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July 14, 2017

**VIA ELECTRONIC FILING**

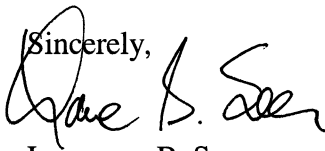
Ms. M. Lynn Jarvis, Chief Clerk  
North Carolina Utilities Commission  
4325 Mail Service Center  
Raleigh, North Carolina 27699-4300

**Re: Application of Duke Energy Progress, LLC for a Certificate of Environmental Compatibility and Public Convenience and Necessity to Construct Transmission Line in the Cleveland Area of Johnston County, North Carolina  
Docket No. E-2, Sub 1150**

Dear Ms. Jarvis:

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 11.5 miles of new 230kV transmission line in Cleveland area of Johnston 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 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,  
  
Lawrence B. Somers

Enclosures

cc: David Drooz (w/encls.)

OFFICIAL COPY

JUL 14 2017

## BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-2, SUB 1150

In the Matter of	)	
	)	
Application of Duke Energy Progress, LLC	)	<b>DUKE ENERGY PROGRESS,</b>
For a Certificate of Environmental	)	<b>LLC'S APPLICATION FOR A</b>
Compatibility and Public Convenience and	)	<b>CERTIFICATE OF</b>
Necessity Pursuant to <u>N.C. Gen. Stat. §§ 62-</u>	)	<b>ENVIRONMENTAL</b>
<u>100 et seq.</u> to Construct Approximately 11.5	)	<b>COMPATIBILITY AND PUBLIC</b>
Miles of New 230kV Transmission Line in	)	<b>CONVENIENCE AND</b>
Cleveland area of Johnston County, North	)	<b>NECESSITY</b>
Carolina	)	

NOW COMES Duke Energy Progress, LLC ("Duke Energy Progress," "DEP" or the "Company"), pursuant to N.C. Gen. Stat. §§ 62-100 et seq. and Rules R1-5 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 the Cleveland area of Johnston County, North Carolina. The new transmission line will originate at the proposed Cleveland-Matthews Road 230kV/23kV transmission-to-distribution substation and terminate at the tap point along the existing Erwin-Selma 230kV transmission line. The total length of the proposed transmission line is approximately 11.5 miles. The project will be referred to in this application as the "Cleveland-Matthews 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 / P. O. Box 1551  
Raleigh, North Carolina 27602

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

Lawrence B. Somers, Deputy General Counsel  
Duke Energy Progress, LLC  
NCRH 20/P.O. Box 1551  
Raleigh, North Carolina 27602  
Tel: (919) 546-6722  
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Robert W. Kaylor  
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Copies of all pleadings, testimony, orders, and correspondence in this proceeding should be served upon the attorneys listed above.

3. Duke Energy Progress 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 Company 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. 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 substation in the Cleveland area of Johnston County, North Carolina. There are currently no transmission lines or substations in this area of Johnston County, which is roughly bounded by Interstate 40 on the west, Highway 70 Bypass on the north, Highway 70 on the east and Interstate 95 on the south. This area is approximately 125,000 acres in size and is located entirely within Duke Energy Progress' service territory, except for the portion within the city limits of Smithfield in the extreme southeastern corner of this area. Nine different substations and 13 distribution circuits currently feed into this area, including two substations located in Wake County. Six 23kV feeders from four substations from as far as 13 miles away terminate less than 1.5 miles from this site, and all six exceeded 17.6 MVA during the 2016 Winter peak which is the Winter Planning Limit. This new substation site was purchased in 2015 based on the projected load center in the vicinity of Cleveland Road and Matthews Road. The new substation and associated transmission line are required to provide needed capacity and enhanced service reliability to support residential and commercial customer growth.



6. The new Cleveland-Matthews Line will connect the proposed Cleveland-Matthews Road 230kV/23kV Substation to the existing Erwin-Selma 230kV transmission line. The total length of the proposed transmission line is approximately 11.5 miles.

7. DEP retained Burns & McDonnell Engineering Company, Inc. to assist with the comprehensive transmission line siting and public input process for the Cleveland-Matthews Line. The study area is located in east-central North Carolina in Johnston and Wake Counties. The overwhelming majority of the study area is located in Johnston County, with a small portion of Wake County comprising the northwest portion of the study area. The western boundary of the study area runs along DEP's existing Erwin-Milburnie 230kV transmission line. The northern portion of the study area extends eastward from the Town of Garner, and the eastern boundary runs along the existing Lee-Milburnie 230kV transmission line. The southern boundary of the study area extends along the Erwin-Selma 230kV transmission line. The study area encompasses approximately 277 square miles and is shown in Figure 2-1 of the Routing Study and Environmental Report ("Report"), attached as Exhibit A to this Application.

8. The preferred route for the Cleveland-Matthews Line originates at the site of the proposed Cleveland-Matthews Road Substation, located on the southeast corner of Polenta Road and Matthews Road in Johnston County, North Carolina. The route exits the substation site to the southeast and extends for approximately 0.5 mile before turning west for approximately 0.2 mile while crossing Matthews Road. The route then continues south for approximately 0.9 mile before crossing Middle Creek. From this point, the preferred route extends generally southeast for approximately 1.8 miles before crossing NC State Highway 210. The route then continues south-southeast for approximately 0.9

mile before crossing Lassiter Road. From here, the route extends approximately 0.5 mile south-southeast before crossing Hickory Grove Church Road. The route then extends southeast for approximately 0.9 mile and crosses King Mill Road. Continuing southeast for another 0.2 mile, the route then turns and travels east for approximately 0.4 mile before turning south. The route extends south-southeast for 0.6 mile and crosses Black Creek. Turning southeast, the route then extends 0.8 mile and crosses Elevation Road. The route continues to travel southeast for another approximately 0.9 mile and then turns south for 0.6 mile and crosses Old School Road. The route then turns southwest for only 0.1 mile and then turns south for 0.3 mile before crossing Jackson Road. The route continues to the south for 0.3 mile before turning southeast, extending approximately 0.4 mile, and crossing an existing CSX/Amtrak railroad line. The route continues southeast for approximately 1.3 miles, crossing U.S. Highway 301, Parker Road, and Interstate 95 before terminating at a tap point along the existing Erwin-Selma 230kV transmission line. This route is 60,791 feet (approximately 11.5 miles) in length, as shown in Figure 4-5 of the Report.

9. 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 summary of the Application that DEP proposes to publish in the newspapers of general circulation serving the portions of Johnston County impacted by the proposed line. DEP will publish this public notice summary 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

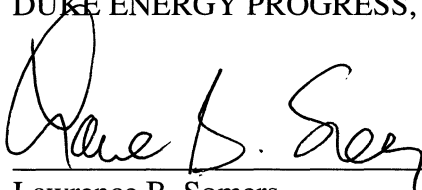
was filed, the date by which parties must seek intervention, and the statute and the rule governing intervention.

10. The information and data required to be filed by Commission Rule R8-62 is supported by the testimony of James Umbdenstock and Timothy Same, being filed simultaneously with this Application and incorporated herein by reference.

WHEREFORE, Duke Energy Progress requests that the Commission grant the Company a Certificate of Environmental Compatibility and Public Convenience and Necessity to construct approximately 11.5 miles of new 230kV transmission line in the Cleveland area of Johnston County, North Carolina.

Respectfully submitted this 14<sup>th</sup> day of July, 2017.

DUKE ENERGY PROGRESS, LLC



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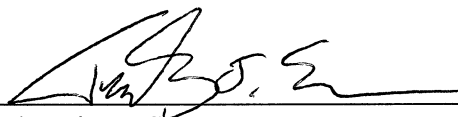
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ATTORNEYS FOR DUKE ENERGY  
PROGRESS, LLC


VERIFICATION

STATE OF NORTH CAROLINA        )  
  )  
COUNTY OF WAKE                    )       DOCKET NO. E-2, SUB 1150

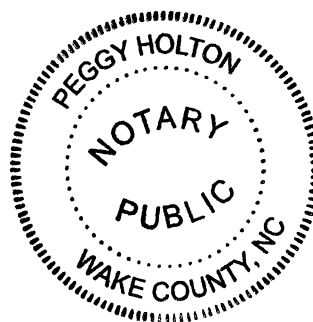
PERSONALLY APPEARED before me, Timothy J. Same, after first being duly sworn, said that he is Lead Transmission Siting Specialist, Transmission Siting and Permitting for Duke Energy Progress, LLC and as such is authorized to make this verification; that he has read the foregoing *Application for a Certificate 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

  
\_\_\_\_\_  
Timothy J. Same

Sworn to and subscribed before  
me this 5<sup>th</sup> day of July 2017.

  
\_\_\_\_\_  
Notary Public   Peggy Holton

My Commission expires: 12/22/2021



# Routing Study and Environmental Report



**Duke Energy**

**Cleveland – Matthews Road 230kV Transmission Tap Line Project  
Project No. 92394**

**06/2/2017**



# **Routing Study and Environmental Report**

prepared for

**Duke Energy**  
**Cleveland – Matthews Road 230kV Transmission Tap Line**  
**Project**  
**Raleigh, NC**

**Project No. 92394**

**06/2/2017**

prepared by

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

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**LIST OF ABBREVIATIONS**

<b><u>Abbreviation</u></b>	<b><u>Term/Phrase/Name</u></b>
Burns & McDonnell	Burns & McDonnell Engineering Company, Inc.
CECPCN	Certificate of Environmental Compatibility and Public Convenience and Necessity
Duke	Duke Energy
EPA	U.S. Environmental Protection Agency
GIS	Geographic Information System
kV	kilovolt
mgd	million gallons per day
NCDOT	North Carolina Department of Transportation
NCDEQ	North Carolina Department of Environmental Quality
NCDWR	North Carolina Division of Water Resources
NCUC	North Carolina Utilities Commission
NCWRC	North Carolina Wildlife Resources Commission
NHD	National Hydrology Dataset
NHP	North Carolina Natural Heritage Program
NLCD	National Land Cover Database
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSW	Nutrient Sensitive Waters
NWI	National Wetland Inventory
RCW	red-cockaded woodpecker

<b><u>Abbreviation</u></b>	<b><u>Term/Phrase/Name</u></b>
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 Cleveland-Matthews Road 230 kilovolt (kV) Transmission Tap Line Project (Project). According to Article 5A, a Certificate of Environmental Compatibility and Public Convenience and Necessity (CEPCN) is required for construction of an electric transmission line designed to carry 161kV or more.

In order 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 Cleveland-Matthews Road T-D Substation to one of three existing transmission lines in the area; Lee-Milburnie 230kV, Erwin-Milburnie 230kV, or Erwin-Selma 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 and copies of agency correspondence and public involvement documentation.

## 2.0 PROJECT DESCRIPTION

Duke proposes to construct a new 230kV transmission tap line to connect the proposed Cleveland-Matthews Road Substation to either the Lee-Milburnie 230kV, Erwin-Milburnie 230kV, or Erwin-Selma 230kV transmission lines. The Project is located primarily in Johnston County, North Carolina, although a very small portion of the study area is located in Wake County. This proposed transmission tap is needed to provide power quality and continued reliability for the region.

### 2.1 Description of the Project

To construct and operate a connection between the proposed Matthews Road Substation and one of the three aforementioned 230kV transmission lines in the area, Duke would require the construction of up to approximately 13 miles of 230kV transmission line within a 125-foot-wide easement. The easement width would be sufficient to provide the necessary configuration for the new line. The proposed Project will require a circuit termination structure at the interconnection with the selected 230kV transmission line and the construction of the Cleveland-Matthews Road Substation to accommodate the new line. The proposed line will be owned and operated by Duke. Alternative routes 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

Duke provides electricity to more than 7 million customers in the United States. Duke's 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 serve power to the substation in the Cleveland area of Johnston County, North Carolina. There are currently no transmission lines or substations in this area of Johnston County which is roughly bounded by Interstate 40 on the west, Highway 70 Bypass on the north, Highway 70 on the east and Interstate 95 on the south. This area is approximately 125,000 acres and is all in Duke Energy Progress service territory except for the city limits of Smithfield in the extreme southeastern corner of this block of land. Currently nine (9) different substations and thirteen (13) distribution circuits feed into this area including two (2) substations located in Wake County. A new substation site in the vicinity of Cleveland Road and Matthews Road would be advantageous to continue providing this area of developing Johnston County with reliable electric service. The new substation and associated transmission line would provide greater capacity and enhanced service reliability to the area to support residential and commercial growth.

### 2.1.2 Location

The Project's study area is located in east-central North Carolina in Johnston and Wake Counties. The overwhelming majority of the study area is located in Johnston County, with a small portion of Wake County comprising the northwest portion of the study area. The western boundary of the study area runs along Duke's existing Erwin-Milburnie 230kV transmission line. The northern portion of the study area extends eastward from the Town of Garner, and the eastern boundary runs along the existing Lee-Milburnie 230kV transmission line. The southern boundary of the study area extends along the Erwin-Selma 230kV transmission line. The study area encompasses approximately 277 square miles and is shown in Figure 2-1.

### 2.1.3 Structures

Transmission line structures would consist of weathering steel H-frame and three-pole angle structures for a majority of the new line. Figure 2-2 depicts typical single-circuit tangent H-frame structures. Ground clearance would meet or exceed the National Electrical Safety Code requirements for a 230kV transmission line. Typical above-ground heights for the new structures would be approximately 65 to 85 feet, depending on the type of structure required. The structures would be spaced approximately 500 to 700 feet apart. Heights and spans may vary depending on the design, terrain, or measures to mitigate potential impacts of the line.

### 2.1.4 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 2-2). 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



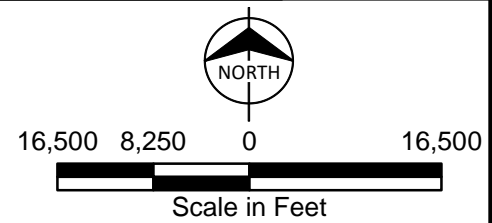
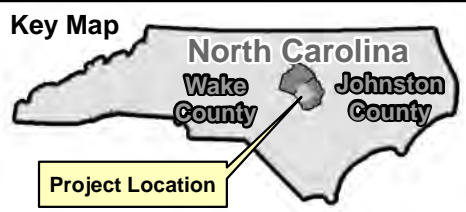
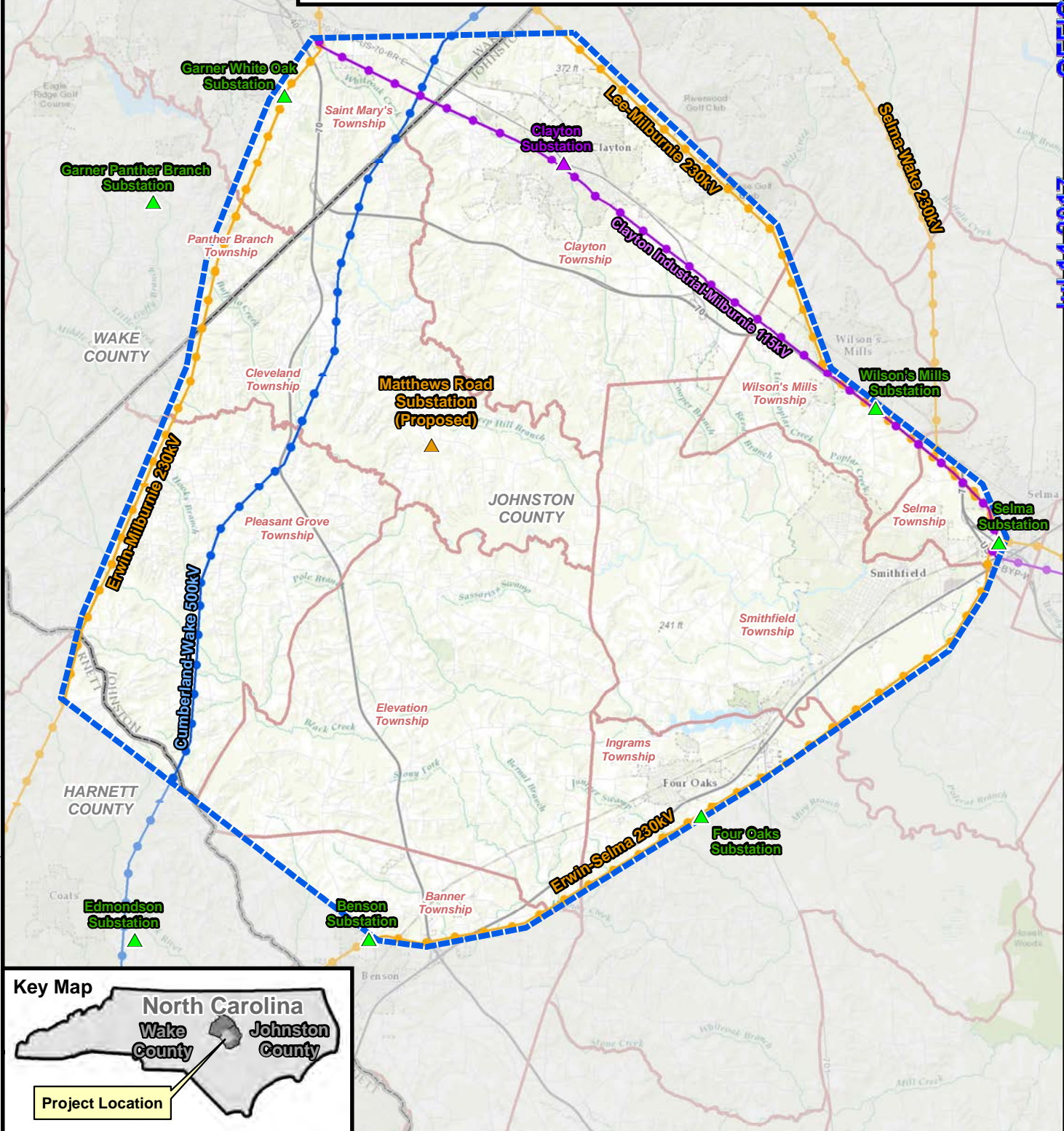
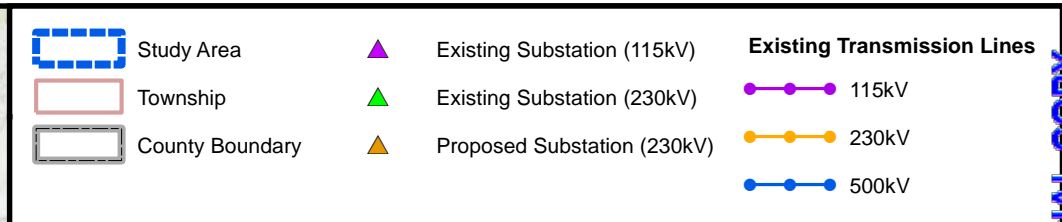


Figure 2-1  
Duke Energy  
Cleveland - Matthews Road 230kV  
Transmission Tap Line Project  
Study Area

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Typical Structure and Right-of-Way  
Single-Circuit 230kV H-Frame Structure

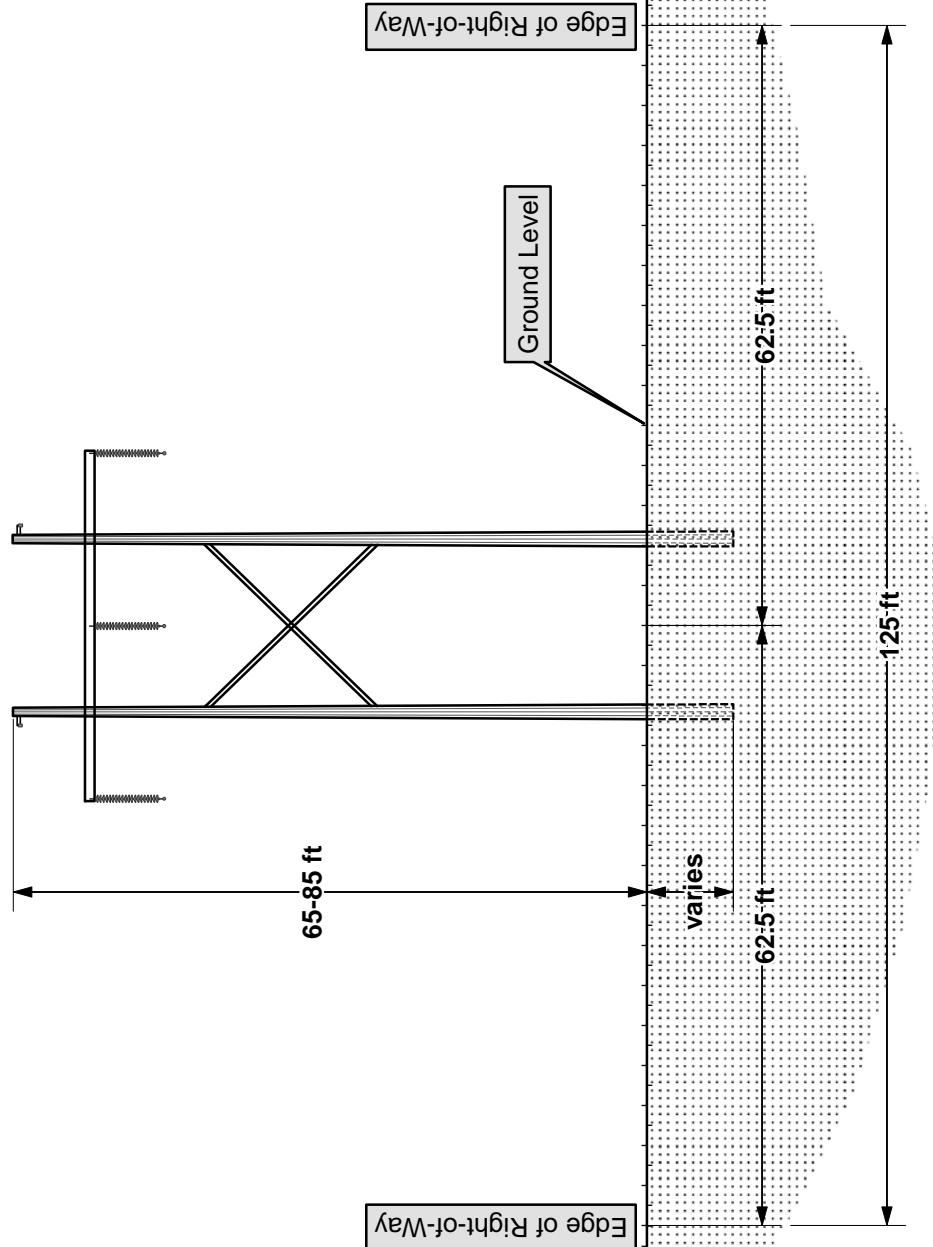
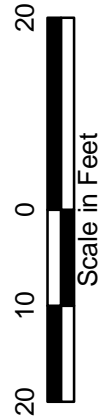


Figure 2-2  
Duke Energy  
Cleveland - Matthews Road 230kV  
Transmission Tap Line Project  
Typical Structure and Right-of-Way



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 in wetlands. Conductors would be pulled through each structure using tensioning equipment. 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.

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 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 2017
- ROW acquisition: summer 2017 – summer 2018
- Construction: fall 2018 – late 2019
- In-service date: late 2019

## 2.4 Project Cost

The total cost estimated for the Project is approximately \$28 million. This estimate includes company labor, contract labor, ROW acquisition, materials, clearing, construction, project administration, overhead, and taxes. Actual cost may vary from the estimate depending on final appraised land values, condemnation costs, final engineering plans, construction labor, and environmental permitting.

### 3.0 DESCRIPTION OF THE STUDY AREA

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 physiography, hydrology, vegetation, wetlands, and wildlife. 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 Piedmont and Coastal Plain provinces. Roughly the northern half of the study area lies within the Piedmont province and consists of rolling, rounded hills with long ridges between hills and valleys. Elevation differences between the hills and valleys are generally only a few hundred feet. Elevations range from 300 to 600 feet along the eastern edge of the Piedmont, while elevations along the western edge can approach 1,500 feet above sea level (DENR, 2015).

The southern half of the study area lies within the Coastal Plain province. 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, including the study area (DENR, 2015).

##### 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 Johnston County based on the physical properties and composition of the soil and the amount of slope and drainage where the soil is located (USDA-NRCS Soil Survey Division, no date). These soil maps are helpful in planning future land use and development.

Soil map units describe the soil characteristics in a specific geographic region. The study area consists of 58 soil map units. Table 3-1 lists the most common soil map units within the study area. Forty-three of the 58 soil map units are not listed in this table because they each represent less than 2 percent of the total study area, and the potential Project impacts on these soils are minimal. The remaining 15 soil map units are described in Table 3-1.

**Table 3-1: Primary Soil Map Units within the Study Area**

<b>Soil Map Unit</b>	<b>Characteristics</b>	<b>Percent of the Study Area</b>
Bibb Sandy Loam (Bb)	<ul style="list-style-type: none"> <li>Nearly level, poorly drained</li> <li>Sandy loam surface, underlying material is sand, sandy loam, and loamy sand</li> <li>Associated with floodplains</li> <li>Used for woodland</li> <li>Hydric soil</li> </ul>	5.6
Cecil Loam (CeB)	<ul style="list-style-type: none"> <li>Gently sloped, well drained</li> <li>Loamy surface, loam and clay subsoil</li> <li>Associated with uplands and gentle hillslopes</li> <li>Used for cropland, pasture, and woodland</li> </ul>	2.3
Gilead Sandy Loam (GeB)	<ul style="list-style-type: none"> <li>Moderately sloped, moderately well-drained</li> <li>Sandy loam surface, sandy clay loam and clay loam subsoil</li> <li>Associated with uplands</li> <li>Used mostly for pasture</li> </ul>	5.9
Gilead Sandy Loam (GeD)	<ul style="list-style-type: none"> <li>Steeper slopes, moderately well-drained</li> <li>Sandy loam surface, sandy clay loam and clay loam subsoil</li> <li>Associated with uplands</li> <li>Used for woodland and pasture</li> </ul>	3.6
Goldsboro Sandy Loam (GoA)	<ul style="list-style-type: none"> <li>Level to moderately sloped, moderately well drained</li> <li>Sandy loam surface, sandy clay loam and clay loam subsoil</li> <li>Associated with uplands</li> <li>Used for cropland</li> <li>Hydric soil</li> </ul>	6.1
Lynchburg Sandy Loam (Ly)	<ul style="list-style-type: none"> <li>Nearly level, poorly drained</li> <li>Sandy loam surface, sandy clay loam subsoil</li> <li>Associated with flats and depressions in upland areas</li> <li>Used for woodland</li> <li>Hydric soil</li> </ul>	3.1
Marlboro-Cecil (McB)	<ul style="list-style-type: none"> <li>Level to moderately sloped, well drained</li> <li>Sandy loam surface, sandy clay subsoil</li> <li>Associated with uplands</li> <li>Used for woodland and cropland</li> </ul>	2.2
Norfolk Loamy Sand (NoA)	<ul style="list-style-type: none"> <li>Well drained</li> <li>Loamy sand surface, sandy clay loam subsoil</li> <li>Associated with uplands</li> <li>Used mostly for cropland</li> <li>Hydric soil</li> </ul>	6.5

<b>Soil Map Unit</b>	<b>Characteristics</b>	<b>Percent of the Study Area</b>
Norfolk Loamy Sand (NoB)	<ul style="list-style-type: none"> <li>• Rounded ridges and side-slopes, well drained</li> <li>• Loamy sand surface, sandy clay loam subsoil</li> <li>• Associated with uplands</li> <li>• Used mostly for cropland</li> <li>• Hydric soil</li> </ul>	5.1
Rains Sandy Loam (Ra)	<ul style="list-style-type: none"> <li>• Nearly level, poorly drained</li> <li>• Sandy loam surface, sandy clay loam subsoil</li> <li>• Associated with depressions and drainage ways</li> <li>• Used for woodland</li> <li>• Hydric soil</li> </ul>	7.2
Uchee Loamy Coarse Sand (UcB)	<ul style="list-style-type: none"> <li>• Moderately sloped, well drained</li> <li>• Loamy coarse sand surface, sandy clay loam subsoil</li> <li>• Associated with ridges and side slopes in uplands</li> <li>• Mostly used for cropland, pasture, and hay land</li> </ul>	2.4
Wagram Loamy Sand (WaB)	<ul style="list-style-type: none"> <li>• Nearly level to moderately sloped, well drained</li> <li>• Loamy sand surface, sandy clay loam subsoil</li> <li>• Associated with uplands</li> <li>• Mostly used for cropland</li> <li>• Hydric soil</li> </ul>	2.9
Wedowee Sandy Loam (WoB)	<ul style="list-style-type: none"> <li>• Moderately sloped, well drained</li> <li>• Sandy loam surface, sandy clay loam, clay and clay loam subsoil</li> <li>• Associated with steeper uplands</li> <li>• Used for woodland, pasture, and cropland</li> </ul>	2.4
Wehadkee Loam (Wt)	<ul style="list-style-type: none"> <li>• Nearly level, poorly drained</li> <li>• Loam surface, loam and clay loam underlying material</li> <li>• Associated with floodplains, generally along streams</li> <li>• Used for woodland</li> <li>• Hydric soil</li> </ul>	4.0
Wehadkee-Chastain (Ww)	<ul style="list-style-type: none"> <li>• Nearly level, poorly drained</li> <li>• Loam surface, loam and clay loam subsoil</li> <li>• Associated with floodplains</li> <li>• Used for woodland</li> <li>• Hydric soil</li> </ul>	2.4

Source: USDA-NRCS Soil Survey Division, no date

### 3.1.3 Water Resources

According to a 2010 U.S. Geological Survey (USGS) study, Johnston County has a population of 168,878 and receives a total of approximately 47 inches of rainfall a year. Surface water is the primary source of water for most residents in Johnston County. A 2010 USGS study showed that estimated surface water usage in the county totaled approximately 21.3 million gallons per day (mgd), and the estimated groundwater usage was approximately 8.4 mgd, with a total of 29.7 mgd water usage in the county. The per capita usage was estimated to be approximately 176 gallons per day.

The study area lies within the Neuse River Basin, which extends for 248 miles from Person County in northern North Carolina southeast to Pamlico Sound. The Neuse River Basin encompasses approximately 6,000 square miles in North Carolina (North Carolina's River Basins, 2013). The Neuse River Basin includes four sub basins: Upper Neuse River, Middle Neuse Creek, Contentnea River, and Lower Neuse River (NCDWR, 2016a).

Numerous hydrological features are within the study area, with major features including the Neuse River, Swift Creek, Middle Creek, Little Creek, Black Creek, and Holts Lake. Surface water in North Carolina is assigned a surface water classification for the best use by the North Carolina Division of Water Resources (NCDWR, 2016b). The Neuse River is classified as WS-IV, which identifies it as a source of water supply, as well as a moderately to highly developed watershed. Swift, Little, Middle, and Black Creeks are classified as "C", which are identified as fishable and swimmable waters, and Holts Lake is classified as "B", which provides additional protection for primary water contact recreation.

Supplemental classifications are sometimes added to the primary classification to provide extra protection to water with special uses. All of the above-referenced hydrological features in the study area have been assigned a supplemental classification of NSW (Nutrient Sensitive Waters), which is intended for waters needing additional nutrient management. Additionally, the Neuse River and Little Creek have been assigned a designation of Category 5 "Impaired" and are listed under section 303(d) of the Clean Water Act. Stream features currently mapped on USGS topography mapping or available soils mapping are subject to a State-regulated 50-foot riparian buffer.

### 3.1.4 Vegetation

The study area is gently rolling to flat with forested areas, crop fields, and pasture. Timbered areas consist primarily of loblolly pine (*Pinus taeda*), shortleaf pine (*Pinus echinata*), and other yellow pine species along with oak (*Quercus spp*), hickory (*Carya spp*), sweetgum (*Liquidambar styraciflua*), blackgum (*Nyssa sylvatica*), red maple (*Acer rubrum*), and winged elm (*Ulmus alata*). Other vegetation includes

dogwood (*Cornus spp*), viburnum (*Viburnum spp*), American beautyberry (*Callicarpa americana*), and other woody vines (Bailey, 1995). Crops within the study area consist primarily of tobacco (*Nicotiana spp*), sweet potatoes (*Ipomoea batatas*), and soybeans (*Glycine max*) (USDA, 1994).

### 3.1.5 Federally Listed Plant Species

The U.S. Fish and Wildlife Service (USFWS) publishes a “County List” which contains a list of federally protected species that occur, or have been known to occur, in each county (Table 3-2). Four federally protected plant species may occur within the Project study area based on the USFWS County Lists (2016a and 2016b) and a North Carolina Natural Heritage Program (NHP) database search (NHP, 2016).

**Table 3-2: USFWS Federally Listed Plant Species**

Common Name	Scientific Name	Johnston County	Wake County	Federal Status <sup>a</sup>
Michaux's sumac	<i>Rhus michauxii</i>	X	X	E
Worthy shield lichen	<i>Canoparmelia amabilis</i>	X		FSC
Long Beach seedbox	<i>Ludwigia brevipes</i>	X		FSC
Virginia least trillium	<i>Trillium pusillum</i> var. <i>virginianum</i>	X		FSC

Source: USFWS, 2106a and 2016b; NC NHP, 2016

(a) E = Endangered; FSC = Federal Species of Concern

### 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).

The majority 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. Most of the wetlands within the study area are riparian areas associated with rivers, streams, creeks, and ponds.

### 3.1.7 Wildlife

Wildlife species found in Johnston and Wake Counties may be present within the study area. Mammal species potentially occurring in the study area include: eastern fox squirrel (*Sciurus niger*), groundhog (*Marmota monax*), 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], 2016).

Bird species 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*), northern cardinal (*Cardinalis cardinalis*), American crow (*Corvus brachyrhynchos*), northern mockingbird (*Mimus polyglottos*), eastern bluebird (*Sialia sialis*), and pine warbler (*Dendroica dominica*) (NCWRC, 2016).

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 sphenoccephala utricularia*), eastern box turtle (*Terrapene carolina carolina*), common musk turtle (*Sternotherus odoratus*), northern rough green snake (*Opheodrys aestivus*), and eastern garter snake (*Thamnophis sirtalis sirtalis*) (NCWRC, 2016).

### 3.1.8 Federally Listed Animal Species

The USFWS publishes “County Lists” which contain a list of federally protected species that occur, or have been known to occur, in each county (Table 3-3). Twelve federally protected animal species may occur within the Project study area based on the USFWS County Lists (2016a and 2016b) and a NHP database search (NHP, 2016).



**Table 3-3: USFWS Federally Listed Animal Species**

Common Name	Scientific Name	Johnston County	Wake County	Federal Status <sup>a</sup>
Red-cockaded woodpecker	<i>Picoides borealis</i>	X	X	E
Tar River spiny mussel	<i>Elliptio steinstansana</i>	X		E
Dwarf wedgemussel	<i>Alasmidonta heterodon</i>	X	X	E
Green floater	<i>Lasmigona subviridis</i>	X	X	FSC
Northern long-eared bat	<i>Myotis septentrionalis</i>		X	T
Yellow lance	<i>Elliptio lanceolata</i>	X	X	FSC
Atlantic pigtoe	<i>Fusconaia masoni</i>	X	X	FSC
Neuse River waterdog	<i>Necturus lewisi</i>	X	X	FSC
Southeastern bat	<i>Myotis austroriparius</i>	X		FSC
Cerulean warbler	<i>Sepophaga cerulea</i>	X		FSC
Carolina madtom	<i>Noturus furiosus</i>	X		FSC
Yellow lampmussel	<i>Lampsilis cariosa</i>	X		FSC

Source: USFWS, 2016a and 2016b; NC NHP, 2016

(a) E = Endangered; FSC = Federal Species of Concern; T = Threatened

### 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 NC OneMap Geographic Information System (GIS) data (2016), 23 tracts of land within the study area are owned and managed by the State of North Carolina. These tracts ranged from approximately 0.7 to 810 acres. Most tracts are North Carolina Department of Transportation (NCDOT) mitigation sites or easements, as well as a Conservation Reserve Enhancement Program Easement, North Carolina Clean Water Management Trust Fund Easement, Central Crops Research Station tracts, and Clemmons State Forest.

### 3.1.11 County/Locally Owned and Managed Lands

Within Johnston and Wake Counties are several locally owned lands. These are primarily county-owned, city-owned, or locally-owned and consist of open space easements (associated with neighborhood homeowner's associations) and local parks (NC OneMap, 2016).

## **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. Portions of seven municipalities occur within the Project study area, including the municipalities of Garner, Clayton, Wilson's Mills, Selma, Smithfield, Four Oaks, and Benson. The study area consists of residential subdivisions, rural residences, and commercially developed areas.

#### **3.2.1.1 Agriculture**

According to the North Carolina Department of Agriculture and Consumer Services (2016) 2012 Census of Agriculture, Johnston County contains 1,175 farms totaling 194,827 acres, which comprises 38.2 percent of the total acreage within the county. The primary crops grown in Johnston County are tobacco, soybeans, potatoes, other vegetables, and hay. Livestock produced in Johnston County include hogs, pigs, and poultry. Crops grown in Wake County, within the study area, would be similar to those grown in Johnston County.

#### **3.2.1.2 Urban and Residential Areas**

The population density for North Carolina was 196.1 persons per square mile in 2010. Johnston County, with a population density of 213.4 persons per square mile, was well above the State's population density (U.S. Census Bureau, 2016a). Wake County's population density in 2010 was 1,078.8 persons per square mile, and included the Raleigh-Durham greater metropolitan area (U.S. Census Bureau, 2016b). The portion of Wake County included in the Project study area is assumed to be well below the county's population density as a whole, as the area within the study area is mostly a mix of residential, commercial, and undeveloped land. Johnston County has 22 elementary schools, 13 middle schools, 10 high schools, and 2 alternative schools (Johnston County Schools, 2016). No schools were identified within the study area in Wake County.

#### **3.2.1.3 Recreation Areas**

Outdoor recreational opportunities, such as hunting and fishing, can be found in the forested areas, lakes, ponds, rivers, and creeks within the study area. Built recreational areas such as parks, ball fields, and golf courses are also found within the study area.

### 3.2.1.4 Transportation and Utilities

The study area is crossed by two interstate highways, one U.S. highway, several North Carolina state highways, and numerous smaller, local roadways. Interstate 40 extends from north to south along the western portion of the study area, while Interstate 95 passes through the study area from east to west along its southern border. U.S. Business Highway 70 extends through the northern and eastern portions of the study area. Several county roadways traverse the study area, as well.

Two single-track rail lines extend through the study area. One Norfolk Southern/Amtrak rail line is located in the northeastern quadrant of the study area, and one CSX/Amtrak rail line is located along the southeastern quadrant of the study area. The Johnston County Airport is the only public airport located within the study area, near the unincorporated community of West Smithfield.

Eight Duke-operated substations serve the Cleveland School area of Johnston County: Garner Panther Branch 230kV, Garner White Oak 230kV, Clayton 115kV, Wilson's Mills 230kV, Selma 230kV, Four Oaks 230kV, Benson 230kV, and Edmondson 230kV. Several Duke-operated transmission lines extend through the study area, as well. Duke operates the Lee-Milburnie 230kV transmission line, which runs the length of the study area from north to south along its eastern edge, as well as the Clayton Industrial-Milburnie 115kV transmission line, which extends through the eastern portion of the study area. The Cumberland-Wake 500kV transmission line extends from north to south through the western portion of the study area, as does the Erwin-Milburnie 230kV transmission line. The Erwin-Selma 230kV transmission line extends along the southern boundary of the study area (see Figure 2-1).

