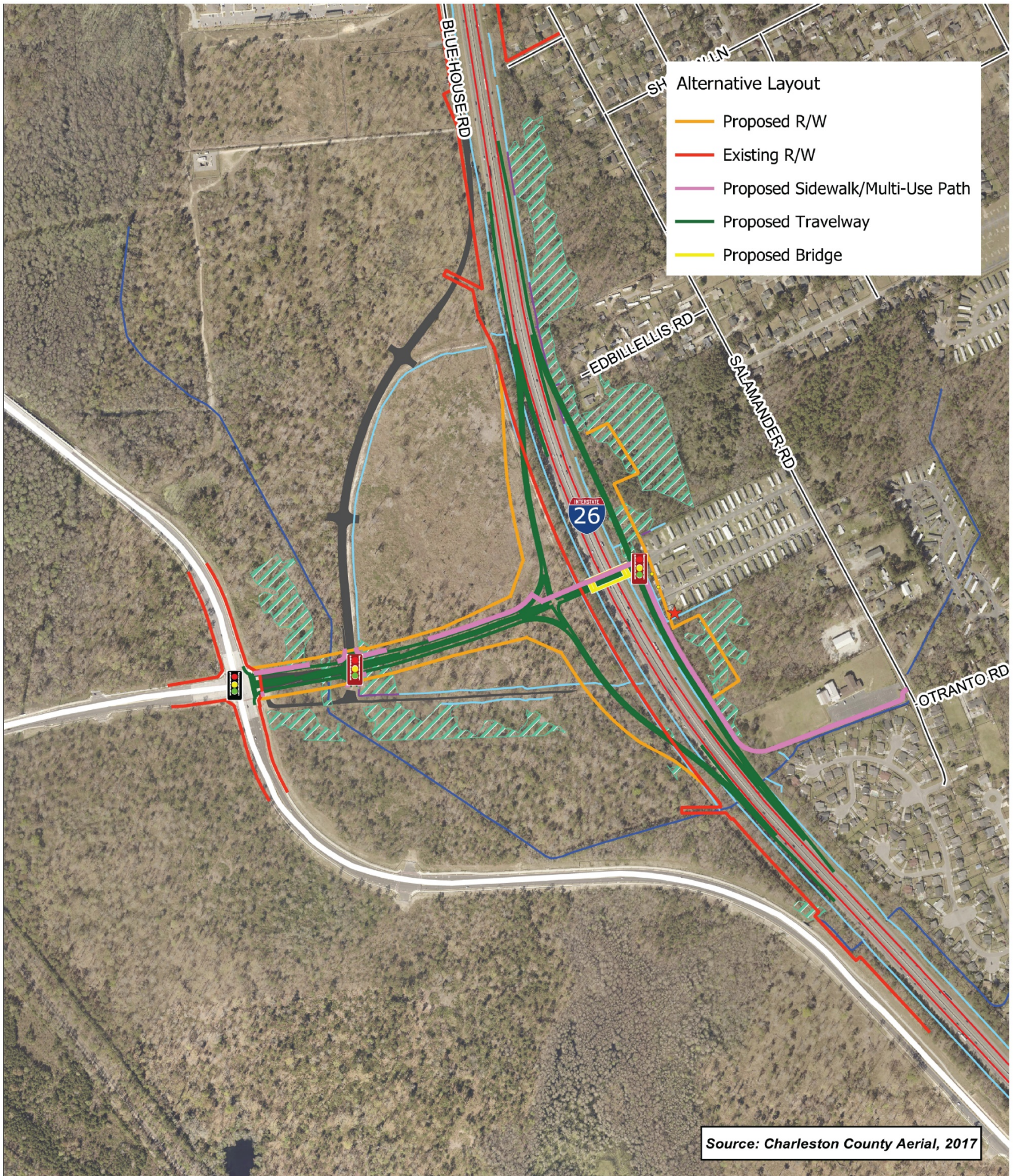
Alternative 8 was designed to have the least impact to private property of the three Reasonable Build Alternatives and is expected to require the re-location of five (5) residences and impact ten (10) different parcels. The proposed alignment and geometry for Alternative 8 is sufficient to accommodate bicycle and pedestrian facilities.

Environmental Impacts

Of the three alternatives proposed, Alternative 8 has the second highest impact to potentially jurisdictional streams/ditches at 1468 linear ft. and highest impact by .07 acres to wetland areas. This Alternative is also expected to have the highest potential impact on the 100-yr. floodplain at .37 acres.

Total Project Cost

While Alternative 8 provides the smallest total project footprint, has the least impact in terms of the number of residential relocations, and avoids conflicts with the cell tower; the costs for retaining walls along the westbound entrance and exit ramps needed to reduce impacts to the adjacent properties add to the overall cost. This alternative has an estimated cost of \$46.3 M and is the second most expensive of the three Alternatives.



Source: Charleston County Aerial, 2017

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	Legend Wetland Areas Blue House Road Parcel Lines		Potential JD Ditch Potential JD Perennial Potential Non-JD Ditch		Displacement Cell Tower Existing Traffic Signal Proposed Traffic Signal		Palmetto Commerce Interchange Figure 3.4.3 Alternative 8

Figure 3.4.3 – Alternative 8

3.4.5 Evaluation Results

The alternatives were evaluated to identify their ability to meet the purpose and need while minimizing impacts. When considered among the three Reasonable Build Alternatives, Alternative 8 is expected to provide the most balance between impacts to the human and natural environment. Alternative 8 meets the needs of the traffic operations and provides for an acceptable amount of ramp storage capacity. This Alternative has less stream impacts than Alternative 7 but more than Alternative 3. While this alternative has slightly more wetland and floodplain impacts than the other alternatives, the differences between the highest impacts and the lowest impacts are minimal at .44 acres and .12 acres, respectively.

The distinguishing factor between the three alternatives is the potential residential relocations. Alternative 7 has 17 residential relocations and Alternative 3 has 15 relocations while Alternative 8 has 5. The two alternatives with substantially higher relocations were eliminated from further consideration based on the ability to minimize impacts with Alternative 8.

At the conclusion of the evaluation of Reasonable Build Alternatives, Alternative 8 is recommended as the Preferred Alternative and will be evaluated further in Chapter 4. Alternatives 3 and 7 have been eliminated from further consideration.

Chapter 03 Footnote References

ⁱ A rendering of each Build Alternative is found in Appendix A of this Environmental Assessment

Environmental Assessment for:

Palmetto Commerce Interchange Project

May 2019

*Chapter 04 – Existing Conditions and
Environmental Consequences for Preferred
Alternative*

4.0 Existing Conditions and Environmental Impacts

This chapter describes the existing environmental, social, and economic conditions within the study area and how these conditions would be affected by the No-Build and preferred alternative. Existing conditions are identified based on literature and associated data file searches, coordination with federal, state, and local agencies, and field investigations where required.

4.1 Land Use

4.1.1 Affected Environment

As indicated in Figure 4.1.1, the land uses within the study area to the north of I-26 are primarily residential and commercial land uses. Since this area has been mostly developed, there are relatively few developments planned in this area that are expected to impact or change the current land uses.

The land use within the study area on the south side of I-26 includes a mix of residential, commercial, and light/heavy industrial uses. The area immediately adjacent to the Study area is primarily vacant/undeveloped lands with trees that have been harvested and thinned over the last several years. Understory conditions consist of early successional woodlands with a low percentage of canopy cover.

This area is, however, included in the recently approved Ingleside Planned Density Development (PDD) which is a 1,527-acre mixed-use development planned to provide a blend of residential, light industrial, commercial/office and retail/mixed uses to this developing area of Charleston County. The Ingleside Planned Density Development will be constructed with or without the proposed project and will be a noted population and economic center in the City of North Charleston.

4.1.2 Environmental Consequences

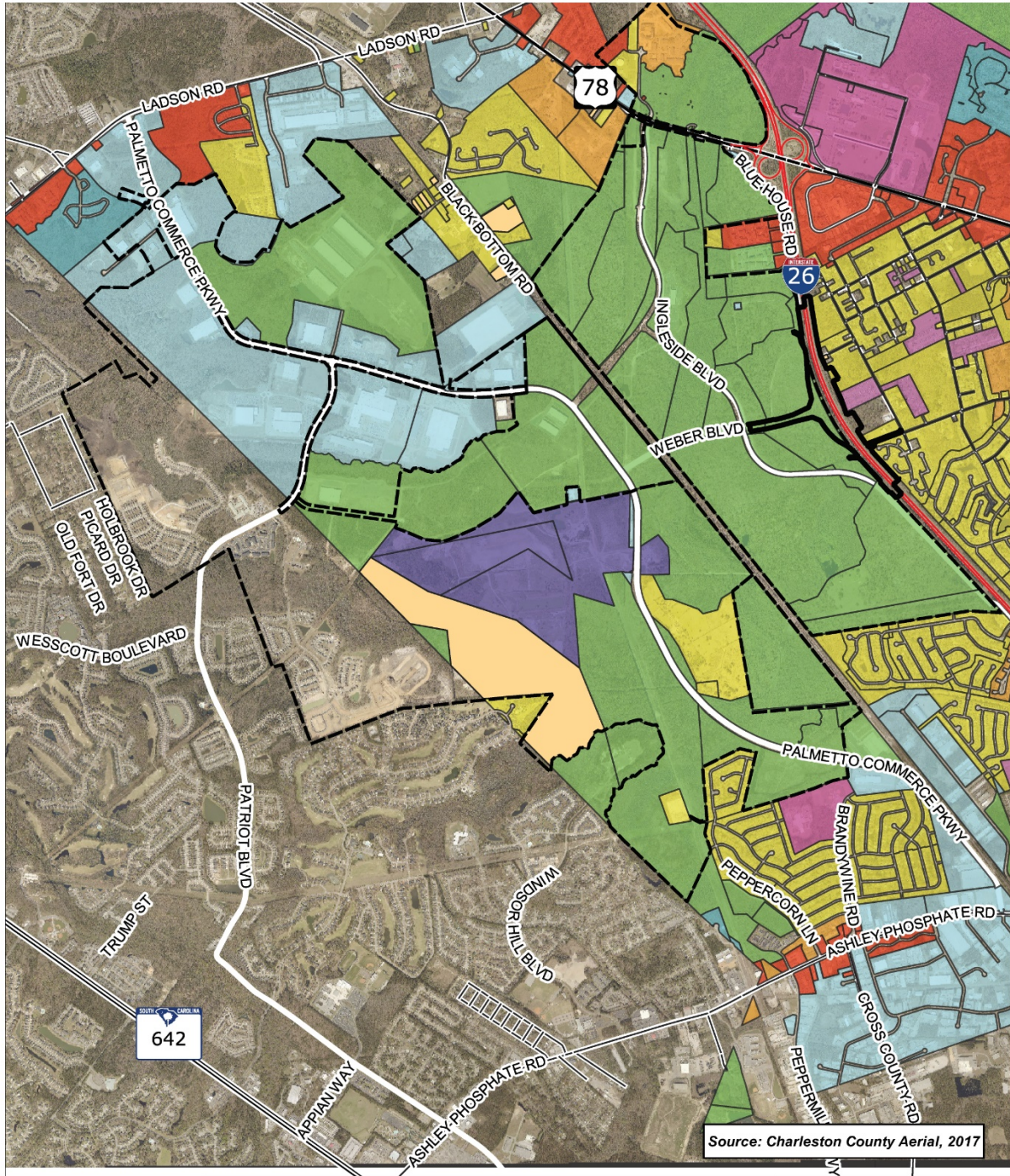
No-Build Alternative

The No-Build Alternative would not change existing or planned land uses in the Study area. The existing and planned growth for the area would continue under the No-build Alternative.

Preferred Alternative

Planned and Existing land use was taken into consideration during the design of project alternatives and the selection of the preferred alternative. The preferred alternative was developed to minimize impacts to adjacent residential, commercial, and environmentally sensitive areas (i.e. wetlands). The preferred alternative is consistent with the City of North Charleston zoning and future land use/development plans as it would provide better access to already planned and developing commercial, light industrial, and residential mixed-use developments to the south of I-26.

The proposed improvements would have minor adverse impacts to existing residential areas along the north side of I-26 and would require the acquisition of vacant lands along the south side of I-26. Anticipated impacts include the conversion of 18.5 acre planned development and residential use to transportation use.



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	Legend		
	Existing Land Use Commercial Heavy Industrial Institutional Light Industrial	Military Mobile Home Multi-Family Residential PUD/MU/PDD Rural/Conservation/HOA	Single Family Low Density Vacant PCI Project Area Economic Development Area
			Palmetto Commerce Interchange Figure 4.1.1 Ex. Land Use and Planned Future Development

Figure 4.1.1 - Ex. Land Use and Planned Future Development

4.1.3 Land Use Indirect and Cumulative Effects

An Agency Coordination Effort (ACE) meeting provided the opportunity for the SCDOT, FHWA, United States Fish and Wildlife Service (USFWS), South Carolina Department of Natural Resources (SCDNR), State Historic Preservation Office (SHPO), National Marine Fisheries Service (NMFS) and the United States Army Corps of Engineers (USACE) to identify areas of potential concern as it pertained to direct, indirect and cumulative impacts of the proposed project. The results of existing project studies were discussed to provide the best available data to the agencies for their review. During this meeting, land use was identified as a notable feature to include in both the indirect and cumulative analysis.

Indirect Effects

Indirect effects, as defined by the Council on Environmental Quality (CEQ) in 40 CFR §1508.8(b), are caused by the proposed action and “*are later in time or farther removed in distance but are still reasonably foreseeable.*” Indirect effects “may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.”⁷⁹

Indirect impacts for the proposed project were analyzed using the National Cooperative Highway Research Program’s Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects. As outlined in the Desk Reference, an eight-step approach was used to evaluate the indirect effects of the proposed project and the summary is included below.

The study area related to the indirect impacts analysis was determined to include the area which could be influenced by the proposed action. This area includes high employment centers along Palmetto Commerce Parkway and Ingleside Boulevard/Northside Drive (Figure 2.3.1). As the proposed project would construct a fully-controlled access interchange, it would limit the indirect study area to those areas to the south of I-26. The current land use in the indirect impact study area is a blend of residential, light industrial, commercial/office and retail/mixed uses. According to the City of North Charleston future land use map, the area is planned to remain zoned for a blend of residential, light industrial, commercial/office and retail/mixed uses. This rapidly growing area of North Charleston is described in both the Summerville Comprehensive Plan (BCDCOG, 2009) and Dorchester County Comprehensive Plan (BCDCOG, 2010) as a future employment center/node. The Our Region Our Plan (BCDCOG, 2012) has also identified this major corridor along I-26 as providing support to future transit corridors of regional significance. With these plans all showing the study area as an area planned for development, the indirect impact’s analysis focused on how this interchange would influence the already planned development, rather than on how it may spur new development.

Currently the developments discussed in detail in section 4.1.1 are scheduled to be constructed in phases spanning over the next 12-15 years until complete. These and other planned developments have been coordinated with local and regional planners and have considered the proposed interchange as part of their planning and scheduling efforts. Since the proposed interchange has been a part of each currently proposed development plan, it is anticipated that this new interchange would cause very little change to existing and proposed scheduled developments.

Because proposed developments within and adjacent to the study area would have existing access points without the construction of the proposed project, it is anticipated that these developments would occur independently of the proposed project. The indirect impacts to land use from adding this additional access point may have minor impacts but with continued regional planning would have no potential to produce significant impacts.

Cumulative Effects

Cumulative Effects are the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. (40 CFR §1508.7.)

Changes in land use have the potential for cumulative effects in this rapidly growing area of Charleston County. The geographic scope of analysis for land use is shown on Figure 4.1.1 and is generally the area along I-26 in the northern portion of North Charleston, east of University Boulevard (US Highway 78), west of Ashley Phosphate Road, and the area to the south of I-26 toward Weber Boulevard.

Currently, the northern and eastern portions of the study area are mostly developed with a medical complex, a university, mix of residential, commercial businesses, and planned industrial uses. In addition, there are areas of undeveloped land that are within wetlands or floodplains, making them unsuitable for development or subject to regulation prior to development.

Past, present and reasonable foreseeable actions that have or could affect land use are shown in Table 4.1.1 and all fall within areas designated by the City of North Charleston for economic development. This area includes high employment centers along Palmetto Commerce Parkway and Ingleside Boulevard/Northside Drive (Figure 2.3.1) The largest of these planned actions is Ingleside PDD, which was approved by North Charleston in January 2016, includes the following land uses: Assembly/Light Manufacturing, Commercial/ Office / Accommodations, Residential, Mixed Use, and Public Facilities. The development of the Ingleside property has been aided by over \$40 Million worth of public infrastructure improvements in recent years. The 3.2 mile Ingleside Boulevard and Weber Boulevard road improvements were recently opened, connecting US 78 directly to Ashley Phosphate Road and the completed Blue House road extension, which provides an additional access point from US 78 to the planned development district.

Table 4.1.1 – Past, Present and Reasonably Foreseeable Projects

Project	Development Intent	Timeframe
I-26/Ashley Phosphate Road Interchange	Improvement to Existing Transportation Facility	Past
I-26/ US 52 Connector ramps (Exit 209)	Improvement to Existing Transportation Facility	Past
Palmetto Commerce parkway Phase I and II	New Transportation Facility	Past
Weber Blvd	New Transportation Facility	Past
Palmetto Commerce Park	New Commercial and Industrial Development	Past, Present and Future
Ingleside PDD	Construct new infill buildings and mixed-use development (retail/commercial & office/residential)	Past, Present and Future
Palmetto Commerce Parkway Phase III	New Transportation Facility	Future
US 78 (University Blvd) 6 lane Divided Improvements	Improvement to Existing Transportation Facility	Future
Palmetto Commerce Interchange	New Transportation Facility	Future
US 78 at Ladson Rd	Improvement to Existing Transportation Facility	Future

In addition to the above projects that have been identified within the study area, the comprehensive plans for the region also identifies many smaller transportation projects that would continue to address congestion in the North Charleston Region.

It is anticipated that cumulative impacts would result from the preferred alternative, just as unforeseeable development in the area would result in cumulative impacts when considered as a whole. The preferred alternative would improve local transportation and provide additional access to developments already planned. Adjacent property owners to the existing planned developments may also redevelop their property over the long term as area land use changes prompt them to change the land use on their individual property.

Again, long term development that is consistent with the long-range plans for the study area would be a beneficial impact for members of the local communities through increased employment opportunities and tax revenues for many years to come. The planned changes in land use also include recreational facilities, open/green space, and parks that enhance opportunities for public use of these areas and result in an overall net benefit to the community. While cumulative impacts may result in the conversion of vacant land to developed uses, these impacts would be minimized by continued coordination with local and regional planners. Adherence to local, state and federal regulatory requirements will help ensure that impacts to natural resources, such as floodplains, streams, and wetlands are protected to the fullest extent.

Since the areas potentially impacted by the preferred alternative have already been planned for development and have been included in North Charleston’s Land Use Plan, cumulative impacts expected from this action would be minimal and have no potential to cause significant effects.

4.2 Protected Farmland

4.2.1 Affected Environment

The Farmland Protection Policy Act (FPPA) requires federal agencies to identify and account for adverse effects of their programs on the preservation of farmland and consider appropriate alternative actions that could lessen adverse impacts that may result.

The Study area is located within the incorporated city limits of North Charleston which is considered an “urbanized area” according to the 2010 U.S. Census Bureau Map. The general Study area is also included in an area planned for mixed use development including a blend of residential, light industrial, commercial, office and retail/mixed uses as indicated in Figure 4.2.1.

An assessment was performed based upon the provisions of the Farmland Protection Policy Act of 1981. Section 6548.2 (a) of 7 CFR Ch. VI (1-1-03 Edition) of the Act states that “Farmland does not include land already in or committed to urban development or water storage [...] Farmland “already in” urban development includes lands identified as “urbanized area” UA on the Census Bureau Map and therefore are not subject to the Act”.

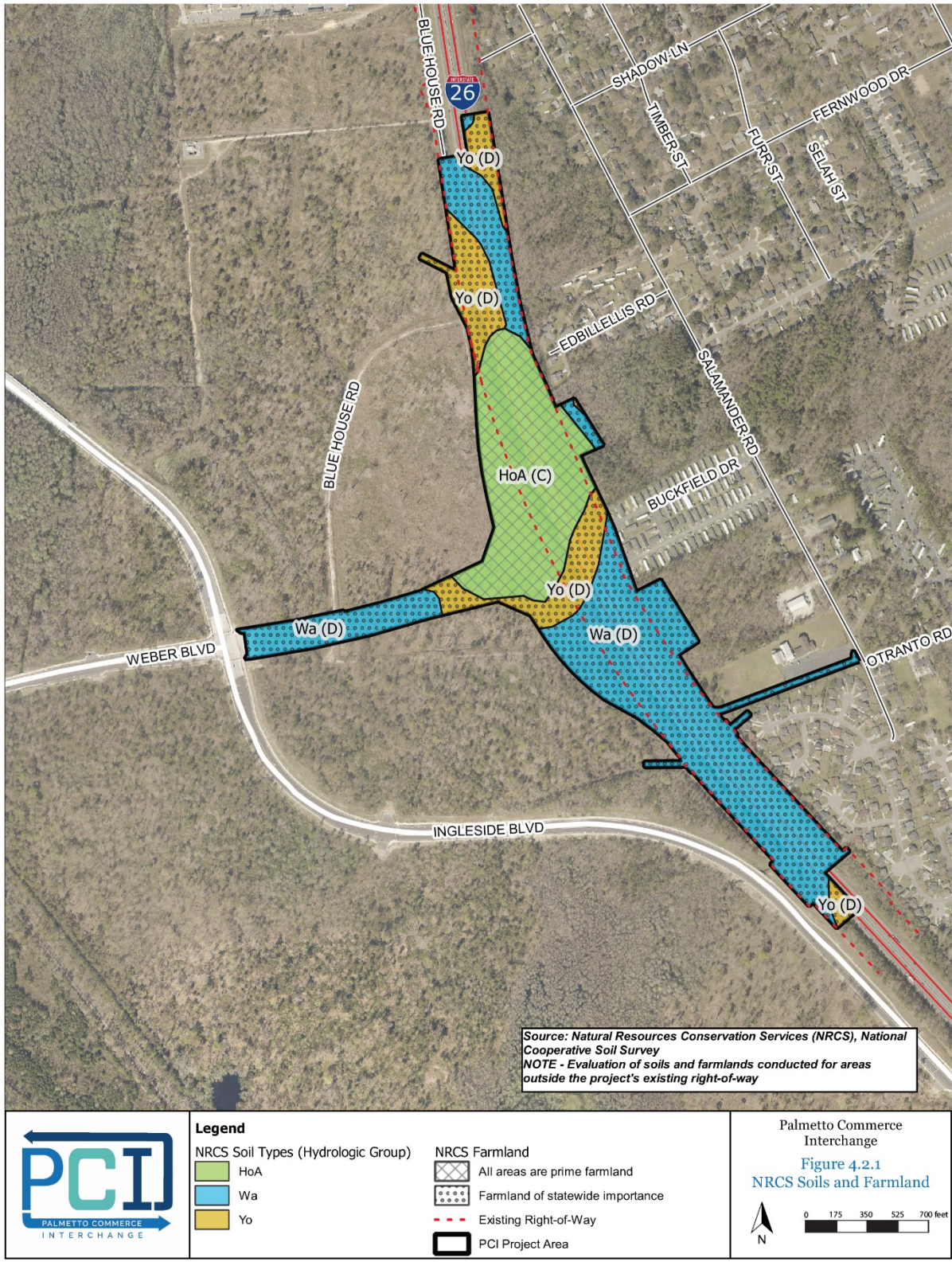
4.2.2 Environmental Consequences

No-Build Alternative

The No-Build Alternative would not affect prime, unique or statewide important farmlands.

Preferred Alternative

There are no impacts to farmlands expected as part of the preferred alternative. Under the provisions of the Farmland Protection Policy Act, since the preferred alternative includes farmlands already in urban development and identified as “urbanized area” by the Census Bureau, the Act does not apply to this project and no further studies are required.



