Jack E. Jirak
Associate General Counsel

Mailing Address:
NCRH 20 / P.O. Box 1551
Raleigh, NC 27602

o: 919.546.3257
f: 919.546.2694

jack.jirak@duke-energy.com

August 13, 2019

VIA ELECTRONIC FILING AND HAND DELIVERY

Chief Clerk
North Carolina Utilities Commission
4325 Mail Service Center
Raleigh, North Carolina 27699-4300

RE: Application of Duke Energy Progress, LLC for a Certificate of Environmental Compatibility and Public Convenience and Necessity to Construct 4.6 Miles of Transmission Line in the northeast area of Wilmington, New Hanover County, North Carolina
Docket No. E-2, Sub 1215

Dear Chief Clerk:

Pursuant to N.C. Gen. Stat. §§ 62-101 et seq. and Commission Rule R8-62, Duke Energy Progress, LLC ("DEP") submits for filing its Application, a draft public notice summary of the Application, and supporting testimony for a Certificate of Environmental Compatibility and Public Convenience and Necessity to construct approximately 4.6 miles of new 230kV transmission line in New Hanover County, North Carolina. The parties identified in N.C. Gen. Stat.§ 62-102(b) will be served, and notice will be published in the appropriate newspapers, once the Commission approves the draft public notice summary pursuant to N.C. Gen. Stat.§ 62-102(c). Pursuant to Commission Rule R8-62(f), DEP respectfully requests that the Commission please either notify DEP of the Commission's approval of such notice or of any required changes within three (3) business days of the filing of this Application. A check in the amount of $250.00 is enclosed for the Application filing fee.

Thank you for your attention to this matter. If you have any questions, please let me know.

Sincerely,

Jack E. Jirak

Enclosures

cc: David Drooz (w/ encls.)

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-2, SUB 1215

In the Matter of:

Application of Duke Energy Progress, LLC for a Certificate of Environmental Compatibility and Public Convenience and Necessity Pursuant to N.C. Gen. Stat. §§ 62-100 et. seq. to Construct Approximately 4.6 Miles of New 230kV Transmission line in the northeast area of Wilmington, New Hanover County, North Carolina	**DUKE ENERGY PROGRESS, LLC'S APPLICATION FOR A CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY AND PUBLIC CONVENIENCE AND NECESSITY**

NOW COMES Duke Energy Progress, LLC ("DEP," "Duke Energy Progress" or the "Applicant"), pursuant to N.C. Gen. Stat.§§ 62-100 et seq. and Rules Rl-5 and R8-62 of the Rules of Practice and Procedure of the North Carolina Utilities Commission ("the Commission") and files its Application for a Certificate of Environmental Compatibility and Public Convenience and Necessity ("Certificate") to construct a new 230kV transmission line in New Hanover County, North Carolina. The new transmission line will originate at the proposed Porters Neck transmission-to-distribution 230kV/23kV substation ("Porters Neck Substation") and terminate at the tap point along the existing Castle Hayne-Folkstone 230kV transmission line. The total length of the proposed transmission line is approximately 4.6 miles. The project will be referred to in this application as the "Porters Neck Line." In support thereof, DEP shows the following:

1. The Applicant's general offices are located at 410 South Wilmington Street, Raleigh, North Carolina, and its mailing address is:

Duke Energy Progress, LLC
410 S. Wilmington Street, NCRH 20
Post Office Box 1551
Raleigh, North Carolina 27602

2. The names and addresses of Applicant's attorneys are:

Jack Jirak, Associate General Counsel
Duke Energy Progress, LLC
P.O. Box 1551, NCRH 20
Raleigh, North Carolina 27602
Tel: (919) 546-3257
jack.jirak@duke-energy.com

Brady W. Allen
The Allen Law Offices, PLLC
1514 Glenwood Ave. Suite 200
Raleigh, North Carolina 27609
Tel: (919) 838-5175
Brady.Allen@theallenlawoffices.com

Copies of all pleadings, testimony, orders, and correspondence in this proceeding should be served upon the attorneys listed above.

3. DEP is engaged in the generation, transmission, distribution, and sale of electricity at retail in the eastern and western portions of North Carolina, and the northeastern portion of South Carolina. It also sells electricity at wholesale to many municipal, cooperative, and investor-owned electric utilities. The Applicant is authorized to transact business in the State of North Carolina and is a public utility under the laws of the State of North Carolina. Accordingly, its operations in the State of North Carolina are subject to the jurisdiction of the Commission.

4. DEP is required by the Federal Energy Regulatory Commission ("the FERC") to comply with the Reliability Standards of the North American Electric Reliability Corporation ("NERC"). NERC may impose stringent penalties for violations of NERC Reliability Standards. In accordance with these Reliability Standards, DEP plans its transmission system to supply projected demands in a reliable manner at all demand levels over the range of forecast system demand, under contingency conditions. Further

in compliance with these Reliability Standards, DEP routinely conducts studies of its transmission system to identify required improvements.

5. DEP provides electricity to approximately 1.5 million customers in North Carolina and South Carolina. Due to the expansion of U.S. Highway 17 and the future expansion of Military Cutoff Road, electric demand is growing northeast of Wilmington, North Carolina. The new substation and associated transmission line are required to provide needed capacity and enhanced service reliability to support existing customers and to allow for future residential and commercial growth.

6. Duke Energy Progress' assessment of electric energy requirements has identified the need to build a new 230kV/23kV transmission-to-distribution substation and a new 230kV transmission line to provide power to the proposed Porters Neck Substation located northeast of Wilmington in New Hanover County, North Carolina. The area is currently served by two existing 230kV substations (Wilmington Ogden 230kV, and Scotts Hill 230kV). The load center of the proposed Porters Neck station is approximately midway between the two existing 230kV substations. Existing distribution feeders from each of the existing substations that serve this area are projected to reach design capacity in the coming years. Two feeders off of the Scotts Hill 230kV substation that were previously overloaded were mitigated in 2017 with the addition of the new Kirkland 24kV circuit breaker. Likewise, three feeders out of the Wilmington Ogden 230kV substation, which traverse three miles north towards the Porters Neck/Market Street area, are projected to be above 95% of capacity by January 2020. Further, both transformer banks at the Wilmington Ogden 230kV Substation are projected to be loaded above their nameplate capacity rating by January 2022.

7. The new Porters Neck Line will connect the proposed Porters Neck 230kV/23kV Substation to the existing Castle Hayne-Folkstone 230kV transmission line. The total length of the proposed transmission line is approximately 4.6 miles.

8. DEP retained Burns & McDonnell Engineering Company, Inc. to assist with the comprehensive transmission line siting and public input process for the Porters Neck Line. The study area is located in the coastal southeast region of North Carolina in New Hanover and Pender Counties. The overwhelming majority of the study area is located in New Hanover County, with a small portion of Pender County comprising the northeast portion of the study area. The three existing transmission lines that follow the western boundary of the study area are the Brunswick Plant Unit 1 – Castle Hayne 230kV, Castle Hayne – Wilmington Corning Sw. Sta. 230kV, and Sutton Plant – Castle Hayne 230kV transmission lines. The northern portion of the study area consists of the existing Castle Hayne–Folkstone 230kV transmission line, and the eastern boundary generally parallels DEP's existing Scotts Bluff 230kV tap line. The southern boundary of the study area extends just south of, and parallel to U.S. Highway 17 and Interstate 140. The study area encompasses approximately 20 square miles and is shown in Figure 3-1 of the Routing Study and Environmental Report ("Report"), attached as Exhibit A to this Application.

9. The preferred route for the Porters Neck Line originates at the site of the proposed Porters Neck Substation, located between U.S. Highway 17 and Porters Neck Road in New Hanover County, North Carolina. The route exits the substation site to the northwest and extends for approximately 380 feet before turning north-northwest for approximately 875 feet while crossing U.S. Highway 17. The route then continues north for approximately 3,170 feet before turning west-northwest. From this point, the

preferred route extends approximately 8,105 feet and crosses the alignment for the proposed Hampstead Bypass. The route then extends north approximately 6,105 feet, crosses Sidbury Road, and then continues to the north for another 2,980 feet. The preferred route then continues to the northwest for approximately 2,555 feet before terminating at a selected tap location along the existing Castle Hayne–Folkstone 230kV transmission line. This route is 24,170 feet in length, approximately 4.6 miles, as shown in Figure 4-6 of the Report. The preferred route does not cross Pender County.

10. The transmission line routing process, studies and physical properties are fully described in the Report. The Report satisfies all of the requirements of N.C. Gen. Stat. § 62-102. Exhibit B is a draft public notice, summarizing the Application, that DEP proposes to publish in the newspapers of general circulation serving the portions of New Hanover County impacted by the proposed line. DEP will publish this public notice upon Commission approval and serve the parties identified in N.C. Gen. Stat. § 62-102(b) with a copy of this Application and a notice stating the date the Application was filed, the date by which parties must seek intervention, and the statute and the rule governing intervention.

11. The information and data required to be filed by Commission Rule R8-62 is supported by the testimony of James T. Umbdenstock and Micah E. Retzlaff, being filed simultaneously with this Application and incorporated herein by reference.

WHEREFORE, Duke Energy Progress requests that the Commission grant the Applicant a Certificate of Environmental Compatibility and Public Convenience and Necessity to construct approximately 4.6 miles of new 230kV transmission line in New Hanover County, North Carolina.

Respectfully submitted this 13th day of August, 2019.

DUKE ENERGY PROGRESS, LLC

Jack Jirak
Associate General Counsel
Duke Energy Corporation
P.O. Box 1551/NCRH 20
Raleigh, North Carolina 27602
Tel 919.546.3257
Jack.Jirak@duke-energy.com

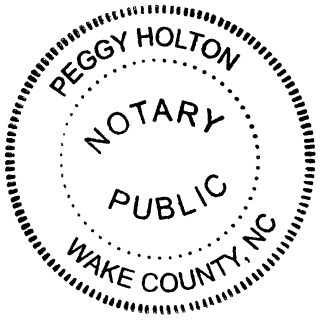
Brady W. Allen
The Allen Law Offices, PLLC
1514 Glenwood Ave., Suite 200
Raleigh, NC 27608
Tel 919-838-5175
Brady.Allen@theallenlawoffices.com

VERIFICATION

STATE OF NORTH CAROLINA)
)
COUNTY OF WAKE)

DOCKET NO. E-2, SUB 1215

PERSONALLY APPEARED before me, Micah E. Retzlaff, after first being duly sworn, said that he is Lead Transmission Siting Specialist – Siting, Permitting and Engagement for Duke Energy Progress, LLC and as such is authorized to make this verification; that he has read the foregoing *Application for a Certificate of Environmental Compatibility and Public Convenience and Necessity* and knows the contents thereof; and that the same are true and correct to the best of his knowledge, information, and belief.



Micah E. Retzlaff
Lead Transmission Siting Specialist
Siting, Permitting and Engagement
Duke Energy Progress, LLC

Sworn to and subscribed before
me this 6th day of August, 2019.

Peggy Holton
Notary Public

My Commission expires: 12/22/2021

Routing Study and Environmental Report

Duke Energy

Wilmington NE Reliability Project
Project No. 105077

06/28/2019

Routing Study and Environmental Report

prepared for

Duke Energy
Wilmington NE Reliability Project
Raleigh, NC

Project No. 105077

06/28/2019

prepared by

Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri

TABLE OF CONTENTS

Page No.

LIST OF TABLES

Page No.

LIST OF FIGURES

Page No.

LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
Burns & McDonnell	Burns & McDonnell Engineering Company, Inc.
CECPCN	Certificate of Environmental Compatibility and Public Convenience and Necessity
Duke	Duke Energy Progress
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
IPaC	Information for Planning and Consultation
kV	kilovolt
NC-CREWS	North Carolina Coastal Region Evaluation of Wetland Significance
NCDOT	North Carolina Department of Transportation
NCDEQ	North Carolina Department of Environmental Quality
NCDNR	North Carolina Department of Natural Resources
NCDWR	North Carolina Division of Water Resources
NCNHDE	North Carolina Natural Heritage Data Explorer
NC NHP	North Carolina Natural Heritage Program
NCUC	North Carolina Utilities Commission
NCWRC	North Carolina Wildlife Resources Commission
NHD	National Hydrology Dataset
NHEO	Natural heritage element occurrence
NLCD	National Land Cover Database
NPDES	National Pollutant Discharge Elimination System

Abbreviation	Term/Phrase/Name
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
Project	Wilmington NE Reliability Project
RCW	red-cockaded woodpecker
ROW	right-of-way
SHPO	State Historic Preservation Office
SPCA	North Carolina Sedimentation Pollution Control Act
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1.0 INTRODUCTION

This report has been prepared in accordance with the requirements of Article 5A, Chapter 62 of the North Carolina General Statutes for Duke Energy's (Duke) proposed Wilmington NE Reliability Project (Project). According to Article 5A, a Certificate of Environmental Compatibility and Public Convenience and Necessity (CECPCN) is required for construction of an electric transmission line designed to carry 161kV or more.

To continue to provide reliable electric service to the region, Duke proposes to design, build, and operate a new 230-kilovolt (kV) transmission tap line. The new 230kV transmission tap line will connect Duke's proposed Porter's Neck T-D Substation to Duke's existing Castle Hayne – Folkstone 230kV transmission line.

Duke retained Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell) to assist with the line routing and public involvement for the Project. Burns & McDonnell also assisted with the selection of routing alternatives and the preparation of this routing study and environmental report. This document contains a summary of the route selection process, public involvement activities, and the potential environmental impacts of the preferred route. The study was completed in support of an application for a CECPCN from the North Carolina Utilities Commission (NCUC).

The following chapters include a description of the Project, including the need for the Project (Chapter 2.0) and a description of the existing environmental and social conditions in the study area (Chapter 3.0). The analysis of routing alternatives is described in Chapter 4.0. Potential environmental impacts of the proposed Project are discussed in Chapter 5.0, and proposed mitigation measures are described in Chapter 6.0. Potential permits and approvals are summarized in Chapter 7.0. A Project summary is provided in Chapter 8.0, and references are provided in Chapter 9.0. The appendices include suitability map criteria, copies of agency correspondence, public involvement documentation, and Project cost estimates.

2.0 PROJECT DESCRIPTION

Duke proposes to construct a new 230kV transmission tap line to connect its proposed Porter's Neck T-D Substation to its existing Castle Hayne – Folkstone 230kV transmission line. The Project is in Pender and New Hanover Counties, North Carolina. This proposed transmission tap is needed to provide power quality and continued reliability for a rapidly growing region.

2.1 Description of the Project

To construct and operate a connection between the proposed Porter's Neck T-D Substation and the Castle Hayne – Folkstone 230kV transmission line, Duke would require construction of a new 230kV transmission line between 4 and 7 miles in length. The required 125-foot-wide easement width would be sufficient to provide the necessary configuration for the new line and ensure safe operation free from potential vegetative and other hazards. The proposed Project will require a circuit termination structure at the interconnection with the Castle Hayne - Folkstone 230kV transmission line, located between structures 8 and 42, and the construction of the proposed Porter's Neck T-D Substation to accommodate the new line. The proposed line will be owned and operated by Duke. Numerous route alternatives have been identified, and a preferred route was selected based on a route analysis process. The analysis is described in Chapter 4.0.

2.1.1 Purpose and Necessity

Due to the expansion of U.S. Highway 17 and the future expansion of Military Cutoff Road, electric demand is growing northeast of Wilmington, North Carolina. Additional electric distribution capacity is needed to serve existing and future homes and businesses in the area. To meet the anticipated increase in demand, a new substation and transmission line are proposed. The proposed Porter's Neck T-D Substation will enhance power reliability, increase available electricity and increase resiliency during severe weather events in the area. The new transmission line is needed to connect the proposed substation to the electric grid, which will enhance Duke's ability to provide greater capacity and service reliability to the area to support residential and commercial growth.

This area is currently served by two existing substations, Wilmington Ogden 230kV to the south and Scotts Hill 230kV to the north. The load center for the proposed Porters Neck station is approximately midway between the Scotts Hill 230kV and Wilmington Ogden 230kV substations, which have limited ability to serve the load due to feeder routes only along Hwy. 17/Market Street in the study area. Existing distribution feeders from the two existing stations (Wilmington Ogden and Scotts Hill) that do serve this area are projected to reach design capacity in the coming years.

2.1.2 Structures

Transmission line structures would consist of steel horizontal H-frame construction or dead-end three-pole structures, installed either direct-buried or using caissons. Figure 2-1 depicts typical single-circuit steel H-frame structures. Ground clearance would meet or exceed the National Electrical Safety Code requirements for a 230kV transmission line. Typical above-ground height for the new structures would be approximately 65-85 feet. The structures would be spaced approximately 600 to 800 feet apart. Heights and spans may vary depending on the design, terrain, or measures to mitigate potential impacts of the line.

2.1.3 Right-of-Way

The route alternatives evaluated for the proposed Project would require a 125-foot-wide right-of-way (ROW) to accommodate the transmission structures (see Figure 2-1). Danger trees, which are trees tall enough to impact the line should they fall, may also need to be cleared outside the required ROW. Once a route has been approved by the NCUC, Duke land agents would work with individual property owners to purchase easements for the new line. Duke pays fair market value for easements, and landowners retain ownership of the property with some limitations on the use of the land in the ROW. Under the agreement, property owners cannot place any permanent structures that will interfere with the conductors or restrict complete access for maintenance of the transmission line or ROW within the corridor.

2.2 Construction, Operation and Maintenance

The transmission line would be constructed in several phases using both rubber-tired and track equipment. In environmentally sensitive areas, float track equipment may also be used during construction of the line. The appropriate materials would be delivered to each structure location for assembly. Holes for direct pole embedment or concrete foundations for structures would be dug with an auger, and the structures would be erected using a crane. Afterwards, the holes would be backfilled with the preexisting soil, and any excess soil would be evenly distributed around each structure. The soil would then be stabilized. In wetland areas, the method used for the installation of structures would depend on the nature of the sub-surface conditions. Excess soil from the holes in wetland areas will be transported to upland areas and stabilized. No concrete foundations are anticipated to be used in wetlands, but final determinations will be made after design and field surveys are completed. Conductors would be pulled through each structure using tensioning equipment. As mentioned previously, danger trees would also be removed along the corridor. Danger trees are trees outside the cleared corridor that are tall enough to potentially impact the transmission line should the trees fall into the ROW.

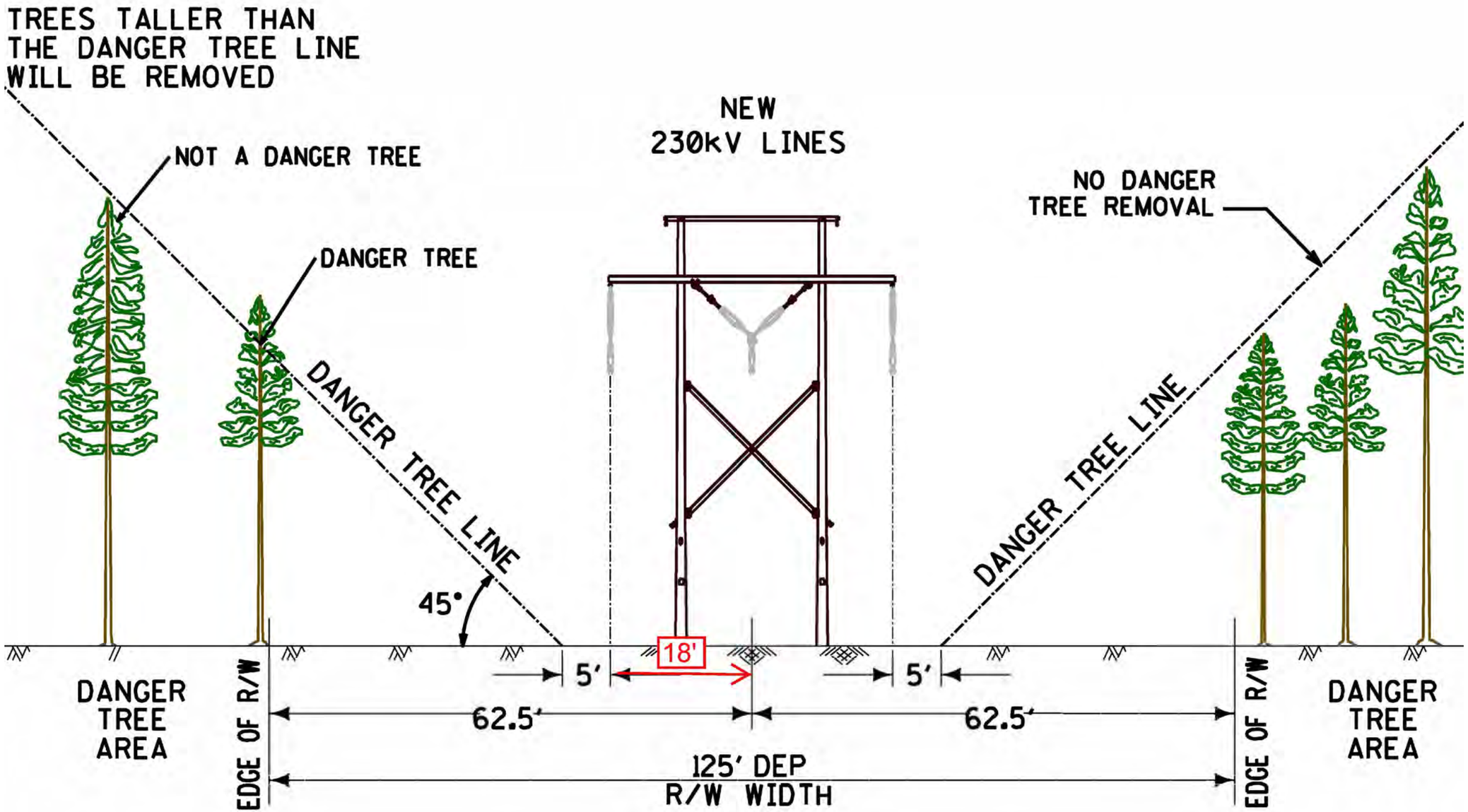


Figure 2-1
Duke Energy
Wilmington NE Reliability Project
Typical Structure

Path: Z:\Clients\ENS\DukeEnrgyPro\105077_PortersNeck230\Studies\Siting\Report\Report Figures\mxd\Figure 2-2 Typical Structure.mxd jdunham 5/9/2019

Service Layer Credits:
Source: Duke Energy Progress, Inc.

Issued: 5/9/2019

Maintaining the ROWs under, and immediately adjacent to, transmission lines is essential for the reliable operation of the line and public safety. Operation and maintenance of the line would consist of periodic inspections of the line and ROW, replacement of hardware, as necessary, and periodic cutting of danger trees and tall vegetation within the corridor.

Periodic inspections of the transmission line would occur on a regular basis and could utilize both aircraft and walking patrols. Normal operation and maintenance would require only infrequent visits by Duke or its contractors. Duke would use an integrated vegetation management approach to include both chemical and limited mechanical control methods to maintain the ROW. Most maintenance activities are on an approximately 6-year cycle, and danger trees are cut as needed. Herbicides are the preferred method of maintaining the ROW. Herbicides are applied to individual woody stems using a low volume backpack sprayer. Duke uses herbicides approved by the U.S. Environmental Protection Agency (EPA) for use on terrestrial and wetland transmission line ROWs.

2.3 Project Schedule

The projected schedule for the Project is described below:

- Route selection: Spring 2019
- ROW acquisition: Summer 2019 - Summer 2020
- Construction: Summer 2020 - Summer 2022
- In-service date: December 2022

3.0 DESCRIPTION OF THE STUDY AREA

The Project's study area is in coastal southeast North Carolina in New Hanover and Pender Counties. Most of the study area is located in New Hanover County, with Pender County comprising the northeastern portion of the study area. The three existing transmission lines that follow the western boundary of the study area are the Brunswick Plant Unit 1-Castle Hayne 230kV, Castle Hayne-Wilmington Corning Sw. St. 230kV, and Sutton Plant-Castle Hayne 230kV transmission lines. The northern boundary consists of the existing Castle Hayne – Folkstone 230kV transmission line, and the eastern boundary generally parallels Duke's existing Scotts Hill 230kV tap line. The southern boundary of the study area extends just south of, and parallel to, U.S. Highway 17 and Interstate 140. The study area encompasses approximately 20 square miles and is shown in Figure 3-1.

The following describes existing environmental conditions, including the natural and social resources located within the study area. The information presented in this chapter was obtained from publicly available data sets and visual observations from public roads.

3.1 Natural Resources

The following is a description of natural resources in the study area that could be affected by the construction and operation of the proposed Project. These resources include topography, soils, hydrology, vegetation, wetlands, wildlife, and managed lands. The potential impacts of this Project upon these resources are described in Chapter 5.0.

3.1.1 Topography

The study area lies within the Coastal Plain province along the coast of North Carolina. This province is generally flat with some gently rolling hills. Elevations range from sea level to near 600 feet in the western portions of the province. The study area is less than four miles from the Atlantic Ocean, and the topography is mostly flat and less than 30 feet above sea level (North Carolina Department of Environmental Quality [NCDEQ], 2018a).

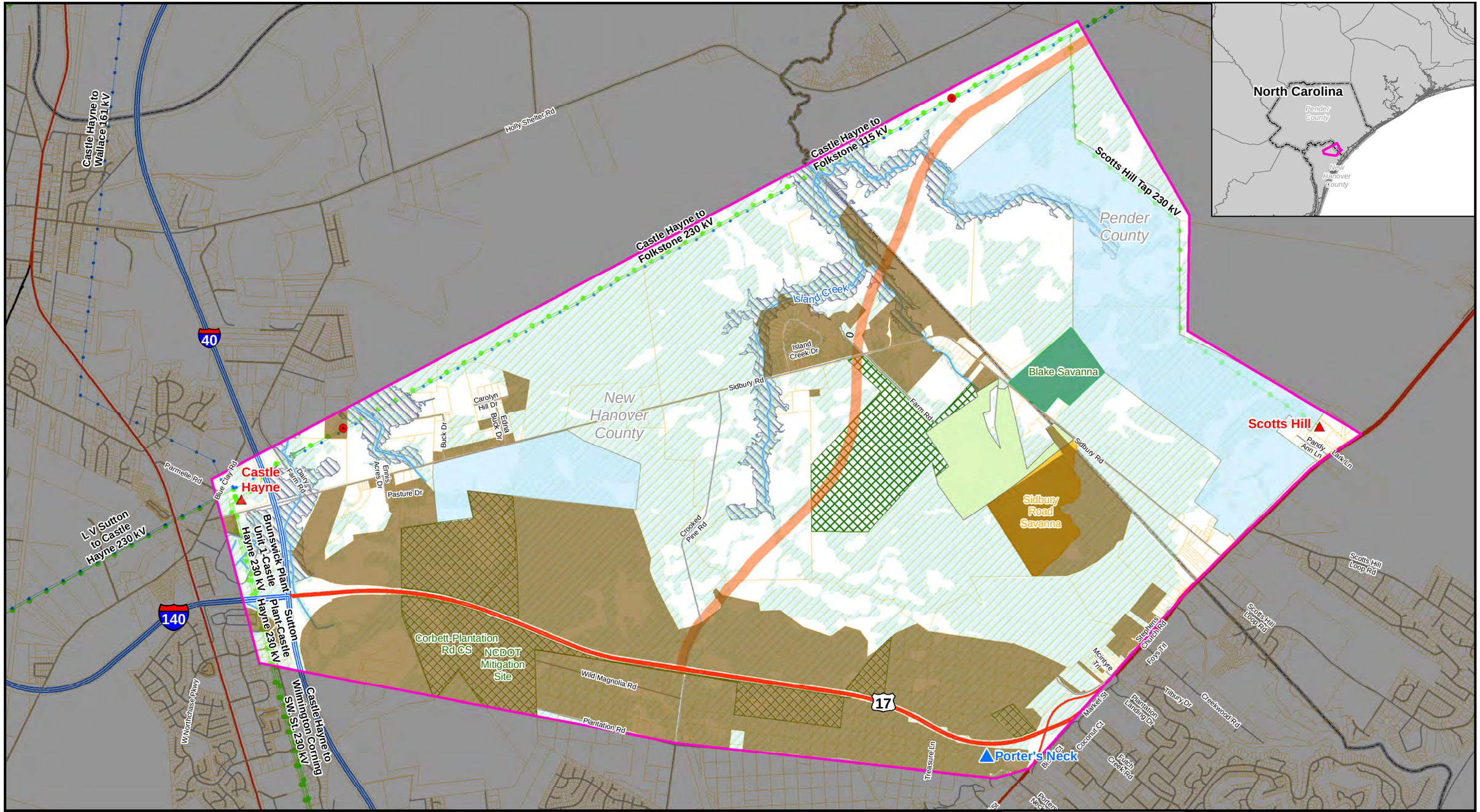
3.1.2 Soils

Land use patterns in the study area are influenced by the suitability and limitations of soil properties for development. The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) has surveyed and mapped the soil units in New Hanover and Pender Counties based on the physical properties and composition of the soil and the amount of slope and drainage where the soil is located. These soil maps are helpful in planning future land use and development.

