LINCOLN COUNTY PLANNING & INSPECTIONS DEPARTMENT
302 NORTH ACADEMY STREET, SUITE A, LINCOLNTON, NORTH CAROLINA 28092
704-736-8440 OFFICE 704-736-8434 INSPECTION REQUEST LINE 704-732-9010 FAX

To: Board of Commissioners
Planning Board

From: Randy Hawkins, Zoning Administrator

Date: May 18, 2018

Re: PD #2018-2
Duke Energy Carolinas, LLC, applicant
Parcel ID# 52075

The following information is for use by the Lincoln County Board of Commissioners and Planning Board at their joint meeting/public hearing on June 4, 2018.

REQUEST

The applicant is requesting the rezoning of 611 acres from I-G (General Industrial) to PD-I (Planned Development-Industrial) to permit an expansion of a combustion-turbine power plant by adding a combustion turbine and associated facilities, including a 90-foot-tall turbine building and a 140-foot-tall stack. A site plan has been submitted as part of the rezoning application.

Under the Unified Development Ordinance, the PD-I district is intended to allow greater flexibility in design and provide for appropriate use of land that is significantly unique in its circumstances to warrant special methods of development.

An electrical generation plant is a conditional use in the I-G district. However, the I-G standards set a maximum structure height of 60 feet. Any use permitted as a conditional use in the I-G district is permitted in a PD-I district subject to approval by the Board of Commissioners and subject to the standards established at the time of approval.

Duke Energy has operated a combustion-turbine plant on the subject property since 1995 to supplement its customer power supply during periods when electricity use is highest. The 1,200-megawatt plant has 16 combustion turbines that operate on natural gas or fuel oil. The proposed expansion calls for an advanced class, 400-megawatt combustion turbine and supporting facilities.

SITE AREA AND DESCRIPTION

The subject property is located at 6760 Old Plank Road in Catawba Springs Township. It is adjoined by property zoned I-G, R-T (Transitional Residential) and PD-R (Planned Development Residential). Land uses in this area include industrial, residential

and agricultural. Adjoining properties include Lake Norman Quarry, Killian Creek Wastewater Treatment Plant and the Trilogy residential development. The Duke Energy site is designated by the Lincoln County Land Use Plan as a Special District, which is applied to uses that warrant their own category.

STAFF'S RECOMMENDATION

Staff recommends that the rezoning request be approved. See staff's proposed statement on following page.

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Zoning Amendment
Staff's Proposed Statement of Consistency and Reasonableness

Case No. **PD #2018-2**

Applicant **Duke Energy Carolinas, LLC**

Parcel ID# **52075**

Location **6769 Old Plank Road**

Proposed amendment **rezone from I-G to PD-I to permit an expansion of a combustion-turbine power plant**

This proposed amendment **is consistent** with the Lincoln County Comprehensive Land Use Plan and other adopted plans in that:

This property is designated by the Land Use Plan as a Special District, due to its existing use as the site of a combustion-turbine power plant.

This proposed amendment **is reasonable and in the public interest** in that:

The surrounding area includes industrial uses. This is a 611-acre site. The existing power plant and the proposed expansion area are well buffered from adjoining properties. The proposed expansion is a public necessity in order to adequately supply power to residential, business and industrial customers during periods of peak demand.

Lincoln County, NC

Office of the Tax Administrator, GIS Mapping Division

Date: 5/17/2018 Scale: 1 Inch = 2000 Feet

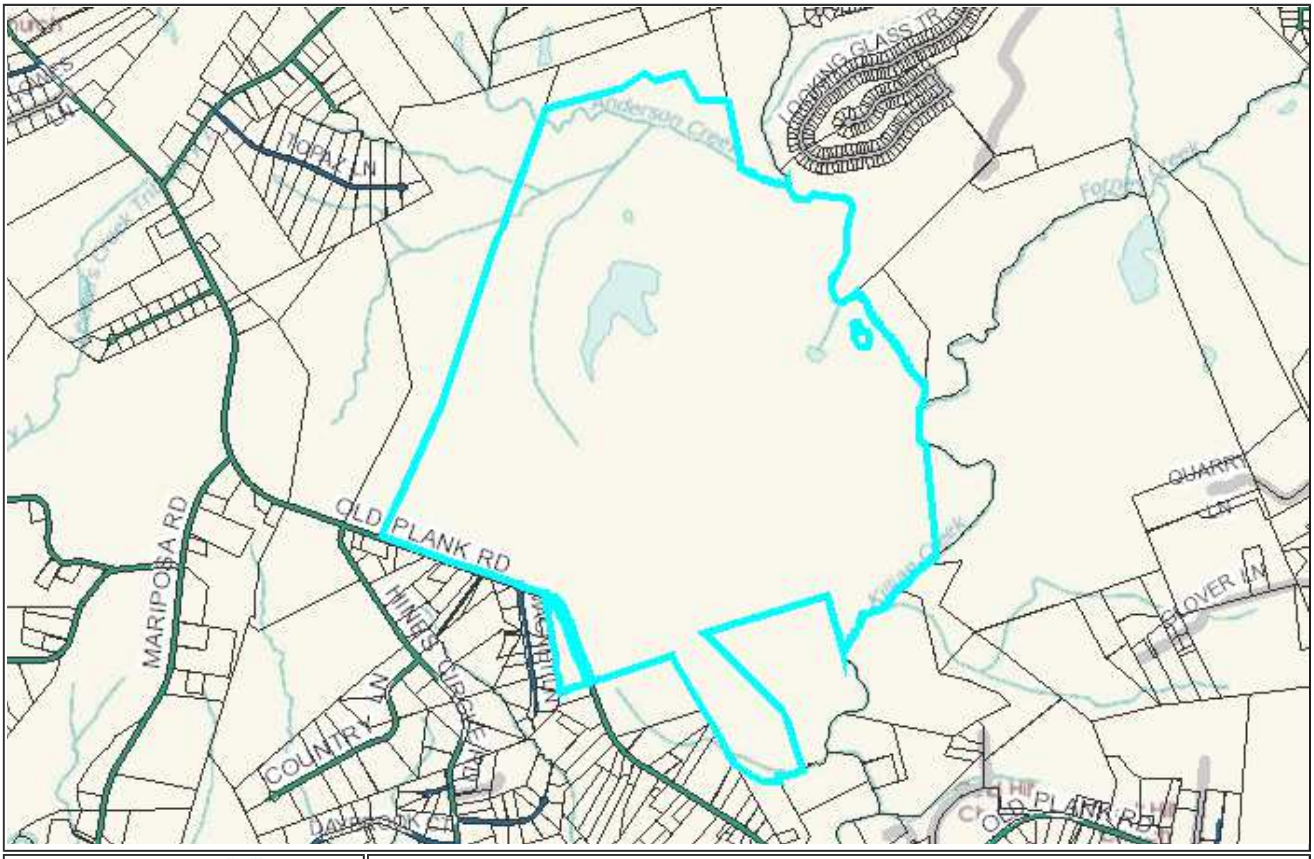


Photo Not Available

Parcel ID	52075	**Owner**	DUKE POWER CO		
Map	3691	**Mailing**	ATTN W WALLACE GREGORY JR P O BOX 33189		
Account	30902	**Address**	CHARLOTTE, NC 28242		
Deed	727 570	**Last Transaction Date**	09/13/1989	**Sale Price**	$0
Plat		**Subdivision**		**Lot**	
Land Value	Work in Progress	**Improvement Value**	Work in Progress	**Total Value**	Work in Progress
Previous Parcel					

-----All values for Tax Year 2018 -----

Description	DUKE POWER LAND			**Deed Acres**	0
Address	6769 OLD PLANK RD			**Tax Acres**	637.851
Township	CATAWBA SPRINGS			**Tax/Fire District**	EAST LINCOLN
Main Improvement				**Value**	
Main Sq Feet		**Stories**		**Year Built**	