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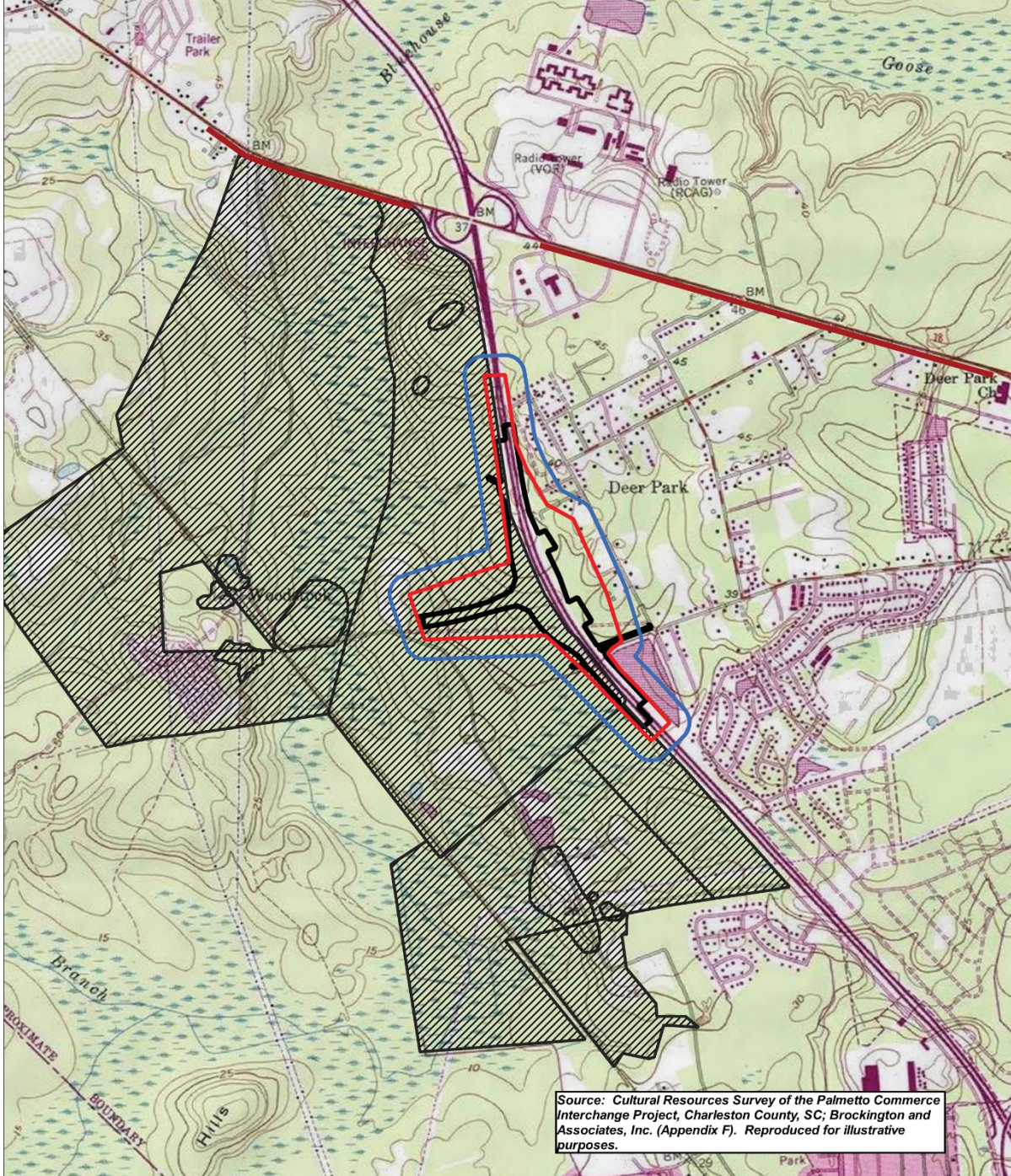
Figure 4.2.1 – NRCS Soils and Farmland

4.3 Cultural Resources

Section 106 of the National Historic Preservation Act of 1966, as amended, requires federal agencies to consider the effects of their actions on historic properties. In accordance with 36 CFR 800.4, archival research and coordination with the State Historic Preservation Officer (SHPO) and the Tribal Historic Preservation Officers (THPO) from the Catawba, Eastern Shawnee, and Muscogee Creek Nation were performed to identify the locations of significant cultural resources in the vicinity of the proposed action. A cultural resources survey was conducted to provide the necessary management data to allow for the sites and properties to be evaluated for recommendations of eligibility to the National Register of Historic Places (NRHP). No cultural resources were found during this survey indicated by Figure 4.3.1. It was determined that no historic properties would be affected by the project, and the State Historic Preservation Officer (SHPO) and the THPO's from the Catawba, and Muscogee Creek Nation concurred with this finding in August 2017 (refer to Appendix F) thus, no impacts are anticipated to historic resources.

The contractor and subcontractors must notify their workers to watch for the presence of any prehistoric or historic remains, including but not limited to arrowheads, pottery, ceramics, flakes, bones, graves, gravestones, or brick concentrations during the construction phase of the project. If any such remains are encountered, the Resident Construction Engineer (RCE) will be immediately notified and all work in the vicinity of the discovered materials and site work shall cease until the SCDOT Archaeologist directs otherwise.

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Source: Cultural Resources Survey of the Palmetto Commerce Interchange Project, Charleston County, SC; Brockington and Associates, Inc. (Appendix F). Reproduced for illustrative purposes.

	Legend Previously Surveyed Area Previously Surveyed Corridor		N 0 500 1000 1500 2000 feet
	Archeological Survey Universe Architectural Survey Universe PCI Project Area		

Figure 4.3.1 – Cultural Resources

4.4 Section 4(f) & 6(f) Resources

4.4.1 Affected Environment

Section 4(f) of the Department of Transportation Act of 1966, as amended, provides protection to publicly owned land including parks, recreation areas, wildlife and water waterfowl refuges, and public or privately-owned historic sites that are listed on or are eligible for the National Register of Historic Places (NRHP). The use of these resources is prohibited unless it is determined that there is no feasible and prudent alternative to the use of the land and the action includes all possible planning to minimize harm to the property resulting from such use.

Section 6(f) of the Land and Water Conservation Fund (LWCF) Act of 1965 requires that the conversion of lands or facilities acquired with LWCF funds be coordinated with the Department of the Interior. Properties using LWCF grants must be maintained as a public recreational facility in perpetuity. There are no Section 4(f) or Section 6(f) resources/properties located within the Study area, thus, no further analysis is warranted.

4.5 Wild and Scenic Rivers

Based upon a review of the “National Rivers Inventory” maintained by the National Park Service, there are no rivers listed within in the study area.⁰⁷ Therefore, no impacts are expected as a result of the No-Build Alternative or preferred alternative.

4.6 Socioeconomic and Demographics

4.6.1 Affected Environment

The proposed project is located in Charleston County, South Carolina. Based on U.S. Census data, the population of Charleston County grew by 11.5% percent between 2000 and 2010, from 309,969 to 350,209 residents, respectively, making Charleston County the third largest county in terms of population within South Carolina. The South Carolina Revenue and Fiscal Affairs Office projects an additional 8.75% percent growth in the population by 2025, with an anticipated 383,800 people residing in Charleston County.⁰⁹ Berkeley County is located just to the north and east of the study area, while Dorchester County is located just to the north and west of the study area. Both Counties are immediately adjacent to the study area and are also rapidly growing areas in the region.

The Charleston region has a diverse economic mix of companies and jobs. A multi-billion dollar tourism industry drives the region's economy, and with one of the busiest container ports along the southeast and Gulf coasts, the economy continues to support a strong manufacturing base and extensive military and medical establishments. According to the Charleston Metro Chamber of Commerce, the unemployment rate for the Charleston Metropolitan Statistical Area (MSA – Comprised of Berkeley, Charleston, and Dorchester Counties) was 4.1 percent in July 2016, which has steadily improved since July 2010 when it was 9.3 percent. The unemployment rate for the region is forecasted to be 3.9 percent in 2018.

The Charleston County region saw a significant rise in the employed civilian workforce between 2010 (296,883) and 2016 (358,063). This is a 20.6% increase in the employed civilian workforce within 6 years and is forecasted to increase by an additional 7% for a population of 386,067 employed civilians in 2019.¹¹

4.6.2 Demographics, Economics, and Housing Characteristics

Table 4.6.1 – Study Area Demographic and Economic Characteristics

Area	Population	% Minority	Median Age	Average Household Size	Median Household Income	% Below Poverty Level
<i>South Carolina</i>	<i>4,777,576</i>	<i>36.10</i>	<i>38.6</i>	<i>2.56</i>	<i>\$45,483</i>	<i>17.9</i>
<i>Charleston County</i>	<i>372,904</i>	<i>36.80</i>	<i>36.5</i>	<i>2.44</i>	<i>\$53,437</i>	<i>17.2</i>
<i>City of North Charleston</i>	<i>104,146</i>	<i>60.50</i>	<i>31.4</i>	<i>2.62</i>	<i>\$39,543</i>	<i>22.7</i>
CT 31.04; BG1	2,744	73.47	31.7	3.00	\$28,313	30.9
CT 31.04; BG2	2,150	75.40	28.2	2.72	\$32,276	28.3
CT 31.07; BG 1	1,421	82.83	36.1	2.69	\$42,102	3.3
CT 31.07; BG 2	646	72.91	51.5	2.76	\$60,724	19.0
CT 31.07; BG3	2,550	62.71	25.9	2.66	\$34,219	18.0
CT 31.08; BG 1	3,142	77.21	29.6	2.34	\$31,572	17.0
CT 31.13; BG1	1,489	55.14	29.6	2.14	\$39,947	12.89
CT 31.13; BG2	1,375	78.69	35.3	3.25	\$31,417	30.18
CT 31.14; BG1	4,359	56.66	29.3	2.29	\$42,401	21.95
CT 31.14; BG2	1,138	26.71	57.5	2.46	\$53,173	17.12
CT 31.14; BG3	2,507	38.73	32.4	2.74	\$66,992	2.75
CT 31.15; BG1	2,566	34.88	22.6	1.72	\$55,488	7.14
CT 31.15; BG2	830	69.52	41.2	3.16	\$31,534	38.31
CT 31.15; BG3	4,487	69.45	23.5	2.86	\$36,154	35.61

Sources: US Census Bureau, 2015 American Community Survey 5-yr Estimates

*Note - Shaded areas are within the Project footprint

The 2015 American Community Survey 5-year Estimates was used at the Block Group (BG) level for determining population and housing characteristics within the study area.

The PCI study area is encompassed by three block groups - Census Tract (CT) 31.13 BG 1, CT 31.14 BG 3, and CT 31.15 BG 2 - in Charleston County, South Carolina (shown in Figure 4.6.1). The study area shown in Figure 4.6.2 includes portions of 14 block groups. Table 4.6.1, provides select demographic and economic characteristics of these BGs, as compared to the local municipality, the City of North Charleston, Charleston County, and the State.¹⁵

Minority Population

As shown in Table 4.6.1, the minority population in the vicinity of the study area ranges from 26.71 to 82.83 percent. The shaded block group areas represent the ones shown within the proposed project footprint area. The minority population for each of the shaded census areas reported percentages from 38.73 to 69.52, which are higher than those for Charleston County (36.8%) and the State of South Carolina (36.1%). However, the average minority population for the City of North Charleston is 63.15 percent. Eight (8) out of fourteen (14) of the block groups in the Study Area have minority populations above 63.15% as shown in Figure 4.6.2.

Median Age

The median ages of the block groups in the study area have a wide range from 22.6 years to 57.5 years. Of the shaded block groups in Table 4.6.1, CT 31.15 BG 2, is the only median age lower than the median age of both Charleston County and the State of South Carolina, at 36.5 and 38.6 years, respectively. The City of North Charleston has a lower median age of 31.4, but the surrounding block groups have a wide range.

Average Household Size

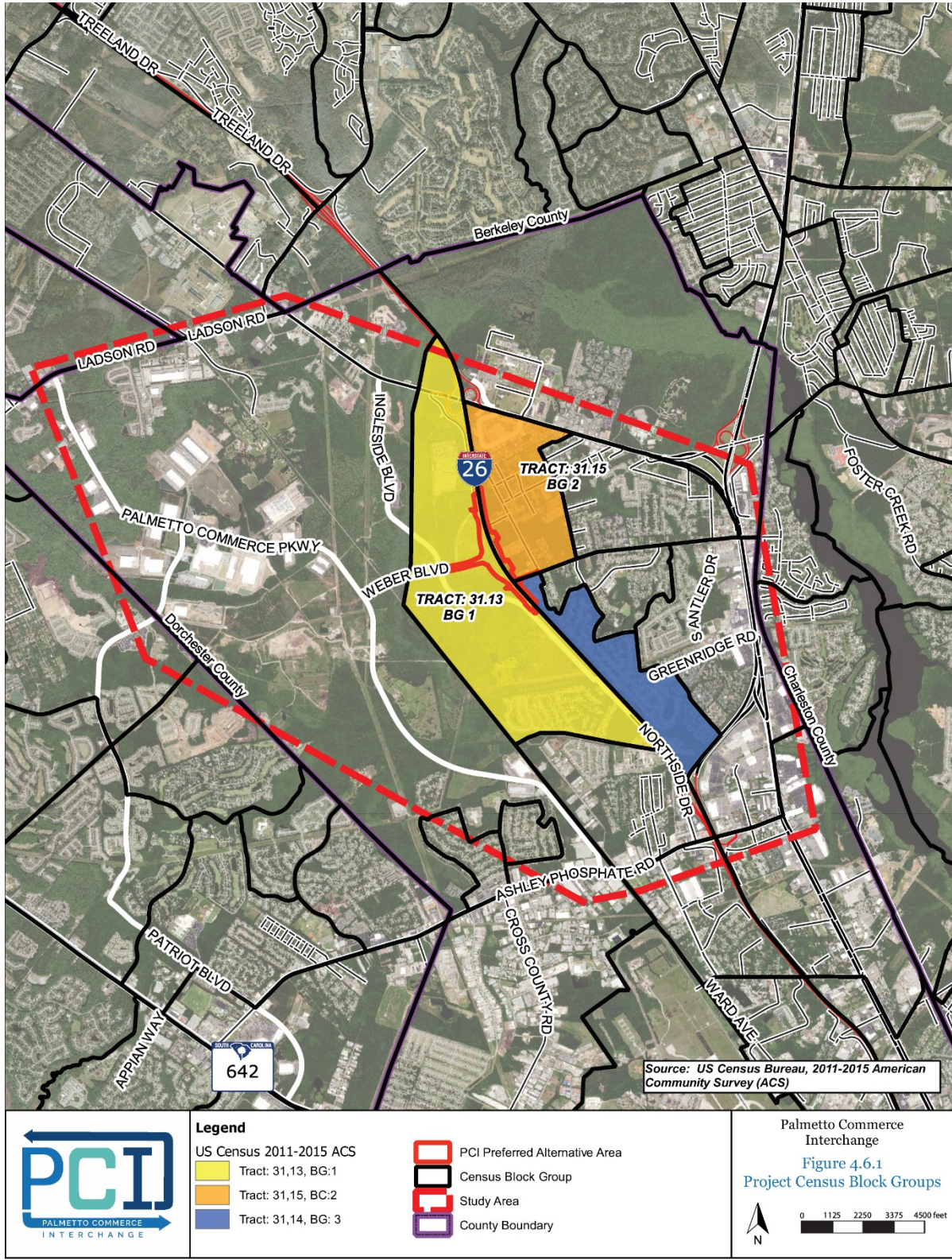
Similar to that of Charleston County and South Carolina, average household size in the City of North Charleston is 2.62. The average household sizes in the study area vary between 1.72 and 3.25 people. The BGs are comprised primarily of vacant land, commercial areas, and various residential housing communities with block group populations ranging from 646 to 4,487 people.

Median Household Income

Charleston County has a median household income of \$53,437 and the State of South Carolina a median household income of \$45,483. Median household income within the City of North Charleston is \$39,543, while median household incomes within the study area range from \$28,313 to \$66,992. With the exception of CT 31.14 BG 3, the median household incomes within the study area are economically below the county and state median incomes, but typical for the City of North Charleston.

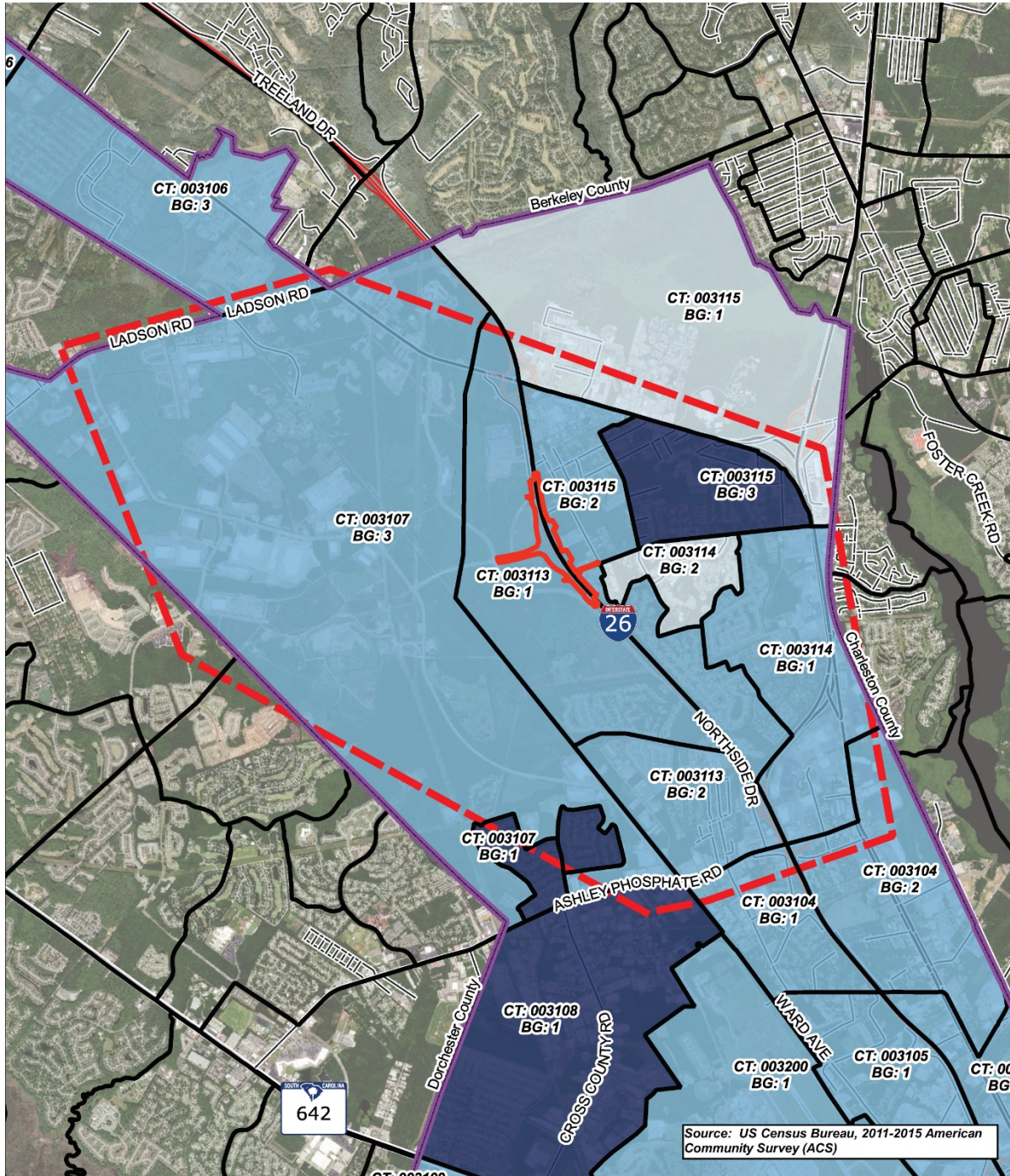
Poverty Level

The percentage of the population living below the poverty level varies from 2.75 to 38.31 percent of the population. For the shaded block groups in Table 4.6.1, CT 31.15 BG 2 is the only BG with a higher percentage of the population living below the poverty level than both Charleston County at 17.2 percent and the State of South Carolina at 17.9 percent. However, the percentage below poverty for the City of North Charleston is 22.7%. As shown in Figure 4.6.3, five out of the fourteen block groups in the study area have poverty levels above 22.7%.



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Figure 4.6.1 – Project Census Block Groups



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	Legend US Census 2011-2015 ACS Minority Population*		Palmetto Commerce Interchange Figure 4.6.2 Minority Population
	0 %- 33 % 33 %- 67 % 67 %- 100 %		

Figure 4.6.2 – Minority Population

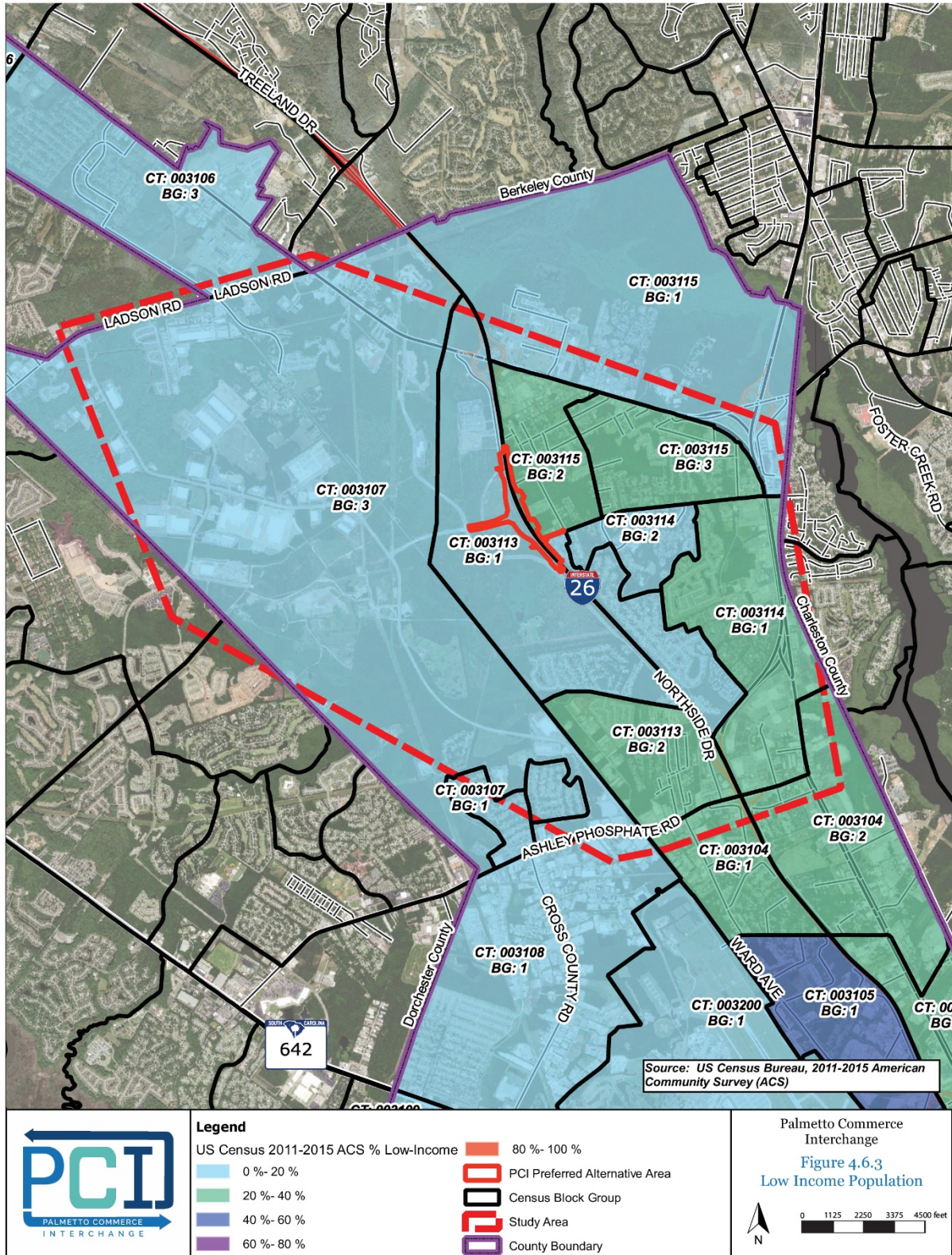


Figure 4.6.3 – Low Income Population

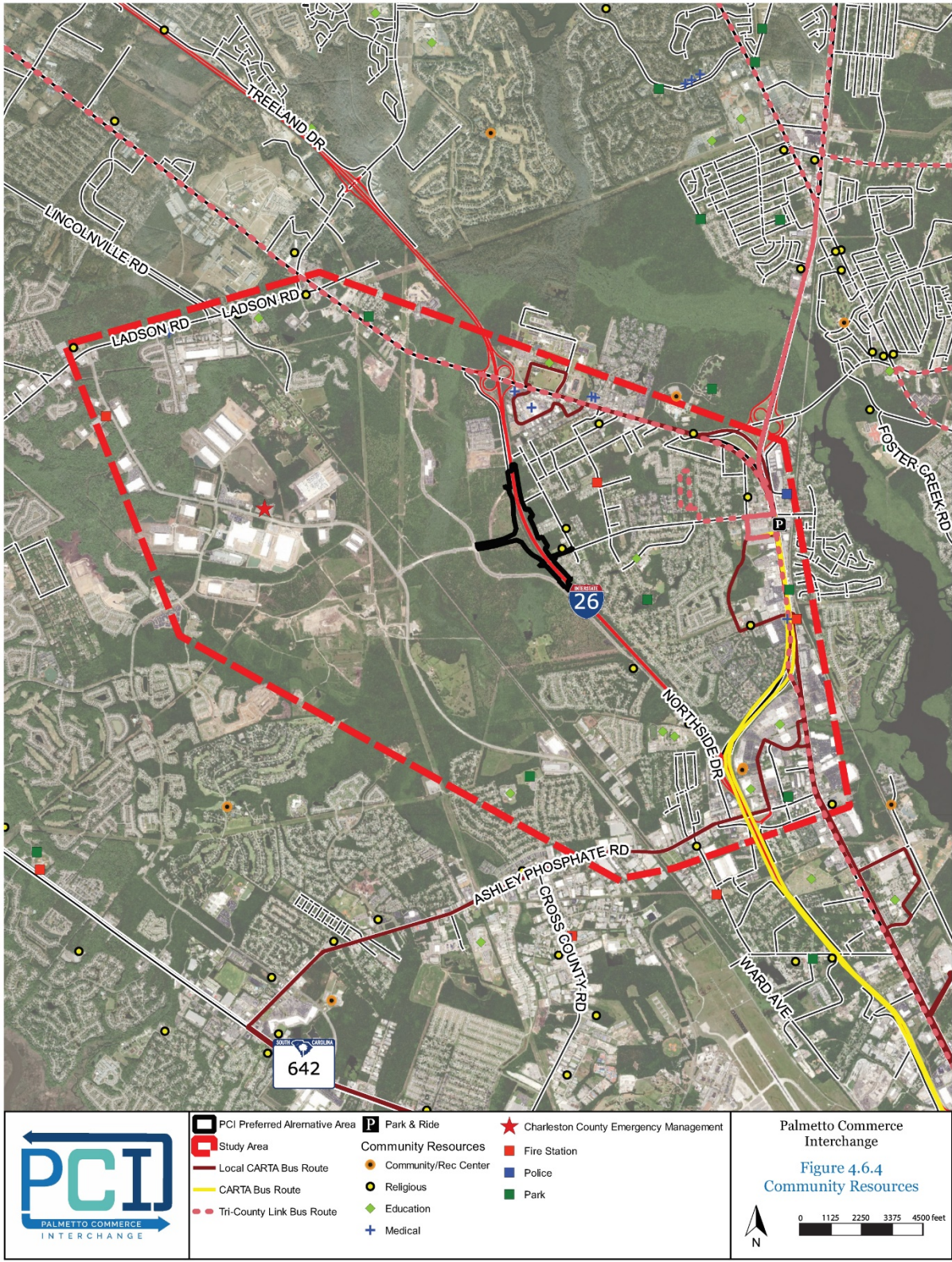
4.6.3 Existing Community Resources

As shown in Figure 4.6.4, the study area has a large number of community resources. These resources include major institutions and facilities, such as a university, regional hospital, North Charleston Wannamaker County Park, and the Charleston County Emergency Operations Center (EOC). The study area also includes many smaller schools, churches, medical offices, parks, community centers, fire stations, and transit hubs.