ATTACHMENT A

OFFICIAL COPY

Aug 13 2019



Legend

- Proposed Substation Location
- Study Area
- Siting Points (Structures 8 and 42)
- Development Subdivision Parcel
- Proposed Development
- Proposed Natural Area
- Proposed Hampstead Bypass
- DOT Mitigation Property
- Wetland
- 100-yr Floodzone
- Parcel Boundary
- Existing Substation
- 230 kV Transmission Line
- 161 kV Transmission Line

NORTH

3,000 1,500 0 3,000

Scale in Feet

DUKE ENERGY®

Figure 3-1
Duke Energy
Wilmington NE Reliability Project
Study Area

Source: NCDOT, FAA, Ventyx Velocity, Esri, FCC, NCHPO, FWS NWI, USGS NHD, New Hanover County, FEMA, NCDNR, and Burns & McDonnell Engineering Company, Inc.

Issued: 6/4/2019

Soil associations describe the soil characteristics in a specific geographic region. The Project study area is primarily comprised of nine soil associations (NRCS, 1977 and NRCS, 1990). These are described in Table 3-1.

Table 3-1: New Hanover and Pender County Soil Associations

Soil Association	Characteristics
Dorovan-Johnston	• Poorly drained • Muck, loam, sandy loam surface layer • Muck or sand underlying layer • Found in areas flooded by streams or tides
Kureb-Baymeade-Rimini	• Excessively drained to well drained • Sand and fine sand surface layer • Sand, fine sandy loam and loamy fine sand subsoil • Found in uplands
Tidal Marsh-Newhan	• Tidal marsh and excessively drained • Sandy throughout • Found on flats and dunes along the seashore
Murville-Seagate-Leon	• Very poorly to somewhat poorly drained • Fine sand and sand surface layer • Fine sand, sand, sandy loam, and clay loam subsoil • Found in uplands and on stream terraces
Murville-Croatan-Torhunta	• Nearly level, very poorly drained • Mucky or loamy surface layer • Sandy or loamy subsoil • Mainly in large interstream areas
Leon-Mandarin	• Nearly level, poorly drained • Sandy throughout • Mainly in large, broad interstream areas
Foreston-Autryville-Baymeade	• Nearly level to gently sloping • Moderately well drained to well drained • Sandy surface layer • Loamy or sandy subsoil • Found near major drainageways
Alpin-Pactolus-Kureb	• Nearly level to gently sloping • Excessively drained to moderately well drained to somewhat poorly drained • Sandy throughout

Soil Association	Characteristics
Muckalee-Dorovan	• Nearly level, poorly drained and very poorly drained • Loamy surface layer • Underlain by a loamy and sandy or sapric material • Associated with major streams

3.1.3 Water Resources

The study area lies within the Cape Fear River Basin. The Cape Fear River Basin drains approximately 9,300 square miles in the middle portion of North Carolina and encompasses 26 counties, including New Hanover and Pender Counties (NCDEQ, 2018b).

There are few distinct hydrological features within the study area, with the major features being Prince George Creek, Island Creek, and two unnamed tributaries to Island Creek. Surface water in North Carolina is assigned a surface water classification for the best use by the North Carolina Division of Water Resources (NCDWR, 2018). Prince George and Island Creeks are classified as "C", which are identified as fishable and swimmable waters, and "Sw", which is a supplemental classification recognizing waters with low velocities and other characteristics different from adjacent streams. Supplemental classifications are sometimes added to the primary classification to provide extra protection to water with special uses. Additionally, Prince George and Island Creeks, along with one of the unnamed tributaries of Island Creek, are classified as "Impaired" and are listed under section 303(d) of the Clean Water Act.

3.1.4 Vegetation

The study area is in the Coastal Plain region of North Carolina and is generally flat with forested areas and a few agricultural fields. Timbered areas consist of loblolly pine (*Pinus taeda*) and longleaf pine (*Pinus palustris*), along with oak (*Quercus spp*), hickory (*Carya spp*), cypress (*Taxodium spp*), sweetgum (*Liquidambar styraciflua*), blackgum (*Nyssa sylvatica*), and beech (*Fagus spp*) (Bailey, 1995 and NCPedia, 2018). Other vegetation includes goldenrod (*Solidago spp*), eastern red cedar (*Juniperus virginiana*), and cattail (*Typha spp*). Crop fields, although few, within the study area appear to consist of soybeans (*Glycine max*) and corn (*Zea mays*).

3.1.5 Federally Listed Plant Species

According to the U.S. Fish and Wildlife Service (USFWS), five Federally protected plant species either occur or may be potentially affected by activities within the Project study area (USFWS, 2018). This

information was obtained using the USFWS Information for Planning and Consultation (IPaC) online search within the Project area. A list of these species is shown in Table 3-2.

Table 3-2: USFWS Federally Listed Plant Species

Common Name	Scientific Name	New Hanover County	Pender County	Federal Status[a]
American chaffseed	*Schwalbea americana*		X	E
Cooley's meadowrue	*Thalictrum cooleyi*	X	X	E
Golden sedge	*Carex lutea*	X	X	E
Rough-leaved loosestrife	*Lysimachia asperulaefolia*	X	X	E
Seabeach amaranth	*Amaranthus pumilus*	X	X	T

(a) E = Endangered; T = Threatened

Additionally, the venus flytrap (*Dionaea muscipula*) is known to occur within the Project study area and is listed as SC-V (special concern-vulnerable) by the North Carolina Natural Heritage Program (NC NHP). According to the NHP, species designated as SC-V are likely to become a threatened species within the foreseeable future.

3.1.6 Wetlands

Wetlands are areas inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal circumstances do support, vegetation adapted for life in saturated soil conditions (U.S. Army Corps of Engineers [USACE], no date). Wetlands filter sediments and contaminants, reduce flood damage, provide breeding grounds for fish and wildlife, including endangered species, and protect shorelines from erosion. Reducing and preventing loss and damage to wetlands is a primary goal of the Clean Water Act (USACE, no date).

According to National Wetland Inventory (NWI) and North Carolina Coastal Region Evaluation of Wetland Significance (NC-CREWS) data available in Geographic Information System (GIS) format, a majority of the study area is considered to be wetland. Most of the wetlands found within the study area are categorized as palustrine, which are non-tidal, vegetated wetlands defined by dominant plant species, such as trees, shrubs, and emergents (herbaceous plants) (Cowardin et al., 1979). The study area contains three main groups of palustrine wetlands: emergent, forested, and scrub-shrub. Forested wetlands are the most common within the area, with other wetlands along riparian areas associated with streams and creeks.

3.1.7 Wildlife

Wildlife species typically found in New Hanover and Pender Counties may be present within the study area. Mammal species potentially occurring in the study area include: eastern fox squirrel (*Sciurus niger*), red fox (*Vulpes vulpes*), eastern cottontail rabbit (*Sylvilagus floridanus*), American beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), coyote (*Canis latrans*), common gray fox (*Urocyon cinereoargenteus*), common raccoon (*Procyon lotor*), bobcat (*Lynx rufus*), Virginia opossum (*Didelphis virginiana*), and whitetail deer (*Odocoileus virginianus*) (North Carolina Wildlife Resources Commission [NCWRC], 2018).

Bird species likely to be found within the study area include waterfowl species such as mallard duck (*Anas rubripes*), black duck (*Anas rupripes*), wood duck (*Aix sponsa*), and Canada goose (*Branta canadensis*). Other bird species may include the following: great blue heron (*Ardea Herodias*), red-shouldered hawk (*Buteo lineatus*), mourning dove (*Zenaida macroura*), wild turkey (*Meleagris gallopavo*), great horned owl (*Bubo virginianus*), northern bobwhite (*Colinus virginianus*), barred owl (*Strix varia*), American crow (*Corvus brachyrhynchos*), and bald eagle (*Haliaeetus leucocephalus*) (NCWRC, 2018).

Reptiles and amphibians potentially found in the study area include green anole (*Anolis carolinensis*), southern toad (*Bufo terrestris*), American bullfrog (*Rana catesbeiana*), green tree frog (*Hyla cinerea*) southern leopard frog (*Rana sphenocephala utricularia*), eastern box turtle (*Terrapene carolina carolina*), diamondback terrapin (*Malaclemys terrapin*), corn snake (*Elaphe guttata*), eastern garter snake (*Thamnophis sirtalis sirtalis*), and cottonmouth (*Agkistrodon piscivorus*) (NCWRC, 2018).

3.1.8 Federally Listed Animal Species

According to USFWS, 12 Federally protected animal species either occur or may be potentially affected by activities within the Project study area (USFWS, 2018). This list was obtained using the IPaC online search within the study area. A list of these species is shown in Table 3-3.

Table 3-3: USFWS Federally Listed Animal Species

Common Name	Scientific Name	New Hanover County	Pender County	Federal Status[a]
Northern long-eared bat	*Myotis septentrionalis*	X	X	T
West Indian manatee	*Trichechus manatus*	X	X	T
Piping plover	*Charadrius melodus*	X	X	T
Red knot	*Calidris canutus rufa*	X	X	T
Red-cockaded woodpecker (RCW)	*Picoides borealis*	X	X	E
American alligator	*Alligator mississippiensis*	X	X	SAT
Green sea turtle	*Chelonia mydas*	X	X	T
Hawksbill sea turtle	*Eretmochelys imbricata*	X	X	E
Kemp's ridley sea turtle	*Lepidochelys kempii*	X	X	E
Leatherback sea turtle	*Dermochelys coriacea*	X	X	E
Loggerhead sea turtle	*Caretta caretta*	X	X	T
Magnificent ramshorn	*Planorbella magnifica*	X		C

(a) E = Endangered; T = Threatened; SAT = Similarity of Appearance (Threatened); C = Candidate

3.1.9 Federally Owned and Managed Lands

No Federally owned or managed lands occur within the Project study area.

3.1.10 State Owned and Managed Lands

According to the North Carolina Department of Natural Resources (NCDNR) Managed Lands GIS data (2018), the only State-owned and managed tracts of land within the Project study area are several North Carolina Department of Transportation (NCDOT) mitigation sites located adjacent to U.S. Highway 17 and also in the central portion of the study area south of Sidbury Road.

3.1.11 County / Locally Owned and Managed Lands

According to the North Carolina Natural Heritage Data Explorer (NCNHDE) GIS database (2018), there are two locally owned and managed lands within the Project study area. Blake Savanna is a 109-acre, privately-owned property that is designated as a "general" natural area. The Sidbury Road Savanna is a 181-acre, privately-owned property that is designated as a "high" natural area. Both properties are managed as undisturbed natural areas for animal and plant species and communities. Both tracts are located along Sidbury Road in the eastern part of the study area. Additionally, an approximately 200-acre property adjacent to the existing Sidbury Road Savanna has been recently purchased with the intent of adding this property to the existing Sidbury Road Savanna natural area.

3.2 Social Resources

Following is a description of the social resources in the study area that could be impacted by the construction and operation of the proposed Project. Topics addressed include patterns of land use and socioeconomics, cultural resources, and visual character.

3.2.1 Land Use and Development Patterns

This section contains information on general land use patterns, agriculture, residential areas, recreation areas, transportation, and utilities within the study area. No municipal boundaries occur within the Project study area, although the City of Wilmington is located southwest of the study area, and there are several unincorporated communities surrounding the study area. The study area consists of some small residential subdivisions, rural residences located mostly along Sidbury Road, large tracts of woodland, and some commercially developed areas along U.S. Highway 17.

3.2.1.1 Agriculture

According to the North Carolina Department of Agriculture and Consumer Services (2018) 2012 Census of Agriculture, New Hanover County contains 50 farms totaling 2,881 acres, while Pender County contains 335 farms totaling 55,775 acres. The primary crops grown in both counties are corn and wheat. Livestock produced in both counties include hogs, pigs, and poultry. Within the Project study area, there are few areas under agricultural production, although there are numerous planted pine trees in some of the undeveloped areas that may be harvested for timber in the future.

3.2.1.2 Urban and Residential Areas

When siting transmission lines, it is preferable to minimize potential impacts to residences and urban areas, if possible. The public prefers that new transmission lines be located as far away from their homes, businesses, and public facilities as possible. Therefore, it is important to understand the population density, housing units, and development trends of the area when identifying new transmission line routes. Population is also an important consideration which is summarized in Section 3.2.2.1.

The population density for North Carolina was 196.1 persons per square mile in 2010. New Hanover County, with a population density of 1,058.1 persons per square mile, includes the City of Wilmington and was well above the State's population density (U.S. Census Bureau, 2018). Pender County's population density in 2010 was 60.0 persons per square mile, which was well below the State's population density (U.S. Census Bureau, 2018). The portions of New Hanover and Pender Counties included within the study area are generally less developed and more rural in nature; however, there are a few residential subdivisions located within the study area, and some commercial development along U.S.

Highway 17. Additionally, there are current and future plans for residential and commercial developments that are in various planning stages within the study area. Figure 3-1 shows the locations in the study area where the public indicated there are plans for subdivisions or where plans have been submitted to the counties for review and approval.

3.2.1.3 Recreation Areas

Outdoor recreational opportunities, such as hunting and fishing, can be found in the forested areas, fields, and streams within the study area. Built recreational areas such as parks, ball fields, and golf courses are not located within the study area.

3.2.1.4 Transportation and Utilities

Most of the transportation infrastructure is located on the periphery of the study area, while the interior of the study area is largely inaccessible via public roads and can only be accessed by private dirt and logging roads. Interstate 40 passes through the extreme western portion of the study area in a north-south direction. Interstate 140 extends across the southern boundary of the study area before merging into U.S. Highway 17 and exiting the study area to the east. Sidbury Road extends through the study area in an east-west direction before turning to the southeast and terminating at U.S. Highway 17. The only other public roads within the study area are those within the few subdivisions occurring along Sidbury Road.

In addition to existing roads, the NCDOT has developed plans for a new roadway that has been approved within the study area. The Military Cutoff / Hampstead Bypass will enter the study area from the south and include an interchange with U.S. Highway 17 before extending to the northeast and exiting the study area in the northeast corner parallel to the south side of the existing Castle Hayne – Folkstone 230kV transmission line. This new roadway, currently in the ROW acquisition phase and scheduled for construction in 2023, is expected to provide additional opportunities for commercial and residential development within the study area (NCDOT, 2018).

Two existing Duke-owned substations occur within the Project study area, and one proposed Duke-owned substation is scheduled for construction within the study area boundary. The Castle Hayne 230kV Transmission-to-Transmission Substation is located in the extreme northwestern corner of the study area west of Interstate 40. The Scotts Hill 230kV Substation is in the far eastern portion of the study area just north of U.S. Highway 17. Duke's proposed Porter's Neck T-D Substation will be constructed between U.S. Highway 17 and Porter's Neck Road along the southern boundary of the study area. Several Duke-owned transmission lines occur in the study area as well. Duke operates the Castle Hayne – Folkstone 230kV transmission line, which extends from the Castle Hayne 230kV Substation and extends in a

northeasterly direction, forming the northern boundary of the study area. The Castle Hayne 230kV Sub - Folkstone 115kV transmission line parallels this same path. The Brunswick Plant Unit 1-Castle Hayne 230kV, Castle Hayne-Wilmington Corning Sw. St. 230kV and Sutton Plant-Castle Hayne 230kV transmission lines extend along the western boundary of the study area into the Castle Hayne 230kV Substation. Near the eastern boundary of the study area, the Scotts Hill 230kV Tap transmission line extends from the Scotts Hill 230kV Substation generally northwesterly before connecting to the Castle Hayne – Folkstone 230kV transmission line (see Figure 2-1).

No rail lines or airports are found within the study area. The Wilmington International Airport, however, is located about three miles south of the study area. One of its runways (6/24) runs generally southwest to northeast and the approach surface for this runway extends into the study area.

3.2.2 Socioeconomic Patterns

This section contains data on population and employment in New Hanover and Pender Counties.

3.2.2.1 Population

Like urban areas, population densities, and housing units, understanding populations and trends within the counties within the study area can help to identify areas of constraint and to develop routes that minimize impacts to the extent practicable.

Between 2010 and 2017, North Carolina's population grew by approximately 7.7 percent, from 9.5 to 10.3 million people. During this same period, New Hanover County experienced a population growth of 12.1 percent, from an estimated 202,667 to 227,198. Pender County experienced a growth of 16.8 percent, from an estimated 52,217 to 60,958 (U.S. Census Bureau, 2018).

3.2.2.2 Employment and Income

According to the U.S. Census Bureau's 2016 American Community Survey (2016a), North Carolina's labor force was 62.6 percent of the population (individuals 16 years of age and over), while New Hanover and Pender County's labor force was 64.4 percent (2016b) and 58.9 percent (2016c), respectively. During the same period, the unemployment rate for North Carolina was 5.1 percent, while the unemployment rate was 5.0 percent in New Hanover County and 5.8 percent in Pender County. The predominant industries for New Hanover County in 2016 were educational services, health care and social assistance, entertainment, recreation, and retail trade. Predominant industries for Pender County included educational services, health care and social assistance, retail trade, and construction.

3.2.3 Cultural Resources

Burns & McDonnell archaeologists performed a records search on June 4, 2018, at the State Historic Preservation Office (SHPO) in Raleigh, North Carolina. There are three previously identified archaeological sites located within the study area. Two sites have been evaluated as not eligible for the National Register of Historic Places (NRHP), and the other site has not been assessed. No listed NRHP, North Carolina Historic Preservation Office Study List, local districts, or local landmarks were found within the study area. One building, the Wesleyan Chapel United Methodist Church, has been determined to be eligible for the NRHP but is not currently listed.

3.2.4 Visual Character

The visual character of an area is a function of the terrain, land cover, and land use. Throughout the study area, the land cover is predominantly forested, with some pasture and a few agricultural fields. The terrain within the study area is very flat. The high density of wooded cover will help reduce the overall visual impact of the line.

The number of people potentially within view of the new line, depending on the route selected, is relatively low, due to the study area being relatively undeveloped and mostly forested. However, the preferred route will have to cross U.S. Highway 17 due to the proposed Porter's Neck Substation location, so the line would be visible to motorists for a brief period as they pass under the line. Other existing man-made elements in the study area include other roadways, transmission lines, distribution lines, and commercial development along U.S. Highway 17, which help to reduce the visual impact of the line in these locations.

4.0 ANALYSIS OF ALTERNATIVES

Duke retained Burns & McDonnell to assist in the route selection, public involvement, and documentation for the Project. This section presents the rationale behind the route identification and evaluation process used for the Project. The evaluation ultimately resulted in the selection of a preferred route.

4.1 Overview of the Routing Process

The following is an overview of the steps involved in the identification of the route alternatives and the selection of a preferred route for the Project.

The limits of the study area were established based on the proposed location of the Porter's Neck Substation, potential tap locations along the Castle Hayne-Folkstone 230kV transmission line (preferably between structures 8 and 42, per Duke engineers), and a preliminary review of potential routing opportunities and constraints in the area. The study area, which encompasses approximately 20 square miles, is shown in Figure 3-1. The study area was defined to incorporate potential Project tap points while offering an area large enough to provide a set of reasonable and geographically distinct route alternatives.

After establishing the study area, data was collected from publicly available sources, including Federal, State, county, and local agencies, for constraints and environmental concerns that could result in challenges for the siting of a transmission line. The collected data were used to create a raster-based suitability surface (described in the following paragraphs) within a GIS framework. The purpose of the suitability surface, and subsequent analysis, was to aid in the identification of areas more likely suitable for the placement of a transmission line route.

Collected data were grouped into 1 of 10 categories: cultural resources, flood zones, land cover, community amenities and public infrastructure, natural resources, occupied buildings, prime and important farmland, public visibility, water features, and current zoning. Each category was further divided into individual criteria and assigned a weight according to each criterion's potential sensitivity to a transmission line, as determined by members of Duke's Project team and based upon a review of the conditions in the study area (Appendix A).

The suitability surface was created using the weighted criteria. Using GIS, criteria were combined through a process called overlay analysis, which results in a cumulative suitability rating by adding the weighted criteria together for each cell within the suitability raster. This results in a single suitability

surface that can be reviewed by the siting team as a means of identifying preferred siting areas. GIS can then use color-coding to help visually display areas of lesser potential impact (Figure 4-1).

This process effectually considers the study area in its entirety. The data and computation are typical of standard siting methods, but suitability analysis creates a visual aid to assist the siting team in identifying potential areas for route alternatives that have a reduced likelihood of potential impact to established criteria.

After completion of a suitability analysis, potential routes were identified (Section 4.2). The objective was to identify economically feasible routes that connected the proposed Porter's Neck T-D Substation to a selected tap location along the Castle Hayne - Folkstone 230kV transmission line while avoiding or minimizing impacts to both community and natural resources. Co-location opportunities with existing transmission lines and roads were investigated during the development of the preliminary routes. Due to the location of the proposed substation and existing transmission lines in the area, and residential and commercial development along the limited roadways in the study area, opportunities to co-locate along existing transmission lines and roadways were limited and include essentially only the Scotts Hill Tap line.

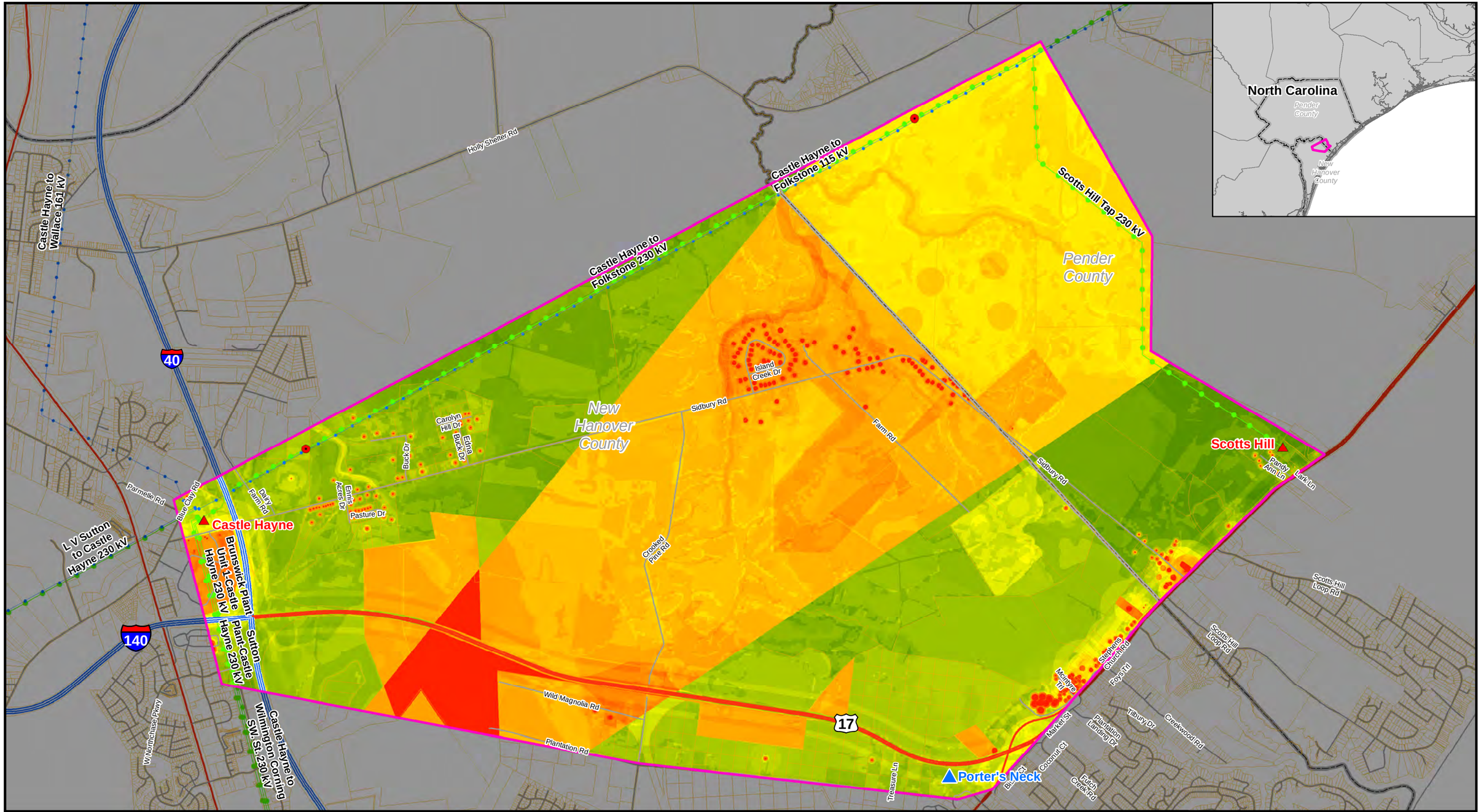
Local, State, and Federal government agencies were contacted by Duke to obtain information on resources of particular concern that were relevant to the routing process. The potential route alternatives were shared with the public and local officials throughout the route identification process to obtain input for the evaluation of the alternatives. The study team then quantified the engineering, social, and environmental resources that would be impacted by each feasible route. Quantitative data and public input were used to evaluate the alternatives and to select a preferred route for the proposed transmission line. Activities leading to the selection of the preferred route are described in more detail in the following sections.