### 3.2.2 Socioeconomic Patterns

This section contains data on population and employment in Johnston County.

#### 3.2.2.1 Population

Between 2010 and 2015, North Carolina's population grew by approximately 5.3 percent, from 9.5 to 10 million people. During this same period, Johnston County experienced a population growth of 9.9 percent, from an estimated 168,878 to 185,660 (U.S. Census Bureau, 2016a). Wake County experienced a growth of 13.7 percent, from an estimated 900,993 to 1,024,198 (U.S. Census Bureau, 2016b).

#### 3.2.2.2 Employment and Income

According to the U.S. Census Bureau's 2014 American Community Survey, North Carolina's labor force was 62.4 percent of the population (individuals 16 years of age and over), while Johnston and Wake County's labor force was slightly higher at 64.0 percent and 71.4 percent, respectively. During the same

period, the unemployment rate for North Carolina was 5.1 percent, while the unemployment rate was 4.4 percent in Johnston County and 3.8 percent in Wake County. The predominant industries for Johnston County in 2014 were manufacturing, educational services, health care and social assistance, and retail trade. Predominant industries for Wake County included educational services, health care and social assistance, and professional, scientific and management services.

### **3.2.3 Cultural Resources**

Burns & McDonnell archaeologists performed a records search on June 6, 2016, at the State Historic Preservation Office (SHPO) in Raleigh, North Carolina. No recorded archaeological sites were found within the study area. Nineteen historic structures, sites, or districts within the study area are listed on the National Register of Historic Places (NRHP) or have been recommended as eligible for the NRHP.

### **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 a mixture of timber and cropland, with some pasture. The terrain within the study area is generally flat to gently sloping.

The number of people potentially within view of the new line, depending on the route selected, is relatively high, due to areas of dense residential development. Highways, local roads, and railroads pass through the study area as described in Section 3.2.1.4, and these add to the man-made elements in the area. Transmission lines and distribution lines are also located throughout the study area.

## 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 Cleveland-Matthews Road Substation at the southeast corner of the intersection of Polenta Road and Matthews Road in Johnston County; the locations of the Lee-Milburnie 230kV, Erwin-Milburnie 230kV, and Erwin-Selma 230kV transmission lines; and a preliminary review of potential routing opportunities and constraints in the area. The study area, which encompasses approximately 277 square miles, is shown in Figure 2-1. 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 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 feedback obtained from public comments (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 Cleveland-Matthews Road Substation to either the Lee-Milburnie 230kV, Erwin-Milburnie 230kV, or Erwin-Selma 230kV transmission lines while avoiding or minimizing impacts to both community and natural resources. Co-location opportunities with existing lines and roads were investigated during the development of the preliminary routes. Due to the location of the proposed substation, general lack of existing transmission lines in the area, and residential and commercial development along roadways, opportunities to co-locate along existing transmission lines and roadways were limited.

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 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



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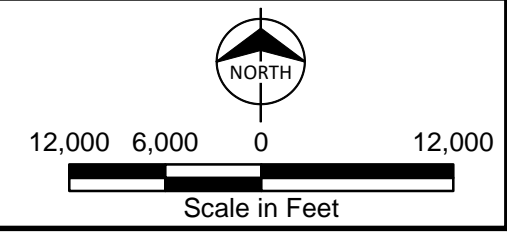
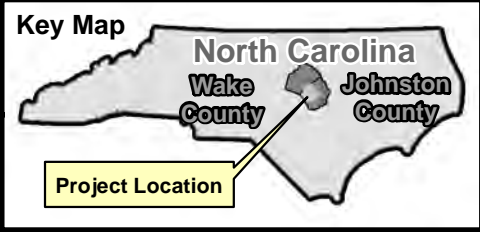
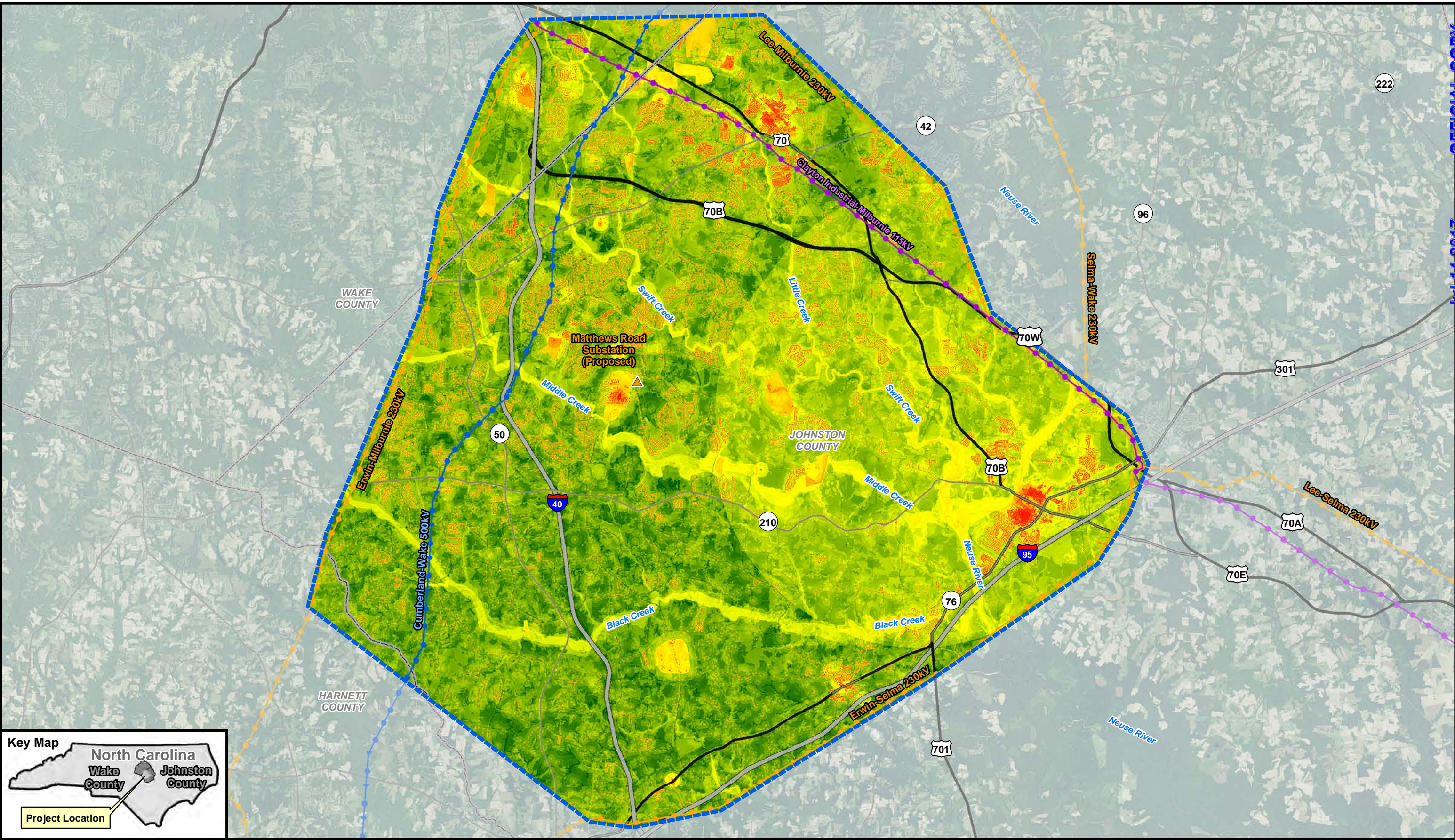


Figure 4-1  
Duke Energy  
Cleveland - Matthews Road 230kV  
Transmission Tap Line Project  
Suitability Map

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Based on the information gathered, a set of feasible routes were identified that connect the proposed Cleveland-Matthews Road Substation to either the Lee-Milburnie 230kV, Erwin-Milburnie 230kV, or Erwin-Selma 230kV transmission lines. The primary goals regarding routing were to:

- Minimize overall impacts by paralleling existing ROWs, including transmission lines, highways, and roads, where possible
- Maximize the distance of the line from existing residences
- 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 either the Lee-Milburnie 230kV, Erwin-Milburnie 230kV, or Erwin-Selma 230kV transmission lines. Each segment begins and ends at intersections with other segments. The set of route alternatives for this Project consisted of 32 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, 32 distinct routes were developed using a combination of the 32 segments. Figure 4-2 shows the route alternatives network overlaid on the suitability analysis map, while Figure 4-3 shows just the route alternatives over an aerial background of the study area.

### 4.3 Public Involvement Activities

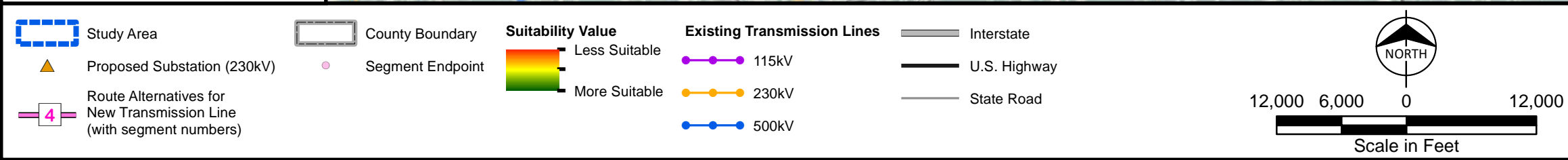
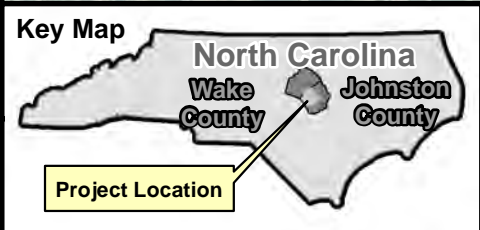
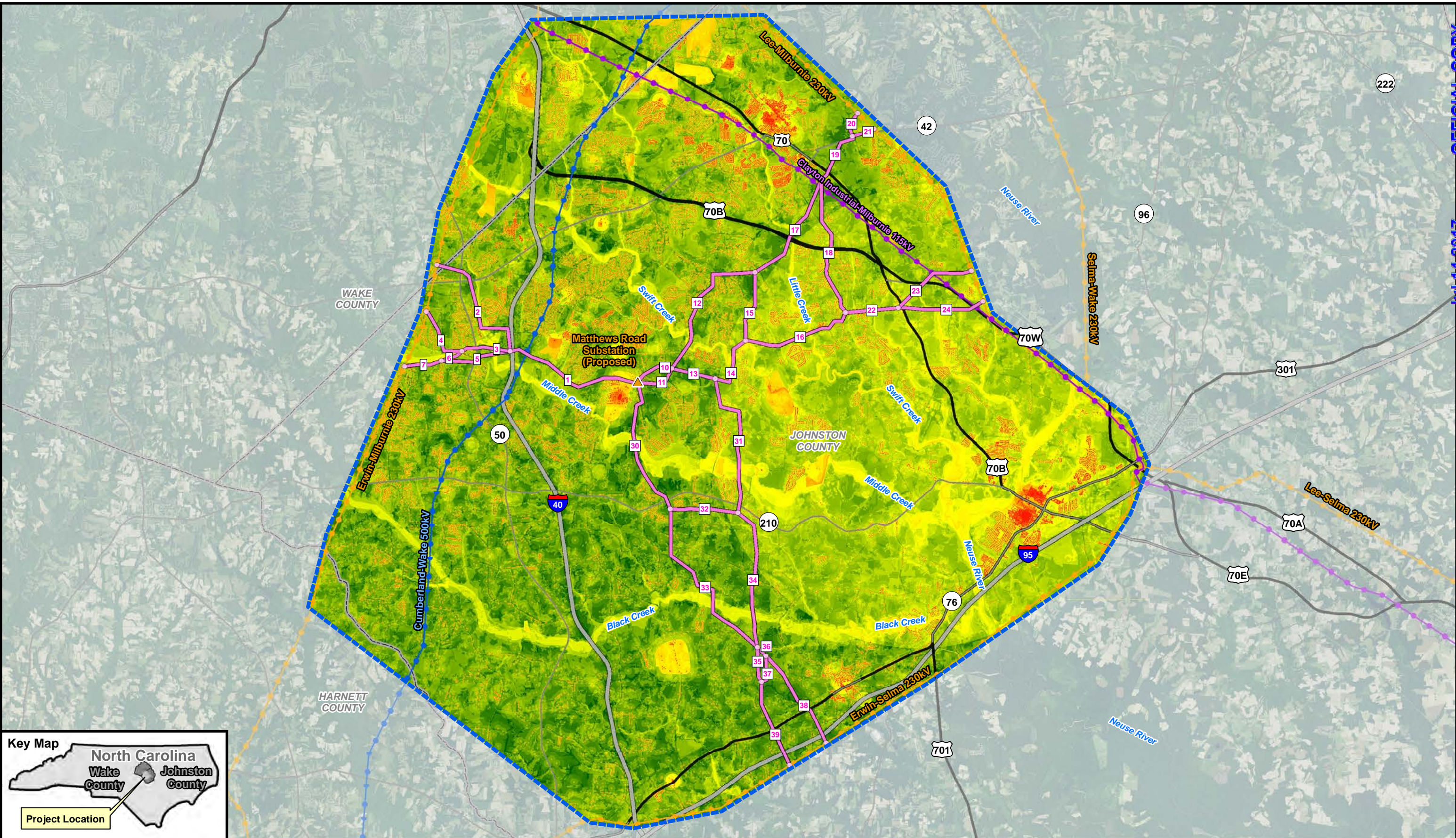
To determine community values relative to the proposed Project, the route selection process included two forms of public input. These included communications with Federal, State, and local agencies, as well as public information workshops held by Duke. All input was used to assess the values and attitudes 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 environmental agencies and to residents.

#### 4.3.1 Agency Communication

State and Federal agencies were contacted by Duke (via email correspondence) to provide input on threatened and endangered species, wetlands, wildlife resources, stream sensitivity, hydric soils, and other potential permitting issues. The following agencies were contacted: the USACE, USFWS, NCWRC, NHP, and N.C. Department of Environmental Quality (NCDEQ), including the N.C. Division of Water Resources and N.C. Division of Land Quality. On December 8, 2016, Duke held an agency scoping meeting that included attendees from all of the agencies that were contacted above, with the exception of the USACE.



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**Figure 4-2**  
Duke Energy  
Cleveland - Matthews Road 230kV  
Transmission Tap Line Project  
Suitability Map  
with Route Alternatives



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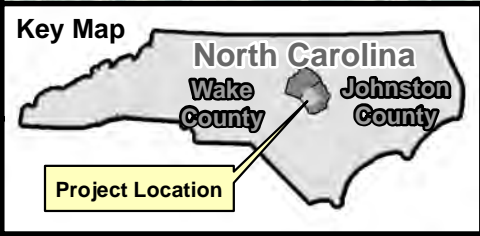
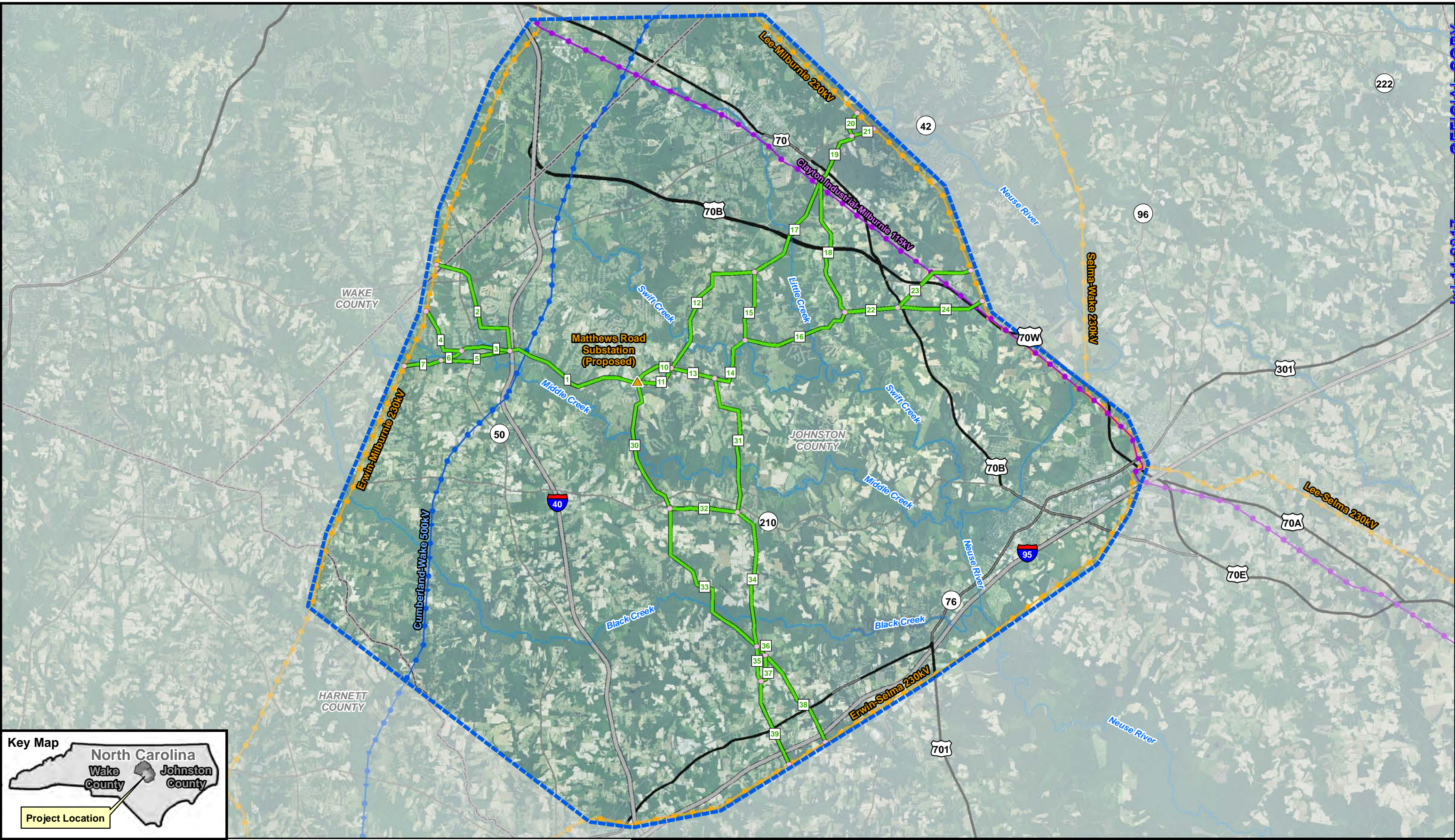


Figure 4-3  
Duke Energy  
Cleveland - Matthews Road 230kV  
Transmission Tap Line Project  
Route Alternatives

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The primary concern discussed during the agency scoping meeting was related to the presence of a federally protected mussel species (dwarf wedgemussel) and other federal aquatic species of concern within the study area. The USFWS and NHP provided Duke with information on streams and their tributaries that had differing levels of sensitivity based on the known existence or potential to support aquatic species of concern. This information was incorporated into the route evaluation factors. 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, the decision-making process used to select a preferred route, and a forum to voice concerns about the proposed Project.

An informational letter and small-scale map describing the Project and advertising the workshops was mailed to all property owners within 500 feet of the alternative routes 2 weeks prior to the workshops. Additionally, a news release was issued to the public 7 days prior to the workshops. Information about the Project and a map of the study area and routes were also available on the Duke website throughout the duration of the route selection phase. 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.

To gather public input on the route alternatives, Duke held two open forum informational workshops on November 16 and 17, 2016, at the C3 Church in Clayton, North Carolina, and the Johnston County Community College in Smithfield, North Carolina, respectively. A total of 149 people signed in to the workshop in Clayton, and 61 people signed in to the workshop in Smithfield. On both evenings, there were additional attendees observed that did not sign in.

The public workshops included displays with information on Project need, engineering, route alternatives, environmental management, and ROW requirements. Representatives from Duke and Burns & McDonnell were present to address the public's questions and take comments. Potential routes for the proposed transmission line were depicted on aerial photographs. 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 workshop received a written questionnaire to communicate their opinions on the 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 6 weeks after the workshops. Individuals could also have their comments recorded on GIS computer workstations at the workshops or online. A total of 128 hard copy questionnaires, 21 letters, and 3 emails were received by landowners either at the public workshops or through the mail. Another 92 questionnaires were completed using the online method. Additionally, 123 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 workstation, and online, are found in Appendix C.

#### 4.4 Identification of the Preferred Route

The analysis of alternatives was based on social, environmental, and engineering factors. Data for each factor 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.

##### 4.4.1 Evaluation Factors

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

**Table 4-1: Routing Factors**

Evaluation Criteria <sup>a</sup>	Measure
<b>Engineering</b>	
Total length	Feet
Road or railroad crossings	Number
New ROW	Acres
Length not along existing infrastructure	Feet
Heavy angles (>30 degrees)	Number
<b>Social</b>	
Residences within 125 feet of centerline	Number
Residences within 126-300 feet of centerline	Number
Residences within 301-500 feet of centerline	Number
Residential proximity score	Number
Businesses within 500 feet	Number
Public facilities within 500 feet	Number
Parcels crossed	Number
NRHP historic/archaeological sites within 1,320 feet	Number
Open space/green areas	Acres

Evaluation Criteria <sup>a</sup>	Measure
Cropland crossed	Acres
Land use (residential) 5-acre parcels or less	Acres
Land use (residential) > 5-acre parcels	Acres
Residential land use score	Number
<b>Environmental</b>	
Upland forest crossed	Acres
Forested and marsh wetland crossed	Acres
Forested hydric ( $\geq 50\%$ ) soils crossed, excludes NWI	Acres
Non-forested wetland crossed	Acres
Non-forested hydric ( $\geq 50\%$ ) soils crossed, excludes NWI	Acres
Wetland crossing score	Number
100-year floodplain crossed	Acres
National Hydrology Dataset (NHD) streams with a 50-foot buffer crossed (high, medium, low)	Acres
Sensitive stream crossings – based on 50-foot buffer	Acres
Stream sensitivity score	Number
Sensitive stream crossings (high, medium, low)	Number

(a) NWI = National Wetland Inventory, NHD = National Hydrology Dataset

The primary source of the data used in this analysis was 2014 aerial imagery supplemented with field reconnaissance of the overall study area and along each of the alternative routes. Digital data, such as roads, parcels, protected lands, and wetland information, were acquired from various agencies. Some of the criteria were quantified using GIS software; others were calculated by measuring information directly from the aerial photography.

Engineering factors were considered for the route analysis. **Total Length** is a general indicator of the overall presence 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 or Railroad Crossings** gives an indicator of potential permitting and/or line crossing issues. **New ROW** 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 a Total Length measurement in reflecting potential overall impacts of a route alternative. **Length Not Along Existing Infrastructure** was measured because following existing corridors is generally considered to have less impact than a new ROW. Existing infrastructure for this Project includes transmission lines, railroads, and roads. Because it is desirable and less impacting to co-locate a new route

along existing corridors, potential impacts would be more likely to occur where a route would be built away from existing corridors, so length not along existing infrastructure was measured; however, Length Not Along Existing Infrastructure was not included in the evaluation since there were very limited areas among all route alternatives where co-location occurred. **Heavy Angles** (>30 degrees) were considered because these angles typically require larger structures and more space. Consequently, these structures tend to be more visible and more expensive.

Proximity to residences, businesses, and public facilities was considered for the route analysis.

**Residences within 125 Feet, between 126-300 Feet, and between 301-500 Feet** 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 criteria for the distance to residences was 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 determine the residential proximity score, the number of residences within 125 feet of the centerline were multiplied by three; the number of residences between 126-300 feet were multiplied by two; and the number of residences between 301-500 feet were multiplied by one. Then, all three results were added together. **Businesses within 500 Feet** and **Public Facilities within 500 Feet** were also quantified. **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 as a result of additional landowners from which to acquire easements. **Parcels Crossed** were not included in the evaluation, since the Residential Land Use Score included parcel counts and would more accurately reflect impacts to residential areas.

Other social impact evaluation criteria were also considered. **NRHP Historic and Archaeological Sites within 1,320 Feet** (quarter-mile) of each segment were quantified based on a records search of known sites maintained by the North Carolina SHPO. This criterion can be used as an index of the actual or potential cultural impact of the proposed routes. **Open Space/Green Areas Crossed** (i.e., parks, wildlife areas, nature preserves, etc.) was used to determine potential impacts the proposed routes would have on any greenspace or open lands within the study area. This criterion was measured but not included in the evaluation because only a handful of segments crossed any public lands, which were open space areas associated with residential subdivisions. Acres of **Cropland Crossed** and acres of **Upland Forest Crossed** was determined using digital National Land Cover Database (NLCD) data and supplemented with aerial photography interpretation. **Upland Forest Crossed** measured the forested areas within the ROW that would be cleared along each route. **Land Use (residential)** was measured using parcel data. The parcels that were designated as residential use were segregated based on the size of the parcels as 5 acres or less versus greater than 5 acres. This approach was used to try and determine parcels that may be

associated with subdivisions versus rural residential properties. To determine the **Residential Land Use Score**, the acreage of parcels within the ROW that were 5 acres or less were multiplied by two and parcels that were greater than 5 acres were multiplied by one. Then, the two results were added together.

Environmental evaluation criteria included forests, hydric soils, wetlands, and water resources. **Forested and Non-Forested Wetland Crossed** were both measured using National Wetland Inventory (NWI) data produced by the USFWS. **Forested and Non-Forested Hydric Soils Crossed** measured the acreage of these soils to capture potential forested and non-forested wetland areas not accounted for in the NWI data, which in Johnston County appears to better represent the extent of potential wetland areas than solely using NWI data. To determine the **Wetland Crossing Score**, the acres of forested wetland and forested hydric soils greater than or equal to 50 percent crossed by the ROW were multiplied by two and non-forested hydric soils greater than or equal to 50 percent crossed by the ROW were multiplied by one, and then both numbers were added together. **100 Year Floodplain Crossed** was measured using Federal Emergency Management Agency (FEMA) digital floodplain data. **NHD Streams with a 50-foot Buffer Crossed** and **Sensitive Stream Crossings** were measured in acres and number, respectively, and were used to determine areas where the ROW might impact protected riparian areas and number of State-identified sensitive streams potentially impacted by a route alternative. The designation for sensitive streams was based on feedback from the USFWS and NHP regarding sensitive aquatic species that are known to occur in the study area. As a result, Little Creek, Swift Creek and/or their tributaries were designated as highly sensitive. Middle Creek and/or its tributaries were designated as medium sensitivity, and all other streams and tributaries in the study area were designated as low sensitivity. The streams were then buffered by 50 feet to incorporate the potential effect of the ROW crossing these locations. To determine the **Stream Sensitivity Score**, the acres of ROW crossing the highly sensitive streams were multiplied by three; the medium sensitive streams were multiplied by two; and the low sensitive streams were multiplied by one. Then, the three results were added together. The NHD Streams with a 50-foot buffer and sensitive stream crossings were measured but not used in the evaluation since **Sensitive Stream Crossings Based on 50 Foot Buffer** captured this data in the Stream Sensitivity Score.

#### 4.4.2 Weighting the Routing Factors

The categories 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 factors 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 5 was used for this process, with 1 representing the lowest consideration and 5 representing the highest consideration during the evaluation. The weights associated with each routing factor are presented in Table 4-2.

**Table 4-2: Routing Factor Weights**

<b>Routing Factor<sup>a</sup></b>	<b>Weight</b>
<b>Engineering</b>	
Total length	2
Road or railroad crossings	1
New ROW (data only and not used in evaluation)	N/A
Length not along existing infrastructure (data only and not used in evaluation)	N/A
Heavy angles (>30 degrees)	1
<b>Social</b>	
Residences within 125 feet of centerline (multiplied by 3) – used to determine score	N/A
Residences within 126-300 feet of centerline (multiplied by 2) – used to determine score	
Residences within 301-500 feet of centerline (multiplied by 1) – used to determine score	
Residential Proximity Score	5
Businesses within 500 feet	1
Public facilities within 500 feet	1
Parcels crossed (data only and not used in evaluation)	N/A
NRHP/archaeological sites within 1,320 feet	3
Open space/green areas	5
Cropland crossed	2
Land use (residential) – 5 acres or less (multiplied by 2) and more than 5 acres (multiplied by 1) – used to determine score	N/A
Residential Land Use Score	3
<b>Environmental</b>	
Upland forest crossed	3
Forested wetland crossed (multiplied by 2) – used to determine score	N/A
Forested hydric (>=50%) soils crossed (multiplied by 2), excludes NWI – used to determine score	
Non-forested wetland crossed (multiplied by 1) – used to determine score	
Non-forested hydric (>=50%) soils crossed (multiplied by 1), excludes NWI – used to determine score	
Wetland Crossing Score	4
Perennial streams crossed	2
100 year floodplains crossed	2
NHD streams with a 50-foot buffer crossed (data only and not used in evaluation)	N/A
Sensitive stream crossings (high – multiplied by 3, medium – multiplied by 2, low – multiplied by 1) based on 50-foot buffer – used to determine score	N/A
Sensitive stream crossings (high, medium, low)	N/A
Stream Sensitivity Score	4

(a) NRHP = National Register of Historic Places, NWI = National Wetland Inventory



### 4.4.3 Evaluation Process

Due to the size of the study area and three potential transmission line tap locations, 32 route segments were developed and evaluated to select a preferred route from the proposed Matthews Road Substation to the Lee-Milburnie 230kV, Erwin-Milburnie 230kV, or Erwin-Selma 230kV transmission line. Data for each of the segments considered is provided in Table 4-3. The route network developed from the 32 segments can be combined to form 32 route alternatives (see Figure 4-3). The route components and route data for all route alternatives are shown in Table 4-4.

Table 4-3: Segment Data

Segment	Engineering					Social												
	Total length (feet)	Road/ Railroad Crossings (number)	New Right-of-Way (acres)	Length Not Along Existing Infrastructure (feet)	Heavy Angles (>30 degrees) (number)	Residences within 125 Feet of Centerline (3x) (number)	Residences within 126-300 Feet of Centerline (2x) (number)	Residences within 301-500 Feet of Centerline (1x) (number)	Residential Proximity Score	Businesses within 500 feet (number)	Public Facilities within 500 feet (number)	Parcels Crossed (number)	NRHP Historic/ Archaeological Sites within 1,320 feet (number)	Open Space/ Green Areas (acres)	Cropland Crossed (acres)	Residential Land Use 5 acre Parcels or less (2x) (acres)	Residential Land Use >5 acre Parcels (1x) (acres)	Residential Land Use Score
1	18,639	4	53.6	18,639	2	0	14	24	52	0	0	14	0	0.0	16.8	0.0	6.7	6.7
2	18,138	4	52.2	18,138	3	0	15	19	49	2	0	28	0	4.6	17.1	0.3	10.7	11.4
3	6,569	1	19.1	6,569	0	0	2	11	15	0	0	16	0	3.6	0.3	0.8	0.0	1.6
4	8,215	0	23.6	8,215	1	0	7	17	31	0	0	5	0	3.8	6.5	0.0	4.4	4.4
5	9,474	1	27.4	9,474	1	0	7	10	24	0	0	13	0	0.5	3.8	0.6	9.0	10.2
6	3,078	0	9.1	2,151	0	0	3	7	13	0	0	8	0	1.7	0.0	0.3	3.9	4.4
7	5,002	0	14.5	5,002	0	1	8	12	31	0	0	18	0	0.9	1.3	2.7	5.2	10.5
10	5,150	3	14.9	4,456	1	0	6	6	18	0	0	12	0	0.0	7.2	0.0	5.3	5.3
11	5,516	1	16.0	3,767	1	0	3	2	8	0	0	7	0	0.0	10.1	0.0	9.1	9.1
12	19,989	5	57.6	19,989	5	1	24	33	84	2	3	35	0	0	25.2	0.5	14.4	15.3
13	5,896	1	17.2	5,896	0	0	0	0	0	0	0	8	0	0	6.7	0.0	2.7	2.7
14	8,282	1	24.0	8,282	2	0	1	1	3	2	0	11	0	0	5.3	0.0	3.0	3.0
15	9,502	2	27.5	9,502	2	1	3	8	17	0	1	9	0	0	8.5	0.4	6.7	7.4
16	14,984	4	43.3	14,984	4	3	18	28	73	0	2	27	0	0	24.9	1.6	21.2	24.5
17	16,193	3	46.7	16,193	4	0	7	8	22	0	0	17	0	0	13.8	0.0	14.5	14.5
18	19,048	6	54.9	19,048	3	6	24	41	107	2	1	45	0	0	29.8	1.5	16.4	19.3
19	7,621	4	22.1	7,621	2	1	6	7	22	2	1	12	0	0	10.5	0.1	0.4	0.7
20	3,416	0	9.9	3,416	1	0	0	0	0	0	0	5	0	0	0.2	0.0	1.9	1.9
21	3,078	0	9.0	1,432	0	0	0	3	3	0	0	6	0	0	0.4	0.2	4.3	4.7
22	7,056	2	20.5	7,056	0	0	5	7	17	0	2	9	0	0	3.4	0.0	0.5	0.5
23	11,648	4	33.6	11,648	1	0	0	4	4	2	2	13	0	0	21.0	0.4	7.3	8.2
24	11,538	3	33.2	11,538	1	0	0	0	0	0	2	14	0	0	12.6	0.0	11.8	11.8
30	18,947	2	54.5	18,947	3	0	4	16	24	0	0	18	0	0	27.5	0.0	33.7	33.7
31	19,961	4	57.5	19,961	2	0	9	15	33	0	0	25	0	0	27.4	0.4	17.3	18.0
32	9,005	1	26.1	9,005	0	0	22	15	59	0	0	11	0	0	10.0	1.2	9.3	11.6
33	24,446	4	70.4	24,446	5	0	8	4	20	0	0	31	0	0	25.6	0.7	33.5	34.9
34	18,991	4	54.8	18,991	1	0	16	10	42	1	1	20	0	0	21.0	1.2	30.8	33.2
35	4,746	1	13.9	4,746	1	0	3	3	9	0	0	8	0	0	4.9	0.1	5.9	6.0
36	1,647	0	5.0	1,647	0	0	0	0	0	0	0	3	0	0	0.0	0.0	1.5	1.5
37	3,824	1	11.2	3,824	1	0	1	4	6	0	0	5	0	0	7.4	0.0	0.0	0.0
38	14,266	6	41.1	14,266	0	0	5	7	17	0	0	20	0	0	20.1	0.7	4.8	6.2
39	11,926	5	34.3	11,926	0	0	2	7	11	0	1	27	0	0	25.2	0.0	12.3	12.3

Table 4-3: Segment Data (continued)

Segment	Environmental														
	Upland Forest Crossed (acres)	Forested & Marsh Wetland Crossed (2x) (acres)	Forested Hydric (> = 50%) Soils Crossed (2x), Excludes NWI (acres)	Non-Forested Wetland Crossed (1x) (acres)	Non-Forested Hydric (> = 50%) Soils Crossed (1x), Excludes NWI (acres)	Wetland Crossing Score	100-Year Floodplains Crossed (acres)	NHD Streams with a 50-foot Buffer Crossed (acres)	Sensitive Stream Crossings (High - 3x) Based on 50' Buffer (acres)	Sensitive Stream Crossings (Medium - 2x) Based on 50' Buffer (acres)	Sensitive Stream Crossings (Low - 1x) Based on 50' Buffer (acres)	Stream Sensitivity Score	Sensitive Stream Crossings - High (number)	Sensitive Stream Crossings - Medium (number)	Sensitive Stream Crossings - Low (number)
1	29.5	2.9	4.4	0.0	0.6	19.5	4.3	2.5	0.0	2.5	0.0	5.0	0	8	0
2	22.4	7.5	5.2	0.0	0.8	28.5	5.3	1.8	0.0	1.8	0.0	3.6	0	5	0
3	12.1	3.8	2.9	0.0	0.0	16.2	11.9	1.8	0.0	1.8	0.0	3.6	0	5	0
4	12.2	4.1	0.6	0.0	0.5	10.3	5.6	1.9	0.5	1.4	0.0	4.2	0	4	0
5	16.3	5.4	1.9	0.0	0.0	15.9	6.4	0.9	0.0	0.9	0.0	1.8	0	3	0
6	4.4	4.7	0.0	0.0	0.0	9.5	3.0	1.0	0.0	1.0	0.0	1.9	0	3	0
7	4.3	6.9	2.0	0.0	0.0	18.1	1.9	0.6	0.0	0.6	0.0	1.2	0	2	0
10	0.7	0.0	7.0	0.0	2.6	23.6	0.0	1.8	0.0	1.8	0.0	3.7	0	3	0
11	2.2	0.0	3.7	0.0	0.1	11.0	0.0	0.3	0.0	0.3	0.0	0.7	0	1	0
12	23.9	0.6	8.0	0.0	1.0	26.1	5.8	1.9	1.6	0.3	0.0	5.5	5	1	0
13	7.0	0.0	3.5	0.0	0.0	10.5	0.0	0.9	0.0	0.9	0.0	1.7	0	2	0
14	15.5	2.0	0.5	0.0	0.5	6.2	4.7	1.6	0.9	0.6	0.0	4.1	2	2	0
15	9.7	0.0	9.3	0.0	0.9	28.8	0.2	0.7	0.7	0.0	0.0	2.2	2	0	0
16	13.1	2.2	3.2	0.0	3.2	17.0	6.2	1.8	1.8	0.0	0.0	5.5	5	0	0
17	23.5	5.8	3.2	0.0	0.0	20.6	0.6	2.1	2.1	0.0	0.0	6.3	6	0	0
18	12.5	0.0	12.5	0.0	4.3	41.9	0.0	1.4	1.4	0.0	0.0	4.1	3	0	0
19	11.2	0.0	0.4	0.0	1.4	2.7	0.0	0.9	0.6	0.0	0.3	2.1	1	0	1
20	9.8	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.4	0.4	0	0	1
21	8.6	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.3	0	0	1
22	13.0	2.5	1.9	0.0	0.1	10.1	0.0	0.9	0.9	0.0	0.0	2.8	3	0	0
23	2.9	1.1	8.4	0.0	6.3	33.7	0.9	0.7	0.0	0.0	0.7	0.7	0	0	2
24	10.3	1.7	8.7	0.0	1.2	30.7	1.8	0.8	0.0	0.0	0.8	0.8	0	0	2
30	11.3	12.2	3.4	0.0	0.3	34.5	5.3	2.9	0.0	2.6	0.3	5.5	0	7	1
31	9.3	10.2	10.3	0.0	0.3	46.7	7.1	0.9	0.0	0.9	0.0	1.9	0	2	0
32	8.6	0.0	7.5	0.0	1.3	23.8	0.0	1.3	0.0	0.0	1.3	1.3	0	0	3
33	31.3	8.6	4.8	0.0	0.6	31.9	5.9	1.8	0.0	0.0	1.8	1.8	0	0	5
34	20.1	7.6	5.8	0.0	0.2	31.0	5.9	2.9	0.0	0.0	2.9	2.9	0	0	6
35	4.4	0.0	4.6	0.0	0.0	13.7	0.0	0.3	0.0	0.0	0.3	0.3	0	0	1
36	4.0	0.0	0.9	0.0	0.0	2.6	0.0	0.3	0.0	0.0	0.3	0.3	0	0	1
37	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0
38	13.8	1.6	5.5	0.0	0.7	18.7	0.0	1.6	0.0	0.0	1.6	1.6	0	0	5
39	7.3	0.0	1.8	0.0	4.7	10.2	0.0	0.7	0.0	0.0	0.7	0.7	0	0	2