As shown on the Local Neighborhood Map (Figure 4.6.5), there are existing residential housing developments in close proximity to the proposed project to include: Deerhaven Manufactured Housing Community (Deerhaven) and Edbillellis Road neighborhood both located north of I-26 within CT 31.15 BG2; the Northwoods Estates residential neighborhood (located north of I-26 within CT 31.14 BG 2 and CT 31.14 BG 3); and, the Cypress River and Ingleside Plantation Apartments (located south of I-26 within CT 31.13 BG 1).

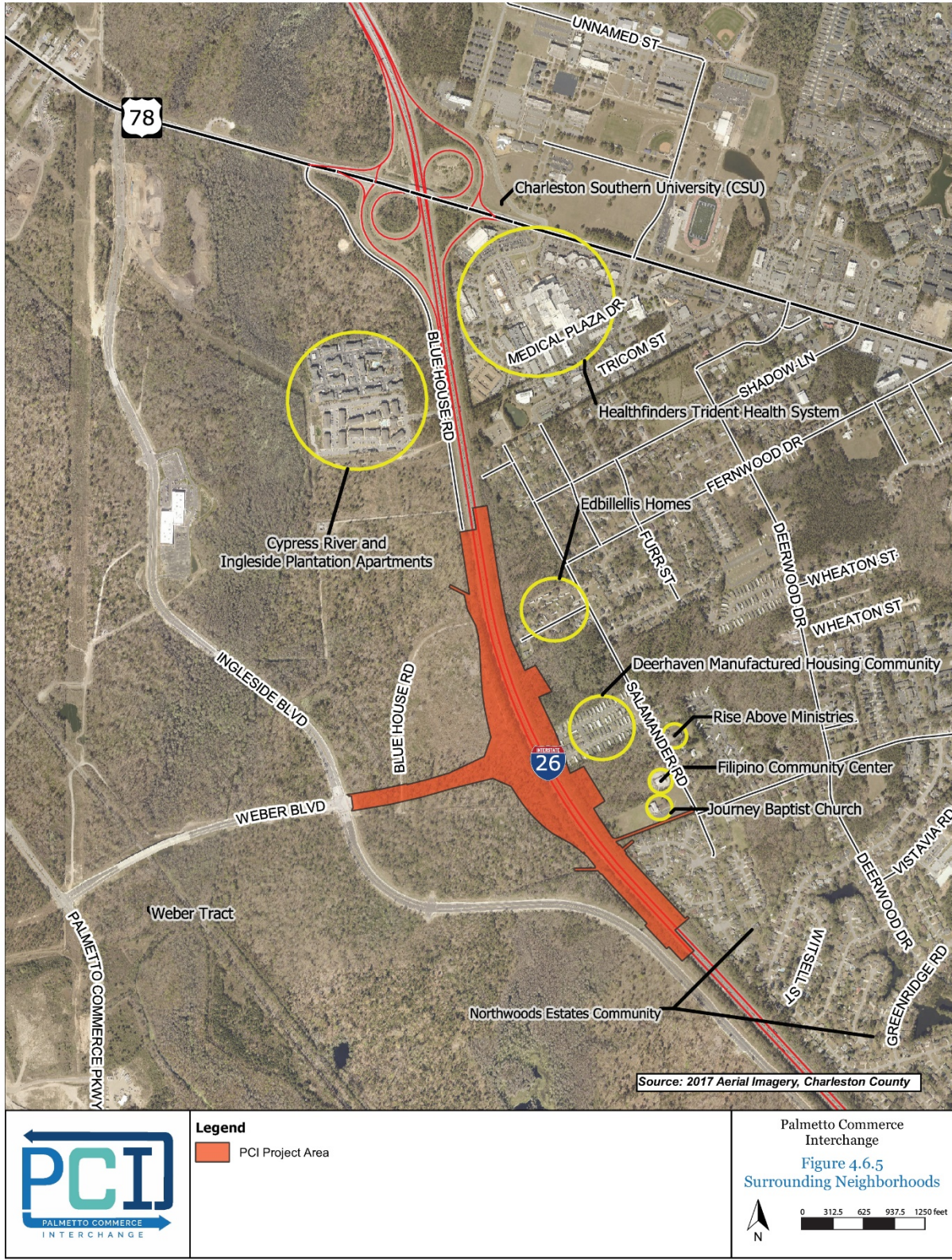
The Cypress River and Ingleside Plantation Apartments are located south of I-26 and west of the study area. These communities are accessed via University Boulevard (US 78) and Blue House Road (a frontage road along the south side of I-26). The Cypress River and Ingleside Plantation Apartments are located adjacent to the area being developed as the Ingleside Planned Density Development (PDD).

The Deerhaven Manufactured Housing Community, the Northwoods Estates residential neighborhood, Edbillellis neighborhood, and several religious and community centers (Journey Baptist Church, Rise Above Ministries, and the Filipino Community Center) are located on the north side of I-26 near the study area. Additionally, Healthfinders Trident Health System medical complex is situated to the north of the study area.



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Figure 4.6.4 – Community Resources



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Figure 4.6.5 – Surrounding Neighborhoods

4.6.4 New Developments

The existing land use to the south of I-26 is mainly vacant/undeveloped with concentrated light industrial use along the Palmetto Commerce Parkway corridor, and a mix of residential and light industrial use around the Palmetto Commerce Parkway and Ashley Phosphate Road intersection to the south of the study area.

This area also includes the Ingleside PDD which is an approximate 1,527-acre mixed-use development planned to provide a blend of residential, light industrial, commercial/office and retail/mixed uses to this developing area of Charleston County. The Ingleside PDD, approved by the City of North Charleston in January 2016, includes the following land uses:

- Assembly/Light Manufacturing – 678 acres
- Commercial/Office/Accommodations – 321 acres
- Residential (maximum of 5,425 units) – 183 acres
- Mixed use – 153 acres
- Public facilities (including rights-of-way) – 183 acres

Although this area is now relatively undeveloped land, the upcoming Ingleside Development will be a noted population and economic center in the City of North Charleston. Future land use within this area is consistent in both local and regional planning studies/initiatives.

Both the *Summerville Comprehensive Plan (BCDCOG, 2009)* and *Dorchester County Comprehensive Plan (BCDCOG, 2010)* identify the Ladson Road corridor (around US 78 and Palmetto Commerce Parkway intersections) along the northern extents of the Study area as a future employment center/node. The *Our Region Our Plan (BCDCOG, 2012)* has also identified this major corridor along I-26 as providing support to future transit corridors of regional significance.

4.6.5 Environmental Consequences

No-Build Alternative

Under the No-Build Alternative potential social impacts are not anticipated from residential and business relocations, and no disruption to planned or established communities or development is expected. Planned growth is likely to occur under both the No-Build and preferred alternative, and according to the Charleston Regional Development Alliance employment opportunities are expected to continue to grow in the region. The No-Build Alternative, however, would not address the existing and future congestion expected in this area as a result of the current and planned growth.

Preferred Alternative

The preferred alternative was analyzed for its potential social impacts in terms of residential and business relocations, alteration of transportation patterns, disruption of planned or established communities, disruption of development, and changes in employment.

Residential and Business Relocations

The preferred alternative is located primarily within and adjacent to the existing 200-foot right-of-way (ROW) for I-26 currently owned by SCDOT. The preferred alternative is anticipated to require the acquisition of 18.5 acres of ROW and have no business or institutional relocations. However, it would require the relocation of five (5) residences, which are manufactured homes located in the Deer Haven Manufactured Housing community. The owners of the manufactured homes rent lots at this manufactured housing community, and some of the lots are vacant at this time. For purposes of this EA, each lot was counted as a potential relocation in case any of these lots are rented later prior to ROW acquisition. The exact number of relocations will be determined once ROW plans are developed and those who have manufactured homes occupying those lots will be contacted by a ROW agent during the acquisition process.

Right-of-way acquisition and relocations would be conducted in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (Uniform Act). The purpose of this law and implementing regulations is to ensure that owners of real property to be acquired for federal and federally-assisted projects are treated fairly and consistently, to encourage and expedite acquisition by agreements with such owner, to minimize litigation and relieve congestion in the courts, and to promote public confidence in federal and federally-assisted land acquisition programs. In addition, benefits under the Uniform Act can be extended to renters if specific requirements are met.

Due to the residential impacts associated with the preferred alternative, a Relocation Impact Study was coordinated with the owner and performed to determine the availability of decent, safe, and sanitary (DSS) housing in the area. A copy of this study is found in Appendix H. This study indicated there are four manufactured home parks within a three-mile radius of the project that offers homes and manufactured homes with similar costs, styles, and amenities as the homes being impacted. The estimated prices for manufactured home purchases, rentals, and lot rentals vary but are generally as follows:

- Manufactured Home Purchase: \$36,000-\$52,000
- Manufactured Home Rental: \$775-\$1,100 per month
- Lot rental: \$250-\$450 per month

The availability of DSS housing in the area is sufficient to accommodate residents displaced as part of this project.

Alteration of Transportation Patterns

The construction of the preferred alternative would result in improved mobility and travel times throughout the study area as it would provide a direct connection between I-26 and existing/future commercial, industrial, and residential areas to the south of I-26. This would relieve some traffic using the US 78 or Ashley Phosphate Road interchanges and provide for better overall network mobility in the study area as discussed in Chapter 2 (Alternatives). These improvements are expected to improve local and regional access to the community resources shown in Figure 4.6.4, as well as improved travel times for emergency responders.

The preferred alternative would improve traffic conditions in the study area and accessibility to local community resources and employment centers to the south of I-26. A bike and pedestrian path is included in the preferred

alternative's design to improve mobility and accessibility options for surrounding communities. This improvement would add a much-needed crossing of I-26 and provide a bicycle and pedestrian friendly facility in the study area with the emphasis on walkable and connected neighborhoods.

Disruption of Planned / Established Communities

The proposed project was planned to minimize impacts to residential communities to the north of I-26, as the preferred alternative would be a partial interchange, and would not provide access to the north side of I-26. Thus, it would not increase traffic on the local roads in the study area on the north side of I-26 near the Deerhaven, Edbillellis Road, and Northwood Estates communities.

As previously discussed, the preferred alternative would impact the Deerhaven Manufactured Home community along the north side of I-26 as it would require the relocation of five (5) residences. Impacts to the communities on the north side of I-26 were limited to the greatest extent possible by choosing the reasonable alternative that relocated the least number of residences, as well as designing the on and off ramps using retaining walls to reduce the construction footprint of the preferred alternative. The remaining homes in Deerhaven would be impacted by minimal increases in mobile air emissions, noise and light, and by changes to the visual character of the area. Although the development is already located immediately adjacent to I-26, the new interchange ramps would be elevated and more visible to the neighboring Deerhaven community. Since the property along the south side of I-26 currently undeveloped, no impacts are expected in that area. The preferred alternative is also anticipated to have short-term effects in the study area during construction, such as noise, dust, and light.

Disruption of Future Development

As discussed previously, future residential and business development is occurring along I-26 under both the No-build and the preferred alternatives. The proposed project has been planned by the County and City of North Charleston to connect to the roadways on the south side of I-26 without disrupting future development.

Changes in Employment

Construction of the proposed project would have short-term impacts on the local economy, including construction employment and purchases of goods and services related to construction activities. The proposed project would create temporary employment opportunities for laborers, equipment operators, and other construction-type employees. The proposed project would also improve access to employment centers, including reduced commute times.

Potential Impacts to Environmental Justice Communities

Federal laws and regulations pertaining to environmental justice are outlined in Title VI of the Civil Rights Act of 1964 in addition to Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. EO 12898 requires that Agencies identify Adverse Effects of their projects, determine whether adverse effects are disproportionately high, and identify whether adverse impacts will be borne by the Environmental Justice (EJ) population. The FHWA guidebook describes Environmental Justice as identifying and addressing disproportionately high and adverse effects of the agency's programs, policies, and activities on minority populations and low-income populations to achieve an equitable distribution of benefits and

burdens. It is essential to the evaluation of potential impacts because it "helps to ensure full and fair participation by potentially affected communities in every phase of the transportation decision-making process. When this is accomplished, the development, construction, operation, and maintenance of transportation projects should reflect an equitable distribution of benefits and burdens."³⁸ The three fundamental principles of environmental justice as described in USDOT EJ Strategy are:

1. To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations
 - i. This has been fulfilled using the approach discussed below to identify and evaluate impacts to EJ communities to determine if there are disproportionately high and adverse human health and environmental effects, and if so, to determine appropriate avoidance, minimization, or mitigation measures
2. To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process
 - i. Public participation in the decision-making process has been part of this project since its inception. Since 2014 there have been two public involvement meetings and two community stakeholder meeting conducted with cooperation from City Council Representatives. Meetings were announced through an official paid press release and distributed to local media. In addition to the meetings, postcard mailers were distributed to all residences in the study area providing information and directing users to the proposed project's website for additional data. Social media platforms were also utilized through the County Facebook and Twitter platforms to leverage the online community through the network of followers to expand the project's reach and exposure. Prior to the public hearing, additional direct mailers of comment opportunities will be sent to potentially affected communities
3. To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.³⁹
 - i. All right-of-way acquisition and relocations will be conducted in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (Uniform Act) and will conform to Title VI of the Civil Rights Act of 1964.

The first step of EJ analysis is to determine if an EJ population is present in the study area. Figure 4.6.1 displays the three census block groups that would be directly impacted by the proposed project. Of the three groups, both tract 31.15 BG2 and 31.13 BG1 have minority populations greater than 50% and tract 31.14 BG has minority populations below 50%. Eight out of fourteen block groups in the study area show minority populations above the City of North Charleston's percent minority of 63.15%. The Census data percentages of the population living below the poverty level for tracts directly impacted by the proposed project are 38.31 percent for Tract 31.15 BG2 and are 12.89% and 2.75% for 31.13 BG1 and 31.14 BG2. Based on the Census data there are both minority and low-income populations present in the study area.

The second step of Environmental Justice analysis is the determination of impacts. The primary impact the preferred alternative has on the EJ populations in the study area is the relocation of five (5) homes in the Deerhaven Neighborhood. This neighborhood is a manufactured housing community that has lots for up to 85 homes. Based on visual inspection of the mobile home park during several visits as well as Census information in this area, it appears that elderly, handicapped, lower-income, and potentially minority residents reside within the Deerhaven community. Additional community characterization was completed as part of a relocation study performed to

evaluate the presence of limiting factors within the impacted neighborhood and there were no elderly or Handicapped displacements noted. In addition to the residential relocations, other adverse impacts expected from the proposed project would be the potential increase in highway traffic noise and potential impacts from vehicle lights. Each of these impacts were evaluated for avoidance, minimization and mitigation to lessen their effects.

First, avoidance of residential relocations was considered. In this analysis the location of where the preferred alignment crosses I-26 was reevaluated. A shift closer to Exit 205 was studied but this shift would not meet design standards. In order to provide proper advance guide signage and sufficient spacing for entrance and exit maneuvers, the FHWA requires a minimum of 1 mile spacing between urban interchanges. The proposed interchange location is approximately 1.1 mile east of Exit 205, Highway 78 and could not be moved any closer. A shift closer to Exit 209 was then evaluated as an avoidance option. This shift would meet the one-mile spacing requirements; however, it would encroach into other existing neighborhoods. These neighborhoods of similar demographic and income classifications as Deerhaven would have been impacted. As the options of complete avoidance were exhausted, the next step in the evaluation process became minimization and enhancement.

As part of the minimization and enhancement measures implemented, relocations were reduced from 17 homes to only five (5) by choosing reasonable alternative 8 as the preferred alternative. In addition, the preferred alternative was designed using retaining walls to further minimize the proposed project footprint, lessening the encroachment into the Deerhaven neighborhood. The increase in highway traffic noise was studied and no receivers were found to have a "substantial increase" in noise levels or qualify for noise barrier mitigation as discussed in more detail in section 4.7. Lighting impacts from the reduction of vegetation and the creation of new roadways were also evaluated. The current development is already located immediately adjacent to I-26 buffered with mature trees. The new westbound ramps will be elevated with a concrete barrier and new tree plantings to provide a visual barrier to the new ramp. The main line I-26 traffic will be less visible to many of the Deerhaven residents with the new interchange. Preliminary designs plan for an elevation of 25 Ft. at the peak of the ramps and higher barrier walls than normal due to the shared use path associated with the design. These barrier walls would block much of the lights and the height difference between the roadway and the ground around the homes should eliminate nuisance light increases associated with the proposed project. To provide visual relief from the proposed new interchange, a landscape plan consisting of a vegetative buffer between the existing Deerhaven Manufactured Home Community and the proposed new interchange will be included in the final project design. This plan will prescribe the selection of plant material that allows for the mix of trees and shrubs, as appropriate, to provide variable height and density. Coordination with Deerhaven Manufactured Home Community will occur during the Public Hearing. The last area of effect to an EJ community was the possible disruption of community cohesion. Through discussions with stakeholders, the proposed project was designed to be a partial interchange to provide a connection from I-26 to the south side of the interstate and does not provide vehicle access to the north side where the established communities exist. This lessens the amount of traffic and disruption to the communities. No new roadways are proposed in the communities to the north side of I-26. While there are some relocations in the Deer Haven neighborhood, there are no relocations in the Northwoods Estate or Edbillellis Road communities. Coordination with the impacted Deer Haven community through public involvement activities revealed that some of the displaced residents could be able to relocate within the same manufactured housing park, or others could be given the option of relocating to neighborhoods nearby whether other manufactured housing parks exist. In addition to adverse impacts, beneficial effects on the EJ community were also evaluated to determine the totality of the circumstances. The beneficial impacts associated with the proposed action would be the multi-use pedestrian and bicycle facility,

which would provide a new non-motorized crossing over I-26, and improved travel times in the overall roadway network.

Although potential EJ populations have been identified that would be impacted by the proposed project, the effect would not be considered disproportionately high and adverse when taking into consideration the proposed avoidance, minimization, and mitigation measures that have been or would be implemented for the proposed project, as well as the offsetting beneficial impacts to the community. Also, the proposed project would not cause the EJ populations' impact to be appreciably more severe or greater in magnitude than adverse effects that would be suffered by the non-environmental justice populations. Thus, the proposed project would not have a disproportionately high and adverse human health and environmental effect to the EJ communities in the study area. Therefore, in accordance with the provisions of E.O. 12898 and FHWA Order 6640.23, no further EJ analysis is required.

4.7 Noise Impact Analysis – Preferred Alternative Alignment

Once a preferred alternative was selected, a detailed noise analysis was conducted and is summarized below. The preferred alternative was studied using the roadway design elevations as well as traffic data derived from the traffic study entitled “Palmetto Commerce Interchange 2040 Build Traffic Volumes – PM Peak Hour,” prepared by Stantec. The full noise impact report for the preferred alternative can be found in Appendix D.

The noise analysis was conducted to evaluate future noise levels, their associated impacts, and the feasibility of noise mitigation measures associated with the preferred alternative. This noise impact analysis is for the new interchange lanes and how the construction of the interchange may impact the surrounding receptors/receivers. Existing conditions (2020), 2040 no-build conditions, and 2040 build conditions were evaluated for the preferred alternative. Traffic on I-26 is expected to increase and was included in the evaluation.

The FHWA Traffic Noise Model (TNM version 2.5, released April 2004) was used in the analysis to compare existing and future noise levels. The analysis was performed in accordance with the procedures outlined in 23 CFR Part 772, Procedures for Noise Abatement of Highway Traffic Noise and Construction Noise and the SCDOT Traffic Noise Abatement Policy.

4.7.1 Noise Abatement Criteria

To determine if highway noise levels are compatible with various land uses, the FHWA has developed noise abatement criteria and procedures to be used in the planning and design of highways. These abatement criteria and procedures are in accordance with Title 23 Code of Federal Regulations (CFR), Part 772, U.S. Department of Transportation, FHWA, Procedures for Noise Abatement of Highway Traffic Noise and Construction Noise. A summary of FHWA Noise Abatement Criteria (NAC) for various land uses is presented in Table 4.7.1. All receivers identified in the project corridor fell into Category B, C or D.

According to FHWA and SCDOT traffic noise policy, “approaching” the NAC is defined as being within one dBA of the NAC. *Leq* (h) is the average energy of a sound level over a one-hour period. All properties covered by NAC B (generally residential) or NAC C (sports areas, places of worship, cemeteries, day care, hospitals) that have a

calculated *Leq* value of 66 dBA or higher would “approach or exceed” the 67 dBA NAC B criterion. All properties covered by NAC E (hotels, offices, restaurants) with a *Leq* value of 71 dBA or higher would “approach or exceed” the 72 dBA NAC E criteria. Properties covered by NAC F (agricultural, airports, bus yards, etc.) have no noise level criteria. A 15 dBA increase is defined by SCDOT as a substantial increase. An impacted receiver is one in which the noise level approaches the NAC or 66 dB in the case of residential locations or one that would have substantial increase as defined above.

When a traffic noise impact occurs, noise abatement measures must be considered under current SCDOT policy. A noise abatement measure is any positive action taken to reduce the impact of traffic noise on an activity area. For the areas where impacts are identified, methods of noise abatement are evaluated to determine the feasibility and reasonableness of their implementation. The evaluation is based on many factors, some of which include constructability, topography, cost, height of wall, and whether changes in existing land use are expected.

Table 4.7.1: 23 CFR 772 (Table 1) Noise Abatement Criteria (NAC)

Activity Category	Leq (h) ^{1,2}	L10 (h) ^{1,2}	Evaluation Location	Description of Activity Category
A	57	60	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B ³	67	70	Exterior	Residential.
C ³	67	70	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	55	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E ³	72	75	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	--	--	--	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	--	--	--	Undeveloped lands that are not permitted.