4.2 Identification of Route Alternatives

The objective of the routing analysis was to identify not only an economically feasible route that offered the most benefits in terms of providing reliable electric service, but also limited adverse impacts to the social and natural environment within the study area. This effort included four main components:

- Field reconnaissance of the study area from publicly accessible roadways
- Review of USGS topographic maps and recent aerial photography
- Review of local planning and zoning documents and available GIS data
- Contacts with local, State, and Federal agencies

ATTACHMENT A



Legend

- Study Area
- Proposed Substation Location
- Siting Points (Structures 8 and 42)
- Existing Substation
- 230 kV Transmission Line
- 161 kV Transmission Line
- **Suitability Factor**
  - Low Suitability
  - High Suitability
- Parcel Boundary

NORTH

3,000 1,500 0 3,000

Scale in Feet

DUKE ENERGY®

Figure 4-1
Duke Energy
Wilmington NE Reliability Project
Suitability

Source: NCDOT, FAA, Ventyx Velocity, Esri, FCC, NCHPO, FWS NWI, USGS NHD, New Hanover County, FEMA, NCDNR, and Burns & McDonnell Engineering Company, Inc.

Issued: 6/3/2019

Based on the information gathered, a set of feasible routes was identified that would connect the proposed Porter's Neck Substation to any one of five suitable tap locations along the Castle Hayne - Folkstone 230kV transmission line. Duke engineers reviewed wetland survey data, accessibility, locations of existing switches and taps, and other engineering requirements along the Castle Hayne – Folkstone line to identify feasible tap locations. They identified five viable tap locations, although only one location would be used by the preferred route alignment. The primary goals regarding routing were to:

- Minimize impacts to wetlands, protected lands, and sensitive species habitats, where possible
- Maximize the distance of the line from existing residences and existing subdivisions, when possible
- Minimize impacts to private property by following existing parcel boundaries when feasible
- Minimize the overall length of the route

The route alternatives consist of individual segments that can be combined in different arrangements to form a continuous path from the proposed substation to one of the identified tap locations. Each segment begins and ends at intersections with other segments. The set of route alternatives for this Project consisted of 33 individual segments. The alternatives were identified to minimize, to the extent practicable, impacts to environmentally sensitive features and residential areas while providing a direct route alignment. Ultimately, 49 distinct routes were developed using a combination of the 33 segments. Figure 4-2 shows the route alternatives network overlaid on the suitability analysis map, while Figure 4-3 shows the route alternatives on an aerial background of the study area.

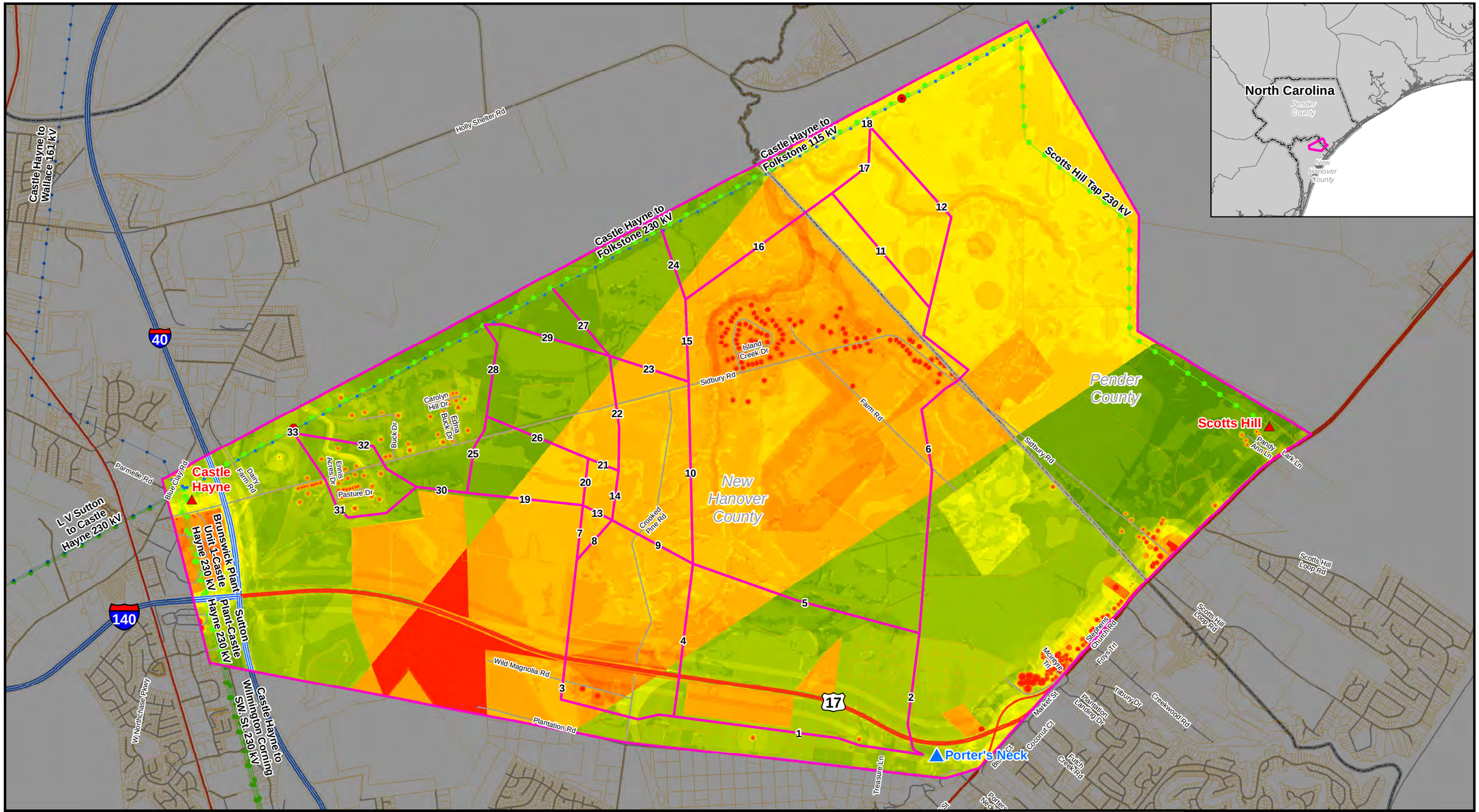
4.3 Public Involvement Activities

To determine community values relative to the proposed Project, the route selection process included two forms of public input. These included communications with Federal, State, and local agencies, as well as public information workshops held by Duke. All input was used to assess the values and attitudes of the residents and public officials regarding the Project, which enabled the Project team to identify the most appropriate factors to evaluate the routes and to develop routes that limited impacts to resources of primary concern to the public agencies and to residents.

4.3.1 Agency Communication

Local, State, and Federal agencies were contacted by Duke (via mail correspondence) to provide input on threatened and endangered species, wetlands, wildlife resources, stream sensitivity, and other potential permitting issues. On April 4, 2018, Duke held an agency scoping meeting at the North Carolina Department of Environmental Quality (NCDEQ) Wilmington Regional Office to discuss the Project and

ATTACHMENT A



Legend

- Study Area
- Preliminary Route Alternative
- Proposed Substation Location
- Siting Points (Structures 8 and 42)
- Existing Substation
- 230 kV Transmission Line
- 161 kV Transmission Line
- **Suitability Factor**
  - Low Suitability
  - High Suitability
- Parcel Boundary

NORTH

3,000 1,500 0 3,000

Scale in Feet

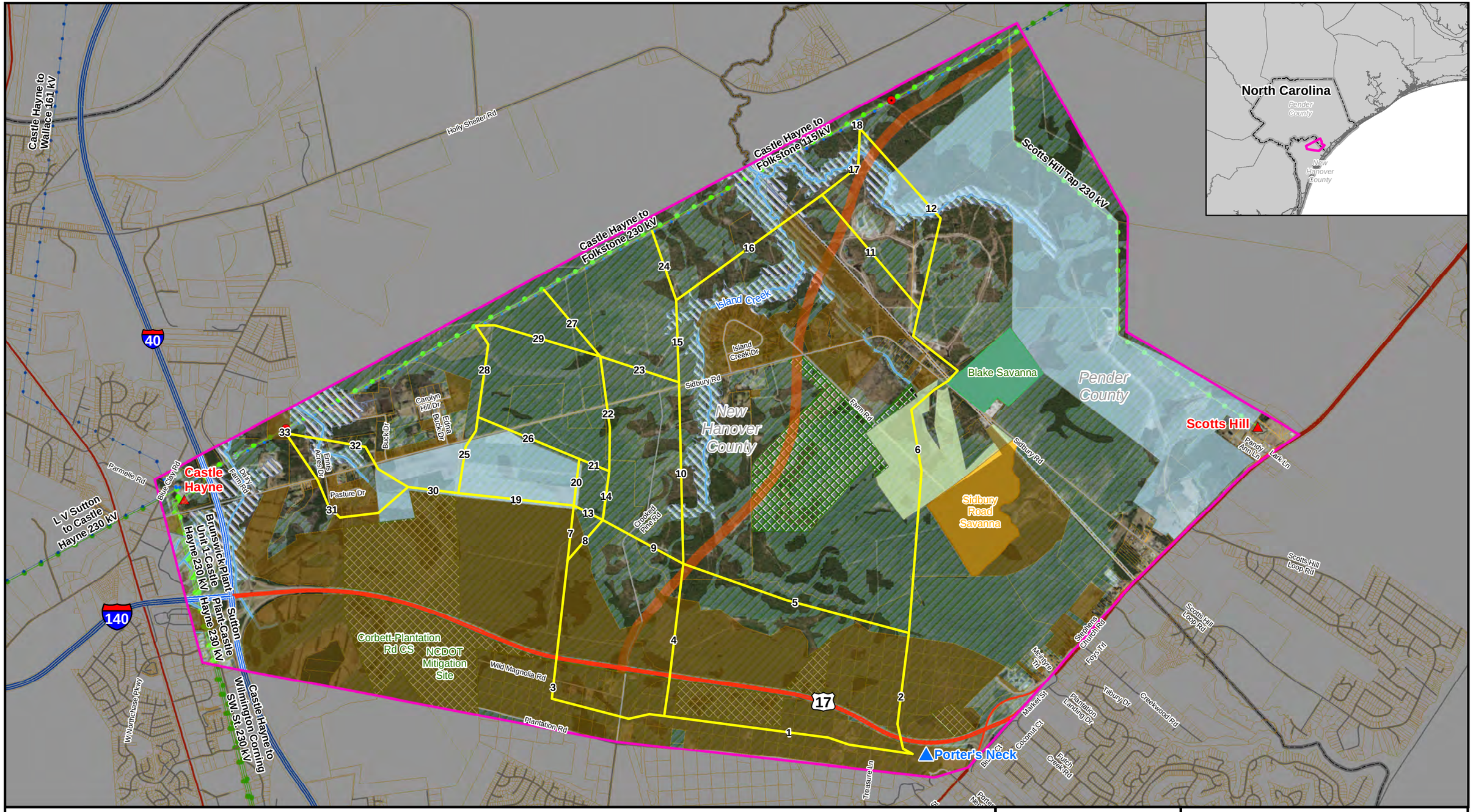
DUKE ENERGY®

Figure 4-2
Duke Energy
Wilmington NE Reliability Project
Suitability with Route Alternatives

Source: NCDOT, FAA, Ventyx Velocity, Esri, FCC, NCHPO, FWS NWI, USGS NHD, New Hanover County, FEMA, NCDNR, and Burns & McDonnell Engineering Company, Inc.

Issued: 6/3/2019

ATTACHMENT A



Legend

- Study Area
- Proposed Substation Location
- Development Subdivision Parcel
- Proposed Development
- Siting Points (Structures 8 and 42)
- Proposed Hampstead Bypass
- DOT Mitigation Property
- Proposed Natural Area
- Parcel Boundary
- Wetland
- 230 kV Transmission Line
- 161 kV Transmission Line
- 100-yr Floodzone
- Preliminary Route Alternative
- Existing Substation

NORTH

3,000 1,500 0 3,000

Scale in Feet

DUKE ENERGY®

Figure 4-3
Duke Energy
Wilmington NE Reliability Project
Preliminary Route Alternatives

Source: NCDOT, FAA, Ventyx Velocity, Esri, FCC, NCHPO, FWS NWI, USGS NHD, New Hanover County, FEMA, NCDNR, and Burns & McDonnell Engineering Company, Inc.

Issued: 6/3/2019

gather input from the agencies. A list of invited agencies and those who attended the scoping meeting are found in Appendix B. The primary concerns discussed during the agency scoping meeting were related to NCDOT mitigation properties within the study area, the presence of Federally protected species, and wetlands within the study area. Copies of agency correspondence are included in Appendix B.

4.3.2 Public Information Workshops

The intent of the public information workshops was to provide potentially affected landowners near the alternative routes an understanding of the need for the Project, present the decision-making process used to select a preferred route, and to provide a forum to voice concerns about the proposed Project.

To gather public input on the study area and route alternatives, Duke held two open-forum informational workshops. The first workshop was a study area workshop, while the second presented the potential route alternatives for the proposed transmission line. Information about the Project and a map of the study area and routes were also available on a project-specific Duke website throughout the duration of the route selection phase. Comments could be left on the website application. The Project website is updated as the development and construction of the Project progresses. Copies of the news release, letters, and website information are included in Appendix C.

The study area workshop, held on July 26, 2018 at the Scott's Hill Baptist Church in Wilmington, North Carolina, introduced the project to the community. At this event, information about the need for the project was available as were detailed maps showing the locations of sensitive data collected and described in Section 3 of this report. Duke also asked invitees and attendees of the workshop to provide additional data that may assist with the Company's efforts to identify potential route alternatives.

Duke also held a route alternatives workshop on January 22, 2019, at the Scott's Hill Baptist Church in Wilmington, North Carolina. There was a delay between workshops due to the damage inflicted on the area from Hurricane Florence (on September 14, 2018). A total of 9 people signed in for the study area workshop in July, and 25 people signed in for the route alternatives workshop in January. On both evenings, there were additional attendees observed that did not sign in.

An informational letter and small-scale map describing the Project and advertising the workshops was mailed to all property owners within the study area for the first open house and within 500 feet of the alternative routes for the second open house. These notifications were sent via mail approximately two weeks prior to the study area open house, and via certified mail prior to the route alternatives open house. Additionally, a news release was issued to the public seven days prior to the second open house. Both of the public workshops included displays with information on Project need, engineering, environmental

management, and ROW requirements. Representatives from Duke and Burns & McDonnell were present to address the public's questions and take comments. During the second workshop, displays of potential route alternatives for the proposed transmission line were depicted on aerial photographs as well. No preferred route had been selected at the time of the workshops. Photographs and drawings showing the types of structures that would be used for the Project were displayed. Duke staff was also present to discuss ROW acquisition and maintenance, and electric and magnetic fields associated with transmission lines.

Participants at the workshops received a written questionnaire to communicate their opinions on the study area, routing criteria, the segment locations, and issues of concern regarding the Project. The public was asked to return questionnaires at the workshops, by mail, or online within four weeks after the workshops. Individuals could also review the study area and routes and have their comments recorded on GIS computer workstations at the workshops or online. A total of 12 hard copy questionnaires and 2 emails were received by landowners either at the public workshops or through the mail. Additionally, 55 specific comments from landowners were recorded at the GIS computer workstations during the public workshops. A sample questionnaire, as well as a summary of the responses received from the questionnaire, GIS computer workstations, and online, are found in Appendix C.

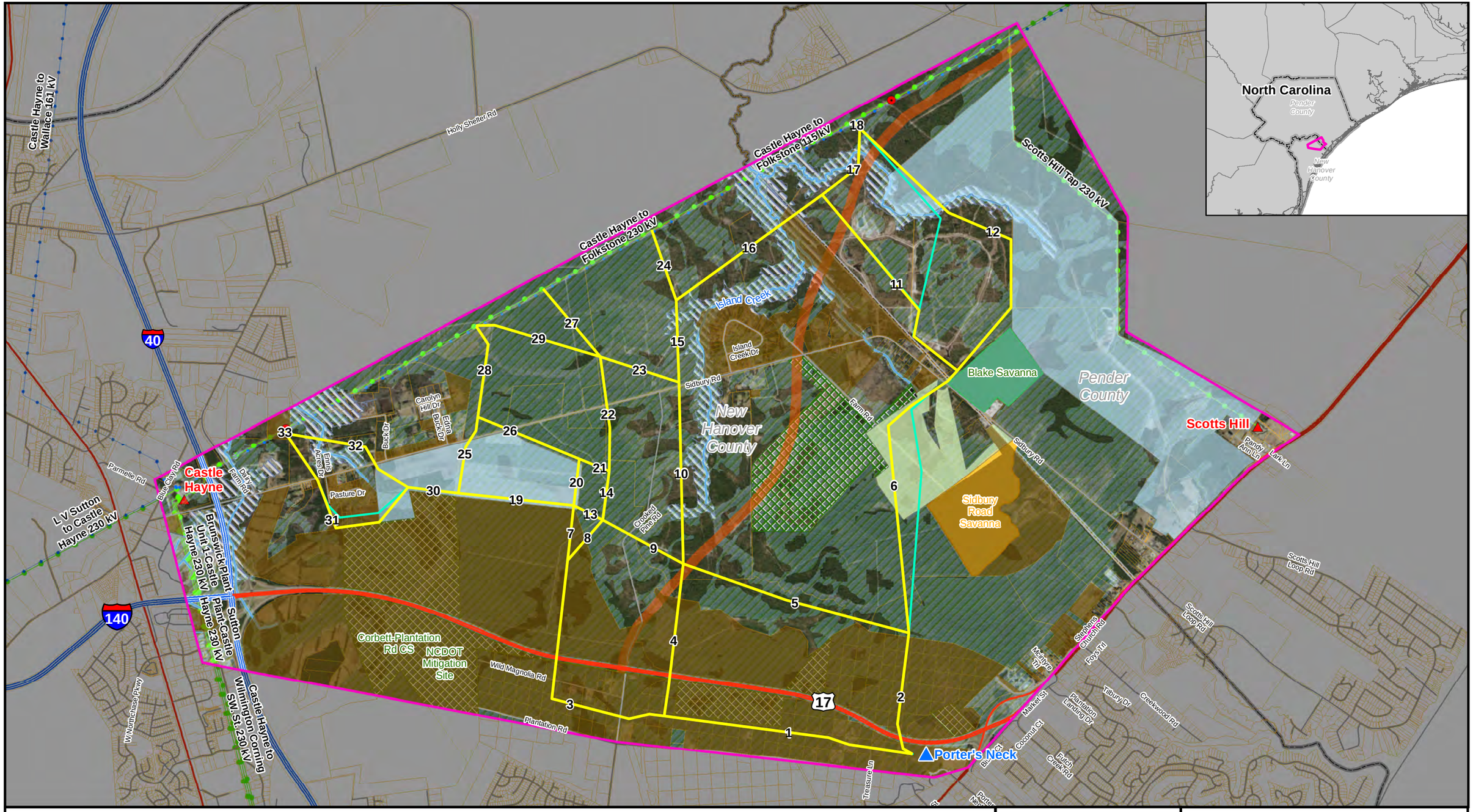
4.3.3 Route Alternatives Adjustments

Following the public informational workshops and comment period, the Project team made some adjustments to the route alternatives network based on comments received during and after the routing public workshop. Specifically, alignment revisions occurred to Segments 6, 11, 12, and 31 to address previously unknown residences, potential residential and commercial developments, or sensitive environmental areas. These revisions were relatively minor and, in each case, moved the segment away from the potential area of concern while maintaining the overall integrity of the route alignment. The revised route alternatives network is shown in Figure 4-4.

4.4 Identification of the Preferred Route

The analysis of alternatives was based on social, environmental, and engineering criteria. Data for each criterion were quantified for each segment and summed for each route. Following is a description of the process that resulted in the selection of a preferred route.

ATTACHMENT A



Legend

- Study Area
- Proposed Substation Location
- Development Subdivision Parcel
- Proposed Development
- Siting Points (Structures 8 and 42)
- Proposed Hampstead Bypass
- DOT Mitigation Property
- Proposed Natural Area
- Parcel Boundary
- Wetland
- 230 kV Transmission Line
- 161 kV Transmission Line
- 100-yr Floodzone
- Preliminary Route Alternative
- Existing Substation
- Revised Route Alternative

NORTH

3,000 1,500 0 3,000

Scale in Feet

DUKE ENERGY®

Figure 4-4
Duke Energy
Wilmington NE Reliability Project
Revised Route Alternatives

Source: NCDOT, FAA, Ventyx Velocity, Esri, FCC, NCHPO, FWS NWI, USGS NHD, New Hanover County, FEMA, NCDNR, and Burns & McDonnell Engineering Company, Inc.

Issued: 6/3/2019

4.4.1 Evaluation Criteria

The evaluation of the proposed routes included a systematic comparison of the alternatives based on land use, social, environmental, and engineering criteria that represent the potential adverse effects on resources in the study area. Table 4-1 shows the routing criteria measured and evaluated.

Table 4-1: Routing Criteria

Routing Criteria	Category	Unit of Measure
Total length	Engineering	Feet
Conservation Lands Score	Land Use	Score
Length through planned residential zones/land use	Land Use	Feet
Road crossings	Engineering	Number
Heavy angles (>20 degrees)	Engineering	Number
Residential Proximity Score	Social	Score
Businesses within 300 feet	Social	Number
Public facilities within 300 feet	Social	Number
Parcels crossed	Social	Number
Length not along parcel edges	Social	Feet
Forested areas within ROW	Environmental	Acres
NWI/Crews/Hydric soils >50% wetlands within ROW	Environmental	Acres
Stream crossings with buffers (50' each side)	Environmental	Acres
RCW buffers crossed	Environmental	Acres
NHEO polygons crossed	Environmental	Acres
Floodplain crossed	Environmental	Acres

RCW – red-cockaded woodpecker; NHEO – natural heritage element occurrence

Data used in this analysis was reviewed using 2016 aerial imagery supplemented with field reconnaissance of the overall study area and along each of the alternative routes where access was available. Digital data, such as roads, parcels, protected lands, and wetland information, were acquired from various agencies and online databases. Some of the criteria were quantified using GIS software; others were calculated by measuring information directly from the aerial photography. For calculations involving acres of impacts, new ROW was used. This value is the acreage of new land that would be needed to construct the line. This amount varies depending on the amount of ROW for the proposed Project that can be shared with existing utilities and roads. New ROW was measured for each route alternative but was not included in the evaluation process since it is similar to total length in reflecting potential overall impacts of a route alternative and because it was used to calculate the land use and land cover impacts.

Engineering criteria were considered for the route analysis. **Total Length** is a general indicator of the overall magnitude of the Project. Length is also an indicator of construction costs. The longer the proposed route, the more expensive it would be if all other factors were equal. The number of **Road**

Crossings gives an indicator of potential permitting and/or line crossing issues that may need to be considered during design and construction. **Heavy Angles** (>20 degrees) were considered because these angles typically require larger structures and more space. Consequently, these structures tend to be more visible and more expensive.

Social and land use criteria were also evaluated, including the proximity to residences, businesses, and public facilities. Proximity to businesses and public facilities were reviewed but not included in the evaluation process because no businesses or public facilities occurred within 300 feet any of the potential route alternatives. Residences within 50 feet from ROW, between 51-100 feet from ROW, and between 101-300 feet from ROW were counted for each proposed segment using aerial photography supplemented with field verification. The impact to residences varied depending on the distance from the route. The three measurements for the distance to residences were converted to a **Residential Proximity Score** to reflect the public concern that residences closer to a transmission line would be more affected than those further away. To calculate the residential proximity score, the number of residences within 50 feet of the edge of ROW were multiplied by three; the number of residences between 51-100 feet were multiplied by two; and the number of residences between 101-300 feet were multiplied by one. Then, all three results were added together to determine an overall score for that route alternative. **Parcels Crossed** were quantified for each segment as a relative measure of the overall impact on private property. Routes that cross significantly more parcels tend to cost more and have potentially greater land use impacts as a result of additional landowners affected and from which to acquire easements. **Length Not Along Parcel Edges** was quantified as well, as it is generally accepted that a transmission line that extends parallel and adjacent to existing property lines are considered to be generally less impactful to a given parcel than a transmission line that traverses through the middle of a parcel.

Other social and land use impact evaluation criteria were also evaluated. Length through or adjacent to conservation lands and length through or adjacent to proposed conservation lands were measured for each route alternative. The **Conservation Lands Score** was developed using these measurements to address potential impacts to these areas, calculated by multiplying the length through or adjacent to conservation lands by two and the length through or adjacent to proposed conservation lands by one. Then, both results were added together to result in the conservation lands score for that route alternative. **Length Through Planned Residential Zones/Land Use** was measured for each route alternative to evaluate the potential for impacts to the planned developments in the area that either have approval or are in the process of approval for residential development.

Environmental evaluation criteria included forests, wetlands, protected species and their habitat, and water resources. To calculate many of these in acres, new ROW was used as mentioned earlier. **Forested Areas within ROW** was determined using digital National Land Cover Database (NLCD) data and supplemented with aerial photography interpretation. This criterion measured the forested areas within the ROW that would be cleared along each route. **Wetlands within ROW** were measured using a combination of National Wetland Inventory (NWI) data produced by the USFWS, North Carolina Coastal Region Evaluation of Wetland Significance (NC-CREWS) data, and hydric soils >50% obtained from soil survey data (SSURGO). **Floodplain Crossed** was measured using Federal Emergency Management Agency (FEMA) digital floodplain data. **Stream Crossings with 50-foot Buffer** were measured in acres and were used to determine areas where the ROW might impact both streams and a 50-foot-wide buffer to represent their associated sensitive riparian areas. **RCW Buffers Crossed** provided a measurement of potential impacts to the red-cockaded woodpecker, a Federally endangered species. Data showing potential clusters and their center points that were identified for the RCW was obtained from the USFWS for the study area. This criterion measured how much of a particular route alternative would pass through a 0.5-mile buffer of each red-cockaded woodpecker centroid, which is a documented area of current or historical habitat or sighting for the RCW. Rather than use the proposed ROW of 125 feet, the ROW was expanded to 250 feet in these areas to better reflect the potential for impact from both the ROW clearing and danger tree clearing. **NHEO Polygons Crossed** measured potential impacts to designated polygons containing current or historic natural heritage element occurrences, according to the North Carolina NHP. NHEO polygons typically consist of areas of habitat or known occurrences of sensitive plant and animal species. An additional 20-foot buffer was applied to these areas to better evaluate the potential for impacts from the proposed routes.

4.4.2 Weighting the Routing Criteria

The criteria described above were considered to represent the potential impact of construction and operation of the new transmission line. The Project team then assigned weights to the criteria based on input from the public, agencies, Duke engineers, and experience with similar transmission line projects across the country. A weight scale from 1 to 10 was used for this process, with 1 representing the lowest level of concern and 10 representing the highest level of concern during the evaluation. The weights associated with each routing criterion are presented in Table 4-2.