Zoning District	Calc Acres
I-G	611.46
R-T	26.39

Voting Precinct	Calc Acres
LW31	1.05
LW18	636.8

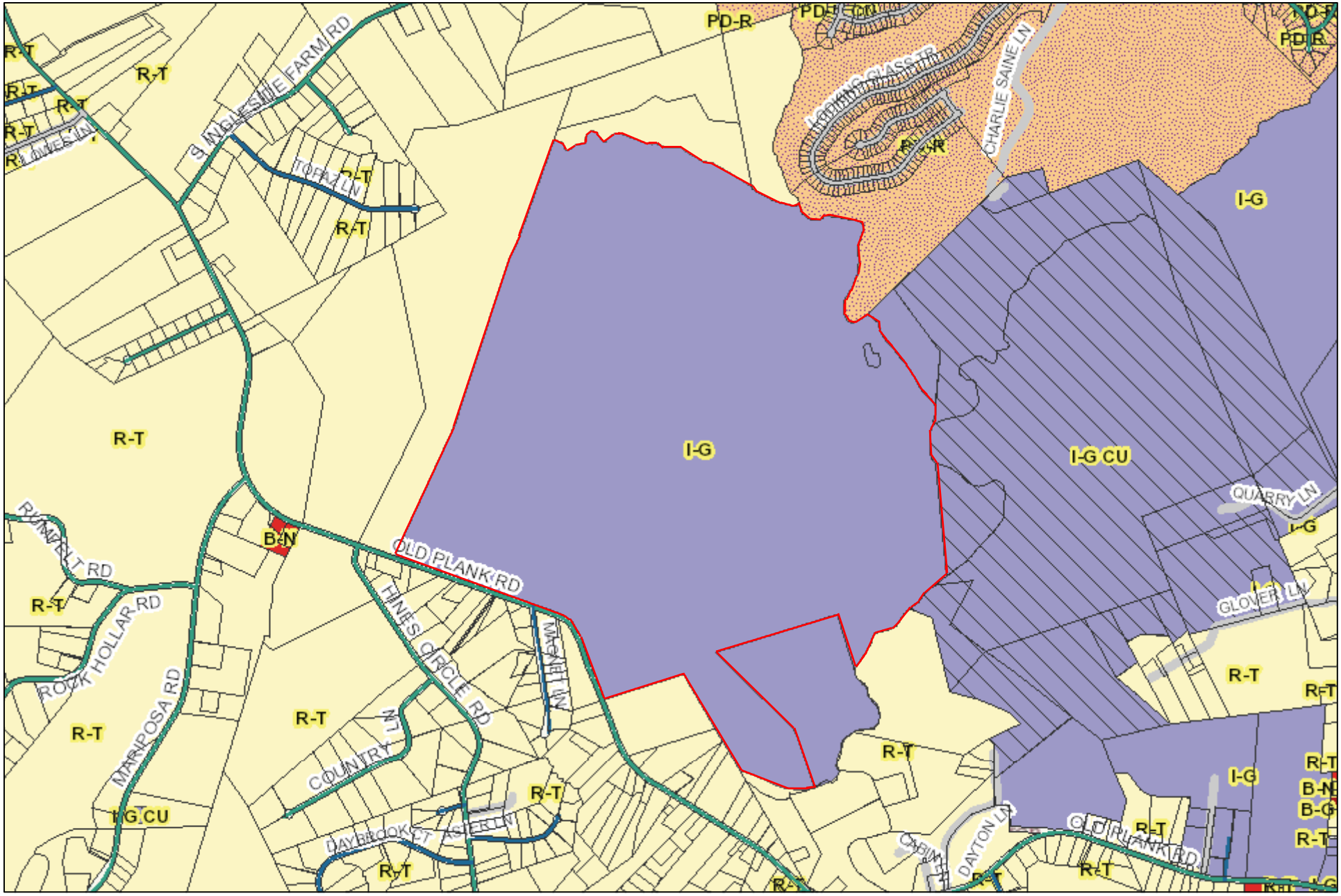
Watershed	Sewer District	
637.85		637.45
	SEWER	0.4

Census County	Tract	Block

109		071002	2006	235.19
109		071002	2018	3.29
109		071002	2019	1.29
109		071002	2017	335.47
109		071002	2000	20.36
109		071102	1016	0.76
109		071102	1070	0.01
109		071002	2020	41.21
109		071102	1020	0.28

Flood Zone	Description	Panel
X	NO FLOOD HAZARD	3710369100 494.15
X	NO FLOOD HAZARD	3710369200 26.91
AE	SPECIAL FLOOD HAZARD AREA BASE ELEVATION DETERMINED - 100 YEAR	3710369100 49.11
AE	SPECIAL FLOOD HAZARD AREA BASE ELEVATION DETERMINED - 100 YEAR	3710369200 67.67
AEFW	FLOODWAY AREA - 100 YEAR FLOOD HAZARD	3710369100 0.01

PD #2018-2
subject property is outlined in red



April 11, 2018

Esri., Inc., Lincoln County, NC

1200 Feet

1 inch = 1,500 feet

May 17, 2018

0 1200 Feet

1 inch = 1,600 feet

Planned Development Rezoning Application

Lincoln County Planning and Inspections Department
Zoning Administrator
302 N. Academy St., Lincolnton, NC 28092
Phone: (704) 736-8440 Fax : 732-9010

PART I

Applicant Name Duke Energy Carolinas, LLC / Gary Thompson
Applicant Address 526 S. Church Street, Charlotte NC 28202
Applicant Phone Number 704-382-6057
Property Owner Duke Energy Carolinas, LLC
Property Owner Address 526 S. Church Street, Charlotte NC 28202
Property Owner Phone Number 704-382-6057

PART II

Property Location 6769 Old Plank Road, Stanley, NC, 28164 (Lincoln County Combustion Turbine Station, LCCT
Property ID (10 digits) 3691372998 Property Size 612 Acres
Parcel # (5 digits) 52075 Deed Book(s) 727 Page(s) 570

PART III

Existing Zoning District I-G, Proposed Zoning District PD-I

Briefly describe how the property is being used and any existing structures.

The property for the proposed facility is located on approximately 612 acres of land owned by Duke Energy Carolinas (DEC) and will be adjacent to an existing power generation facility, the Lincoln County Combustion Turbine (LCCT) power generation facility which began operation in 1995 and provides peaking power generation for DEC and its customers.

The 1,200 MW LCCT facility includes 16 Combustion Turbines (CT), stacks, electric transformers, power distribution centers, plant switchyard, transmission lines, gas pipeline, gas meter/regulation station, fuel oil unloading station and storage tanks, water intake/pump structure, surface water storage pond, filtered water tanks, demineralized water tanks, administrative building, warehouse, water treatment building and various other balance of plant equipment and facilities that support plant operations.

Briefly described the proposed planned development.

The proposed planned development is for an additional CT generation unit to be constructed on the LCCT site. This proposed Lincoln County CT Addition Project will consist of a single new 400 MW simple-cycle advanced class combustion turbine generating unit.

On June 12, 2017 DEC submitted to the North Carolina Utilities Commission (NCUC), its Application for Certificate of Public Convenience and Necessity (CPCN) to construct and operate the Lincoln County CT Addition Project (the Project) at the existing Lincoln County CT Site. The NCUC issued on

December 7, 2017 an Order with findings of facts including, that DEC conducted a comprehensive siting process and appropriately selected its existing Lincoln County CT generation complex as the site for the Project, and further approved the CPCN with this Order such that the planned development is a public necessity.

The proposed CT unit will be natural gas-fired with ultra-low sulfur fuel oil backup. The existing on-site Piedmont Natural Gas lateral pipeline from the Transco main pipeline will be modified to provide natural gas for the new unit. The fuel oil unloading and storage facilities built for the existing units will be expanded with an additional oil storage tank for back-up fuel needs. The generator will be connected with an expansion of the existing plant's 230kV switchyard with a single on-site 230 kV bus line. No new transmission lines are planned to be constructed outside the Lincoln County CT property, and no transmission system upgrades are anticipated.

Other plant equipment and features for the proposed development include; Generator Step-Up Transformer, Auxiliary Transformer, Power Control Centers, Service Water Storage Tank, Demineralized Water Storage Tank, Fuel Gas Compressors, Fin Fan Coolers, Dilution SCR Air Supply Fans, Aqueous Ammonia Storage, Nitrogen Storage, Hydrogen/CO2 Storage, Service/Instrument Air Compressors, Gas Turbine Building, Stack, Lubricating Oil Storage Building, and Administration/Control/Warehouse Building.

Development on the subject property is governed by the Lincoln County Unified Development Ordinance (the "UDO"). The subject property is currently zoned I-G, a zoning district that limits building heights to 60 feet. Compared to the existing CTs on the site this planned advanced class CT technology is by nature much larger in size, has higher unit output, is more fuel efficient, and has lower plant emission rates which will provide significant benefits to DEC customers. The proposed expansion project includes a 90 foot tall turhine building (unoccupied, designed to reduce noise and protect the CT from weather) and a 140 foot tall stack. There are other unoccupied structures taller than 60 feet such as CT inlet filter, dilution SCR and 230 kV transmission support structures).These structures exceed the maximum height allowed by the current I-G zoning district.

As required in the CPCN process DEC conducted numerous siting studies including engagement of an expert consultant (UCS) to conduct a visual effects field study where residential areas and public roadways were identified as resources with potential to be most affected by views of the new facility, particularly views of the 90 foot high gas turbine building and 140 foot high stack. The new CT site location chosen on the property provides screening via hill/elevation and well as tree huffers. Additionally , the major structures will be painted with a color scheme to facilitate blending into the undulating tree line. After analyzing multiple views of the proposed Lincoln County CT Addition, UCS concluded in its study that the impact of probable views will be negligible.