Table 4-4: Route Data

Route	Segments	Engineering					Social												
		Total length (feet)	Road/ Railroad Crossings (number)	New Right-of-Way (acres)	Length Not Along Existing Infrastructure (feet)	Heavy Angles (>30 degrees) (number)	Residences within 125 Feet of Centerline (3x) (number)	Residences within 126-300 Feet of Centerline (2x) (number)	Residences within 301-500 Feet of Centerline (1x) (number)	Residential Proximity Score	Businesses within 500 feet (number)	Public Facilities within 500 feet (number)	Parcels Crossed (number)	NRHP Historic/ Archaeological Sites within 1,320 feet (number)	Open Space/ Green Areas (acres)	Cropland Crossed (acres)	Residential Land Use 5 acre Parcels or less (2x) (acres)	Residential Land Use >5 acre Parcels (1x) (acres)	Residential Land Use Score
1	1,2	36,776	8	105.5	36,776	6	0	29	43	101	2	2	41	0	4.6	33.9	0.3	17.4	18.1
2	1,3,4	33,423	5	95.8	33,423	4	0	23	46	92	0	0	33	0	7.2	23.6	0.8	11.0	12.7
3	1,3,6,7	33,287	5	95.5	33,287	2	1	25	47	100	0	0	51	0	5.7	18.4	3.6	15.8	23.1
4	1,5,7	33,114	5	95.0	33,114	3	1	27	45	102	0	0	42	0	1.1	22.0	3.2	20.8	27.2
5	10,12,17,19,20	52,369	15	150.2	50,620	16	2	40	48	134	4	4	77	0	0.0	56.4	0.6	35.8	37.1
6	10,12,17,19,21	52,032	15	149.2	50,282	16	2	40	51	137	4	4	78	0	0.0	56.6	0.8	38.3	39.9
7	10,13,14,15,17,19,20	56,060	14	160.8	54,311	15	2	20	24	70	4	4	67	0	0.0	51.7	0.5	33.6	34.6
8	10,13,14,15,17,19,21	55,722	14	159.8	53,973	15	2	20	27	73	4	4	68	0	0.0	51.9	0.7	36.0	37.5
9	10,13,14,16,18,19,20	64,397	19	184.7	61,027	15	10	52	74	208	6	6	113	0	0.0	84.1	3.2	50.1	56.5
10	10,13,14,16,18,19,21	64,060	19	183.7	60,690	15	10	52	77	211	6	6	114	0	0.0	84.3	3.5	52.5	59.4
11	10,13,14,16,22,23	53,016	15	152.1	52,089	10	3	30	44	113	4	4	73	0	0.0	68.0	2.1	39.5	43.7
12	10,13,14,16,22,24	52,906	14	151.8	51,979	9	3	30	40	109	2	2	75	0	0.0	59.6	1.6	44.0	47.2
13	10,13,31,34,35,39	66,670	18	191.2	65,024	8	0	36	40	112	1	1	95	0	0.0	91.7	1.6	73.7	76.9
14	10,13,31,34,36,37,39	67,395	18	193.3	65,749	10	0	34	41	109	1	1	94	0	0.0	94.2	1.6	69.3	72.5
15	10,13,31,34,36,38	65,911	18	189.1	64,265	7	0	36	38	110	1	1	83	0	0.0	81.9	2.3	61.9	66.4
16	11,12,17,19,20	52,735	13	151.3	50,986	15	2	37	44	124	4	4	72	0	0.0	59.3	0.6	39.6	40.9
17	11,12,17,19,21	52,398	13	150.3	50,649	15	2	37	47	127	4	4	73	0	0.0	59.6	0.8	42.1	43.7
18	11,13,14,15,17,19,20	56,426	12	161.8	54,677	16	2	17	20	60	4	4	62	0	0.0	54.6	0.5	37.4	38.4
19	11,13,14,15,17,19,21	56,089	12	160.8	54,339	16	2	17	23	63	4	4	63	0	0.0	54.9	0.7	39.8	41.3
20	11,13,14,16,18,19,20	64,763	17	185.7	61,394	16	10	49	70	198	6	6	108	0	0.0	87.0	3.2	53.9	60.3
21	11,13,14,16,18,19,21	64,426	17	184.7	61,056	16	10	49	73	201	6	6	109	0	0.0	87.2	3.5	56.3	63.2
22	11,13,14,16,22,23	53,382	13	153.1	52,455	11	3	27	40	103	4	4	68	0	0.0	70.9	2.1	43.3	47.5
23	11,13,14,16,22,24	53,272	12	152.8	52,345	10	3	27	36	99	2	2	70	0	0.0	62.5	1.6	47.8	51.0
24	11,13,31,34,35,39	67,036	16	192.2	65,390	9	0	33	36	102	1	1	90	0	0.0	94.6	1.6	77.5	80.7
25	11,13,31,34,36,37,39	67,761	16	194.3	66,115	11	0	31	37	99	1	1	89	0	0.0	97.1	1.6	73.1	76.3
26	11,13,31,34,36,38	66,277	16	190.1	64,631	8	0	33	34	100	1	1	78	0	0.0	84.8	2.3	65.6	70.2
27	30,32,34,35,39	63,616	13	182.4	61,970	8	0	47	50	144	1	1	80	0	0.0	87.9	2.4	91.4	96.1
28	30,32,34,36,37,39	64,340	13	184.5	62,694	10	0	45	51	141	1	1	79	0	0.0	90.4	2.3	87.0	91.7
29	30,32,34,36,38	62,857	13	180.3	61,210	7	0	47	48	142	1	1	68	0	0.0	78.1	3.0	79.6	85.6
30	30,33,35,39	60,066	12	172.2	60,066	11	0	17	29	63	0	0	81	0	0.0	82.7	0.7	84.8	86.3
31	30,33,36,37,39	60,791	12	174.3	60,791	11	0	15	30	60	0	0	80	0	0.0	85.2	0.7	80.5	81.9
32	30,33,36,38	59,307	12	170.1	59,307	8	0	17	27	61	0	0	69	0	0.0	72.9	1.4	73.0	75.8
Max		67,761	19.0	194.3	66,115	16.0	10.0	52.0	77.0	211.0	6.0	6.0	114.0	0	7.2	97.1	3.6	91.4	96.1
Average		56,646	13.6	162.5	55,209	10.9	2.2	32.5	43.1	114.6	2.5	2.5	76.3	0	0.6	68.4	1.7	52.3	55.7
Min		33,114	5.0	95.0	33,114	2.0	0.0	15.0	20.0	60.0	0.0	0.0	33.0	0	0.0	18.4	0.3	11.0	12.7
St. Dev		10,171	3.7	29.2	9,593	4.2	3.2	11.2	14.4	42.5	2.0	2.0	19.4	0	1.8	22.1	1.0	22.1	22.5

DATA ONLY - Not used in z-score evaluation

Lowest (best-scoring) values highlighted by criterion

Table 4-4: Route Data (continued)

Route	Segments	Environmental														
		Upland Forest Crossed (acres)	Forested & Marsh Wetland Crossed (2x) (acres)	Forested Hydric (> = 50%) Soils Crossed (2x), Excludes NWI (acres)	Non-Forested Wetland Crossed (1x) (acres)	Non-Forested Hydric (> = 50%) Soils Crossed (1x), Excludes NWI (acres)	Wetland Crossing Score	100-Year Floodplains Crossed (acres)	NHD Streams with a 50-foot Buffer Crossed (acres)	Sensitive Stream Crossings (High - 3x) Based on 50' Buffer (acres)	Sensitive Stream Crossings (Medium - 2x) Based on 50' Buffer (acres)	Sensitive Stream Crossings (Low - 1x) Based on 50' Buffer (acres)	Stream Sensitivity Score	Sensitive Stream Crossings - High (number)	Sensitive Stream Crossings - Medium (number)	Sensitive Stream Crossings - Low (number)
1	1,2	51.6	10.4	9.5	0	1.4	41.3	9.6	4.3	0.0	4.3	0.0	8.6	0	13	0
2	1,3,4	53.6	10.5	7.9	0	1.2	38.0	21.5	6.2	0.0	6.2	0.0	12.3	0	17	0
3	1,3,6,7	50.0	17.8	9.3	0	0.6	54.8	20.7	5.9	0.0	5.9	0.0	11.7	0	18	0
4	1,5,7	49.8	14.9	8.3	0	0.6	47.1	12.4	4.0	0.0	4.0	0.0	8.0	0	13	0
5	10,12,17,19,20	68.4	6.4	18.5	0	5.0	55.0	6.3	7.1	4.3	2.1	0.7	18.0	12	4	2
6	10,12,17,19,21	67.2	6.4	18.5	0	5.0	55.0	6.3	7.1	4.3	2.1	0.6	17.9	12	4	2
7	10,13,14,15,17,19,20	76.2	7.8	23.9	0	5.5	69.0	5.3	8.4	4.4	3.3	0.7	20.4	11	7	2
8	10,13,14,15,17,19,21	75.0	7.8	23.9	0	5.5	69.0	5.3	8.3	4.4	3.3	0.6	20.4	11	7	2
9	10,13,14,16,18,19,20	68.5	4.2	27.2	0	12.0	74.8	10.7	8.7	4.7	3.3	0.7	21.5	11	7	2
10	10,13,14,16,18,19,21	67.3	4.2	27.2	0	12.0	74.8	10.7	8.6	4.7	3.3	0.6	21.4	11	7	2
11	10,13,14,16,22,23	51.2	7.8	24.5	0	12.8	77.2	11.5	7.7	3.7	3.3	0.7	18.3	10	7	2
12	10,13,14,16,22,24	58.6	8.4	24.7	0	7.7	74.0	12.5	7.7	3.7	3.3	0.8	18.4	10	7	2
13	10,13,31,34,35,39	48.1	17.8	33.0	0	7.8	109.6	13.1	7.5	0.0	3.6	3.9	11.2	0	7	9
14	10,13,31,34,36,37,39	51.2	17.8	29.4	0	7.8	102.1	13.1	7.5	0.0	3.6	3.9	11.2	0	7	9
15	10,13,31,34,36,38	53.9	19.4	33.0	0	3.8	108.6	13.1	8.4	0.0	3.6	4.8	12.1	0	7	12
16	11,12,17,19,20	69.9	6.4	15.2	0	2.4	45.7	6.3	5.6	4.3	0.6	0.7	15.0	12	2	2
17	11,12,17,19,21	68.7	6.4	15.2	0	2.4	45.7	6.3	5.6	4.3	0.6	0.6	14.9	12	2	2
18	11,13,14,15,17,19,20	77.8	7.8	20.6	0	2.9	59.7	5.3	6.9	4.4	1.8	0.7	17.4	11	5	2
19	11,13,14,15,17,19,21	76.5	7.8	20.6	0	2.9	59.7	5.3	6.8	4.4	1.8	0.6	17.4	11	5	2
20	11,13,14,16,18,19,20	70.0	4.2	23.8	0	9.5	65.5	10.7	7.2	4.7	1.8	0.7	18.5	11	5	2
21	11,13,14,16,18,19,21	68.8	4.2	23.8	0	9.5	65.5	10.7	7.1	4.7	1.8	0.6	18.4	11	5	2
22	11,13,14,16,22,23	52.8	7.8	21.1	0	10.2	68.0	11.5	6.1	3.7	1.8	0.7	15.3	10	5	2
23	11,13,14,16,22,24	60.2	8.4	21.4	0	5.2	64.7	12.5	6.2	3.7	1.8	0.8	15.4	10	5	2
24	11,13,31,34,35,39	49.7	17.8	29.7	0	5.3	100.3	13.1	6.0	0.0	2.1	3.9	8.1	0	5	9
25	11,13,31,34,36,37,39	52.8	17.8	26.0	0	5.2	92.9	13.1	6.0	0.0	2.1	3.9	8.2	0	5	9
26	11,13,31,34,36,38	55.5	19.4	29.6	0	1.3	99.4	13.1	6.9	0.0	2.1	4.8	9.1	0	5	12
27	30,32,34,35,39	51.4	19.8	23.0	0	6.5	92.1	11.3	8.1	0.0	2.6	5.5	10.8	0	7	13
28	30,32,34,36,37,39	54.5	19.8	19.3	0	6.4	84.7	11.3	8.2	0.0	2.6	5.5	10.8	0	7	13
29	30,32,34,36,38	57.2	21.4	23.0	0	2.5	91.2	11.3	9.1	0.0	2.6	6.4	11.7	0	7	16
30	30,33,35,39	53.9	20.8	14.5	0	5.5	76.1	11.2	5.7	0.0	2.6	3.1	8.3	0	7	9
31	30,33,36,37,39	57.1	20.8	10.8	0	5.5	68.7	11.2	5.7	0.0	2.6	3.1	8.3	0	7	9
32	30,33,36,38	59.8	22.4	14.5	0	1.5	75.2	11.2	6.6	0.0	2.6	4.0	9.2	0	7	12

Max	77.8	22.4	33.0	0	12.8	109.6	21.5	9.1	4.7	6.2	6.4	21.5	12.0	18.0	16.0
Average	60.2	12.3	21.0	0	5.4	72.0	10.8	6.9	2.1	2.8	2.0	14.0	5.5	7.0	5.1
Min	48.1	4.2	7.9	0	0.6	38.0	5.3	4.0	0.0	0.6	0.0	8.0	0.0	2.0	0.0
St. Dev	9.4	6.4	7.1	0	3.5	19.8	3.8	1.3	2.2	1.2	2.0	4.5	5.6	3.6	4.9

DATA ONLY - Not used in z-score evaluation  
Lowest (best-scoring) values highlighted by criterion

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 combined score, length, acres, and numbers of selected resources. These units are not comparable, but need to be considered together, as a whole, in the evaluation process. The level of complexity resulting from the number of routes, combined with numerous criteria and differences in measurement units made it impossible 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.

Criteria totals for each potential route were summed, and a Z-score was calculated for each criterion 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 then established for each route by determining 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 a weight factor to each criterion to give greater consideration in the evaluation process to those criteria that are considered to have a greater impact on the overall Project evaluation (see Table 4-2). 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 factors. 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.

Weights were assigned to each criterion and were multiplied by the raw Z-score calculated for each criterion for each potential route. By weighting the Z-scores, those criteria determined to warrant greater consideration during the evaluation process were weighted higher and thus became more significant contributors to the overall analysis and screening of the potential routes. For example, acres of upland forest crossed received a weighting of 3, while the residential proximity score was weighted as a 5. If the Z-scores ranged from -5 to 5 for each category, weighted scores for the upland forest category would range from -15 to 15, while residences would range from -25 to 25. This way, residences near to the route are given a more significant contribution to the overall score for the analysis.

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 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 identified the routes with lower overall impacts.

Z-scores only consider quantified route evaluation criteria. Therefore, Z-scores do not reflect a definitive comparison of routes, but provide an index of the overall potential impacts associated with a particular route. This methodology is used to organize, manage, and screen the extensive route data in order 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 4-5).

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, in order to streamline the analysis, approximately 20 percent of the lowest-scoring (least-impacting) routes in the Z-score analysis were retained for additional evaluation and comparison. This lowest-scoring 20 percent included seven route alternatives, all of which scored well compared to the remaining route alternatives and would be feasible to construct with fewer impacts compared to the other routes.



Table 4-5: Weighted Route Scores

Weight		2	1	1	5	1	1	5	2	3	3	4	2	2	4	Total	
Route	Segments	Engineering			Social						Environmental						
		Total length (feet)	Road/ Railroad Crossings (number)	Heavy Angles (>30 degrees) (number)	Residential Proximity Score	Businesses within 500 feet (number)	Public Facilities within 500 feet (number)	Open Space/ Green Areas (acres)	Cropland Crossed (acres)	Residential Land Use Score	Upland Forest Crossed (acres)	Wetland Crossing Score	Perennial Streams Crossed (number)	100-Year Floodplains Crossed (acres)	Stream Sensitivity Score		
4	1,5,7	-4.63	-2.29	-1.89	-1.49	-1.21	-1.21	1.58	-4.20	-3.80	-3.34	-5.05	0.00	0.82	-5.33	-32.02	
1	1,2	-3.91	-1.49	-1.17	-1.60	-0.23	-0.23	11.36	-3.11	-5.02	-2.76	-6.22	0.00	-0.64	-4.83	-19.85	
31	30,33,36,37,39	0.81	-0.42	0.02	-6.43	-1.21	-1.21	-1.66	1.52	3.48	-1.02	-0.68	0.00	0.19	-5.06	-11.64	
32	30,33,36,38	0.52	-0.42	-0.69	-6.31	-1.21	-1.21	-1.66	0.41	2.67	-0.15	0.64	0.00	0.19	-4.25	-11.46	
3	1,3,6,7	-4.59	-2.29	-2.12	-1.72	-1.21	-1.21	14.66	-4.52	-4.35	-3.28	-3.48	0.00	5.12	-2.00	-10.99	
30	30,33,35,39	0.67	-0.42	0.02	-6.08	-1.21	-1.21	-1.66	1.30	4.07	-2.01	0.82	0.00	0.19	-5.06	-10.56	
2	1,3,4	-4.57	-2.29	-1.65	-2.66	-1.21	-1.21	18.76	-4.05	-5.74	-2.12	-6.89	0.00	5.55	-1.47	-9.54	
18	11,13,14,15,17,19,20	-0.04	-0.42	1.22	-6.43	0.75	0.75	-1.66	-1.24	-2.30	5.62	-2.49	0.00	-2.91	3.04	-6.13	
19	11,13,14,15,17,19,21	-0.11	-0.42	1.22	-6.08	0.75	0.75	-1.66	-1.22	-1.92	5.23	-2.49	0.00	-2.91	2.98	-5.89	
23	11,13,14,16,22,24	-0.66	-0.42	-0.22	-1.84	-0.23	-0.23	-1.66	-0.53	-0.63	-0.02	-1.48	0.00	0.85	1.26	-5.80	
16	11,12,17,19,20	-0.77	-0.15	0.98	1.10	0.75	0.75	-1.66	-0.82	-1.98	3.11	-5.33	0.00	-2.34	0.85	-5.51	
17	11,12,17,19,21	-0.84	-0.15	0.98	1.46	0.75	0.75	-1.66	-0.80	-1.60	2.71	-5.33	0.00	-2.34	0.79	-5.28	
22	11,13,14,16,22,23	-0.64	-0.15	0.02	-1.37	0.75	0.75	-1.66	0.22	-1.10	-2.39	-0.82	0.00	0.34	1.18	-4.87	
7	10,13,14,15,17,19,20	-0.12	0.12	0.98	-5.25	0.75	0.75	-1.66	-1.51	-2.81	5.13	-0.62	0.00	-2.91	5.70	-1.45	
8	10,13,14,15,17,19,21	-0.18	0.12	0.98	-4.90	0.75	0.75	-1.66	-1.49	-2.43	4.74	-0.62	0.00	-2.91	5.64	-1.21	
12	10,13,14,16,22,24	-0.74	0.12	-0.45	-0.66	-0.23	-0.23	-1.66	-0.80	-1.13	-0.51	0.39	0.00	0.85	3.93	-1.12	
5	10,12,17,19,20	-0.84	0.38	1.22	2.28	0.75	0.75	-1.66	-1.08	-2.49	2.62	-3.46	0.00	-2.34	3.51	-0.36	
11	10,13,14,16,22,23	-0.71	0.38	-0.22	-0.19	0.75	0.75	-1.66	-0.04	-1.61	-2.88	1.05	0.00	0.34	3.84	-0.19	
6	10,12,17,19,21	-0.91	0.38	1.22	2.63	0.75	0.75	-1.66	-1.06	-2.10	2.22	-3.46	0.00	-2.34	3.45	-0.12	
25	11,13,31,34,36,37,39	2.19	0.65	0.02	-1.84	-0.72	-0.72	-1.66	2.60	2.73	-2.39	4.22	0.00	1.16	-5.18	1.06	
26	11,13,31,34,36,38	1.89	0.65	-0.69	-1.72	-0.72	-0.72	-1.66	1.49	1.92	-1.53	5.53	0.00	1.16	-4.37	1.24	
24	11,13,31,34,35,39	2.04	0.65	-0.45	-1.49	-0.72	-0.72	-1.66	2.37	3.32	-3.39	5.72	0.00	1.16	-5.18	1.67	
14	10,13,31,34,36,37,39	2.11	1.19	-0.22	-0.66	-0.72	-0.72	-1.66	2.33	2.23	-2.88	6.09	0.00	1.16	-2.52	5.74	
15	10,13,31,34,36,38	1.82	1.19	-0.93	-0.54	-0.72	-0.72	-1.66	1.23	1.42	-2.02	7.40	0.00	1.16	-1.71	5.92	
28	30,32,34,36,37,39	1.51	-0.15	-0.22	3.11	-0.72	-0.72	-1.66	1.99	4.79	-1.85	2.56	0.00	0.22	-2.87	6.01	
29	30,32,34,36,38	1.22	-0.15	-0.93	3.22	-0.72	-0.72	-1.66	0.88	3.98	-0.98	3.87	0.00	0.22	-2.06	6.19	
13	10,13,31,34,35,39	1.97	1.19	-0.69	-0.31	-0.72	-0.72	-1.66	2.11	2.82	-3.88	7.59	0.00	1.16	-2.52	6.34	
27	30,32,34,35,39	1.37	-0.15	-0.69	3.46	-0.72	-0.72	-1.66	1.77	5.38	-2.84	4.06	0.00	0.22	-2.87	6.62	
20	11,13,14,16,18,19,20	1.60	0.92	1.22	9.82	1.72	1.72	-1.66	1.68	0.61	3.15	-1.32	0.00	-0.10	3.98	23.34	
21	11,13,14,16,18,19,21	1.53	0.92	1.22	10.17	1.72	1.72	-1.66	1.70	1.00	2.75	-1.32	0.00	-0.10	3.92	23.57	
9	10,13,14,16,18,19,20	1.52	1.45	0.98	10.99	1.72	1.72	-1.66	1.42	0.11	2.66	0.55	0.00	-0.10	6.64	28.02	
10	10,13,14,16,18,19,21	1.46	1.45	0.98	11.35	1.72	1.72	-1.66	1.44	0.49	2.26	0.55	0.00	-0.10	6.58	28.25	

Lowest (best-scoring) values highlighted by criterion

The two lowest-scoring routes (Route 4 and Route 1), as well as the fifth and seventh lowest-scoring routes (Route 3 and Route 2), would all exit the proposed Matthews Road Substation site and extend to the west before tapping the existing Erwin-Milburnie 230kV transmission line. The third, fourth, and sixth lowest-scoring routes (Route 31, Route 32, and Route 30) would all exit the proposed substation site to the south and would continue southward to tap the existing Erwin-Selma 230kV transmission line. A comparison of these seven 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 weighted score based on measured criteria for each route alternative, the Project team considered the merits of the remaining seven route alternatives to determine a preferred route for construction between the Project endpoints.

The weighted Z-scores for the four routes exiting the proposed Matthews Road Substation site to the west (western routes) ranged from -32.02 to -9.54, while the weighted Z-scores for the three routes exiting the substation site to the south (southern routes) ranged from -11.64 to -10.56. After further desktop and field reviews of these seven routes, combined with additional meetings with the Project team, it was determined that any one of these routes would be feasible and constructible; therefore, the two lowest-scoring routes from each subset (two western routes and two southern routes) were retained for further comparison and evaluation. Coincidentally, the two lowest-scoring routes from each subset happened to be the four lowest-scoring routes overall. The remaining western routes (Route 4 at -32.02 and Route 1 at -19.85) were compared against the remaining southern routes (Route 31 at -11.64 and Route 32 at -11.46) to determine which of these would present the overall best option for a preferred route alignment (Figure 4-4).







Route 4 (segments 1, 5, and 7) was the overall lowest-scoring route (-32.02) and was the shortest overall alignment, at approximately 6.3 miles in length. Route 1 (segments 1 and 2) was the second lowest-scoring route overall (-19.85) and fourth shortest overall alignment at approximately 7.0 miles in length. Both of these routes were considerably shorter than the two remaining southern routes. Route 31 (segments 30, 33, 36, 37, and 39) was the third overall lowest-scoring route (-11.64) with a total length of approximately 11.5 miles, while Route 32 (segments 30, 33, 36, and 38) was the fourth lowest-scoring route (-11.46) with a total length of approximately 11.2 miles.

The differences in Z-scores between the western and southern routes can be primarily attributed to their differences in total length. Generally, longer routes have higher overall impacts because the increased length provides greater chances to affect all measured criteria. In this case, criteria such as parcels crossed, cropland crossed, and wetland crossed favored the western routes due to their shorter length. However, impacts to residences did not reflect this. Route 4 would pass within 500 feet of 73 residences, and had a Residential Proximity Score of 102, the highest among the final four routes being evaluated. Similarly, Route 1 would pass within 500 feet of 72 residences with a Residential Proximity Score of 101. Conversely, Route 31 would pass within 500 feet of 45 residences with a Residential Proximity Score of 60 (the best of all routes evaluated), and Route 32 would pass within 500 feet of 44 residences with a Residential Proximity Score of 61. Comparing the lowest-scoring western route (Route 4) with the lowest-scoring southern route (Route 31) shows a 61.6 percent increase in residential proximity (within 500 feet) for Route 4 than for Route 31. This is due to the western routes traversing through more densely populated areas, primarily through and adjacent to several residential subdivisions, while the southern routes traverse areas more rural in nature, with scattered residences spaced further apart. Routes 4 and 1 also impact acres of designated open space (1.1 and 4.6 acres, respectively), which are areas attributed to subdivisions in the area and generally serve as non-developed greenspace as part of the subdivision. The two southern routes do not cross any designated open space acres as part of their alignments.

Even though the southern routes are longer than the western routes, the increase in impacts for individual criteria is small. The range of upland forest crossed among the four remaining routes is 10.0 acres (59.8 for Route 32 to 49.8 acres for Route 4). The range of forested wetland crossed is 12.0 acres (22.4 acres for Route 32 to 10.4 acres for Route 1). The range of floodplain crossed is 2.8 acres (12.4 acres for Route 4 to 9.6 acres for Route 1). The range of medium sensitive stream crossings is 6 (7 for Route 31 and 32 to 13 for Route 1 and Route 4).

Several streams and associated watersheds crossed by the four remaining route alternatives are considered to be sensitive due to the presence of a federally protected mussel species (dwarf wedgemussel) and other

federal aquatic species of concern. The western routes would generally parallel Middle Creek and its floodplain, while the southern routes would have perpendicular crossings of Middle Creek and Black Creek and their floodplain areas.

Cumulatively, it is anticipated that the western routes may have higher long-term environmental impacts due to the western routes paralleling sensitive streams, and in some cases being constructed within floodplain and wetland areas associated with the designated open space/green areas between the residential subdivisions located adjacent to Route 4 and Route 1. This could potentially result in difficulties during permitting, construction, access, and maintenance of a transmission line through these sensitive areas. The southern routes, by crossing sensitive streams, floodplains, and wetland areas in a perpendicular manner, would potentially limit environmental impacts during construction in these areas, and may allow for easier access for maintenance of the line (see Figure 4-4).

Impacts to individual property owners and to the general public in the vicinity of the four remaining route alternatives are more difficult to measure than some of the other quantitative data evaluated for this Project; however, landowners and the general public were given an opportunity to comment on potential impacts to their properties or the Project in general. During the public open houses and subsequent public comment period, individuals were able to comment on a specific segment or segments along a given route alternative. A combination of 10 individual segments (1, 2, 5, 7, 30, 33, 36, 37, 38, and 39) were used to develop the remaining four route alternatives (Route 4, Route 1, Route 31, and Route 32). The segments comprising Route 4 or Route 1 (segments 1, 2, 5, and 7) registered a total of 95 comments from landowners or the general public, while the segments comprising Route 31 or 32 (segments 30, 33, 36, 37, 38, and 39) registered a total of 7 comments. The number of comments related to individual segments is not conclusive to determine potential impacts to landowners or the public in general. However, the disparity between comments received for the western routes versus the southern routes illustrates the general level of interest and/or concern from landowners and the public along these routes.

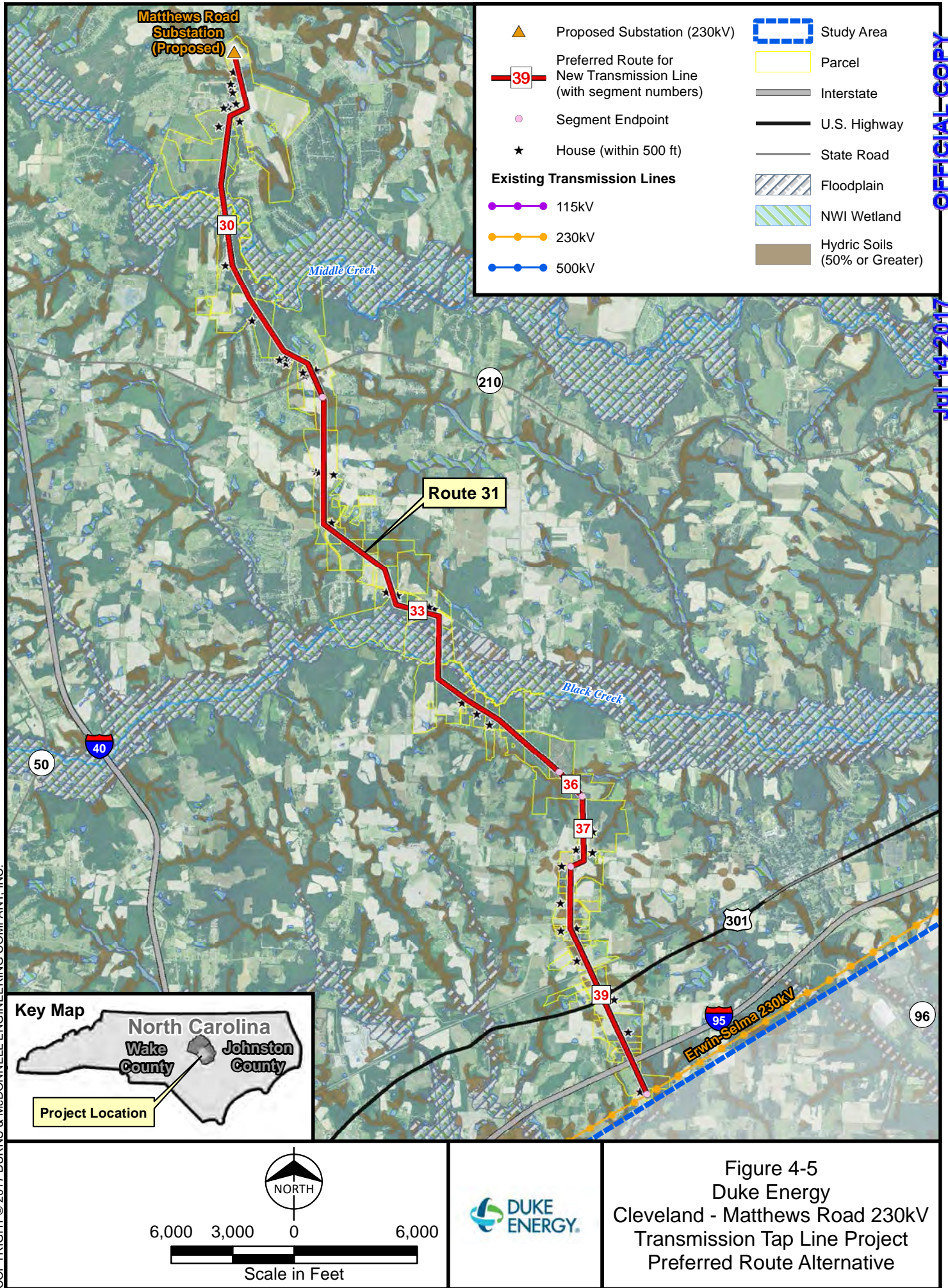
When considering the four route alternatives retained for further evaluation, both quantitative and qualitative data was used to differentiate the routes and to provide a rationale for the selection of a preferred route alignment. Environmental, social, and engineering data was collected and evaluated, as well as input from landowners and the community potentially impacted by the route alignment. Upon further investigation by the Project team, it was discovered that the potential condemnation of open space/green space areas owned by a subdivision homeowner association could require the condemnation of all property owners within that subdivision, based on precedent from a previous legal case. This knowledge, along with proximity to residences and subdivisions, potential environmental impacts to

sensitive streams and floodplains, and construction and maintenance concerns associated with the western routes, resulted in the elimination of these two routes (Route 4 and Route 1) from further consideration. The remaining routes, Route 31 and Route 32, were then evaluated to determine which of these alignments would provide the best overall route alignment for construction and operation of the Project.

Route 31 and Route 32 had similar Z-scores (-11.64 and -11.46, respectively) and were identical except that Route 31 used segments 37 and 39 while Route 32 used segment 38 to extend to the Erwin-Selma 230kV transmission line. This minor difference in alignments resulted in Route 32 being slightly shorter (1,484 feet shorter) than Route 31. Route 32 also had 3 fewer heavy angles and crossed 11 fewer parcels. Conversely, Route 31 scored better for Residential Proximity, with the lowest value among all 32 route alternatives. Route 31 crossed more cropland acres (85.2 versus 72.9) and less upland forest acres (57.1 versus 59.8) than Route 32. Route 31 also crossed less acres of forested and marsh wetland (20.8 versus 22.4) than Route 32 and less acres of forested hydric soils (10.8 versus 14.5) than Route 32, resulting in an overall Wetland Crossing Score of 68.7, which was 6.5 points better than Route 32. Route 31 had a better Stream Sensitivity Score (8.3) compared to Route 32 (9.2) and would have 16 sensitive stream crossings compared to 19 crossings when using Route 32.

Crossing cropland versus forested land is desirable from a construction, access, and future maintenance perspective, since there is likely to be better access across cropland versus forested areas and less clearing of trees and other vegetation. Additionally, fewer sensitive stream crossings is beneficial during construction as well, as this would require less permitting and fewer preventative measures to minimize impacts to these sensitive areas. Finally, crossing fewer acres of wetland and hydric soils is beneficial from a construction, access, and maintenance perspective and would potentially require less permitting effort in these areas. For the above reasons, the Project team determined that Route 31 would be the best route alternative to carry forward as the preferred alternative due to its reduced impacts to residences, forested acres, and wetlands, and better potential access during construction and operation and future maintenance of the transmission line (Figure 4-5).







## 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 Cleveland-Matthews Road Substation to a tap point on either the Lee-Milburnie 230kV, Erwin-Milburnie 230kV, or Erwin-Selma 230kV transmission lines. Potential impacts to both natural and social resources located in the study area 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 segment and route data and corresponding route evaluation presented in Table 4-3 through Table 4-5. Figure 4-5 shows the preferred route described in the following section.

#### 5.2.1 Preferred Route

Route 31, which is composed of Segments 30, 33, 36, 37, and 39, was selected as the preferred route and will connect the proposed Cleveland-Matthews Road Substation to the Erwin-Selma 230kV transmission line (see Figure 4-5). This route is 60,791 feet (approximately 11.5 miles) in length.

Following is a description of the path taken by the preferred route. The preferred route originates at the site of the proposed Cleveland-Matthews Road Substation, located on the southeast corner of Polenta Road and Matthews Road in Johnston County, North Carolina. The route exits the substation site to the southeast and extends for approximately 0.5 mile before turning west for approximately 0.2 mile while crossing Matthews Road. The route then continues south for approximately 0.9 mile before crossing Middle Creek. From this point, the preferred route extends generally southeast for approximately 1.8 miles before crossing NC State Highway 210. The route then continues south-southeast for approximately 0.9 mile before crossing Lassiter Road. From here, the route extends approximately 0.5 mile south-southeast before crossing Hickory Grove Church Road. The route then extends southeast for approximately 0.9 mile and crosses King Mill Road. Continuing southeast for another 0.2 mile, the route then turns and travels east for approximately 0.4 mile before turning south. The route extends south-southeast for 0.6 mile and crosses Black Creek. Turning southeast, the route then extends 0.8 mile and crosses Elevation Road. The route continues to travel southeast for another approximately 0.9 mile and then turns south for 0.6 mile and crosses Old School Road. The route then turns southwest for only 0.1 mile and then turns south for 0.3 mile before crossing Jackson Road. The route continues to the south for



0.3 mile before turning southeast, extending approximately 0.4 mile, and crossing an existing CSX/Amtrak railroad line. The route continues southeast for approximately 1.3 miles, crossing U.S. Highway 301, Parker Road, and Interstate 95 before terminating at a tap point along the existing Erwin-Selma 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**

Evaluation Criteria <sup>a</sup>	Preferred Route Value	Range of Values
Total length (feet)	60,791	33,114 – 67,761
Road/railroad crossings (number)	12	5 – 19
New right-of-way (acres)	174.3	95.0 – 194.3
Length not along existing infrastructure (feet)	60,791	33,114 – 66,115
Heavy angles (number)	11	2 – 16
Residences within 125 feet of centerline (number)	0	0 – 10
Residences within 126-300 feet of centerline (number)	15	15 – 52
Residences within 301-500 feet of centerline (number)	30	20 – 77
Residential Proximity Score	60	60 – 211
Businesses within 500 feet (number)	0	0 – 6
Public facilities within 500 feet (number)	0	0 – 6
Parcels crossed (number)	80	33 – 114
NRHP historic/archaeological sites within 1,320 feet (number)	0	0 – 0
Open space/green areas (acres)	0	0.0 – 7.2
Cropland crossed (acres)	85.2	18.4 – 97.1
Residential land use 5 acre parcels or less (acres)	0.7	0.3 – 3.6
Residential land use >5 acre parcels (acres)	80.5	11.0 – 91.4
Residential Land Use Score	81.9	12.7 – 96.1
Upland forest crossed (acres)	57.1	48.1 – 77.8
Forested and marsh wetland crossed (acres)	20.8	4.2 – 22.4
Forested hydric ( $\geq 50\%$ ) soils crossed, excluding NWI (acres)	10.8	7.9 – 33.0
Non-forested wetland crossed (acres)	0	0.0 – 0.0
Non-forested hydric ( $\geq 50\%$ ) soils crossed, excluding NWI (acres)	5.5	0.6 – 12.8

Evaluation Criteria <sup>a</sup>	Preferred Route Value	Range of Values
Wetland Crossing Score	68.7	38.0 – 109.6
100-year floodplains crossed (acres)	11.2	5.3 – 21.5
NHD streams with a 50-foot buffer crossed (acres)	5.7	4.0 – 9.1
Sensitive stream crossings (high) based on 50' buffer (acres)	0	0.0 – 4.7
Sensitive stream crossings (medium) based on 50' buffer (acres)	2.6	0.6 – 6.2
Sensitive stream crossings (low) based on 50' buffer (acres)	3.1	0.0 – 6.4
Stream Sensitivity Score	8.3	8.0 – 21.5
Sensitive stream crossings-high (number)	0	0 – 12
Sensitive stream crossings-medium (number)	7	2 – 18
Sensitive stream crossings-low (number)	9	0 – 16

(a) NRHP = National Register of Historic Places, NWI = National Wetland Inventory, NHD = National Hydrology Dataset

### 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 4 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 can 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 USGS 1:24,000 scale topographic maps and NHD data, the preferred route will contain 16 sensitive stream crossings of low and moderate designation from a State perspective.