Table 4-2: Routing Criteria Weights

Routing Criteria	Weight
Total length	3
Conservation Lands Score	7
Length through planned residential zones/land use	4
Road crossings	1
Heavy angles (>20 degrees)	2
Residential Proximity Score	10
Businesses within 300 feet	1
Public facilities within 300 feet	3
Length not along parcel edges	6
Forested areas within ROW	5
NWI/Crews/Hydric soils >50% wetlands within ROW	6
Stream crossings with buffers (50’ each side)	4
RCW buffers crossed	5
NHEO polygons crossed	7
Floodplain crossed	2

If weight factors were not applied, all criteria would be assumed to have the same level of impact on the evaluation process. Although all criteria need to be considered during the routing process because they have the capacity to influence potential impacts, design, and cost, certain criteria have the capacity to influence the Project in a greater manner. Therefore, all criteria are not equal in terms of importance to the Project, and thus are weighted accordingly. For example, the number of streams crossed is an important criterion to be considered because of the potential impact to aquatic systems and habitat, as well as design criteria. However, design issues are relatively easy to address when crossing streams and measures can be taken to mitigate impacts to aquatic systems along a waterway. Therefore, this criterion received a lower weight. On the other hand, the number of residences located near the route was given a higher weight during evaluation because of the concerns expressed by homeowners and landowners and the potential for impacts to their homes.

4.4.3 Evaluation Process

To provide connections to the five potential transmission line tap locations, 33 route segments were developed and evaluated to select a preferred route from the proposed Porter’s Neck T-D Substation to Duke’s existing Castle Hayne – Folkstone 230kV transmission line. The route network developed from the 33 segments can be combined to form 49 route alternatives (see Figure 4-3). To distinguish route numbers from segment numbers, the letters “PN” were added to the routes followed by the route number. The route components and route data for all route alternatives are shown in Table 4-3.

Table 4-3: Route Data

Route	Segments	Total length (feet)	Length through or adjacent to conservation lands (2) (feet)	Length through or adjacent to proposed conservation lands (1) (feet)	Conservation Lands Score (score)	Length through planned residential zones/land use (feet)	Road crossings (number)	New ROW (acres)	Heavy angles (>20 degrees) (number)	Residences within 50 feet from ROW (3) (number)	Residences within 51-100 feet from ROW (2) (number)	Residences within 101-300 feet from ROW (1) (number)	Residential Proximity Score (score)	Businesses within 300 feet (number)	Public facilities within 300 feet (number)	Parcels crossed (number)	Length not along parcel edges (feet)	Forested areas within ROW (acres)	NWI/Crews/ Hydric soils >50% wetlands within ROW (acres)	Stream crossings with buffers (50' each side) (acres)	RCW buffers crossed (use 0.5 mile buffer w/250 ft. ROW) (acres)	NHEO polygons crossed (+20 foot buffer) (acres)	Floodplain crossed (acres)
PN1	1,3,7,19,25,28	29,390	4,120	0	8,240	24,940	4	84.6	8	0	0	2	2	0	0	39	14,290	51.8	84.6	0.0	13.3	0.0	0.0
PN2	1,3,7,19,30,31,33	32,010	7,570	0	15,140	28,830	4	92.1	7	0	1	10	12	0	0	51	15,280	57.9	80.8	0.0	13.3	0.0	0.0
PN3	1,3,7,19,30,32,33	30,090	5,830	0	11,660	26,470	4	86.6	8	0	1	6	8	0	0	44	14,590	56.5	74.3	0.3	13.3	0.0	3.0
PN4	1,3,7,20,26,25,30,31,33	36,150	7,570	0	15,140	28,190	6	103.9	11	0	1	10	12	0	0	52	17,730	72.5	92.6	0.0	13.3	0.0	0.0
PN5	1,3,7,20,26,25,30,32,33	34,240	5,830	0	11,660	25,830	6	98.4	12	0	1	6	8	0	0	45	17,040	71.1	86.1	0.3	13.3	0.0	3.0
PN6	1,3,7,20,26,28	28,040	4,120	0	8,240	20,530	4	80.7	6	0	0	2	2	0	0	39	14,490	60.5	80.7	0.0	13.3	0.0	0.0
PN7	1,3,8,13,19,25,28	30,450	4,120	0	8,240	24,100	4	87.6	10	0	0	2	2	0	0	39	15,350	54.7	87.6	0.0	13.3	0.0	0.0
PN8	1,3,8,13,19,30,31,33	33,070	7,570	0	15,140	28,000	4	95.1	9	0	1	10	12	0	0	51	16,340	60.7	83.8	0.0	13.3	0.0	0.0
PN9	1,3,8,13,19,30,32,33	31,150	5,830	0	11,660	25,640	4	89.6	10	0	1	6	8	0	0	44	15,650	59.4	77.3	0.3	13.3	0.0	3.0
PN10	1,3,8,13,20,26,25,30,31,33	37,210	7,570	0	15,140	27,360	6	106.9	14	0	1	10	12	0	0	52	18,790	75.4	95.6	0.0	13.3	0.0	0.0
PN11	1,3,8,13,20,26,25,30,32,33	35,290	5,830	0	11,660	25,000	6	101.4	15	0	1	6	8	0	0	45	18,100	74.0	89.1	0.3	13.3	0.0	3.0
PN12	1,3,8,13,20,26,28	29,100	4,120	0	8,240	19,700	4	83.7	9	0	0	2	2	0	0	39	15,550	63.4	83.7	0.0	13.3	0.0	0.0
PN13	1,3,8,14,21,26,25,30,31,33	37,290	7,570	0	15,140	25,750	6	107.2	13	0	1	10	12	0	0	52	20,190	76.9	95.9	0.0	13.3	0.0	0.0
PN14	1,3,8,14,21,26,25,30,32,33	35,380	5,830	0	11,660	23,390	6	101.7	14	0	1	6	8	0	0	45	19,500	75.5	89.4	0.3	13.3	0.0	3.0
PN15	1,3,8,14,21,26,28	29,180	4,120	0	8,240	18,090	4	84.0	8	0	0	2	2	0	0	39	16,950	64.9	84.0	0.0	13.3	0.0	0.0
PN16	1,3,8,14,22,27	28,000	4,120	0	8,240	18,090	4	80.6	6	0	0	2	2	0	0	39	14,940	67.4	79.9	0.0	13.3	0.0	0.0
PN17	1,3,8,14,22,29	29,380	4,120	0	8,240	18,090	4	84.6	6	0	0	2	2	0	0	39	16,320	65.1	83.4	0.0	13.3	0.0	0.0
PN18	1,4,10,15,16,17,18	32,470	4,140	0	8,280	16,390	2	93.4	4	0	0	2	2	0	0	33	25,520	45.7	62.1	0.6	13.3	1.3	9.7
PN19	1,4,10,15,24	25,580	4,140	0	8,280	12,510	2	73.7	1	0	0	2	2	0	0	30	18,630	48.5	55.6	0.0	13.3	1.3	3.8
PN20	1,4,10,23,27	26,090	4,140	0	8,280	12,510	2	75.1	3	0	0	2	2	0	0	31	19,150	53.2	59.6	0.0	13.3	1.3	1.6
PN21	1,4,10,23,29	27,480	4,140	0	8,280	12,510	2	79.1	2	0	0	2	2	0	0	31	20,530	50.8	63.1	0.0	13.3	1.3	1.6
PN22	1,4,9,13,19,25,28	28,260	4,140	0	8,280	18,530	3	81.3	7	0	0	2	2	0	0	33	15,700	45.7	73.0	0.0	13.3	1.3	0.0
PN23	1,4,9,13,19,30,31,33	30,880	7,590	0	15,180	22,420	3	88.9	6	0	1	10	12	0	0	45	16,680	51.7	69.2	0.0	13.3	1.3	0.0
PN24	1,4,9,13,19,30,32,33	28,970	5,850	0	11,700	20,060	3	83.4	7	0	1	6	8	0	0	38	15,990	50.3	62.7	0.3	13.3	1.3	3.0
PN25	1,4,9,13,20,26,25,30,31,33	35,030	7,590	0	15,180	21,780	5	100.7	11	0	1	10	12	0	0	46	19,130	66.3	81.0	0.0	13.3	1.3	0.0
PN26	1,4,9,13,20,26,25,30,32,33	33,110	5,850	0	11,700	19,420	5	95.2	12	0	1	6	8	0	0	39	18,440	65.0	74.5	0.3	13.3	1.3	3.0
PN27	1,4,9,13,20,26,28	26,910	4,140	0	8,280	14,120	3	77.4	6	0	0	2	2	0	0	33	15,890	54.3	69.1	0.0	13.3	1.3	0.0
PN28	1,4,9,14,21,26,25,30,31,33	35,110	7,590	0	15,180	20,170	5	100.9	11	0	1	10	12	0	0	46	20,530	67.8	81.2	0.0	13.3	1.3	0.0
PN29	1,4,9,14,21,26,25,30,32,33	33,190	5,850	0	11,700	17,810	5	95.4	12	0	1	6	8	0	0	39	19,850	66.4	74.8	0.3	13.3	1.3	3.0
PN30	1,4,9,14,21,26,28	26,990	4,140	0	8,280	12,510	3	77.7	6	0	0	2	2	0	0	33	17,290	55.8	69.3	0.0	13.3	1.3	0.0
PN31	1,4,9,14,22,27	25,810	4,140	0	8,280	12,510	3	74.3	4	0	0	2	2	0	0	32	15,280	58.3	65.3	0.0	13.3	1.3	0.0
PN32	1,4,9,14,22,29	27,200	4,140	0	8,280	12,510	3	78.3	4	0	0	2	2	0	0	32	16,660	56.0	68.7	0.0	13.3	1.3	0.0
PN33	2,5,10,15,16,17,18	31,060	0	0	0	7,870	2	89.4	7	0	0	0	0	0	0	19	28,030	47.5	48.8	0.6	14.5	0.0	9.7
PN34	2,5,10,15,24	24,170	0	0	0	3,990	2	69.6	4	0	0	0	0	0	0	16	21,150	50.3	42.3	0.0	14.5	0.0	3.8
PN35	2,5,10,23,27	24,690	0	0	0	3,990	2	71.1	6	0	0	0	0	0	0	17	21,660	55.0	46.3	0.0	14.5	0.0	1.6
PN36	2,5,10,23,29	26,070	0	0	0	3,990	2	75.1	5	0	0	0	0	0	0	17	23,040	52.6	49.7	0.0	14.5	0.0	1.6
PN37	2,5,9,13,19,25,28	26,850	0	0	0	10,010	3	77.3	8	0	0	0	0	0	0	19	18,210	47.5	59.6	0.0	14.5	0.0	0.0
PN38	2,5,9,13,19,30,31,33	29,470	3,460	0	6,920	13,900	3	84.8	7	0	1	8	10	0	0	31	19,190	53.5	55.8	0.0	14.5	0.0	0.0
PN39	2,5,9,13,19,30,32,33	27,560	1,710	0	3,420	11,540	3	79.3	8	0	1	4	6	0	0	24	18,500	52.2	49.3	0.3	14.5	0.0	3.0
PN40	2,5,9,13,20,26,25,30,31,33	33,620	3,460	0	6,920	13,260	5	96.7	12	0	1	8	10	0	0	32	21,640	68.1	67.6	0.0	14.5	0.0	0.0
PN41	2,5,9,13,20,26,25,30,32,33	31,700	1,710	0	3,420	10,900	5	91.2	13	0	1	4	6	0	0	25	20,960	66.8	61.2	0.3	14.5	0.0	3.0
PN42	2,5,9,13,20,26,28	25,500	0	0	0	5,600	3	73.4	7	0	0	0	0	0	0	19	18,400	56.1	55.7	0.0	14.5	0.0	0.0
PN43	2,5,9,14,21,26,25,30,31,33	33,700	3,460	0	6,920	11,650	5	96.9	12	0	1	8	10	0	0	32	23,050	69.6	67.9	0.0	14.5	0.0	0.0
PN44	2,5,9,14,21,26,25,30,32,33	31,780	1,710	0	3,420	9,290	5	91.4	13	0	1	4	6	0	0	25	22,360	68.2	61.4	0.3	14.5	0.0	3.0
PN45	2,5,9,14,21,26,28	25,580	0	0	0	3,990	3	73.7	7	0	0	0	0	0	0	19	19,810	57.6	56.0	0.0	14.5	0.0	0.0
PN46	2,5,9,14,22,27	24,400	0	0	0	3,990	3	70.3	5	0	0	0	0	0	0	18	17,790	60.2	51.9	0.0	14.5	0.0	0.0
PN47	2,5,9,14,22,29	25,790	0	0	0	3,990	3	74.3	5	0	0	0	0	0	0	18	19,170	57.8	55.4	0.0	14.5	0.0	0.0
PN48	2,6,11,17,18	25,910	1,520	5,350	8,390	13,990	3	74.6	9	1	0	3	6	0	0	21	20,570	38.8	52.7	0.3	6.2	0.0	1.8
PN49	2,6,12,18	26,730	1,760	5,350	8,870	13,390	3	77.0	6	1	0	2	5	0	0	23	20,820	45.0	52.3	0.3	6.2	0.0	1.9
Max		37,290	7,590	5,350	15,180	28,830	6	107.2	15	1	1	10	12	0	0	52	28,030	76.9	95.9	0.6	14.5	1.3	9.7
Average		29,869	3,923	218	8,064	16,308	4	85.9	8	0	0	4	5	0	0	34	18,586	59.0	69.6	0.1	13.4	0.4	1.4
Min		24,170	0	0	0	3,990	2	69.6	1	0	0	0	0	0	0	16	14,290	38.8	42.3	0.0	6.2	0.0	0.0
St. Dev		3,728	2,505	1,070	4,920	7,527	1	10.6	3	0	1	3	4	0	0	11	2,922	9.2	14.4	0.2	1.6	0.6	2.2

Burns & McDonnell quantified the route criteria for the potential route alternatives following the public workshops. No single route had the lowest value for all of the measured criteria. While a particular route may have been the lowest for one criterion, it may have been much higher for another. The routing criteria included units such as score, length, acres, and numbers of selected resources. These units are not comparable and need to be considered together in the evaluation. The level of complexity resulting from the number of routes, combined with numerous criteria and differences in measurement units made it infeasible to conduct a route-by-route comparison to identify a route that would minimize potential overall impacts to the area. Consequently, Burns & McDonnell used the statistical Z-score analysis as a tool to screen the route alternatives and identify a smaller, more manageable number of routes warranting further investigation and comparison for the selection of a preferred route alignment.

The Z-score was calculated for each criterion and for each route. A Z-score determines the mean value within a set of data and compares each individual route value to the mean. A degree of difference (standard deviation) is also incorporated into the Z-score that indicates how far each route value deviates from the mean value. For example, the total length of all routes would be quantified, and the mean value would be determined for the entire set of routes. The total length for each route would then be compared against the mean value. If a particular route length was equal to the mean value, then the assigned Z-score would be zero. If the total length was greater than the mean value, then the Z-score for that route would be a positive number. If the total length was less than the mean value, the Z-score would be a negative value for that route. The more the individual route value exceeded the mean, the higher the positive number would be. Conversely, the more the route value was below the mean, the more negative the Z-score.

After all Z-scores were calculated, Burns & McDonnell applied the weights as described in Section 4.4.2 to each criterion to give greater consideration in the evaluation process to those criteria that are of greatest concern relative to the impact of the Project (see Table 4-2). Weights were multiplied by the raw Z-score calculated for each criterion for each potential route. Higher weights allowed those criteria to become more significant contributors to the overall analysis and screening of the potential routes.

After applying weights to each of the route criteria, a weighted Z-score for each criterion was calculated for each route. The weighted Z-scores across all criteria for each route were summed to give a total weighted Z-score for each route. Both positive and negative Z-scores were included in the analysis to determine the total weighted Z-score. A positive Z-score for a particular route would suggest that the route would have greater-than-average impacts as compared to all routes. A negative Z-score would indicate routes having less-than-average impacts as compared to the other routes. The Z-score analysis

allowed all of the routes to be screened and helped the team identify the routes with lower overall impacts.

Z-scores only consider quantified route evaluation criteria. Therefore, Z-scores do not necessarily reflect all actual impacts but provide a guide to better assess and compare overall potential impacts associated with all routes. This methodology is used to organize, manage, and screen the extensive route data to streamline the analysis to a manageable number of routes that can be further evaluated before a final route recommendation is made. Having determined total weighted Z-scores for all route alternatives, Burns & McDonnell arranged the routes by their total weighted Z-scores. Routes were listed in ascending order, beginning with routes having the lowest Z-scores and continuing to the routes having the highest Z-scores (Table 4-4). Z-scores ranged from a low of -50.3 to a high of 56.8.

Based on the number of possible route combinations for the Project, it was not feasible to do a route-by-route comparison of all possible routes. Therefore, the six lowest-scoring (least-impacting) routes (representing the top 12 percent of all route alternatives) in the Z-score analysis were reviewed for additional evaluation and comparison.

All six of the lowest-scoring routes (Routes 34, 46, 42, 37, 47, and 35) would exit the proposed Porter's Neck T-D Substation site and extend to the northwest before tapping the existing Castle Hayne – Folkstone 230kV transmission line using one of three central tap locations. None of the lowest-scoring routes used the extreme western or eastern tap locations. Those routes using the extreme western or eastern tap locations had greater conservation land impacts (existing and proposed natural areas) and residential impacts, were generally longer, and also had the potential to impact areas of proposed residential and commercial development A comparison of the remaining six lowest-scoring routes, and ultimately the selection of a preferred route, is discussed in the following section.

4.4.4 Selection of the Preferred Route

After each route received a total weighted score, the Project team considered the merits of the lowest scoring six route alternatives to determine a preferred route for construction between the Project endpoints.

The weighted Z-scores for the six lowest-scoring route alternatives ranged from -50.3 to -45.5. After further desktop reviews of these six routes, combined with additional meetings with the Project team, it was determined that any one of these routes would be feasible and constructible; therefore, they were further evaluated and compared to determine which of these would present the overall best option for a preferred route alignment (Figure 4-5).