SEE PLANNING DEPT. FOR PLANNED DEVELOPMENT FEES

I hereby certify that all knowledge of the information provided for this application and attachments is true and correct to the best of my knowledge.

Applicant's Signature

5/16/2018

Date

Lincoln County Combustion Turbine (CT) Addition Project. PD-I Rezoning Application.

My name is Mark Landseidel. My business address is 400 South Tryon Street, Charlotte, North Carolina. I am General Manager of Project Development in the Project Management and Construction Department of Duke Energy where I am responsible for the initiation and development of new generation projects. I am a Project Management Professional and have been with the Company for 35 years, most of that time with responsibility for major projects, including development of nine new gas fired generation projects totaling approximately 5,000 MWs in capacity.

I will provide some background on the Lincoln County Combustion Turbine (CT) Addition Project, describe the Certificate of Public Convenience and Necessity (CPCN) process and the North Carolina Utilities Commission (NCUC) determination of that Public Necessity including plant siting considerations and potential impact assessments.

The Lincoln County CT Addition Project will consist of a new 400 MW simple-cycle advanced class combustion turbine natural gas-fueled electric generating unit, with fuel oil backup, and related transmission (on-site only) and natural gas pipeline interconnection facilities (on-site only) which will be described in more detail later in this statement. The Lincoln County CT Addition Project will be located at the Company's existing Lincoln County CT site and will provide peaking generating capacity to the Duke Energy Carolina (DEC) system.

The plant will be a new model Siemens advanced-class series test and validation CT unit. The plant is scheduled to begin generating electricity for the benefit of DEC customers in 2020 during an extended commissioning, testing and validation period, and DEC will take care, custody and control of the unit and begin full commercial operation in 2024. The Company has sixteen existing CTs at the Lincoln County CT site totaling approximately 1,200 MW, which provide peaking generation to the Company's customers. The Lincoln County CT Addition Project will be located on DEC owned property adjacent to the existing plant.

In 2016, Siemens approached Duke Energy as part of its efforts to seek a utility customer host site for testing and validation of the new advanced-class gas turbine it is developing. Siemens offered the Company very favorable pricing and contract terms for the highly efficient CT unit which will provide real and significant cost savings to DEC customers as well as economic benefits to Lincoln County where the unit will be built and for North Carolina where Siemens will manufacture these CT units. As such the

Siemens advanced-class series turbine was determined to be the best option for the approximately 400 MW DEC 2024 CT capacity need that was identified in the 2016 DEC Integrated Resource Plan ("IRP").

As discussed in more detail in CPCN Exhibit 2 provided in this rezoning proceeding, DEC conducted a comprehensive siting study, and the Existing Lincoln County CT Site scored highest on the siting evaluation by a significant margin. In addition to the utilization of the existing switchyard and transmission capacity, the site provides other cost advantages, including available land, existing fuel oil unloading infrastructure and existing natural gas supply infrastructure. There are also operating cost synergies associated with the existing Lincoln CT units.

When it became evident in late 2016 that DEC may propose this Lincoln County CT Addition Project, Duke Energy met with various Lincoln County leaders and stakeholders in late 2016 / early 2017.

Pursuant to Commission Rule R8-61(a), on January 31, 2017 DEC submitted to the NCUC, its Preliminary Information Filing for the Lincoln County CT Addition as required at least 120 days prior to filing an application for a CPCN to construct this generating facility. This Preliminary Information Filing was available to the public, and in essence, is a preliminary version of CPCN Exhibit 2 provided in this proceeding, and discusses the proposed facility description, siting and preliminary site studies.

Pursuant to N.C. Gen. Stat. §62-110.1 and Commission Rule R8-61(b), on June 12, 2017 DEC submitted to the NCUC, its Application for Certificate of Public Convenience and Necessity to construct and operate the Lincoln County CT Addition Project at the existing Lincoln County CT Site. This was available to the public and includes Exhibit 2 cited earlier including site specific studies and impact analysis.

A number of Lincoln County CT site studies were conducted and provided in the CPCN application Exhibit 2 including; cultural historical and archeological, botanical, wildlife, wetlands, water, aviation, meteorological, air quality, geological, seismic, visual, and auditory. Visual and auditory studies have been provided in this proceeding which show minimal impact to the adjoining or abutting property.

DEC engaged expert consultant UC Synergetic (UCS) to conduct a probable visual effects field study, where existing residential properties and public roadways were identified as resources with the potential to be most affected by views of the new

facility, particularly views of the 90-foot-high gas turbine building (unoccupied) and 140-foot-high stack. The new CT site location provides screening via hill/elevation as well as tree buffers. Figure 1.4.3.1-1 (CPCN Exhibit 2) shows areas within five miles that have a view of the existing plant only, areas with a view of the new CT only, and areas predicted to have views of both. Of the total area within five miles of the site (78.54 square miles), the proposed facility will be visible in areas totaling only 0.16 square miles (0.20 percent of the total area) UCS further predicts that outside of the DEC owned property, the future facility will be visible from only 0.11 square miles that do not already have a view of the existing generating facilities (0.14% of the total area). Also provided in this proceeding a UCS Lincoln CT Visual Impact Assessment updated April 20, 2018 which includes additional visual analysis and photos from areas around the site including Trilogy. After analyzing multiple views of the proposed Lincoln CT Addition UCS concluded that the impact of probable views will be negligible.

DEC also engaged expert consultant Stewart Acoustical Consultants to conduct an auditory study of existing noise sources and estimate impact of the Lincoln CT Addition. The existing quarry, speedway, aircraft and Old Plank Road are significant community noise sources. The new CT Addition only increases sound power levels of the plant by 3 dBA. Due to the way humans hear this is a barely noticeable increase. Neighbors to the north at the Trilogy property will see less than a 2 dBA increase with the new CT (which is not noticeable to most). DEC has required in the Siemen's Engineering, Procurement and Construction (EPC) contract that they guarantee certain noise requirements and for the installation of significant engineered noise reductions measures such as installation of stack silencer, gas turbine building, air inlet filter silencer, low noise tempering fans, and gas compressor enclosure.

On June 28, 2017 the NCUC issued notice and an Order for a public witness hearing to be held at the James W. Warren Citizens Center, Lincoln County on August 16, 2017 in the Commissioner's Hearing Room where public witness testimony was to be received and the actual transcript of that hearing has been provided in this proceeding.

The expert witness hearing took place in Raleigh on August 30, 2017. As a result of the hearings, and evidence considered, the NCUC issued on December 7, 2017 an Order (also provided this proceeding) with findings of facts including, that DEC conducted a comprehensive siting process and appropriately selected its existing Lincoln County CT generation complex as the site for the project, and further approved the Certificate of Public Convenience and Necessity for the project.

Detailed Plant Description and Requirements

The Lincoln County CT Addition Project will consist of a single new 400 MW simple-cycle advanced class combustion turbine generating unit. It will be natural gas-fired with ultra-low sulfur fuel oil backup.

The existing on-site Piedmont Natural Gas lateral pipeline from the Transco main pipeline will be modified to provide natural gas for the new unit. The fuel oil unloading and storage facilities built for the existing units will be expanded with an additional oil storage tank for back-up fuel needs. The generator will be connected to the existing plant's 230kV switchyard with a single on-site 230 kV bus line. No new transmission lines are planned to be constructed outside the Lincoln County CT property, and no transmission system upgrades are anticipated.

DEC has submitted an air permit application to North Carolina Division of Air Quality ("DAQ") requesting a permit to authorize construction and operation of the combustion turbine unit. The application includes all required modeling and analysis to demonstrate compliance with regulatory requirements and air quality standards. The new unit will be designed to control emissions via combustion controls as well as a dilution air Selective Catalytic Reduction ("SCR") and Carbon Monoxide ("CO") Catalyst to Best Available Control Technology ("BACT"). Continuous emission monitoring systems ("CEMS") will be installed on the turbine's exhaust stack.

Potable water for the new unit will be supplied by the county. Process/Service water for new unit operation will be sourced from the existing site surface water pond and water treatment system. The site has a Publicly Owned Treatment Works ("POTW") permit with the county. Sanitary waste water will be discharged to the Lincoln County Waste Water Treatment system. Process waste water (potential oily waste water and evaporative cooling system blowdown) will be routed to the existing plant waste water system prior to discharge to the POTW. Other liquid waste streams such as gas turbine wash wastewater will be pumped to tank trucks and hauled off-site for treatment.

Other plant equipment and features include; Generator Step-Up Transformer, Auxiliary Transformer, Power Control Centers, Service Water Storage Tank, Demineralized Water Storage Tank, Fuel Gas Compressors, Fin Fan Coolers, Dilution SCR Air Supply Fans, Aqueous Ammonia Storage, Nitrogen Storage, Hydrogen/CO2 Storage,

Service/Instrument Air Compressors, Gas Turbine Building (unoccupied), Stack, Lubricating Oil Storage Building, and Administration/Control/Warehouse Building.