SOURCE: 23 CFR Part 772

¹ Either *Leq*(h) or *L10*(h) (but not both) may be used on a project.

² The *Leq*(h) and *L10*(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.

³ Includes undeveloped lands permitted for this activity category.

4.7.2 Existing Noise Levels

Ambient noise field measurements were taken at twelve (12) representative locations in the study area during daytime hours. A map showing the ambient noise measurement locations is shown in Figure 4.7.1. Four sites were located on the south side of I-26 in the undeveloped areas between Ingleside Boulevard and the interstate where the new interchange would connect to Ingleside Boulevard. There were no current potential receivers located on the south side of the interstate, and these readings were located too far from the current noise source to be used for validation. Eight other sites were located on the north side of the interstate. On the north side there were three residential neighborhoods with potential impacted receivers. These residential neighborhoods off Salamander Road included homes on Edbillellis Road, the Deerhaven Manufactured Housing Community (DHMC), and the Northwoods Estates neighborhood. There were also three places of worship; Journey Baptist Church, Rise Above Ministry and the Filipino Community Center.

The traffic data was input into the TNM program to compare the model generated noise level to the noise level measured during each observation. If the difference between the measured noise levels and modeled noise levels are +/- 3 dB or less, then the model is considered validated and can be used to predict future noise levels. The comparison results below show that overall the validation of the TNM program is satisfactory to use to predict future noise levels. It should be noted that there were two readings (PC-East-5 and PC-East-7) which were slightly above 3 dBA. During both of these readings it was noted that there were instances of heavy truck “jake braking” which produces louder than normal sound from the vehicles and could be the reason for the above normal field readings. All other field readings versus modeled readings were within +/- 3 dBA. The results of the field noise measurements are listed in Table 4.7.2.

Table 4.7.2 – Ambient Noise Levels

Ambient Sound Meter Location	Date	Time	Measured Noise Levels (dBA)	Modeled Noise Levels (dBA)	Difference (dBA)
PC East 1 – Field at Journey Baptist Church	8/8/2017	12:11-12:27	64.6	63.7	-0.9
PC-East 2 – Doe Walk Lane at DMHC	8/8/2017	14:48-15:03	62.6	60.2	-2.4
PC-East 3 – End of Edbillellis Road	8/8/2017	19:03-19:18	64.7	62.8	-1.9
PC East 4 – Bentwood Blvd cul-de-sac	8/8/2017	13:58-14:14	61.8	61.3	-0.5
PC East 5 – ROW fence behind 8687 Bentwood Dr. in Northwood Estates	1/10/2018	14:42-14:57	72.3	69.2	-3.1
PC East 6 – ROW fence behind 3002 Edbillellis Road	1/10/2018	10:23-10:38	71.3	71	-0.3
PC East 7 – ROW fence at End of Twisted Antler Drive in Deerhaven Manufactured Housing Community	1/10/2018	11:31-11:46	70.2	66.8	-3.4
PC East 8 – ROW fence behind Journey Baptist Church	1/10/2018	12:25-12:40	70.6	70.7	0.1
The following ambient measurement locations were on the undeveloped areas of the project and were not used for validation purposes because they were generally too far from noise sources:					
PC West 1 – Located in wooded area on southeast side of new roadway leading to interchange	8/9/2017	13:06-13:21	59.1		
PC West 2 – Located in wooded/wet area on southwest side of new roadway leading to interchange	8/9/2017	12:33-12:48	55.8		
PC West 3 - Located in wooded/wet area west of proposed new EB off-ramp, southwest of interchange	8/9/2017	10:41-10:56	60.5		
PC West 4 - Located in wooded/wet area on southwest side of new roadway leading to interchange	8/9/2017	11:21-11:36	65.1		



Figure 4.7.1 – Ambient Noise Measurement Locations

4.7.3 Modeled Future Noise Levels

The existing (2020), future 2040 no-build, and future 2040 build traffic data was provided by Stantec with data provided from SCDOT. The existing AM and PM peak hour traffic 2040 build AM and PM peak hour traffic volumes were provided for the proposed project. The 2040 PM peak hour traffic volume data had the highest traffic volume on the north side of I-26. Since the potential impacted receivers were located on this side of the interstate, it was decided to use these traffic volumes in the noise model. A heavy truck restriction limiting trucks over 6 wheels to the 2 right lanes was also taken into account in the model. The traffic volumes, mix, and speed limits used are in Appendix D.

Receiver location is the specific location of an outdoor area where frequent human activity occurs that might be impacted by highway traffic noise and may benefit from reduced noise levels. TNM model assigns receiver elevations at five (5) feet above the existing ground level to simulate the height of a person's ear and thus, the noise level that a person perceives.

One hundred forty-six (146) receivers were modeled in the TNM program using the 2040 forecasted traffic volumes provided for the 2020 existing, 2040 no-build and build scenarios. These included four (4) receivers located at the end of Edbillellis Road, thirty-six (36) receivers located within the Deerhaven Manufactured Housing Community (DMHC), ninety-seven (97) receivers located in the Northwoods Estates residential area, six (6) along Doe Drive and three (3) places of worship: Journey Baptist Church, the Filipino Community Center, and Rise Above Ministries. See Table 4.7.5 for a list of receivers included in the noise model. See Figure 4.7.2 for receiver locations.

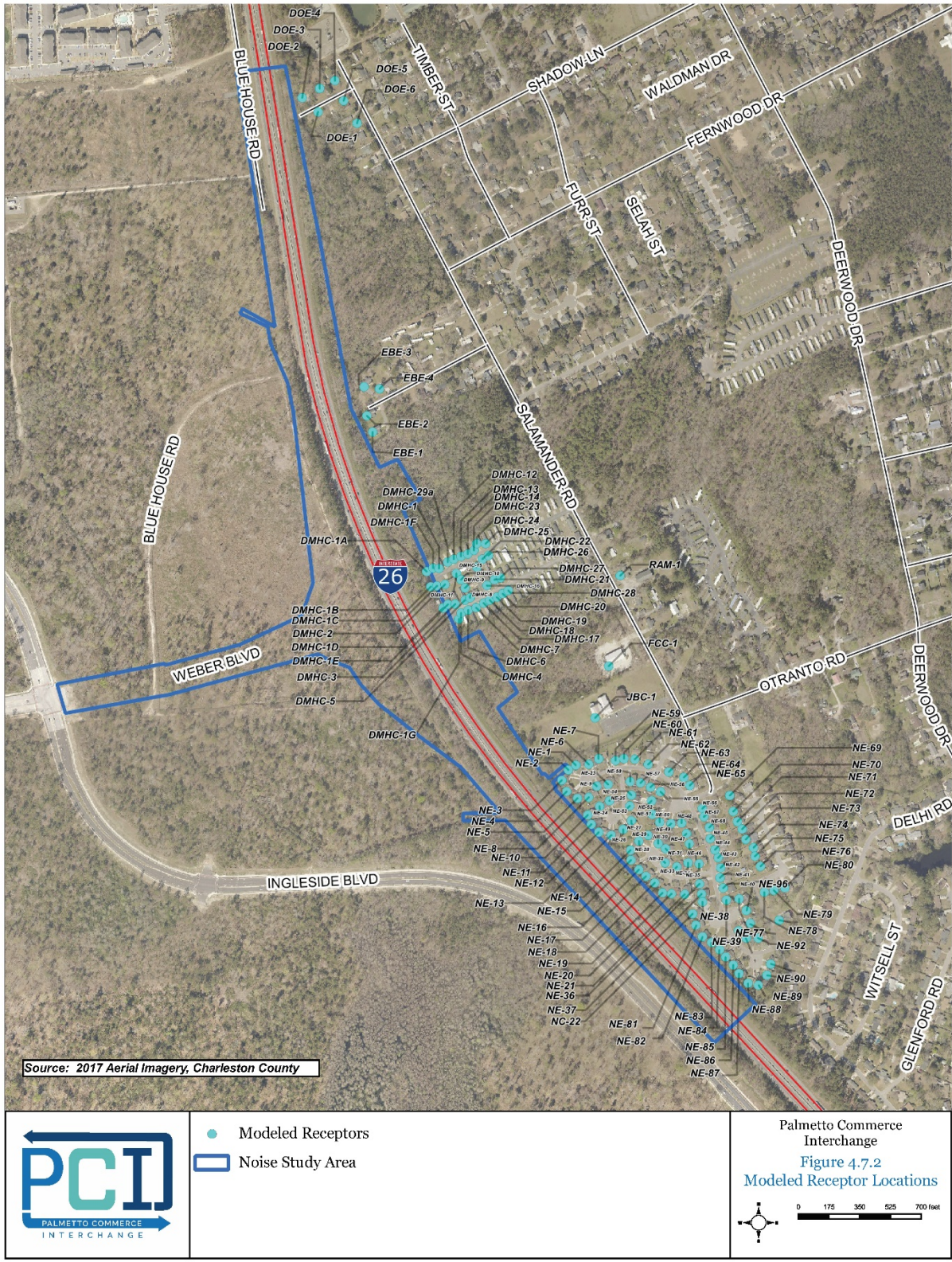


Figure 4.7.2 – Modeled Receptor Locations

4.7.4 Noise Impact Results

For the preferred alternative, future noise was estimated using the TNM. Per the SCDOT definition a traffic noise impact occurs when predicted traffic noise levels:

- (a) Approach or exceed their respective NAC listed in 23 CFR 772 (SCDOT defines “approach” as within 1 dBA of the FHWA noise abatement criteria for the applicable land use category, or
- (b) Indicate a “substantial increase” over existing levels (SCDOT has defined a “substantially increase” as an increase in noise levels of 15 dBA or more in the design year over the existing noise level, or
- (c) When both conditions (a) and (b) occur.

This does not imply that receivers that do not meet the above criteria would not experience an increase in noise levels. These criteria are simply used to guide FHWA and the SCDOT in determining when noise abatement measures must be evaluated.

Using the existing and forecasted 2040 traffic data, and an analysis of the PCI preferred alternative, the TNM model determined the following impacts would be expected:

- With the existing traffic there are seventy-two (72) receivers that have noise levels that approach or exceed the NAC criteria for its respective land use.
- With the 2040 No-Build traffic there are seventy-five (75) residential receivers that would have noise levels that approach or exceed the NAC criteria for its respective land use.
- With the 2040 Build traffic there are thirty-seven (37) residential receivers that would have noise levels that approach or exceed the NAC criteria for its respective land use. The number of receptors that approach or exceed the NAC are the lowest in this model because of the construction of the proposed interchange. The new on and off ramps would be constructed at a much higher elevation than the existing roadway, thus providing a shielding of noise from the Interstate.

All noise receptors that would be impacted by the proposed project are Category B (residential). Table 4.7.5 shows the summary of the modeled receivers for the existing, 2040 no-build and 2040 build scenarios.

All the impacted receivers were residential locations and had noise levels that approach or exceed the NAC. No receivers were found to have a “substantial increase” in noise levels from the proposed project, meaning that none of the receivers would experience an increase of 15dBA or greater over existing noise levels. Figures 4.7.3, 4.7.4, and 4.7.5 show the locations of the receivers for the existing and no-build conditions where noise levels approach or exceed the NAC, and the build scenario where impacts are anticipated.

In addition to the noise impacts associated with the use of the new facility, impacts from construction of the preferred alternative were also evaluated. If the Build Alternative is chosen, temporary increases in noise levels would occur during the time period that construction takes place. Noise levels due to construction, although temporary, can impact areas adjacent to the project. The major noise sources from construction would be the heavy

equipment operated at the site. However, other construction site noise sources would include hand tools and trucks supplying and removing materials. As the contractor would be required to comply with SCDOT and OSHA regulations concerning noise attenuation devices on construction equipment, construction noise should not hinder or annoy normal community functions. A full discussion of potential noise impacts during construction and mitigation options for construction noise impacts can be found in Appendix D.

Table 4.7.5 – PCI Noise Results

Table 2: Existing and Design Year Sound Levels							
Receptor Name	Existing	2040 No-Build	2040 Build Alt. 8	Increase over Existing	NAC Impact?	NAC	Land Use
DMHC-1"	70.2	70.3	63.4	-6.8	N	66	B
DMHC-2"	69.4	69.5	64.6	-4.8	N	66	B
DMHC-3"	70.3	70.4	58.8	-11.5	N	66	B
DMHC-4"	70	70.1	57.7	-12.3	N	66	B
DMHC-5"	68.2	68.3	59.4	-8.8	N	66	B
DMHC-6"	68	68.1	57.7	-10.3	N	66	B
DMHC-7"	66.7	66.8	57.4	-9.3	N	66	B
DMHC-8"	66.4	66.6	58.5	-7.9	N	66	B
DMHC-9"	66.2	66.3	59.7	-6.5	N	66	B
DMHC-10"	66.3	66.5	60.9	-5.4	N	66	B
DMHC-11"	66.2	66.4	61.3	-4.9	N	66	B
DMHC-12"	66.9	67	61.2	-5.7	N	66	B
DMHC-13"	65.8	65.9	60.2	-5.6	N	66	B
DMHC-14"	64.9	65	59.5	-5.4	N	66	B
DMHC-15"	64.6	64.8	59.5	-5.1	N	66	B
DMHC-16"	64.4	64.5	57.9	-6.5	N	66	B
DMHC-17"	65.5	65.7	57.1	-8.4	N	66	B
DMHC-18"	64.6	64.8	57	-7.6	N	66	B
DMHC-19"	63.9	64.1	56.8	-7.1	N	66	B
DMHC-20"	63.1	63.3	56.5	-6.6	N	66	B
DMHC-21"	63.5	63.6	57.6	-5.9	N	66	B
DMHC-22"	63.3	63.5	58.6	-4.7	N	66	B
DMHC-23"	64.1	64.3	59.1	-5.0	N	66	B
DMHC-24"	63.4	63.5	58.3	-5.1	N	66	B
DMHC-25"	62.6	62.8	57.9	-4.7	N	66	B
DMHC-26"	62.6	62.8	58	-4.6	N	66	B
DMHC-27"	62.7	62.9	57.1	-5.6	N	66	B
DMHC-28"	62.3	62.5	56.2	-6.1	N	66	B
DMHC-1A"	71.5	71.6	Relocation	-	Relocation	66	B
DMHC-1B"	72.6	72.7	Relocation	-	Relocation	66	B
DMHC-1C"	71.1	71.2	Relocation	-	Relocation	66	B
DMHC-1D"	72.9	73	Relocation	-	Relocation	66	B
DMHC-1E"	71.9	72	Relocation	-	Relocation	66	B
DMHC-1F"	71.1	71.2	64.7	-6.4	N	66	B
DMHC-1G"	71.1	71.2	58.2	-12.9	N	66	B
DMHC-29a"	68.2	68.3	62.4	-5.8	N	66	B
RAM-1"	54.8	55	52	-2.8	N	66	C
JBC-1"	61.2	61.4	55	-6.2	N	66	C
FCC-1"	57.9	58.1	53.6	-4.3	N	66	C

Table 2: Existing and Design Year Sound Levels							
Receptor Name	Existing	2040 No-Build	2040 Build Alt. 8	Increase over Existing	NAC Impact?	NAC	Land Use
NE-1"	64.7	64.9	56.9	-7.8	N	66	B
NE-2"	67	67.2	57.3	-9.7	N	66	B
NE-3"	70.9	71.1	59.8	-11.1	N	66	B
NE-4"	73.4	73.6	63.4	-10.0	N	66	B
NE-5"	73.1	73.3	63.5	-9.6	N	66	B
NE-6"	62.7	62.9	56.2	-6.5	N	66	B
NE-7"	61.5	61.7	55.7	-5.8	N	66	B
NE-8"	67.3	67.4	59.5	-7.8	N	66	B
NE-9"	62	62.2	57	-5.0	N	66	B
NE-10"	73.2	73.3	63	-10.2	N	66	B
NE-11"	74.7	74.8	66.3	-8.4	Y	66	B
NE-12"	74.1	74.2	68	-6.1	Y	66	B
NE-13"	71.3	71.5	67.6	-3.7	Y	66	B
NE-14"	70.1	70.3	67.5	-2.6	Y	66	B
NE-15"	73.1	73.2	71.5	-1.6	Y	66	B
NE-16"	73.6	73.7	72.7	-0.9	Y	66	B
NE-17"	73	73.2	72.7	-0.3	Y	66	B
NE-18"	72.9	73	72.8	-0.1	Y	66	B
NE-19"	73.4	73.6	73.4	0.0	Y	66	B
NE-20"	70.5	70.6	71	0.5	Y	66	B
NE-21"	69	69.1	69.7	0.7	Y	66	B
NE-22"	70.5	70.6	71.5	1.0	Y	66	B
NE-23"	61.5	61.6	57.6	-3.9	N	66	B
NE-24"	64.2	64.4	58.9	-5.3	N	66	B
NE-25"	56.1	56.3	55.9	-0.2	N	66	B
NE-26"	64.8	65	64.2	-0.6	N	66	B
NE-27"	57	57.2	56.6	-0.4	N	66	B
NE-28"	57.5	57.7	57	-0.5	N	66	B
NE-29"	57.1	57.3	57.4	0.3	N	66	B
NE-30"	60.5	60.7	60.6	0.1	N	66	B
NE-31"	60.7	60.8	60.7	0.0	N	66	B
NE-32"	61	61.1	61	0.0	N	66	B
NE-33"	61.2	61.4	61.4	0.2	N	66	B
NE-34"	59.8	59.9	59.9	0.1	N	66	B
NE-35"	58.3	58.4	58.5	0.2	N	66	B
NE-36"	59.5	59.7	60.3	0.8	N	66	B
NE-37"	62.7	62.8	63.3	0.6	N	66	B
NE-38"	63.5	63.6	64.1	0.6	N	66	B
NE-39"	58.8	58.9	59.4	0.6	N	66	B

Table 2: Existing and Design Year Sound Levels

Receptor Number	Existing	2040 No-Build	2040 Build	Increase over Existing	NAC Impact?	NAC	Land Use
NE-40"	57.1	57.3	57.6	0.5	N	66	B
NE-41"	56.3	56.4	56.6	0.3	N	66	B
NE-42"	56.2	56.4	56.5	0.3	N	66	B
NE-43"	56.2	56.3	56.4	0.2	N	66	B
NE-44"	56.6	56.7	56.7	0.1	N	66	B
NE-45"	57.1	57.3	57.4	0.3	N	66	B
NE-46"	59.1	59.2	59.2	0.1	N	66	B
NE-47"	58.7	58.8	58.8	0.1	N	66	B
NE-48"	58.2	58.4	58.2	0.0	N	66	B
NE-49"	58.4	58.5	58.3	-0.1	N	66	B
NE-50"	58.6	58.8	57.9	-0.7	N	66	B
NE-51"	59.9	60.1	58.3	-1.6	N	66	B
NE-52"	59	59.2	57.5	-1.5	N	66	B
NE-53"	59.4	59.5	57.5	-1.9	N	66	B
NE-54"	58.9	59	57	-1.9	N	66	B
NE-55"	58.2	58.3	56.7	-1.5	N	66	B
NE-56"	58.4	58.6	56.8	-1.6	N	66	B
NE-57"	58.8	59	56.3	-2.5	N	66	B
NE-58"	59.7	59.8	56.4	-3.3	N	66	B
NE-59"	59.6	59.8	55.9	-3.7	N	66	B
NE-60"	59.2	59.3	55.6	-3.6	N	66	B
NE-61"	58.5	58.7	55.2	-3.3	N	66	B
NE-62"	57.9	58	55.5	-2.4	N	66	B
NE-63"	57	57.2	55.5	-1.5	N	66	B
NE-64"	56.4	56.6	55.3	-1.1	N	66	B
NE-65"	56.4	56.5	55.6	-0.8	N	66	B
NE-66"	56.6	56.7	56.5	-0.1	N	66	B
NE-67"	56.9	57.1	56.9	0.0	N	66	B
NE-68"	56.9	57	57	0.1	N	66	B
NE-69"	54.8	55	54.8	0.0	N	66	B
NE-70"	54.9	55	55.1	0.2	N	66	B
NE-71"	54.8	55	55.1	0.3	N	66	B
NE-72"	54.7	54.9	55.2	0.5	N	66	B
NE-73"	54.9	55	55.3	0.4	N	66	B
NE-74"	54.9	55.1	55.3	0.4	N	66	B
NE-75"	55.3	55.5	55.7	0.4	N	66	B
NE-76"	55.8	56	56.3	0.5	N	66	B
NE-77"	58.8	59	59.3	0.5	N	66	B
NE-78"	57.5	57.6	58	0.5	N	66	B

Table 2: Existing and Design Year Sound Levels

Receptor Number	Existing	2040 No-Build	2040 Build	Increase over Existing	NAC Impact?	NAC	Land Use
NE-79"	56.9	57.1	57.5	0.6	N	66	B
NE-80"	56.3	56.5	56.9	0.6	N	66	B
NE-81"	72.4	72.6	73.1	0.7	Y	66	B
NE-82"	73.1	73.2	74	0.9	Y	66	B
NE-83"	72.7	72.8	73.3	0.6	Y	66	B
NE-84"	72.5	72.6	73	0.5	Y	66	B
NE-85"	72.5	72.6	73.3	0.8	Y	66	B
NE-86"	72.4	72.5	73.4	1.0	Y	66	B
NE-87"	72.6	72.7	73.7	1.1	Y	66	B
NE-88"	72.4	72.6	73.7	1.3	Y	66	B
NE-89"	72.5	72.6	72.1	-0.4	Y	66	B
NE-90"	64.4	64.6	66	1.6	Y	66	B
NE-91"	58.7	58.9	59.4	0.7	N	66	B
NE-92"	59.8	60	60.6	0.8	N	66	B
NE-93"	60.4	60.5	61.1	0.7	N	66	B
NE-94"	60.5	60.6	61.1	0.6	N	66	B
NE-95"	59.9	60.1	60.5	0.6	N	66	B
NE-96"	59.4	59.6	60	0.6	N	66	B
NE-97"	58.4	58.5	59.1	0.7	N	66	B
EBE-1"	72.1	72.2	63	-9.1	N	66	B
EBE-2"	72	72.1	64.1	-7.9	N	66	B
EBE-3"	71.5	71.6	66.2	-5.3	Y	66	B
EBE-4"	67.7	67.8	63.4	-4.3	N	66	B
DOE-1"	69.4	69.6	69.8	0.4	Y	66	B
DOE-2"	72.4	72.6	72.9	0.5	Y	66	B
DOE-3"	67.6	67.7	68.3	0.7	Y	66	B
DOE-4"	64.2	64.3	64.9	0.7	N	66	B
DOE-5"	64.2	64.4	64.8	0.6	N	66	B
DOE-6"	63.6	63.8	64.2	0.6	N	66	B



Source: 2017 Aerial Imagery, Charleston County



- Modeled Receptors (No Impact)
- Modeled Receptors (Approaches or Exceeds NAC)
- Noise Study Area

Palmetto Commerce Interchange
Figure 4.7.3
Existing Conditions
Modeled Receptor Impacts

N

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Figure 4.7.3 – Existing Conditions Modeled Receptors Impacts



Source: 2017 Aerial Imagery, Charleston County



- Modeled Receptors (No Impact)
- Modeled Receptors (Approaches or Exceeds NAC)
- Noise Study Area

Palmetto Commerce
Interchange
Figure 4.7.4
No-Build
Modeled Receptor Impacts

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Figure 4.7.4 – No-Build Modeled Receptor Locations



Source: 2017 Aerial Imagery, Charleston County

	<ul style="list-style-type: none"> ● Modeled Receptors (No Impact) ● Modeled Receptors (Approaches or Exceeds NAC) ▭ Noise Study Area 	<p>Palmetto Commerce Interchange Figure 4.7.5 Build Modeled Receptor Impacts</p>

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Figure 4.7.5 – Build Modeled Receptor Locations

4.7.5 Consideration of Abatement

Since there are receivers that would be impacted by the noise from the 2040 Design Year Build Alternative 8, abatement measures were considered for the proposed project. When considering noise abatement measures, primary consideration shall be given to exterior areas where frequent human use occurs. Since South Carolina is not part of the FHWA-approved Quiet Pavement Pilot Program, the use of quieter pavements was not considered as an abatement measure for the proposed project. In addition, the planting of vegetation or landscaping was not considered as a potential abatement measure since it is not an acceptable Federal-aid noise abatement measure due to the fact that only dense stands of evergreen vegetation planted 100 feet deep will reduce noise levels. In accordance with 23 CFR §772.13(c), the following measures were considered and evaluated as a means to reduce or eliminate the traffic noise impacts:

- A. Acquisition of Right-of-Way - The acquisition of rights-of-way to mitigate the noise levels at the affected site would result in disruptive relocations.
- B. Traffic Management - Measures such as exclusive lane designations and signing for prohibition of certain vehicle type would prevent the project from serving its intended purpose, such as moving people, goods and services.
- C. Alteration of Horizontal and Vertical Alignments - Alignment modifications as a means of noise abatement would result in disruptive relocations for this project and would not be cost effective.
- D. Acquisition of real property or interests therein (predominately unimproved property) to serve as a buffer zone to preempt development - Adequate property is not available to create an effective buffer zone between the proposed roadway and the impacted receivers.
- E. Noise Barriers - Among the most common noise barriers are earthen berms and freestanding walls. The optimum situation for the use of free-standing noise barriers is when a dense concentration of impacted receivers lies directly adjacent to and parallel with the highway right-of-way. In these instances, one barrier can protect many people at a relatively low cost per impacted site.