The transmission line will be designed to span all waterbodies so that no structures will be placed within any waterway. All streams along the preferred route are narrow enough that they can easily be spanned with normal structure spacing and heights. 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. Most of the structures will be buried approximately 9 to 15 feet, an insufficient depth to encounter subsurface aquifers if present.

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 associated with any stream crossings.

### 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 due to shrub and tree clearing. 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 31) will require clearing approximately 57 acres of forested upland and approximately 21 acres of forested wetland. 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 and 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. Some cropland may also be impacted along the preferred route by the placement of structures. Impacts to crops are discussed in Section 5.4.1.1.

#### **5.3.4 Federally Listed Plant Species**

According to the USFWS and NHP, one federally endangered plant species (Michaux's sumac) has been documented in the study area. Additionally, three plant species with a "species of concern" designation have been documented 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 the USFWS.

#### **5.3.5 Wetlands**

The majority of the wetlands in the study area are forested riparian areas. The ROW for the preferred route will cross 20.8 acres of forested NWI wetlands, 10.8 acres of forested hydric soils and 5.5 acres of non-forested hydric soils.

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 spanned or avoided and erosion control techniques will be used to limit sedimentation of waterways.

### **5.3.7 Federally Listed Animal Species**

According to the USFWS and NHP, 12 federally listed animal species are known, or have been known, to occur within the study area. Three species are listed as “endangered”; one species is listed as “threatened”; and eight species are listed as “species of concern.” Eight of these 12 species are aquatic, and are not expected to be directly impacted by clearing or construction of a new transmission line. Another species, the northern long-eared bat, is known to occur within Wake County but not Johnston County, and therefore is not expected to be impacted since the preferred route is located entirely within Johnston County. Two other species, the southeastern bat and cerulean warbler, are listed as “species of concern.” The status of these species will be monitored to determine if changes in listing occur prior to Project construction. If a species’ listing is elevated to threatened or endangered, the USFWS will be contacted and efforts will be made to further limit impacts to these species. The federally endangered red-cockaded woodpecker (RCW) has been known to occur within the study area and is found primarily in mature pine forests. Most, if not all, of the forested land crossed by the preferred route consists of forested wetland, deciduous upland forest, and immature pine plantations; therefore, impacts to the RCW are not anticipated. Duke will conduct field surveys to determine presence/absence of federally protected species as required by the USFWS.

### **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 NHP, 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, the USFWS, 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 could result in some minor impacts to agricultural land within the proposed ROW. The preferred route will cross 85.2 acres of cropland based on land use classifications made by the NLCD. Impacts to cropland would occur because structures placed in cropland remove some of the land from production and may create obstacles for large farm machinery. Some structure and minor alignment adjustments may be made during future easement consultations with landowners to further reduce impacts. Temporary disturbance from heavy equipment within the ROW may result in the loss of some crops during construction. The only land that will be unavailable for agricultural use following construction will be the area occupied by the structure or guy wires. Other cropland within the ROW can continue to be farmed.

The preferred route will remove some land from the production of timber. Trees will be cleared from the ROW, and the ROW will be periodically managed to keep it treeless. Landowners may be allowed to clear and sell timber from their land if it will conflict with the transmission line ROW. 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 along highways and other local roads. The preferred route will be constructed within 500 feet of 45 residences. No businesses or public facilities are located within 500 feet of the preferred route.

#### **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 and fishing, may occur on private lands within the forested and agricultural areas and creeks. 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. Most roads in the study area are considered local routes, although U.S. Highway 301 and Interstate 95 are crossed by the preferred route. The preferred route also crosses the CSX/Amtrak rail line approximately 0.25 mile north of its crossing of Interstate 95. Duke will adhere to city, county, State, and Federal regulations for road and railroad 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 agricultural fields and 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 Johnston County because Duke will pay property taxes based on the value of the new electric transmission line.

### 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. Where present, surrounding forest vegetation and terrain may help to provide visual screening of the preferred route. Crossing open agricultural land can make the line more visible from viewpoints with a long perspective. Additionally, the line will be seen at road crossings and where the line is constructed near or along roads. However, 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. Following is a brief summary of the impacts of the preferred route for the proposed Project.

The preferred route will have relatively minor overall impacts. No businesses or public facilities are within 500 feet of the preferred route, and only 45 residences are within 500 feet, most of which are in a rural setting spaced over an 11-mile route. The area through which the preferred route extends is primarily rural in nature.

Environmental impacts are expected to be limited, as there are no State or Federal lands, or lands designated for recreational purposes, located near the preferred route alignment. Impacts to protected species is anticipated to be minimal, as the species found along the preferred route are aquatic and streams are not anticipated to be disturbed during construction or operation of the line. There are no NRHP-listed or eligible archaeological or historic sites or properties near the preferred route. The preferred route is

expected to minimize potential impacts to wetlands and forested areas during construction and operation of the line. For the above reasons, the preferred route (Route 31) 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, such as co-locating new lines adjacent to existing lines to reduce the required ROW width and the 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 11.5 circuit miles of new transmission line will be built from the proposed Cleveland-Matthews Road Substation to the Erwin-Selma 230kV transmission line once the Project is approved by the NCUC. The primary issues discussed in Chapter 5.0 regarding natural resources were soil and erosion control, water resources and 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 or

crossing streams, 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. Similarly, some streams might be crossed with temporary bridges, where such crossings can be done without damaging stream banks. 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 the ROWs that are paralleled. If 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. Similarly, some streams might be crossed with temporary bridges, where such crossings can be done without damaging stream banks.

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. Any excess spoilage will be spread evenly around the structure location. 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 State and federally protected species. State or 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, while longer than some of the other routes, traverses primarily rural forested and agricultural areas with scattered residences, 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, 19 NRHP-listed or eligible sites were found to occur within the study area, but the preferred route alignment would not impact any of these protected resources. 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 be H-frames. 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**

<b>Administering Agency<sup>a</sup></b>	<b>Potentially Required Permit, Clearance or Approval</b>
<b>Federal</b>	
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
<b>State</b>	
North Carolina Utilities Commission	Certificate of Environmental Compatibility and Public Convenience and Necessity
North Carolina Department of Transportation	Utility Encroachment Agreement, 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
<b>Local</b>	
CSX/Amtrak Railroad	Utility Crossing Agreement
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

In order 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 Cleveland-Matthews Road T-D Substation to one of three existing transmission lines in the area; Lee-Milburnie 230kV, Erwin-Milburnie 230kV, or Erwin-Selma 230kV transmission line.

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 (NHP, USFWS, NCWRC, USACE, and NCDEQ) 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 originates at the site of the proposed Matthews Road Substation, located on the southeast corner of Polenta Road and Matthews Road in Johnston County, North Carolina. The route exits the substation site to the southeast and extends for approximately 0.5 mile before turning west for approximately 0.2 mile while crossing Matthews Road. The route then continues south for approximately 0.9 mile before crossing Middle Creek. From this point, the preferred route extends generally southeast for approximately 1.8 miles before crossing NC State Highway 210. The route then continues south-southeast for approximately 0.9 mile before crossing Lassiter Road. From here, the route extends approximately 0.5 mile south-southeast before crossing Hickory Grove Church Road. The route then extends southeast for approximately 0.9 mile and crosses King Mill Road. Continuing southeast for another 0.2 mile, the route then turns and travels east for approximately 0.4 mile before turning south. The route extends south-southeast for 0.6 mile and crosses Black Creek. Turning southeast, the route then extends 0.8 mile and crosses Elevation Road. The route continues to travel southeast for another approximately 0.9 mile and then turns south for 0.6 mile and crosses Old School Road. The route then turns southwest for only 0.1 mile and then turns south for 0.3 mile before crossing Jackson Road. The route continues to the south for 0.3 mile before turning southeast, extending approximately 0.4 mile, and crossing an existing CSX/Amtrak railroad line. The route continues southeast for approximately 1.3 miles, crossing U.S. Highway 301, Parker Road, and Interstate 95 before terminating at a tap point along the existing Erwin-Selma 230kV transmission line (see Figure 4-5).

The preferred route was selected for the following reasons:

- Overall lowest Residential Proximity Score among all routes, an indication of minimal potential impacts to residences and property owners
- Minimal input from concerned landowners as opposed to much greater input along other lowest-scoring routes, indicating less chance of construction or access issues and a more positive public perception of the Project
- No open space (subdivision-owned) crossed
- Least number of residences within 300 feet of centerline
- No businesses or public facilities within 500 feet of centerline
- No highly sensitive stream crossings
- Utilizes cropland acres when possible to avoid extensive removal of forested areas along the route
- Crosses acres of wetland and hydric soils in a perpendicular manner, where possible, which is beneficial not only from a construction, access, and maintenance perspective, but would also potentially require less permitting effort in these areas

The preferred route was one of the least overall impacting routes (fifth lowest-scoring) in the numerical evaluation performed for the proposed Project. For this and the above reasons, and by using standard construction procedures and mitigation techniques when 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.

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## **APPENDIX A - 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**

Archaeological Site - Ineligible for the NRHP*		7			
Archaeological Site - Ineligible for the NRHP - 50' Buffer	2				
Archaeological Site - Unassessed for the NRHP - 50' Buffer				20	
Archaeological Site - Unassessed for the NRHP - 50' Buffer				20	
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 District - Potentially Eligible for the NRHP					75
Historic District - Potentially Eligible for the NRHP - 500' Buffer				19	
Historic District - Potentially Eligible for the NRHP - 1000' Buffer			11		
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 - Ineligible for the NRHP		7			
Historic Site - Ineligible for the NRHP - 100' Buffer	5				
Historic Site - Ineligible for the NRHP - 500' Buffer	2				
Historic Site - Ineligible for the NRHP - 1000' Buffer	0				75
Historic Site - Potentially Eligible for the NRHP					75
Historic Site - Potentially Eligible for the NRHP - 100' Buffer					
Historic Site - Potentially Eligible for the NRHP - 500' Buffer				19	
Historic Site - Potentially Eligible for the NRHP - 1000' Buffer			15		
No Recorded Cultural Resources	0				

\*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				

	SENSITIVITY TO TRANSMISSION LINE CONSTRUCTION				
	0-5 LOW	6-10 MODERATE/ LOW	11-15 MODERATE	16-20 MODERATE/ HIGH	25-100 HIGH

**FUTURE LAND USE**

Commercial	2				
Conventional Subdivisions			11		
Business/Industrial		6			
Park				20	
Future Beltway	4				
Industrial	0				
Institutional		6			
Large-Lot Residential		6			
Low-Density Residential			11		
Manufactured Housing Park		6			
Mixed Residential	5				
Mixed Use	5				
Neighborhood Activity Center	0				
Open Space				20	
Future Quarry					50
Road Right-of-Way		10			
Rural Conservation Modified Subdivisions	3				
Rural Conservation Subdivisions	3				
School			15		
Traditional Neighborhood Development		10			
Utilities	0				
Voluntary Argicultural District	3				

**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	

	SENSITIVITY TO TRANSMISSION LINE CONSTRUCTION				
	0-5 LOW	6-10 MODERATE/ LOW	11-15 MODERATE	16-20 MODERATE/ HIGH	25-100 HIGH

**COMMUNITY AMENITIES AND PUBLIC INFRASTRUCTURE**

Cemetery					100
Religious Facility - Not built					25
Communication Tower					25
Other Transmission Right-of-Way			15		
Duke Energy Substation			15		
Duke Energy Transmission Line Right-of-Way	2				
Fire/EMT					
Government				20	
Natural Gas Right-of-Way				20	25
Pump Station					25
Road Right-of-Way/Railroad Right of Way				20	
Rock Quarry					50
Sewer Line		6			
Water Tower					25
Airport Property					100
Airport Property Glide Path					50
Airport Property Less than 5 miles away				16	
No Identified Community Amenities or Public Infrastructure	0				

**NATURAL RESOURCES**

NHP Fed T&E (agencies response should identify T&E in the area)				20	25
Protected Private Lands					50
Cons. Easement					75
National Parks					
National Parks > 500' away, but outside	5				
National Parks < 500' away, but outside		10			
State Lands					75
State Lands > 500' away, but outside	5				
USFS Service					
NHP Rare Plant (agency response should identify and note NHP in the study area)		10	15		



	SENSITIVITY TO TRANSMISSION LINE CONSTRUCTION				
	0-5 LOW	6-10 MODERATE/ LOW	11-15 MODERATE	16-20 MODERATE/ HIGH	25-100 HIGH

**OCCUPIED BUILDINGS**

Religious Facility Building (Footprint)					100
Religious Facility Building (50' Buffer)				20	
Religious Facility Building (100' Buffer)				16	
Religious Facility Building (500' Buffer)			12		
Religious Facility Building (1,000' Buffer)		8			
Commercial Building (Footprint)					100
Commercial Building (100' Buffer)			15		
Commercial Building (200' Buffer)		8			
Daycare Building (Footprint)					100
Daycare Building (50' Buffer)					100
Daycare Building (100' Buffer)					25
Daycare Building (500' Buffer)				16	
Daycare Building (1000' Buffer)		6			
Fire/EMT Building (Footprint)					100
Fire/EMT Building (50' Buffer)			15		
Fire/EMT Building (100' Buffer)		6			
Fire/EMT Building (200' Buffer)	2				
Government Building (Footprint)					100
Government Building (50' Buffer)			15		
Government Building (100' Buffer)		6			
Government Building (200' Buffer)	2				
Industrial Building (Footprint)					100
Industrial Building (50' Buffer)			15		
Industrial Building (100' Buffer)		6			
Industrial 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 (1,000' Buffer)	2				
Recreation Building (Footprint)					100
Recreation Building (50' Buffer)			15		
Recreation Building (100' Buffer)		10			
Recreation Building (200' 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)					
Single - Family Residence (500' Buffer)		6		20	
Single - Family Residence (1,000' Buffer)	2				

	SENSITIVITY TO TRANSMISSION LINE CONSTRUCTION				
	0-5 LOW	6-10 MODERATE/ LOW	11-15 MODERATE	16-20 MODERATE/ HIGH	25-100 HIGH

**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		
Scenic Highways					25
Viewshed Model in GIS, Using DEM, Land Cover, Houses, etc.	0	5	10	20	

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	
Palustrine Scrub / Shrub			11		
Stream (Open Water 50' Buffer)		6			
Stream (Open Water 100' Buffer)		6			
50' Buffer		8			
100' Buffer		5			
Coastal Wetland / Marsh				16	
Coastal Wetland / Marsh (75' Buffer)				16	

	SENSITIVITY TO TRANSMISSION LINE CONSTRUCTION				
	0-5 LOW	6-10 MODERATE/ LOW	11-15 MODERATE	16-20 MODERATE/ HIGH	25-100 HIGH
<b>ZONING</b>					
Institutional District	2				
Rural Agricultural District	2				
Agricultural District	1				
General Industrial	1				
Business District	5				
Institutional and Public		6			
Manufactured Housing Development		6			
Mixed Use		6			
Neighborhood Business		6			
Residential Multi-Family		6			
Residential Single-Family		6			

## **APPENDIX B - AGENCY CORRESPONDENCE**

**Dunham, John**

---

**From:** Barton, Tim  
**Sent:** Thursday, December 08, 2016 11:20 AM  
**To:** Dunham, John  
**Subject:** FW: Cleveland - Matthews Road 230kV Transmission Tap Line Scoping Meeting

---

**From:** Tyner, Gail [<mailto:Gail.Tyner@duke-energy.com>]  
**Sent:** Thursday, December 08, 2016 11:12 AM  
**To:** Same, Timothy John <[Timothy.Same@duke-energy.com](mailto:Timothy.Same@duke-energy.com)>; Barton, Tim <[tbarton@burnsmcd.com](mailto:tbarton@burnsmcd.com)>  
**Subject:** FW: Cleveland - Matthews Road 230kV Transmission Tap Line Scoping Meeting

FYI

---

**From:** Railey, Rosetta [[mailto:rosetta\\_railey@fws.gov](mailto:rosetta_railey@fws.gov)]  
**Sent:** Thursday, December 08, 2016 12:05 PM  
**To:** Ellis, John  
**Cc:** Lee, David; Greg Walmsley; Ratcliffe, Judith; Smith, Danny; Holley, John; Stancil, Vann F; Robinson, Laura; Tyner, Gail; Dailey, Samantha J CIV USARMY CESAW (US  
**Subject:** Re: Cleveland - Matthews Road 230kV Transmission Tap Line Scoping Meeting

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

Hello All,

I do not have a record of any USFWS conservation easements in Johnston County.

Rose

Rosetta Railey, Biological Technician  
Roanoke River NWR  
P.O. Box 430  
114 West Water Street  
Windsor, NC 27983  
Office: 252-794-3808, Ext. 102

Fax:  
2

52-794-3780

OFFICIAL COPY

Jul 14 2017



Work Cell: 252-217-5154

[rosetta\\_railey@fws.gov](mailto:rosetta_railey@fws.gov)

On Thu, Dec 8, 2016 at 11:47 AM, Ellis, John <[john\\_ellis@fws.gov](mailto:john_ellis@fws.gov)> wrote:  
Gail,

The easements in Johnston Co are split between Rose Railey and Greg Walmsley. I've copied both of them with this email so you will have their contact info. Send them the maps of alternatives and they should be able to let you know if there are any easements along the routes.

Thanks  
John

On Wed, Dec 7, 2016 at 12:00 PM, Lee, David <[david.lee@ncdenr.gov](mailto:david.lee@ncdenr.gov)> wrote:

Judy,

Thank you for the information. See you tomorrow.

Thanks,

David

David S. Lee

Environmental Assistance Coordinator

Raleigh/Fayetteville Regional Offices

North Carolina Department of Environmental Quality

(919) 791-4204

E-mail correspondence to and from this address may be subject to the North Carolina Public Records Law and may be disclosed to third parties

**From:** Ratcliffe, Judith  
**Sent:** Wednesday, December 07, 2016 11:47 AM  
**To:** Smith, Danny <[danny.smith@ncdenr.gov](mailto:danny.smith@ncdenr.gov)>; Holley, John <[john.holley@ncdenr.gov](mailto:john.holley@ncdenr.gov)>; Ellis, John <[john\\_ellis@fws.gov](mailto:john_ellis@fws.gov)>; Stancil, Vann F <[vann.stancil@ncwildlife.org](mailto:vann.stancil@ncwildlife.org)>; Robinson, Laura <[Laura.Robinson@ncdcr.gov](mailto:Laura.Robinson@ncdcr.gov)>; Lee, David <[david.lee@ncdenr.gov](mailto:david.lee@ncdenr.gov)>  
**Cc:** Tyner, Gail <[Gail.Tyner@duke-energy.com](mailto:Gail.Tyner@duke-energy.com)>; Dailey, Samantha J CIV USARMY CESAW (US <[Samantha.J.Dailey@usace.army.mil](mailto:Samantha.J.Dailey@usace.army.mil)>  
**Subject:** FW: Cleveland - Matthews Road 230kV Transmission Tap Line Scoping Meeting  
**Importance:** High

Hello All,

I will be representing the Natural Heritage Program in Laura Robinson's place at the meeting tomorrow...she ran the proposed routes through the NC Natural Heritage Data Explorer (report attached) and found that many of the species within the project area are aquatic animals. Thank you for the opportunity to participate in this scoping.

Sincerely,

Judy Ratcliffe

Judith Ratcliffe, Zoologist

Natural Heritage Program

Division of Land and Water Stewardship

North Carolina Department of Natural and Cultural Resources

919-707-8628 office

[judith.ratcliffe@ncdcr.gov](mailto:judith.ratcliffe@ncdcr.gov) NEW EMAIL ADDRESS

[www.ncnhp.org](http://www.ncnhp.org)

121 West Jones Street

1651 Mail Service Center

Raleigh, North Carolina 27699-1651



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North Carolina Public Records Law and may be disclosed to third parties.*

---

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---

**From:** Lee, David  
**Sent:** Monday, November 28, 2016 10:33 AM  
**To:** Smith, Danny <[danny.smith@ncdenr.gov](mailto:danny.smith@ncdenr.gov)>; Holley, John <[john.holley@ncdenr.gov](mailto:john.holley@ncdenr.gov)>; Ellis, John <[john\\_ellis@fws.gov](mailto:john_ellis@fws.gov)>; Stancil, Vann F <[vann.stancil@ncwildlife.org](mailto:vann.stancil@ncwildlife.org)>; Robinson, Laura <[Laura.Robinson@ncdcr.gov](mailto:Laura.Robinson@ncdcr.gov)>  
**Cc:** Tyner, Gail <[Gail.Tyner@duke-energy.com](mailto:Gail.Tyner@duke-energy.com)>; Dailey, Samantha J CIV USARMY CESAW (US) <[Samantha.J.Dailey@usace.army.mil](mailto:Samantha.J.Dailey@usace.army.mil)>  
**Subject:** Cleveland - Matthews Road 230kV Transmission Tap Line Scoping Meeting  
**Importance:** High

Thank you all for your prompt response to Gail's request to hold this scoping meeting prior to the Christmas holidays.

We will meet at 9:30 a.m. on Thursday, December 8, at the Raleigh Regional Office, 3800 Barrett Drive, Raleigh, NC.

Samantha Daily, with the Corps will not be available that day, but Gail is arranging another time to meet with her separately.

Gail, the information you have previously provided, has been forwarded to this group. If there is any additional information that you would like to share prior to the meeting, please do so.

Thank you,

David

David S. Lee

Environmental Assistance Coordinator

Raleigh/Fayetteville Regional Offices

North Carolina Department of Environmental Quality

(919) 791-4204

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---

**From:** Lee, David

**Sent:** Friday, November 18, 2016 2:56 PM

**To:** Smith, Danny <[danny.smith@ncdenr.gov](mailto:danny.smith@ncdenr.gov)>; Holley, John <[john.holley@ncdenr.gov](mailto:john.holley@ncdenr.gov)>; 'Thomas, John T JR SAW' <[John.T.Thomas.JR@usace.army.mil](mailto:John.T.Thomas.JR@usace.army.mil)>; 'Ellis, John' <[john\\_ellis@fws.gov](mailto:john_ellis@fws.gov)>; Stancil, Vann F <[vann.stancil@ncwildlife.org](mailto:vann.stancil@ncwildlife.org)>; Buchanan, Misty <[misty.buchanan@ncdcr.gov](mailto:misty.buchanan@ncdcr.gov)>; Robinson, Laura <[Laura.Robinson@ncdcr.gov](mailto:Laura.Robinson@ncdcr.gov)>

**Cc:** 'Tyner, Gail' <[Gail.Tyner@duke-energy.com](mailto:Gail.Tyner@duke-energy.com)>

**Subject:** FW: Cleveland - Matthews Road 230kV Transmission Tap Line 1of2

Hello all,

Please see the request below from Gail Tyner, with Duke Energy Progress regarding a Scoping Meeting to discuss the Proposed Cleveland – Matthews Road 230kV Transmission Line in Johnston County, NC., primarily to receive feedback regarding the routes they are considering.



As she has noted, she would like to meet before Christmas if possible.

In that regard, I am proposing meeting at 9:30 a.m. on either Tuesday, December 6; Thursday, December 8; or Tuesday, December 13, for approximately 2.5 hours here at the Raleigh Regional Office, located at 3800 Barrett Drive, Raleigh, NC.

Please let me know if you or a member of your staff would be available to participate on either of those three dates.

Thank you,

David

David S. Lee

Environmental Assistance Coordinator

Raleigh/Fayetteville Regional Offices

North Carolina Department of Environmental Quality

(919) 791-4204

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---

**From:** Tyner, Gail [<mailto:Gail.Tyner@duke-energy.com>]

**Sent:** Friday, November 18, 2016 10:48 AM

**To:** Lee, David <[david.lee@ncdenr.gov](mailto:david.lee@ncdenr.gov)>

**Subject:** Cleveland - Matthews Road 230kV Transmission Tap Line 1of2

David

I've attached the scoping meeting request for a proposed 6-13 mile transmission line in Johnston County. The project study area is quite large, so I've included quad maps and KMZ files. I'll send the maps in a separate email. I know we just met with the agencies on the Powhatan Road Tap Line (Novo Nordisk), so they may not think another scoping meeting for the same county is warranted, but we would like to meet with everyone because this project has the potential to cross Middle Creek and dwarf wedge mussel habitat.

We'd like to meet before Christmas if possible. I know it might be difficult due to holiday schedules. Please let me know if you have any questions/concerns.

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](mailto:gail.tyner@duke-energy.com)

**Dunham, John**

---

**From:** Barton, Tim  
**Sent:** Friday, December 09, 2016 9:50 AM  
**To:** Dunham, John  
**Subject:** FW: Cleveland - Matthews Road 230kV Transmission Tap Line Scoping Meeting  
**Attachments:** 2016-10\_NCNHP\_Aquatic\_Source\_Features\_CMTL.zip

FYI

---

**From:** Tyner, Gail [mailto:Gail.Tyner@duke-energy.com]  
**Sent:** Friday, December 09, 2016 9:47 AM  
**To:** Barton, Tim <tbarton@burnsmcd.com>; Same, Timothy John <Timothy.Same@duke-energy.com>  
**Subject:** FW: Cleveland - Matthews Road 230kV Transmission Tap Line Scoping Meeting

Tim

Attached is the point source data from NHP for the known aquatic occurrences – (not for public distribution). It is my understanding for weighting the segments, we are going to assume presence of protected species in all streams for the first round of analysis. So I'm not sure that the point source data is important at this point. It may become more important once we determine the top 3-5 routes and decide to take a closer look at specific crossings.

The agencies stressed that crossings of Middle Creek and its tributaries is preferable to crossings of Swift Creek, Little Creek, and/or their tributaries. Tim Same and I discussed weighting the Swift Creek, Little Creek, and their tributaries the same weight as proximity to homes (the most negative factor). We were thinking of identifying a 100' buffer on all mapped streams (topo, NHD, and/or County GIS) and applying the negative weight to those crossings.

Do you think this will capture the agencies concerns, without automatically tossing out all the routes that cross Swift and Little creeks? Please let me know if you have any questions/concerns or have another idea about how to capture the data and agencies concerns.

Thanks  
Gail

---

**From:** Ratcliffe, Judith [mailto:judith.ratcliffe@ncdcr.gov]  
**Sent:** Thursday, December 08, 2016 3:54 PM  
**To:** Tyner, Gail  
**Cc:** Ellis, John; Stancil, Vann F  
**Subject:** RE: Cleveland - Matthews Road 230kV Transmission Tap Line Scoping Meeting

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

Hi Gail,

It was very nice to meet you today, thank you for including NC Natural Heritage Program in the scoping for this project. Attached please find the source feature points for aquatic species in the watersheds within this project

boundary. Please remember that this data is for internal use only, source feature points are not a part of our distributed data sets. If you have any questions or if we can be of further assistance, please do not hesitate to contact me.

Sincerely,  
Judy Ratcliffe

Judith Ratcliffe, Zoologist  
Natural Heritage Program  
Division of Land and Water Stewardship  
North Carolina Department of Natural and Cultural Resources

919-707-8628 office  
[judith.ratcliffe@ncdcr.gov](mailto:judith.ratcliffe@ncdcr.gov) NEW EMAIL ADDRESS  
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**From:** Lee, David  
**Sent:** Wednesday, December 07, 2016 12:01 PM  
**To:** Ratcliffe, Judith <[judith.ratcliffe@ncdcr.gov](mailto:judith.ratcliffe@ncdcr.gov)>; Smith, Danny <[danny.smith@ncdenr.gov](mailto:danny.smith@ncdenr.gov)>; Holley, John <[john.holley@ncdenr.gov](mailto:john.holley@ncdenr.gov)>; Ellis, John <[john\\_ellis@fws.gov](mailto:john_ellis@fws.gov)>; Stancil, Vann F <[vann.stancil@ncwildlife.org](mailto:vann.stancil@ncwildlife.org)>; Robinson, Laura <[Laura.Robinson@ncdcr.gov](mailto:Laura.Robinson@ncdcr.gov)>  
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**Subject:** RE: Cleveland - Matthews Road 230kV Transmission Tap Line Scoping Meeting

Judy,

Thank you for the information. See you tomorrow.

Thanks,

David

David S. Lee  
Environmental Assistance Coordinator  
Raleigh/Fayetteville Regional Offices  
North Carolina Department of Environmental Quality  
(919) 791-4204



---

**From:** Ratcliffe, Judith

**Sent:** Wednesday, December 07, 2016 11:47 AM

**To:** Smith, Danny <[danny.smith@ncdenr.gov](mailto:danny.smith@ncdenr.gov)>; Holley, John <[john.holley@ncdenr.gov](mailto:john.holley@ncdenr.gov)>; Ellis, John <[john\\_ellis@fws.gov](mailto:john_ellis@fws.gov)>; Stancil, Vann F <[vann.stancil@ncwildlife.org](mailto:vann.stancil@ncwildlife.org)>; Robinson, Laura <[Laura.Robinson@ncdcr.gov](mailto:Laura.Robinson@ncdcr.gov)>; Lee, David <[david.lee@ncdenr.gov](mailto:david.lee@ncdenr.gov)>

**Cc:** Tyner, Gail <[Gail.Tyner@duke-energy.com](mailto:Gail.Tyner@duke-energy.com)>; Dailey, Samantha J CIV USARMY CESAW (US <[Samantha.J.Dailey@usace.army.mil](mailto:Samantha.J.Dailey@usace.army.mil)>

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Judy Ratcliffe

Judith Ratcliffe, Zoologist  
Natural Heritage Program  
Division of Land and Water Stewardship  
North Carolina Department of Natural and Cultural Resources

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**Sent:** Monday, November 28, 2016 10:33 AM

**To:** Smith, Danny <[danny.smith@ncdenr.gov](mailto:danny.smith@ncdenr.gov)>; Holley, John <[john.holley@ncdenr.gov](mailto:john.holley@ncdenr.gov)>; Ellis, John <[john\\_ellis@fws.gov](mailto:john_ellis@fws.gov)>; Stancil, Vann F <[vann.stancil@ncwildlife.org](mailto:vann.stancil@ncwildlife.org)>; Robinson, Laura <[Laura.Robinson@ncdcr.gov](mailto:Laura.Robinson@ncdcr.gov)>

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**Subject:** FW: Cleveland - Matthews Road 230kV Transmission Tap Line 1of2

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David

David S. Lee

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**From:** Tyner, Gail [<mailto:Gail.Tyner@duke-energy.com>]  
**Sent:** Friday, November 18, 2016 10:48 AM  
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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](mailto:gail.tyner@duke-energy.com)

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JUL 14 2017

## **APPENDIX C - PUBLIC INVOLVEMENT INFORMATION**

Contact: Meredith Archie  
24-Hour Media Line: 800.559.3853  
Twitter: @DE\_Meredith A

Nov. 9, 2016

## **Duke Energy to invest more than \$28 million to support Johnston County growth**

- **Utility to construct a new substation and transmission line**
- **Community open houses on the project to be held Nov. 16 & 17**

CLAYTON, N.C. – As part of its ongoing commitment to providing reliable service to its customers, Duke Energy Progress has announced plans to construct a new transmission line and substation to serve the Cleveland area of Johnston County.

“Duke Energy is committed to powering the growth of our customers and communities,” said Marty Clayton, Duke Energy district manager in Johnston County. “The Cleveland area has experienced 36 percent electric load growth over the past two decades. This new infrastructure will provide greater capacity and enhanced service reliability to support residential and commercial growth.”

The utility’s \$28.4 million investment includes construction of a new 230-kilovolt (kV) transmission-to-distribution substation and a new 230-kV transmission tap line, as well as distribution line upgrades. The new substation will be located on land currently owned by Duke Energy on the southeast corner of the intersection of Matthews Road and Polenta Road in Johnston County. The new transmission tap line will connect one of Duke Energy’s three existing 230-kV transmission lines in the area to the new substation.

Duke Energy is currently evaluating potential routes for construction of the transmission tap line and is seeking input from the public. Property owners along the various alternate routes have been notified by letter and provided opportunities for input in this process.

The public is also invited to attend one of two community open houses to learn more about the project and provide input on the route selection.

### **Cleveland Matthews Transmission Project Community Open Houses**

Wednesday, Nov. 16, 2016 | 4-7 p.m.  
C3 Church  
8246 Cleveland Rd. | Clayton, N.C.

Thursday, Nov. 17, 2016 | 4-7 p.m.  
Johnston County Community College  
Tart Building  
245 College Rd. | Smithfield, N.C.



During the open houses, various information stations will be set up where Duke Energy representatives will provide information on the project, aerial maps of the proposed route options, and an estimated timeline for the project. Once the public input and review process is complete, a final route will be selected by spring of 2017, and anticipated to be in-service by the end of 2019.

“Our goal is to minimize impacts to homes and businesses, the environment and cultural resources as we work to determine the final route,” said Clayton. “We also want to address the questions and concerns of potentially affected property owners and are committed to communicating with the public throughout the process.”

Additional information on the project will be available beginning Nov. 16 at [www.duke-energy.com/cleveland-matthews](http://www.duke-energy.com/cleveland-matthews). Members of the public may also email questions and comments to [CarolinasEast@duke-energy.com](mailto:CarolinasEast@duke-energy.com) or call 800.297.5886.

### **Duke Energy**

Duke Energy is one of the largest electric power holding companies in the United States. Its regulated utility operations serve approximately 7.4 million electric customers located in six states in the Southeast and Midwest, representing a population of approximately 24 million people. Its Commercial Portfolio and International business segments own and operate diverse power generation assets in North America and Latin America, including a growing portfolio of renewable energy assets in the United States.

Headquartered in Charlotte, N.C., Duke Energy is an S&P 100 Stock Index company traded on the New York Stock Exchange under the symbol DUK. More information about the company is available at [duke-energy.com](http://duke-energy.com).

The [Duke Energy News Center](#) serves as a multimedia resource for journalists and features news releases, helpful links, photos and videos. Hosted by Duke Energy, [illumination](#) is an online destination for stories about remarkable people, innovations, and community and environmental topics. It also offers glimpses into the past and insights into the future of energy.

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###

## Cleveland Matthews Road 230-kilovolt (kV) Transmission Tap Line QUESTIONNAIRE

*Please complete this questionnaire after you review the information presented at the Open House.*

This questionnaire is designed to gather important information to be considered during the route selection process for a proposed single-circuit, 230-kV transmission tap line. The new transmission line will extend from one of three existing 230-kV transmission lines to a new 230-kV/23-kV transmission-to-distribution substation on the southeast corner of the intersection of Matthews Road and Polenta Road in Johnston County. The three existing 230-kV transmission lines that the new line could potentially tap are the: Lee Sub-Milburnie 230kV line to the northeast; the Erwin-Selma 230kV line to the southeast; or the Erwin-Milburnie 230kV line to the west of the substation site. Your answers will help Duke Energy understand public interests and concerns and allow the team to incorporate this information into the route selection and planning. Thank you for your input.

1. Which of the following describes you? (Please mark all that apply)

- ☐ Homeowner or property owner
- ☐ Business owner
- ☐ Governmental Agency
- ☐ Potential line route is near my home/farm/business
- ☐ Not affected by any routes
- ☐ Other, please specify \_\_\_\_\_

### PROJECT NEED

2. Do you believe the need for this transmission tap line has been explained adequately?

\_\_\_\_\_ yes      \_\_\_\_\_ no      \_\_\_\_\_ uncertain

### LINE ROUTING CONSIDERATIONS

3. The routing of a transmission line involves many considerations. Please circle the number corresponding to the level of importance of that factor to you.

	<div style="display: flex; justify-content: space-around;"> <span><b>Not Important</b></span> <span><b>Rating</b></span> <span><b>Somewhat Important</b></span> <span><b>Most Important</b></span> </div>				
a) Proximity to residential homes	1	2	3	4	5
b) Proximity to public amenities (e.g., churches)	1	2	3	4	5
c) Minimize new corridor impact by placing new facilities alongside existing linear infrastructure (e.g. utility lines, roads, railways)	1	2	3	4	5
d) View from roadways	1	2	3	4	5
e) View from residences	1	2	3	4	5
f) Impact to environmentally sensitive areas	1	2	3	4	5
g) Impact to streams and wetlands	1	2	3	4	5
h) Impact to historic and archaeological resources	1	2	3	4	5
i) Impact to forests	1	2	3	4	5
j) Impact to cropland or specialty crops (i.e. orchards, Christmas tree farms, etc.)	1	2	3	4	5
k) Impact to commercial/industrial properties	1	2	3	4	5
l) Maintain or improve reliable electric service	1	2	3	4	5

(continued on the back)

4. Do you know of any building, family cemetery, landmark or other concern in the siting study area which could be considered historically important or should be considered in the routing analysis? If so, please describe the area below and any applicable information, such as property address or owners name. Also, please visit our GIS workstation to locate the areas with one of our representatives.

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5. If you have concerns with one or more transmission line segments shown on the display of potential routes, please indicate the segment number(s) and describe your concern.

Segment No.

Concern

<hr/>	<hr/>
<hr/>	<hr/>
<hr/>	<hr/>

**CONTACT INFORMATION (Personal information will be kept confidential)**

Name 

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 Phone 

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Address 

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**ADDITIONAL COMMENTS**

You can also submit comments on the project website. Visit [www.duke-energy.com/cleveland-matthews](http://www.duke-energy.com/cleveland-matthews) and click on the "interactive map" link.

In an effort to inform the public about our project, it is important that we effectively communicate. What suggestions do you have regarding how we might improve our public notification and information process?