The Engineering, Procurement and Construction (EPC) contract requires that Siemens provide detailed plant design, procurement of equipment and material, construction and commissioning of the new unit. The contract requires that Siemens shall diligently, duly and and properly perform and complete the Work and its other obligations under the contract, and ensure that all Work shall conform to all applicable Laws and Prudent Industry Practice (which shall mean those practices, methods, equipment, specifications and standards of safety, performance, dependability, and efficiency as commonly used and accepted by highly experienced firms for such generation facilities similar to this CT unit). The contract also requires Siemens to provide training to DEC operations and maintenance personnel.

The contract requires that Siemens communicate with and ascertain requirements of, all Government Authorities in relation to vehicular access to and egress from the Site and shall be responsible for routing of heavy or large loads to the Site and to satisfy any requirements of Government Authorities for such loads.

Further the contract requires that Siemens comply with all applicable Environmental Laws and meet the requirements of Owner Policies related to environmental, health, safety and security. The NCUC Condition #3 in the NCUC Order states: "That DEC shall construct and operate the Lincoln County CT Project in accordance with all applicable laws and regulations, including provisions of all permits issued by the NC Department of Environment Quality. Finally the additional CT unit will be operated consistent with the existing CT units which have been operating safety for over 20 years at the Lincoln County site.

Planned Development Rezoning Application Attachments

Attachment 1	State of North Carolina Utilities Commission - ORDER ISSUING CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSIT WITH CONDITIONS; Exhibit 2 – Site and Permitting Information
Attachment 2	Duke Property Map Zoned I-G (outlined in black)
Attachment 3	Siemens Lincoln Cty Addition Site Plan (Figure 1)
Attachment 4	Duke Lincoln County CT Addition Project – Rendering with Structure Heights
Attachment S	Lincoln County CT Addition – Plant Layout/Plant View
Attachment 6	Attachment 6 UC Synergetic – Lincoln CT Visual Impact Assessment dated April 2D, 2018
Attachment 7	Lincoln County Combustion Turbine Plant CT addition – CPCN Noise Impact Study dated May 17, 2D17
Attachment 8	Community Meeting Report
Attachment 9	Duke Energy Carolinas – Conditional Rezoning Development Standards

STATE OF NORTH CAROLINA
UTILITIES COMMISSION
RALEIGH

DOCKET NO. E-7, SUB 1134

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

In the Matter of Application of Duke Energy Carolinas, LLC, for a Certificate of Public Convenience and Necessity to Construct a 402-MW Natural Gas-Fired Combustion Turbine Generating Facility in Lincoln County, North Carolina	))))))	ORDER ISSUING CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY WITH CONDITIONS

HEARD: Hearing Room 2115, Dobbs Building, Raleigh, North Carolina on August 30 and August 31, 2017; James W. Warren Citizens Center, Lincoln County Commissioners Hearing Room, Room 301, 115 W. Main Street, Lincolnton, North Carolina on August 16, 2017.

BEFORE: Chairman, Edward S. Finley, Jr., Presiding;
Commissioners ToNola D. Brown-Bland, Bryan E. Beatty, Jerry C. Dockham, Lyons Gray, James G. Patterson and Daniel G. Clodfelter

APPEARANCES:

For the Applicant, Duke Energy Carolinas, LLC:

Lawrence B. Somers, Deputy General Counsel, Duke Energy Corporation, P.O. Box 1551/NCRH20, Raleigh, North Carolina 27602

Robert W. Kaylor, Law Office of Robert W. Kaylor, P.A., 225 Hillsborough Street, Suite 160, Raleigh, North Carolina 27603

For Carolina Utility Customers Association, Inc. (CUCA):

Robert F. Page, Crisp, Page, & Currin, LLP, 4010 Barrett Drive, Suite 205, Raleigh, North Carolina 27609

For North Carolina Waste Awareness and Reduction Network, Inc. (NCWARN):

John D. Runkle, 2121 Damascus Church Road, Chapel Hill, North Carolina 27516

For the North Carolina Sustainable Energy Association (NCSEA):

Peter H. Ledford, 4800 Six Forks Road, Suite 300, Raleigh, North Carolina 27609

For the North Carolina Attorney General's Office:

Margaret A. Force, Assistant Attorney General, N.C. Department of Justice, Post Office Box 629, Raleigh, NC 27602

For the Sierra Club and the Natural Resources Defense Council (NRDC):

Gudrun Thompson and Nadia Luhr, Southern Environmental Law Center, 601 W. Rosemary Street, Suite 220, Chapel Hill, NC 27516

Bridget M. Lee, *pro hac vice*, Sierra Club, 50 F. Street, NW, Floor 8, Washington, D.C. 20001

For the Using and Consuming Public:

Dianna W. Downey, Staff Attorney, and Robert Josey, Staff Attorney, Public Staff-North Carolina Utilities Commission, 4326 Mail Service Center, Raleigh, North Carolina 27699-4326

BY THE COMMISSION: On January 31, 2017, Duke Energy Carolinas, LLC ("Duke Energy Carolinas," "DEC" or the "Company") filed preliminary information, pursuant to Commission Rule R8-61(a), in advance of filing an application for a Certificate of Public Convenience and Necessity ("CPCN"). On June 12, 2017, pursuant to N.C.G.S. 62-110.1 and Commission Rule R8-61(b), the Company filed a verified CPCN application to construct a new, nominal 402 MW (winter rating) simple-cycle advanced combustion turbine natural gas-fueled electric generating unit, with fuel oil backup, and related transmission and natural gas pipeline interconnection facilities, to be located at its existing

Lincoln County Combustion Turbine generating facility in Lincoln County, near Stanley, North Carolina (hereinafter the "Lincoln County CT Project" or "Project"). As part of the CPCN application, the Company included the supporting pre-filed direct testimony and exhibits of Matthew L. Kalemba, Lead Planning Analyst in Integrated Resource Planning and Analytics – Carolinas for Duke Energy Carolinas and Mark E. Landseidel, General Manager of Project Development for Duke Energy Corporation.

On June 28, 2017, the Commission issued an *Order Scheduling Hearings, Requiring Filing of Testimony, Establishing Procedural Guidelines and Requiring Public Notice*. The intervention of the Public Staff has been recognized pursuant to N.C. Gen. Stat. §62-15(d) and Commission Rule R1-19(e).

Motions to intervene were filed and granted for the following persons and organizations: North Carolina Waste Awareness and Reduction Network (NC WARN), Carolina Utility Customers Association, Inc. (CUCA), North Carolina Electric Membership Corporation (NCEMC), the North Carolina Sustainable Energy Association (NCSEA), the North Carolina Attorney General's Office, the Sierra Club, and the Natural Resources Defense Council (NRDC).

On August 7, 2017, the State Clearinghouse filed with the Commission comments submitted by Clearinghouse agencies regarding DEC's proposed generating facility. The cover letter stated: "Because of the nature of the comments, it has been determined that no further State Clearinghouse review action on your part is needed for compliance with the North Carolina Environmental Policy Act."

On August 14, 2017, the Public Staff filed a motion for an extension of time to file witness testimony, which the Commission granted on the same date.

On August 15, 2017, the Public Staff filed the testimony of Dustin R. Metz, Electric Engineer in the Electric Division of the Public Staff and John R. Hinton, Director of Economic Research Division of the Public Staff. On August 15, 2017, the Sierra Club and NRDC jointly filed the testimony of Thomas Vitolo, Ph.D., an economics consultant from Synapse Energy Economics.

As scheduled, a public hearing was held in Lincolnton on August 16, 2017. The following public witnesses testified at the public hearing: Rita Burns-Wooten, Joe Wooten, Granville Angell, Alice Angell, Kevin Poet, and Luis Rodriguez.

On August 25, 2017, Duke Energy Carolinas filed the rebuttal testimony of Phillip O. Stillman, Director of Load Forecast and Fundamentals, as well as that of witnesses Kalemba and Landseidel. No other party filed testimony in this matter.

The matter came on for hearing as scheduled on August 30, 2017, and the pre-filed testimony was received subject to cross-examination. On September 1, 2017, pursuant to the Commission's request during the evidentiary hearing, Duke Energy Carolinas filed DEC Confidential Late-Filed Exhibit No. 1, the Engineering, Procurement and Construction Agreement with Siemens Energy Inc. ("Siemens"), and DEC Confidential Late-Filed Exhibit No. 2, the Long-Term Service Agreement with Siemens.

On September 8, 2017, the Commission issued a notice of mailing of transcript and ordered the parties to submit briefs and/or proposed orders no later than September 30, 2017. On September 28, 2017, the Attorney General requested an extension of time to file proposed orders and briefs. On September 28, 2017, the Commission granted the motion, extending the due date until October 9, 2017.