When considering abatement, the SCDOT Noise Policy Guidelines state that noise abatement measures must be both feasible and reasonable. The feasibility and reasonableness of a noise barrier is determined by the following factors for Feasibility and Reasonableness.

1. Feasibility:

There are two mandatory feasibility factors that must be met for a noise abatement measure to be considered reasonable. The two mandatory factors must collectively be achieved in order for a noise abatement measure to be deemed reasonable. Failure to achieve any one of the factors will result in the noise abatement measure being deemed not feasible.

a. Acoustic Feasibility - It is SCDOT's policy that a noise reduction of at least 5 dBA must be achieved for at least 75 percent of impacted receivers for the noise abatement measure to be acoustically feasible. If this goal is not met, then abatement is determined not to be feasible and no further analysis is required.

b. Engineering Feasibility - Feasibility also includes engineering considerations. The ability to achieve noise reduction may be limited by engineering considerations such as the topographical features of the area,

safety, drainage, utilities, maintenance and access. In addition, due to constructability constraints, the height of the noise abatement measure cannot exceed 25 feet.

2. Reasonableness:

There are three mandatory reasonable factors that must be met for a noise abatement measure to be considered reasonable. The three mandatory reasonable factors must collectively be achieved in order for a noise abatement measure to be deemed reasonable. Failure to achieve any one of the reasonable factors will result in the noise abatement measure being deemed not reasonable.

a. Noise Reduction Design Goal - It is SCDOT's policy that a noise reduction of at least 8 dBA must be achieved for 80% of those receivers determined to be in the first two building rows and considered benefited. Please note that the first two building rows will only be applicable if they are within 500 feet from the edge of pavement noise source. If the design goal is not met, then abatement is determined not to be reasonable and no further analysis is required.

b. Cost Effectiveness - The allowable cost of the abatement will be based on \$35.00 per square foot. This allowable cost is based on actual construction costs on recent SCDOT projects. This construction cost will be divided by the number of benefited receivers. If the cost per benefited receiver is less than \$30,000 then the barrier is determined to be cost effective.

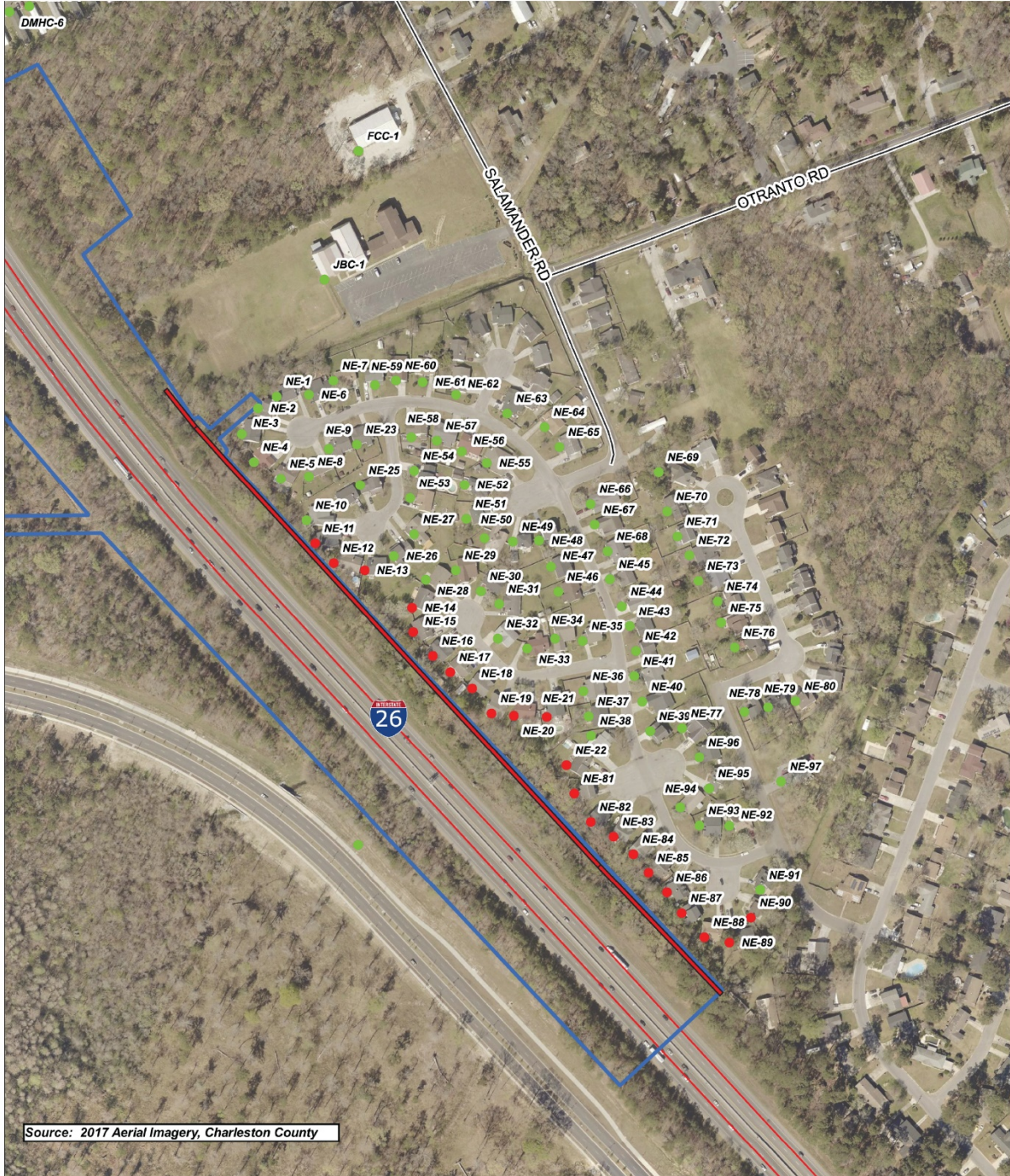
c. Viewpoints of the Property Owners and Residents of the Benefited Receivers – If the noise reduction design goal and cost-effective criteria are met, SCDOT shall solicit the viewpoints of all of the benefited receivers and document a decision on either desiring or not desiring the noise abatement measure. The viewpoints will be solicited as part of the public involvement process through a voting procedure if a barrier is proposed. The voting ballot will explain that the noise abatement shall be constructed unless a majority (greater than 50% of the benefited receivers) of votes not desiring noise abatement is received. For non-owner-occupied benefited receivers, both the property owner and the renter may vote on whether the noise abatement is desired.

4.7.6 Barrier Analysis

Based on the noise impact results of the Build scenario under the SCDOT policy, the areas that would warrant evaluation for a noise barrier was modeled. As indicated above a review to determine if barriers would be considered reasonable or feasible was performed. Table 4.7.6 includes a summary of the barrier evaluations and the SCDOT Feasible and Reasonable Worksheets are located in Appendix D. Overall, as a result of the mitigation analysis, there were no feasible and reasonable solutions to mitigate for the predicted noise impacts according to the SCDOT Traffic Noise Abatement Policy. Therefore, there are no noise barriers proposed to be carried forward to the construction phase.

Table 4.7.6 – Barrier Evaluation Summary

Table 5: Barrier Evaluation Summary								
Barrier	Receiver Number	Acoustically Feasible? (Y/N)	Engineering Feasibility? (Y/N)	Overall Feasible ? (Y/N)	Meets Noise Reduction Goal? (Y/N)	Is Barrier Cost Effective? (Y/N)	Overall Reasonable? (Y/N)	Conclusion
B1	DOE 1 - DOE 6	Y	Y	Y	Y	N	N	Feasible, but not reasonable
B2	EBE 1 – EBE 4	Y	Y	Y	N	--	N	Feasible, but not reasonable
B3	NE 1 – NE 101	Y	Y	Y	Y	N	N	Feasible, but not reasonable



Source: 2017 Aerial Imagery, Charleston County

	Barrier Wall-B3	<p>Palmetto Commerce Interchange Figure 4.7.6 Northwoods Estate Barrier Wall Evaluation</p>
	Modeled Receptors (No Impact) Modeled Receptors (Approaches or Exceeds NAC) Noise Study Area	

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Figure 4.7.6 – Northwoods Estate Barrier Wall Evaluation



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	Barrier Wall-B2	
	Modeled Receptors (No Impact)	
	Modeled Receptors (Approaches or Exceeds NAC)	
	Noise Study Area	

Figure 4.7.6a – Edbillellis Barrier Wall Evaluation



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	Barrier Wall-B1	
	Modeled Receptors (No Impact)	
	Modeled Receptors (Approaches or Exceeds NAC)	
	Noise Study Area	

Figure 4.7.6b – Doe Drive Barrier Wall Evaluation

4.7.7 Conclusion

The noise evaluation for the PCI preferred alternative looked at potential receivers located in the adjacent residential neighborhoods surrounding the interchange roadways. One hundred forty-six (146) receivers were modeled in the TNM program using the 2040 forecasted traffic volumes provided for the existing and no-build scenarios. These included four (4) receivers located at the end of Edbillellis Road, thirty-six (36) receivers located within the Deerhaven Manufactured Housing Community (DMHC), ninety-seven (97) receivers located in the Northwoods Estates residential area, six (6) along Doe Drive and three (3) places of worship: Journey Baptist Church, the Filipino Community Center, and Rise Above Ministries.

Overall, there were twenty-six (26) receivers that would have noise levels that approach or exceed the NAC criteria for its respective land use for the 2040 Design Year Build Alternative 8 condition. As a result, mitigation analysis was warranted according to the SCDOT Traffic Noise Abatement Policy, however, none of the barrier analyses results met both the feasible and reasonable criteria as per the SCDOT Traffic Noise Abatement Policy.

The noise impact technical report has been incorporated into this document by reference, and can be found in Appendix D. In accordance with 23 CFR 772.15, in an effort to prevent future noise impacts on currently undeveloped lands, a copy of the noise impact analysis report will be provided to the Charleston County Planning Commission and the city of North Charleston. This report will provide the local officials with:

- a. The best estimation of future noise levels (for various distances from the proposed project for both developed and undeveloped lands, and properties in the immediate vicinity of the project.
- b. information that may be useful to the local community to protect future land development from becoming incompatible with anticipated highway noise levels, and
- c. Eligibility for Federal-aid participation for Type II projects as described in 23 CFR 772.13(b).

4.8 Air Quality

4.8.1 Affected Environment

The National Ambient Air Quality Standards (NAAQS) were established by the U.S. Environmental Protection Agency (USEPA) under the Clean Air Act (CAA), as amended, to protect public health, the environment, and quality of life from detrimental effects of air pollution. The South Carolina Department of Health and Environmental Control (SCDHEC) is responsible for regulating and ensuring compliance with the CAA in South Carolina.

The NAAQS have been established for the following criteria pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO₂), ozone (O₃), particulate matter (PM₁₀ and PM_{2.5}), and sulfur dioxide (SO₂). NAAQS primary standards have been established to protect human health, with secondary standards established to protect human welfare.

Presently, Charleston County meets all air quality standards for automobile related pollutants and is in compliance with all of the NAAQS.

Mobile Source Air Toxics

In addition to the criteria air pollutants for which there are federal NAAQS, the USEPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories or refineries).

Background

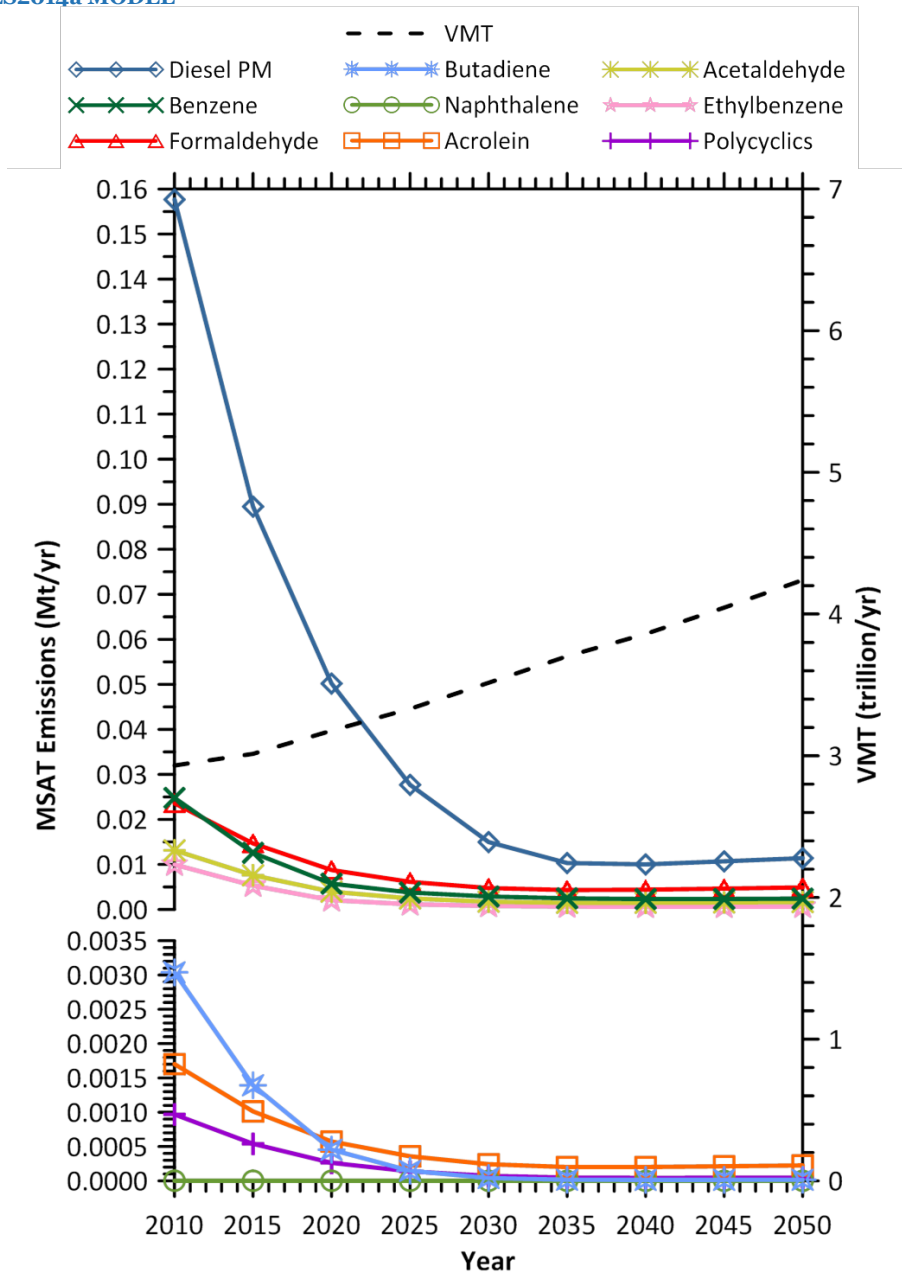
Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that the U.S. Environmental Protection Agency (EPA) regulate 188 air toxics, also known as hazardous air pollutants. The EPA assessed this expansive list in its rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007), and identified a group of 93 compounds emitted from mobile sources that are part of EPA's [Integrated Risk Information System](#) (IRIS).ⁱ In addition, EPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers or contributors and non-cancer hazard contributors from the [2011 National Air Toxics Assessment](#) (NATA).ⁱⁱ These are *1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter*. While FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules.

Motor Vehicle Emissions Simulator (MOVES)

According to EPA, MOVES2014 is a major revision to MOVES2010 and improves upon it in many respects. MOVES2014 includes new data, new emissions standards, and new functional improvements and features. It incorporates substantial new data for emissions, fleet, and activity developed since the release of MOVES2010. These new emissions data are for light- and heavy-duty vehicles, exhaust and evaporative emissions, and fuel effects. MOVES2014 also adds updated vehicle sales, population, age distribution, and vehicle miles travelled (VMT) data. MOVES2014 incorporates the effects of three new Federal emissions standard rules not included in MOVES2010. These new standards are all expected to impact MSAT emissions and include Tier 3 emissions and fuel standards starting in 2017 (79 FR 60344), heavy-duty greenhouse gas regulations that phase in during model years 2014-2018 (79 FR 60344), and the second phase of light duty greenhouse gas regulations that phase in during model years 2017-2025 (79 FR 60344). Since the release of MOVES2014, EPA has released MOVES2014a. In the November 2015 [MOVES2014a Questions and Answers Guide](#),ⁱⁱⁱ EPA states that for on-road emissions, MOVES2014a adds new options requested by users for the input of local VMT, includes minor updates to the default fuel tables, and corrects an error in MOVES2014 brake wear emissions. The change in brake wear emissions results in small decreases in PM emissions, while emissions for other criteria pollutants remain essentially the same as MOVES2014.

Using EPA's MOVES2014a model, as shown in Figure 4.8.2, FHWA estimates that even if VMT increases by 45 percent from 2010 to 2050 as forecast, a combined reduction of 91 percent in the total annual emissions for the priority MSAT is projected for the same time period.

Figure 4.8.2
FHWA PROJECTED NATIONAL MSAT EMISSION TRENDS 2010 – 2050
FOR VEHICLES OPERATING ON ROADWAYS
USING EPA'S MOVES2014a MODEL



Note: Trends for specific locations may be different, depending on locally derived information representing vehicle-miles travelled, vehicle speeds, vehicle mix, fuels, emission control programs, meteorology, and other factors

Source: EPA MOVES2014a model runs conducted by FHWA, September 2016.

Diesel PM is the dominant component of MSAT emissions, making up 50 to 70 percent of all priority MSAT pollutants by mass, depending on calendar year. Users of MOVES2014a will notice some differences in emissions compared with MOVES2010b. MOVES2014a is based on updated data on some emissions and pollutant processes

compared to MOVES2010b, and also reflects the latest Federal emissions standards in place at the time of its release. In addition, MOVES2014a emissions forecasts are based on lower VMT projections than MOVES2010b, consistent with recent trends suggesting reduced nationwide VMT growth compared to historical trends.

MSAT Research

Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. These limitations impede the ability to evaluate how potential public health risks posed by MSAT exposure should be factored into project-level decision-making within the context of NEPA.

Nonetheless, air toxics concerns continue to arise on highway projects during the NEPA process. Even as the science emerges, the public and other agencies expect FHWA to address MSAT impacts in its environmental documents. The FHWA, EPA, the Health Effects Institute, and others have funded and conducted research studies to try to more clearly define potential risks from MSAT emissions associated with highway projects. The FHWA will continue to monitor the developing research in this field.

NEPA Context

The NEPA process requires, to the fullest extent possible, that the policies, regulations, and laws of the Federal Government be interpreted and administered in accordance with its environmental protection goals, and that Federal agencies use an interdisciplinary approach in planning and decision-making for any action that adversely impacts the environment (42 U.S.C. 4332). In addition to evaluating the potential environmental effects, FHWA must also take into account the need for safe and efficient transportation in reaching a decision that is in the best overall public interest (23 U.S.C. 109(h)). The FHWA policies and procedures for implementing NEPA are contained in regulation at 23 CFR Part 771.

4.8.2 Environmental Consequences

No-Build Alternative

Since the study area is located within an attainment area, the No-Build Alternative is not expected to affect air quality.

Preferred Alternative

In accordance with the CAA, all portions of South Carolina are designated as in attainment, non-attainment, or unclassifiable for meeting NAAQS standards. An area with air quality that is better than NAAQS standards is considered to be in attainment, while an area with air quality that is worse than NAAQS standards is designated as being in non-attainment. If there is a lack of information for determining an attainment status, the area is designated as unclassifiable. Each state determines which areas within its boundaries are designated to be in attainment or non-attainment and must develop a State Implementation Plan to ensure that areas achieve and/or maintain attainment status for NAAQS standards.

The study area is located in Charleston County, which is currently in attainment for all NAAQS criteria pollutants.⁴⁰ Therefore, since the proposed project is located within an attainment area, then a general conformity analysis is not required by the CAA and there are no air quality impacts anticipated from the construction of this project.

Mobile Source Air Toxics

A qualitative analysis provides a basis for identifying and comparing the potential differences among MSAT emissions, if any, from the various alternatives. The qualitative assessment presented below is derived in part from a study conducted by FHWA entitled *A Methodology for Evaluating Mobile Source Air Toxic Emissions among Transportation Project Alternatives*.^{iv}

For each alternative in this EA, the amount of mobile source air toxics (MSAT) emitted would be proportional to the vehicle miles traveled, or VMT, assuming that other variables such as fleet mix are the same for each alternative. Because the VMT estimated for the No Build Alternative is essentially the same as for any of the Build Alternatives, higher levels of MSAT are not expected from any of the Build Alternatives compared to the No Build. In addition, because the estimated VMT under each of the Build Alternatives are nearly the same it is expected there would be no appreciable difference in overall MSAT emissions among the various alternatives. Also, regardless of the alternative chosen, emissions will likely be lower than present levels in the design year as a result of the Environmental Protection Agency's (EPA) national control programs that are projected to reduce annual MSAT emissions by over 90 percent from 2010 to 2050 (Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents, Federal Highway Administration, October 12, 2016). Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in virtually all locations.

Under each alternative there may be localized areas where VMT would increase, and other areas where VMT would decrease. Therefore, it is possible that localized increases and decreases in MSAT emissions may occur.

In sum, under all Build Alternatives in the design year it is expected there would be reduced MSAT emissions in the immediate area of the project, relative to the No Build Alternative, due to the slight reduction in VMT associated with more direct routing, and due to EPA's MSAT reduction programs.

Incomplete or Unavailable Information for Project-Specific MSAT Health Impacts Analysis

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in mobile source air toxic (MSAT) emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The Environmental Protection Agency (EPA) is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System (IRIS), which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects"

(EPA, <https://www.epa.gov/iris>). Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). A number of HEI studies are summarized in Appendix D of FHWA's Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents. Among the adverse health effects linked to MSAT compounds at high exposures are: cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations (HEI Special Report 16, <https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-review-literature-exposure-and-health-effects>) or in the future as vehicle emissions substantially decrease.

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts – each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupported assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways; to determine the portion of time that people are actually exposed at a specific location; and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI (Special Report 16, <https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-review-literature-exposure-and-health-effects>). As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. The EPA states that with respect to diesel engine exhaust, “[t]he absence of adequate data to develop a sufficiently confident dose-response relationship from the epidemiologic studies has prevented the estimation of inhalation carcinogenic risk (EPA IRIS database, Diesel Engine Exhaust, Section II.C. https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0642.htm#quainhal).”

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the Clean Air Act to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires EPA to determine an “acceptable” level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual

risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA's approach to addressing risk in its two-step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable ([https://www.cadc.uscourts.gov/internet/opinions.nsf/284E23FFE079CD59852578000050C9DA/\\$file/07-1053-1120274.pdf](https://www.cadc.uscourts.gov/internet/opinions.nsf/284E23FFE079CD59852578000050C9DA/$file/07-1053-1120274.pdf)).

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

Construction Impacts

Temporary air quality impacts could occur during construction but should be minor and short term. These impacts could be in the form of emissions from construction equipment and dust from construction activities. To minimize these potential impacts, construction equipment would be maintained in satisfactory condition to meet minimum exhaust emission standards. In accordance with Section 107.7 of the South Carolina Highway Department Standard Specifications for Highway Construction, the contractor would comply with South Carolina Air Pollution Control Laws, Regulations and Standards. The contractor would also comply with county and other local air pollution regulations. Contractors would be required to comply with all regulations and standards for construction outlined in the South Carolina Standard specifications for Highway Construction to reduce dust. Typically, BMPs include vegetative cover, mulch, spray-on adhesive, calcium chloride application, water sprinkling, stone, tillage, wind barriers, and construction of a temporary graveled entrance/exit to the construction site.