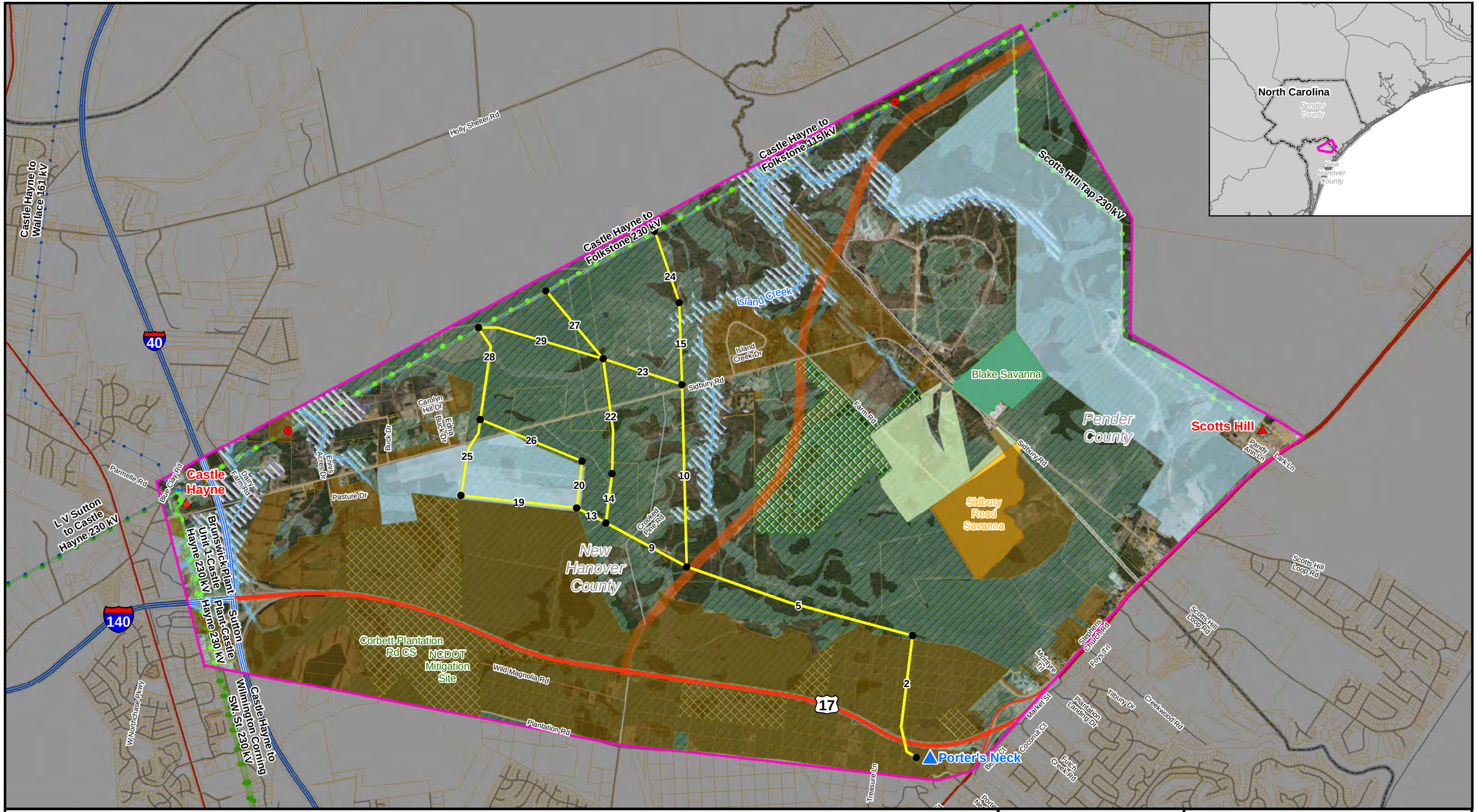
Table 4-4: Sorted Weighted Z-Scores

Weight		3	7	4	1	2	10	6	5	6	4	5	7	2		
Route	Segments	Total length (ft)	Conservation Lands Score	Length through planned residential zones/land use	Road crossings	Heavy angles (>20 degrees)	Residential Proximity Score	Length not along parcel edges	Forested areas within ROW	NWI/Crews/ Hydric soils >50% wetlands within ROW	Stream crossings with buffers (50' each side)	RCW buffers crossed (use 0.5 mile buffer w/250 ft. ROW)	NHEO polygons crossed (+20 foot buffer)	Floodplain crossed	Total	Segments
PN34	2,5,10,15,24	-4.6	-11.5	-6.5	-1.4	-2.4	-11.8	5.3	-4.7	-11.4	-2.4	3.6	-4.6	2.1	-50.3	2,5,10,15,24
PN46	2,5,9,14,22,27	-4.4	-11.5	-6.5	-0.6	-1.8	-11.8	-1.6	0.6	-7.4	-2.4	3.6	-4.6	-1.3	-49.7	2,5,9,14,22,27
PN42	2,5,9,13,20,26,28	-3.5	-11.5	-5.7	-0.6	-0.6	-11.8	-0.4	-1.6	-5.8	-2.4	3.6	-4.6	-1.3	-46.1	2,5,9,13,20,26,28
PN37	2,5,9,13,19,25,28	-2.4	-11.5	-3.3	-0.6	0.0	-11.8	-0.8	-6.3	-4.2	-2.4	3.6	-4.6	-1.3	-45.6	2,5,9,13,19,25,28
PN47	2,5,9,14,22,29	-3.3	-11.5	-6.5	-0.6	-1.8	-11.8	1.2	-0.6	-5.9	-2.4	3.6	-4.6	-1.3	-45.6	2,5,9,14,22,29
PN35	2,5,10,23,27	-4.2	-11.5	-6.5	-1.4	-1.2	-11.8	6.3	-2.2	-9.7	-2.4	3.6	-4.6	0.1	-45.5	2,5,10,23,27
PN45	2,5,9,14,21,26,28	-3.5	-11.5	-6.5	-0.6	-0.6	-11.8	2.5	-0.8	-5.7	-2.4	3.6	-4.6	-1.3	-43.1	2,5,9,14,21,26,28
PN36	2,5,10,23,29	-3.1	-11.5	-6.5	-1.4	-1.8	-11.8	9.1	-3.5	-8.3	-2.4	3.6	-4.6	0.1	-42.0	2,5,10,23,29
PN48	2,6,11,17,18	-3.2	0.5	-1.2	-0.6	0.5	2.0	4.1	-11.0	-7.0	4.8	-22.4	-4.6	0.3	-37.9	2,6,11,17,18
PN49	2,6,12,18	-2.5	1.1	-1.6	-0.6	-1.2	-0.3	4.6	-7.6	-7.2	4.5	-22.4	-4.6	0.4	-37.3	2,6,12,18
PN19	1,4,10,15,24	-3.5	0.3	-2.0	-1.4	-4.2	-7.2	0.1	-5.7	-5.8	-2.4	-0.3	10.4	2.1	-19.5	1,4,10,15,24
PN6	1,3,7,20,26,28	-1.5	0.3	2.2	0.2	-1.2	-7.2	-8.4	0.8	4.6	-2.4	-0.3	-4.6	-1.3	-18.8	1,3,7,20,26,28
PN31	1,4,9,14,22,27	-3.3	0.3	-2.0	-0.6	-2.4	-7.2	-6.8	-0.4	-1.8	-2.4	-0.3	10.4	-1.3	-17.7	1,4,9,14,22,27
PN1	1,3,7,19,25,28	-0.4	0.3	4.6	0.2	0.0	-7.2	-8.8	-3.9	6.2	-2.4	-0.3	-4.6	-1.3	-17.7	1,3,7,19,25,28
PN39	2,5,9,13,19,30,32,33	-1.9	-6.6	-2.5	-0.6	0.0	2.0	-0.2	-3.7	-8.5	4.5	3.6	-4.6	1.5	-17.0	2,5,9,13,19,30,32,33
PN16	1,3,8,14,22,27	-1.5	0.3	0.9	0.2	-1.2	-7.2	-7.5	4.6	4.3	-2.4	-0.3	-4.6	-1.3	-15.8	1,3,8,14,22,27
PN20	1,4,10,23,27	-3.0	0.3	-2.0	-1.4	-3.0	-7.2	1.2	-3.2	-4.2	-2.4	-0.3	10.4	0.1	-14.7	1,4,10,23,27
PN27	1,4,9,13,20,26,28	-2.4	0.3	-1.2	-0.6	-1.2	-7.2	-5.5	-2.5	-0.2	-2.4	-0.3	10.4	-1.3	-14.1	1,4,9,13,20,26,28
PN22	1,4,9,13,19,25,28	-1.3	0.3	1.2	-0.6	-0.6	-7.2	-5.9	-7.3	1.4	-2.4	-0.3	10.4	-1.3	-13.6	1,4,9,13,19,25,28
PN32	1,4,9,14,22,29	-2.1	0.3	-2.0	-0.6	-2.4	-7.2	-4.0	-1.6	-0.4	-2.4	-0.3	10.4	-1.3	-13.6	1,4,9,14,22,29
PN17	1,3,8,14,22,29	-0.4	0.3	0.9	0.2	-1.2	-7.2	-4.7	3.3	5.7	-2.4	-0.3	-4.6	-1.3	-11.6	1,3,8,14,22,29
PN12	1,3,8,13,20,26,28	-0.6	0.3	1.8	0.2	0.5	-7.2	-6.2	2.4	5.9	-2.4	-0.3	-4.6	-1.3	-11.6	1,3,8,13,20,26,28
PN30	1,4,9,14,21,26,28	-2.3	0.3	-2.0	-0.6	-1.2	-7.2	-2.7	-1.8	-0.1	-2.4	-0.3	10.4	-1.3	-11.2	1,4,9,14,21,26,28
PN21	1,4,10,23,29	-1.9	0.3	-2.0	-1.4	-3.6	-7.2	4.0	-4.4	-2.7	-2.4	-0.3	10.4	0.1	-11.1	1,4,10,23,29
PN7	1,3,8,13,19,25,28	0.5	0.3	4.1	0.2	1.1	-7.2	-6.6	-2.3	7.5	-2.4	-0.3	-4.6	-1.3	-11.1	1,3,8,13,19,25,28
PN15	1,3,8,14,21,26,28	-0.6	0.3	0.9	0.2	0.0	-7.2	-3.4	3.2	6.0	-2.4	-0.3	-4.6	-1.3	-9.2	1,3,8,14,21,26,28
PN33	2,5,10,15,16,17,18	1.0	-11.5	-4.5	-1.4	-0.6	-11.8	19.4	-6.2	-8.7	12.2	3.6	-4.6	7.5	-5.6	2,5,10,15,16,17,18
PN38	2,5,9,13,19,30,31,33	-0.3	-1.6	-1.3	-0.6	-0.6	11.2	1.2	-3.0	-5.8	-2.4	3.6	-4.6	-1.3	-5.5	2,5,9,13,19,30,31,33
PN41	2,5,9,13,20,26,25,30,32,33	1.5	-6.6	-2.9	1.0	2.9	2.0	4.9	4.3	-3.5	4.5	3.6	-4.6	1.5	8.5	2,5,9,13,20,26,25,30,32,33
PN3	1,3,7,19,30,32,33	0.2	5.1	5.4	0.2	0.0	6.6	-8.2	-1.3	1.9	4.5	-0.3	-4.6	1.5	10.9	1,3,7,19,30,32,33
PN44	2,5,9,14,21,26,25,30,32,33	1.5	-6.6	-3.7	1.0	2.9	2.0	7.8	5.0	-3.4	4.5	3.6	-4.6	1.5	11.4	2,5,9,14,21,26,25,30,32,33
PN24	1,4,9,13,19,30,32,33	-0.7	5.2	2.0	-0.6	-0.6	6.6	-5.3	-4.7	-2.9	4.5	-0.3	10.4	1.5	15.0	1,4,9,13,19,30,32,33
PN9	1,3,8,13,19,30,32,33	1.0	5.1	5.0	0.2	1.1	6.6	-6.0	0.2	3.2	4.5	-0.3	-4.6	1.5	17.5	1,3,8,13,19,30,32,33
PN40	2,5,9,13,20,26,25,30,31,33	3.0	-1.6	-1.6	1.0	2.3	11.2	6.3	5.0	-0.8	-2.4	3.6	-4.6	-1.3	19.9	2,5,9,13,20,26,25,30,31,33
PN2	1,3,7,19,30,31,33	1.7	10.1	6.7	0.2	-0.6	15.8	-6.8	-0.6	4.6	-2.4	-0.3	-4.6	-1.3	22.4	1,3,7,19,30,31,33
PN43	2,5,9,14,21,26,25,30,31,33	3.1	-1.6	-2.5	1.0	2.3	11.2	9.2	5.8	-0.7	-2.4	3.6	-4.6	-1.3	22.9	2,5,9,14,21,26,25,30,31,33
PN18	1,4,10,15,16,17,18	2.1	0.3	0.0	-1.4	-2.4	-7.2	14.2	-7.2	-3.1	12.2	-0.3	10.4	7.5	25.2	1,4,10,15,16,17,18
PN23	1,4,9,13,19,30,31,33	0.8	10.1	3.2	-0.6	-1.2	15.8	-3.9	-4.0	-0.2	-2.4	-0.3	10.4	-1.3	26.5	1,4,9,13,19,30,31,33
PN8	1,3,8,13,19,30,31,33	2.6	10.1	6.2	0.2	0.5	15.8	-4.6	1.0	5.9	-2.4	-0.3	-4.6	-1.3	29.0	1,3,8,13,19,30,31,33
PN5	1,3,7,20,26,25,30,32,33	3.5	5.1	5.1	1.8	2.3	6.6	-3.2	6.6	6.9	4.5	-0.3	-4.6	1.5	35.8	1,3,7,20,26,25,30,32,33
PN26	1,4,9,13,20,26,25,30,32,33	2.6	5.2	1.7	1.0	2.3	6.6	-0.3	3.3	2.0	4.5	-0.3	10.4	1.5	40.4	1,4,9,13,20,26,25,30,32,33
PN11	1,3,8,13,20,26,25,30,32,33	4.4	5.1	4.6	1.8	4.1	6.6	-1.0	8.2	8.1	4.5	-0.3	-4.6	1.5	42.9	1,3,8,13,20,26,25,30,32,33
PN29	1,4,9,14,21,26,25,30,32,33	2.7	5.2	0.8	1.0	2.3	6.6	2.6	4.1	2.1	4.5	-0.3	10.4	1.5	43.4	1,4,9,14,21,26,25,30,32,33
PN14	1,3,8,14,21,26,25,30,32,33	4.4	5.1	3.8	1.8	3.5	6.6	1.9	9.0	8.2	4.5	-0.3	-4.6	1.5	45.4	1,3,8,14,21,26,25,30,32,33
PN4	1,3,7,20,26,25,30,31,33	5.1	10.1	6.3	1.8	1.7	15.8	-1.8	7.4	9.6	-2.4	-0.3	-4.6	-1.3	47.2	1,3,7,20,26,25,30,31,33
PN25	1,4,9,13,20,26,25,30,31,33	4.2	10.1	2.9	1.0	1.7	15.8	1.1	4.0	4.7	-2.4	-0.3	10.4	-1.3	51.9	1,4,9,13,20,26,25,30,31,33
PN10	1,3,8,13,20,26,25,30,31,33	5.9	10.1	5.9	1.8	3.5	15.8	0.4	8.9	10.8	-2.4	-0.3	-4.6	-1.3	54.4	1,3,8,13,20,26,25,30,31,33
PN28	1,4,9,14,21,26,25,30,31,33	4.2	10.1	2.1	1.0	1.7	15.8	4.0	4.8	4.8	-2.4	-0.3	10.4	-1.3	54.9	1,4,9,14,21,26,25,30,31,33
PN13	1,3,8,14,21,26,25,30,31,33	6.0	10.1	5.0	1.8	2.9	15.8	3.3	9.7	10.9	-2.4	-0.3	-4.6	-1.3	56.8	1,3,8,14,21,26,25,30,31,33

ATTACHMENT A

OFFICIAL COPY

Aug 13 2019



Legend

- Segment Endpoint
- Lowest Scoring Route Alternatives
- Study Area
- Proposed Substation Location
- Development Subdivision Parcel
- Proposed Development
- Siting Points (Structures 8 and 42)
- Proposed Hampstead Bypass
- DOT Mitigation Property
- Proposed Natural Area
- 230 kV Transmission Line
- 161 kV Transmission Line
- Parcel Boundary
- Wetland
- 100-yr Floodzone
- Existing Substation

NORTH

3,000 1,500 0 3,000

Scale in Feet

DUKE ENERGY®

Figure 4-5
Duke Energy
Wilmington NE Reliability Project
Lowest Scoring Route Alternatives

Source: NCDOT, FAA, Ventyx Velocity, Esri, FCC, NCHPO, FWS NWI, USGS NHD, New Hanover County, FEMA, NCDNR, and Burns & McDonnell Engineering Company, Inc.

Issued: 6/3/2019

All the best-scoring six routes had the same impacts to conservation lands, residences, streams, RCW buffers, and NHEO polygons. Conservation lands, residences, and NHEO polygons were the most highly weighted criteria and had the greatest influence on the ranking of the routes. While these criteria do not help distinguish among the top scoring routes, they are a primary reason why all these routes scored the best overall. The top routes had the least impacts to each of these criteria of all routes considered, except for the RCW buffer crossed. The routes that benefited in the analysis from lower RCW buffer impacts were offset by greater impacts to residences and conservation lands and as a result, these routes did not score in the top 12 percent. Duke will conduct habitat surveys and work with the USFWS to minimize potential impacts to the RCW.

To compare and select a preferred route from the top six routes requires a review of the remaining criteria. Impacts associated with each of the top routes varied substantially among these eight criteria. Some of the routes were longer than the others (Routes PN37, PN47, and PN42); some had greater forested impacts (Routes PN46, PN47, and PN42); some had greater wetland impacts (Routes PN37, PN42, and PN47); some had less length along parcel edges (Routes PN35, PN34, and PN47); and some had greater floodplain crossed (Routes PN34 and PN35). This variability in these criteria is why these route's total scores are separated by only about 4.5 points. Where one route benefited in some criteria, its score would be offset by other criteria in which it scored poorer. In fact, the bottom three top-scoring routes (Routes PN37, PN47, and PN35) scored within only 0.6 of a point of each other (-45.5 to -46.1). Overall, these lower scoring top routes would appear to have greater overall impacts than the top two-scoring routes (Routes PN34 and PN46).

Route PN34 (Segments 2, 5, 10, 15, 24) and Route PN46 (2, 5, 9, 14, 22, 27) had similar Z-scores (-50.3 and -49.7, respectively) and were the two shortest route alternatives. Like the other top routes, neither route was adjacent to, or crossed, any conservation lands and had no residential impacts within 300 feet of the ROW. Both routes crossed the least amount of planned residential zones/properties among all route alternatives (3,990 feet), did not cross any streams, and did not cross any NHEO sensitive species polygons. Route PN34 scored better than all the other routes in six of the eight remaining criteria. It was the shortest route (4.6 miles) and had the least wetland impacts (42.3 acres), forest clearing (50.3 acres), the fewest road crossings (2), and the least heavy angles (4). The only two criteria in which Route PN46 (and other routes) scored better than Route PN34 were length not along parcel edges (21,150 feet vs. 17,790 feet) and floodplain crossed (0 vs. 3.8 acres). While it is preferable to follow parcel edges whenever possible, this route avoids many of the impacts associated with the other top routes in part by not staying along parcel boundaries. If it were to follow the parcel edges along its path, it would be longer and would likely have greater wetland and residential impacts. In addition, the floodplain crossed is

relatively narrow and could likely be spanned or designed in such a way as to minimize impacts. Crossing less forested land is preferable to minimize clearing impacts and costs and crossing fewer acres of wetland and hydric soils is also preferable from a construction, access, and maintenance perspective and would potentially require less permitting cost and effort than the other routes. Route PN34 also received minimal input from concerned landowners compared to other routes. For these reasons, the Project team determined that Route PN34 would be the overall least impacting route alternative to carry forward as the preferred route (Figure 4-6). Should unexpected issues arise with Route PN34 during Project development, Route PN46 or the other top-scoring alternatives would be viable alternatives.

4.4.5 Project Cost Estimates

Cost estimates were developed for each of the six lowest-scoring route alternatives. Estimates ranged from $15.8 million to $17.8 million for these six route alternatives. The preferred route, Route 34, had an estimate of $15.8 million. The process and rationale for the estimates is summarized below.

The existing Castle Hayne – Folkstone 230kV circuit runs parallel with a 115kV circuit. In order to tap off of the Castle Hayne – Folkstone 230kV circuit, two existing structures will need to be raised to allow enough room for the tap span between the existing 230kV and 115kV circuits. Structures have been spotted using a typical 450-foot ruling span and the appropriate number of dead-end structures based on line angle. Additionally, 3 remote control switches have been included with each estimate (i.e. one on each leg). Each cost estimate includes material, labor, ROW clearing, mobilization, and other “typical” tasks such as siting, engineering, grading, erosion control, etc.. Actual cost may vary from the estimate depending on final appraised land values, condemnation costs, final engineering plans, construction labor, and environmental permitting. The complete cost estimate table and associated maps are included in Appendix D.

ATTACHMENT A

Legend

- Segment Endpoint
- Study Area
- Proposed Substation Location
- Preferred Route Alternative
- Development Subdivision Parcel
- Proposed Development
- Siting Points (Structures 8 and 42)
- Proposed Hampstead Bypass
- DOT Mitigation Property
- Proposed Natural Area
- 230 kV Transmission Line
- 161 kV Transmission Line
- Parcel Boundary
- Wetland
- 100-yr Floodzone
- Existing Substation

NORTH

3,000 1,500 0 3,000

Scale in Feet

DUKE ENERGY®

Figure 4-6
Duke Energy
Wilmington NE Reliability Project
Preferred Route Alternative

Source: NCDOT, FAA, Ventyx Velocity, Esri, FCC, NCHPO, FWS NWI, USGS NHD, New Hanover County, FEMA, NCDNR, and Burns & McDonnell Engineering Company, Inc.

Issued: 6/3/2019

5.0 ENVIRONMENTAL IMPACTS OF THE PROPOSED PROJECT

5.1 Introduction

This section contains a description of the potential environmental effects that could result from the construction, operation, and maintenance of the proposed 230kV transmission line from the proposed Porter's Neck T-D Substation to a tap point along the Castle Hayne-Folkstone 230kV transmission line. Potential impacts to both natural and social resources located in the study area and along the preferred route are considered.

5.2 Description of the Preferred Route

The evaluation of alternatives resulted in the selection of a preferred route for the Project. The preferred route was identified in Chapter 4.0 from the route data and corresponding route evaluation presented in Table 4-3 and Table 4-4. Figure 4-6 shows the preferred route described in the following section.

5.2.1 Preferred Route

Route PN34, which is composed of Segments 2, 5, 10, 15, and 24, was selected as the preferred route and will connect the proposed Porter's Neck T-D Substation to a tap location along the Castle Hayne – Folkstone 230kV transmission line (see Figure 4-6). This route is 24,170 feet (approximately 4.6 miles) in length.

The preferred route originates at the site of the proposed Porter's Neck T-D Substation, located between U.S. Highway 17 and Porter's Neck Road in New Hanover County, North Carolina. The route exits the substation site to the northwest and extends for approximately 380 feet before turning north-northwest for approximately 875 feet, crossing U.S. Highway 17. The route then continues generally northward for approximately 3,170 feet before turning west-northwest. From here, the preferred route extends approximately 8,105 feet and crosses the alignment for the proposed Hampstead Bypass. The route then extends to the north for approximately 6,105 feet, crosses Sidbury Road, and then continues to the north for another 2,980 feet. The preferred route alignment then extends to the northwest for approximately 2,555 feet before terminating at a selected tap location along the existing Castle Hayne – Folkstone 230kV transmission line.

5.2.2 Preferred Route Data

Table 5-1 contains a cumulative summary of the data for the preferred route described in Chapter 4.0, as well as the range of values for all the other routes compared.

Table 5-1: Preferred Route Summary Data

Routing Criteria	Preferred Route Value	Range of Values
Total length (feet)	24,170	24,170 – 37,290
Conservation Lands Score (score)	0	0 – 15,180
Length through planned residential zones/land use (feet)	3,990	3,990 – 28,830
Road crossings (number)	2	2 – 6
New ROW (acres)	69.6	69.6 – 107.2
Heavy angles (>20 degrees) (number)	4	1 – 15
Residential Proximity Score (score)	0	0 – 12
Businesses within 300 feet (number)	0	0 – 0
Public facilities within 300 feet (number)	0	0 – 0
Parcels crossed (number)	16	16 – 52
Length not along parcel edges (feet)	21,150	14,290 – 28,030
Forested areas within ROW (acres)	50.3	38.8 – 76.9
NWI/Crews/Hydric soils >50% wetlands within ROW (acres)	42.3	42.3 – 95.9
Stream crossings with buffers (50’ each side) (acres)	0	0 – 0.6
RCW buffers crossed (acres)	14.5	6.2 – 14.5
NHEO polygons crossed (acres)	0	0 – 1.3
Floodplain crossed (acres)	3.8	0 – 9.7

5.3 Impacts on Natural Resources

Following is a description of potential impacts to natural resources in the study area from the construction and operation of the preferred route. These resources include topography, soils, hydrology, vegetation, wetlands, and wildlife.

5.3.1 Topography and Soils

Clearing, construction, and operation of the proposed Project will not result in any significant impacts to the existing topography. The Project will generally follow the existing contour of the land, and extensive grading or earthwork will not be necessary. Land clearing will consist of tree and shrub removal. Impacts, if any, to topography from the use of heavy equipment will be localized, limited, and temporary in nature.

The Project will result in temporary and minor adverse soil impacts within the ROW during construction regardless of the route selected. Duke’s ROW clearing practices involve cutting vegetation within four inches of the ground. Stumps, low-growing vegetation, and root mats are left in place. There is no “grubbing” or grading within the ROW. However, some impacts to area soils will result from the use of heavy construction equipment and the excavation of soils required for installing the transmission structures. Construction activities, which are temporary in nature, can cause soil compaction, ruts or tracks from vehicular movement, and mixing of the soil profile.

During and following construction of the proposed transmission line, some erosion may occur within the cleared ROW. Mitigation proposed in Chapter 6.0 includes Project compliance with the North Carolina Sedimentation Pollution Control Act (SPCA), thus controlling offsite sedimentation and avoiding potential soil run-off into area streams.

5.3.2 Hydrology

Construction and operation of the Project will not significantly impact surface water features along the transmission line route. Based on U.S. Geological Survey (USGS) 1:24,000 scale topographic maps and National Hydrology Dataset (NHD) data, the preferred route crosses no streams.

The transmission line will be designed to span any waterbodies so that no structures will be placed within any waterway. Similarly, the construction and maintenance of the transmission line will not disturb any subsurface waters. Each structure will be buried to a depth of approximately 10 percent of the actual structure height plus 1.5 feet.

Duke, as indicated above, intends to fully comply with the SPCA, as well as other applicable laws, such as the Federal Clean Water Act. This compliance, coupled with Duke's limited-impacting ROW clearing practices, is intended to prevent offsite sedimentation, including impacts to streams and wetlands. Mitigation measures proposed in Chapter 6.0 will further reduce potential water quality impacts.

5.3.3 Vegetation

Construction and maintenance of the proposed transmission line will result in the loss of tall vegetation within the transmission line ROW. Herbaceous vegetation will not be removed but could be damaged by construction equipment and vehicular movement. Disturbed areas in uplands will be mulched and/or re-seeded following the disturbance, as described in Duke's erosion control plan, which will be submitted to NCDEQ's Land Quality Section for the Project. Most tree clearing activity will occur where the line crosses undeveloped forested land. The preferred route (Route PN34) will require clearing approximately 50 acres of forested land. In addition to the clearing of the actual maintained ROW, danger trees that could fall into the new transmission line and cause an outage will also be removed outside the maintained corridor.

The majority of the woody vegetation that will be impacted consists of pine, with some deciduous hardwood stands. Mature trees, such as pines, oaks, hickories, and maples occurring in or immediately adjacent to the transmission line ROW, will have to be cleared to protect the integrity of the line. Ongoing maintenance of the ROW during operation of the line through mowing and/or herbicide application will

encourage the proliferation of lower-growing types of vegetation, which helps stabilize the soil. No cropland will be impacted along the preferred route.

5.3.4 Federally Listed Plant Species

According to the USFWS and NC NHP, five Federally protected plant species either occur or may occur within the Project study area (see Table 3-2). Additionally, one State species of concern (Venus flytrap) is known to occur within the study area. Although none of these species are known to occur along the preferred route, the USFWS will be contacted and efforts will be made to further limit impacts to these species if they are found along the route alignment. Duke will conduct field surveys to determine presence/absence of Federally protected species as required by USFWS.

5.3.5 Wetlands

The majority of the wetlands in the study area consist of forested wetlands, with some scrub/shrub wetlands as well. The ROW for the preferred route will cross 42.3 total acres of wetlands.

Construction and operation of the Project is designed to limit jurisdictional discharges to water or wetlands. Forested wetlands will be maintained as scrub/shrub or emergent wetlands. Duke's ROW clearing practices include hand-clearing and the use of construction matting in jurisdictional wetlands to help avoid jurisdictional discharges. Similarly, Duke typically can avoid placing structures in streams or smaller wetlands by spanning such areas. Erosion control measures described previously and in Chapter 6.0 will further prevent sediment from entering waterways or impacting wetlands.

Duke conducts wetland/stream determinations and gets USACE approval for wetland/stream extent and location. Duke notifies the USACE and NCDWR on its proposed transmission construction projects, seeking confirmation that the project design is exempt from Section 404 and Section 401 permitting requirements. Should the Project require unavoidable impact to waters or wetlands, Duke will obtain the required approvals, normally under the USACE Nationwide Permit 12.

5.3.6 Wildlife

Construction and maintenance of the preferred route could result in some adverse impacts to wildlife. The removal of forested vegetation within or near the proposed ROW may impact foraging, shelter, or nesting habitat for some species. Impacts to most species will be temporary and short-term during construction and will consist primarily of displacement and disturbance. Some less mobile species occurring in the construction corridor could be directly impacted, and movements between segmented habitats could be temporarily impeded due to noise and human presence. Additional temporary disturbance could occur during future maintenance of the line. No impacts are expected to fish or other aquatic species because

waterways will be avoided, and erosion control techniques will be used to limit sedimentation of any nearby waterways.

5.3.7 Federally Listed Animal Species

According to USFWS, 12 Federally protected animal species are known, or have been known, to occur within the Project study area (see Table 3-3). This list was obtained using the IPaC online search within the Project area. Four species are listed as “endangered”; six species are listed as “threatened”; one species is listed as “threatened” due to similarity of appearance; and one species is listed as “candidate”. Seven of these 12 species are aquatic and are not expected to be directly impacted by clearing or construction of the new transmission line. Four of the other protected species (northern long-eared bat, piping plover, red knot, and American alligator) could potentially occur within the study area but are not known to occur along the preferred route. The Federally endangered red-cockaded woodpecker (RCW) has been known to occur within the study area and is found primarily in mature pine forests. The forested land crossed by the preferred route consists of forested wetland, some deciduous upland forest, and pine plantations and forest. Impacts to the RCW could occur but are not anticipated. According to data showing RCW clusters, the preferred route alignment would cross approximately 14.5 acres of a 0.5-mile buffer surrounding a historic cluster occurrence of RCW. Duke will conduct field surveys to determine presence/absence of all Federally protected species as required by the USFWS and will coordinate with the agency to implement any necessary mitigation measures.

5.3.8 Environmentally Sensitive Lands

No known environmentally sensitive lands are impacted by the preferred route. The data used to evaluate possible impacts to environmentally sensitive lands was provided by the NCNHDE and NCDNR, which catalogs lands managed by State or Federal agencies, as well as conservation easements or mitigation lands. It is possible that other, as yet unknown, environmentally sensitive lands are located within the path of the preferred route. Duke will work with the landowners and the NHP prior to construction to limit potential impacts to environmentally sensitive lands.

5.4 Impacts on Social Resources

This section contains a discussion of the potential impacts of the Project on the social resources in the area, including land use, socioeconomics, and cultural resources.

5.4.1 Existing Land Use

The following paragraphs provide information on potential impacts to agriculture, urban and residential areas, recreational areas, and transportation and utility corridors. In general, the preferred route will have

very limited impacts on the existing land uses in the area. Duke will work with individual landowners to the extent feasible to reach agreeable solutions to land use conflicts that may arise.

5.4.1.1 Agriculture and Other Land Uses

Construction and operation of the preferred route would not impact any of the limited agricultural lands occurring within the study area. The preferred route will remove some land from the production of timber. Trees will be cleared from the ROW and danger trees will be cleared outside the ROW. The ROW will be periodically managed to keep it treeless. Landowners will be compensated for any timber cleared by Duke's contractors for the transmission line and for the use of their land according to each negotiated easement.

5.4.1.2 Urban and Residential Areas

Though predominately rural, there are still homes scattered throughout the area, mostly concentrated in small subdivisions along and adjacent to Sidbury Road. The preferred route will not be located within 300 feet of any residences. There are also no businesses or public facilities located within 300 feet of the preferred route. The preferred route would cross 3,990 feet of subdivision development parcels, although most of these parcels are undeveloped with no road access.

5.4.1.3 Recreation Areas

No lands crossed by the preferred route are reserved for recreational use. However, outdoor recreational opportunities, such as hunting, bird watching, and hiking may occur on private lands within the forested areas. Limited, temporary impacts to seasonal hunting activities may occur during construction of the transmission line.

5.4.1.4 Transportation and Utilities

Construction of the preferred route may result in some brief disruption of traffic during stringing of the line and hauling of material to the job site. The limited roads in the study area are considered local routes and subdivision streets, although U.S. Highway 17 and the proposed Hampstead Bypass will be crossed by the preferred route. Duke will coordinate with the NCDOT to verify that the crossing of the proposed Hampstead Bypass will not interfere with planned highway infrastructure. Duke will also adhere to city, county, State, and Federal regulations for road crossings.

The preferred route alternative does not cross any existing transmission lines. The operation of the new 230kV line will result in an overall increased reliability of electrical service both in and out of the study area.

5.4.2 Socioeconomic Patterns

This section addresses the potential impacts of the preferred route on the socioeconomic patterns in the study area. The topics include population, employment, and income.

5.4.2.1 Population

Construction and operation of the preferred route will not directly result in a change in the population in the study area. However, the Project will help to meet the electrical needs of an overall growing population, as well as any local businesses and industries, and increase reliability of the electrical system in the vicinity. Reliable electric service is important to residents and a significant factor in the location of many industries. The preferred route avoids densely populated areas and passes primarily through undeveloped wooded areas.

5.4.2.2 Employment and Income

Construction and operation of the new line will not significantly affect employment in the study area. The construction work force will be small and temporary. Workers will likely commute on a daily or weekly basis to the construction area. The presence of additional workers may result in a slight increase in retail sales in and near the study area due to purchases of food, fuel, and other merchandise. No additional staff will be expected for Project operations. By meeting the need for additional power in the area, industries and businesses may be attracted to the area in the future, thereby increasing the potential for employment in and around the study area. The Project will also increase the tax base in New Hanover County because Duke will pay property taxes based on the value of the new electric transmission line. The preferred route does not cross Pender County.

5.4.3 Cultural Resources

The route identification process included avoidance to the extent practicable of known historical and archaeological resources based on a records search of the study area conducted by Burns & McDonnell at the SHPO in Raleigh, North Carolina. This search indicated there were no NRHP-listed or eligible archaeological sites or historic structures that may be crossed by the preferred route. If the SHPO requires an archaeological survey of portions of the preferred line route, Duke will retain a consultant to perform the survey and submit the results, and any proposed mitigation will be coordinated with the SHPO. Structure placement generally can be adjusted to avoid most archaeological sites.

5.4.4 Visual Character

The visual character of an area is a function of the terrain, land cover and land use. Construction and operation of the transmission line will impact the existing aesthetics of the study area through which the line passes, primarily due to the clearing of trees and the introduction of a new linear facility.

The transmission line could create some visual contrast with the surrounding environment. However, since a majority of the preferred route traverses through existing forested areas, much of the preferred route alignment may be screened from view. The line will be seen at road crossings and where the line is constructed near or along roads. Visibility from the roads will be temporary and fleeting, due to the normal flow of traffic.