On October 9, 2017, the Public Staff and the Company each filed a Proposed Order. On that same date, Sierra Club/NRDC, the AGO, NCSEA and NC WARN filed briefs, and CUCA filed a letter supporting the imposition of the conditions proposed by the Public Staff.

Based upon consideration of the pleadings, testimony, and exhibits received into evidence, and the record as a whole, the Commission makes the following:

FINDINGS OF FACT

1. Duke Energy Carolinas, LLC is a public utility with a public service obligation to provide electric utility service to customers in its service area in North Carolina and is subject to the jurisdiction of the Commission.

2. The Commission has jurisdiction over this Application pursuant to the Public Utilities Act. Pursuant to G.S. 62-110.1 and Commission Rule R8-61(b), a public utility or other person must receive a CPCN from the Commission prior to constructing an electric generating facility to be directly or indirectly used for public utility service.

3. Duke Energy Carolinas plans to construct a new nominal 402 MW simple-cycle CT dual-fuel (natural gas and ultra-low sulfur diesel fuel) electric generating unit and related transmission and natural gas pipeline interconnection facilities at its existing Lincoln Combustion Turbine generating facility in Lincoln County, North Carolina. The Lincoln CT Project will use a Siemens advanced-class series CT unit; the plant is scheduled to begin producing electricity in 2020 during an extended commissioning, testing and validation period; and Duke Energy Carolinas will take care, custody and control of the unit and begin commercial operation in 2024.

4. Duke Energy Carolinas' 2016 Integrated Resource Plan ("IRP"), filed with the Commission on September 1, 2016 in Docket No. E-100, Sub 147, shows load growth, existing unit retirements, and the need for capacity additions to meet Duke Energy Carolinas customers' needs over the next fifteen years. The 2016 IRP identifies the need for an additional 1,689 MW of new resources to meet customers' energy needs by 2025 and 3,923 MW by 2031. As currently projected, there is a need for the Lincoln CT Project in the 2024/25 timeframe. The Lincoln CT Project is therefore consistent with the Company's 2016 IRP.

5. Any potential risks with approval of the CPCN at this stage are outweighed by the benefits to customers from the project.

6. The Lincoln CT Project will provide a cost-effective peaking generation resource for Duke Energy Carolinas' system and customers. The technology selected by the Company for the Lincoln CT Project will provide enhanced reliability, low turn down, fast ramp, and efficient dispatch capability for the Duke Energy Carolinas system. The load following capability of the Lincoln CT Project will provide additional system flexibility and generation ancillary service benefits to help accommodate the impacts resulting from the increasing amounts of intermittent renewable resources being added to the Duke Energy Carolinas system. The advanced-class simple cycle CT technology proposed by Duke Energy Carolinas for the Lincoln CT Project is a practical technological option to provide peaking generation capacity by 2024, when it is needed.

7. Duke Energy Carolinas considered a broad spectrum of demand-side management options ("DSM"), energy efficiency ("EE") programs, and renewable resources in its IRP process and in making the decision to pursue the Lincoln CT Project

as the best option to meet its customers' resource needs. Duke Energy Carolinas cannot rely upon EE, DSM and renewables to eliminate or delay its needs for generation system peaking capacity in the 2024 timeframe.

8. Duke Energy Carolinas properly evaluated the wholesale market in determining how to meet the capacity needs that will be met by the Lincoln CT Project.

9. Duke Energy Carolinas conducted a comprehensive siting process and appropriately selected its existing Lincoln County CT generation complex as the site for the Lincoln CT Project.

10. The Lincoln CT Project will utilize all required environmental controls, and the necessary environmental permitting is subject to the jurisdiction of other State agencies.

11. The Company's estimated construction cost for the Lincoln CT Project is reasonable and is hereby approved. Duke Energy Carolinas shall submit a progress report each year during construction that includes any revisions in the cost estimates as required by N.C.G.S. 62-110.1(f).

12. Pursuant to N.C.G.S. 62-110.1, the issuance of a Certificate of Public Convenience and Necessity for the Lincoln CT Project proposed by Duke Energy Carolinas is required by the public convenience and necessity, subject to the conditions set forth in the ordering paragraphs below.

EVIDENCE AND CONCLUSIONS FOR FINDINGS OF FACT NOS. 1-2

These findings are informational, procedural, and jurisdictional in nature and are uncontroverted.

North Carolina General Statute 62-110.1 is intended to provide for the orderly expansion of electric generating capacity in order to create a reliable and economical power supply and to avoid the costly overbuilding of generation resources. State ex rel. Utilities Comm. v. Empire Power Co., 112 N.C. App. 265, 278 (1993), disc. rev. denied, 335 N.C. 564 (1994); State ex rel. Utilities Comm. v. High Rock Lake Ass'n, 37 N.C. App. 138, 141, disc. rev. denied, 295 N.C. 646 (1978). A public need for a proposed generating facility must be established before a certificate is issued. Empire, 112 N.C. App. at 279-80; High Rock Lake, 37 N.C. App. at 140. Beyond need, the Commission must also determine if the public convenience and necessity are best served by the generation option being proposed. The standard of public convenience and necessity is relative or elastic, rather than abstract or absolute, and the facts of each case must be considered. State ex rel. Utilities Comm. v. Casey, 245 N.C. 297, 302 (1957). "[Chapter 780 of the 1975 Session Laws], codified as G.S. 62-110.1(c)-(f), directs the Utilities Commission to consider the present and future needs for power in the area, the extent, size, mix and location of the utility's plants, arrangements for pooling or purchasing power, and the construction costs of the project before granting a certificate of public convenience and necessity for a new facility." High Rock Lake, 37 N.C. App. at 140-41.

As hereinafter discussed in this order, the Commission has considered all of these factors -- need, the size and mix of existing plants, pooling, purchases, DSM, alternative technologies including renewables, fuel costs, and construction costs -- in determining whether the public convenience and necessity are served by Duke Energy Carolinas' proposal in this docket.

EVIDENCE AND CONCLUSIONS FOR FINDING OF FACT NO. 3

The evidence in support of this finding is based upon the verified application and the testimony and exhibits of Duke Energy Carolinas witnesses Mark Landseidel and Matthew Kalemba, and the testimony of Public Staff witness Dustin Metz.

Mark E. Landseidel, Duke Energy's General Manager of Project Development in the Project Management and Construction Department, testified to the project details of the planned Lincoln CT Project. The Lincoln County CT Project will consist of a new nominal 402 MW (winter rating) simple-cycle advanced combustion turbine natural gas-fueled electric generating unit, with fuel oil backup, and related transmission and natural gas pipeline interconnection facilities. This project will provide peaking generating capacity to the Duke Energy Carolinas system. The plant will be the first Siemens advanced-class series test and validation CT unit. The plant is scheduled to begin generating electricity for the benefit of DEC customers in the third quarter of 2020 during an extended commissioning and testing period, and DEC will take care, custody and control of the unit and begin commercial operation in the fourth quarter of 2024. The Company has sixteen existing CTs at the Lincoln CT site totaling 1,488 MW (winter rating), which provide peaking generation to the Company's customers. The Lincoln County CT Project will be sited adjacent to the existing CT units.

In 2016, Siemens approached Duke Energy Carolinas as part of its efforts to seek a utility customer host site for testing and validation of the new advanced-class gas turbine it is developing. The advanced-class Siemens CT will be designed to compete with other advanced-class series CTs being introduced into the market by GE and Mitsubishi. The Company conducted a due diligence evaluation of the new Siemens design development,

including visits to Siemens' turbine manufacturing and test facilities in Germany and Charlotte. Siemens' new advanced-class turbines will be manufactured at its Charlotte facility. These advanced-class turbines will provide higher output, improved efficiency and faster ramp rates than existing large frame gas turbines.

The Lincoln County CT Project will be designed with a single 230 kV Generator Step-Up transformer, 230 kV bus line, and interconnected to the existing 230 kV Lincoln County CT electrical switchyard. No new transmission lines are planned to be constructed outside the Lincoln County CT property, and additional interconnection study work is underway to determine if any offsite transmission system upgrades are required.

The Project will be dual fuel, capable of burning pipeline natural gas or back-up ultra-low sulfur diesel fuel from on-site storage facilities. The existing Piedmont Natural Gas Company, Inc. ("Piedmont") pipeline from Transco will be modified to provide service to the Project at a location adjacent to the Project. Duke Energy Carolinas will have an interruptible transportation service agreement with Piedmont to provide gas transportation service for the Project. The plant gas supply will be served initially from Transco utilizing Duke Energy Carolinas' existing gas transportation service agreements and supply portfolio. The fuel oil unloading and storage facilities built for the existing Lincoln County CTs will be expanded with an additional storage tank.