4.9 Hazardous Materials

4.9.1 Affected Environment

Hazardous materials are generally defined as any material that has or will have, alone or when combined with other materials, a harmful effect on humans or the natural environment. They may be characterized as reactive, toxic, infectious, flammable, explosive, corrosive, or radioactive and can be in the form of a solid, sludge, liquid, or gas. Hazardous materials and waste sites are regulated primarily by the Resource Conservation and Recovery Act of 1976 (RCRA), as amended; the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA); and the Superfund Amendments and Reauthorization Act of 1986 (SARA).

4.9.2 Environmental Consequences

No-Build Alternative

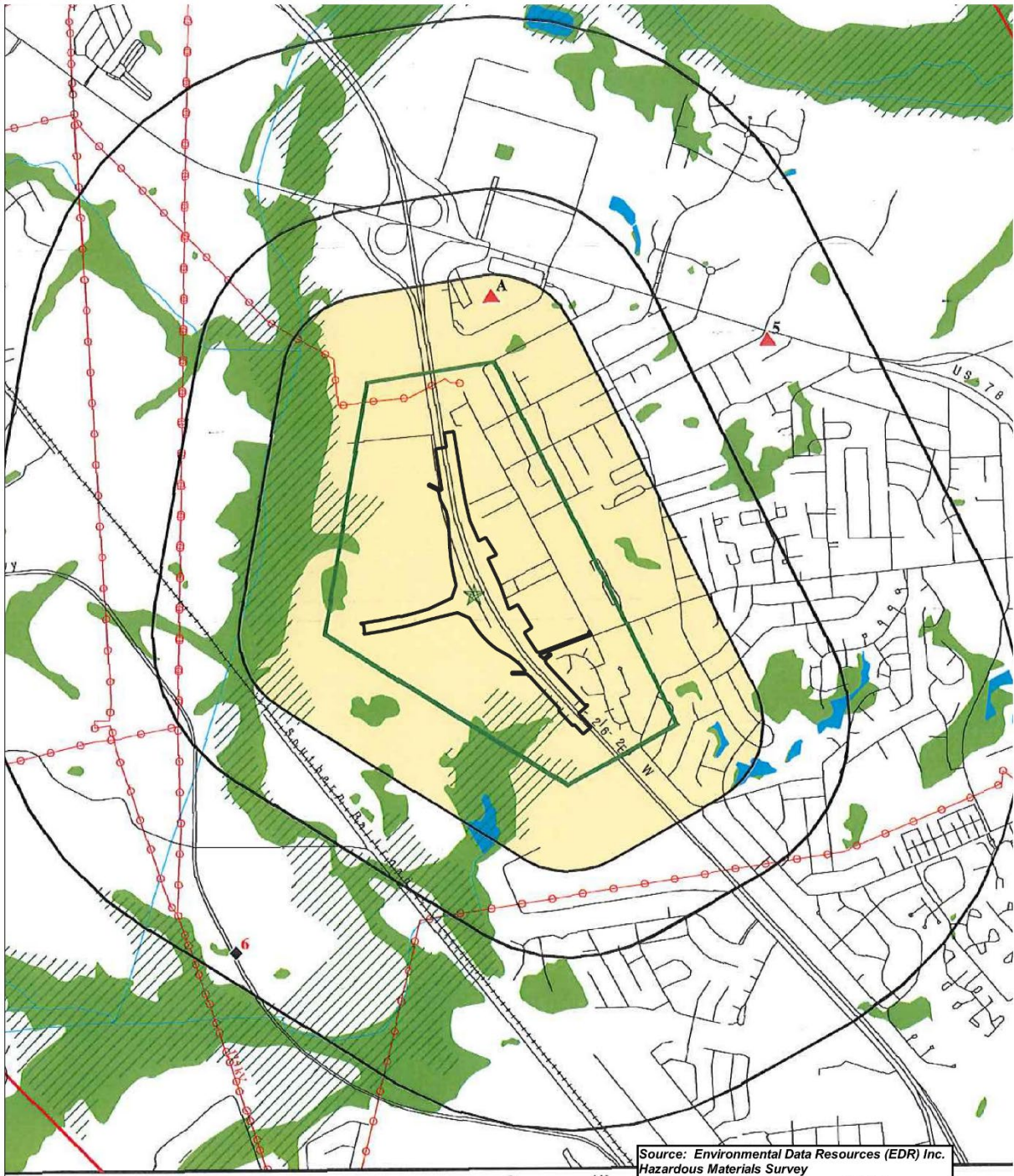
The No-Build Alternative would not affect any existing hazardous materials or waste sites.

Preferred Alternative

A Hazardous Materials Survey was completed for the preferred alternative and included an EDR Radius Map™ (provided by Environmental Data Resources, Inc. (EDR)) of the study area. The map (shown in Figure 4.9.1) included the search of federal, state and local databases for regulated sites and/or sites of environmental concern. The ASTM International's Standards for Environmental Site Assessment's appropriate search distances were used for the various database searches^{vii}. Site visits of properties accessible during the study were conducted including interviews of government officials. A historical search of aerial photographs, USGS topographic maps, and documents were also conducted to assist in identifying parcels that may be of environmental concern due to past uses.

This survey revealed a total of one plotted site within ¼-mile of the preferred alternative study area. Other plotted sites were located more than ¾-miles from study area. There were no UST sites located directly within the study area. The plotted site was the Trident Medical Center (UST ID# 01666) located at 9330 Medical Plaza Drive about 0.2 miles north of the study area. The site had three USTs removed from the ground (two in 1986 and one in 2000). The site has one UST currently in use and operating in compliance with SCDHEC regulations. Based on the location and being at a lower elevation relative to the subject site, this facility was not considered as a potential recognized environmental condition.

Since there are no known sites in the study area, the preferred alternative would not have an impact on Hazardous Materials. If unknown Hazardous Materials are identified during construction, and avoidance of those materials is not a viable alternative, the South Carolina Department of Health and Environmental Control (SCDHEC) will be informed. Hazardous materials will be tested and removed and/or treated in accordance with the United States Environmental Protection Agency and the SCDHEC requirements, if necessary. A copy of the Hazardous Materials Survey has been incorporated into this document by reference, and can be found in Appendix E.



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	Legend PCI Project Boundary		Target Property Sites at elevations higher than or equal to the target property Sites at elevations lower than the target property Manufactured Gas Plants National Priority List Sites Dept. Defense Sites	Indian Reservations BIA County Boundary Power transmission lines 100-year flood zone 500-year flood zone National Wetland Inventory State Wetlands	<p style="text-align: center;">Palmetto Commerce Interchange Figure 4.9.1 Hazardous Materials Map</p>

Figure 4.9.1 – Hazardous Materials Map

4.10 Water Quality

4.10.1 Affected Environment

Potential impacts to water quality have been evaluated with respect to potential impacts in the following areas: groundwater, surface water, and drinking water shown in Figure 4.10.1.

Groundwater

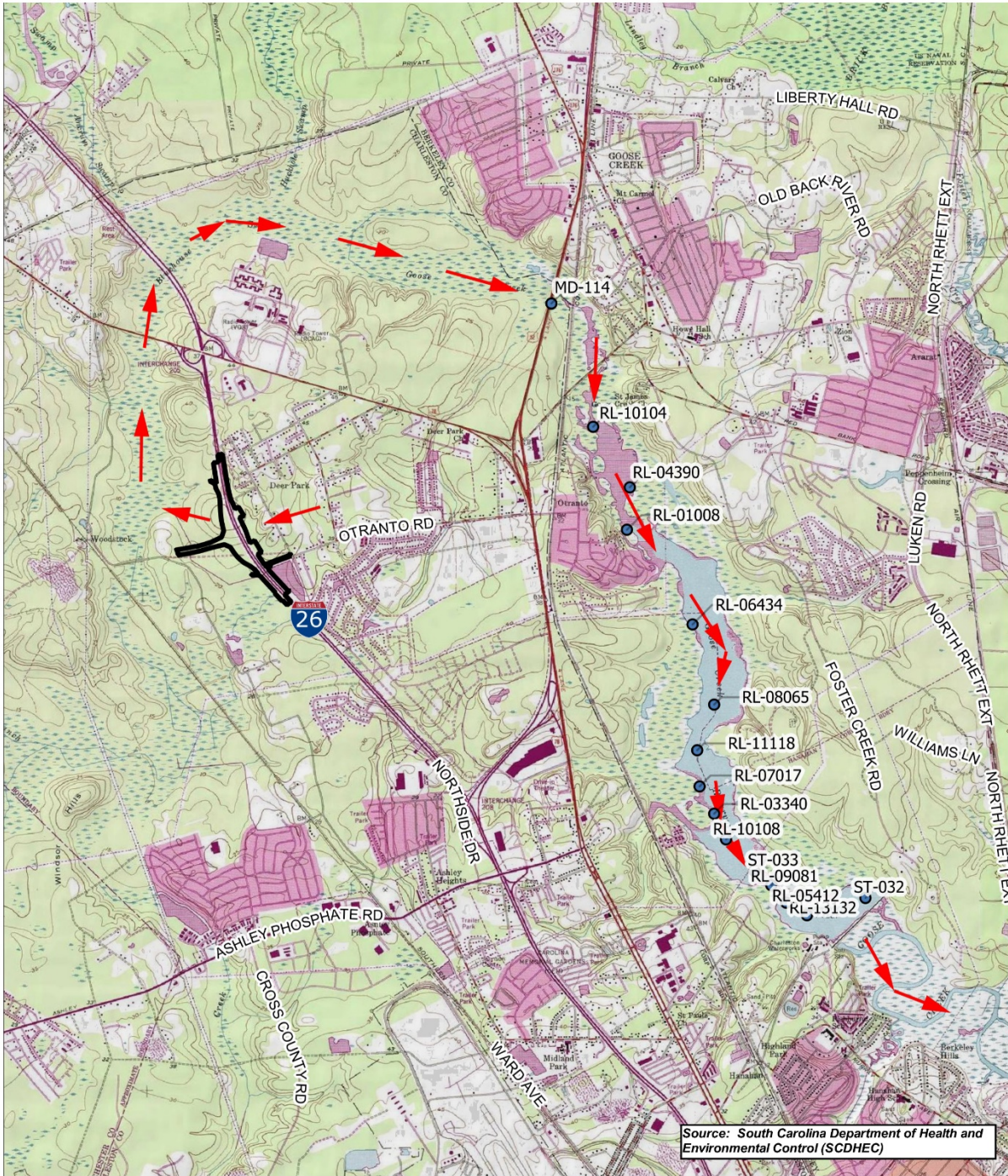
The study area is situated in the Lower Coastal Plain above the Southeastern Coastal Plain Aquifer System, which is comprised of seven regional aquifers and four major confining layers. The regional aquifers in descending order are the Surficial Aquifer, the Tertiary Sand/Limestone Aquifer, the Black Mingo Aquifer, the Pee Dee Aquifer, the Black Creek Aquifer, the Middendorf Aquifer, and the Cape Fear Aquifer.⁵⁸ With the exception of the Cape Fear Aquifer, all of these aquifers are used to some extent in South Carolina. The most widely used aquifers in the Lower Coastal Plain are the Middendorf, Surficial, Black Mingo, and Tertiary Sand/Limestone Aquifers.⁵⁹ SCDHEC has established an ambient groundwater quality monitoring network to determine statewide and aquifer-specific baseline values for groundwater quality within each of the regional aquifers in South Carolina.⁸⁷ Each year, a selection of wells from a specific area is sampled on a five-year rotation. No SCDHEC monitoring wells are located within the study area. AMB-025 is the closest groundwater quality monitoring well and is located approximately 8.52 miles of the study area.⁵³

Surface Water

As noted previously, storm water from the project study area would eventually flow past SCDHEC water quality monitoring station MD-114 in the Goose Creek Reservoir. Station MD-114 has been listed on SCDHEC's 2016 303(d) List as impaired for aquatic life due to low levels of dissolved oxygen.

Drinking Water

Drinking water is supplied to the study area by the Charleston Water System (CWS), which relies on surface water from the Back River and no ground water is used for its water supply.



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	<p>Legend</p> <ul style="list-style-type: none"> Monitoring Station Flow Line PCI Project Area 	<p>Palmetto Commerce Interchange Figure 4.10.1 Water Quality Monitoring Stations</p>
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Figure 4.10.1 – Water Quality Monitoring Stations

4.10.2 Environmental Consequences

No-Build Alternative

The No-Build Alternative would have no effect on water quality in the study area.

Preferred Alternative

Groundwater

It is not likely that the preferred alternative would impact groundwater resources in the Study area. Most of the groundwater aquifers, with the exception of the Surficial Aquifer, are located in confined units deep below the earth's surface. The Surficial Aquifer could be impacted during construction due to its proximity to the earth's surface, its variability in depth, and because it is an unconfined unit. The Surficial Aquifer could be exposed during the grading activities for the newly paved areas of the preferred alternative, leading to pollutants entering the aquifer. Soluble materials such as petroleum products could be leaked or spilled during construction and subsequently enter into exposed areas of the Surficial Aquifer, and cause contamination. However, Best Management Practices (BMPs) would be in place during construction, which would include an SPCC Plan to manage spills and leaks of soluble materials so as to limit potential impacts.

Surface Water

The proposed project has the potential to contribute to increased storm water runoff related to increased impervious area and pollutants from vehicle operations on the highway. SCDOT stormwater BMPs would be utilized as necessary to minimize any water quality impacts to the adjacent waterbodies. Where possible, grassed swales, detention areas and/or engineered treatment systems would be implemented to address water quality concerns. The design of the preferred alternative would include a stormwater retention pond which would retain sediment during construction and detain the additional runoff created when adding impervious surface areas. The contractor would be required to minimize this impact through implementation of construction BMP's, reflecting policies contained in 23 CFR 650 B and SCDOT's Supplemental Specifications on Seeding and Erosion Control Measures (July 2017).

Drinking Water

Drinking water is supplied to the study area by the Charleston Water System (CWS), which relies on surface water from the Back River and no ground water is used for its water supply. The preferred alternative would involve work within tributaries to Blue House Swamp and the Goose Creek Reservoir and would not affect private wells or the drinking water supply.

4.11 Floodplains

4.11.1 Affected Environment

Executive Order 11988, Floodplain Management, requires that efforts be made by federal agencies to avoid, to the extent possible, the long and short-term adverse impacts associated with the occupancy and modification of floodplains. When there is a practicable alternative, federal agencies are required to avoid direct or indirect support of floodplain development. In addition, this Executive Order prohibits floodplain encroachments that are uneconomic, hazardous, or would result in incompatible development of the floodplain. The Executive Order also

prohibits any action that would cause a critical interruption of an emergency transportation facility, a substantial flood risk, or an adverse impact on the floodplain's natural resource values.

The 100-year floodplain boundary designed as Zone AE delineates the flood elevation that has a one percent chance of being equaled or exceeded each year. The floodway is the “channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.”¹¹⁰ Encroachments into the floodplain are discouraged, since it removes floodwater storage capacity. If impacts cannot be avoided, measures must be implemented to minimize impacts and restore the floodplain to the extent possible.¹¹¹ Federal regulations will allow development in the 100-year floodplain or the floodway if it is demonstrated through hydrologic and hydraulic analysis that the development would meet the requirements set forth by the Federal Emergency Management Agency (FEMA). Encroachment into the floodway is prohibited unless it has been demonstrated that no rise in flood levels would result.¹¹²

4.11.2 Environmental Consequences

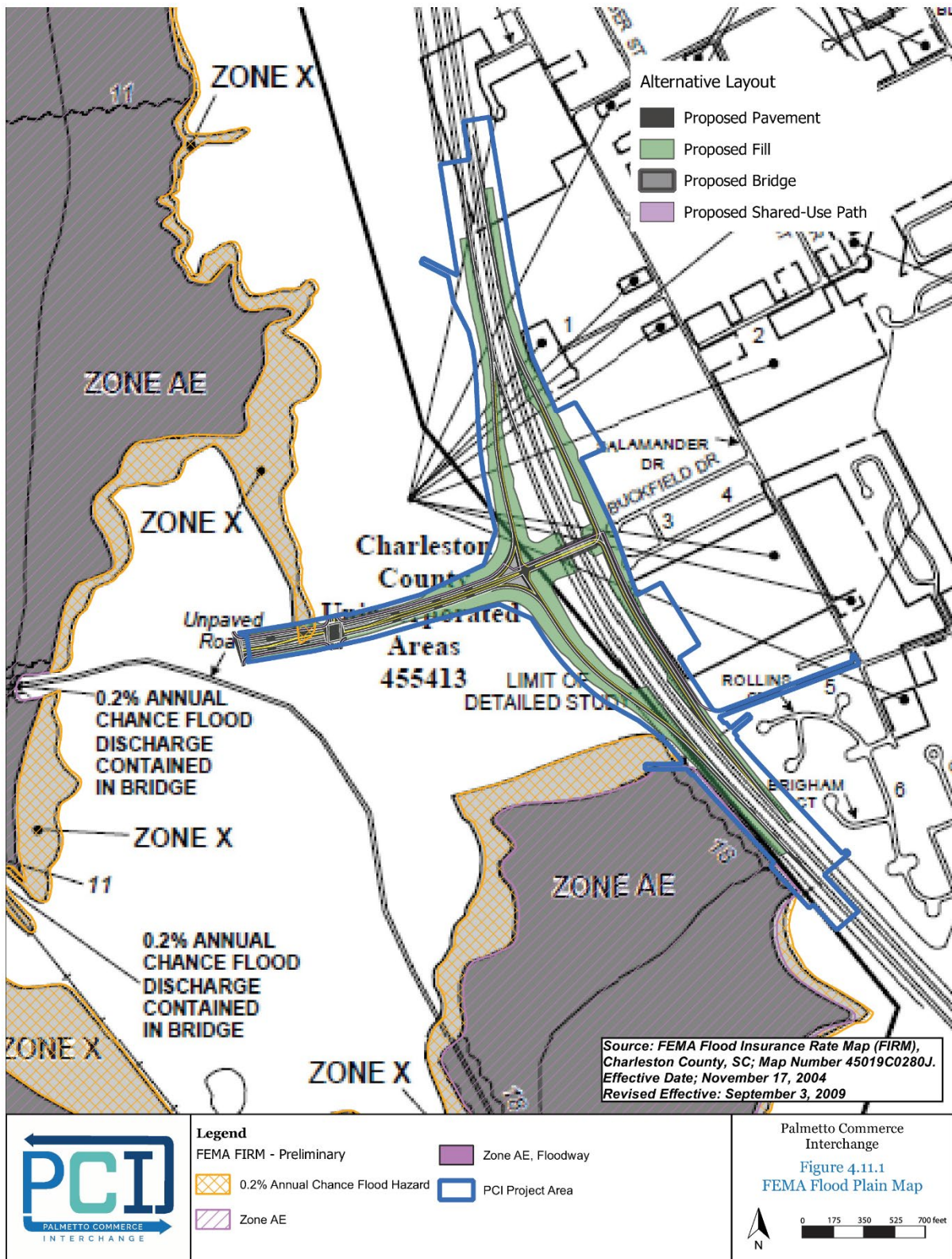
No-Build Alternative

The No-Build Alternative would have no effect on the 100-year floodplain.

Preferred Alternative

The 100-year flood plan data for the study area was obtained from FEMA Flood Insurance Rate Maps (FIRMs) and is illustrated on Figure 4.11.1. Zone X are the limits of the base flood and the 0.2 percent annual chance (or 500-year) flood. As illustrated in the figure, 100-year floodplains exist within the study area adjacent to I-26. Although portions of the 100-year floodplain exist within the proposed right-of-way, the anticipated fill limits for the preferred alternative are also shown and are not expected to encroach into the 100-year floodplain and therefore would not be a significant or longitudinal encroachment as defined under 23 CFR 650A or have an appreciable environmental impact on this base floodplain.

Coordination with FEMA would occur during future project phases, if required. The proposed project should be able to achieve a No Rise certification (no rise in flood levels resulting from the project) and detailed hydrologic studies would be completed during future design phases of the project, as required by 23 CFR 650, Subpart A. The South Carolina Department of Transportation Location and Hydraulic Design of Encroachments on Floodplains Checklist has been completed and is included in Appendix J. Coordination with the local delegated flood administrator to ensure that the project would meet state and federal requirements will occur.



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Figure 4.11.1 – FEMA Flood Plain Map

4.12 Jurisdictional Waters of the U.S. (Wetlands, Open Waters, & Streams)

4.12.1 Affected Environment

Wetlands, as currently defined by the United States Army Corps of Engineers (USACE, 33 CFR §328.3[b]) and USEPA (40 CFR §230.3[t]) are “Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands typically include swamps, marshes, bogs, and similar areas.”⁵⁷ The USACE, through Section 404 of the CWA, has regulatory authority over waters of the United States, including wetlands. This authority empowers the USACE to identify wetland/upland boundaries and to regulate alterations of jurisdictional wetlands. These boundaries are established in accordance with the methodology in the 1987 Corps of Engineers Wetlands Delineation Manual,⁵⁸ and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0).⁵⁶ An area must exhibit evidence of three criteria to be considered a wetland:

1. Predominance of hydrophytic vegetation-species of plants that are recognized as being adapted to survive in areas with frequently saturated or inundated soils;
2. Presence of hydric soils-soils that exhibit characteristics that develop under conditions of frequent saturation or inundation; and,
3. Wetland hydrology-as evidenced by observation of numerous hydrologic indicators such as standing water, presence of algal mats, water marks on trees, water stained leaves, etc.

Wetlands are specifically protected by law because of the functions and values they provide with respect to:

- Hydrology (e.g., flood control, groundwater recharge and discharge, and dissipation of erosive forces);
- Water quality (e.g., removal of sediments, toxins, and nutrients);
- Food chain support and nutrient cycling (e.g., primary production and nutrient export/utilization);
- Wildlife habitat (e.g., breeding, rearing, and feeding grounds for fish and wildlife species); and
- Socioeconomics (e.g., recreational, educational, aesthetic, and consumptive uses).

Identification

The Study area for the preferred alternative overlaps the Weber Tract that received a jurisdictional determination for SAC-2015-1252-1JC. A wetland delineation was conducted during 2017 for the remainder of the study area. A Jurisdictional determination package has been submitted to the USACE and is included in Appendix C.

The undisturbed part of the preferred alternative Study area consists of a previously forested portion south of I-26 that has predominantly been harvested within the last several years and thinned to a pre-development stand with a low percentage of canopy coverage. The understory conditions consist of early successional woodlands with a high percentage of ground coverage between approximately 95 to 100 percent. The extreme southern portion of the project, the extension of Blue House Road and its intersection with Weber Boulevard, contains a limited amount of relatively forested wetlands and uplands. That area contains a well-developed canopy with an understory of moderate ground coverage. The Study area north and east of I-26 consists of a fringe of undeveloped woodlands, relatively mature mixed pine-hardwood uplands, fragmented mixed hardwood wetland drainage ways, and

flatwoods of common distribution throughout the lower coastal plain of South Carolina. A wetland area summary of the study area is found in Figure 4.12.1.