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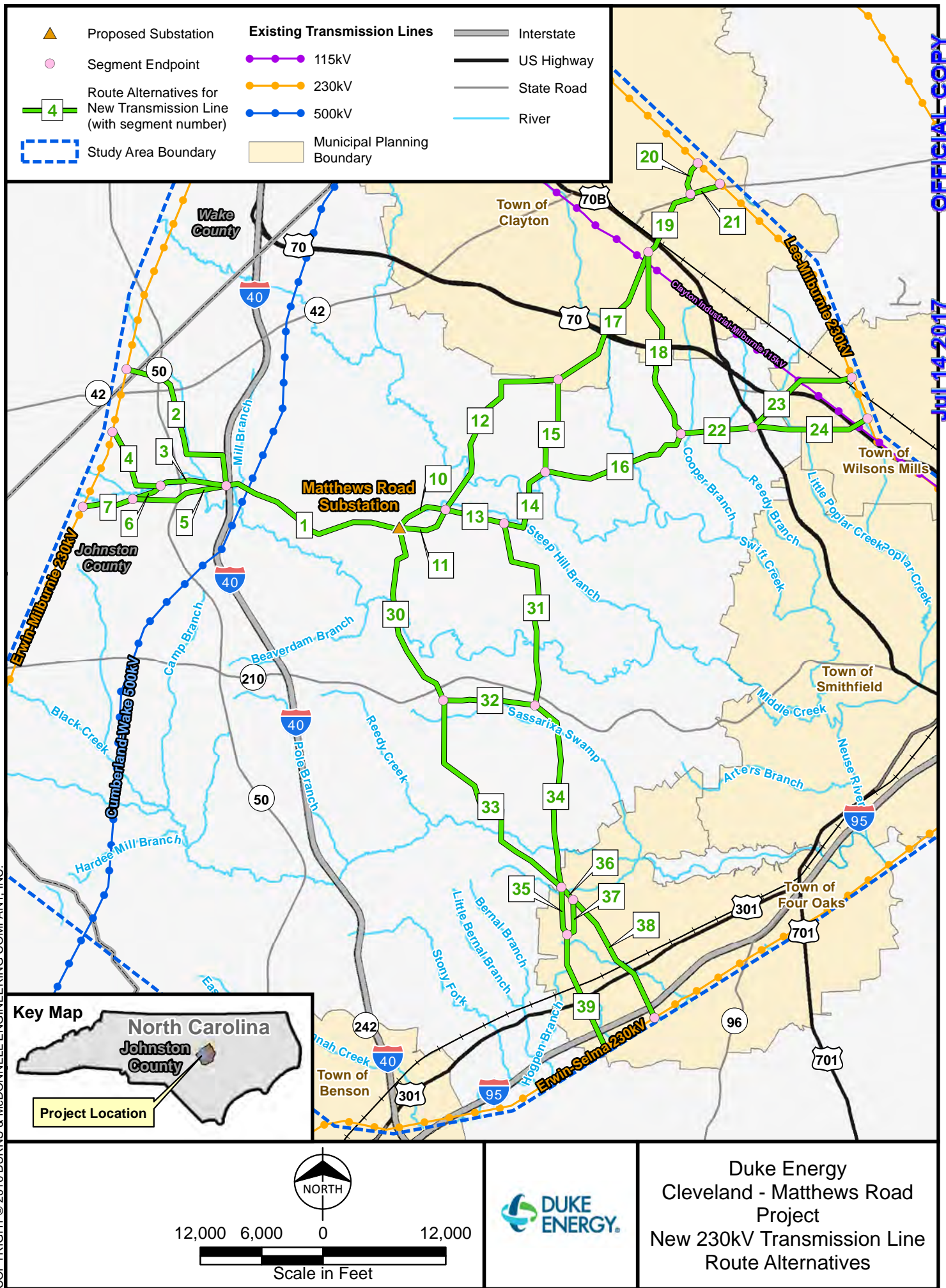
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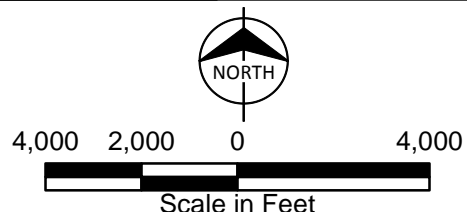
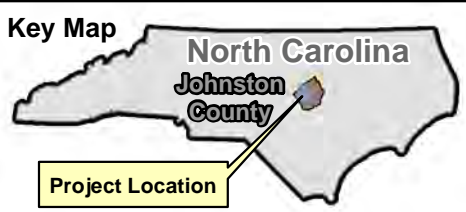
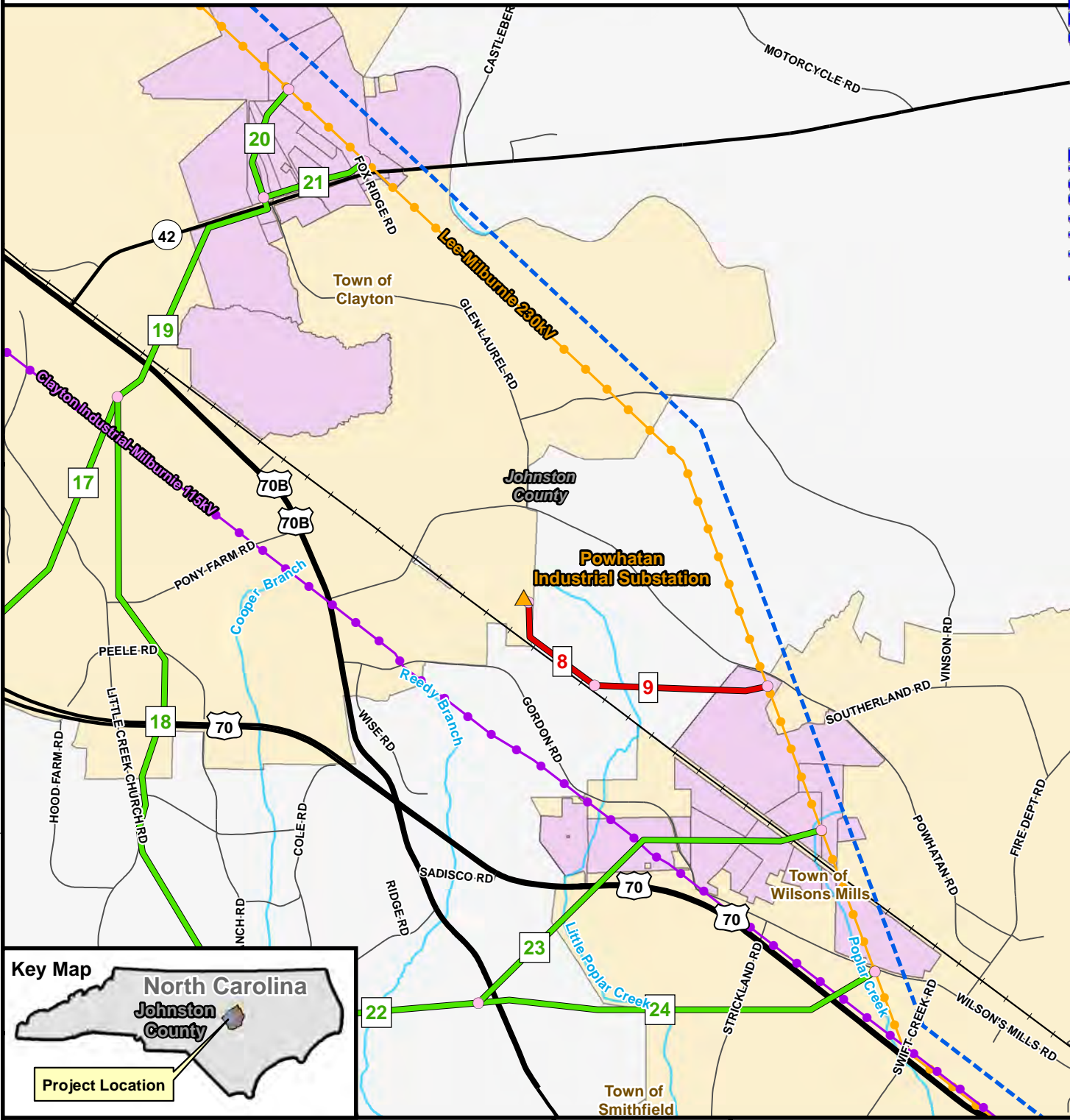
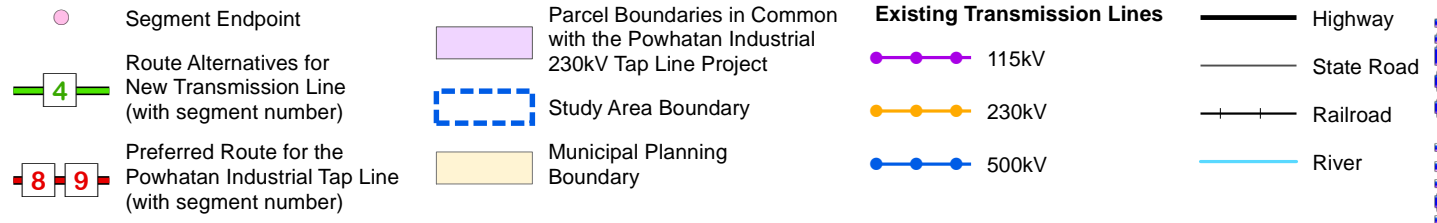
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If taking the questionnaire with you, please mail completed questionnaires before December 25, 2016 to:

**Duke Energy**  
 Transmission Public Outreach  
 410 South Wilmington Street | NC3  
 Raleigh, NC 27601







**Duke Energy**  
Cleveland - Matthews Road Project  
New 230kV Transmission Line  
In Common with the  
Powhatan Industrial Project



## Cleveland-Matthews Road 230kV Transmission Project

### Summary of Line Routing Consideration from Questionnaires

The routing of a transmission line involves many considerations. From the list of routing factors below, please circle the number corresponding to the level of importance of that factor to you.

Answer Options	Not Important	---	Somewhat Important	---	Most Important	Rating Average	Response Count
Proximity to residential homes	4	1	11	13	181	4.74	210
Proximity to public amenities (e.g., churches)	17	19	50	22	86	3.73	194
Minimize new corridor impact by placing new facilities alongside existing linear infrastructure (e.g. utility lines, roads, railways)	57	9	30	35	68	3.24	199
View from roadways	32	27	77	26	42	3.09	204
View from residences	4	6	16	13	171	4.62	210
Impact to environmentally sensitive areas	5	3	23	63	116	4.34	210
Impact to streams and wetlands	5	4	23	67	111	4.31	210
Impact to historic and archaeological resources	5	12	34	73	77	4.02	201
Impact to forests	7	10	66	35	89	3.91	207
Impact to cropland or specialty crops (i.e. orchards, Christmas tree farms, etc.)	9	8	69	32	86	3.87	204
Impact to commercial/industrial properties	25	44	92	16	27	2.88	204
Maintain or improve reliable electric service	7	24	51	93	28	3.55	203

*answered questions* 2,456  
*skipped questions* 184

**Cleveland-Matthews Road 230kV Transmission Project  
Concerns from Questionnaires by Segment Number**

Questionnaire Number	Segment Number and Concerns from Questionnaires
1	12 - it would go through behind my house thereby decreasing my property value when I go to sell. Don't want to be close to high voltage lines. It goes through a lot my father in law is trying to sell and through my neighbors barnyard.
2	32 - Saragass swamp and also repair area for failing septic systems
3	1 - right behind my home and crosses organic farm
4	31- view of our property. Not been able to call my property home
5	1- house less than 100' and I want to expand and build on my house. If this is built, I won't be able to add on
6	34 - goes through all our property
7	unknown - commented online
8	18 - Care to preserve our natural areas around our house and being able to mask the poles as much as possible
9	12 - I'm concerned about my property value going down. Also the visual I'm going to have at my house
10	12 - too close to homes and farmland will decrease the value of the homes around it. Have a permanent and total disable veterans that would not handle the noise
11	12 - Please consider that this line would be an eyesore to numerous residences. This line has too many homes that will lose their value
12	12 - brand new neighborhood, houses 1 year old, line would affect home value by decreasing property values exponentially
13	12 - new houses, line too close, it will decrease property value
14	32 - there is an existing construction easement there. And its behind our house a creek/swamp. Also, there is already a powerline on Lakewood Road nearby
15	5, 6, 7 - my family (small child) just purchased our home in 7/2016. one of the main reasons is because of the woods behind us. The proposed easements would drastically reduce usable property on my land. It also decrease visibility. Health concerns for my 1 year old as well
16	4 - we bought our lot 16 years ago because of the privacy offered by large lots and wetlands/stream at the rear. This is extremely important to us. Route would destroy this
17	18 - There is open land to the east of homes on Bess Drive. Line should be moved further from homes
18	none
19	4 - Proposed line is within 75 feet of the homes along wetlands. This area where line proposed on segment 4 often has 10-15 feet of water running in wetlands following rains of 3-4"
20	1 - Housing development going in here. Christmas tree farm and log cabin on part of this land
21	24 - closeness to property
22	15 - will cross 31 acres of land we were going to develop for housing
23	1 - public health, value of property, static sound and very unsightly
24	34 - it runs right over our neighbors driveway and right beside an existing home
25	34 - going right through my yard and my house
26	34, 36 - I live right where it runs. The line would be directly over my neighbors house. That can't happen
27	12 - lose property value. Brand new house built for 250K and now could be 200 feet in front of it.
28	34 - proposed line is right beside my home, be brothers home
29	1 - organic farm management, sensitive wetlands, managed timber tracts
30	none
31	1 - organic farm and wetland/forest habitats
32	none
33	1 - no comments
34	30 - would run across the back of our farm this is a working cattle operation
35	12 - crosses our cropland and woodland
36	32 - minor concern about noise and eyesore of large power poles affecting property values
37	1 - disruption of organic family farm
38	1 - organic farmland, line is splitting fields and chemical application is a concern, high value crops
39	1 - century farm, timber income, loss of land value, organic agriculture
40	1 - my concern is the proposed line would go through a certified organic farm and a homeowner who refuses build up to create a healthy future for everyone
41	1 - organic farm and residential area
42	30 - close to my house

Questionnaire Number	Segment Number and Concerns from Questionnaires
43	1 - im extremely concerned about the family farm at 1000 mclmore road. The owner has been fighting for years to keep the farm in production and to get organic certification for the land and this route would be devastating to her family farm and the organic certification
44	11 - will cut our farm directly in half, loss of timber, impact on wildlife, proximity to home
45	12 - right of way near property owners shop under construction. Could angle transmission lines be less intrusive not bulky? Be put across street on farm land putting it across road from at least two parcels that will be affected by current layout of 12
46	none
47	6, 7 - overall look of system
48	18 - have a business here and hoping to expand and add on to business in the future. Business has been there 20 years. If you put this on the property it will eliminate us doing any future projects.
49	23 - across hog farm irrigation spray site. Prime commercial
50	23 - my family 3 sisters and me live on the farm which has been in the family over 150 years. It's a beautiful farm please don't destroy it
51	39 - Our forever home was built on this farm which is also our livelihood. Our view would look directly at proposed line. Eyesore. Also would cross over multiple pastures and in between our barns and home. Cemetery would be impacted as well
52	6, 7 - too close to existing homes
53	2 - se attached comments
54	none
55	32 - too close to housing developments
56	18 - I am concerned about cancer and other health concerns
57	none
58	32 - Dull Meadows
59	3, 4, 5, 6, 7 - These proposed routes are all within one such area owned by a Mrs. Duty and currently for sale. Routing the power lines through here would decimate this sensitive area that deserves to be conserved and heralded as natural treasure.
60	3, 4, 6 - we live at 248 Susan Drive in Garner. These segments will run down our street and directly behind our home. Not only will this decrease home value for us and our neighbors, it will destroy the woods surrounding our home. We love our neighborhood and home largely due to the wildlife, this will threaten that. We are also concerned about health issues, regardless of your studies. Another concern is that these lines will be going up in a flood plain - the woods behind our home regularly flood- we had 15 feet of water in our yard during hurricane Mathew. We are concerned about an added electrical component during future floods. We are also concerned your construction may change the topography of the land, making our home even more susceptible to flooding.
61	16 - Proposed Duke Energy Route 16 (along Steel Bridge and Little Creek Church Roads) would do permanent and irreparable damage to the current use of the new \$1.4 million dollar Little Creek SDA Church fellowship property and playgrounds, activity areas, worship atmosphere and environment. Being close to nature is a fundamental part of worship of God, our Creator. Also, there are people with medical devices that would be afraid to attend services or outside activities at Little Creek due to the possible impact on medical devices such as pacemakers and other medical devices.
62	16 - same comment as Q61
63	16 - same comment as Q61
64	16 - same comment as Q61
65	32 - Saragass swamp, daughter, yard my swamp, I know there is a need for this line but there are a lot of wild plants in this area you will destroy
66	16 - same comment as Q61
67	16 - same comment as Q61
68	16 - same comment as Q61
69	16 - same comment as Q61
70	16 - same comment as Q61
71	16 - same comment as Q61
72	16 - same comment as Q61
73	16 - same comment as Q61
74	16 - same comment as Q61
75	16 - no comments
76	16 - same comment as Q61
77	unsightly damage to property would do irreparable damage to church property and playgrounds
78	16 - same comment as Q61
79	16 - same comment as Q61
80	16 - same comment as Q61
81	16 - same comment as Q61

Questionnaire Number	Segment Number and Concerns from Questionnaires
82	same comment as Q61
83	same comment as Q61
84	same comment as Q61
85	none
86	would be harmful to the people that live close plus make the area less useful. The church yard would be good for children to play
87	16 - same comment as Q61
88	16 - same comment as Q61
89	16 - same comment as Q61
90	16 - same comment as Q61
91	16 - same comment as Q61
92	16, 18 - this page won't hold them. Other than destroying the value of 150 year old farms on Route 18, it's the health and impact to environment that concerns me most. We lost our brother in law to brain tumor 4 years ago and he lived directly under a line such as this
93	16 - most important future programs
94	16 - same comment as Q61
95	16 - same comment as Q61
96	16 - same comment as Q61
97	35, 36 - proximity to rear of residence; placement of existing parcels rendering balance of property unbuildable/unusable due to large easement and aesthetic quality of land, and already existing easement of residential service
98	31 - this line segment shows coming through our land and too near our residence
99	3, 4, 6 - I have concerns about future property value decreases since the powerline would be the new view off my front porch. Like all the other property owners, I don't like the idea of a powerline running next to my property
100	4 - I changed my mind. Go ahead and put your lines behind my lot in the wetlands - maybe that will drain the swamp and minimize future flooding in my home
101	35, 36 - Proximity to rear of residences; placement of existing parcels rendering balance of property unbuildable/unusable due to large easement and aesthetic quality of land, and already existing easement of residential service
102	31 - This line segment shows coming through our land and too near our residence
103	3, 4, 6 - I have concerns about future property value decreases since the powerline would be the new view off my front porch. Like all the other property owners, I don't like the idea of a powerline running next to my property
104	4 - I changed my mind. Go ahead and put your lines behind my lot in the wetlands - maybe that will drain the swamp and minimize future flooding in my home
105	3, 4, 5, 6, 7 - Transmission line passes through Middle Creek and Amphibolite Slope which is significantly rare. Line passes through or very near Native Indian artifacts and burial mounds
106	24 - Already have two of your power lines on our property. A third line will adversely affect our ability to sell, or lease, our property for development. Ref. my letter
107	4, 5 - along the transmission line with the designated segment 15 the following applicable considerations are cited: buildings - the primary property livestock barn and additional horse barn are nearest to segment 15. The landowner made special provisions when the land was purchased to insure power lines were buried on the property so as to avoid any power lines above ground. Cemetery - a historical family cemetery lies alongside segment 15. Landmarks - a middle school and associated athletic fields border segment 15 and a future development of property by landowner will border the opposite side of segment 15. Property access and changes - segment 15 eliminates the homeowner access to home and property. The proposed transmission lines impact the property in additional locations at segment 16 so that two of four sides of the homeowner land are bordered with large transmission lines. Medical concerns - homeowner has a magnetized medical implant and a cardiac arrhythmia that precludes any activity near power lines of this magnitude. A 2007 article in the Internal Medicine Journal summarized a case control study of 854 patients and suggested an increased risk of lymphoproliferative and myeloproliferative disorders like lymphoma and leukemia with prolonged residence close to high voltage power lines, especially early in life
108	18 - it greatly devalues the land and I have considered building a house on this land and will not be able to do so or raise a family next to my parents if this happens
109	16 - same comment as Q61
110	16 - same comment as Q61
111	3, 4, 6 - these routes run through the property of our subdivision disturbing our quality of life, along with the disturbance and destruction of natural areas that closely surround the south end of our property. The area surrounding middle creek should be left undisturbed so that the current wildlife can be preserved. There are plenty of open fields and other designated utility right of ways that can be utilized
112	18 - Peele Road across from new home built 1 year ago and family farmland
113	16 - same comment as Q61

Questionnaire Number	Segment Number and Concerns from Questionnaires
114	16 - same comment as Q61
115	16 - same comment as Q61
116	16 - same comment as Q61
117	16 - same comment as Q61
118	16 - same comment as Q61
119	16 - same comment as Q61
120	16 - same comment as Q61
121	16 - same comment as Q61
122	16 - same comment as Q61
123	16 - proposal from Duke energy would in my opinion decrease property value as well as be an eyesore in our community. Thank you for your understanding. God Bless you all
124	16 - same comment as Q61
125	12, 15 - home value going down. Just built and moved into home in June 14th 2016 - we moved here loving the open fields
126	16 - proposed duke energy route 16 along steel bridge and little creek church road
127	16 - no comments
128	16 - no comments
Web1	Segment 1: I have concern about the disruption of Ms. Brownes working family farm that has been in her family for 130 years at 1000 Mclemore Rd. The placement of the powerlines and right of way would render it impossible for her to maintain certified organic status that took many years of planning and work to gain. Johnston county is already experiencing a tremendous loss of farmland being sold to developers and at a time when we need to maintain community infrastructure such as local farms, we should not be disrupting those farms that want to hang on and work them. This is also an organic farm that keeps the soil and land intact and practices best ecological practices and we surely need more of that, not less. This property also borders my property and I have concerns about impact it has on wildlife. My other concern is of the endangered species the wedge mussel which reside on that property and in nearby waterways.
Web2	Segment 16: We recently completed construction of our home and the right of way is within 130 feet of our home. The right of way completely encompasses our new barn. We are developing a site plan for potential residential development in an area the alignment will directly impact. There would be stream impacts on our property and a significant impact to wetlands and streams on the property south of us. Our view shed will be completely destroyed by this alignment not to mention hearing the annoying hum constantly. The alignment will significantly devalue our property and will make our property and future plans unmarketable.
Web3	Segment 32: This is the only segment that makes no forward progress. I don't understand why money would be spent and land disturbed for nothing (no forward progress). Runs along Sassarixa Swamp. This would disturb an area abundant with wildlife. This substation is needed as a result of out of control growth and poor planning in the western part of the county. I would have thought this would have been addressed during planning and route determined with developers giving easements for route. I feel the route should be Erwin-Milburnie or Lee-Milburnie. The route should go thru the western part of the county because that is who it will serve. The Erwin-Selma route will be at the cost of mostly lifelong residents and family farms that should not be disturbed because of western county poor planning. I live on a farm. I look out my back door and see pasture and woodland. Segment 32 would change this. It goes thru the middle of my farm. I would see transmission lines rather than woodland. Put the route in the western part of county that poor planning and growth has already ruined rather than ruining property of lifelong residents like me.
Web4	Segment 37: This line appears to be entirely too close to my residence
Web5	Segment 1
Web6	Segment 11: This will be within 100 ft of my house. I am concerned it being that close to our house. There is hundreds of undeveloped acres behind the house. Not sure why they have to come so close. It will hurt resale and value. Duke will need to reimburse for losses associated with this project.
Web7	Segment 1: This route runs within 100ft of our house. There is a concern for health and property value. There are plenty of undeveloped acreage that the route can be moved further back away from houses. Will duke reimburse for losses in values because it is so close. You should send someone out to see how close it will actually be.
Web8	Segment 16: Impacts our local farms and equestrian center as well as many residences. This route threatens the livelihood of these farmers and cattle ranchers.
Web9	Segment 5: Loss of property values, visibility of a transmission line, reduced woodlands area and health impacts Segment 6: Loss of property values, visibility of a transmission line, reduced woodlands area and health impacts Segment 7: Loss of property values, visibility of a transmission line, reduced woodlands area and health impacts Segment 16: Disruption and permanent affect to family farm land. It isn't just the transmission line but the creation of a permanent easement that would disrupt current and future use of this land. Possible maintenance of said lines could also cause damage to seasonal crops.
Web10	



Questionnaire Number	Segment Number and Concerns from Questionnaires
Web11	Segment 33  Segment 1: Current path directly and negatively impacts the accelerated growth of the area which has long ranging effects (even financially) to the county level. This can have a devastating impact on the market value of properties ( current and those in planning) which in turn effects the taxability, and hits the countys tax base. Segment 10: Current path directly and negatively impacts the accelerated growth of the area which has long ranging effects (even financially) to the county level. This can have a devastating impact on the market value of properties ( current and those in planning) which in turn effects the taxability, and hits the countys tax base. Segment 11: Current path directly and negatively impacts the accelerated growth of the area which has long ranging effects (even financially) to the county level. This can have a devastating impact on the market value of properties ( current and those in planning) which in turn effects the taxability, and hits the countys tax base. Segment 12: Current path directly and negatively impacts the accelerated growth of the area which has long ranging effects (even financially) to the county level. This can have a devastating impact on the market value of properties ( current and those in planning) which in turn effects the taxability, and hits the countys tax base. Segment 13: Current path directly and negatively impacts the accelerated growth of the area which has long ranging effects (even financially) to the county level. This can have a devastating impact on the market value of properties ( current and those in planning) which in turn effects the taxability, and hits the countys tax base.
Web12	
Web13	Segment 1: Negative impact on potential residential development Segment 9: Negative impact on potential residential development Segment 10: Negative impact on potential residential development Segment 11: Negative impact on potential residential development Segment 12: Negative impact on potential residential development Segment 13: Negative impact on potential residential development
Web14	Segment 2: I'm afraid the value of my home will decrease due to this segment being directly behind my home. My home is big investment and I don't want that to decrease. I'm afraid that my husband's defibrillator will be impacted by the EMF. I had cervical cancer and I'm afraid the EMF transmission will impact me with additional cancers. I think the wetlands behind our house will be directly impacted by the construction causing the potential for drainage issues. I'm concerned on the noise from the transmission line impacting my ability to live in the house.
Web15	Segment 5: Negative impact on property value, Negative impact on forest and creek (wetlands) Segment 6: Negative impact on property value, Negative impact on forest and creek (wetlands) Segment 7: Negative impact on property value, Negative impact on forest and creek (wetlands)
Web16	Segment 5: visibility of transmission line, reduced woodland, decreased property values and environmental impacts on wetland
Web17	Segment 1: Segment 1 would run through a certified Century Farm that is being farmed as *100% organically managed* , and that ability would be lost if the line went through. About 18 families are being supported by this farm, as well as support to farm-to-table restaurants. There are also environmental concerns, such as the the impact on Middle Creek, which is a sensitive wetland on the property. This wetland potentially contains the endangered dwarf wedge mussel. There are erosion issues as well.
Web18	Segment 1: The farm at 1000 McLemore Rd, Clayton NC 27520 also has environmental concerns, including the impact on Middle Creek, a sensitive wetland, which runs along the back of the property, which may contain the endangered dwarf wedge mussel and the whole property, which has been managed for wildlife by since 1996. Several of the fields are highly erodible and have been in the Conservation Reserve Program for the last twenty years. After twenty years of effort, the farm is *100% organically managed* now. Duke will want to use herbicides which would be prohibited for organic certification. The farm supports three farm families, one of which grows food for fifteen families with hopes to expand to double that. That's eighteen families that will be immediately affected, just on one property. There's no need to disrupt this property. Other options are less disruptive.
Web19	Segment 5: decreased property values, visibility of transmission line, loss of property, environmental impacts Segment 6: reduced woodland areas, health impacts Segment 7: safety for the many of children that live in our subdivision, noise coming from these lines, who will fix damages that will be done to our subdivision with the construction.....you know something will get damaged before work is completed
Web20	Segment 2: That line where proposed to be will ruin 50 acres of land

Segment Number and Concerns from Questionnaires	
<b>Web21</b>	Segment 1: Two Trees farm in Segment One, owned by Beth Browne at 1000 McLemore Rd, is a registered Century Farm, a significant historical site. It's been farmed in one family for over a hundred years, and represents a legacy of community agriculture quickly disappearing from the region. It's also a model of organic farming, supporting not only the owner, but two farmers and all of the families their crops support. The farm also contains sensitive wetlands, which contain endangered wildlife. Placing the pipeline through - or even near - these wetlands would cause irrevocable environmental harm. It would be irresponsible and unacceptable to place the pipeline in this location, and I am sure that with this information, you will undertake the necessary alterations to preserve this unique location.
<b>Web22</b>	Segment 4: too close to home Segment 5: too close to home Segment 6: same Segment 7: same
<b>Web23</b>	Segment 32: This proposal is 200 ft from the back of my home to the center of the right of way and 86 feet from the edge of the right of way to my property line. It was explained an additional 65 feet from the edge of the right away trees could be removed if a threat to the lines that only leave a 20 ft buffer that has a effect on the wood view from my home that was the biggest factor when purchasing my home. There are wetlands in that area with flowing water, where we have seen deer and box turtles. Being an oncology nurse I am particularly concerned of health issues with the close proximity of my house to the actual lines which will be less than 200 ft if the top of the structures are 36 feet wide. Looking at the other options there are clearly more direct routes than using segment 32.
<b>Web24</b>	Segment 18: Parcel # 4320432 is a family farm which has been in the same family for over 150 years. Value of land will be significantly decreased if above ground high voltage power line runs through it. Considerable concern regarding health risks of high voltage line near residential homes.
<b>Web25</b>	none
<b>Web26</b>	Segment 1: I am very concerned for our children's safety. These lines run within 150 either side of houses with kids. The proposed area is the kids play area. They play baseball, flying kites, down, shoot off rockets and toy helicopters and airplanes in the proposed area. The proposed lines are way to close to our houses. If you decide on this area, please consider moving them away from residential houses.
<b>Web27</b>	Segment 16: Impacts to our property will negate any current and future property plans. The proposed corridor directly impacts a new structure on our property. The proposed corridor is within 130' from my newly constructed home. We have major health concerns, not to mention the significant devaluation of our property.
<b>Web28</b>	Segment 6: 1. Segments 5,6,7 will significantly impact my home and land that I just purchased in July 2016. Shaun Palmer 2. Segments 5,6,7 will significantly impact with the forest and wetlands in and behind my property which is one of the main reasons I purchased my home. Shaun Palmer 3. Segments 5,6,7 will significantly impact the flood plain. I have photos of this area flooding 15 feet above the ground surface in October of 2016. Shaun Palmer 4. Segments 5,6,7 will significantly impact the biology in the area of Middle Creek and surrounding tributaries. Shaun Palmer 5. Segments 5,6,7 will require massive grade changes as this area is very hilly and steep within the surrounding area. The area is extremely "swampy" as well which is filled with wildlife. I would check the blue lines in this area as well for endangered species (i.e. salamanders).
<b>Web29</b>	Segment 6: Wet lands and a creek runs across the back of the property
<b>Web30</b>	Segment 16: We would like for segment 16 to not be considered as an option for a transmission line. We are very concerned about our property value, the long term effects to the wetlands, natural farm land and livestock that surround our home. We moved to this area because that natural beauty and would hate to see it tarnished by large power structures. It's a known fact that these lines drive property values down and discourage home buyers in the area in which they are put up. Please reconsider this segment as a viable option for a transmission route. It's also very troubling that Duke Power didn't notify homeowners/property owners in the areas in which these lines are being considered so we could have the opportunity to attend one of the meetings. We found out after the fact. This should be a community decision and homeowners/tax payers should have a say.
<b>Web31</b>	Segment 1: 30-as described above
<b>Web32</b>	Segment 32: Cuts at least 2 family farms in half!
<b>Web33</b>	Segment 32: Splits several family farms!!
<b>Web34</b>	Segment 32: Splits farmland in half
<b>Web35</b>	Segment 2: I recently received notice of the impact of this proposed 230 KV transmission transmission line within 500 feet of my home. I feel this proposal would cause great damage to the value of my home's worth and destroy the atmosphere of our peaceful/quiet neighborhood. As a homeowner as well as health reason this is unnecessary stress being made to me and others in Chadbourne impacting the value of our homes, lifestyle here at Chadbourne and our health. I am requesting Duke Energy to use another path for their planning/building of a 230 kv transmission line and not directly inside our community and wetlands where this is the habitat of in dangerous wildlife. In addition I have my home for sale and believe this proposal is impacting as this is something that is required to be expose to potential buyers. There is much open land in Johnson & Wake County that could be considered that would not be directly built in our backyards.

Questionnaire Number	Segment Number and Concerns from Questionnaires
<b>Web36</b>	<p>Segment 4: I have several concerns of the segment 4 proposed location. The proposed right away for this line encroaches within 10 -20 feet of my property line. Stripping the trees from this area would not only be an eyesore from my back yard but would likely reduce property values to below the purchase price from 2000 because of the loss scenery which was the selling point in the first place---no one could disturb the wetlands for any reason!! But the most pressing points of this proposal is the wetland status and the impact on flooding and wildlife loss.</p> <p>The area below me is habitat to not only hawks and owls but also to mink. Stripping tree cover from this area would impact the delicate balance forcing out the mink and removing song birds that depend on the tree shelters. In addition, this area floods after 2-3 inch rains to the west and northwest, partly the result of new subdivisions to the west that stripped all trees from the land bordering the wetland resulting in increased runoff not captured or slowed by the trees that were cut down. This flooding encroaches on all the properties on the western segment of segment 4 in Creekside Place subdivision by 30-40 feet. We have had instances where the flooding has threatened homes but the presence of trees both slowed the current to some degree and once the water receded the trees absorbed what was left in depressions along the route. Removal of these trees would be criminal by eliminating the absorption potential of the trees and ground cover resulting in a public health situation due to increased mosquito populations breeding in the stagnant pools that would be left after the trees are removed. In addition the flooding potential will increase putting all the properties at risk for building damage which we realized during Hurricane Matthew that flooded my crawl space but invaded 4 house below me with 10-20- inches of water in their living areas. Based on the misery that these people are facing any altering of the current wetland status would make these properties relatively worthless. It is my hope that Duke Energy is as concerned about preserving customers safety and security as we are.</p> <p>Segment 32: This proposed power line route would put this line very close to my house. I have 2 children and have alot of concerns for them. Also, it is highly possible that we will sell our property in the future and if the power lines were put near our property, this would very much cause our property values to decline. The property values are already lower in my neighborhood and this potential route could impact our property values even more and it is highly possible we would have a very difficult time selling our home with a power line almost in our backyard. I have already consulted a local realtor about this. Also, the public perception is that EMF transmitted from power lines can cause cancer. I have asked a few people what they think about power lines and they have said the same thing. We bought this house because of the quiet area and the farm behind our property and because there are no power lines or houses behind our property. Before we purchased our home, we looked at other homes and if any of the homes were near power lines I would not even consider buying the home. Please choose an alternate location. We do not want this power line put near our property. Thank you for your consideration.</p>
<b>Web37</b>	<b>Web38</b>
<b>Web39</b>	<p>Segment 19</p> <p>Segment 16: The view shed will be negatively impacted, land prices will depreciate with that negative view shed for us and the surrounding homes. There will be a disruption of a farming enterprise, decreased income and depreciated land values, negative visual appeal and lack of freedom to use the land as the owners wish in the future. When the work begins, the cattle and land management will be difficult at best for the farms whose land is involved in the project. At least two churches will be adversely impacted by the project as well.</p>
<b>Web40</b>	Segment 16: Close to my subdivision, even affecting some properties directly up the street from me.
<b>Web41</b>	Segment 16: Runs close to the subdivision. Concerns about home value dropping due to visual appeal. Too close to wetlands.
<b>Web42</b>	Segment 2: Close to my property and designated wetlands
<b>Web43</b>	Segment 5: Impacts residence and wetlands behind properties, home prices will be impacted, health impacts, visibility of transmission lines
<b>Web43</b>	Segment 6: Impacts residence and wetlands behind properties, home prices will be impacted, health impacts, visibility of transmission lines
<b>Web43</b>	Segment 7: Impacts residence and wetlands behind properties, home prices will be impacted, health impacts, visibility of transmission lines
<b>Web44</b>	Segment 2
<b>Web45</b>	Segment 1: 16- Where it crosses the corner of Little Creek Church Rd. is too close to Massey Farm Subdivision and in the center of a church playground.
<b>Web46</b>	Segment 5: Segment 6: Segment 7:
<b>Web47</b>	<p>Segment 5: Segments 5, 6, 7 are much too close to the Northern portion of our subdivision. Less than 500 feet to our homes is substantially unacceptable. We have very serious concerns about the adverse impact to property values to our homes, environmental degradation to area so close to our subdivision, very serious health concerns about having high power lines so close to our property. Clearly adverse psychological impact on residents due to having high power lines so close. We have all invested a substantial amount of time, money and effort to finding exactly the right neighborhood for our families, NOT in close proximity to high power lines. 500 feet or less to our homes is unacceptable, 5,000 feet would seem a more appropriate and reasonable proximity to residential areas. Respectfully request that this damage not be done to the home owners in the Northern portion of our subdivision.</p> <p>Segment 6: Please see our comments for Segment 5, they also apply for Segment 6.</p> <p>Segment 7: Please see our comments for Segment 5. They also apply for Segment 7.</p>

Segment Number and Concerns from Questionnaires	
<b>Web48</b>	Segment 16: This is going to be way to close to my property and impact my family's health- My little boys love to play outside in our back yard- we purchased our property to be far away from such high tension wires, we turned down several houses that had more upgrades than our own in order to be where we felt safe. These lines being put up so close to homes, going through some families back yards and through the church property is not only going to be physically unhealthy but also fiscally unhealthy. Our homes values in this neighborhood of Summerset place have just finally started to bounce back to being in the right value. Putting those lines will diminish the already low home values. I can't stress enough how this needs to be reworked running high tension lines through a neighborhood, farm and someones back yard is just irresponsible and reprehensible. I moved to the country to live in the country not to have wires staring me in the face from my back yard. You must find another way.
<b>Web49</b>	Segment 16 Segment 16: First, I know the Letersky family, who own the property at 100 Lee Road. It was their dream to have their horses and home on that acreage. The proposed line and right-of-way destroys the location where they are placing their home; the rest of the land is either not suitable for building (steep slope into the creek) or existing horse pasture with barns. My interest in stopping this route stems from the fact that I have a secure chicken run and coop in the way of the proposed right-of-way and moving the coop and run would entail some expense. I also live in Summerset Place (on Contender Drive) and I would prefer to look out into my back woods and not see power transmission lines towering over the trees, as would all of my 190+ neighbors. The reason we bought in the "country" was for the beautiful, natural "wooded" views and pasture-land.
<b>Web51</b>	Segment 1 none
<b>Web52</b>	none
<b>Web53</b>	none
<b>Web54</b>	Segment 16: Route 16 comes within close proximity of our subdivision. The view shed will be negatively impacted and with that comes the high probability that land prices will depreciate for us and the surrounding homes. There will be a disruption of the farming enterprise if you choose route 16. We have horse farms and cattle farms nearby that will all be negatively impacted by route 16. We purposely did not even consider buying any home that was in close proximity to structures like these that you will be constructing. There is also a church that will be negatively impacted by route 16. Decreased income and depreciated land values, negative visual appeal and lack of freedom to use the land as the owner wishes are all reasons that I ask you to remove route 16 from your project options. We specifically purchased our home because it was surrounded by beautiful farmland. There are farmers that have worked their entire lives to have and maintain their land. Their livelihood will be devastatingly impacted if you choose route 16. I appreciate your consideration in regards to my concerns and I thank you for taking the time to read them and I hope to hear back from you that route 16 is no longer a possibility. Thank you, Lisa Kuras
<b>Web55</b>	Segment 2: This segment passes over extremely sensitive wetlands and to use this route is pressed against neighborhood homes. Segment 5: This line will run through our neighbor's property and very close to our home. As a result our home values will be negatively affected and we have significant concerns about our health. This line will run within 400 feet of our home and pool. Segment 6: This line will run through our neighbor's property and very close to our home. As a result our home values will be negatively affected and we have significant concerns about our health. This line will run within 400 feet of our home and pool. Segment 7: This line will run through our neighbor's property and very close to our home. As a result our home values will be negatively affected and we have significant concerns about our health. This line will run within 400 feet of our home and pool.
<b>Web57</b>	Segment 11: Impact to property value, reducing and/or eliminating any future development opportunities. Parcel 4323286 Segment 12: Impact to property value, reducing and/or eliminating any future development opportunities. Parcel 4318489
<b>Web58</b>	
<b>Web59</b>	Segment 12: Segment 12 goes directly behind my property. I have 2 small children. I don't want them growing up anywhere near these power lines. It would also hurt the property value and resale value of our home. I don't want to look out my back window and see this everyday. Segment 12 would go directly through the middle of my Father in laws lot that he is trying to sell. This lot is directly beside my property. It would make it completely unsalable. It would go through the back of my neighbors lot. Their resale value will plummet. We have another lot in our subdivision, Creek View, that the owner is refusing to build until the route is announced. This leaves a vacant Lot. That's all you see when you drive in. We only have a 7 lot subdivision. It would completely ruin the resale value of all of our houses, not to mention the decrease in property value for the rest of the homes on this segment. There is a lot of families who have lived here a long time who did not ask for all of this growth. My husband and I don't feel we should have to pay the price for that. There are much shorter and more economic routes you can choose from. Please disqualify Segment 12. Segment 14: This segment goes through Swift Creek Nursery as well. It does not have as much impact as Segment 31 but it would still be a nuisance and we do not want it running through our nursery. Segment 31: Segment 31 goes directly through Helen and Lanny Thomas' business Swift Creek Nursery. They are my in-laws and both my husband and I work there. It would go straight through our Pot in Pot beds. There are hundreds of thousands of dollars invested in those plants. A lot of time and effort when into installing those beds. That is part of our livelihood. It would take a significant chunk of our sales to not have the large trees and shrubs that our customers buy and depend on a daily basis. Not to mention all the farmers surrounding us that depend on the land for their livelihood. Please disqualify this route.