Construction would begin in mid-2018, and Siemens will bring the unit online in a series of three versions as part of the comprehensive testing and validation process. Version A will have a nominal winter rating of 369 MW and will begin testing and validation in 2020. Version B will have a nominal winter rating of 382 MW, and begin testing and validation in 2022. The final commercial operation version C will have a nominal winter

rating of 402 MW and begin testing and validation in 2023, with Duke Energy Carolinas taking care, custody and control of the unit in late 2024. During the approximately four-year extended testing and validation period, Siemens will determine the timing and nature of operation of the unit; however, Duke Energy Carolinas will receive the capacity at no cost and the energy delivered to the Duke Energy Carolinas grid at only the variable cost of the fuel. Furthermore, Siemens will pay for any inefficient fuel use to the extent the unit is run out of economic merit order. Although Siemens will control the operation of the unit during the four-year extended commissioning, testing and validation period, DEC will still have the ability to direct Siemens to make changes in the unit's operation if system needs so require, including requiring Siemens to stop operating the unit or reduce output.

EVIDENCE AND CONCLUSIONS FOR FINDING OF FACT NO. 4

The evidence in support of this finding is based upon the verified application and the testimony and exhibits of Duke Energy Carolinas witnesses Landseidel, Phillip Stillman, and Kalemba, including the 2016 DEC IRP and 2017 DEC IRP Update Report, the testimony of Public Staff witnesses Robert Hinton and Dustin Metz and NRDC/Sierra Club witness Dr. Thomas Vitolo, and NRDC/Sierra Club Confidential Cross Exhibit 1.

Matthew R. Kalemba, Duke Energy Carolinas' Lead Planning Analyst, offered extensive testimony as to the comprehensive planning process that led to the development of the Duke Energy Progress 2016 IRP and the decision to add the Lincoln CT Project. Mr. Kalemba also testified to the 2017 DEC IRP Update Report, portions of which were introduced as NRDC/Sierra Club Confidential Cross Exhibit 1, and which was filed subsequent to the hearing on September 1, 2017, in Docket No. E-100, Sub 147.

The Duke Energy Carolinas 2016 IRP identifies the need for an additional 1,689 MW (winter rating) of new resources to meet customers' energy needs by 2025 and 3,923 MW by 2031. The Duke Energy Carolinas 2016 IRP includes the need for 468 MW of CT capacity in the winter of 2024/2025, which will be met in part by the Lincoln County CT Addition.

Mr. Kalemba testified that the 2016 IRP incorporates a 15-year load forecast, purchase power contracts, existing generation, energy efficiency and demand-side management, new resource additions, and a minimum target planning reserve margin of 17.0%. The comprehensive planning process for the 2016 IRP demonstrates that a combination of renewable resources; energy efficiency and demand-side management programs; and additional baseload, intermediate, and peaking generation are required over the next 15 years to reliably meet customer demand. Mr. Kalemba explained that, after accounting for increased energy efficiency impacts, Duke Energy Carolinas' Spring 2016 forecast shows average annual growth in summer peak demand of 1.2 percent, winter peak demand growth of 1.3 percent, and the average territorial energy growth rate of 1.0 percent.

The 2016 IRP examined future resource plans under scenarios that did, and did not, include future carbon prices. Under the no carbon Base Case, which consisted of no CO_2 emission costs and no new nuclear generation, the portfolio consisting of 142 MW (2,202 MW nameplate) of compliance and non-compliance renewable generation, 1,221 MW of new natural gas combined cycle capacity, 2,808 MW of new natural gas CT capacity (including the Lincoln County CT Project), 85 MW of nuclear uprates capacity,

669 MW of demand-side management, and 461 MW of energy efficiency was selected over the planning horizon.

Mr. Kalemba testified that the minimum planning reserve margin of 17.0% was based on new resource adequacy studies that DEC and DEP commissioned and that were finalized in 2016. Three main drivers led to the commissioning of these studies including: 1) the high penetration of solar resources that have been connected to the Utilities' transmission and distribution systems in the past two to three years; 2) the high volume of solar resources currently in the Utilities' interconnection queues; and 3) the significant load response to cold weather that was experienced during the 2014 and 2015 winter periods.

Mr. Kalemba testified to the details of the load forecast contained in the 2016 IRP, but noted that in addition to customer growth, plant retirements and expiring purchased power contracts create the need to add incremental resources to allow the Company to meet future customer demand. In particular, over the last several years, aging, less efficient coal plants have been replaced with a combination of renewable energy, EE, DSM, and state-of-the-art natural gas generation facilities. Additionally, DEC plans to retire the 1,161 MW Allen Steam Station, with Units 1-3 scheduled to retire by December 2024 and Units 4 and 5 in 2028. The combination of load growth and these planned retirements contribute to the need for the Lincoln County CT Project.

The Commission has accepted Duke Energy Carolinas 2016 IRP as reasonable for planning purposes. On June 17, 2017, the Commission issued its Order Accepting Integrated Resource Plans And Accepting REPS Compliance Reports in Docket No. E-100, Sub 147, which held that Duke Energy Carolinas' (and the other IOUs) "forecasts of

native load requirements and other system capacity or firm energy obligations, supply-side and demand-side resources expected to satisfy those loads, and reserve margins are reasonable for planning purposes, and the Commission accepts the IRP Reports as filed in this docket." Public Staff witness Hinton testified to the Public Staff's review of the Company's 2016 IRP and that it supports the need for new combustion turbine peaking generation in 2024.

Mr. Kalemba also testified to the Duke Energy Carolinas 2017 IRP Update, relevant excerpts from which were provided to intervenors in response to data requests (NRDC/Sierra Club Confidential Cross Ex. 1), and which was filed in Docket. No. E-100, Sub 147 on September 1, 2017, the day following the completion of the evidentiary hearing. Mr. Kalemba explained the significant new capacity needs that Duke Energy Carolinas has over the 15-year IRP planning horizon, 3,923 MW in the 2016 IRP. The 2017 IRP Update shows a resource need or gap in every year from 2024 through 2032. In comparison to the 2016 IRP, the 2017 IRP Update shows the first need in 2024, instead of 2022. As a result, the 1,221 MW combined cycle need, shown in 2022 in the 2016 IRP, has now shifted to a 1,282 MW combined cycle need in 2024, resulting in an even greater resource need in 2024 than was shown in the 2016 IRP. The 2017 IRP Update includes the 402 MW Lincoln CT as a designated resource in 2024, but still has a 337 MW resource gap in that year.

Mr. Kalemba also testified to the reduction in load forecast contained in the DEC 2017 IRP Update, when compared to the 2016 IRP load forecast, but explained that the lower load forecast did not move the first need beyond 2024. The 2017 IRP Update still shows a resource gap in 2024, which is primarily dictated by the retirement of the 604

MW Allen Coal Units 1-3 by December 2024 as required by the Company's New Source Review litigation settlement. Mr. Kalemba further testified that even if the Company's load forecast were to continue to decline, "it is almost certain that there will be a need for new generation in 2024, and the Lincoln CT represents a cost-effective means to meet that need."

The Public Staff and NRDC/Sierra Club witnesses questioned the timing of the need for the Lincoln CT Project and asserted many possible changes to the underlying assumptions of the IRP that could materialize between now and the Lincoln CT Project's 2024 commercial operation date when Duke Energy Carolinas will take care, custody and control of the unit. NRDC witness Dr. Vitolo criticized the accuracy of Duke Energy Carolinas' past load forecasts as overstated; however, the Commission has accepted the Company's past load forecasts and found them to be reasonable for planning purposes in the IRP proceedings, including the 2016 IRP. In rebuttal, Duke Energy Carolinas witness Phillip O. Stillman, Director of Load Forecast and Fundamentals, disagreed with Dr. Vitolo's tests to validate his claims, and noted that Dr. Vitolo's conclusions were misleading because he did not consider the many changes in DEC's wholesale load, he gave no consideration to the significant decline in textile industry in the DEC territory, he gave no consideration to the 2007-2009 recession when DEC experienced a nearly 20% decline in industrial sales, and Dr. Vitolo's calculations were performed off the summer peak projections with no consideration given to the winter peak, even though Dr. Vitolo agreed that this is a winter need. Mr. Stillman further explained that if Dr. Vitolo had performed the same tests based on a winter peak the results would have been different and that under the seven-year-ahead test the forecasted peaks would have been under

projected nearly as often as they were over projected. While Mr. Stillman acknowledged that the Commission's 2016 IRP Order noted that DEC's load forecast "may be high," he testified that the concerns noted relate to the sensitivity of how customers react to winter peaks and that the Company is making refinements to the forecasting methodology in the 2017 IRP Update as requested by the Commission.

Based upon the 2016 IRP, the 2017 IRP Update and the entire record before the Commission, if the Commission were to deny the CPCN for the Lincoln CT Project, it is likely that DEC would need to seek a CPCN for a significantly higher cost CT to replace the Lincoln CT Project. Such a result would be short-sighted and contrary to the public convenience and necessity.