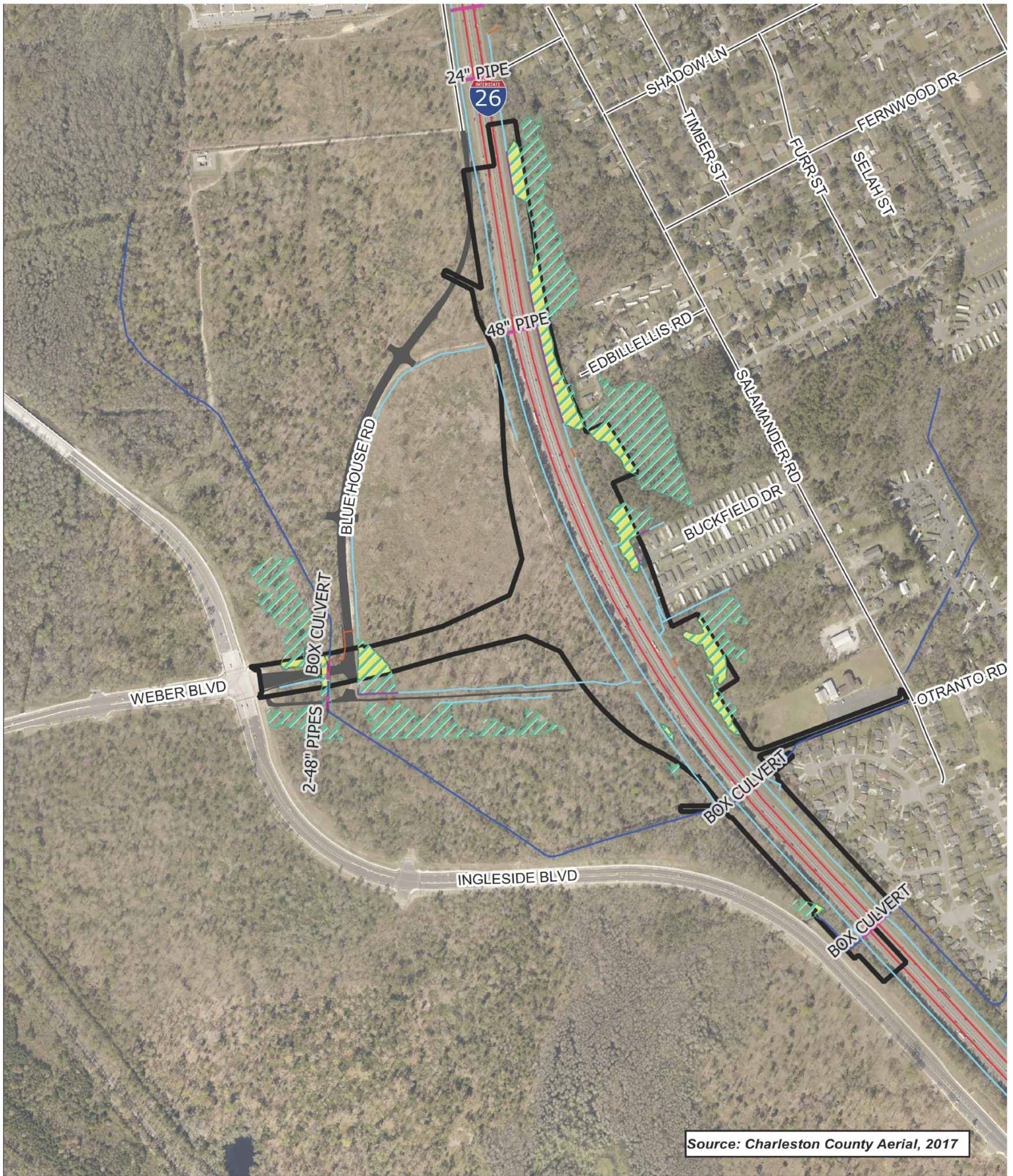
Waters of the United States

Wetlands and other waters of the United States identified within the study area were classified based on a modified Cowardin system. The Cowardin system, derived from Classification of Wetlands and Deepwater Habitats of the United States,⁵⁹ categorizes wetlands using hydrologic, geomorphologic, chemical, and biological factors. This system was modified by the United States Fish and Wildlife Service (USFWS) by grouping the 275 Cowardin wetland types into eighteen general categories based on vegetative composition. This modification was used to classify the wetland types within the study area and was then further refined with detailed descriptions of specific wetland types of South Carolina found in *The Natural Communities of South Carolina* by John B. Nelson.⁶⁰

Jurisdictional Tributaries

USACE has regulatory authority over streams as waters of the United States under Section 404 of the CWA. USACE will assert jurisdiction over traditional navigable waters (TNWs), which are described in 33 CFR§328(a)1 as, “all waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide.” USACE will also assert jurisdiction over non-navigable tributaries, where the waters flow directly, or indirectly into a TNW, and are a relatively permanent water (RPW, perennial) which has a continuous flow for at least three consecutive months.¹²⁶ Streams with a non-relatively permanent flow of water (NRPWs, intermittent), less than three continuous months, will be considered jurisdictional when they are found to exhibit a significant nexus with downstream TNWs.

In order to determine if a NRPW is a jurisdictional feature, a significant nexus analysis is required. A significant nexus analysis will “Assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of downstream traditional navigable waters.⁷⁵” The lateral extent of USACE jurisdiction of a drainage feature, in the absence of abutting wetlands, is based on the Ordinary High Water Mark (OHWM), as defined in 33 CFR§328.3(e), which states, “The term ordinary high water mark means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.⁷⁶” Drainage features that exhibited an OHWM were identified during the field investigations. Features within the study area that exhibited an OHWM are considered to be jurisdictional waters of the United States and are also included on Figure 4.12.1. The flow regime of each feature (RPW or NRPW) was also noted during the field investigation. Streams present in the study area have been previously disturbed, primarily via channelization. Named streams within or adjacent to the study area include the McChune Branch, Blue House Swamp and Goose Creek Reservoir.



Source: Charleston County Aerial, 2017

	Legend		
	<ul style="list-style-type: none"> — Major Culverts — Survey Culverts — Potential JD Ditch — Potential JD Perennial 	<ul style="list-style-type: none"> — Potential Non-JD Ditch Wetland Areas Wetland Areas in Project ROW PCI Project Area 	<ul style="list-style-type: none"> Blue House Road Parcel Lines
<p>Palmetto Commerce Interchange</p> <p>Figure 4.12.1</p> <p>Wetland Areas Map</p>			

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Figure 4.12.1 – Wetland Areas Map

4.12.2 Environmental Consequences

No-Build Alternative

The No-Build Alternative would have no effect on wetlands within the Study area.

Preferred Alternative

Impacts

In accordance with Executive Order 11990, potential impacts to wetlands and waters of the United States were quantified and avoidance and minimization measures implemented. Potential impacts were calculated for each of the 3 alternatives based on a pending Jurisdictional Determination. The preferred alternative would impact approximately 4.04 acres of wetlands and approximately 1,468 LF of streams and potentially jurisdictional ditches. Impacts would occur from roadway fill, clearing, excavation, culvert and bridge construction, rip-rap placement, and placement/access for geotechnical reinforcement along roadway shoulder. These impacts would be offset by providing wetland mitigation.

Permits

Both state and federal regulatory agencies would require environmental permits or certifications prior to construction of the preferred alternative. The proposed project would require a USACE Section 404 Individual Permit. Additionally, SCDHEC-Ocean and Coastal Resource Management (OCRM) would be required to issue a Coastal Zone Consistency (CZC) and 401 Water Quality Certification (WQC) prior to the USACE permit issuance. An objective of the CWA is “to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.” Toward achievement of this goal, the CWA prohibits the discharge of dredged or fill material into wetlands, streams, and other waters of the United States unless a permit issued by USACE or under CWA Section 404 authorizes such a discharge.

Avoidance

When considering the avoidance of wetlands and waters of the US, the design team worked diligently to comply with Executive Order (EO) 11990 – “Protection of wetlands.” EO 11990 requires federal agencies to strongly require and consider a range of alternatives that can accommodate new construction without impacts to wetlands unless there are no practicable alternatives to the impacts.^{viii} The Proposed Alternative includes roadway improvements and connections to the existing I-26 and local road network. Wetlands and other jurisdictional waters of the United States are located throughout the I-26 corridor and within the existing I-26 right-of-way making complete avoidance of impacts to area wetlands difficult. To meet the Purpose and Need of the project it was not achievable to totally avoid all wetland impacts with the preferred alternative.

The large wetland systems associated with McChune Branch and Blue House Swamp were identified as areas to avoid to the greatest extent possible during the design of the preferred alternative. The largest area of wetlands associated with these two systems is located to the south and west of Ingleside Boulevard. The preferred alternative was designed to the north and east of Ingleside Boulevard to avoid, to the greatest extent practicable, these wetland areas.

As noted in Chapter 3, the preferred alternative would require the highest total impact to wetlands and the second highest total impact to streams/other waters of the US. However, EO 11990 also calls for the consideration of, “economic, environmental and other pertinent factors.”^{ix} When comparing the impacts of the preferred alternative,

it was less than one half (0.5) acre of wetlands and less than three hundred feet of streams/other waters higher than the other reasonable alternatives. However, the preferred alternative requires the lowest total residential relocations compared to the other reasonable alternatives. The minor difference between alternatives for wetlands and stream impacts were evaluated, but when compared to the significant reduction of residential relocations, and the ability to minimize impacts to the community and human environment, these differences were considered negligible.

Minimization

Since impacts to wetlands and streams/other waters were unavoidable, efforts to minimize these impacts were incorporated into the development of the preferred alternative. Minimization efforts were established to meet SCDOT Highway Design Manual and AASHTO requirements while still providing relief to the wetlands and streams/other waters in the study area. Where feasible, design elements were incorporated into the design of the preferred alternative to minimize the impact to wetlands and streams/other waters.

The preferred alternative would minimize fill slopes to reduce the impact to wetlands throughout the proposed project. Fill slopes would be tightened from 6H:1V, per SCDOT Highway Design Manual standards, to 4H:1V or 2H:1V where practicable to avoid wetlands. Reducing the horizontal limits of fill will minimize the amount of fill to be placed in wetlands as the roadway is constructed.

Additionally, retaining walls were also used to reduce the footprint of the preferred alternative; which greatly reduced the potential impacts to the wetlands north of the Deerhaven Mobile Home Community. Retaining walls greatly reduce the amount of fill required for construction because they provide a vertical wall to retain placed fill instead of fill slopes. Retaining walls are more expensive than fill slopes but are being utilized to minimize impacts to wetlands where feasible for the preferred alternative.

Existing culverts and pipes associated with Weber Boulevard, Ingleside Drive, and Bluehouse Road would be maintained as part of the preferred alternative. While wetlands and streams/other waters will be impacted, keeping the existing culverts and pipes should minimize the isolation of unimpacted wetlands from the larger wetland complex after construction of the preferred alternative. Furthermore, Stormwater BMPs (including grassed swales, engineered treatment systems, seeding of slopes, silt fences, detention areas, and sediment basins) would also be utilized as necessary to minimize impacts to the adjacent wetlands.

Mitigation

USACE has determined that for wetland impacts that exceed 0.10-acre, compensatory mitigation is required. Total potential wetland impacts resulting from the preferred alternative are approximately 4.04 acres of wetlands and approximately 1,468 LF of streams / potentially jurisdictional ditches.

USACE and USEPA issued the Department of Defense, Department of the Army, Corps of Engineers 33 CFR Parts 325 and 332/Environmental Protection Agency 40 CFR Part 230 Compensatory Mitigation for Losses of Aquatic Resources; Final Rule (Final Rule), on April 10, 2008. The Final Rule establishes the order in which priority is given to provide compensatory mitigation for projects. The hierarchy is as follows: First priority is given to mitigation banks as the provider of mitigation credits when the impact site is located within a watershed that can be serviced by existing bank(s). If there are no banks that service the watershed where the impacts are to occur, second priority is given to In-Lieu Fee Program mitigation credits. If there are no In-Lieu Fee Programs that service the watershed

where the impacts are to occur, third priority is given to Permittee-Responsible Mitigation under a Watershed Approach.

Charleston County proposes to purchase required mitigation credits for unavoidable impacts from a USACE-approved commercial mitigation bank. Due to the time anticipated to receive permit approval, a specific bank or combination of banks would be identified further into the permitting process. According to the USACE Regulatory In-Lieu Fee and Bank Information Tracking System (RIBITS) there are currently four (4) freshwater wetland mitigation banks and one (1) stream mitigation bank that may be available to supply the preferred alternative with the necessary mitigation credits.

Public Interest Review Factors

The US Army Corps of Engineers public interest review process is the primary framework for their overall evaluation of projects. 33CFR320 describes this process as follows; “The decision whether to issue a permit will be based on an evaluation of the probable impacts, including cumulative impacts, of the proposed activity and its intended use on the public interest. Evaluation of the probable impact which the proposed activity may have on the public interest requires a careful weighing of all those factors which become relevant in each particular case. The benefits which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. The decision whether to authorize a proposal and if so, the conditions under which it will be allowed to occur, are therefore determined by the outcome of this general balancing process. That decision should reflect the national concern for both protection and utilization of important resources. All factors which may be relevant to the proposal must be considered including the cumulative effects thereof: among those are conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership and, in general, the needs and welfare of the people.” The preferred alternative was evaluated subject to this review process and the results are shown in Table 4.12.1.

Table 4.12.1– Public Interest Review Screening

Public Interest Review Factor	Impacts				Resource Section in Document
	Adverse	Beneficial	Negligible/No	N/A	
Conservation			X		4.1.2, 4.2.2, 4.12.2, 4.13.2
Economics		X			4.6.5
Aesthetics			X		4.6.5
Wetlands	X				4.12.2
Historic Properties			X		4.3
Fish and Wildlife Resources			X		4.13.2
Flood Hazards			X		4.11.2
Floodplain Values			X		4.11.2
Land Use	X				4.1.2
Navigation				X	
Shore Erosion and Accretion				X	
Recreation		X			4.6.2
Water Supply and Conservation				X	
Water Quality			X		4.10.2
Energy Needs				X	
Safety				X	
Food and Fiber Production				X	
Mineral Needs				X	
Considerations of Property Ownership	X				4.6.5
The Needs and Welfare of the People		X			4.6.5

EPA 404(b)1 Guidelines

EPA established the 404(b)1 guidelines to outline standards used to evaluate activities regulated under Section 404 of the CWA. According to the 404(b)1 guidelines, fill material cannot be permitted in wetlands or waters of the US if a practicable alternative would have less adverse impact on the aquatic ecosystem, as long as the alternative does not have other significant adverse environmental consequences. This alternative commonly referred to as the least environmentally damaging practicable alternative (LEDPA) weighs the impacts to each of the public interest review factors discussed in table 3.2.1. Wetlands and other waters were given special consideration during development and evaluation of this project.

The preferred alternative would impact approximately 4.04 acres of wetlands, and approximately 1,468 linear feet of potentially jurisdictional streams/ditches. While this is approximately 0.4 acre and 285 linear feet more impact when compared to the other reasonable alternatives, the preferred alternative was weighed against many other impact factors and was considered the LEDPA based on the substantial decrease in the number of residential displacements it would require. Given the practicability of avoiding other human and natural resources, particularly minimizing the relocation of residences, the additional impact was determined to be justified; therefore, the proposed impact to wetlands and other waters would comply with EPA's 404(b)1 guidelines.

4.12.3 Jurisdictional Waters of the U.S. Indirect and Cumulative Effects

Indirect Effects

Indirect effects, as defined by the Council on Environmental Quality (CEQ) in 40 CFR §1508.8(b), are caused by the proposed action and “are later in time or farther removed in distance but are still reasonably foreseeable.” Indirect effects “may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.”⁷⁹

Indirect impacts for the proposed project were analyzed using the National Cooperative Highway Research Program's Desk Reference for Estimating the Indirect Effects of Proposed Transportation projects. This analysis followed the same methodology and geographic study area as the Indirect Effects analysis for Land Use chapter 4.1.3. and the summary of indirect impacts related to wetlands and other waters is included below.

The study area related to the indirect impacts analysis was determined to include those area which could be influenced by the proposed action. This area would include the adjacent wetland complexes associated with McChune Branch and Bluehouse Swamp. As discussed in section 4.1.1 there are multiple planned developments in the vicinity of the proposed project. These developments are likely to result in potential impacts to wetlands and other waters associated with McChune Branch and Bluehouse Swamp. It was determined that these developments would occur independently from the proposed project and therefore would not be an impact indirectly associated with the project. Additionally, it should be noted that any potential impacts to wetlands or other waters must be authorized by SCDHEC and USACE prior to construction.

There are no indirect effects to wetlands anticipated for the proposed project.

Cumulative Effects

Cumulative Effects are the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. (40 CFR §1508.7.)

Cumulative effects analysis for Jurisdictional Waters of the U.S. followed the same methodology and geographic study area as the Cumulative Effects analysis for Land Use chapter 4.1.3. The same past, present and reasonably foreseeable projects noted in table 4.1.1 were also evaluated as part of the analysis of jurisdictional waters impacts.

Cumulative impacts to the McChune Branch and Bluehouse Swamp complexes are possible after completion of the proposed project. The land use areas around the proposed project have been designated for economic development and thus may result in potential impacts to these wetland systems. There are areas of undeveloped land that are within wetlands or floodplains, making them typically unsuitable for development, however many have been slated for preservation as part of the Ingleside PDD. All potential impacts to wetlands or other waters are subject to authorization by the USACE and the SCDHEC prior to development therefore any cumulative impacts to the McChune Branch or Bluehouse Swamp systems would require additional evaluation during their permitting process. EO requires compensatory mitigation to offset impacts to wetlands; any project impacting wetlands or WOUS would require mitigation to offset impacts.

Although the loss of wetlands has the potential to cumulatively impact the surrounding area, there are no significant cumulative impacts anticipated from this proposed project.

4.13 Threatened & Endangered Species

4.13.1 Affected Environment

The Endangered Species Act of 1973 (ESA), as amended, requires federal agencies, in consultation with, and assisted by, the USFWS, to ensure that their actions are not likely to jeopardize the continued existence of species that have been listed as endangered or threatened under the ESA. The ESA also requires federal agencies to ensure that their actions do not result in the destruction or adverse modification of federally designated critical habitats for listed species.

4.13.2 Environmental Consequences

No-Build Alternative

The No-Build Alternative would have no effect on threatened and endangered species within the Study area.

Preferred Alternative

Federally-Listed Rare, Threatened, and Endangered Species

As required of the ESA, current documentation concerning federally listed endangered, threatened, proposed endangered, proposed threatened, and candidate species, as well as information concerning designated critical habitats was obtained from the USFWS. The federally protected species documented for Charleston County and the expected impacts of the preferred alternative are described in the following sections and summarized in Table 4.13.1.

Bald Eagle

The bald eagle is a large raptor with a wingspan of approximately seven feet. Adult individuals of this species have a mainly dark brown plumage with a solid white head and tail. The bald eagle develops adult plumage in the fifth or sixth year. Juveniles of the species exhibit a chocolate brown to blackish plumage with occasional occurrences of white mottling on the tail, belly, and underwings. The bald eagle's primary diet consists of fish. However, it will feed on birds, mammals, and turtles when fish are not available. The bald eagle's primary habitat is undisturbed riparian zones including coastal, river, and lakeshore areas. Bald eagle nest sites within the southeast are usually located in living dominant or co-dominant pine or cypress trees. Nest sites are often located in the largest living trees within the area commanding an open view of the surrounding terrain. Nest sites are generally located within one-half mile of open water with a clear flight path leading to the water. Please note that as of June 2007, the Bald Eagle has been removed from the Federal list of threatened and endangered species protected by *The Endangered Species Act of 1973*. The bald eagle remains federally protected and is subject to *The Bald and Golden Eagle Protection Act of 1940*.

The Study area does not contain the open water areas preferred by this species. The dominant wetland areas within the Study area do not provide for a commanding view of the surrounding area, or a clear flight path to open water. The documented eagle occurrences for the Ladson, SC USGS quadrangle are located southeast of the Study area adjacent to the Goose Creek Reservoir. There are no documented bald eagle nesting sites contained in the vicinity of the Study area per the database maintained by the SCDNR Heritage Trust Program. Accordingly, the preferred alternative is expected to have No Effect on this federally protected species.

Red-Cockaded Woodpecker (*Picoides borealis*)

The red-cockaded woodpecker is a black and white bird measuring approximately seven inches long. The bird displays black and white horizontal stripes on its back. The cheeks and underparts are white, and the sides are streaked in black. The cap and stripe on the throat and neck of the bird are black. Male individuals of the species have a small red spot on each side of the black cap and display a red crown patch after the first post-fledgling molt. The woodpecker's diet consists primarily of insects and seasonal wild fruit.

The red-cockaded woodpecker's range is closely linked to the distribution of southern pines. Loblolly and longleaf pines that are 60-plus years old are generally selected for nesting sites. However, other species of southern pines are sometimes used for nesting. The woodpecker usually excavates nest cavities in trees infected with a fungus that produces red-heart disease. Preferred nesting sites generally include relatively open, mature pine stands with an undeveloped or low understory layer. Foraging habitat is frequently limited to pine or pine-hardwood stands that are 30 years or older, with a preference for pine trees with a diameter of 10 inches or larger. The USFWS indicates that the maximum foraging range for the red-cockaded woodpecker is approximately one-half mile.

There is no suitable habitat for the red-cockaded woodpecker located within the Study area. There are no pine or pine-hardwood stands located adjacent to the Study area consisting of the age and structure preferred by this species. In addition, the SCDNR records reviewed did not indicate any documented red-cockaded woodpecker occurrences within the Ladson, SC USGS quadrangle. Accordingly, the preferred alternative is expected to have No Effect on this federally protected species.

Wood Stork (*Mycteria americana*)

The wood stork is a large wading bird that is approximately 50 inches tall and has a wingspan of approximately five feet. The plumage of the wood stork is primarily white, with black primary and secondary wing feathers and a short black tail. The head and neck are dark gray and primarily unfeathered. The wood stork displays a prominent black bill that is slightly decurved and thick at the base. The wood stork feeds primarily on small fish, including minnows and shellfish. The wood stork requires shallow wetland areas with a depth of six to 10 inches. The bird's primary habitat is brackish and freshwater wetland areas with associated shallow water zones. The wood stork favors depressional areas within larger wetland systems that are subject to falling water levels due to the resultant concentration of fish species. Wood storks are highly colonial and prefer forested wetland areas (swamps) or islands surrounded by open water for nesting.

The portion of Bluehouse Swamp located in the vicinity of the Study area may be considered potentially suitable nesting habitat for the wood stork. However, the wetland areas located within the boundaries of the Study area are not considered suitable nesting habitat for this species. In addition, the portion of Bluehouse Swamp situated near the boundaries of the Study area do not represent the principal foraging habitat preferred by this species. The documented wood stork occurrence further downstream adjacent to the upper reaches of the Goose Creek Reservoir is located in an area that is subjected to more consistent water levels due to back-flooding associated with the impoundment of the Goose Creek Reservoir. This area also contains relatively open emergent areas interspersed within the forested areas of the swamp. Further, the Study area is located at a distance from the documented wood stork occurrence that includes separation by developed areas and multiple roadway crossings. Accordingly, the preferred alternative is expected to have No Effect on this federally protected species.

Bachman's Warbler (*Vermivora bachmanii*)

Bachman's Warbler is one of the smallest and rarest of the North American warblers. This species matures to a length of approximately four to four and one-half inches. Individuals of the species are olive green above and yellow below. Males have a black throat patch and crown. Females have a gray crown minus the black throat patch found on the males. Bachman's Warbler requires mixed-hardwood forested wetland areas for nesting and foraging habitat. These areas are typical of bottomland hardwoods habitat found throughout the southeastern United States. Nesting locations are close to the ground within heavy shrub cover normally found in canopy openings and along the perimeter of areas of long-term inundation.

The limited portion of remaining forested wetlands within the Study area may be considered potentially suitable nesting and foraging habitat for Bachman's warbler. These areas have a well-developed canopy with a well-developed understory component. Absent from these areas is the heavy shrub fringe at the margins of wetlands that is preferred by this species. The recently harvested areas within the Study area consist of early successional woodlands and do not contain the generally non-deciduous shrub layer preferred by this species. The last confirmed sighting of this species in South Carolina was in 1988 at a location within I'on Swamp in the Francis Marion National Forest located in the northern portion of Charleston County. The previous confirmed sighting of this species within South Carolina prior to 1988 was in 1962. In addition, the SCDNR records reviewed indicated no documented Bachman's warbler occurrences within the Ladson, SC USGS quadrangle. Accordingly, the proposed project may affect, but not likely to adversely affect this Federally protected species.

Kirtland's Warbler (*Dendroica kirtlandii*)

Kirtland's warbler is small bird measuring approximately 12 centimeters long. This species is pale yellow below and bluish gray with black streaks along the back. The male individuals of this species exhibit a black mask. The females are generally duller in color and lack the black mask. Kirtland's warbler has a white eye ring and a characteristic habit of a constantly bobbing tail. Kirtland's Warbler summers in the jack pine forests of the Great Lakes region. The bird migrates to the Bahaman Islands during the winter months, traveling through the coastal southeastern states, including South Carolina. The winter nesting habitat includes pine forests and associated scrub-shrub areas.

The scattered mixed pine-hardwoods within the eastern portion of the project are not considered suitable habitat for Kirtland's Warbler to utilize on its migration south to the Bahama Islands. However, the lack of consistent pine-dominated stands and associated scrub-shrub areas within the study area is a limiting factor to its suitability as habitat for this species as well as the heavily fragmented nature of the area due to adjacent development and existing roadways. In addition, there are no documented occurrences of this species within the vicinity of the study area. Accordingly, the proposed project is expected to have No Effect on this Federally protected species.

Northern Long-Eared Bat (*Myotis septentrionalis*)

The northern long-eared bat is characterized by its long ears and longer tail when compared to other *Myotis* species. The northern long-eared bat grows to a mature length of less than 4 inches with a wingspan of approximately 8 to 10 inches in width. This species typically has a medium to dark brown back with a pale brown underside. This species roosts in forested areas during the summer within both living and dead trees and changes roosting locations often. In winter, the species hibernates in former mines and caves from the late fall until spring. Mating generally occurs from July-October and the females store the sperm during hibernation and become pregnant in the spring. This species is occasionally found roosting in structures such as sheds and barns. This species forages at dusk similar to other bats and prefers moths but will also feed on other flying insects within the forest canopy. The northern long-eared bat will use echolocation to feed on flying insects as well as feeding on insects located on foliage.