5.5 Summary

The construction and operation of the proposed Project will have limited impacts on natural and social resources in the study area. The preferred route will have relatively minor overall impacts. No residences, businesses, or public facilities are within 300 feet of the preferred route. Although future development is expected to occur within the study area, the area through which the preferred route extends is primarily undeveloped and rural in nature.

Environmental impacts are expected to be limited, as there are no protected or conservation lands, or lands designated for recreational purposes, located near the preferred route alignment. Impacts to protected species is anticipated to be minimal, as there are no known current occurrences of protected species along the preferred route ROW. RCW clusters crossed indicate they are historical occurrences. There are no NRHP-listed or eligible archaeological or historic sites or properties near the preferred route. The preferred route would have less potential impacts to wetlands and forested areas during construction and operation of the line than other considered routes. Because the majority of the area consists of wetlands, mitigation measures described in the next section will help to further limit impacts. For the above reasons, the preferred route (Route PN34) for the Project is the best overall route of the routes evaluated.

6.0 MITIGATION MEASURES

6.1 Introduction

Mitigation measures are those steps undertaken to reduce the potential impact of the construction or operation of a project on natural and social resources. The primary forms of mitigation are avoidance of potential negative impacts, which typically occurs during the initial route development, and minimization through implementing mitigation measures and line designs to limit overall impacts.

This section includes a discussion of the steps taken to avoid negative impacts through the routing and design of the proposed transmission line. For those impacts that could not be avoided, recommended measures for reducing impacts are described. If impacts cannot be avoided or minimized to the extent that no substantial adverse effect is expected, additional mitigation may be required by the agencies in charge of the resource affected.

6.2 Mitigation of Natural Resource Impacts

Approximately 4.6 circuit miles of new transmission line will be built from the proposed Porter's Neck T-D Substation to the Castle Hayne - Folkstone 230kV transmission line if the Project is approved by the NCUC. The primary issues discussed in Chapter 5.0 regarding natural resources were erosion control, wetlands, and threatened and endangered species. Measures to reduce or eliminate potential negative impacts to these resources are described below.

6.2.1 Soil and Erosion Control

Duke routinely submits an erosion control plan to NCDEQ's Land Quality Section for approval prior to project construction. Under an agreement with the Land Quality Section, Duke is allowed to file simplified plans, since ROW clearing typically only involves cutting of vegetation above-ground, with no "blading," "grubbing," or other typical land-disturbing activities. Duke also limits impacts to stream buffer areas, wetlands, and other "sensitive" areas by using internal construction buffers that must be hand-cleared and matted during construction, in addition to the "sensitive" area itself.

In upland areas, holes for each structure will be dug with an auger, and the structures will be erected using a crane. Most structures will be buried directly in the ground. Excess soil from the structure excavations in uplands will be evenly distributed around each structure and the soil stabilized. Installation of structures in wetlands will vary due to soil conditions. Excess soil in wetland areas will be transported to upland areas and stabilized. Generally, heavy equipment will be prohibited from entering wetlands, with several exceptions. Where necessary (typically to avoid a work-around that would create greater

disturbance), wetlands can be crossed using construction mats and/or low-ground-pressure (non-rutting) equipment. When heavy equipment must traverse the ROW, access routes will be selected to reduce impacts by following existing ground contours. Areas disturbed by construction activities will be restored by establishing an appropriate ground cover to limit erosion of the soil.

Where possible, contractors will use existing access roads along existing ROWs. Where new access roads are required, they will be routed, where practicable, to follow present land contours and limit clearing and surface changes.

6.2.2 Protection of Water Resources and Wetlands

Duke will survey the preferred route for jurisdictional waters and wetlands. Duke's standard transmission ROW clearing and line construction practices call for avoiding impacts to waters and wetlands to the extent practicable. All vegetation is cut to near-ground level, and ROWs within wetlands are hand-cut. Vegetative buffers adjacent to streams are left as appropriate (only low-growing vegetation can be left). No "blading" or "grubbing" of stumps is allowed, and remaining root mats typically sprout and quickly re-vegetate ROWs with native species. Remaining stumps help maintain stream bank stabilization. Heavy equipment is kept out of waters and wetlands to the extent possible. Where necessary (typically to avoid a work-around that would create greater disturbance), wetlands can be crossed using construction mats and/or low-ground-pressure (non-rutting) equipment.

There will be no change in contours or redirection of water flow, and the amount of spoilage from the installation of structures will be limited. Structures may be installed with vibratory caissons to minimize displacement of soils in wetlands. Any excess spoilage will be spread evenly around the structure location or in upland areas. Trees outside of the ROW corridor tall enough to endanger the line if they fell ("danger trees") will be selectively cut.

Duke will work closely with the USACE and NCDWR to comply with the applicable regulations and permit conditions, if necessary. Additional mitigation measures may be implemented following consultation with the USACE for Section 404 compliance.

6.2.3 Federally Listed Species

Communication has been initiated with the USFWS and NCWRC regarding potential impacts concerning Federally protected species. Federally protected species known to occur within the study area or near the preferred route ROW are not expected to be adversely impacted. Further consultation with the USFWS and NCWRC will be initiated once a route has been approved to comply with the Endangered Species Act. Duke will hire a contractor to conduct a review of the preferred route to determine whether potential

habitat for protected species is likely to be impacted by the route. If habitat is found along the route, surveys to determine the presence or absence of protected species along the preferred route may be necessary.

Mitigation to avoid damage to protected plant and wildlife species communities or habitat could include strategic structure placement, avoidance, or other USFWS or NCWRC recommendations. Duke already has in place a memorandum of understanding with the NHP to manage any threatened and endangered species found on existing ROWs.

6.3 Mitigation of Social Resource Impacts

The main issues discussed in Chapter 5.0 related to social resources were land use, cultural resources, and visual character. Measures to avoid or reduce potential negative impacts to these resources are described below.

6.3.1 Land Use

Routes were developed to limit impacts to residences and other land uses where possible. The preferred route was the shortest overall route and traverses primarily rural forested areas, as opposed to areas with dense residential subdivisions and commercial operations. Duke will work with individual landowners, if needed, to reach agreeable solutions, to the extent feasible, for land use conflicts that may arise.

6.3.2 Cultural Resources

The route identification process included the avoidance of known historical and archaeological resources. In this instance, one NRHP-eligible site was found to occur within the study area, but the preferred route alignment would not impact this site. No mitigation for the protection of cultural resources is anticipated at this time. However, the SHPO may recommend that Duke perform an archaeological survey of the preferred route. If the survey results in the discovery of any sites that could be considered eligible for the NRHP, the line or structures could be adjusted to avoid the sites, or other actions will be taken as recommended by the SHPO. If a survey is required, the findings will be submitted to the SHPO, and any proposed mitigation will be coordinated with the SHPO.

6.3.3 Visual Character

Most of the structures for the proposed Project will consist of steel H-frame structures. H-frame structures are typically shorter and have longer spans than single-pole structures. Because the H-frame structures are shorter, they will generally not exceed the height of nearby trees, which will help to shield the line from view. Where practicable, structures will be located to take advantage of any existing vegetation for

screening from residences and roadways. Typically, the structure itself creates the most visual contrast for a transmission line, so longer spans will result in fewer overall structures and less overall visual impact compared to other structure designs. The visual impact of the line is further reduced because H-frame structures are better suited for following the contour of the land than single-pole structures. Because angle structures are larger, require more space, and hence are more visible, the preferred route was designed to minimize the number of such structures to the extent practicable, while also avoiding residences and other known constraints.

6.4 Conclusion

By following Duke's standard clearing and construction practices, the route selection process described, and the above mitigation techniques, most potential impacts of the selected route will either be avoided or reduced. As a result, the construction and operation of the proposed Project will have limited effects on the natural and social resources within the study area.

7.0 POTENTIAL PERMITS, APPROVALS, AND CLEARANCES

Duke will construct the Project in accordance with all applicable Federal, State, and local permit requirements. Duke is responsible for obtaining all permits and approvals required to construct the Project. A comprehensive list of the potentially required permits, approvals, and administering agencies is included in Table 7-1. Consultations for the Project are ongoing with Federal, State, and local agencies. Further correspondence and agency clearances will be forwarded to the NCUC upon receipt.

Table 7-1: Preliminary List of Potential Permits, Clearances and Approvals

Administering Agency[a]	Potentially Required Permit, Clearance or Approval
Federal	
U.S. Army Corps of Engineers	Clean Water Act (Section 404) Nationwide 12 and Jurisdictional Determination
U.S. Fish & Wildlife Service	Endangered Species Act (Section 7) Informal Consultation
State	
North Carolina Utilities Commission	Certificate of Environmental Compatibility and Public Convenience and Necessity
North Carolina Department of Transportation	Utility Encroachment Agreement, Highway Crossing Permit, Heavy Haul Permit, Street and Driveway Access Permit (Temporary)
NCDEQ – Division of Energy, Mineral, and Land Resources	Erosion and Sedimentation Control Permit
NCDEQ – Division of Water Resources	Clean Water Act (Section 401) Water Quality Certification, NPDES General Permit for Stormwater Discharges (Construction Activities)
North Carolina Natural Heritage Program	State-listed Threatened and Endangered Plant Species Consultation
North Carolina Wildlife Resources Commission	State-listed Threatened and Endangered Wildlife Species Consultation
North Carolina State Historic Preservation Office	Cultural Resource Consultation and Review
Local	
Landowners	ROW Easements (Temporary and Permanent)

(a) NCDEQ = North Carolina Department of Environmental Quality
(b) NPDES = National Pollutant Discharge Elimination System, ROW = right-of-way

8.0 SUMMARY

To continue to provide reliable electric service to the region, Duke proposes to design, build, and operate a new 230kV transmission tap line. The new 230kV transmission tap line will connect Duke's proposed Porter's Neck T-D Substation to Duke's existing Castle Hayne – Folkstone 230kV transmission line at a tap location between structures 8 and 42.

Data was collected from cursory field surveys; aerial photography; local, State, and Federal agencies; and other sources to identify routes between the Project endpoints. Two public workshops were held to provide information about the Project and preliminary routes and to acquire public input to be used to help compare the routes. Throughout the course of the Project, correspondence was conducted with environmental stakeholders and the public. Preliminary routes were compared to identify a feasible route that limits the overall social and environmental impacts of the Project.

The preferred route (PN34) originates at the site of the proposed Porter's Neck T-D Substation, located between U.S. Highway 17 and Porter's Neck Road in New Hanover County, North Carolina. The route exits the substation site to the northwest and then turns north-northwest, crossing U.S. Highway 17. The route then continues generally northward, then turns to the west-northwest, crossing the alignment for the proposed Hampstead Bypass. The route then extends generally northward, crossing Sidbury Road and then terminating at the selected tap location along the existing Castle Hayne – Folkstone 230kV transmission line.

The preferred route was selected for the following reasons:

- No homes located within 300 feet of the route, an indication of minimal potential impacts to residences and homeowners
- Minimal input from concerned landowners as opposed to other routes, indicating a more positive public perception of the Project
- No impacts to conservation lands
- Least amount of length through planned residential zones/development areas
- Crosses fewest acres of wetland and hydric soils among all routes, which is beneficial not only from a construction, access, and maintenance perspective, but would also potentially require less permitting effort

The preferred route was the least overall impacting route (lowest-scoring) in the numerical evaluation performed for the proposed Project. By using standard construction procedures and mitigation techniques

and coordinating the Project with State and Federal agencies to comply with necessary regulations, the construction, operation, and maintenance of the proposed Project will have limited effects on the natural and social resources within the study area. Duke will continue to work with environmental stakeholders and landowners to reduce impacts of this proposed Project.

9.0 REFERENCES

Bailey, Robert G. (1995). *Description of the Ecoregions of the United States*. 2nd ed. Misc. Publ. No. 1391 (rev.) 108 pp. Washington D. C.: USDA Forest Service.

Cowardin, L. M., V. Carter, F. C. Golet, E. T. LaRoe. (1979). *Classification of Wetlands and Deepwater Habitats of the United States*. Washington, D.C.: U.S. Department of the Interior, Fish and Wildlife Service. National Wetlands Inventory Home Page. Retrieved 14 July 2016 from http://www.fws.gov/wetlands/Documents/Classification-of-Wetlands-and-Deepwater-Habitats-of-the-United-States-2013.pdf.

NCPedia (2018). *North Carolina Regional Vegetation*. Retrieved 4 October 2018 from https://www.ncpedia.org/vegetation#coastalplain

North Carolina Department of Agriculture and Consumer Services. (2018). *Census of Agriculture*. Retrieved 5 October 2018 from https://www.nass.usda.gov/Publications/AgCensus/2012/Full_Report/Volume_1,_Chapter_2_County_Level/North_Carolina/st37_2_001_001.pdf

North Carolina Department of Environmental Quality (NCDEQ). (2018a). *Physiographic Provinces of North Carolina*. Retrieved 3 October 2018 from https://ncdenr.maps.arcgis.com/apps/MapSeries/index.html?appid=1316f4eb4e3349298c3bd0063ab8fb89

North Carolina Department of Environmental Quality (NCDEQ). (2018b). *Cape Fear River Basin Documents.* Retrieved 4 October 2018 from https://deq.nc.gov/about/divisions/mitigation-services/dms-planning/watershed-planning-documents/cape-fear-river-basin

North Carolina Department of Environmental Quality: Division of Water Resources (NCDWR) (2018). *Classifications*. Retrieved 4 October 2018 from https://deq.nc.gov/about/divisions/water-resources/planning/classification-standards/classifications#DWRPrimaryClassification

North Carolina Department of Natural Resources (NCDNR) (2018). Managed Lands GIS data.

North Carolina Department of Transportation (NCDOT) (2018). *U.S. 17 Hampstead Bypass & Military Cutoff Road Extension*. Retrieved 8 October 2018 from https://www.ncdot.gov/projects/us-17-hampstead-bypass/Pages/default.aspx

North Carolina Natural Heritage Data Explorer (NCNHDE) (2018). Natural Heritage Natural Area GIS database.

North Carolina Wildlife Resources Commission (NCWRC). (2018). *Conserving North Carolina's Wildlife Resources: North Carolina Species*. Retrieved 5 October 2018 from https://www.ncwildlife.org/Conserving/Species

U.S. Army Corps of Engineers (USACE). (no date). *Recognizing Wetlands: An Informational Pamphlet*. Retrieved 6 July 2016 from http://www.usace.army.mil/Portals/2/docs/civilworks/regulatory/rw_bro.pdf.

U.S. Census Bureau (2016a). *2012-2016 American Community Survey 5-Year Estimates: North Carolina*. Retrieved 9 October 2018 from https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF

U.S. Census Bureau (2016b). *2012-2016 American Community Survey 5-Year Estimates: New Hanover County, North Carolina*. Retrieved 9 October 2018 from https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk

U.S. Census Bureau (2016c). *2012-2016 American Community Survey 5-Year Estimates: Pender County, North Carolina*. Retrieved 9 October 2018 from https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk

U.S. Census Bureau (2018). *QuickFacts: Pender County, North Carolina; New Hanover County, North Carolina; North Carolina; United States.* Retrieved 8 October 2018 from https://www.census.gov/quickfacts/fact/table/pendercountynorthcarolina,newhanovercountynorthcarolina,nc,US/PST045217

U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS). (1977). Soil Survey of New Hanover County North Carolina. Retrieved 3 October 2018 from https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/north_carolina/NC129/0/NewHanover.pdf

U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS). (1990). Soil Survey of Pender County North Carolina. Retrieved 3 October 2018 from https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/north_carolina/NC141/0/Pender.pdf

U.S. Fish and Wildlife Service (USFWS). (2018). *Information for Planning and Consultation.* Retrieved 4 October 2018 from https://ecos.fws.gov/ipac/location/JARZ6Z5NIJA6PFJ5HHMUGMHGGY/resources

APPENDIX A - SUITABILITY MAP CRITERIA

Suitability Map Criteria

	SENSITIVITY TO TRANSMISSION LINE CONSTRUCTION				
	0-5 LOW	6-10 MODERATE / LOW	11-15 MODERATE	16-20 MODERATE / HIGH	25-100 HIGH
CULTURAL RESOURCES					
Historic District - Eligible for the NRHP					**100**
Historic District - Eligible for the NRHP - 500' Buffer					**25**
Historic District - Eligible for the NRHP - 1000' Buffer			**15**		
Historic Site - Eligible for the NRHP					**100**
Historic Site - Eligible for the NRHP - 100' Buffer					**100**
Historic Site - Eligible for the NRHP - 500' Buffer				**19**	
Historic Site - Eligible for the NRHP - 1000' Buffer			**15**		
Historic Site - Potentially Eligible for the NRHP					**75**
Historic Site - Potentially Eligible for the NRHP - 100' Buffer					**75**
Historic Site - Potentially Eligible for the NRHP - 500' Buffer				**19**	
Historic Site - Potentially Eligible for the NRHP - 1000' Buffer			**15**		

*National Register of Historic Places

FEMA FLOOD ZONES					
Zone AE - A 1% Annual Chance of Flooding where Base Flood Elevations are Provided		**6**			
Zone AE - Floodway					**25**
Zone B - 0.2 PCT Annual Chance Flood Hazard	**2**				
Zone X - Area of Minimal Flood Hazard	**0**				
FUTURE LAND USE					
Low-Density Residential			**11**		
Road Right-of-Way		**10**			
LAND COVER					
Barren	**2**				
Grassland/Herbaceous	**2**				
Cultivated/Crop/Pasture/Hay	**2**				
Rock				**20**	
Hardwood Forest				**19**	
Pine Forest			**15**		
Mixed Forest			**17**		
Scrub / Shrub / Cut-Over	**3**				
Urban / Built-up (High Density Type Development)				**16**	

Suitability Map Criteria

COMMUNITY AMENITIES AND PUBLIC INFRASTRUSTURE

Cemetery					100
Communication Tower					25
Duke Energy Substation			15		
Duke Energy Transmission Line Right-of-Way	2				
Fire / EMT				20	
Government				20	
Road Right-of-Way/Rail Road Right of Way				20	
Airport Property					100
Airport Property Glide Path					50
Airport Property Less than 5 miles away				16	

NATURAL RESOURCES

NHP Fed T&E (agencies response should identify T&E in the area)				20	
Protected Private Lands					25
Cons. Easement					50
NHP Rare Plant (agency response should identify and note NHP in the study area)		10			

OCCUPIED BUILDINGS

Church Building (Footprint)					100
Church Building (50' Buffer)				20	
Church Building (100' Buffer)				16	
Church Building (500' Buffer)			12		
Church Building (1000' Buffer)		8			
Commercial Building (Footprint)					100
Commercial Building (100' Buffer)			15		
Commercial Building (200' Buffer)		8			
Fire / EMT Building (Footprint)					100
Fire / EMT Building (50' Buffer)			15		
Fire / EMT Building (100' Buffer)		6			
Fire / EMT Building (200' Buffer)	2				
Multi-Family Residence (Footprint)					100
Multi-Family Residence (50' Buffer)					25
Multi-Family Residence (100' Buffer)				16	
Multi-Family Residence (500' Buffer)		6			
Multi-Family Residence (1000' Buffer)	2				
School Building (Footprint)					100
School Amenities (Area used for school activities)					50
School - Including Amenities (500' Buffer)				20	
School - Including Amenities (1000' Buffer)			15		
Single - Family Residence (Footprint)					100
Single - Family Residence (50' Buffer)					100
Single - Family Residence (100' Buffer)				20	
Single - Family Residence (500' Buffer)		6			
Single - Family Residence (1000' Buffer)	2				

Suitability Map Criteria

PRIME AND IMPORTANT FARMLANDS

All areas are prime farmland		**7**			
Farmland of local importance		**7**			
Farmland of statewide importance		**7**			
Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season	**5**				
Prime farmland if protected from flooding or not frequently flooded during the growing season	**5**				
Not prime or important farmland	**0**				

PUBLIC VISIBILITY - Crossing Distance

Interstate 0-200'	**5**				
Interstate 200-500'		**10**			
Interstate 500' +			**13**		
State Roads 0-60'	**2**				
State Roads 60-240'		**6**			
State Roads 240' +			**11**		
Local Roads 0-40'	**1**				
Local Roads 40-120'		**5**			
Local Roads 120'+			**10**		

gradient scale based on amount of impact using model

WATER FEATURES

Open Water		**6**			
Palustrine Emergent - Herbaceous Wetland			**11**		
Palustrine Forested - Forested Wetland (Woody Wetlands)				**16**	
Stream (Open Water 50' Buffer)		**6**			
Stream (Open Water 100' Buffer)		**6**			
50' Buffer		**8**			
100' Buffer		**5**			

ZONING

Institutional District	**2**				
General Industrial	**1**				
Business District	**5**				
Mixed Use		**6**			
Residential Multi-Family		**6**			
Residential Single-Family		**6**			

APPENDIX B - AGENCY CORRESPONDENCE

Agency Contact List

Title	Firstname	Lastname	Position	Agency	Address1	Address2	City	State	Zip	Phone
Mr.	Timothy	Beard	State Conservationist	USDA, Natural Resources Conservation Service	4407 Bland Road	Ste 117	Raleigh	NC	27609	919-873-2101
Ms.	Gracia	Szczech	Regional Administrator	Federal Emergency Management Agency Region IV	Federal Emergency Management Agency	3003 Chamblee Tucker Road	Atlanta	GA	30341	770-220-5200
Mr.	Trey	Glenn	Regional Administrator	U.S. Environmental Protection Agency, Southeast Region	Sam Nunn Atlanta Federal Center	61 Forsyth Street SW	Atlanta	GA	30303-8960	404-562-9900
Col.	Robert	Clark	Wilmington District Commander	U.S. Army Corps of Engineers, Wilmington District	69 Darlington Ave		Wilmington	NC	28403	910-251-4633
Ms.	Emily	Greer	Regulatory Specialist	U.S. Army Corps of Engineers, Wilmington Regulatory Field Office	69 Darlington Ave		Wilmington	NC	28403	910-251-4633
Mr.	Pete	Benjamin	Field Supervisor	U.S. Fish and Wildlife Service, Raleigh Ecological Services Field Office	PO Box 33726		Raleigh	NC	27636	919-856-4520
Mr.	Ken	Arney	Regional Forester	U.S. Forest Service, Southern Region	1720 Peachtree Road NW		Atlanta	GA	30309	404-347-4177
Ms.	Kimberly	Bose	Secretary	Federal Energy Regulatory Commission	888 First Street NE		Washington	DC	20426	202-502-8400
Mr.	Stan	Austin	Regional Director	U.S. National Park Service, Southeast Region	100 Alabama Street SW	1924 Building	Atlanta	GA	30303	404-507-5600
Mr.	Michael	O'Harra	Regional Administrator	Federal Aviation Administration, Southern Region	1701 Columbia Avenue		College Park	GA	30337	404-305-5000
Mr.	John	Sideris	Manager, ILMATCT	Federal Aviation Administration-Wilmington Office	2220 Control Tower Drive		Wilmington	NC	28405	910-815-4642
Mr.	Emmett	Rogers	County Executive Director	USDA, Farm Service Agency	Pender County Farm Service Agency	801 S. Walker Street	Burgaw	NC	28425	910-259-9123
Mr.	Steve	Troxler	Commissioner	North Carolina Department of Agriculture and Consumer Services	1001 Mail Service Center		Raleigh	NC	27699-1001	919-707-3000
Ms.	Patricia	Hay	Regional Administrative Office Manager	North Carolina Department of Environment and Natural Resources	127 Cardinal Drive Ext.		Wilmington	NC	28405	910-796-7215
Mr.	Dan	Sams	Environmental Program Supervisor, Land Resources	North Carolina Department of Environment and Natural Resources	127 Cardinal Drive Ext.		Wilmington	NC	28405	910-796-7326
Mr.	Jim	Gregson	Regional Supervisor, Water Resources	North Carolina Department of Environment and Natural Resources	127 Cardinal Drive Ext.		Wilmington	NC	28405	910-796-7386
Ms.	Debra	Wilson	District Manager, Coastal Management	North Carolina Department of Environment and Natural Resources	127 Cardinal Drive Ext.		Wilmington	NC	28405	910-796-7266
Mr.	Wayne	Randolph	Regional Supervisor, Waste Management	North Carolina Department of Environment and Natural Resources	127 Cardinal Drive Ext.		Wilmington	NC	28405	910-796-7320
Mr.	Gordon	Myers	Executive Director	North Carolina Wildlife Resources Commission	1701 Mail Service Center		Raleigh	NC	27699-1701	919-707-0151
Mr.	David	Cobb	Division Chief	North Carolina Wildlife Resources Commission	1722 Mail Service Center		Raleigh	NC	27699-1722	919-707-0050
Mr.	Chris	Kent	District 2 Management Biologist	North Carolina Wildlife Resources Commission	1722 Mail Service Center		Raleigh	NC	27699-1722	252-617-0019
Ms.	Misty	Buchanan	NHI Director	North Carolina Natural Heritage Program	121 W. Jones Street	1651 Mail Service Center	Raleigh	NC	27699-1651	919-707-8107
Mr.	James	Trogdon III	Secretary of Transporation	North Carolina Department of Transportation	1501 Mail Service Center		Raleigh	NC	27699-1501	919-707-2800
Ms.	Karen	Collette	Division Engineer, Division 3	North Carolina Department of Transportation	5501 Barbados Blvd.		Castle Hayne	NC	28429	910-341-2000
Mr.	Shane	Hardee	District Forester, District 8	North Carolina Forest Service	1413 Chadbourn Highway		Whiteville	NC	28472	910642-5093
Mr.	Stephen	Murphey	Director, Division of Marine Fisheries	North Carolina Department of Environmental Quality	3441 Arendell Street		Morehead City	NC	28557	252-808-8013
Mr.	Mike	Murphy	Director	North Carolina Division of Parks and Recreation	121 W. Jones Street	Mail Service Center 1615	Raleigh	NC	27699-1615	919-707-9300
Dr.	Roy	Crabtree	Regional Administrator, Southeast Region	National Marine Fisheries Service	263 13th Avenue South		St. Petersburg	FL	33701	727-824-5301
Ms.	Ramona	Bartos	Deputy SHPO	North Carolina State Historic Preservation Office	4617 Mail Center		Raleigh	NC	27699-4617	919-807-6583
Mr.	Wayne	Clark	Planning and Land Use Director	New Hanover County Planning and Land Use	230 Government Center Dr.	Suite 110	Wilmington	NC	28403	910-798-7164
Mr.	Kyle	Breuer	Planning Director	Pender County Planning Department	805 South Walker Street		Burgaw	NC	28425	910-259-1202

BURNS McDONNELL

February 27, 2018

«AddressBlock»

Re: Duke Energy Progress
Porter's Neck 230kV Transmission Tap Line Project
Request for Agency Review
Project Number 105077

«GreetingLine»

Burns & McDonnell Engineering Company, Inc. has been retained by Duke Energy Progress, Inc. (DEP) to conduct a routing study and environmental review for a 230kV overhead electric transmission line to be located in northern New Hanover County and southern Pender County, North Carolina. Included with this letter is a map illustrating the general project area.