The Commission concludes that DEC has demonstrated a need for additional peak generating capacity in the 2024 time period. Because of the unique and beneficial arrangement with Siemens for DEC to host the extended commissioning, testing and validation period for this new advanced-class turbine from 2020 to 2024 when DEC will assume care, custody and control of the unit, the Commission concludes that this approach for the timing of the Lincoln CT Project is appropriate and consistent with the public convenience and necessity. For these reasons, the Commission concludes that the need for the Lincoln CT Project has been adequately demonstrated.

EVIDENCE AND CONCLUSIONS FOR FINDING OF FACT NO. 5

The evidence in support of this finding is based upon the verified application and the testimony and exhibits of Duke Energy Carolinas witnesses Landseidel, Phillip Stillman, and Kalemba, including the 2016 DEC IRP and 2017 DEC IRP Update Report,

the testimony of Public Staff witnesses Robert Hinton and Dustin Metz and NRDC/Sierra Club witness Dr. Thomas Vitolo, and NRDC/Sierra Club Confidential Cross Exhibit 1.

Public Staff witnesses Metz and Hinton and NRDC/Sierra Club witness Vitolo testified that because the IRP need date for the Lincoln CT Project is seven years from now in 2024, any number of changes to the load forecast, cost of technology, availability of alternative supply side options such as renewables and battery storage and other uncertainties were "possible." Dr. Vitolo asserted that it is premature for the Commission to issue a CPCN for the Lincoln CT Project, and Mr. Metz and Mr. Hinton asserted that it is premature for the Commission to issue a CPCN unless additional conditions are imposed. The Public Staff and NRDC/Sierra Club witnesses compared the timing between the filing of the CPCN application and the IRP need date for the Lincoln CT Project to that of the Duke Energy Progress ("DEP") contingent Asheville CT project in Docket No. E-2, Sub 1089, which was denied by the Commission without prejudice to DEP to refile. The Commission finds that the facts and circumstances of the Asheville CT are distinguishable from those here. First, DEP sought a CPCN for the Asheville CT project in 2016 with a potential commercial operation date in 2023; however, DEP did not propose to begin construction of the Asheville CT unit upon receipt of the CPCN because it was contingent upon efforts to work with customers in the DEP Western Region to utilize DSM, EE and other programs to attempt to delay or eliminate the peak demand growth that would require the contingent Asheville CT unit. Here, Duke Energy Carolinas needs a CPCN for the Lincoln CT Project to support the commencement of construction in 2018 to enable the operation of the unit in 2020. The Lincoln CT Project is scheduled to begin generating electricity in 2020 during an extended commissioning, testing and validation

period, and DEC will take care, custody and control of the unit in 2024 which aligns with the IRP need. Furthermore, Company witness Kalemba testified that the Asheville CT need is much more sensitive to load forecast changes, efforts to adopt EE in the DEP Western Region, and transmission modifications than the timing of the Lincoln CT Project, which is why the Asheville CT CPCN was filed as contingent upon the efforts to delay or eliminate the peak load demand. Mr. Kalemba further explained that the need for the Lincoln CT Project is primarily driven by the 604 MW Allen coal unit retirements in 2024 and that "while the comparison and timing are similar, the risks around those projects [Asheville CT and Lincoln CT] are not comparable."

Second, although the Public Staff and NRDC/Sierra Club argued that DEC is seeking a CPCN seven years before the generation is needed, with a corresponding seven-year period when the underlying assumptions supporting the CPCN application could change, Company witness Landseidel testified that those parties had underestimated the timing necessary to design, permit and construct an advanced-class turbine. Mr. Landseidel explained that if the Company were to need an advanced-class CT in 2024, without the extended commissioning, testing and validation period, the Company would begin design in 2020 and file the preliminary CPCN information with the Commission in early 2021. Upon questioning by the Commission, Mr. Landseidel confirmed that, as such, there is only an approximately two to two and a half year window after receipt of a CPCN order in this case when the possible uncertainties noted by the Public Staff and NRDC/Sierra Club could potentially develop. Even then, because of the significant capacity needs by 2024, the Company may need to file a CPCN application for a combined cycle project sooner. From an IRP perspective, although Mr. Kalemba

acknowledged that “anything is possible,” a two to two and half year window is “not a great deal of time” for the concerns of the Public Staff and NRDC/Sierra Club to materialize. The Commission agrees.

Mr. Kalemba further addressed the Public Staff and NRDC/Sierra Club’s concerns as to timing and need by explaining that although there is some risk that the underlying IRP need and analysis that supports any proposed new generation resource CPCN application could change during the course of project construction and before the ultimate commercial operation of that resource, this type of risk is always present. Mr. Kalemba also discussed N.C.G.S. 62-110.1(e1), which allows the Commission to review a CPCN to determine “whether changes in the probable future growth of the use of electricity” require modification or even revocation of a CPCN if the Commission finds that completion of the generation facility is no longer in the public interest. The Commission agrees and finds that the CPCN statute already contemplates that the underlying need for any generation facility which receives a CPCN could change prior to completion, and provides the Commission with a statutory avenue to address such a change in the unlikely event that it occurs during the construction or commission, testing and validation period for the Lincoln CT Project.

Furthermore, the Commission concludes that the risks of possible changes to the timing and need for the Lincoln CT Project are outweighed by the overwhelming and known benefits to customers from the project. As is discussed in greater detail, infra, first, DEC negotiated a significant multi-million dollar discount for the capital cost of the CT from Siemens, which Public Staff witnesses Metz and Hinton have acknowledged. Next by not taking care, custody, and control of the unit until 2024, DEC’s customers will

receive four years of free energy and capacity during Siemens' testing and validation period prior to DEC seeking to recover its costs for the Lincoln CT Project, along with fuel savings. Additionally, Siemens has agreed to reimburse the Company and its customers for inefficient fuel costs during that testing and validation period. DEC negotiated a discounted Long-Term Service Agreement ("LTSA") with Siemens, which provides for predictable maintenance costs and risk in line with a current generation machine. Also, simply having the CT operating on DEC's system will allow the Company to become familiar with the technology and will allow the Company to raise any concerns with the unit's operation and its impact on the system prior to assuming care, custody and control. Furthermore, the opportunity for DEC to partner with Siemens to test and validate this new turbine, and its many significant benefits, would be lost if the Commission were to adopt the position of NRDC/Sierra Club or adopt all of the proposed conditions of the Public Staff, all to the detriment of DEC's customers.

EVIDENCE AND CONCLUSION FOR FINDING OF FACT NO. 6

The evidence in support of this finding is based upon the verified application and the testimony and exhibits of Duke Energy Carolinas witnesses Kalemba and Landseidel, including the Company's late-filed exhibits, the testimony of Public Staff witnesses Hinton and Metz and NRDC/Sierra Club witness Vitolo.

Witness Kalemba testified to the economic analysis that DEC performed and which revealed that the Lincoln CT Project is the least cost option for customers in the 2024 time period. Mr. Kalemba discussed several quantitative reasons why DEC concluded that the Lincoln CT Project is the best resource addition for customers. First, the Lincoln County CT Project is being offered to the Company at a significant discount to similar

advanced technology CTs available in the marketplace - - approximately **[BEGIN CONFIDENTIAL] [END CONFIDENTIAL]** % total project cost savings. Additionally, in comparison to the less advanced, less efficient F-class CTs, the Utility is receiving an approximate **[BEGIN CONFIDENTIAL] [END CONFIDENTIAL]** % total project cost savings. Second, the Company will not seek to recover the capital costs of the CT in rates until after assuming care, custody and control in 2024; however, the Company's customers will benefit from the energy generated by the CT during its extended commissioning period that begins in 2020. During the approximately four-year extended testing and validation period, Siemens will determine the timing and nature of operation of the unit; however, DEC will receive the energy delivered to the Company's grid at only the variable cost of the fuel. As such, DEC customers will receive free capacity and essentially free energy during the four-year testing and validation period. Furthermore, Siemens will pay for any inefficient fuel use to the extent the unit is run out of economic merit order during this period. Third, the Lincoln County CT is approximately 6% more fuel efficient than current F-Class options, and is comparable to other suppliers' advanced-class gas turbines. As such, the new unit would be DEC's most efficient peaking unit and will be available for economic dispatch with an estimated capacity factor of 16%. However, the Lincoln CT Project could have capacity factors as high as 50% depending upon fuel prices and could therefore dispatch as an intermediate resource. Finally, major maintenance costs associated with the Lincoln County CT Project are deferred until the Company takes care, custody, and control of the unit in late 2024. The long-term major maintenance costs that become DEC's responsibility in 2024 are covered

by the LTSA whose terms are being provided at a significant discount to those associated with the less advanced F-Class CT technologies.