The Study area contains potentially suitable summer roosting and foraging habitat for this species within the portion of the Study area situated east and north of US Interstate 26 and also within the extreme western portion of the Study area. The preferred winter hibernation habitat for this species does not exist within the Study area or its immediate vicinity. In addition, the narrow range of forested woodlands within the Study area is a limiting factor to its suitability for this species. Consultation for the NLEB was conducted per the 4(d) Rule Streamlined Consultation Form. The FHWA determined that the proposed project may affect the NLEB, but that any resulting incidental take of the NLEB is not prohibited by the final 4(d) rule. The USFWS received this form and had no objection (Appendix C). Thus, FHWA presumes that its determination is informed by the best available information and that its project responsibilities under Section 7(a)(2) with respect to the NLEB are fulfilled through the USFWS January 5, 2016, Programmatic Biological Opinion.

Flatwoods Salamander (*Ambystoma cingulatum*)

The flatwoods salamander is a small amphibian growing to a length of up to five inches. This species is black in color with a cross-pattern of irregular, gray lines on the back. The belly of the flatwoods salamander is gray to black with whitish to gray spots. This species prefers fire-maintained, seasonally wet, pine savannas and pine flatwoods located within the southeastern portion of the United States. These areas consist predominantly of long leaf pine

or slash pine with a low percentage of canopy cover. Additionally, this species may be found in the vicinity of cypress ponds. Shallow water wetland habitat is required for laying eggs.

The Study area does not contain suitable habitat for the flatwoods salamander. There are no fire-maintained wet savannas, pine flatwoods or open cypress ponds located within the Study area. The adjacent range habitat preferred by this species is not present within or immediately adjacent to the Study area. In addition, the SCDNR records did not identify any documented occurrences of this species within the Ladson, SC USGS quadrangle. Accordingly, the preferred alternative is expected to have No Effect on this federally protected species.

American Chaffseed (*Schwalbea americana*)

American chaffseed is a perennial herb growing to a height of 0.6 to 0.7 meters tall. The entire plant, including the leaves and flowers, are covered with fine hairs. Chaffseed is an erect herb with simple, alternate leaves that are lance-shaped to elliptic and purplish tinged. The corollas are creamy yellow to purple-tinted green and rose-tinted green and shaped like turtle heads. The fruit resembles a capsule that is divided into four sections that shed numerous, winged seeds. The seeds are greenish-brown in color and linear in shape. The flowering period for chaffseed occurs in May through June, with the fruiting period occurring June through July. American chaffseed is found in moist to dry, sandy soils in the Coastal Plain. The species prefers fire-maintained areas such as wet savannas and open, moist pine flatwoods. Chaffseed also occurs within open, grass and sedge systems. The species depends on a fluctuating water table and frequent fire to maintain the open habitat that it requires.

The Study area does not contain suitable habitat for American chaffseed. There are no freshwater wet savannas or open pine flatwoods located within the Study area. In addition, the Study area is not subjected to frequent fire to control understory growth. Accordingly, the preferred alternative is expected to have No Effect on this federally protected species.

Canby's Dropwort (*Oxypolis canbyi*)

Canby's dropwort is a perennial herb growing from elongate, stoloniferous rhizomes to a height of 2.6 to 3.9 feet in height. The stems are hollow and erect with slender leaves. The species is aromatic, smelling like dill. The flowering period is from May through early August. The flowers of Canby's dropwort have white petals and pale green sepals and are five parted. The leaves are round in cross-section, thin, and divided by partitions. The primary habitats of Canby's dropwort are wet pineland ponds and savannas, wet meadows, and around the edges of open cypress ponds. The species prefers habitat with little or no canopy closure. Canby's dropwort prefers soils subject to high water table conditions.

The Study area does not contain suitable habitat for Canby's dropwort. The Study area contains areas with a high percentage of canopy closure and recently harvested woodlands with a dense understory component. In addition, the SCDNR records did not identify any documented occurrences of this species within the Ladson, SC USGS quadrangle. Accordingly, the preferred alternative is expected to have No Effect on this federally protected species.

Pondberry (*Lindera melissifolia*)

Pondberry is a deciduous shrub found within wetland areas of the southeastern coastal plain and wetland areas associated with the southern portion of the Mississippi River. The shrub grows to a maximum height of approximately six feet and forms dense thickets. The leaves of pondberry are thin and drooping and taper to a point

at the tip. Leaves are ovate to elliptic in shape and have an odor resembling sassafras when crushed. Pondberry produces multiple yellow flowers from February to March and red fruit from August to October. Pondberry prefers seasonally wet areas within bottomland hardwoods, ponds, and shallow depressions located within the sandhills and coastal plain region.

Pondberry prefers seasonally wet areas within bottomland hardwoods, ponds, and shallow depressions located within the sandhills and coastal plain region. The forested wetland areas located within the study area are not considered potentially suitable habitat for this species due to either having a well-developed canopy with a high percentage of closure; or having been recently harvested and consisting of early successional woodlands. Neither of these conditions is preferred by this species. There are 15 documented colonies of this species in South Carolina. However, there are no documented occurrences of this species within Charleston County. The closest documented colonies of this species are in Berkeley County, South Carolina. Accordingly, the proposed project is expected to have No Effect on this Federally protected species.

Summary

The proposed project may affect but is not likely to affect Bachman's warbler. Consultation for the NLEB was conducted per the 4(d) Rule Streamlined Consultation and a determination was made that the project may affect the NLEB, but that any resulting incidental take of the NLEB is not prohibited by the final 4(d) rule. Due to the limiting factors of the study area referenced above and the lack of suitable on-site habitat preferred by the listed species as identified by the on-site reconnaissance of the study area, the results of this biological assessment indicate that the proposed project will not affect the remaining Federal listed threatened and endangered species documented for Charleston County. In addition, the proposed project will not affect any critical habitat or at-risk species documented by the USFWS. The USFWS Concurred with this finding in an email dated April 2, 2019 (Appendix C) No further study of the study area as regards the listed species is recommended at this time.

Table 4.13.1: Federally Protected Species in Charleston County

Common Name	Scientific Name	Federal Status	Effect
Plants			
American chafseed	<i>Schwalbea americana</i>	Endangered	No effect
Canby's dropwort	<i>Oxypolis canbyi</i>	Endangered	No effect
Pondberry	<i>Lindera melissifolia</i>	Endangered	No effect
Seabeach Amaranth	<i>Amaranthus pumilus</i>	Threatened**	No effect
Animals			
Bald Eagle	<i>Haliaeetus leucocephalus</i>	BGEPA*	No effect
Red-Cockaded Woodpecker	<i>Picoides borealis</i>	Endangered	No effect
Wood Stork	<i>Mycteria americana</i>	Endangered	No effect
Bachman's Warbler	<i>Vermivora bachmanii</i>	Endangered	May affect, but not likely to adversely affect
Piping Plover	<i>Charadrius melodus</i>	Threatened**	No effect
Kirtland's Warbler	<i>Dendroica kitlandii</i>	Endangered	No effect
Shortnose Sturgeon	<i>Acipenser brevirostrum</i>	Endangered**	No effect
Atlantic Sturgeon	<i>Acipenser oxyrinchus</i>	Endangered**	No effect
Loggerhead Sea Turtle	<i>Caretta caretta</i>	Threatened**	No effect
Kemp's Ridley Sea Turtle	<i>Lepidochelys kempii</i>	Endangered**	No effect
Leatherback Sea Turtle	<i>Dermochelys coriacea</i>	Endangered**	No effect
Green Sea Turtle	<i>Chelonia mydas</i>	Threatened**	No effect
West Indian Manatee	<i>Trichechus manatua</i>	Endangered**	No effect
Finback Whale	<i>Balaenoptera physalus</i>	Endangered**	No effect
Humpback Whale	<i>Megaptera novangliae</i>	Endangered**	No effect
Right Whale	<i>Balaena glacialis</i>	Endangered**	No effect
Northern long-eared bat	<i>Myotis septentrionalis</i>	Threatened	May affect, but any resulting incidental take of the NLEB is not prohibited by the final 4(d) rule
Flatwoods Salamander	<i>Ambystoma cingulatum</i>	Threatened	No effect

* Federally Protected under the Bald and Golden Eagle Protection Act (BGEPA)

** These species utilize habitat types associated with the immediate coastline and not adjacent to a coastal river system, these species are not discussed further in this report of findings for the subject Study area.

Source: Red Bay Environmental Biological Assessment of US Interstate 26 Palmetto Commerce Parkway Interchange Study area

4.13.3 State-Listed Rare, Threatened, and Endangered Species

The *South Carolina Nongame and Endangered Species Conservation Act* outlines the state's role in assisting with the preservation and propagation of federally listed threatened and endangered species, as well as setting forth guidelines to protect wildlife which, although not listed on a federal level, have been determined to be endangered within the state. Table 4.13.2 lists the state-listed threatened and endangered species that are known to occur in Charleston County, their habitat requirements, and indicates if suitable habitat is present in the study area.

In addition to the federally protected species identified above, the Study area does not contain suitable habitat for the swallow-tailed kite, gopher tortoise, gopher frog and broad-striped siren. There is a limited amount of potentially suitable habitat for the spotted turtle; however, the preferred habitat characteristics preferred by this species are not located within the Study area boundaries. The limited amount of mature, forested woodlands within the Study area are potentially suitable foraging habitat for Rafinesque's big-eared bat. However, the preferred roosting habitat consisting of buildings, bridges, caves and mines are not present within the Study area. In addition, the developed and developing nature of areas adjacent to the Study area are an additional limiting factor due to this species' sensitivity to nearby human activities. As indicated in Table 4.13.2, the proposed project is expected to have No Effect on the State documented threatened and endangered species.

Table 4.13.2: State Protected Species in Charleston County

Common Name	Scientific Name	State Status	Effect
Animals – State Protected			
Spotted Turtle	<i>Clemmys guttata</i>	State Threatened	No effect
Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii</i>	State Endangered	No effect
Swallow-tailed kite	<i>Elanoides forficatus</i>	State Endangered**	No effect
Least tern	<i>Sterna antillarum</i>	State Threatened**	No effect
Wilson's plover	<i>Charadrius wilsonia</i>	State Threatened**	No effect
Gopher tortoise	<i>Gopherus polyphemus</i>	State Endangered	No effect
Gopher frog	<i>Rana capito</i>	State Endangered	No effect
Broad-striped dwarf siren	<i>Pseudobranchius striatus</i>	State Threatened	No effect

** These species utilize habitat types associated with the immediate coastline and not adjacent to a coastal river system, these species are not discussed further in this report of findings for the subject Study area.

Source: Red Bay Environmental Biological Assessment of US Interstate 26 Palmetto Commerce Parkway Interchange Study area

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Environmental Assessment for:
Palmetto Commerce Interchange Project

May 2019

*Chapter 05 – Public Involvement and Agency
Coordination*

5.0 Public Involvement Overview

The public involvement efforts for the Project were designed to provide stakeholders the opportunity to receive information, discuss issues, and actively partake in the transportation decision-making process. Engagement efforts were aimed at *identifying* the various audiences/stakeholders vested and impacted by the study; *educating* these groups on the purpose and need for the project; *informing* them of the alternatives under consideration and the environmental impacts associated with each; *providing* an opportunity for the public to offer feedback, and actively and meaningfully *engaging* them in the decision-making process in the selection of a preferred alternative.

Agency involvement and coordination focused on federal, state, and local governmental agencies providing technical input and assistance in the development of the Environmental Assessment, screening of alternatives, and analysis of associated environmental impacts.

5.1 Public Involvement Efforts

5.1.1 PIP Development

A Public Involvement Plan (PIP) was developed for the proposed project with guidance from the SCDOT's Public Involvement Policy for NEPA Compliance (Revised February 2015) following the guidelines for Tier 3: Projects that qualify for an Environmental Assessment (EA), and input from the County. The PIP was created to guide the project's engagement efforts and define strategies for communicating with agencies, stakeholders, and the public through the Environmental Assessment process.

5.1.2 Public Information Meetings

Two public information meetings were held (September 2014 and September 2017) at the Northside Baptist Church in North Charleston, South Carolina. Meetings followed an open-house format where project information and analysis results were organized into information stations and displayed on easy to read meeting presentation boards. Stations were staffed by study team representatives who served as facilitators. This approach proved effective in disseminating project information in a manageable manner and allowed team members to engage the public on a one-on-one basis.

Meeting resources included a short presentation providing the proposed project overview and schedule, informational print handouts, large scale presentation boards, and comment cards for participants wishing to provide feedback. It was important to the project team that the information provided to the public was as inclusive and informative as possible. In the presentation of the alternatives being evaluated, 3-D models of each interchange alternative were developed to help the public fully visualize the interchange layout and operation of the interchange as it related to ramp tie-ins etc. The 3-D models of each alternative and a short video of each were presented (shown as still shots in Figure 5.5.1.). This was critical in the presentation of the impacts associated with each alternative since it better informed the public feedback as they indicated their preferred alternative. All input provided has been documented and compiled in Appendix I.

Public Information Meeting - September 3rd, 2014

Approximately 173 people attended the September 3, 2014 meeting and 22 people submitted comments via hand in comment cards, email, and website e-comments. This meeting was held for the public to understand the process of developing an EA, gather important facts about the Proposed Project, and ask questions about potential impacts from the Proposed Project.

At the time of the initial Public Information Meeting in September 2014, Charleston County had only secured funding for design and permitting efforts for the project. Since funding was not yet available for construction, the County elected to suspend work on the project in the spring of 2015. In 2016, the County was successful in passing a half-cent sales tax referendum and (with funding for the remainder of the project secured) work on the project resumed. However, since nearly three years had passed since the initial Public Information Meeting, Charleston County elected to host a second Public Information Meeting in October 2017 to re-introduce the project and solicit public comments.

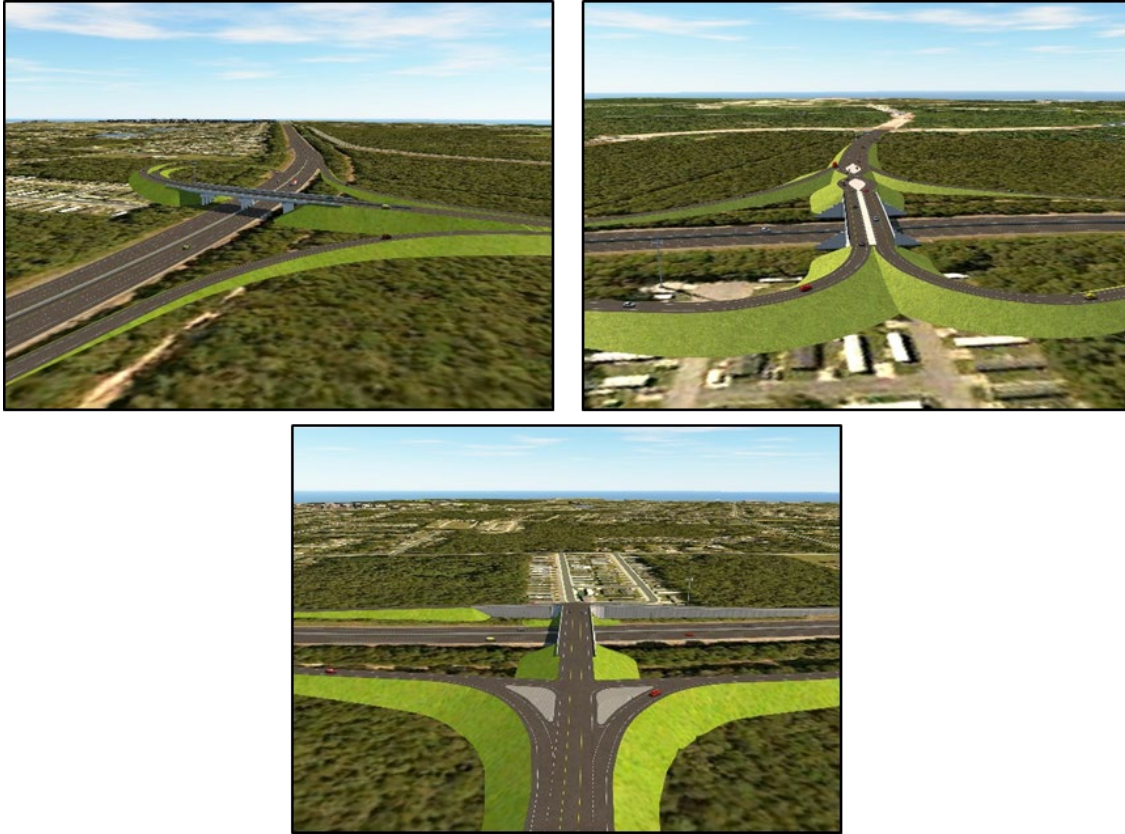
Public Information Meeting - October 17th, 2017

Approximately 122 people attended the October 17th meeting and 77 comments were received via hand-in comment cards, email, and website e-comments. This meeting was held for the public to understand the information being gathered to develop the EA, the project timeline, the alternatives being evaluated, and the preliminary environmental impacts associated with each alternative. The meeting also provided an opportunity for the public to ask questions about the potential impacts from the proposed Project and to provide feedback on the alternative that should be the preferred alternative. Examples of the renderings presented are shown in Figure 5.1.1.

Neighborhood Outreach Meetings

A neighborhood outreach meeting was requested by Council Member Virginia Jamison (District 3, North Charleston) to provide residents an opportunity to learn more about the project and its impacts and provide feedback on the alternatives. The meeting was held at the Northwoods Estates Community Center on November 11, 2017. Approximately 22 people attended the November 13th meeting and 7 comments were received. This meeting presented the information and materials used in the second public information meeting held in October, 2017.

Figure 5.1.1 Rendered 3-D model of Alternative 3 (top left), Alternative 7 (top right), and Alternative 8 (bottom)



5.1.3 Project Mailing List

Project related post cards were mailed via US Postal Service to resident and business addresses throughout the Study area. Additionally, a Project Electronic Mailing List was built based upon published contact information for local and federal officials; civic, community, religious, health, and educational organizations located within the study area. Information provided through outreach meetings and website comments was also utilized for mailing information.

5.1.4 Project Website

During the initial design phases in 2014, a project web page was created and was (and still is) hosted on the Charleston County Government website, <https://www.palmettocommerceinterchange.com/>. The web page provides general project information, meeting notifications, meeting handouts and presentation materials, and an opportunity for interested persons to provide feedback through an e-comment submittal. When work on the project

resumed in 2016, the County requested a new dedicated website be created for the proposed project. The website was developed and launched in October 2017 (palmettocommerceinterchange.com). This website serves as the primary repository for project information and updates throughout the life of the project. All meeting presentations, handouts, and videos are hosted on this site.

5.1.5 Media Relations

Public information meetings were announced through an official paid press release and distributed to local media outlets. Social media was also utilized through the County Facebook and Twitter platforms to leverage the on-line community through the network of followers to expand the project's reach and exposure. Media outlets and organizations that have promoted the Palmetto Commerce Interchange public meetings or project in general include:

- 1. News 4. "I-26 Interchange Plan Unveiled, Public Asked For Comments" September 2014.**
<http://abcnews4.com/archive/i-26-interchange-plan-unveiled-public-asked-for-comments>
- 2. City of North Charleston. "Charleston County Hosts Public Meeting for Palmetto Commerce Interchange", September 2014.**
<http://www.northcharleston.org/Events/Charleston-County-Hosts-Public-Meeting-for-Palmett.aspx?itemid=24410>
- 3. News 2. "Meeting on Palmetto Commerce Interchange Project set for October", September 2017.**
<http://counton2.com/2017/09/29/meeting-on-palmetto-commerce-interchange-project-set-for-october/>
- 4. News 2. "New plans introduced for Palmetto Commerce Interchange", October 2017.**
<http://counton2.com/2017/10/17/new-plans-introduced-for-palmetto-commerce-interchange/>
- 5. News 2. "Officials ask for your comments on Palmetto Commerce Interchange project", November 2017.**
<http://counton2.com/2017/11/03/officials-ask-for-your-comments-on-palmetto-commerce-interchange-project/>
- 6. Post and Courier. "Plans for Palmetto Commerce Parkway interchange project to be presented Oct. 17", October 2017.**
https://www.postandcourier.com/news/plans-for-palmetto-commerce-parkway-interchange-project-to-be-presented/article_bec28d10-a77d-11e7-bcf2-b7dd9197c18c.html
- 7. Charleston County (Facebook and Twitter)**
- 8. City of North Charleston (Facebook)**

5.2 Agency Coordination

The lead federal agency is the Federal Highway Administration (FHWA) with the South Carolina Department as co-lead agency. These two agencies provided oversight to Charleston County (The County) throughout the project review. Agency involvement included regular process meetings held to get feedback and technical expertise on approaches/methodologies used in the analysis of impacts and development of the EA.

The Palmetto Commerce Interchange project was also presented at one Agency Coordination Effort (ACE) meeting at SCDOT. Members from FHWA, SCDOT, SHPO, USFWS, and SCDNR were present and provided comments on concerns specific to their agency's role in the review process. A copy of the meeting minutes is included in Appendix G.

Specific Agency Coordination in the EA process include:

1. **The State Historic Preservation Officer (SHPO)** responded August 11, 2017 concurring with the background research and the field investigations that were completed for the Cultural Resources Survey by Brockington and Associates, Inc. The Department has determined that no historic properties will be affected by the proposed project.
2. **The Catawba Nation** responded on August 22, 2017 concurring with the departments determination that no historic properties will be affected by the proposed project.
3. **The Muscogee (Creek) Nation** responded on August 15, 2017 concurring with the departments determination that no historic properties will be affected by the proposed project.
4. **The U.S. Fish and Wildlife Service and SCDNR Heritage Trust Database** was used in determining the federally documented threatened and endangered species for Charleston County, South Carolina. A Biological Assessment was completed for this Project and the USFWS concurred with the determinations of the FHWA on April 2, 2019. The Biological Assessment and concurrence documentation are located in Appendix C.
5. **USACE** issued SAC-2015-1252-1JC wetland determination on behalf of the Weber Corp tract (TMS-393-00-00-083) on February 1, 2016. The JD for the remaining tracts of the Project has been submitted and is pending approval by the USACE.
6. Coordination with the **City of North Charleston** has been ongoing throughout the development of the project. They were invited to each of the public meetings and were involved in communications with neighboring communities.

Environmental Assessment for:
Palmetto Commerce Interchange Project

May 2019

Chapter 06 – List of Preparers

6.1 Federal Highway Administration

Michelle Herrell, South Carolina Division, Environmental Protection Specialist, responsible for review of the EA.

Shane Belcher, South Carolina Division, Environmental Coordinator, responsible for review of the EA.

6.2 South Carolina Department of Transportation

Joy Riley, P.E., Program Manager, responsible for project coordination.

Lyle Lee, P.G., Assistant Program Manager, responsible for project coordination.

Chad Long, Director of Environmental Services, responsible for review of the EA.

Henry Phillips, NEPA Division Manager, responsible for review of the EA.

David Kelly, NEPA Coordinator, responsible for agency coordination.

Will McGoldrick, Permits Coordinator, responsible for coordination with the USACE.

Nicole Riddle, Public involvement Coordinator, responsible for review of public involvement activities

6.3 Charleston County

Richard Turner, P.E., Deputy Director for Operations, Project Manager, responsible for overall management of the Palmetto Commerce Interchange project for Charleston County.

6.4 Davis and Floyd

Brice Urquhart, P.E., Vice President, Project Manager, responsible for management of the Palmetto Commerce Interchange project.

Sam Pridgen, P.E., Transportation Engineer, Lead Roadway Designer, responsible for preliminary design of alternative concepts for the EA.

6.5 Stantec

James R. Fisher, P.E., Senior Transportation Engineer, primary author of the Traffic Study

Freddy He, PhD, P.E., PTOE, Principal, responsible for leading the Traffic Study modelling.

6.6 HDR

David Montgomery, P.E., Senior Project Manager, prepared preliminary layout of alternative concepts and managed HDR's work

Jonathan Eichelberger, Roadway Design Engineer, prepared layout and cost estimates of alternative concepts

6.7 Three Oaks Engineering

Heather Robbins, Senior Environmental Planner, Project Manager, responsible for overall management of EA revisions and primary authorship of noise analysis.

Mark Mohr, Environmental Planner, responsible for review of the EA and primary author of the Environmental Assessment revisions.

Shelby Moody, Environmental Scientist, Noise Specialist, responsible for preparation of the noise analysis

Russell Chandler, Environmental Scientist, responsible for wetlands impacts analysis

6.8 Red Bay Environmental

Judd Goff, Senior Environmental Scientist, responsible for natural resource investigations and wetlands delineation