We are contacting you early in our process to solicit comments and information you can provide regarding potential constraints within the project area, such as Geographic Information System (GIS) shapefiles or hard copy maps of constraints you feel will help us identify sensitive resources within the project area. Please send comments to John Dunham, Burns & McDonnell, 9400 Ward Parkway, Kansas City, MO 64114 or electronically at jdunham@burnsmcd.com. Please call me at (816) 822-3128 or email me if you have any questions or require additional information. Thank you for your time and we look forward to hearing from you.

Sincerely,

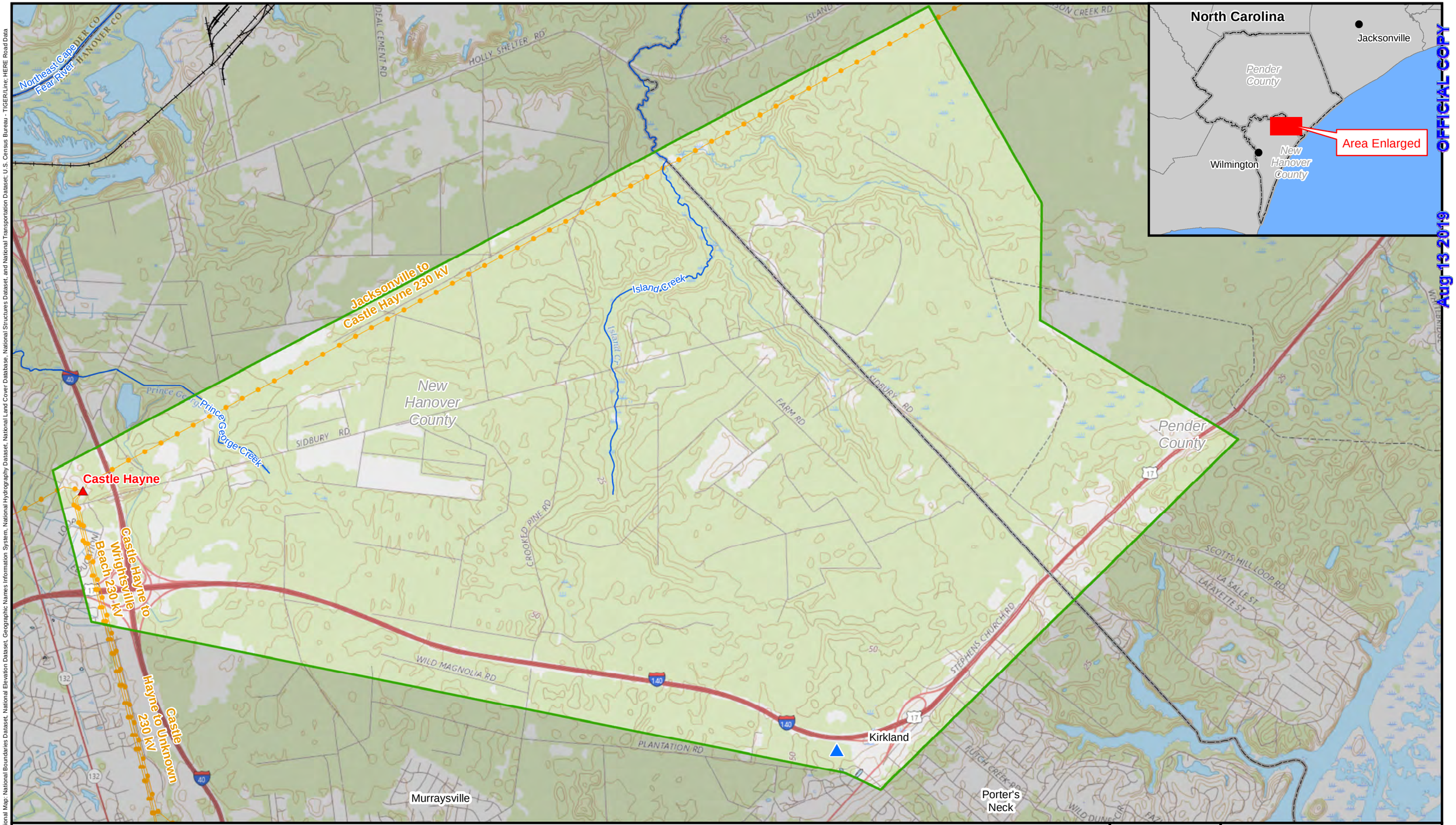
John Dunham
Project Manager
Environmental Services Group

Enclosure Map

cc: Micah Retzlaff, Duke Energy Progress
Kristi Wise, Burns & McDonnell

9400 Ward Parkway \ Kansas City, MO 64114
O 816-333-9400 \ F 816-333-3690 \ burnsmcd.com

ATTACHMENT A



Proposed Substation Location
Existing Substation
Study Area
County Boundary
Existing 230kV

NORTH

3,000 1,500 0 3,000
Scale in Feet

DUKE ENERGY.

Study Area
Porter's Neck 230kV Line
Duke Energy Progress
New Hanover & Pender Counties

Source: NCDOT, FAA, Ventyx Velocity, Esri, FCC, NCHPO, FWS NWI, USGS NHD, New Hanover County, FEMA, NCDNR, and Burns & McDonnell Engineering Company, Inc.

Issued: 2/23/2018

Path: Z:\Clients\ENS\DukeEnrgyPro\105077_PortersNeck230\Studies\Geospatial\DataFiles\ArcDocs\Agency Letter Map_Working.mxd jdunham 2/23/2018

Service Layer Credits: USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; U.S. Census Bureau - TIGER/Line; HERE Road Data

SIGN UP SHEET
SCOPING MEETING

Duke Energy Porters Neck 230kV Transmission Line
Porters Neck
New Hanover County

April 4, 2018

Name	Agency	Phone	Email
Cameron Weaver	DEQ-DEACS	910-796-74-75	Cameron.Weaver@ncdenr.gov
*Tyler Crumbley	USACE	910-251-4170	Tyler.Crumbley@usace.army.mil
Rhonda Hall	DEMLR-LQ	910-796-7312	Rhonda.Hall@ncdenr.gov
Chad Coburn	DWR-401	910-796-7379	Chad.Coburn@ncdenr.gov
Linda Lewis	DEMLR-SW	910-796-7343	Linda.Lewis@ncdenr.gov
X Brennan Dooley	USACE	910-251-4694	Brennan.J.Dooley@usace.army.mil
*Laura Robinson	NC NHP	919-707-8647	Laura.Robinson@ncdcr.gov
Gail Tyner	Duke Energy	919-546-2974	Gail.Tyner@duke-energy.com
Micah Retzlaff	Duke Energy	919-357-8691	Micah.Retzlaff@duke-energy.com

NCDEQ
WILMINGTON REGIONAL OFFICE
127 CARDINAL DRIVE
WILMINGTON, NC 28405
910-796-7215, FAX 910-350-2004

From: Retzlaff, Micah E.
To: Dunham, John; Tyner, Gail
Cc: Wise, Kristi; Oakley-Lisk, Pamela
Subject: RE: Porters Neck Agency Meeting Questions
Date: Thursday, April 5, 2018 7:52:30 AM
Attachments: Duke Energy Porters Neck 230kV Transmission Line Scoping Sign in.doc
Importance: High

John,

Gail and I did meet with the State agencies yesterday and presented your questions as part of our meeting. Attached is a list of the attendees (NOTE: Brennan Dooley w/ US ACE was not present, but was referenced as the county contact for future submittals; Gail knows Brennan well if you need her to coordinate questions).

Here's the responses/information we received:

1. Can we obtain specific locations within the study area for protected species such as RCW, Venus flytrap, etc. that we need to stay away from during the routing process? Are there special exclusion buffers associated with these sites? Did that shapefile/attribute data I forwarded you answer these questions?

2. Are there any other protected lands or easements within the study area that were not previously identified that could present an obstacle during routing? None known by the agency team. There was reference to the endangered species in those two savannahs and mitigation areas already noted in the map, but no recent updates.

3. Are there any new planned developments (residential or commercial) within the study area that we may not be aware of? The only project of note they referenced is the future interchange of the Military Cutoff extension onto the new Hwy 17. The best reference we could find is the County parcel map which shows the future ROW.

4. Does the NWI wetland data reflect the true wetlands in this area, or do they over/underestimate the true wetlands? DENR rep confirmed that the NWI is "really bad" especially for this area. He relies on the "NC crews" data layer in the NC One Map application. I don't have any idea what this is, but imagine that you all do. If not, Gail and Lamees use it extensively and could probably help.

5. Since this area is so close to the coast, are there any special issues that would involve coastal wetlands/tidal areas and protected species? If so, are there restrictions in these areas? DEQ confirmed that this area is not subject to special coastal/tidal rules. Other than the known species in the area, there were no additional species of note.

6. What are the specific restrictions on the NCDOT Mitigation property? DOT rep was not there. Gail is reaching out to a contact she worked with when the highways were extended and will make an initial request for additional information about these noted areas.

During the meeting, Gail confirmed that our consultant may be reaching out to each of the agency reps for additional information requests as needed.

Thanks,

Micah

From: Dunham, John [mailto:jdunham@burnsmcd.com]
Sent: Friday, March 30, 2018 2:25 PM
To: Retzlaff, Micah E.; Tyner, Gail
Cc: Wise, Kristi; Oakley-Lisk, Pamela
Subject: Porters Neck Agency Meeting Questions

Hi, Micah and Gail. Attached are some questions Kristi and I came up with for the agency meeting next week. You may have already planned to ask these questions but we wanted to make sure we were covered. Thanks a bunch. Have a super weekend! John

John W. Dunham \ Burns & McDonnell
Senior Environmental Scientist \ Environmental Services
O 816-822-3128 \ **M** 816-877-4948 \ **F** 816-822-4299
jdunham@burnsmcd.com
9400 Ward Parkway \ Kansas City, MO 64114

From: Retzlaff, Micah E.
To: Wise, Kristi; Dunham, John
Subject: FW: [External] DEP Line Siting Project - Porters Neck Area
Date: Thursday, April 12, 2018 9:34:10 AM
Attachments: image002.png
mapofsites.pdf

Email #2 about the mitigation areas in Porters Neck.

From: Tyner, Gail
Sent: Thursday, April 05, 2018 6:45 PM
To: Retzlaff, Micah E.
Subject: FW: [External] DEP Line Siting Project - Porters Neck Area

From: Paugh, Leilani Y [mailto:lpaugh@ncdot.gov]
Sent: Thursday, April 05, 2018 4:40 PM
To: Tyner, Gail
Subject: FW: [External] DEP Line Siting Project - Porters Neck Area

Gail

Attached is a map of another mitigation site we have purchased but not restored within your study area. The parcel pin numbers are

3261-13-5768.000

3261-06-6639.000

3261-06-4553.000

This site will have similar restrictions on it.

LeiLani

LeiLani Paugh
Mitigation and Modeling Group Supervisor
Environmental Analysis Unit
North Carolina Department of Transportation

919 707 6146 office
lpaugh@ncdot.gov

From: Tyner, Gail [mailto:Gail.Tyner@duke-energy.com]
Sent: Thursday, April 05, 2018 12:33 PM
To: Paugh, Leilani Y
Cc: Retzlaff, Micah E.
Subject: [External] DEP Line Siting Project - Porters Neck Area

LeiLani

We are siting a transmission line between the US17 Bypass/Market Street Intersection (southeastern corner of the project study area) and our existing Castle Hayne – Folkstone 230kV Line along the northwest project study area boundary. See attached map.

Looks like there are NCDOT Mitigation Sites adjacent to the 17 Bypass.

Could you send the restrictions associated with crossing NCDOT mitigation sites and any relevant information on the mitigation sites – I assume that they have RCW and/or RLL occurrences?

Thanks

Gail Tyner

Duke Energy Progress

Environmental Specialist, Siting & Permitting

410 S. Wilmington Street
NC 2
Raleigh, NC 27601-1551

919.546.2974 (office)
919.546.7175 (fax)
gail.tyner@duke-energy.com

From: Retzlaff, Micah E.
To: Wise, Kristi; Dunham, John
Subject: FW: [External] DEP Line Siting Project - Porters Neck Area
Date: Thursday, April 12, 2018 9:30:29 AM
Attachments: image001.png
image002.png

Kristi/John,

Here is additional information we've received from the NC DOT regarding those mitigation areas along Hwy 17 in the Porters Neck study area.

Let me know if there are any questions. Additionally, we've had our agency meeting so reaching out directly to Gail's contact below should be fine too. NOTE: I'm forwarding along a 2nd e-mail about this too.

Micah

From: Tyner, Gail
Sent: Thursday, April 05, 2018 6:45 PM
To: Retzlaff, Micah E.
Subject: FW: [External] DEP Line Siting Project - Porters Neck Area

---

From: Paugh, Leilani Y [mailto:lpaugh@ncdot.gov]
Sent: Thursday, April 05, 2018 4:37 PM
To: Tyner, Gail
Subject: FW: [External] DEP Line Siting Project - Porters Neck Area

*** Exercise caution. This is an EXTERNAL email. DO NOT open attachments or click links from unknown senders or unexpected email. ***

Hi Gail

Here is our information below on the NCDOT sites you identified. The permit condition lists the restricted activities. Please let me know if you need any additional information.

Thanks

LeiLani

LeiLani Paugh
Mitigation and Modeling Group Supervisor
Environmental Analysis Unit
North Carolina Department of Transportation

919 707 6146 office

lpaugh@ncdot.gov

From: Feulner, Brett M
Sent: Thursday, April 05, 2018 4:24 PM
To: Paugh, Leilani Y
Subject: RE: [External] DEP Line Siting Project - Porters Neck Area

Leilani,
The four DOT Sites from west to east on the 17 bypass are as follows

1-Corbett Tract and Strip
Wetlands, RLL and RCW

2-Plantation Road
RLL and RCW

3-34 Acre Residual
RLL and RCW

4-22 Acre Residual
RLL and RCW

404 permit 9/23/2003
The Corbett Tract Site shall be maintained by the permittee in its natural condition in perpetuity. Prohibited activities within the mitigation area specifically include, but are not limited to, the construction or placement of buildings, signs, or any other structures; the:discharge of dredged or fill material, any debris, waste, or garbage; excavation; grading; dredging; leveling or any other earth moving activity; cutting, removal or damage of any vegetation; any activity which would impact the drainage or water quality on the site; except as required by implementation of the mitigation plan. This condition runs with the land. The permittee shall not sell, lease, or otherwise convey any interest in the property making up the mitigation property without first providing 60 days written notice to the Corps of the proposed conveyance. The instrument effecting such conveyance shall include legally binding restrictions on the use of the mitigation property as described in this condition
to be enforceable by the permittee as well as the U.S. Anny Corps of Engineers, Wilmington District.
The instrument establishing such restrictions shall be subject to the approval of the U.S. Anny Corps of Engineers. The permittee shall enforce the terms ofthe required restrictions.

BO (May 22, 2002)
According to data collected in 2000 and 2001, at least 354 rough leaf loosestrife stems in 2 subpopulations are located in the proposed alignment. NCDOT proposes to protect several properties adjacent to the ROW to minimize overall impacts.

-The Corbett Tract has 18 separate clusters of rough leaf loosestrife.

-The Plantation Road Site has 7 separate clusters of rough leaf loosestrife.

-The Corbett Strip has no clusters of rough leaf loosestrife but cannot be ruled out as habitat.

-The 34-Acre Residual Site has separate clusters of rough leaf loosestrife and portions should be considered habitat.

- The 22-Acre Residual Site has separate clusters of rough leaf loosestrife and portions should be considered habitat.

From: Paugh, Leilani Y
Sent: Thursday, April 05, 2018 12:36 PM
To: Feulner, Brett M
Subject: FW: [External] DEP Line Siting Project - Porters Neck Area

Brett

Please pull any site info and permit conditions for this. Thanks.

LeiLani

LeiLani Paugh
Mitigation and Modeling Group Supervisor
Environmental Analysis Unit
North Carolina Department of Transportation

919 707 6146 office
lpaugh@ncdot.gov

From: Tyner, Gail [mailto:Gail.Tyner@duke-energy.com]
Sent: Thursday, April 05, 2018 12:33 PM
To: Paugh, Leilani Y
Cc: Retzlaff, Micah E.
Subject: [External] DEP Line Siting Project - Porters Neck Area

LeiLani

We are siting a transmission line between the US17 Bypass/Market Street Intersection (southeastern corner of the project study area) and our existing Castle Hayne – Folkstone 230kV Line along the northwest project study area boundary. See attached map.

Looks like there are NCDOT Mitigation Sites adjacent to the 17 Bypass.

Could you send the restrictions associated with crossing NCDOT mitigation sites and any relevant information on the mitigation sites – I assume that they have RCW and/or RLL occurrences?

Thanks

Gail Tyner

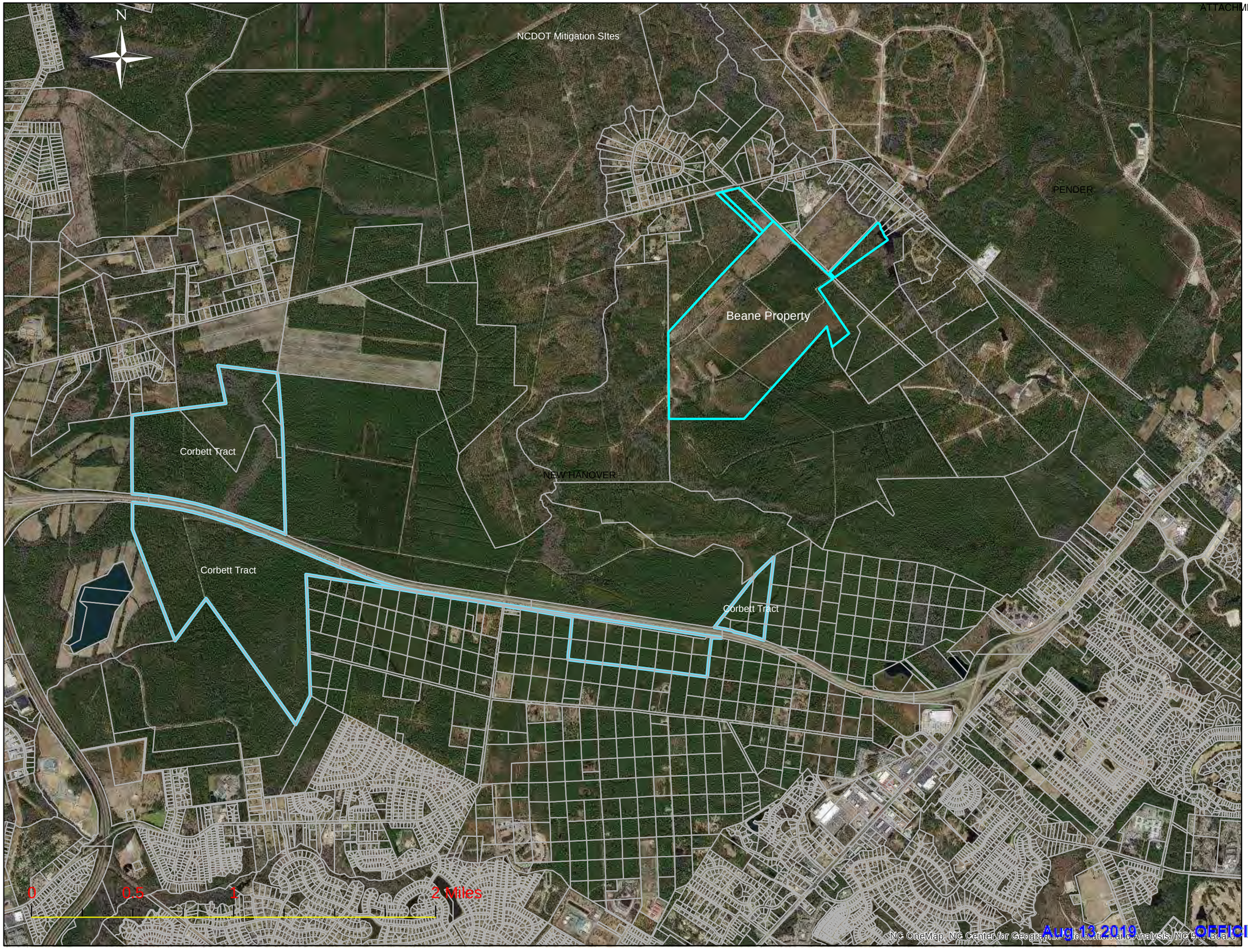
Duke Energy Progress

Environmental Specialist, Siting & Permitting

410 S. Wilmington Street
NC 2
Raleigh, NC 27601-1551

919.546.2974 (office)
919.546.7175 (fax)
gail.tyner@duke-energy.com

Email correspondence to and from this sender is subject to the N.C. Public Records Law and may be disclosed to third parties.



Memorandum

BURNS McDONNELL

Date: April 6, 2018

To: Kristi Wise & John Dunham

From: Dusty Werth

Subject: Porter's Neck FAA Review

I completed a preliminary review of the Porter's Neck study area for potential FAA concerns and the following is a summary of my findings.

The southwestern portion of the study area is covered by the circling area for the Wilmington International (ILM) airport (blue hatching on attached figure) and will have a height restriction of 260 feet above mean sea level (AMSL). This was calculated by determining the Minimum Descent Altitude (MDA) and subtracting the Required Obstacle Clearance (ROC) (560 feet AMSL – 300 feet = 260 feet AMSL). Given that the terrain in this area is generally 25 – 50 feet AMSL, a transmission structure would need to exceed 200 feet Above Ground Level (AGL) before becoming an obstruction based on this surface (any structure exceeding 200 feet AGL is automatically an obstruction).

Runway 24 also has several Instrument Landing System (ILS)/Localizer (LOC) approaches as well as Area Navigation (RNAV) approaches that cross a large section of the study area (red hatching on attached figure). Based on a high-level review of these Terminal Instrument Procedures (TERPS), it does not appear that poles up to 135 feet AGL are likely to interfere with any of these approaches. Due to the limited amount of obstructions in this area, I would highly recommend that several test structures be filed with the FAA Obstruction Evaluation/Airport Airspace Analysis (OE/AAA) office to get determinations indicating that the proposed transmission line would not be determined to be a hazard. These can be filed once the preliminary routes have been developed to determine the feasibility and double check this high-level analysis.

There is a Non Directional Beacon (NDB) located in the center of the study area (see attached figure). It would be best to avoid placing a transmission line in close proximity to this beacon if at all possible.

This analysis takes into consideration only the currently published procedures for the existing runways at ILM. Any plans on file, planned procedures, runway extensions, new runways, etc. are not typically publicly available but can be discovered through the filing of test structures with the OE/AAA.

DEW

Attachment: FAA Review Map

320
245
167
89
350

Project Study Area
Existing Transmission Lines
Fix Points
Existing Obstructions
TACAN/DME
Non Directional Beacon (NDB)
VOR/VORTAC
Part 77 Surfaces
Circling Area
RNAV Approach

NORTH

3,000 1,500 0 3,000
Scale in Feet

BURNS McDONNELL

FAA Review
Porter's Neck
Duke Energy Progress

Source: Energy Velocity, FAA, ESRI, and Burns & McDonnell Engineering Company, Inc.

Issued: 4/6/2018

Path: \\bmcdfs\Clients\ENS\DukeEnrgyPro\105077_PortersNeck230\Studies\GeospatialDataFiles\ArcDocs\FAA\FAA_Review.mxd dwerth 4/6/2018

Service Layer Credits:

APPENDIX C - PUBLIC INVOLVEMENT INFORMATION

Transmission – Public Engagement
NCRH 05 | 401 South Wilmington Street
Raleigh, NC 27601
duke-energy.com

July 9, 2018

<<Owner1>>
<<MailAddress1>>
<<MailCity>>, <<MailState>> <<MailZip>>

Strengthening the electric power system to meet your community's future energy needs

Dear Community Member and Property Owner:

Duke Energy is committed to providing you with reliable, resilient electric service, now and into the future. To prepare the electric system for the forecasted growth in the Wilmington area, we are conducting a transmission line routing study northeast of Highway 17 in New Hanover and Pender counties. Please refer to the enclosed map.

We invite you to a community workshop to learn about and to discuss this important project:
Thursday, July 26, 2018 | 4-7 p.m.
Scotts Hill Baptist Church | 185 Scotts Hill Loop Road | Wilmington, N.C.

Duke Energy uses a three-phase, comprehensive study method to identify future transmission line corridors. This study entails an examination and analysis of geographic, environmental and cultural resources as well as aesthetic data combined with engineering knowledge.

We have gathered data from federal, state and local agencies. Our next step is to meet with the community and document input from residents and business owners who live and work in the area.

This community workshop is an important step in developing a comprehensive study plan for a new transmission line in your area. Please join us to discuss how a preferred route will be selected, to learn more about the routing study process and to provide valuable information that will help determine the most appropriate route for the line.

The meeting will be an open house format, allowing you to attend as your schedule permits. Duke Energy employees will be at information stations ready to address your questions, provide information and receive your feedback.

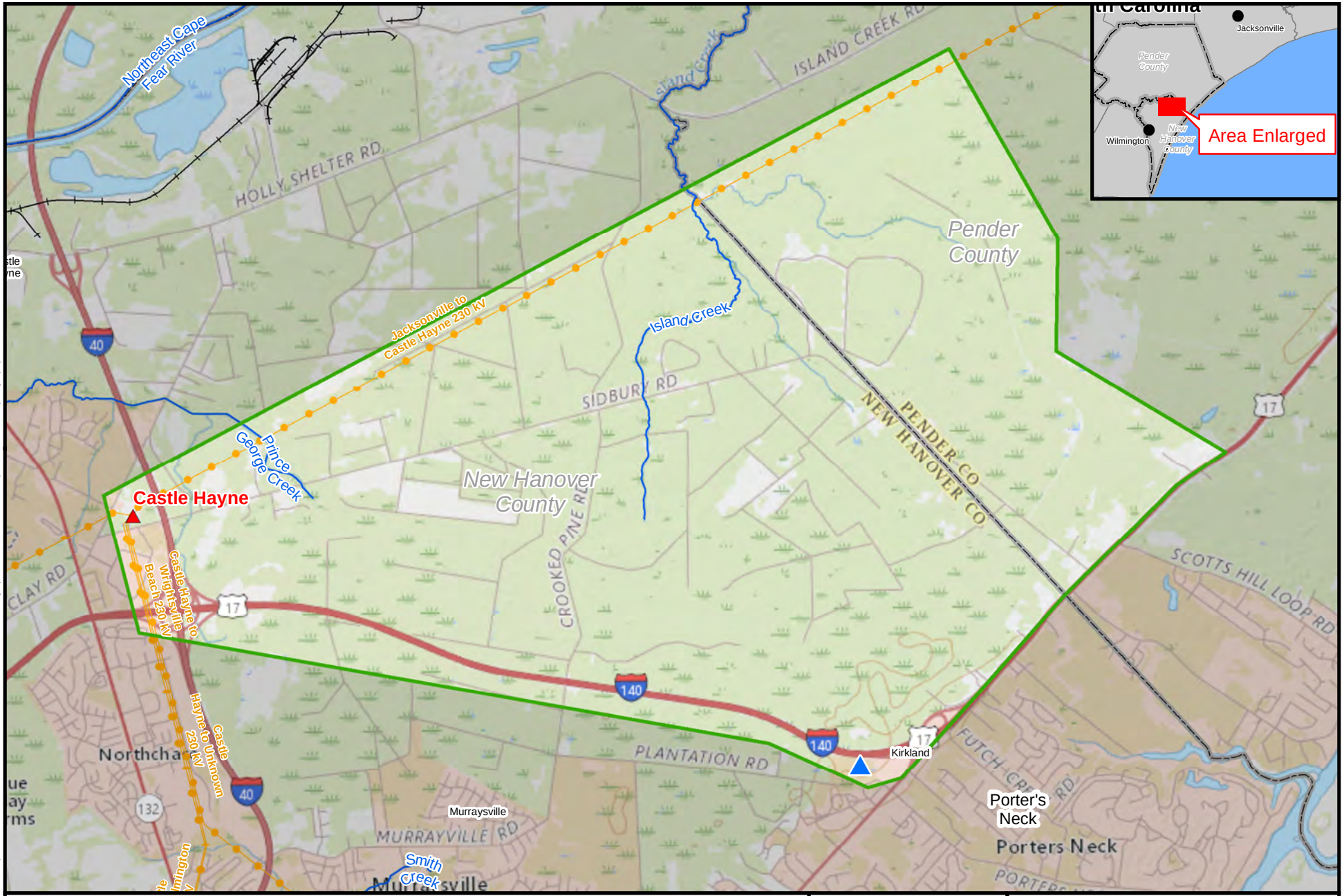
You can learn more about the transmission routing study process and view the map online at duke-energy.com/WilmingtonNEProject starting July 25. If you have questions, you may contact us at 866.297.5886 or send an email to CarolinasEast@duke-energy.com.