Questionnaire Number	Segment Number and Concerns from Questionnaires
<b>Web60</b>	Segment 16: Route 16 should be avoided at all costs. The visual rural, agrarian nature of my and my neighbors surrounding property will be negatively impacted for a lifetime with a rippling financial effect on all land values in the surrounding properties. This will be disrupting our local farm, and is by far the worst route to choose. Please do not choose route 16. Thank you.
<b>Web61</b>	Segment 32: This segment runs directly adjacent to multiple residential subdivisions, decreasing property values of every house in the vicinity. Moving the line further south would avoid a significant number of homes and run mostly through farm and woodland.
<b>Web62</b>	Segment 16: The building and property of the Little Creek SDA Fellowship (along Steel Bridge and Little Creek Church Roads): Restriction of playground and activity areas on the property - making the versatility of the property and lessen it's use and property values; Due to either High-power line interference to member and/or visitor Medical devices (i.e., pacemakers, hearing aids, etc.); And/Or High-power Line interference/feedback to the Audio/Visual equipment used as an integral part of the Worship! Services!
<b>Web63</b>	Segment 16:
<b>Web64</b>	Segment 16: Horse farms, cattle farms and the extraordinary close proximity to houses that will reduce our property values and deface the rural picturesque land around us that we all moved here to enjoy.
<b>Web65</b>	Segment 5: My concern is with the amount of water that flows across the intersection of lines 5, 6 and 7, and the potential increase of flooding risks to the lower elevations. This intersection of 5, 6, 7 is located on the slope side of a ridge. Elevation ~ 270 ft. The slope starts at ~300 ft at the top and in less than 1 mile drops to under 200 ft into the surrounding creeks. The amount of water that sheds across our property is significant. It's not unusual to see a gushing flow through the culverts during a normal rains, and river rapid speed after severe storms. (Summer storms, Tropical Storms) I say all that to say this. The land grading required to put these lines in will remove a significant amount of stormwater flow buffering. This will allow the creeks to over flow their banks more frequently and thus have more flooding events. In addition the grading could also introduce new pathways for water to get off the ridge. Line #5 runs right by a solar panel farm that could be at an increased risk of flooding. Thank you for your consideration of this perspective Dustin Winkler Segment 6: See comment 5 Segment 7: See comment 5
<b>Web66</b>	Segment 16: The 100 plus acres of land on Steel Bridge Road, parcels 4362212, 4387344, owned by W.J. Woodard, Jr. has prime residential development potential. Working the land for 54 years has been an investment for our future. At age 74 long term care is a primary concern for both Mr. and Mrs. Woodard. This land is their security. The proposed high voltage line across the middle of this land would create permanent damage to the potential value of the property for residential development. The financial hardship would shackle the family for generations. There are many negative feeling for the project with our neighbors and family regarding the health effects, noise, appearance, land values and probable future encroachments on the easements by Duke Energy.
<b>Web67</b>	Segment 1:
<b>Web68</b>	Segment 1: All 39 segments would be affected by the new transmission lines in a negative way. Property values will decline, in addition to safety and environmental concerns for all property owners.
<b>Web69</b>	Segment 31: Segment 31 impacts numerous residential properties, one of which is my own, and alternative doesn't. I would be able to hear and see it from my porch, it is less than a football field from my front door. This is completely unacceptable, I moved to the property to have privacy and peace, a huge power line running through the middle on my property is not going to be peaceful. The construction process will take a while, all of which will be disruptive to me and my family. After it is completed, I will constantly see and hear it in my yard and possibly while inside my home. My property value will decrease significantly, making it impossible for me to sell my home and move due to the power line. We also planned to be able to farm the pines on the property and build a newer home in the future to accommodate our growing family. Furthermore, it is about 5% longer, less straight route than the alternative so it would cost more to construct.
<b>Web70</b>	Segment 5: Decreased property values Visibility of a transmission line Health Impacts Segment 6: Decreased property values Visibility of a transmission line Health Impacts Segment 7: Decreased property values Visibility of a transmission line Health Impacts



Questionnaire Number	Segment Number and Concerns from Questionnaires
Web71	Segment 31: Segment 31 impacts numerous residential properties, one of which is my own, and alternative doesn't. I would be able to hear and see it from my porch, it is less than a football field from my front door. This is completely unacceptable, I moved to the property to have privacy and peace, a huge power line running through the middle on my property is not going to be peaceful. The construction process will take a while, all of which will be disruptive to me and my family. After it is completed, I will constantly see and hear it in my yard and possibly while inside my home. My property value will decrease significantly, making it impossible for me to sell my home and move due to the power line. We also planned to be able to farm the pines on the property and build a newer home in the future to accommodate our growing family. Furthermore, it is about 5% longer, less straight route than the alternative so it would cost more to construct.
Web72	Segment 31: Additionally, we have mature hardwoods at the back of our property that are intrinsically valuable given their age. They provide a buffer between us and adjacent homeowners and provide habitat for various species, such as the Virginia Big-Eared Bat. Segment 31 would also bisect the second parcel I own, approximately in half. This area is planned for an effort to re-populate with bobwhite quail. The necessity of keeping the 125 foot cleared area essentially barren except for low grass will not be conducive to these plans. It appears that segment 31 could be shifted 1 mile east and would impact a smaller number of parcels along Crantock Road, most of which are currently undeveloped or recently cleared of lumber. We are opposed to segment 31 in the strongest possible terms.
Web73	Segment 16: Segment 16 is very close to residential areas and wooded area where children play. It also runs through land with horses and cattle.
Web74	Segment 16: I believe this is the one near my house.
Web75	
Web76	Segment 5: These three come together in my backyard. There is wetland there, a beautiful forest and trees that shelter our home. We bought this home because of this lot looking exactly as it is. The impact to our particular lot would be catastrophic to the view, our privacy, our way of living, our family's health and our property value . Segment 6: These three come together in my backyard. There is wetland there, a beautiful forest and trees that shelter our home. We bought this home because of this lot looking exactly as it is. The impact to our particular lot would be catastrophic to the view, our privacy, our way of living, our family's health and our property value . Segment 7: These three come together in my backyard. There is wetland there, a beautiful forest and trees that shelter our home. We bought this home because of this lot looking exactly as it is. The impact to our particular lot would be catastrophic to the view, our privacy, our way of living, our family's health and our property value .
Web77	Segment 1: Segment 31
Web78	Segment 1: Current design path bisects two large tracts at such angles that is very disruptive to the current uses (farming/residential) and future highest and best use. Segment 16: Route 16 & Norton Property Land owned by Damon and Jennifer Norton (primary residence 2634 Little Creek Church Road, Clayton NC) and multiple other properties owned around this area for the purpose of rental income. I am writing to voice opposition to Route 16 of the proposed transmission line through our community. The view around the area will be negatively impacted, land prices will depreciate. For us there will be a disruption of rental value and therefore our income and livelihood will be affected immediately and in the future. The decreased income and depreciated land values, negative visual appeal and lack of freedom to use the land as we might need. The negative impact for a lifetime with a rippling financial affect.
Web79	Segment 31: Runs through an active working farm field. Segment 32: Runs through an active working farm field. Segment 34: Runs through an active working farm field, runs directly adjacent to the old homestead, directly adjacent to a cemetery and is also adjacent to my 92 year old grandmothers home place. She has kept the farm intact and active for many decades.
Web80	Segment 31: Family Working Farm Segment 32: Family Working Farm Segment 34: Family Cemetery, Family Home place which has been there since 1800's, family working farm, and burial for Sassarixa Indians.
Web81	
Web82	Segment 1: #34 line goes through farm land and forest land which includes a brook of fresh water. Indians lived on this land due to the brook. The field behind the Johnson Homeplace was always a gold mine for arrowhead hunting.
Web83	Segment 16: The proposed segment 16 has arisen many concerns to not only affected property values but most importantly homeowner usage of said property.
Web84	Segment 16 will undoubtedly significantly decrease property values. Also it will prevent us landowners from being able to build in the future on our own property due to your lines and easement. Your proposed lines will cut in half land that has been apart of my family for 3 generations. and lastly there is a large concern for the static electricity that will be put off by the transmission lines that will cause many issues. These lines are not supposed to be this close to homes and we as affected landowners feel that there is a much better route to be taken maybe through existing industrial and commercial areas where land value will not be affected visually and monetary. There are few parts of Clayton left that are still in the rural community not affected by growth. help keep what of theses lands rural that we can.

Questionnaire Number	Segment Number and Concerns from Questionnaires
<b>Web85</b>	Segment 16: The proposed segment 16 has caused much concern and mental stress on affected landowners. Your transmission line is proposed to cut in half land that has been in my family for generations. With the obvious horrible visually impact set aside, your lines will cause tremendous decrease in property values. your easement severely limit us to future use of our land. Another very large concern we have is the impact on wildlife in the area. Here on Birchwood court we have a small amount of wildlife of which we are careful to protect and manage. your proposed line is the go through much of our small amount of woodland and we fear it will push what wildlife we do have, away. Static electricity put off by the lines is known to cause issues to cattle and is linked to birthing issuers. how will you reimburse us farmers for affect on our income we rely on from our cows and land? im sorry but no amount of money is worth a large transmission line through the middle of a 4 generation family land which we all hold sacred. i feel that there is a better route you can take through commercial areas such as 42 area. Leave us and our land alone we dont want your line or your easement.
<b>Web86</b>	Segment 31:
<b>Web87</b>	Segment 31: Segment 32: Segment 34:
<b>Web88</b>	Segment 31:
<b>Web89</b>	Segment 1: 4381062
<b>Web90</b>	
<b>Web91</b>	
<b>Web92</b>	Segment 4: This proposed line would cross my parents property which surrounds my property. We already have the main line running through our property and now have this proposed line running through it. We would have 2 main electric lines running less than 500 feet from our home. This would also decimate our property values and would basically cut off the backside of my parents property from road access. Why would the proposed power line not follow the property line instead of going straight through it? This is totally unacceptable. Surely, there are better options available. For example, would it not make sense to utilize Segment 7 which is practically a straight line to the main power line?









Question/Issue/Email Number	Segment Numbers associated with or assumed	Comment	Comment 2
Web50	none	The communication of this project was terrible. We found out about the November information sessions on the day of the second session. I asked Dave L. clerkly (owner of 100 Lee Road - a Granddaddy impacted property) and he said that they did not receive any notification of the project. They were approached by a neighbor down Steel Bridge Road. I also know the Grande family (150 Lee Road), who are also impacted, and they were not notified either. The failure to inform any landowner who could possibly be impacted does not show "good will" in my opinion. It appears more like you are trying to "slide" this project through without any "real" concern for the landowners. Bad form...My suggestion would be to send multiple mailings to each land owner with the potential to be impacted (that is what I assumed had happened), informing them of meetings/sessions/hearings and hold sessions in different weeks, not 2 days in a row (what if an impacted landowner was out of town that week?). There is a family cemetery on Lee Road (Porter Duncan Family Cemetery) at 261 Lee Road.	
Web51	none	Letters to property owners. Emails to property owners. More public meetings. Run the new lines beside existing routes, along the roads, in existing easements, bury them. Why build this line in the woods with difficult access. We do not want our property ruined with your power lines. My address doesn't show up on the survey map. Send mail info explaining exactly how this impacts my home/neighborhood.	
Web52 Web53	none 16	All subdivisions in the area should be notified. 500 ft notification is not acceptable when the structures will be 85 ft tall and stretch the entire length of the main entry road to the subdivision. New subdivisions that are being constructed should have the builders notified.	This route 16 is very close to our neighborhood and surrounding farm land. The depreciation of value in land and residences of surrounding area is unacceptable. We moved to the area recently away from power lines and do not want to even be close to the new transmission line. To know that we were not even considered, notified or spoken to is inconsiderate and again unacceptable. This line is going to impact many subdivisions in this area. We have been residents of Johnston County and the Cleveland area since 2001 and are very disappointed in how this new transmission line information has been hidden from the public to comment on. These are our homes, what we have invested in, you need to reroute # 16.
Web54	none	I believe that you should broaden the range of the people that you notify in regards to projects like this. To me, 500 feet of a structure is not a wide enough range. All people that are in the area of projected project locations should be notified and not just those that are within 500 feet. Unfortunately I did not find out about this until after the public meetings took place.	
Web55 Web56	none 5, 6, 7	More meetings, first ones were not publicly advertised. In the future, ALL homes in an affected subdivision should be notified. These type of projects affect all homes in the subdivision not just the ones within 500 feet of the lines. We have been in the area for 20 years and have been impacted by this project. We have been told that you do not pursue routes 5, 6 and 7 due to the impact on our neighborhood and the protected wetlands behind the subdivision. The property behind our home through which the lines will run are protected wetlands. It is an important consideration especially now due to the amount of building in our area. Preserving this wetland is necessary for the ecological balance in this area. Thank you for your consideration.	
Web57	11, 12	I need a better understanding of what impact these lines will have on future use of land. The two parcels I am concerned about belong to my mother (85 yrs old) and my father's estate. They are currently used for farming but the best, obvious future usage would be residential or commercial development. I am concerned that current routes 11 & 12 would be impacted. I have relayed this to my Attorney and an environmental group out of chapel hill nc. as a real estate broker and builder in this area for 25 years I'm sure this route would cut thru my property.	
Web58	none	There is no easement for this. I have relayed this to my Attorney and an environmental group out of chapel hill nc. as a real estate broker and builder in this area for 25 years I'm sure this would drop my property value. I have contacted several local appraisers who agree. Thanks donald lee white 120 breckenridge drive gamer nc 27529	
Web59	none	You should give a lot more notice of the public meetings. Many families had already made plans and were unable to come. You should give a couple months notice and then:	
Web60	none	Communication should be given for more of a radius than 500 feet from property.	
Web61	none	Please ask all business and/or public gathering properties to notify their customers, members well ahead of time - and to provide online and, for stakeholders without internet access proper documentation so they may discuss and notify you of their concerns well ahead of time before any deadlines are due.	
Web62	16	Thank You. This map does not make it clear what the three options actually are, but it looks like coming from the west would have the least impact on homes and roadways. Route 16 would destroy our country drive down Steel Bridge or Lee roads, which is one reason why we built out here in Summerseat Place. It appears that the lines from the northeast or southeast could maybe be completed without this link. Again, it is impossible for me to tell for sure what the three options really are.	
Web63 Web64	16	You already mail correspondence to all customers, why not include notification to those that may be impacted by this extremely controversial proposed route 16 project?	There is a family cemetery north east of Steel Bridge/Lee Rd intersection that is in the proposed Route 16 path
Web65	none	Door hangers on the affected neighbor hood.	
Web66	none	When mailing first letters, include road numbers, land marks etc. so people know where the line are proposed	
Web67	none	Our concern is the property value decrease of our home	
Web68	none	Direct mail and social media	Concern that there are properties such as buildings or other landmarks that could be historically important, but do not have specific
Web69 Web70	none none	I would have appreciated an actual phone call and conversation with someone that cared. Advertisements on TV and being reported by the local news would have been nice to inform the general public. Many of our neighbors are against this line as well now that they have been informed by others in the neighborhood. So much of the items that come through the mail are junk. I think this was easily trained by many customers. The meetings were not helpful as they would not answer questions.	
Web71	31	We would have appreciated an actual phone call and conversation with someone that cared. Advertisements on TV and being reported by the local news would have been nice to inform the general public. Many of our neighbors are not in favor of the lines after being informed by members of the neighborhood. So much of the items that come through the mail are junk, so I think this was easily trashed by many customers. The meetings were not helpful as they would not answer questions.	There is an old family home on my property that is currently used for storage, farm equipment, etcetera. While it is not a historic landmark, it is important to my family as it reminds us of the history of this land. We continue to use it for farm equipment and furniture storage. It would be destroyed by Segment 31.
Web72 Web73	none none	No recommendations. The letters and forums are necessary and much appreciated. Letters to homeowners/landowners and business owners impacted might be the most effective communication to ensure you're reaching all affected parties	
Web74 Web75 Web76 Web78	none none none 31	Send emails and continue to hold public meetings. Additional comments. No reply that the lines will be near my house. I really don't think what the people say will really have an impact on the final decision. Of course, the person(s) assigned to talk to the neighbors will try what they think people want to hear instead of the real truth. I understand money plays a big part in most decisions however I wish the power lines were underground. Jhhhh We were notified through mail, and were provided access to this website which I think was helpful and informative SEGMENT 31 To whom it may concern at Duke Energy, I currently live along your proposed Segment 31 and am writing to express my grave misgivings about this specific route. The location of Segment 31 would be extremely disruptive to the area and would cause a significant loss of property value and income for many of the residents in the area. I am writing to you to express my concerns and to request that you consider alternative routes run more along property borders, through less visible areas and through unused land. I urge you to avoid Segment 31.	
Web77 Web78	none 16	Sincerely, J. W. Strickland I have recently been retained. I have not been involved with the project long enough to offer suggestions.	
Web79	none	Land owned by Damon and Jennifer Norton (primary residence 2634 Little Creek Church Road, Clayton NC) and multiple other properties owned around this area for the purpose of rental income. I am writing to voice opposition to Route 16 of the proposed transmission line through our community. The view around the area will be negatively impacted, land prices will depreciate. For us there will be a disruption of rental value and therefore our income and livelihood will be affected immediately and in the future. The decreased income and depreciated land values, negative visual appeal and lack of freedom to use the land as we might need. The negative impact for a lifetime with a rippling financial affect.	This proposed line impacts the Johnson-Smith-Rouzer and Overman families. The proposed line impacts a working farm that dates back to the 1800s. The farm is still worked today and employs 50+ people during the peak season. My grandfather still lives in the house she and my grandfather built 60 years ago and it's just on the other side of the old homestead which is next to your proposed line. Your proposed line also goes through a wetland that was never deforested because it is a downstream outfall for the farms ponds and other upstream water. There is a cemetery just to the East of your proposed line.
Web80		I know that many folks on our line did not realize exactly what was involved or what you are attempting to do. I have heard, but not verified, that the attendance at the meetings was low which would be a tell-tell sign that something in the communication was not adequate.	



**Cleveland-Matthews Road 230kV Transmission Project**  
**Comments from Computer Stations at Public Workshop (November 16 and 17, 2016)**

Segment Number	Type	Comment	Owner
	Agricultural Lands	This land is cattle and horse, and the largest undeveloped parcels in the area. Carolina packers is held by stockholders. They are very against the building of any transmission lines on their properties.	Carolina Packers, Inc.
	Agricultural Lands	This land is cattle and horse, and the largest undeveloped parcels in the area. Carolina packers is held by stockholders. They are very against the building of any transmission lines on their properties.	Carolina Packers, Inc.
	Agricultural Lands	Restrictions on used of land for ag.	Mitchell Keith Holloway
	Agricultural Lands	One of these areas is an organic farm.	Scott E. Magyar
	Agricultural Lands	Opposed to route on farm land. Soy beans or tobacco	Robert Ransom Massengill, Jr.
	Archaeological and Historic Sites	This is marked as Sanctuary Land.	Mark A. Williams
	Cemeteries	This is an old cemetery.	Jimmy R. Cox
	Cemeteries	Old cemetery from 1800s located in this patch of woods.	Carol Owen Holloway
	Development Planned	This is an area that is currently being developed.	Scott E. Magyar
	Development Planned	Any future development is definitely impacted by a transmission line running through the middle of the property.	Janet Peele Moss
	Development Planned	This property is under contract to be developed.	Nancy D. Duty Revocable Trust
	Floodplains	This is a low-lying area.	Jimmy R. Cox
	Forests	This area has been under a family conservation plan and is a private forestry management. The forestry service is contracted to plant it and manage it over time. Owner brought in "An Inventory of Significant Natural Areas in Johnston County, North Carolina". October 2001. This comment is related to the General Comment directly north (just north of Segment 3).	Lola S. Delbridge
31	Forests	Mature hardwood forest that owners would like to preserve. Opposed to route segment 31.	Martin K. Williams
	General Comment	Outbuilding	N/A
	General Comment	The turns, with guy wires are not appealing at all on the Coats and Johnson family's lands.	Glenda Ellen Coats
	General Comment	Not a residence, former business	Gary Bass Johnson
17	General Comment	Opposed to route segment 17	Kevin L. Lee
	General Comment	Potential route adjustment.	Kevin L. Lee
35	General Comment	The old 301 dirt road is on the property. It's a historic road used for soldiers to march during American Revolution. Also used for other purposes. There is a ditch on the south side of the property. Does not want it built on the property, because it separates the land. Line 35 runs the length of the entire property from north to south. Would like a print out of the line on the property sent to his home address.	Mary K. Sumrell, Jesse K. Lassiter
17, 18	General Comment	Shooting lanes the west of the centerline. Strongly not in favor of the project on segment 17 or 18.	Robert Ransom Massengill, Jr.
	General Comment	The topography here is very steep. Neighbors are concerned about the access being on-way in and one-way out.	Shaun J. Palmer
	General Comment	This area is an area where recreational activities and hunting take place.	Terry Allen Parker, Sr.
	General Comment	Wondering about option being pushed slightly north. Since current route option is affecting property, could it be pushed north slightly	Tyler Price
	General Comment	TEST - COMMENT	James Keith Smith
	General Comment	Suggest moving the route segment further south.	Margaret E. White
	Levees	High-hazard dam-just rebuilt, with a 70ft emergency spillway near the south end of this line.	Terry Allen Parker, Sr.
	None	Property owners (Homeowners Association) concern with EMF	N/A
	None	approximately 8 houses to be platted on front of property with a septic system to serve those 8 houses. Soils are very soft.	N/A
	None	Also owned by Sherry Baker. Have home, shop, garden, land originally owned by Bessie & Gilbert Langdon. Family property. Owned property since 1986. Raise livestock	Dale Baker
	None	Crosses through creek, property wet along and adjacent to the creek-FEMA floodplain. Tree stands in the woods. Rear of property used for hunting. Proposed line is in close proximity to the pond.	David Marshall Barefoot, Jr. Life Estate
	None	Is not in favor of this proposed route. Too close to the property. Concerned with property value impacts.	Anthony Bolin
	None	Under contract for residential development.	Margaret Faye Britt
	None	Owned property since 1960s. Active farmland, daughter still lives on the property.	Louise L. Byrd Life Estate
	None	Under contract for residential development.	C Walter Byrd Revocable Trust
	None	Do not want - concerned with visual impact, property values, and EMF.	James Carter
	None	Proposed route is directly adjacent to property driveway.	Mary Ellen G. Causby
	None	Comment by Don Wells. We are in discussions with Cleveland Pop Warner Association to donate portions or all of these tracts for a practice facility and game field. I don't know if these lines would interfere with that facility, but it is much needed in Cleveland.	Cleveland Road 8969 LTD PTNRP
	None	These tracts are low-lying, and part of it is under water year-round (Southern end of the tracts). My main concern here is that the area between this proposed line and Middle Creek is the perfect location for a future reservoir to provide water to the surrounding areas. The location of the line may not be a problem, but a future reservoir should be considered.	Cleveland Road 8969 LTD PTNRP
	None	Bisects driveway and farmed fields. Proposed route is in front yard. At about 3.5 feet down, you reach an aquifer/muck (consistency of applesauce) at front of property.	Roger G Crickenberger
	None	Actively being farmed. Forestry Conservation Area. Proposed line in the front yard of the property. Family farm property.	Lola S. Delbridge
	None	Forestry conservation easement. Adjacent to Middle Creek. Existing lines adjacent to Route 50-why not follow the existing power lines?	Lola S. Delbridge
	None	I think this property is titled to Cleveland Road 8969 Limited Partnership, for which I am a general partner. This land is in the process of being developed by Wells Brothers, LLC. It will be future phases of Wellesley Subdivision, which has already begun on McLemore Road. The lots on the southern end, at a minimum, of this planned subdivision will be adversely affected by the power lines being in sight.	Don Wells
	None	Concerned with existing tree buffer, trees in excess of 100 feet. Creek on property within the tree buffer, turtles inhabit the creek. Concerned with proposed line crossing the driveway. Concerned with EMF. Would prefer for line to be along Crantock Road without impacting property. Concerned about property and house value. Future plans to divide property for children to build homes. Proposed line impacts those potential lots.	Jean Pierre Edery
	None	Proposed lines are over nursery planting, planted pines, and over pond. Would be more ideal to take line across open fields.	Edward Lanny Thomas Revocable Trust
	None	Farming business on property. Black Angus cattle in vicinity of the proposed line. Cows drink well water from waterers on property. Preference is for a different route to the east of Matthews Road and not in pasture land.	Elm Grove Farm Limited Partnership
	None	grading work already started. New home and shop going up on the property.	Thomas Ray Godwin
	None	Landowner owns business on the property to the south, but is potentially planning on adding to the north on current property.	Richard Ashley Gordon
	None	Drainage ditch along southern boundary with manmade drainage ditch on the other side of property line. Does not want line behind house. Concerned with property value and visual impact. Why not use the I-40 right of way for the proposed lines?	Gary D. Haas
	None	County planning to install sewer line 5 feet east of property line to the middle school. Line has already been flagged. Branch of creek in the area. Proposed line bisects front yard.	Helen Stephens Thomas Revocable Trust

Segment Number	Type	Comment	Owner
	None	Swamp south of property. Preference to not have this route chosen. Existing 220 line running parallel to Lakewood Road.	Charlie Jernigan
	None	Close proximity to the residential dwelling and driveway.	Benjamin Lee Johnson
	None	Wetlands in vicinity with dwarf wedge mussel in the swamp.	John C. Johnson III
	None	Family cemetery property - 15-20 grave sites. Proposed line is within 140-150 feet of the cemetery property line.	Randy W. Johnson
	None	Proposed line eliminates opportunity to divide property for children. Concerned with visual impact to existing dwelling. Proposed line cuts both pastures in half. Livestock in fields. Divides dwelling from barns. Concerns about driving tractor under powerlines back and forth from fields/pastures to barns. Drainage ditches through the woods to help with water flow. Concerned about drainage ditches being impacted.	Randy W. Johnson
	None	House on this lot, as well as the other lots along Wood Valley Dr. Do not want-concerned with property values, visual impact, EMF./	Lindsay N. Jones
	None	Swampy area/low area that does not drain adequately.	Herman Ray Lancaster
	None	Also owned by Linda Harper. Wetlands and swamp area, red fox, deer, lady slippers, northern portion of property never dry. Land owned by family since 1950s. Part of family farm, all of land of original family farm still owned by family.	Nickey A. Langdon
	None	Hardwoods on northern portion of property.	Larrick Family Trust
	None	Comment by Don Wells, of Wells Brothers, LLC. Wells Brothers has been in negotiation on this tract of land to add to the Wellesley Subdivision, the first phase of which is already being sold on McLemore Road. This proposed route would eliminate this tract completely from our consideration. In my opinion, this route would devalue this entire tract of land to near zero.	Elizabeth Booker Lawson
	None	Property is under contract to be sold and developed for commercial development. Proposed line cuts through middle of the property.	Little Creek Eleven LLC
	None	Recently platted subdivision	LMN Holdings II LLC
	None	Property designated for future development adjacent to recently developed residential subdivision.	LMN Holdings II LLC
	None	Endangered clam within Swift Creek Area. NC State studies	Thomas R. McDowell
	None	Concerned with loss of trees and privacy. Concerned for environmental impacts due to the swamp land adjacent to the property.	Ronald W. Moerbe
	None	Putting a cell tower on the property in the next week or so. Property is actively being farmed. Concerned with equipment coming onto property and destroying farmland.	Billy Ray Price
	None	Concerned with visual impact from new house. Too close to house. Concerned with EMF. Lived at house since 2009, do not want any change with additional power lines. Do not understand why it cannot be located in area without houses. Fields adjacent and across the street flood in rains. Front yard ponds during rain events. Why is it so close to house? Why could it not be farther west where there is less impact to a dwelling?	Timothy J. Purvis
	None	Concern about potential noise from the lines.	James B. Reed
	None	Comment by Don Wells. I am a member in RamsGate, LLC, which is developing these 2 tracts. The line here would cross over the open space for RamsGate Subdivision.	Richard D. Braswell Revocable Trust
	None	7563 Cleveland Road - physical address. Impacts the value of the farmland. Family property that has been passed down through generations. Would like to pass to children in the same manner that it was received. Main concern is line coming across the field.	Robert W. Barber Revocable Trust
	None	Barber Family Cemetery property.	Robert W. Barber Revocable Trust
	None	Property recently at the Planning Commission approved for residential development of about 50 houses.	Frederick Sanders
	None	Back of property floods.	James Allen Schoenholz
	None	Distribution line exists parallel to the existing transmission line. Adding a third line on the property unfairly impacts property owners and value of property. Proposed line bisects property. With new interstate being developed, property will be available for development. Having line through center of the property would preclude development options. Current transmission/distribution line easements encompass approximately 15 acres of the property. Property owners still have property tax responsibilities though the area of easements cannot be used. Wooded area has swamp and floodplain. Would prefer, if line must be in this area, that the line be moved southeast toward Swift Creek Road. There is an approved NCDOT project for US 70, including a feeder road. STIP Project W-5600 (approved Alternative 2A). US 70 will become I-42 in the future.	Francis Knox Toler
	None	Under contract for residential development. 3rd oldest home in County (1835) - great great grandfather built house. Only remaining mule barn in county, built in 1910.	Barry Phillip Tomlinson
	None	Under contract for residential development.	Barry Phillip Tomlinson
	None	Owner runs a hog operation on this property. Concerned with this and also possibly future development property.	George Clifford Uzzle III
	None	Been at residence for 27 years, house built 7 years ago, 18 years to groom property in current state. Wet area, year round natural spring. Flooded during Fran, Floyd, and Matthew. Concerned about property value for 2600 sf house, contemplating shop being built on the property. Pond fed by natural spring on the property inhabited by fish.	Melody B. Wallace
	None	Cuts farm in half, which would cause hardship for future development. Wetlands on property. 3rd generation family farm. Why did route not come to rear/southern portion of property and along sod farm property? This would definitely not impact existing residents as much.	Arthur William Watkins
	None	Old structure in the area of the right of way. Structure is in use for storage purposes. Would be destroyed by this proposed line.	Martin K. Williams
	None	Bisects property. Property owners opposed to the location of this proposed line.	Martin K. Williams
	None	Concerned with property values, how it will effect health, safety for kids and family, impact to only good view from property. A lot of residential impacts along this proposed route as opposed to directing the line along a different path. Worried about neighbor's organic farm, which is bisected by the proposed line. Concerned with potential for structures or lines to fall onto house or property. Concerned with removal of trees along route, which act as a wind barrier. Impact to property values, recently constructed an addition to the house. Endangered mussels in the pond and swamp in the vicinity and within the path of the proposed route.	Rebekah A. Williams
	Row width	Concern about additional portion of parcel that should be leased.	Beverly Holloway
	Recreational Areas	Creek used for kayaking and fishing	N/A
	Residences and Residential Use Areas	Plans to subdivide property, into 5-10 parcels, for horses. Also, two barns very close to the ROW. Near the school currently being constructed.	N/A
	Residences and Residential Use Areas	Concern regarding property values and visual impacts of new transmission. This is a new neighborhood. The setting for where we're living would be affected by the line.	N/A
	Residences and Residential Use Areas	Land has been subdivided and recently sold. McClellmore Farms.	Joe David Austin

Segment Number	Type	Comment	Owner
	Residences and Residential Use Areas	Parcel Owner Has Serious Concerns about Health and Children. Cancer in the family and child is the smallest living child ever born in North Carolina. His house and his property are the foundation of his family and what he holds close. When there is so much land north of here. Why does the line have to go so close to the neighborhood. Access would be very difficult as there is only one entrance for the entire neighborhood. It's just a lot.	Andrew Moses
	Residences and Residential Use Areas	Very opposed to option 30. Their property was purchased because of its rural location and view from the porch. Also, there is a small creek that runs behind their house. Has concerns about health impacts.	Betty & Rich Buschhorn
	Residences and Residential Use Areas	This property is currently under an estate disbursement. It may not even be available to be purchased or an easement because it affects the value of the estate.	Carolina Packers, Inc.
	Residences and Residential Use Areas	This property also owned by Jimmy Cox. Just wants the information known even though not relevant to the project.	Jimmy R. Cox
	Residences and Residential Use Areas	Running right through the front yard of the residence. This resident has lived on this land and inherited from the family. The house was built in 1923 and the resident was born in the house. They are the family that has established the conservation lands to the east (area comment) and the north (point comment.)	Lola S. Delbridge
	Residences and Residential Use Areas	Visual impact and the property value impact is not ideal. Opposed to this option. When the house was bought and moved to the area, the area was quiet and out in the country, but now the food lion and this option changes the feel of the area compared to when purchased.	Elizabeth D. Homberg
	Residences and Residential Use Areas	Hunting cabin and residence	Kevin Lee
	Residences and Residential Use Areas	This option would affect the home values greatly and compensation for the loss of value would be needed.	Raymond Lefrancois
	Residences and Residential Use Areas	The family does not want this line (Segment 18.) This option crosses the family farm, and it crosses the family farm that they have owned for 150 years. It crosses right in front of her parent's house as well. The potential health impacts are a serious concern from past family history of living under/near power lines. The property value decreasing is also a concern. The visual impact is an additional concern if it is so close and on their property.	Janet Peele Moss
	Residences and Residential Use Areas	14109 Hwy 50 Willow Springs, NC	Nancy D. Duty Revocable Trust
34	Residences and Residential Use Areas	The Parker family owns multiple tracts along option 34. They are very opposed to this option, and feel it affect their farms, their lakes/ponds, and homes.	Terry Allen Parker, Sr.
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34	Residences and Residential Use Areas	The Parker family owns multiple tracts along option 34. They are very opposed to this option, and feel it affect their farms, their lakes/ponds, and homes.	Terry Allen Parker, Sr.
	Residences and Residential Use Areas	Prefer to follow property line to the south, closer to hog farm.	Billy Thomas Parrish
	Residences and Residential Use Areas	Concerned about property value. Visual impacts of the proposed option.	Tyler Price
	Residences and Residential Use Areas	Mr. Rawlings is concerned why the ROW is so close to the property lines, when the other larger deemed non-developable, e.g. for commercial or residential purposes. Why not move the line further away impacting the same parcel owners it is affecting now.	David M. Rawlings
	Residences and Residential Use Areas	This is Mr. Waters driveway.	Wesley Waters
	Residences and Residential Use Areas	This is cleared land and now a house and outbuilding.	Wesley Waters
	Residences and Residential Use Areas	Concern about proximity to homes, prefer to move route segment further south to fewer homes. Concern about house prices and land values. Concern about impacts of the noise/use of satellite dish and causing interference.	Margaret E. White
	Residences and Residential Use Areas	Planned future development along the road for kids.	Lynda J. Williams Life Estate
	Residences and Residential Use Areas	Planning to purchase land to the west. Concern about land values and viability of using the land for development in the future. Limited availability for perc.	Lynda J. Williams Life Estate
	Residences and Residential Use Areas	Considering purchasing this as part of the other land purchase.	Lynda J. Williams Life Estate
	Residences and Residential Use Areas	This is a building.	Anthony Woodard
	Residences and Residential Use Areas	This is a building.	Anthony Woodard
	Residences and Residential Use Areas	Swimming pool	Anthony Woodard



Segment Number	Type	Comment	Owner
	Residences and Residential Use Areas	There is a house on this property also.	Anthony Woodard
	Streams, Waterbodies, other Drainages	Floods regularly.	Raymond Lefrancois
	Streams, Waterbodies, other Drainages	This area floods greatly. Official records were 77".	Raymond Lefrancois
	Streams, Waterbodies, other Drainages	This area floods after very large rains. Recent flood depth Mr Palmer recorded during Hurricane Matthew on 10/8/2016 was 16ft.	Shaun J. Palmer
	Streams, Waterbodies, other Drainages	There is a steep bluff (~20ft) down to the creek here.	Dennis W. Rogers
	Streams, Waterbodies, other Drainages	The topography through this area is very steep along the creek.	Arthur W. Watkins
	Streams, Waterbodies, other Drainages	Wetlands are located behind the property and NWI data is not represented.	Margaret E. White
	Streams, Waterbodies, other Drainages	water drains to pond	Martin K. Williams
	Wetlands	There is a stream and wetlands that run through this area. They are very opposed to this option for the route.	Jean Pierre Edery
	Wetlands	Riparian Barrier.	Rebekah A. Williams

## Construction of New Lines

Installing transmission structures and lines can be similar to a typical construction site, with numerous crews, trucks and other equipment. Generally, homeowners can anticipate skilled contractors and trade workers, who are subject to specific requirements, to work during daylight hours. We typically do not work during nighttime hours. A Duke Energy employee is assigned to each project as an inspector.