We look forward to talking with you at the workshop and discussing how we will continue to meet your energy needs.

Sincerely,

Keith Gifford
Project Manager
State Parcel Number:
Enclosure (1)

ATTACHMENT A



Proposed Substation Location
Existing Substation
Study Area
County Boundary
Existing 230kV

NORTH

3,000 1,500 0 3,000
Scale in Feet

DUKE ENERGY.

Study Area
Porter's Neck 230kV Line
Duke Energy Progress
New Hanover & Pender Counties

Source: NCDOT, FAA, Ventyx Velocity, Esri, FCC, NCHPO, FWS NWI, USGS NHD, New Hanover County, FEMA, NCDNR, and Burns & McDonnell Engineering Company, Inc.

OFFICIAL COPY
Aug 13 2019

Wilmington NE Project
Transmission Line Routing Study Questionnaire

This survey will help the routing team understand your interests and concerns and incorporate this information into the route selection process.

YOUR INFORMATION

Name: _____ Phone: _____

Organization (if applicable): _____ Email: _____

Address: _____ City/State/Zip: _____

WHICH OF THE FOLLOWING APPLIES TO YOU

My home/property/business (please circle which applies) is in the study area _____

I'm interested in the project, but do not live or own property in the study area _____

Government representative _____ If so, which agency _____

Other, please explain _____

HOW DID YOU FIND OUT ABOUT THE PROJECT/THIS MEETING

Mailing _____ Neighbor/Friend _____ News Release _____ Internet _____

Other, please explain _____

PROJECT FACTORS

Please circle the number indicating the level of importance of that factor to you.

Factors	Not Important		Somewhat Important		Most Important
Distance from homes/residences	1	2	3	4	5
Distance from commercial businesses and industrial facilities	1	2	3	4	5
Distance from public facilities (e.g. schools, parks, churches, cemeteries, etc.)	1	2	3	4	5
Distance from historic/cultural sites	1	2	3	4	5
Distance from conservation areas	1	2	3	4	5
Crossing of wetlands, floodplains and streams/rivers	1	2	3	4	5
Crossing cropland/pastureland	1	2	3	4	5
Crossing forested land	1	2	3	4	5
Following property lines	1	2	3	4	5
Following roads	1	2	3	4	5
Following other utility corridors	1	2	3	4	5
Total length of the project (reducing the total cost)	1	2	3	4	5

DUKE ENERGY®

*BUILDING A **SMARTER** ENERGY FUTURE℠*

ADDITIONAL COMMENTS

If you would like to comment further on your answers above or identify any other issues that you would like to be considered, please use the space below or an additional sheet of paper.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

I WOULD LIKE TO REQUEST FOLLOW UP TO MY QUESTIONS/CONCERNS: YES NO

PREFERRED METHOD FOR FOLLOW UP: Phone _____ Email _____ Mail _____

If you choose to take this form with you, please return by Aug. 24, 2018 to:

Wilmington NE Reliability Project
C/O Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

The form may also be returned via email to jdunham@burnsmcd.com

DUKE ENERGY®

Wilmington NE Transmission Project

Get Connected

Information about the Wilmington NE Electric Transmission Line Project

Project Need

Fostered by the expansion of Highway 17 and the future expansion of Military Cutoff Road, electric demand is growing northeast of Wilmington. Additional capacity on the electric distribution lines that serve area homes and businesses is needed. To meet this anticipated demand, a new substation and transmission line are being planned.

The substation will be built on Duke Energy-owned property located off Porters Neck Road. This station will house new technologies designed to enhance electric power reliability, increase available electricity and increase resiliency during severe weather events.

To power this substation, a new electric transmission line is needed to connect it to the electric grid. The new transmission line will tie to the Jacksonville-Castle Hayne 230-kV line or the Castle Hayne-Wrightsville Beach 230-kV transmission lines.

Project Description

- A new 4- to 6-mile-long 230-kilovolt (kV) transmission line
- Two switches – components that allow operators to move the electric load from one power line to another during outages or required maintenance, reducing or eliminating power outages

Benefits to the Community

- Enhances Duke Energy's ability to provide safe and reliable energy to homes, community facilities and businesses in the area
- Addresses the need for additional capacity to continue delivering reliable electricity to meet the growing energy needs of the region
- Improves the resiliency of the electric system during periods of changing demand and severe weather conditions

Public Input

Duke Energy appreciates community feedback and remains committed to conducting an open route selection process. We will provide multiple opportunities and methods for gathering input from the community, including two workshops/open houses, and are establishing an interactive website and providing a toll-free phone number and email address for neighbors' questions and comments.

We are committed to selecting the route that has the least overall effect on property owners, the environment and the community.

More information and contact:

duke-energy.com/WilmingtonNE
CarolinasEast@duke-energy.com
866.297.5886

DUKE ENERGY®

*BUILDING A **SMARTER** ENERGY FUTURE℠*

duke-energy.com

Transmission Line Routing Study Process

Phase I
Potential Corridor Development

- Project Scoping/ Team Member Responsibility Assignments
- Delineation of Study Area
- Regional, Environmental, Land Use and Community Data Collection and Entry
- Agency Contact/Community Outreach
- Analyze Data/Determine Areas of Constraint and Opportunity
- Field Review and Further Agency Discussion of Study Area
- Identify Potential Corridors for Phase II

Potential Corridor Identification

Phase II
Potential Corridor Evaluation and Comparison

- Community Workshops/Agency Comments
- Field Review of Potential Corridors and Adjustments if Needed
- Develop Potential Corridors Evaluation Criteria
- Evaluate and Rank Potential Corridors
- Cost and Engineering Evaluation/ Schedule Development

Selected Corridor

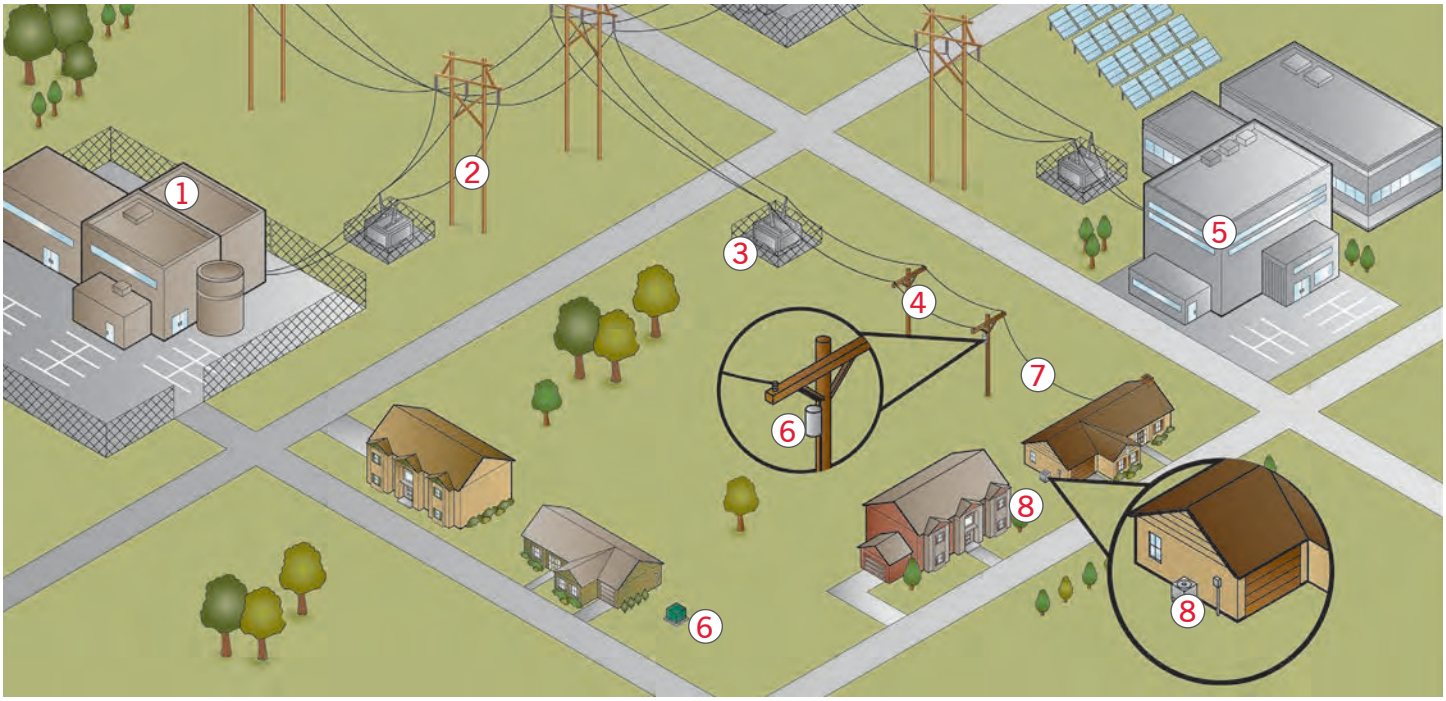
Phase III
Study Documentation and Agency Approval

- Agency Contact/Community Notification
- Develop Mitigation Measures
- Produce Environmental Report or Other Routing Study Documentation
- Submit to Review Agencies/ Licensing Authorities if Needed

Selected Route and Right-of-Way Acquisition

Delivering Electricity to You

Understanding the Electric Delivery System



Electricity — everyone uses it. Power generation is a complex process, and delivering electricity to your home or business is dependent on sophisticated distribution systems. Duke Energy wants you to have a general understanding of our electric power production process and how the combination of generating stations, poles and power lines work together to make your days and nights more comfortable and convenient.

Power Generating Stations (1)

Duke Energy produces electricity at our nuclear, fossil-fueled, solar and hydroelectric generation stations.

Transmission Lines (2)

From the generating stations, large amounts of electricity are transported on high-voltage transmission lines to local substations. Duke Energy's transmission lines, rated at 44 to 525 kilovolts, extend throughout our service territories, and also connect our utilities with surrounding electric utilities to promote greater reliability of the regional grid systems.

Substations (3)

Next, substations — banks of electrical equipment — convert the transmission line voltage to lower levels that are appropriate for use in local communities. Substations also control the flow of electricity and protect the lines and equipment from damage.

Distribution Power Lines (4)

Distribution power lines, which can be installed above or underground, carry between 4 and 25 kilovolts of electricity to your neighborhood.

Your Home or Business (5)

A (6) transformer converts the distribution level voltage to levels that can be used inside your home or business (120 to 480 volts). Voltage is carefully measured to meet the customer's needs. Transformers can be mounted on poles or placed on the ground. This voltage is carried from the transformer through an underground or overhead power line — also referred to as a (7) service drop-to (8) individual meters.

More information and contact:

duke-energy.com
CarolinasEast@duke-energy.com
866.297.5886

DUKE ENERGY®

*BUILDING A **SMARTER** ENERGY FUTURE℠*

duke-energy.com

Maintenance and Use of Rights of Way

For frequently requested uses, please contact an Asset Protection agent for additional information.

- In some cases, Duke Energy purchases right-of-way land from a property owner for substations or transmission lines, called fee-owned land. Duke Energy will continue to own the land, but in many cases the company can allow some limited agricultural use on the property.
- In other cases, Duke Energy purchases an easement for a transmission line. An easement is the right to use part of someone else's land. The property owner continues to own the land but allows the company to use the land for electrical equipment.
- Duke Energy understands that landowners want to use rights of way for many purposes, and we encourage uses that are safe for the public and our employees and that do not interfere with the reliable operation and maintenance of the line.
- A property owner may be allowed to use a right of way for things such as agriculture, grazing, temporary storage of movable items and entrance crossings. Parking may be allowed under lines.
- Certain encroachments, such as parking lots or fences, may be constructed on Duke Energy rights of way with prior written approval from an Asset Protection encroachment representative if they comply with certain conditions. For example, fences must be properly grounded and must include a 16-foot-wide gate to allow crews access to the right of way.
- In some cases, low-growing shrubs, bushes, hedges, flowers, grasses or other plants may be planted within Duke Energy rights of way with prior approval by an Asset Protection representative. An Asset Protection representative can be reached by contacting the Customer Care Center at 800.700.8744.
- Septic tanks or related drain fields, wells, burial grounds or other similar structures are not allowed within Duke Energy rights of way.

Maintenance of rights of way

- Periodically (approximately every four to eight years, depending on the area and other variables), the company will clear the easement area of trees and plants that prevent access, endanger our lines or facilities, or grow taller than 12 to 15 feet at maturity (depending on area).
- Trees with branches that grow into the rights of way will be pruned as needed to maintain safe distances from the transmission lines. Dangerous trees will be cut as needed.
- Trees are considered dangerous if they can fall into lines and endanger the operation of the transmission line. Trees in the rights of way that reach a mature height of 12 feet or more will be removed.
- Under normal conditions, Duke Energy can access the easement by using the easement itself or any existing public road.

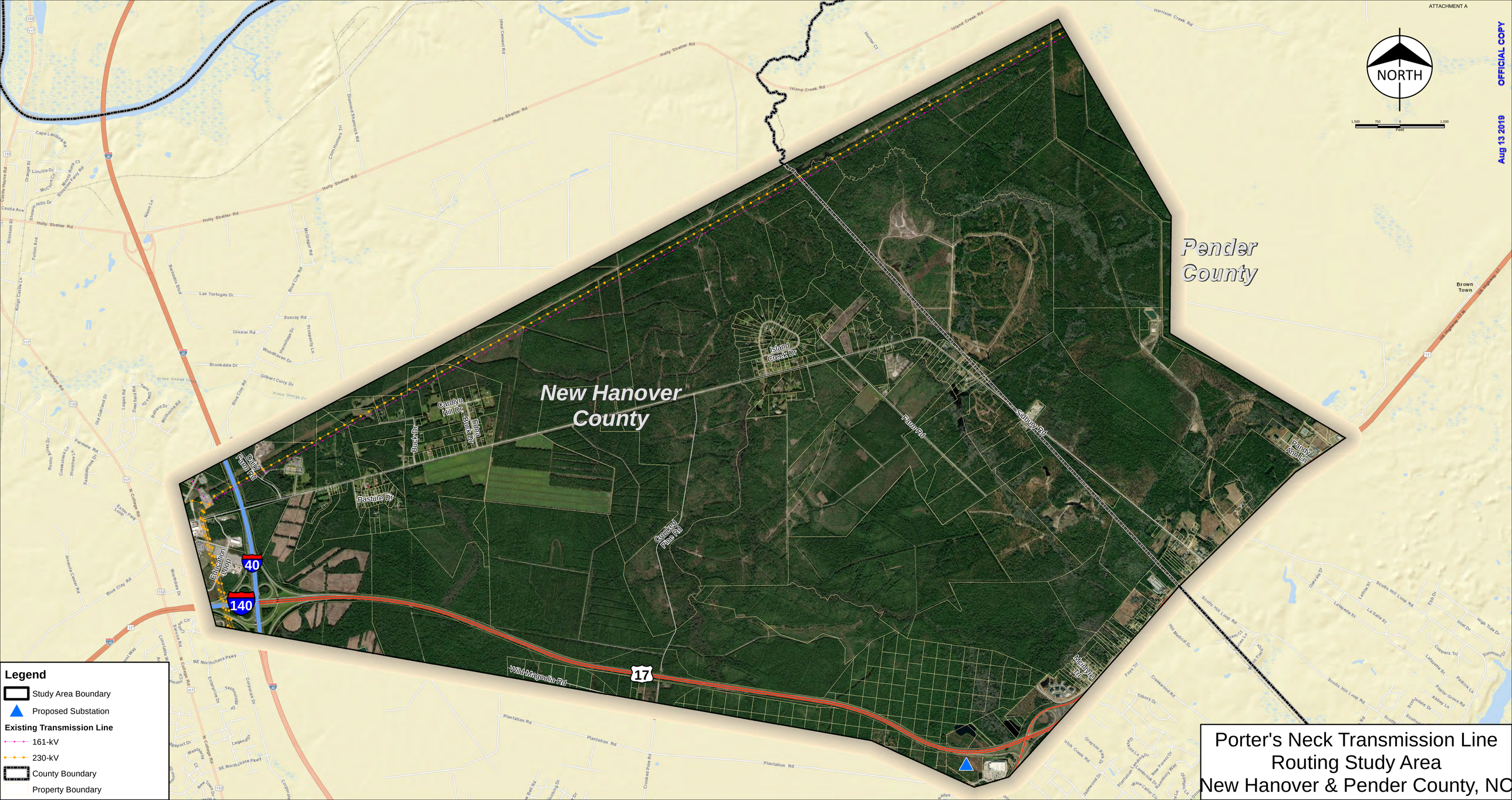
More information and contact:

duke-energy.com
CarolinasEast@duke-energy.com
866.297.5886

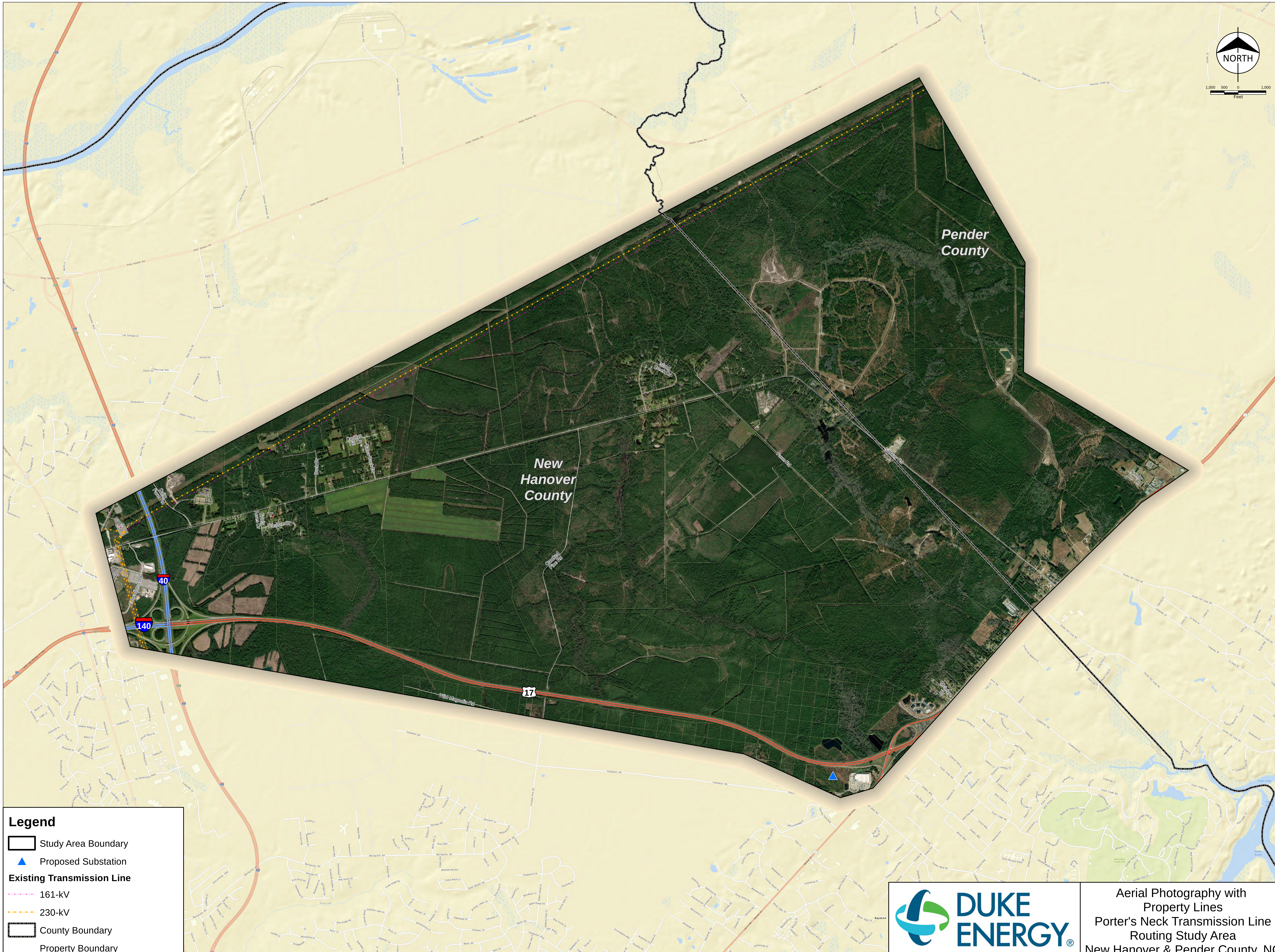
DUKE ENERGY®

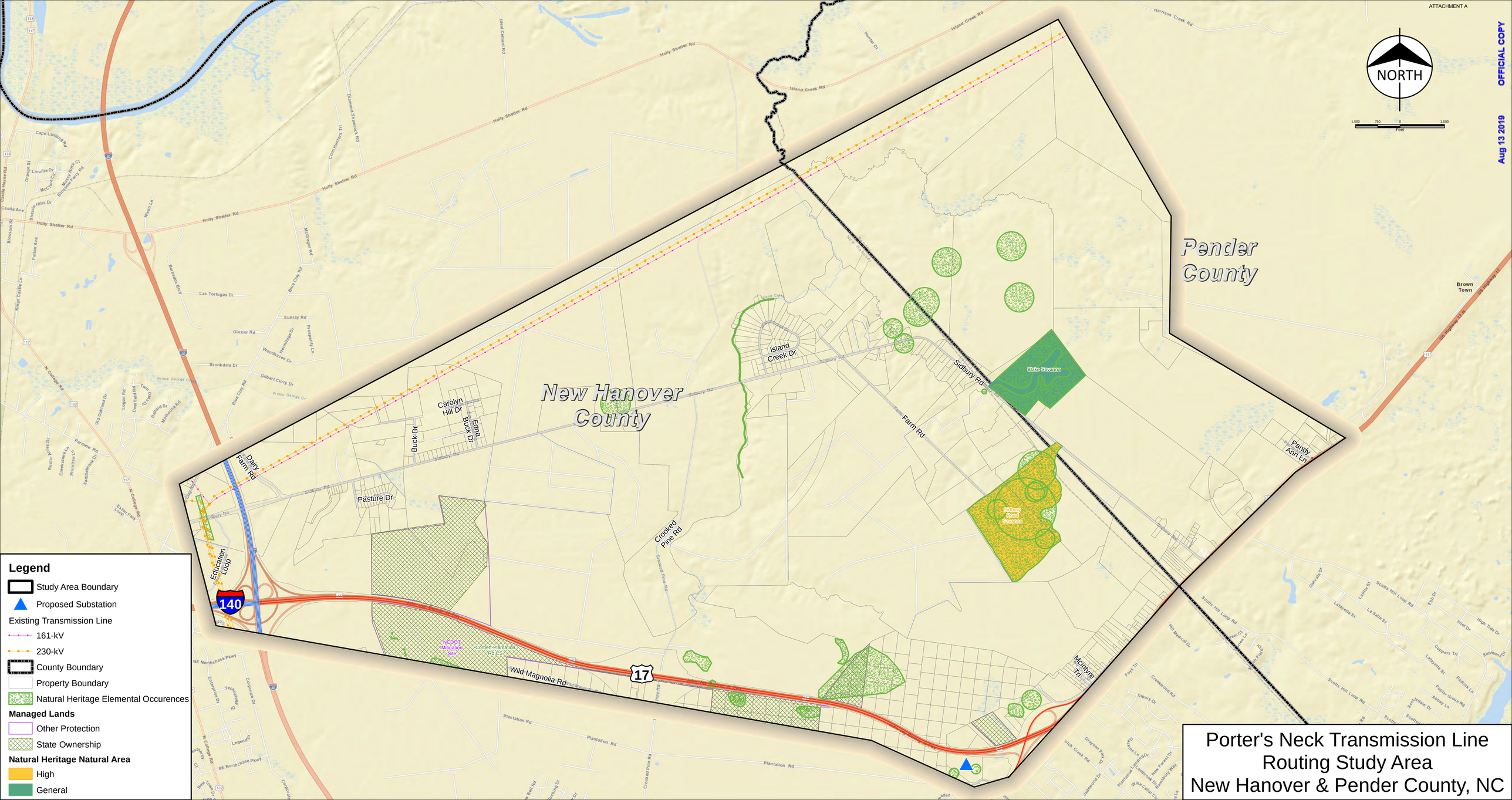
*BUILDING A **SMARTER** ENERGY FUTURE℠*

duke-energy.com


ATTACHMENT A
OFFICIAL COPY
Aug 13 2019
NORTH
1,500 750 0 1,500
Feet
New Hanover County
Pender County
Island Creek Dr
Carolyn Hill Dr
Buck Dr
Buck Dr
Edna Buck Dr
Dairy Farm Rd
Pasture Dr
Education Loop
Crooked Pine Rd
Ferry Rd
Sidbury Rd
Randy Ann Ln
Wild Magnolia Rd
Mallard Ln
40
140
17
Brown Town
Legend
Study Area Boundary
Proposed Substation
Existing Transmission Line
161-kV
230-kV
County Boundary
Property Boundary
Porter's Neck Transmission Line
Routing Study Area
New Hanover & Pender County, NC

ATTACHMENT A




ATTACHMENT A
OFFICIAL COPY
Aug 13 2019
NORTH
1,500 750 0 1,500
Feet
New Hanover County
Pender County
Legend
Study Area Boundary
Proposed Substation
Existing Transmission Line
161-kV
230-kV
County Boundary
Property Boundary
Natural Heritage Elemental Occurences
Managed Lands
Other Protection
State Ownership
Natural Heritage Natural Area
High
General
Porter's Neck Transmission Line
Routing Study Area
New Hanover & Pender County, NC