In deciding specific locations and types of structures, the company considers many factors including property boundaries, nearby roads, cultural and archaeological sites, terrain, potential environmental impacts and avoiding structures.

There may be lulls between the phases of activity, but in general homeowners can expect the following stages of construction:

### Surveying

Small survey crews will be on the site several times during the project.

### Clearing and Grading

Probably the most noticeable portion of construction is clearing and grading, which is the earliest step. The right of way (ROW) must be clear during the construction process. Workers also may build access roads during this phase.

### Foundations and Installing Structures

Homeowners can expect large trucks with drilling equipment or a concrete mixer in the right of way. The concrete is poured at the bottom of a deep hole to form the foundation. The structure materials arrive in sections and may be assembled on the ground before being installed.

### Stringing Lines

Trucks carrying large reels of conductor are typically used, with a winch to pull the conductor through. Linemen attach the wires to the structures. Later, crews install “ground rods” to the structures. Homeowners’ power is typically not affected when the line is energized.

For Additional information:

Email: [CarolinasEast@duke-energy.com](mailto:CarolinasEast@duke-energy.com)

Phone: 866-297-5886

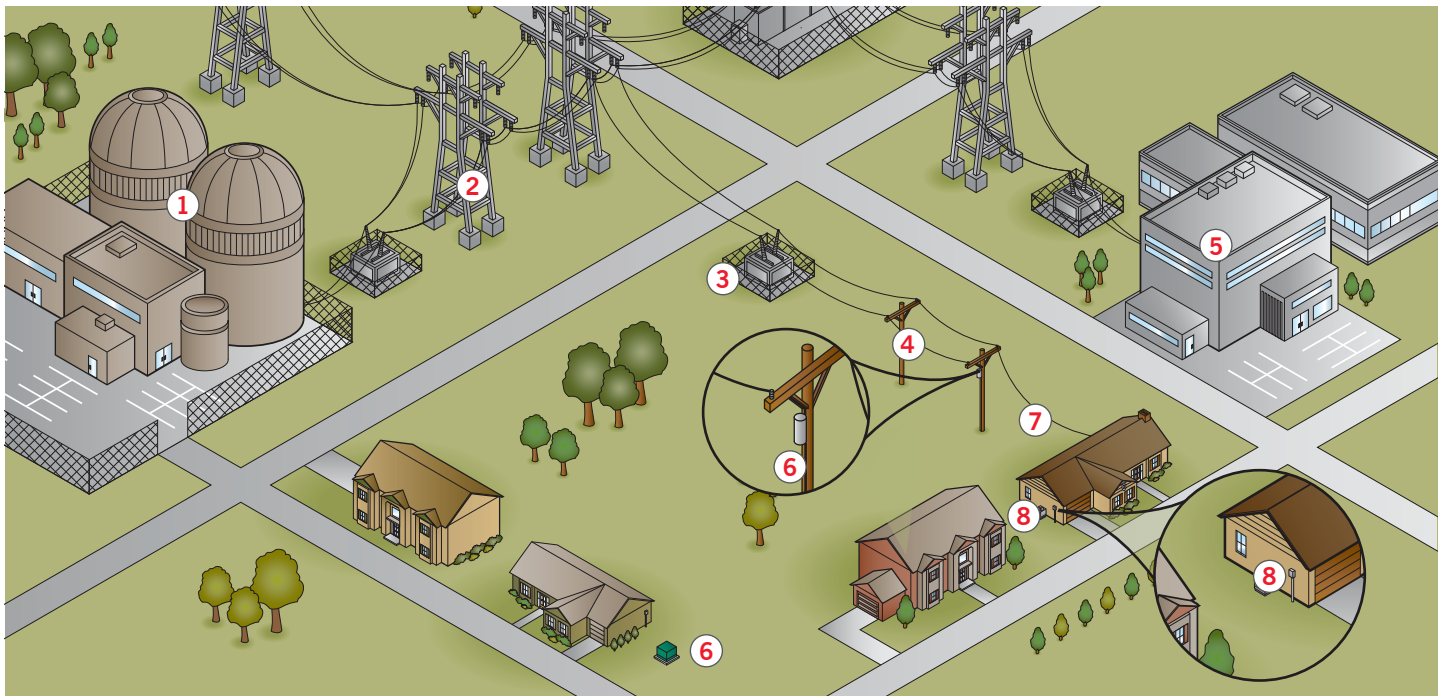
# Delivering Electricity to You

Understanding the Electric Delivery System



OFFICIAL COPY

Jul 14 2017



**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 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 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 44,000 volts to 525,000 volts, 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 ground or underground, carry between 4,000 and 25,000 volts 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.

### To report an outage, please call:

**North Carolina/South Carolina:** 800-POWERON (800-769-3766) or Español: 866-4APAGON (866-427-2466)

**Indiana:** 800-343-3525 | **Ohio/Kentucky:** 800-543-5599

### For more information:

Visit [duke-energy.com](http://duke-energy.com) | Follow us on [Twitter](https://twitter.com/DukeEnergyStorm) @DukeEnergyStorm | Like Duke Energy Storm on [Facebook](https://www.facebook.com/DukeEnergyStorm)

## Electric and Magnetic Fields

Duke Energy is committed to providing electric service safely for our customers and a safe working environment for our employees.

- The company funds, participates in and monitors research aimed at answering questions and addressing property owners' concerns about electric and magnetic fields (EMF).
- Electric fields are created by voltage present when an appliance remains plugged in, even when it is switched off. Magnetic fields, by contrast, only are present when electric current is flowing in wires, so if an appliance is switched off it will normally not create magnetic fields.
- Extremely low-frequency electric and magnetic fields are all around us – not just in power lines, but also in electrical wiring in buildings, electric motors and appliances, TVs, computers, hair dryers, etc.
- Proximity to an electric device is often more a factor in the strength of the magnetic field than the size of the device.
- Numerous studies have been conducted over the past 30 years in an attempt to determine whether an association exists between exposure to magnetic fields and human health.
- There have been studies that pointed to some association between EMF and human health, and others that found no association at all. Association does not mean cause and effect.
- Virtually all laboratory studies on animals and cells have failed to establish a consistent association between EMF and human health.
- International Agency for Research on Cancer (IARC) states: "All known human carcinogens that have been studied adequately for carcinogenicity in experimental animals have produced positive results in one or more animal species." No positive results (causing animal cancers) have been found from magnetic fields exposure.
- An EMF report, completed by the National Institute of Environmental Health Sciences to the U.S. Congress, states, "The lack of connection between the human data and the experimental data (animal and mechanistic) severely complicates the interpretation of these results." Given the limitations of current scientific knowledge, we are not able to determine the potential effect of EMF on human health.

## Miscellaneous Related Topics

### General Public Exposure Limits for Power Frequency Fields

Organization	Magnetic field (gauss)*	Electric field (kV/m)
ICNIRP	2.0	4.2 (60Hz)/5.0 (50Hz)
IEEE	9.1	5.0 (10.0 on ROW)

\*One Gauss = 1000 milli-Gauss (mG)

## EHS

**Electromagnetic Hypersensitivity (EHS):** Some individuals experience a wide range of nonspecific symptoms such as headaches and sleep disturbance that can be quite debilitating, which they ascribe to EMF exposure. Further, some of these individuals believe that they can sense the presence of high fields, which trigger symptoms. The consensus of the scientific community is that while some of these individuals clearly have health conditions and may react to factors in their environment, their symptoms are not related to EMF. This conclusion is based mostly on carefully conducted tests in the laboratory in which individuals self-identified as EHS cannot reliably detect the presence of fields, and their symptoms cannot be attributed to EMF. Several studies have indicated that the observed effects may be caused by an expectation that something harmful is going to happen. In light of the fact that an EMF basis for these individuals' conditions has not been observed, the condition has more recently been labeled "Idiopathic Environmental Intolerance Attributed to Electromagnetic Fields."

## Implanted Devices

**Pacemakers and Other Medical Devices:** Cardiac pacemakers and defibrillators are the most commonly implanted medical devices, and research has indicated that they may be susceptible to interference under certain high field conditions. The sensitivity of these devices depends on the manufacturer, design and how they are used by a patient. Metallic case shielding, internal circuits, filters and bipolar sensing have contributed to improved immunity to interference, and in practice, interference is very rare. Many other medical assist devices are now deployed in patients, such as insulin pumps and brain stimulators, but interference to them from power frequency fields has not been addressed. International product standards generally call for implanted medical devices to maintain immunity to power frequency magnetic fields of 1 gauss (G) and 5 kV/m.

## Studies on People Exposed to Higher Than Normal Fields

**Occupational Studies:** Studies of workers can offer a useful opportunity to examine environmental EMF exposures at higher levels than occur in residential settings. Many occupational studies of electrical workers and others exposed to higher magnetic fields have examined both cancer and other diseases. Overall, the occupational studies do not support a link between magnetic fields exposure and any form of cancer or other adverse effects.

## Cancer Clusters

**Cancer Clusters:** When several cancers occur close in time and space – that is, in a cluster such as in a given school – people seek a reason. At times, EMF has been thought to be a possible culprit. Most often, upon further investigation, no actual cancer cluster is identified. The perception of a cluster arises partly because people do not always understand how common cancer is. In industrialized countries, one in 2-3 people will develop some type of cancer during their lifetimes. Cancer clusters can and do occur by chance, but distinguishing a chance occurrence from an occurrence with a common cause is difficult. As a result, cancer cluster investigations are rarely productive, and none have linked a cancer cluster to magnetic field exposure.

For Additional information:

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# EMF

## WHAT ARE ELECTRIC AND MAGNETIC FIELDS?

All of us depend on electricity on a daily basis. We rely on electricity to meet basic needs such as heating, cooling and lighting our homes. And we depend on electricity to meet the transportation, communication and industrial requirements of a modern society.



Electric and magnetic fields, often collectively referred to as EMF, are natural occurrences as a result of our use of

electricity. Wherever an electric current is present, fields of magnetic force occur.

For example, the earth has a large magnetic field which makes compass needles point north, and the human body generates its own electric current which is necessary for life.

Because electricity is so common in daily life today, most of us are in contact with electric and magnetic fields virtually all of the time. Examples include home wiring, cars, water pipes, kitchen appliances, televisions, computers, hair dryers, electric clocks and utility power lines.

### HOW DO THESE FIELDS BEHAVE?

#### Electric Fields

Electric fields are created by voltage. The higher the voltage, the stronger the electric fields. You will find an electric field near any electrical appliance that is plugged in, even if it is not operating. Electric fields are strongest closest to their source.

#### Magnetic Fields

Magnetic fields are created by current or electricity flowing through a wire. Magnetic field strength increases with

current, so you will find a stronger magnetic field near an appliance when it runs on “high” than when it runs on “low.” An appliance must be plugged in and operating to create a magnetic field. Magnetic fields are also strongest close to their source.

### WHERE MIGHT I FIND ELECTRIC AND MAGNETIC FIELDS?

Electric and magnetic fields are found everywhere electricity is used, such as personal computer terminals, televisions and other household appliances. The magnetic fields are measured in milligauss. Magnetic fields associated with appliances are typically stronger than those fields found near power lines.

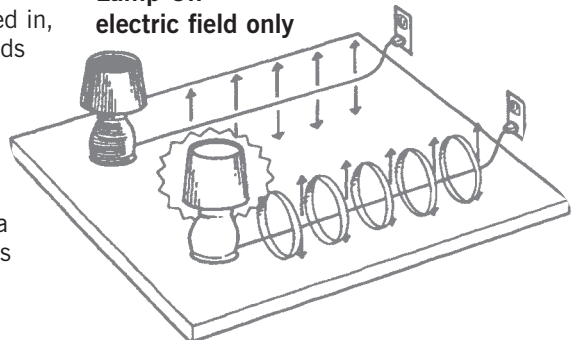
### CAN THESE FIELDS BE BLOCKED?

Electric fields can be blocked by most objects such as trees, the ground, buildings and other objects. However, magnetic fields pass through most objects. This is one reason why burying power lines will not necessarily eliminate magnetic fields.

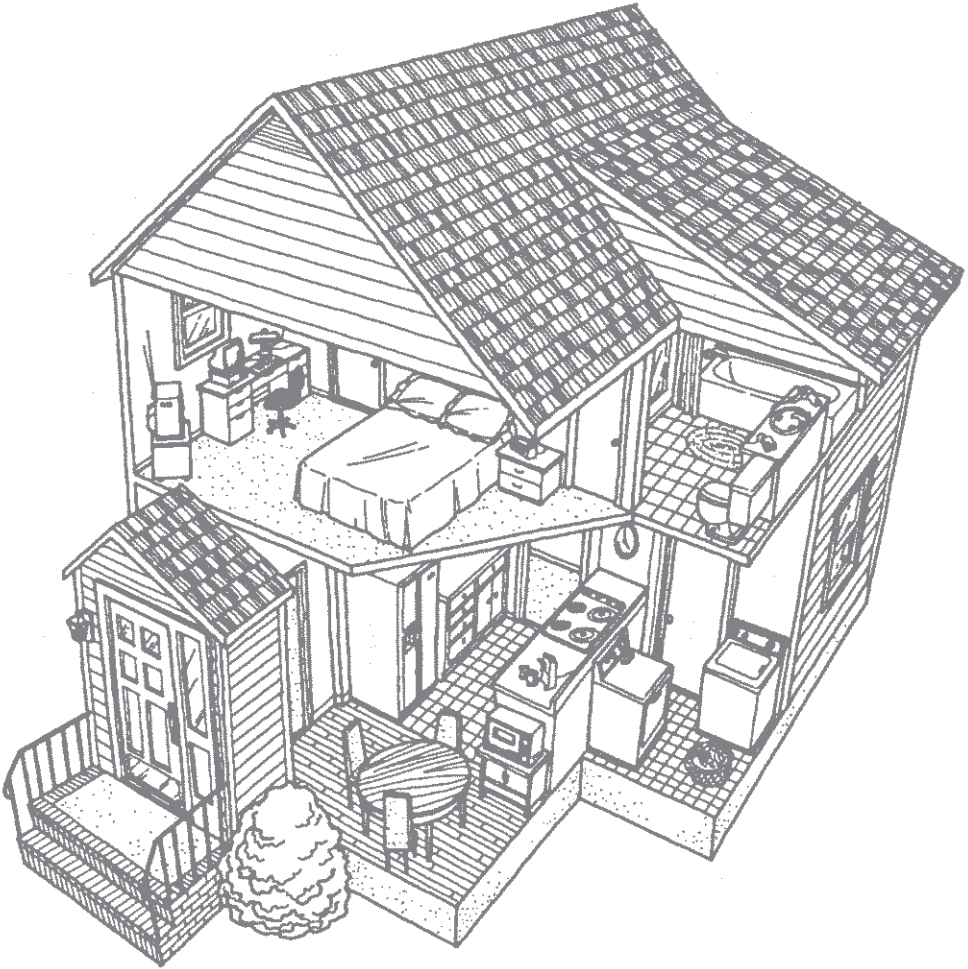
### HOW DO YOU MEASURE THESE FIELDS?

The strength of electric and magnetic fields can be measured with special instruments. Electric fields are measured in units of volts per meter (abbreviated V/m) with an electric field strength

Lamp Off —  
electric field only



Lamp On —  
electric & magnetic fields



**TYPICAL MAGNETIC FIELD READINGS**

Typical 60 hertz magnetic fields measured at various distances.  
Magnetic fields are measured in milligauss (mG).

Typical items in the home	1 inch	1 foot	3 feet	Maximum
Microwave oven	140.0	65.0	10.0	2,000
Refrigerator	6.0	4.0	1.2	15
Electric range	250.0	25.0	2.0	2,000
Electric razor	500.0	–	–	15,000
Hair dryer	100.0	30.0	–	20,000
Electric can opener	5000.0	470.0	24.0	30,000
Computer terminal/TV	26.0	3.4	1.2	500
Electric clock	130.0	15.5	2.5	900

meter. Magnetic fields are measured in units of milligauss, (abbreviated mG) with a gaussmeter. Most scientific research and public issues have focused on measuring magnetic fields. Therefore, we will be referring more frequently to magnetic fields.

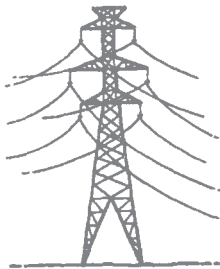
The electric field's strength is determined by the "push" – or voltage – necessary to make the electricity move. The higher the voltage, the greater the field produced. Current does not have to be flowing in an object for an electric field to exist. Thus, a stereo or toaster that is plugged in, but not operating, may still produce an electric field.

The amount of electric current flowing through a wire determines the strength of the magnetic field. Just as a magnet loses the ability to attract as it is moved away from an object, the magnetic field decreases as you move away from the source. Anything that has electricity flowing through it produces a magnetic field.

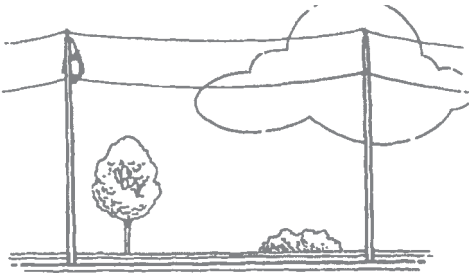
**Fields Decrease with Distance**

EMF levels are higher close to their source and drop off rapidly with distance. This is one reason why you may measure stronger levels of EMFs from certain home appliances than from nearby power lines.

**Typical Transmission Line**



**Typical Distribution Line**



**TYPICAL MAGNETIC FIELD READINGS**

Typical 60 hertz magnetic fields measured at various distances.  
Magnetic fields are measured in milligauss (mG).

Transmission lines*	Under line	Edge of right of way	50 ft. from edge
44kV	1.0 - 25.0	0.2 - 2.5	0.1 - 1.0
100kV	2.1 - 19.3	0.6 - 3.4	0.3 - 1.9
230kV	4.5 - 29	1.9 - 6.4	1.0 - 3.5
525kV	17 - 40	6 - 15	2.4 - 4.0
Distribution lines*	0.1 - 35		

Substation – Magnetic fields from the equipment in a substation, measured at the fence, are generally negligible. However, readings at the fence can reflect the magnetic fields from the power lines entering and exiting the substation and generally do not exceed readings in this table for distribution lines.

\*These are typical readings under normal operating conditions at moderate load.

## WHAT DO THESE MEASUREMENTS REALLY MEAN?

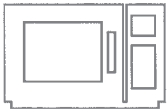
Although new technology has made it easier to measure EMFs, it is still very difficult to relate these measurements to human exposure. Measurements vary from moment to moment, depending on the current flow, the type of appliance and a person's position in relation to the source of the fields.

Interpreting measurements and setting guidelines for exposure levels are difficult, and there is still no consensus as to any health effects resulting from EMFs, let alone whether such effects are related to stronger or weaker fields. It's also not clear whether brief, high level fields from appliances such as hair dryers have more impact than continuous low-level fields from power lines, wiring or other sources.

## ARE EMFs LIKE MICROWAVES AND X-RAYS?

No, they are not the same although they are all forms of electromagnetic energy.

EMFs from 60 Hertz electric utility power do not have the energy of higher frequency



EMFs such as microwaves that can heat substances or x-rays that can break apart molecules.

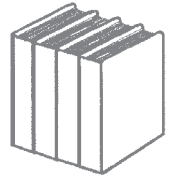
When you use a microwave oven, the energy passes through materials containing water, converting the energy to heat energy. This heat is absorbed by the materials making your food or liquid hot.

X-rays are much stronger. The energy in X-rays is strong enough to break apart the molecules that contain genes. Excessive X-ray exposure can lead to mutations and cancer. While X-ray exposure has its risks,

so do the conditions that X-rays are meant to diagnose. This is why you and your doctor should make careful judgments about when you have X-rays taken. EMFs do not have enough energy to break apart molecules like X-rays do. And although EMFs can cause heating in substances, this heat is barely detectable. Normally occurring temperature changes in human cells are greater than the temperature changes EMFs can produce. Some laboratory studies have suggested EMFs may produce small changes in human cells. These changes are yet to be understood.

## WHAT KIND OF RESEARCH HAS BEEN DONE?

Two types of studies are being done: laboratory studies and epidemiology studies. Millions of dollars are being spent worldwide on EMF research and more conclusive information is expected in the next few years. To be able to put research results in perspective, it is helpful to understand the strengths and weaknesses of each type of study.



Laboratory studies primarily involve exposing cells, tissues and animals to either electric or magnetic fields under a variety of controlled conditions. These studies allow research to closely control exposure to EMF and provide information about the small-scale changes EMFs may cause. Most emphasis to date focuses on the changes caused by magnetic fields. However, laboratory studies have not shown how or if these changes affect human health. Nor have they been able to precisely duplicate the types of EMF exposures that people experience throughout the day.

In EMF epidemiological studies, researchers try to establish whether there is a statistical association between selected groups of people with certain types of EMF exposure and certain kinds



of disease. However, these types of studies cannot establish a clear cause-and-effect relationship between EMFs and disease. This is because real-life studies cannot rule out other possible explanations for health effects – such as diet and lifestyle – and because it is difficult to discover what past exposures to EMFs and other factors have been.

### **WHAT DO YOU MEAN BY “ASSOCIATION?”**

Some studies have suggested an “association” between EMF and some types of cancer. An association is different from a “cause and effect.” Association means that two or more events can be joined or linked together. This linking of events does not necessarily mean that the association is valid. Cause and effect means that if one event occurs (cause) another event (effect) will occur a percentage of the time.

The most common analogy of an association is this:

**ASSOCIATION:** A rooster crowing in the morning will cause the air temperature to rise several hours later.

There is strong statistical association between a rooster crowing and the air temperature rising. We know that this occurs a very high percentage of the time. However, the association, while statistically linked, is incorrect. Therefore, there is NOT a cause and effect.

The sun rising (cause) is the common event that results in the air temperature (effect), not the rooster crowing.



Some studies thus far have tied a slight association to EMF and cancer. No common cause has been directly related to the effect.

Scientists are trained to sort out true causes from observed associations such as

that above. This is especially important in the EMF research now under way.

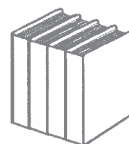
### **HAVE THERE BEEN RECENT STUDIES ON EMF?**

Some laboratory studies have suggested that EMFs may cause small, sometimes reversible changes in cell reproductions, rhythms, communication and growth. Research is being done to confirm these results and to determine how these changes occur and whether they have implications for human health.



### **WHAT ABOUT STUDIES OF PEOPLE, PARTICULARLY STUDIES INVOLVING CANCER?**

Much attention has focused on the incidence of cancer among people living or working near electric and magnetic fields. Researchers in Colorado, Washington, Rhode Island, England, Canada, Denmark and Sweden have completed studies on the statistical incidence of cancer. Some suggest a possible relationship between cancer and the proximity of outdoor power lines; the others found no such relationship. However, none of the researchers found a direct link between actual EMF exposure and cancer incidence. Studies of people who work around electric equipment also have been inconclusive. Some studies suggest that electric and telephone lineworkers, electricians and aluminum workers have a slightly higher risk of cancer while other studies find no evidence of increased risk.



## ***HAVE ANY OF THE LABORATORY, CHILDHOOD OR OCCUPATIONAL STUDIES ESTABLISHED A CAUSE AND EFFECT RELATIONSHIP BETWEEN EMF AND CANCER?***

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No.

The researchers would like to find a way to separate other factors such as exposure to heavy traffic, air pollution or chemicals that might play a role in increased cancer rates reported in EMF epidemiological studies. For instance, workers exposed to EMFs may also be exposed on the job to chemicals that could cause cancer. Study findings may also be due to the small sizes of the groups studied.

## ***ARE THERE HARMFUL HEALTH EFFECTS?***

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The use of electricity has increased greatly in the last 40 years, but there has been no corresponding significant increase in childhood leukemia or any of the other cancers suggested by epidemiological studies. The consensus among health professionals and scientists studying the issue is that no firm conclusions can be drawn. Based on this fact, and on the research to date, some researchers believe that if EMFs are shown to cause health effects, the risk of these effects will probably be comparatively small.

## ***Voluntary risks are more accepted.***

Individuals will typically accept great risks that they choose for themselves if they think that related benefits are worth it, but still reject even the slightest risks they feel are imposed on them. For example, more than 3 million people are killed or injured in motor vehicle accidents each year – but people continue to drive. Although the risks related to EMFs remain unproven, people may be unwilling to accept those risks because they believe that their exposure is not a matter of choice.

## ***Deciding what is right for you.***

We all face risks in life all the time and probably have our own ways of determining what actions are sensible. Do you always spend the extra time it takes to buckle your seatbelt? How much time and money do you invest in fire safety around your home? Like these decisions, the EMF issue requires that we gather information, weigh the risks and do what makes the most sense to us. The aim of Duke Energy is to provide you with the information you need to make that informed decision.

Several states have set guidelines for power line design and location. But because there is no consensus on the issue, most states and regulatory agencies recommend that further study occur before health-based standards are set – or high expenditures are made – to limit EMF levels from power lines and electrical equipment. In the absence of widespread government standards, it becomes a matter of personal responsibility to weigh the potential risks associated with EMFs and to determine your response.

## ***PUBLIC CONCERN***

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In the early 1970s, public concern began to surface over possible health effects associated with electric and magnetic fields. Since then, hundreds of studies have been completed or are under way. Many of the studies have dealt specifically with magnetic fields that exist around appliances or power lines.

To date, none of these studies have shown a cause and effect relationship between EMF and human health.

The weight of reliable evidence suggests that long-term risk to public health – if it exists at all – appears to be very small. According to a number of science and health experts researching the issue,

including panels convened by the World Health Organization, the National Academy of Sciences and the American Institute of Biological Sciences, there exists no persuasive scientific evidence that electric and magnetic fields can lead to public health problems.

### ***Duke Energy's Commitment to Health and Safety***

**Our mission is to provide our customers with safe, reliable, cost-effective electric service.**

At Duke Energy, one of our top priorities is the health and safety of our customers and employees. We continue to follow ongoing research surrounding electric and magnetic fields (EMFs) and are strongly committed to understanding the scientific facts about EMF and human health.

Hundreds of studies have been generated since the early 1970s. These studies show some inconsistencies in their findings. Scientists continue working diligently and openly to understand the effects of these fields. Our hope is that these studies will resolve the inconsistencies and provide a basis for informed decisions.

Additional research on this complex subject is needed. We also recognize the need to continue developing reliable information on the subject so that responsible, informed decisions can be made. Duke Energy will continue to fund and support a vigorous research effort in conjunction with other electric utilities and research institutions. By participating in and monitoring the results of future studies, Duke Energy will keep abreast of developments and be in a position to provide objective, timely information to you. If this research shows a need to alter our procedures, we will take the steps necessary to continue safe delivery of electricity.

Duke Energy also makes a yearly financial contribution to the Electric Power Research Institute (EPRI), which funds about 40 percent of the world's EMF research. We have joined with other leading energy companies in supporting federal funding with the expectation that those dollars will help speed up the research process.

If you have questions about EMF, call your local Duke Energy office and someone will put you in touch with the EMF contact.



## Environmental Stewardship

At Duke Energy, we are committed to protecting and responsibly managing natural resources. We feel this is essential in contributing to a cleaner environment and the quality of life in the communities we serve.

As part of the development of any transmission project, Duke Energy consults with the *United States Fish & Wildlife Service, the United States Army Corps of Engineers, the North Carolina Wildlife Resources Commission, North Carolina Department of Environment and Natural Resources, including the NC Division of Water Resources and the NC Division of Land Quality, and the NC Natural Heritage Program.*

Overhead transmission lines can be sited and built to span many environmentally sensitive areas without directly impacting them. For example, overhead transmission lines are able to span streams, rivers and wetlands, although streams and wetlands are avoided as much as possible to ensure these environments are not disturbed during construction and operation.

Duke Energy also surveys the right-of-way areas for rare plant species and avoids areas where these grow. Employees follow the optimal survey window for North Carolina's federally threatened and endangered plant species.

Our employees developed a successful assessment process to identify and protect endangered species and their habitats including the bald eagle, American alligator, red knot, red-cockaded woodpecker, Bachman's sparrow, Eastern painted bunting, mimic glass lizard, Carolina gopher frog, southern hognose snake, and the piping plover in Eastern North Carolina.

Duke Energy complies with all applicable federal, state and local laws and regulations, and company policies and procedures.

Duke Energy supports community efforts in environmental education, protection and conservation and engages in partnerships that address common issues and promote sound public policy.

For Additional information:

Email: [CarolinasEast@duke-energy.com](mailto:CarolinasEast@duke-energy.com)

Phone: 866-297-5886

# Environmental Responsibility



Environmental responsibility is a core value of Duke Energy. We are committed to excellence in our environmental practices and performance. The company acknowledges our responsibility to be a good steward of the natural resources entrusted to our care while providing affordable and reliable energy to our customers.

Environmental factors will be an integral part of planning, design, construction and operational decisions. Further, we will conduct business according to the following principles:

## **Compliance**

Comply with local, state and federal environmental laws and regulations.

## **Performance Accountability**

Maintain an environmental management system, including the use of objectives and goals to measure, track, drive and continually improve performance.

## **Minimizing Impacts**

Effectively manage waste and promote the prevention of pollution. Take appropriate measures to prevent environmental degradation and be prepared to act effectively in the event of an environmental emergency.

## **Stewardship and Transparency**

Proactively address environmental issues and find innovative solutions to protect and improve the environment. Communicate environmental performance to stakeholders and support effective community efforts in environmental education, protection and conservation.

## **Management and Employee Commitment**

Assure that employees and contractors are aware of their individual role in implementing this policy.



## Maintenance and Use of Rights of Way (ROW)

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

- In some cases, Duke Energy purchases right-of-way (ROW) 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. We encourage uses that are safe for the public and our employees and uses 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.
- 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 (ROW)**

- 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 or 15 feet at maturity (depending on area).
- Trees with branches that grow into the right 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 right 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.

For Additional information:

Email: [CarolinasEast@duke-energy.com](mailto:CarolinasEast@duke-energy.com)

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[www.duke-energy.com/CarolinasEastProjects](http://www.duke-energy.com/CarolinasEastProjects)  
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410 South Wilmington Street | NC3  
Raleigh, NC 27601

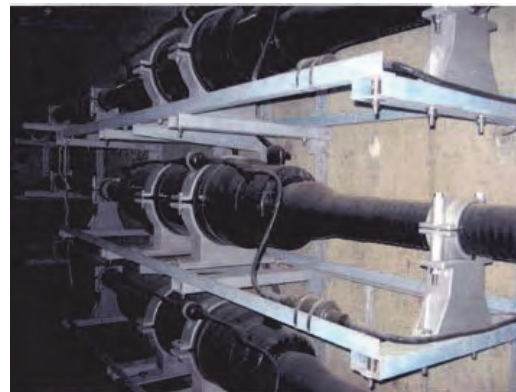
## Undergrounding Transmission Lines

**Distribution lines, the power lines that connect directly to homes and businesses, are often placed underground. So why not bury transmission lines too?**

The answer is complicated.

Duke Energy carefully evaluates each transmission project to determine whether an overhead or underground installation is most suitable. Burying transmission lines presents significantly different challenges than overhead construction.

- The construction of underground transmission lines demands the use of more expensive materials and requires precise installation and testing. This, along with other additional costs such as real estate acquisition and relocation of underground utilities, results in costs that are generally 10 to 15 times more than the cost of overhead transmission lines, depending on the specific project.
- Installation requires extensive digging that can have a significant impact on natural resources such as wetlands and wildlife habitats. Typically, that means a 16-foot-wide trench that's 6 to 9 feet deep. Also, burying lines does not preclude the need to remove trees, and construction impacts would be considerable – with heavy construction equipment, blasting and the need to build access roads and other facilities.
- Mountainous terrain poses additional installation and environmental challenges for underground lines, likely requiring shorter distances between manholes, cable reinforcement and special construction processes, adding to the costs of the line.



- The size of the duct bank in which the transmission cables are placed can vary depending on the voltage, power requirements and number of transmission circuits.
- Manholes for cable pulling and splicing are buried 10 feet deep and are 8 feet wide and 24 feet long. Manhole spacing is normally 1,500 to 2,000 feet but can vary significantly depending on the features and obstructions of the underground route.
- Though underground transmission lines are protected from trees, they are still subject to damage. When a fault does occur, it takes much longer to repair, resulting in longer restoration times.

While the installation of transmission lines underground presents a number of challenges, we will continue to evaluate each transmission project to determine the safest, most effective installation for our customers and our communities.

For Additional information:

Email: [CarolinasEast@duke-energy.com](mailto:CarolinasEast@duke-energy.com)

Phone: 866-297-5886



## Vegetation Management

Keeping the lights on.

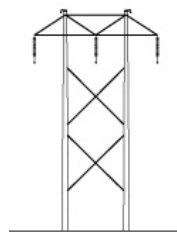
### Overview

Our customers want reliable power – in both good weather and bad. And while the trees that thrive throughout our 104,000 square miles of service area are a source of tremendous pride, they are also one of the main causes of power outages.

Duke Energy works consistently to balance aesthetics with our goal to provide safe, reliable power to the households and businesses that depend on us. It is our responsibility to ensure power lines are free of trees and other obstructions that could disrupt electric service. Trees that are close to power lines must be trimmed or cut down to ensure they don't cause power outages, and Duke Energy does much of this work proactively.

Our crews use a variety of methods to manage vegetation growth along distribution circuits and transmission power line rights of way, including vegetation pruning, felling (cutting down) and herbicides. These methods are based on widely accepted standards developed by the tree care industry and approved by the American National Standards Institute for tree care maintenance and operations.

### Examples of typical transmission and distribution structures



**Transmission Line Structure**



**Distribution Line Structure**



## Transmission rights of way

High-voltage transmission lines provide large amounts of electricity over long distances. The transmission lines in your community are part of the larger, interconnected grid system that powers an entire region, not just the community through which the lines run. Federal rules are more stringent for some transmission lines, depending on the voltage, and may include fines up to \$1 million per day for tree-related outages. Duke Energy manages its grid to provide reliable operation of transmission facilities while adhering to regulations and easement rights.

## Distribution rights of way

Distribution lines carry power from local substations to homes and businesses. A distribution right of way provides access to a strip of land so that utilities (electric, telephone, cable, water and/or gas) may build and maintain service lines. Duke Energy manages rights of way to provide reliable delivery of electricity.

## Vegetation management methods

Duke Energy uses an Integrated Vegetation Management approach, which includes careful pruning, selective herbicidal application and tree felling. This allows us to evaluate power line areas and determine the best method for maintaining reliable service.

The objective of an Integrated Vegetation Management program is to maintain the lines – before the trees and brush are close enough to cause outages – in a manner that is consistent with good arboricultural practices.

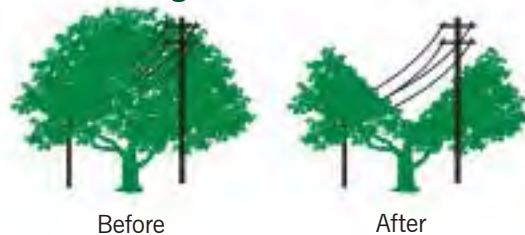
Duke Energy uses specific circuit information, reliability data and other indicators to prioritize lines for tree pruning and removal.

## Pruning methods

We do not “round” trees over because it’s not good for a tree’s health. We subscribe to directional or targeted pruning. These methods are endorsed by the tree care industry as the best pruning techniques for tree health.

## Examples of trimming methods

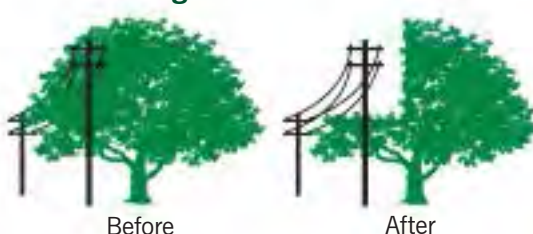
### “V” trimming



### Side trimming



### “L” trimming



Directional pruning involves cutting a limb back to another limb (or lateral) so that future growth of the resulting limb is directed away from the power lines. The basis for this type of pruning is that each limb removed from a tree is removed either where it joins another limb or at the trunk. With directional pruning, tree growth causes less impact to public safety and electrical service. This procedure is different from the philosophy of “rounding” trees over in which limbs are cut at arbitrary points, normally leaving unhealthy “stub” cuts, which can damage the tree.

## Pruning vs. cutting down

Each tree is different and must be considered individually. Trees with trunks close to the power lines may require much more pruning than trees located farther from the line. Additionally, not all pruning techniques are appropriate for all tree species.

When pruning, our trimming professionals make every attempt to trim for sufficient clearance until we return on our next planned maintenance.

Before deciding to remove a tree, we first evaluate its health and proximity to the lines. A tree may have a decayed portion on the trunk, for instance, or it may have soil that is severely eroded away from its root system. It could also be dead or in the process of dying. There are a number of reasons that might make a tree more likely to fall and therefore be a hazard to the line.

Sometimes trees are required to be cut down when they are too close to power lines or when they would have to be pruned severely.

## Herbicide applications

Duke Energy uses environmentally responsible herbicide applications to control tall growing incompatible plants within power line rights of way. Our objective is to maintain low-growing vegetation to minimize potential electric power interruptions, which also enhances wildlife habitat.

We use professional contractors to apply herbicide by utilizing different methods including foliar, stump, stem and vine applications.

Duke Energy contractors have been trained on the proper, safe and environmentally responsible techniques of managing plant growth. All products used by Duke Energy are

registered by the Environmental Protection Agency and approved by appropriate state agencies.

## Debris removal

The majority of Duke Energy's pruning and cutting occurs during planned maintenance. We typically dispose of any small limbs and brush in landscaped settings. The larger pieces of wood are cut into manageable lengths for the property owner's use. In nonlandscaped sites, pruned vegetation and wood debris are left in place to biodegrade. When an "Act of God" (e.g., lightning, ice storms, high winds, hurricanes, tornadoes) causes trees or other vegetation to fall across power lines and thus create power outages, we cut the trees and brush so poles and lines can be repaired and re-energized. Disposal of any wood, limbs or debris resulting from this type of emergency operation is the property owner's responsibility.

For more information, visit [duke-energy.com/safety/right-of-way-management.asp](http://duke-energy.com/safety/right-of-way-management.asp).

Visit the Arbor Day Foundation at [arborday.org/treelineusa](http://arborday.org/treelineusa) for information about planning and planting vegetation around electrical facilities.

# Factors Considered When Siting Transmission Lines



## Community/Public Input



## Land Use

Residential, commercial, industrial, major developments, schools, conservation lands and parks, existing linear facilities, airports and managed lands



## Land Cover

Forest woodland, mixed forest, grassland/pasture, fresh water urban development and urban residential



## Cultural Resources

Archaeological resources, historic resources, historic districts and cemeteries



## Natural Resources

State and federal rare, threatened and endangered species



## Visual Resources

View shed analysis



## Water Resources

Wetlands, streams and floodplains



## Occupied Buildings

Number of single-family residences in proximity of a proposed route



## Safety/Reliability/Cost

# Transmission Line Construction Activities



Material Laydown Yard



Right-of-Way Clearing



Conductor (Wire) Installation



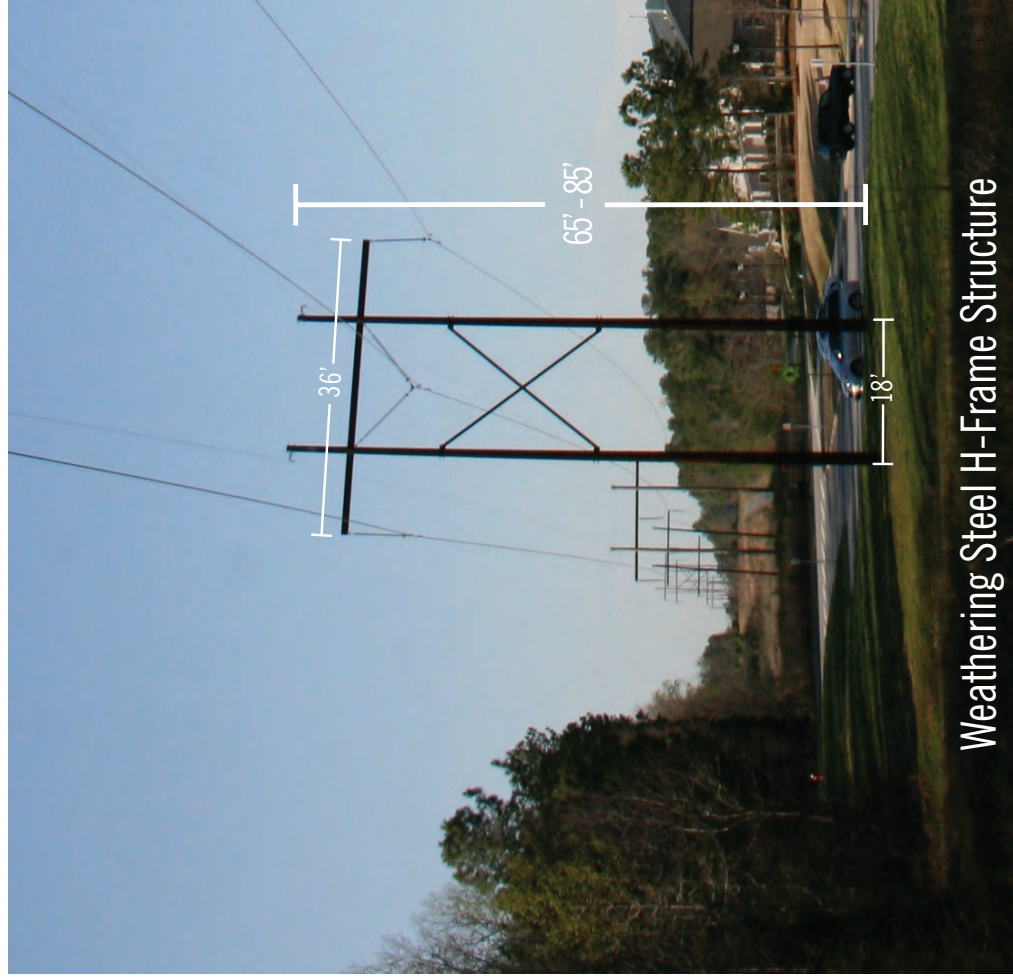
Cleared & Maintained Right of Way



# Typical 230-kilovolt (230kV) Structures



Weathering Steel Three-Pole Angle Structure



Weathering Steel H-Frame Structure





CREATE AMAZING.

Burns & McDonnell World Headquarters  
9400 Ward Parkway  
Kansas City, MO 64114  
O 816-333-9400  
F 816-333-3690  
[www.burnsmcd.com](http://www.burnsmcd.com)

## Exhibit B

## BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-2, Sub 1150

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 11.5 )  
 Miles of New 230kV Transmission Line in )  
 Johnston County, North Carolina )

**PUBLIC  
NOTICE**

NOTICE IS HEREBY GIVEN that on July \_\_\_, 2017, Duke Energy Progress, LLC (“DEP” or “Applicant”) filed with the North Carolina Utilities Commission (“Commission”) an application to obtain a certificate of environmental compatibility and public convenience and necessity to construct approximately 11.5 miles of new 230kV transmission line in Johnston County, North Carolina.

The preferred route originates at the site of the proposed Cleveland-Matthews Road Substation, located on the southeast corner of Polenta Road and Matthews Road in Johnston County, North Carolina. The route exits the substation site to the southeast and extends for approximately 0.5 mile before turning west for approximately 0.2 mile while crossing Matthews Road. The route then continues south for approximately 0.9 mile before crossing Middle Creek. From this point, the preferred route extends generally southeast for approximately 1.8 miles before crossing NC State Highway 210. The route then continues south-southeast for approximately 0.9 mile before crossing Lassiter Road. From here, the route extends approximately 0.5 mile south-southeast before crossing Hickory Grove Church Road. The route then extends southeast for approximately 0.9 mile and crosses King Mill Road. Continuing southeast for another 0.2 mile, the route then turns and travels east for approximately 0.4 mile before turning south. The route extends south-southeast for 0.6 mile and crosses Black Creek. Turning southeast, the route then extends 0.8 mile and crosses Elevation Road. The route continues to travel southeast for another approximately 0.9 mile and then turns south for 0.6 mile and crosses Old School Road. The route then turns southwest for only 0.1 mile and then turns south for 0.3 mile before crossing Jackson Road. The route continues to the south for 0.3 mile before turning southeast, extending approximately 0.4 mile, and crossing an existing CSX/Amtrak railroad line. The route continues southeast for approximately 1.3 miles, crossing U.S. Highway 301, Parker Road, and Interstate 95 before terminating at a tap point along the existing Erwin-Selma 230kV transmission line.

Anyone wishing to view Duke Energy Progress's certificate application report and/or the detailed maps concerning this project may do so at either the Office of the Chief Clerk of the Commission, Dobbs Building, 430 North Salisbury Street, Raleigh, North Carolina, or at the following Duke Energy Progress location: Garner Office, 1408 Mechanical Boulevard, Garner, North Carolina. Please contact Beverly Smith at 919-661-4305 prior to the visit. The filing is also available on the Commission's web site, [www.ncuc.net](http://www.ncuc.net). (Search for Docket No. E-2, Sub 1150).

The Commission has scheduled the application for public hearing at \_\_\_\_ p.m., on \_\_\_\_\_, 2017 in \_\_\_\_\_, North Carolina. This hearing may be canceled if no significant protests are received subsequent to public notice.

Persons desiring to intervene as formal parties of record should file a verified petition under Commission Rules R1-5 and R1-64 no later than \_\_\_\_\_, 2017. Such a petition should be filed with the Chief Clerk, North Carolina Utilities Commission, 4325 Mail Service Center, Raleigh, North Carolina 27699-4300. Intervenors shall also file the direct testimony and exhibits of expert witnesses with the Commission on or before \_\_\_\_\_, 2017.

Persons desiring to send written statements to inform the Commission of their position in the matter should address their statements to the North Carolina Utilities Commission, 4325 Mail Service Center, Raleigh, North Carolina 27699-4300 and reference Docket no. E-2, Sub 1150. Such written statements will be included in the Commission's official files. If the public hearing is not canceled, however, such written statements cannot be considered competent evidence unless those persons appear at the hearing and testify concerning the information contained in their written statements.

The Public Staff of the Utilities Commission, through its Executive Director, is required by statute to represent the using and consuming public in proceedings before the Commission. Statements to the Executive Director should be addressed to: Mr. Chris Ayers, Executive Director, Public Staff-North Carolina Utilities Commission, 4326 Mail Service Center, Raleigh, North Carolina 27699-4300.

The Attorney General is also authorized to represent the using and consuming public in proceedings before the Commission. Statements to the Attorney General should be addressed to: The Honorable Josh Stein, Attorney General of North Carolina, 9001 Mail Service Center, Raleigh, North Carolina 27699-9001.

ISSUED BY ORDER OF THE COMMISSION.

This the \_\_\_\_ day of \_\_\_\_\_, 2017.

NORTH CAROLINA UTILITIES COMMISSION  
M. Lynn Jarvis, Chief Clerk

(In accordance with N.C. Gen. Stat. § 62-102(c), Duke Energy Progress, LLC will publish this Public Notice, upon approval and instruction from the North Carolina Utilities Commission, in the newspapers of general circulation in the area of the proposed project.)

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-2, SUB 1150

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 11.5 )  
Miles of New 230kV Transmission Line in )  
Cleveland area of Johnston County, North )  
Carolina )

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**DIRECT TESTIMONY OF  
TIMOTHY J. SAME FOR  
DUKE ENERGY PROGRESS,  
LLC**



1    **Q.     PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

2    A.     My name is Timothy J. Same, and my business address is 410 S. Wilmington  
3           Street, Raleigh, North Carolina 27601.

4    **Q.     BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?**

5    A.     I am employed as Lead Transmission Siting Specialist, Transmission Siting,  
6           Permitting, and Engagement by Duke Energy Progress, LLC (“DEP”).

7    **Q.     WHAT ARE YOUR RESPONSIBILITIES AS LEAD TRANSMISSION  
8           SITING SPECIALIST?**

9    A.     As Lead Transmission Siting Specialist, Transmission Siting and Permitting, I  
10          am responsible for both the siting/due diligence of substation sites to be  
11          purchased in fee, as well as the selection of preferred/least impactful routes  
12          for transmission lines which require easement and/or right of way (“ROW”)   
13          acquisition for DEP territories.

14   **Q.     PLEASE DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL  
15          BACKGROUND.**

16   A.     I am a registered Professional Engineer in the state of North Carolina, having  
17          received a Bachelor of Science in Civil Engineering from Clarkson  
18          University. I began my career in Pennsylvania working as a job engineer in  
19          the field for Lane Construction, rebuilding Route 22 through Bethlehem,  
20          Pennsylvania. I then began employment with Dunn & Sgromo Engineers in  
21          Syracuse, New York, where I worked as an assistant engineer and began  
22          designing site work and utilities. In 1999, I began working for Costich  
23          Engineering, P.C. where I continued designing site work and utilities for land

1 development projects, and eventually became a Senior Project Manager before  
2 leaving in 2006 to begin working for the John R. McAdams Company, Inc. as  
3 a Project Manager. While with the John R. McAdams Company, Inc., I  
4 handled increasingly more complex land development projects including  
5 multi-phase, private sector, and mixed-use development/construction projects.  
6 In 2009, I continued my career in Project Management with Greenhorne &  
7 O'Mara, where I transitioned into overseeing architects and engineers working  
8 on federal projects on military installations in the mid-Atlantic region. In  
9 addition, while at Greenhorne & O'Mara, I began designing projects for  
10 Progress Energy Carolinas, Inc. (now DEP). In 2013, I began my  
11 employment with DEP in the substation engineering unit. In September 2014,  
12 I transitioned into my current role as the Lead Siting Specialist for DEP.

13 **Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE NORTH**  
14 **CAROLINA UTILITIES COMMISSION?**

15 A. No, but I have previously submitted pre-filed direct testimony before this  
16 Commission in Docket No. E-2, Subs 1102 and 1111.

17 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

18 A. The purpose of my testimony in this proceeding is to support DEP's  
19 Application for a Certificate of Public Convenience and Necessity to construct  
20 11.5 miles of new 230kV transmission line in the Cleveland area of Johnston  
21 County, North Carolina, which I will refer to as the "Cleveland-Matthews line"  
22 or "Project".

1   **Q.    WERE YOU INVOLVED IN PREPARING DEP’S APPLICATION IN**  
2       **THIS DOCKET?**

3    A.    Yes.

4   **Q.    TO YOUR KNOWLEDGE, WILL DEP FILE AND PROVIDE ALL**  
5       **INFORMATION, BEGIN PUBLIC NOTICE REQUIRED BY THIS**  
6       **COMMISSION, AND OBTAIN ALL FEDERAL AND STATE**  
7       **LICENSES, PERMITS, AND EXEMPTIONS REQUIRED FOR**  
8       **CONSTRUCTION AND OPERATION OF THIS TRANSMISSION**  
9       **LINE?**

10   A.    Yes.

11   **Q.    PLEASE DESCRIBE THE PROCESS UTILIZED TO SITE THE**  
12       **CLEVELAND-MATTHEWS LINE.**

13       Duke Energy Progress retained Burns & McDonnell Engineering Company,  
14       Inc. (“Burns & McDonnell”), a full service international engineering and  
15       construction firm with substantial utility and infrastructure siting experience,  
16       to assist the Company with the line siting and public input for the Project.  
17       Burns & McDonnell conducted a comprehensive siting study and prepared a  
18       Routing Study and Environmental Report (the “Routing Study”), which is  
19       attached as Exhibit A to the Application. My role was to oversee Burns &  
20       McDonnell from preliminary route alternative identification through the  
21       selection of the preferred route.

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

1 The limits of the study area were established based on the proposed location  
2 of the Cleveland-Matthews Road Substation at the southeast corner of the  
3 intersection of Polenta Road and Matthews Road in Johnston County; the  
4 locations of the Lee-Milburnie 230kV, Erwin-Milburnie 230kV, and Erwin-  
5 Selma 230kV transmission lines; and a preliminary review of potential routing  
6 opportunities and constraints in the area. The study area, which encompasses  
7 approximately 277 square miles, is shown in Figure 2-1 of the Routing Study.  
8 The study area was defined to incorporate potential Project tap points while  
9 offering an area large enough to provide a set of reasonable and  
10 geographically distinct route alternatives.

11 After establishing the study area, data was collected from publicly  
12 available sources, including State, county, and local agencies, for constraints  
13 and environmental concerns that could result in challenges for the siting of a  
14 transmission line. The collected data were used to create a raster-based  
15 suitability surface within a GIS framework. The purpose of the suitability  
16 surface, and subsequent analysis, was to aid in the identification of areas more  
17 likely suitable for the placement of a transmission line route. DEP also held  
18 two community workshops and received input from residents in the study  
19 area.

20 Collected data were grouped into one of ten categories: cultural  
21 resources, flood zones, land cover, community amenities and public  
22 infrastructure, natural resources, occupied buildings, prime and important  
23 farmland, public visibility, water features, and current zoning. Each category

1 was further divided into individual criteria and assigned a weight from 1 to 5  
2 according to each criterion's potential sensitivity to a transmission line, as  
3 determined by members of DEP's Project team and feedback obtained from  
4 public comments. The weight scale of 5 representing the highest  
5 consideration during the evaluation. For example, Residential Proximity  
6 Score has a weight scale of 5.

7 The suitability surface was created using the weighted criteria. Using  
8 GIS, criteria were combined through a process called overlay analysis, which  
9 results in a cumulative suitability rating by adding the weighted criteria  
10 together for each cell within the suitability raster. This results in a single  
11 suitability surface that can be reviewed by the siting team as a means of  
12 identifying preferred siting areas. GIS can then use color-coding to help  
13 visually display areas of lesser potential impact (see Figure 4-1 of the Routing  
14 Study.).

15 After completion of a suitability analysis, potential routes were  
16 identified. The objective was to identify economically feasible routes that  
17 connected the proposed Cleveland-Matthews Road Substation to either the  
18 Lee-Milburnie 230kV, Erwin-Milburnie 230kV, or Erwin-Selma 230kV  
19 transmission lines while avoiding or minimizing impacts to both community  
20 and natural resources. Local, State, and Federal government agencies were  
21 contacted by DEP to obtain information on resources of particular concern  
22 that were relevant to the routing process. The potential route alternatives were  
23 shared with the public and local officials throughout the route identification



1 process to obtain input for the evaluation of the alternatives. The study team  
2 then quantified the engineering, social, and environmental resources that  
3 would be impacted by each feasible route. Quantitative data and public input  
4 were used to evaluate the alternatives and to select a preferred route for the  
5 proposed transmission line.

6 **Q. HOW DID YOU DEVELOP THIRTY-TWO ALTERNATE ROUTES**  
7 **FOR THE CLEVELAND-MATTHEWS LINE?**

8 A. The objective of the routing analysis was to identify an economically feasible  
9 route that offered the most benefits in terms of providing reliable electric  
10 service, but also limited adverse impacts to the social and natural environment  
11 within the study area. This effort included four main components:

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

18 Based on the information gathered, a set of feasible routes were identified that  
19 connect the proposed Cleveland-Matthews Road Substation to either the Lee-  
20 Milburnie 230kV, Erwin-Milburnie 230kV, or Erwin-Selma 230kV  
21 transmission lines. The primary goals regarding routing were to:

- 22 • Minimize overall impacts by paralleling existing ROWs, including  
23 transmission lines, highways, and roads, where possible

- Maximize the distance of the line from existing residences
- 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 either the Lee-Milburnie 230kV, Erwin-Milburnie 230kV, or Erwin-Selma 230kV transmission lines. Each segment begins and ends at intersections with other segments. The set of route alternatives for this Project consisted of 39 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, 32 distinct routes were developed using a combination of the 39 segments.

**Q. DID DUKE ENERGY PROGRESS SEEK PUBLIC INPUT AS PART OF THE CLEVELAND-MATTHEWS LINE SITING PROCESS?**

A. Yes. To determine community values relative to the proposed Project, the route selection process included several forms of public input. These included communications with Federal, State, and local agencies, as well as public information workshops held by DEP to provide and receive information from the public about the study area. 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 environmental agencies and to residents.

1 State and Federal agencies were contacted by DEP (via email  
2 correspondence) to provide input on threatened and endangered species,  
3 wetlands, wildlife resources, stream sensitivity, hydric soils, and other  
4 potential permitting issues. The following agencies were contacted: the U.S.  
5 Army Corps of Engineers (“USACE”), U.S. Fish and Wildlife Service  
6 (“USFWS”), NC Wildlife Resources Commission (“NCWRC”), NC Natural  
7 Heritage Program (“NHP”), and N.C. Department of Environmental Quality  
8 (“NCDEQ”), including the N.C. Division of Water Resources and N.C.  
9 Division of Land Quality. On December 8, 2016, DEP held an agency scoping  
10 meeting that included attendees from all of the agencies that were contacted  
11 above, with the exception of the USACE.

12 The primary concern discussed during the agency scoping meeting  
13 was related to the presence of a federally protected mussel species (dwarf  
14 wedgemussel) and other federal aquatic species of concern within the study  
15 area. The USFWS and NHP provided DEP with information on streams and  
16 their tributaries that had differing levels of sensitivity based on the known  
17 existence or potential to support aquatic species of concern. This information  
18 was incorporated into the route evaluation factors.

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

1           An informational letter and small-scale map describing the Project and  
2           advertising the workshops was mailed to all property owners within 500 feet  
3           of the alternative routes two weeks prior to the workshops. Additionally, a  
4           news release was issued to the public seven days prior to the workshops.  
5           Information about the Project and a map of the study area and routes were also  
6           available on the DEP website throughout the duration of the route selection  
7           phase. The Project website is updated as the development and construction of  
8           the Project progresses.

9           To gather public input on the route alternatives, DEP held two open  
10          forum informational workshops on November 16 and 17, 2016, at the C3  
11          Church in Clayton, North Carolina, and the Johnston County Community  
12          College in Smithfield, North Carolina, respectively. A total of 149 people  
13          signed in to the workshop in Clayton, and 61 people signed in to the workshop  
14          in Smithfield. On both evenings, there were additional attendees observed that  
15          did not sign in.

16          The public workshops included displays with information on Project  
17          need, engineering, route alternatives, environmental management, and ROW  
18          requirements. Representatives from DEP and Burns & McDonnell were  
19          present to address the public's questions and take comments. Potential routes  
20          for the proposed transmission line were depicted on aerial photographs. No  
21          preferred route had been selected at the time of the workshops. Photographs  
22          and drawings showing the types of structures that would be used for the  
23          Project were displayed. DEP staff was also present to discuss ROW

1 acquisition and maintenance, and electric and magnetic fields associated with  
2 transmission lines.

3 Participants at the workshop received a written questionnaire to  
4 communicate their opinions on the routing criteria, the segment locations, and  
5 issues of concern regarding the Project. The public was asked to return  
6 questionnaires at the workshops, by mail, or online within six weeks after the  
7 workshops. Individuals could also have their comments recorded on GIS  
8 computer workstations at the workshops or online. A total of 128 hard copy  
9 questionnaires, 21 letters, and three emails were received by landowners either  
10 at the public workshops or through the mail. Another 92 questionnaires were  
11 completed using the online method. Additionally, 123 specific comments  
12 from landowners were recorded at the GIS computer workstations during the  
13 public workshops.

14 **Q. AFTER COMPILING DATA FROM COMMUNITY WORKSHOPS,**  
15 **PROPERTY OWNERS IN THE AREA AND DATA FROM OTHER**  
16 **SOURCES, HOW DID YOU EVALUATE THE 32 ALTERNATE**  
17 **ROUTES?**

18 A. The analysis of alternatives was based on social, environmental, and  
19 engineering factors. Data for each factor were quantified for each segment and  
20 summed for each route.

21 The evaluation of the proposed routes included a systematic  
22 comparison of the alternatives based on the social, environmental, and



1 engineering factors that represent the potential adverse effects on resources in  
2 the study area. The routing factors include the following:

3 Engineering:

- 4 • Total length (Feet)
- 5 • Road or railroad crossings (Number)
- 6 • New Rights Of Way (Acres)
- 7 • Length not along existing infrastructure (Feet)
- 8 • Heavy angles (>30 degrees) (Number)

9 Social:

- 10 • Residences within 125 feet of centerline (Number)
- 11 • Residences within 126-300 feet of centerline (Number)
- 12 • Residences within 301-500 feet of centerline (Number)
- 13 • Residential proximity score (Number)
- 14 • Businesses within 500 feet (Number)
- 15 • Public facilities within 500 feet (Number)
- 16 • Parcels crossed (Number)
- 17 • NRHP historic/archaeological sites within 1,320 feet (Number)
- 18 • Open space/green areas (Acres)
- 19 • Cropland crossed (Acres)
- 20 • Land use (residential) 5-acre parcels or less (Acres)
- 21 • Land use (residential) > 5-acre parcels (Acres)
- 22 • Residential land use score (Number)

1 Environmental:

- 2 • Upland forest crossed (Acres)
- 3 • Forested and marsh wetland crossed (Acres)
- 4 • Forested hydric ( $\geq 50\%$ ) soils crossed, excludes NWI (Acres)
- 5 • Non-forested wetland crossed (Acres)
- 6 • Non-forested hydric ( $\geq 50\%$ ) soils crossed, excludes NWI (Acres)
- 7 • Wetland crossing score (Number)
- 8 • 100-year floodplain crossed (Acres)
- 9 • National Hydrology Dataset (“NHD”) streams with a 50-foot buffer
- 10 crossed (Acres)
- 11 • Sensitive stream crossings – based on 50-foot buffer (Acres)
- 12 • Stream sensitivity score (Number)
- 13 • Sensitive stream crossings (Number)

14 The primary source of the data used in this analysis was 2014 aerial  
15 imagery supplemented with field reconnaissance of the overall study area and  
16 along each of the alternative routes. Digital data, such as roads, parcels,  
17 protected lands, and wetland information, were acquired from various  
18 agencies. Some of the criteria were quantified using GIS software; others were  
19 calculated by measuring information directly from the aerial photography.

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

1 Road or Railroad Crossings gives an indicator of potential permitting and/or  
2 line crossing issues. New ROW is the acreage of new land that would be  
3 needed to construct the line. This amount varies depending on the amount of  
4 ROW for the proposed Project that can be shared with existing utilities and  
5 roads. New ROW was measured for each route alternative but was not  
6 included in the evaluation process since it is similar to a Total Length  
7 measurement in reflecting potential overall impacts of a route alternative.  
8 Length not along existing Infrastructure was measured because following  
9 existing corridors is generally considered to have less impact than a new  
10 ROW. Existing infrastructure for this Project includes transmission lines,  
11 railroads, and roads. Because it is desirable and less impacting to co-locate a  
12 new route along existing corridors, potential impacts would be more likely to  
13 occur where a route would be built away from existing corridors, so length not  
14 along existing infrastructure was measured; however, length not along  
15 existing infrastructure was not included in the evaluation since there were  
16 very limited areas among all route alternatives where co-location occurred.  
17 Heavy Angles (>30 degrees) were considered because these angles typically  
18 require larger structures and more space. Consequently, these structures tend  
19 to be more visible and more expensive.

20 Proximity to residences, businesses, and public facilities was  
21 considered for the route analysis. Residences within 125 Feet, between 126-  
22 300 Feet, and between 301-500 Feet were counted for each proposed segment  
23 using aerial photography supplemented with field verification. The impact to

1 residences varied depending on the distance from the route. The three criteria  
2 for the distance to residences was converted to a Residential Proximity Score  
3 to reflect the public concern that residences closer to a transmission line  
4 would be more affected than those further away. To determine the residential  
5 proximity score, the number of residences within 125 feet of the centerline  
6 were multiplied by three; the number of residences between 126-300 feet were  
7 multiplied by two; and the number of residences between 301-500 feet were  
8 multiplied by one. Then, all three results were added together. Businesses  
9 within 500 Feet and Public Facilities within 500 Feet were also quantified.  
10 Parcels Crossed were quantified for each segment as a relative measure of the  
11 overall impact on private property. Routes that cross significantly more  
12 parcels tend to cost more as a result of additional landowners from which to  
13 acquire easements. Parcels Crossed were not included in the evaluation, since  
14 the Residential Land Use Score included parcel counts and would more  
15 accurately reflect impacts to residential areas.

16 Other social impact evaluation criteria were also considered. National  
17 Register of Historic Places (“NRHP”) Historic and Archaeological Sites  
18 within 1,320 Feet (quarter-mile) of each segment were quantified based on a  
19 records search of known sites maintained by the North Carolina State Historic  
20 Preservation Office. This criterion can be used as an index of the actual or  
21 potential cultural impact of the proposed routes. Open Space/Green Areas  
22 Crossed (i.e., parks, wildlife areas, nature preserves, etc.) was used to  
23 determine potential impacts the proposed routes would have on any

1 greenspace or open lands within the study area. This criterion was measured  
2 but not included in the evaluation because only a handful of segments crossed  
3 any public lands, which were open space areas associated with residential  
4 subdivisions. Acres of Cropland Crossed and acres of Upland Forest Crossed  
5 was determined using digital National Land Cover Database data and  
6 supplemented with aerial photography interpretation. Upland Forest Crossed  
7 measured the forested areas within the ROW that would be cleared along each  
8 route. Land Use (residential) was measured using parcel data. The parcels that  
9 were designated as residential use were segregated based on the size of the  
10 parcels as 5 acres or less versus greater than 5 acres. This approach was used  
11 to try and determine parcels that may be associated with subdivisions versus  
12 rural residential properties. To determine the Residential Land Use Score, the  
13 acreage of parcels within the ROW that were 5 acres or less were multiplied  
14 by two, and parcels that were greater than 5 acres were multiplied by one.  
15 Then, the two results were added together.

16 Environmental evaluation criteria included forests, hydric soils,  
17 wetlands, and water resources. Forested and Non-Forested Wetland Crossed  
18 were both measured using National Wetland Inventory (“NWI”) data  
19 produced by the USFWS. Forested and Non-Forested Hydric Soils Crossed  
20 measured the acreage of these soils to capture potential forested and non-  
21 forested wetland areas not accounted for in the NWI data, which in Johnston  
22 County appears to better represent the extent of potential wetland areas than  
23 solely using NWI data. To determine the Wetland Crossing Score, the acres of



1 forested wetland and forested hydric soils greater than or equal to 50 percent  
2 crossed by the ROW were multiplied by two, and nonforested hydric soils  
3 greater than or equal to 50 percent crossed by the ROW were multiplied by  
4 one, and then both numbers were added together. 100 Year Floodplain  
5 Crossed was measured using Federal Emergency Management Agency digital  
6 floodplain data. NHD Streams with a 50-foot Buffer Crossed and Sensitive  
7 Stream Crossings were measured in acres and number, respectively, and were  
8 used to determine areas where the ROW might impact protected riparian areas  
9 and number of State-identified sensitive streams potentially impacted by a  
10 route alternative. The designation for sensitive streams was based on feedback  
11 from the USFWS and NHP regarding sensitive aquatic species that are known  
12 to occur in the study area. As a result, Little Creek, Swift Creek and/or their  
13 tributaries were designated as highly sensitive. Middle Creek and/or its  
14 tributaries were designated as medium sensitivity, and all other streams and  
15 tributaries in the study area were designated as low sensitivity. The streams  
16 were then buffered by 50 feet to incorporate the potential effect of the ROW  
17 crossing these locations. To determine the Stream Sensitivity Score, the acres  
18 of ROW crossing the highly sensitive streams were multiplied by three; the  
19 medium sensitive streams were multiplied by two; and the low sensitive  
20 streams were multiplied by one. Then, the three results were added together.  
21 The NHD Streams with a 50-foot buffer and sensitive stream crossings were  
22 measured but not used in the evaluation since Sensitive Stream Crossings  
23 Based on 50 Foot Buffer captured this data in the Stream Sensitivity Score.

1           The categories described above were considered to represent the  
2           potential impact of construction and operation of the new transmission line.  
3           The Project team then assigned weights to the factors based on input from the  
4           public, agencies, DEP engineers, and experience with similar transmission  
5           line projects across the country. A weight scale from 1 to 5 was used for this  
6           process, with 1 representing the lowest consideration and 5 representing the  
7           highest consideration during the evaluation. The weights associated with each  
8           routing factor are presented in Table 4-2 of the Routing Study.

9   **Q.   WHAT WERE THE RESULTS OF THE COMPREHENSIVE**  
10 **EVALUATION?**

11 A.   We determined that Route 31 was the best overall (least impactful) route.

12 **Q.   WHY?**

13 A.   Route 31 was selected as the best route for the following reasons:

- 14           • Overall lowest Residential Proximity Score among all routes, an  
15           indication of minimal potential impacts to residences and property  
16           owners
- 17           • Minimal input from concerned landowners as opposed to much greater  
18           input along other lowest scoring routes, indicating less chance of  
19           construction or access issues and a more positive public perception of  
20           the Project
- 21           • No open space (subdivision-owned) crossed
- 22           • Least number of residences within 300 feet of centerline
- 23           • No businesses or public facilities within 500 feet of centerline

- 1           • No highly sensitive stream crossings
- 2           • Utilizes cropland acres when possible to avoid extensive removal of
- 3           forested areas along the route
- 4           • Crosses acres of wetland and hydric soils in a perpendicular manner,
- 5           where possible, which is beneficial not only from a construction,
- 6           access and maintenance perspective, but would also potentially require
- 7           less permitting effort in these areas

8           The preferred route was one of the least overall impacting routes (fifth  
9           lowest-scoring) in the numerical evaluation performed for the proposed  
10          Project. For this and the above reasons, and by using standard construction  
11          procedures and mitigation techniques when coordinating the Project with  
12          State and Federal agencies to comply with necessary regulations, the  
13          construction, operation, and maintenance of the proposed Project will have  
14          limited effects on the natural and social resources within the study area. DEP  
15          will continue to work with environmental stakeholders and landowners to  
16          reduce impacts of this proposed Project.

17   **Q.   PLEASE DESCRIBE THE PREFERRED ROUTE OF THE PROPOSED**  
18   **TRANSMISSION LINE.**

19   A.   The preferred route originates at the site of the proposed Cleveland-Matthews  
20          Road Substation, located on the southeast corner of Polenta Road and  
21          Matthews Road in Johnston County, North Carolina. The route exits the  
22          substation site to the southeast and extends for approximately 0.5 mile before  
23          turning west for approximately 0.2 mile while crossing Matthews Road. The

1 route then continues south for approximately 0.9 mile before crossing Middle  
2 Creek. From this point, the preferred route extends generally southeast for  
3 approximately 1.8 miles before crossing NC State Highway 210. The route  
4 then continues south-southeast for approximately 0.9 mile before crossing  
5 Lassiter Road. From here, the route extends approximately 0.5 mile south-  
6 southeast before crossing Hickory Grove Church Road. The route then  
7 extends southeast for approximately 0.9 mile and crosses King Mill Road.  
8 Continuing southeast for another 0.2 mile, the route then turns and travels east  
9 for approximately 0.4 mile before turning south. The route extends south-  
10 southeast for 0.6 mile and crosses Black Creek. Turning southeast, the route  
11 then extends 0.8 mile and crosses Elevation Road. The route continues to  
12 travel southeast for another approximately 0.9 mile and then turns south for  
13 0.6 mile and crosses Old School Road. The route then turns southwest for  
14 only 0.1 mile and then turns south for 0.3 mile before crossing Jackson Road.  
15 The route continues to the south for 0.3 mile before turning southeast,  
16 extending approximately 0.4 mile, and crossing an existing CSX/Amtrak  
17 railroad line. The route continues southeast for approximately 1.3 miles,  
18 crossing U.S. Highway 301, Parker Road, and Interstate 95 before terminating  
19 at a tap point along the existing Erwin-Selma 230kV transmission line.

20 **Q. HOW MANY LANDOWNERS WILL BE DIRECTLY AFFECTED BY**  
21 **THE PROPOSED TRANSMISSION LINE, AND HAS DUKE ENERGY**  
22 **PROGRESS CONTACTED THOSE LANDOWNERS?**

1 A. There are 67 landowners that will be directly affected by having at least some  
2 portion of the proposed 125-foot right-of-way on their property. On April 20,  
3 2017, Duke Energy Progress sent letters to the 67 property owners of the total  
4 77 land parcels that are within the proposed 125-foot right of way. In addition,  
5 Duke Energy Progress also sent letters to another 23 owners of 24 total land  
6 parcels that are outside the proposed 125-foot right of way, but within 200 feet  
7 of the proposed centerline in case survey crews need to access a portion of  
8 these parcels outside, but adjacent to the proposed right of way. All of these  
9 letters (90 total notification letters) were mailed certified US Postal Service  
10 and included the appropriate reference to N.C. Gen. Stat. §40A-11 providing  
11 the necessary 30-day notice to enter the properties for the purpose of  
12 surveying, soil borings, appraisals, and assessments.

13 **Q. IN CONCLUSION, WHY IS DUKE ENERGY PROGRESS SEEKING**  
14 **APPROVAL TO CONSTRUCT THE CLEVELAND-MATTHEWS**  
15 **LINE?**

16 A. Duke Energy Progress' comprehensive transmission line siting process  
17 identified the Cleveland-Matthews Line as the best and least impactful route  
18 to serve the transmission needs in this portion of Johnston County. I believe  
19 that DEP's application is in the public convenience and necessity, and I ask  
20 that the Commission approve it.

21 **Q. DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?**

22 A. Yes.



BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-2, SUB 1150

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 11.5 )  
Miles of New 230kV Transmission Line in )  
Cleveland area of Johnston County, North )  
Carolina )

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**DIRECT TESTIMONY OF  
JAMES UMBDENSTOCK FOR  
DUKE ENERGY PROGRESS, LLC**

OFFICIAL COPY

Jul 14 2017

1    **Q.    PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

2    A.    My name is James Umbdenstock, and my business address is 1020 W.  
3           Chatham Street, Cary, North Carolina 27511.

4    **Q.    BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?**

5    A.    I am employed as a Lead Engineer, in Carolinas Power Quality, Reliability  
6           and Integrity/Planning, in Carolinas East, by Duke Energy Progress, LLC  
7           (“DEP”). DEP is a wholly owned, indirect subsidiary of Duke Energy  
8           Corporation (“Duke Energy”).

9    **Q.    WHAT ARE YOUR RESPONSIBILITIES AS LEAD ENGINEER?**

10   A.    I am responsible for helping plan the electrical distribution infrastructure  
11           necessary to serve new growth and development in the Northeast Zone of  
12           DEP territory in North Carolina. This includes coordinating the design and  
13           construction of all transmission-to-distribution substations with Transmission  
14           for all of DEP, both North and South Carolina.

15   **Q.    PLEASE DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL**  
16   **BACKGROUND.**

17   A.    I graduated from North Carolina State University with a Bachelor of Science  
18           degree in Electrical Engineering in 1979. I have worked for DEP for almost  
19           38 years, all in the area of Distribution. I have also held various engineering  
20           roles at DEP. I am a licensed Professional Engineer in the State of North  
21           Carolina.

22   **Q.    HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE NORTH**  
23   **CAROLINA UTILITIES COMMISSION?**

1 A. Yes, I testified during the construction of the Cary Trenton Road 230kV  
2 Substation and its associated transmission tap line, in Docket No. E-2, Sub  
3 855.

4 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

5 A. The purpose of my testimony in this proceeding is to describe the need and  
6 necessity for the construction of the proposed 11.5 miles of new 230kV  
7 transmission line in the Cleveland area of Johnston County, North Carolina.

8 **Q. WERE YOU INVOLVED IN PREPARING DEP'S APPLICATION IN**  
9 **THIS DOCKET?**

10 A. Yes.

11 **Q. WHY IS DEP REQUESTING THIS COMMISSION TO GRANT THE**  
12 **CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY?**

13 A. As detailed in the Certificate application, DEP's assessment of electric energy  
14 requirements, has identified the need to build a new 230kV/23kV  
15 transmission-to-distribution substation and a new 230kV transmission line to  
16 provide power to the substation in the Cleveland area of Johnston County,  
17 North Carolina. There are currently no transmission lines or substations in this  
18 area of Johnston County, which is roughly bounded by Interstate 40 on the  
19 west, Highway 70 Bypass on the north, Highway 70 on the east and Interstate  
20 95 on the south. This area is approximately 125,000 acres in size and is  
21 located entirely within Duke Energy Progress' service territory, except for the  
22 portion within the city limits of Smithfield in the extreme southeastern corner  
23 of this area. Nine (9) different substations and thirteen (13) distribution

1 circuits currently feed into this area including two (2) substations located in  
2 Wake County. Six 23kV feeders from four substations from as far as 13 miles  
3 away terminate less than 1.5 miles from this site, and all six exceeded 17.6  
4 MVA during the 2015 Winter peak (January 2015) which is the Winter  
5 Planning Limit for 23 kV feeders. This new substation site was purchased in  
6 2015 based on the projected load center in the vicinity of Cleveland Road and  
7 Matthews Road. The new substation and associated transmission line is  
8 required to provide needed capacity and enhanced service reliability to  
9 support our existing customers plus allow for future residential and  
10 commercial growth.

11 **Q. DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?**

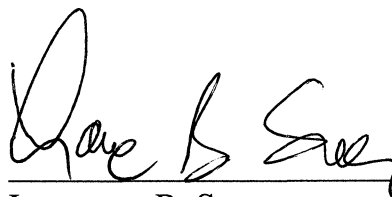
12 A. Yes.

## CERTIFICATE OF SERVICE

I certify that a copy of Duke Energy Progress, LLC's Application for a Certificate of Environmental Compatibility and Public Convenience and Necessity to Construct Transmission Line in the Cleveland Area of Johnston County, North Carolina in Docket No. E-2, Sub 1150, has been served by electronic mail, hand delivery or by depositing a copy in the United States mail, postage prepaid to the following parties:

David Drooz  
Public Staff  
North Carolina Utilities Commission  
4326 Mail Service Center  
Raleigh, NC 27699-4326  
[david.drooz@psncuc.nc.gov](mailto:david.drooz@psncuc.nc.gov)

This the 14<sup>th</sup> day of July, 2017.



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