Mr. Kalemba explained that the Present Value Revenue Requirement ("PVRR") analysis for the Lincoln CT Project is conducted using the 2016 IRP without the CO_2 legislation expansion plan as the Base Case. This Base Case is compared to a case where the 468 MW Undesignated F-Class CT need identified in the 2024/2025 timeframe is mostly replaced by the 402 MW Lincoln CT Project. The balance of the MWs that are not replaced by the Lincoln CT Project are replaced by an F-Class CT in that same time period. Through this analysis, it was determined that the Base Case PVRR savings associated with the Lincoln CT project is **[BEGIN CONFIDENTIAL] [END CONFIDENTIAL]**. These PVRR savings are centered around three main variables:

1. Lower Capital Cost: The Siemens Advanced Turbine is being offered at an approximate **[BEGIN CONFIDENTIAL] [END CONFIDENTIAL]** cost savings versus the avoided F-Class CT. Additionally, from a timing standpoint, the Lincoln CT aligns with the designated need identified in the IRP as DEC is taking care, custody, and control in October 2024. From a PVRR standpoint, the net capital expenditures savings of this project versus the Base Case is approximately **[BEGIN CONFIDENTIAL] [END CONFIDENTIAL]**.

2. Improved System Fuel Cost: The Siemens Advanced Turbine is more efficient than F-Class CTs that were included in the Company's 2016 IRP, and this improved efficiency leads to reduced fuel and operating costs. Additionally, while DEC will not be taking care, custody, and control of the unit until 2024, DEC's customers will benefit from the energy produced from the unit beginning in the third

quarter of 2020 as the Advanced Turbine begins its extended commissioning and testing period. From a PVRR standpoint, the system fuel and operating costs are reduced by approximately **[BEGIN CONFIDENTIAL] [END CONFIDENTIAL]** versus the Base Case.

3. Lower Maintenance Costs: The negotiated LTSA for the Advanced CT is approximately **[BEGIN CONFIDENTIAL] [END CONFIDENTIAL]** lower on a $/MW-Start basis compared to the generic F-Frame CT assumptions. From a PVRR standpoint, the long-term maintenance costs savings are approximately **[BEGIN CONFIDENTIAL] [END CONFIDENTIAL]** versus the Base Case.

In addition to the Base Case analysis, several sensitivities were conducted around fuel price, as well as a sensitivity that includes an expansion plan with Lee Nuclear and a carbon tax on carbon emissions. These sensitivities all showed positive benefits from the Lincoln CT project.

NRDC/Sierra Club witness Vitolo asserted that DEC had not shown that the Lincoln CT Project is the least cost resource option, and based his opinion on the possibility that potential changes to the cost or viability of other alternatives could develop before 2022, when he asserted that DEC would need to make a decision on a resource to meet a 2025 capacity need. Public Staff witness Hinton reviewed DEC's PVRR analysis and found it to be reasonable and determined that the "economic justification is correct." Mr. Hinton also agreed that the PVRR of the Lincoln CT Project is very favorable to customers. Mr. Hinton also concluded that, as proposed, the Lincoln CT Project "will be a cost-effective resource." Mr. Hinton voiced concerns about the risks of possible changes in the underlying assumptions related to issues such as changes to load

forecast, development of alternative technologies, battery storage, DSM/EE, and renewables that caused the Public Staff to support a CPCN only if additional conditions were adopted by the Commission. DEC witness Kalemba testified, however, that even if the need was delayed for an additional six years until the winter of 2030/2031, the Lincoln CT Project would still have a positive PVRR and be beneficial to customers. The Commission is not persuaded by the Public Staff and NRDC/Sierra Club's concerns and finds that the economic justification for the Lincoln CT Project is significant and that the public convenience and necessity supports the construction of the Lincoln CT Project as proposed. The possible risks raised by the Public Staff and NRDC/Sierra Club are just that, possible but not absolute, and the Commission finds that they are outweighed by the significant, measurable and demonstrable benefits to customers from the Lincoln CT Project. DEC has the opportunity now to take advantage of very advantageous terms it has negotiated with Siemens and such benefits would be lost to the detriment of customers if the Commission were to deny the CPCN as requested by the Public Staff and NRDC/Sierra Club, and such a result would thereby require DEC to seek another CPCN in a couple of years at what is very likely to be a much higher customer cost.

NRDC/Sierra Club witness Vitolo expressed technology concerns about the "yet-untested design" of the new Siemens advanced-class turbine. Public Staff Hinton testified, however, that aside from the risk items that gave the Public Staff pause to support the CPCN only if additional conditions were imposed, "we are supportive of the economics and the engineering associated with this unit. We are - - we're solid behind that." Company witness Landseidel testified to the extensive due diligence Duke Energy Carolinas undertook to evaluate the new Siemens advanced-class turbine design,

including visits to Siemens facilities in Germany and Charlotte, and that the Company was satisfied that the technology did not present an unacceptable risk. Mr. Landseidel described the evolution of the CT technology over the last 25 years and how the new Siemens advanced-class unit will build upon the efficiency gains over the years and will be comparable to the GE and Mitsubishi advanced-class turbines. Mr. Landseidel testified that he personally visited these other manufacturers' new advanced-class turbine projects under construction in Oklahoma and Texas as part of the Company's due diligence. Mr. Landseidel also explained that Siemens is an established and proven gas turbine supplier and has all incentives to match or better any improvement from other advanced-class turbine manufacturers.

Mr. Landseidel also testified to the many protections the Company negotiated with Siemens to address technology risk. In his rebuttal testimony to NRDC/Sierra Club witness Vitolo's concerns about the Siemens technology, Mr. Landseidel explained that the EPC agreement provides a significant price discount (as validated by Burns & McDonnell and verified by the Public Staff), significant benefits to customers during testing and validation, high unit performance with guarantees, schedule guarantees, a favorable Long-Term Service Agreement, and perhaps the ultimate technology risk mitigation - - per the EPC agreement with Siemens, if in the unlikely event that the advanced CT does not meet certain DEC performance criteria, Siemens must then replace the advanced CT with two of the existing technology F-frame units at no additional cost. In addition, Siemens would be responsible for **[BEGIN CONFIDENTIAL] [END CONFIDENTIAL]** Company witness Kalemba testified that if Siemens has to replace the advanced-class turbine with two F-frame CT units per the EPC agreement, such CTs

would be for a total of 468 MW at the same cost of the 402 MW advanced-class CT, therefore resulting in an even lower $/kW benefit for customers. The EPC agreement also contains additional technology risk mitigation provisions that require Siemens to pay liquidated damages if the final version of the advanced-class turbine is either Version A or Version B at commercial operation, instead of the planned Version C. Furthermore, the EPC contains **[BEGIN CONFIDENTIAL] [END CONFIDENTIAL]** Mr. Landseidel testified that in his 35 years working for Duke Energy in major project construction and management, he has never been involved in a more favorable EPC contract than the one negotiated with Siemens for the Lincoln CT Project.

Mr. Landseidel also testified to the analysis performed by Burns & McDonnell to prepare a cost estimate for a GE advanced-class turbine at the Lincoln CT site. The cost estimate for the Lincoln CT unit is **[BEGIN CONFIDENTIAL] [END CONFIDENTIAL]** less than the Burns & McDonnell cost estimate, or less than **[BEGIN CONFIDENTIAL] [END CONFIDENTIAL]** of the market price for a similar unit. Mr. Landseidel described this as **[BEGIN CONFIDENTIAL] [END CONFIDENTIAL]**

During the extended testing and validation period, Siemens will also maintain a spare parts inventory, take parts life risk including in/out costs, and be responsible for all major maintenance costs until the unit goes into commercial operation. Siemens will also provide a full two-year warranty on the entire facility after DEC puts the unit into commercial operation. Siemens has also agreed to favorable long-term parts and maintenance agreement terms, which provide additional cost and risk benefits to DEC and DEC's customers. Mr. Landseidel testified to the **[BEGIN CONFIDENTIAL] [END CONFIDENTIAL]**

The technology selected for the Lincoln County CT Project will provide enhanced reliability, low turn down, fast ramp and efficient dispatch for the Duke Energy Carolinas system. Duke Energy Carolinas currently has approximately 735 MW (nameplate) of compliance and non-compliance intermittent renewable generation interconnected to its system, and the DEC 2016 IRP projects that a total of approximately 2,168 MW (nameplate) of rated compliance and non-compliance renewable energy resources will be interconnected to the Company's system by 2031. These resources help the Company comply with renewable energy mandates and provide important energy benefits to DEC's customers; however, the inherent intermittency of these resources does not allow the capacity to be dispatched or contribute to reliability in the same manner as a traditional resource such as a combustion turbine. Thus, the load following capability of the Lincoln County CT Project provides additional system flexibility, and reliability, to help accommodate the impacts resulting from the increasing amounts of intermittent resources being added to the Duke Energy Carolinas system.

The selection of the Siemens technology also helps to support economic development in North Carolina as both the plant and the manufacturing facility for the major components of the CT are located in North Carolina. With approximately 1,700 people employed by Siemens in the Greater Charlotte area and an additional 150-plus temporary jobs required for the construction, testing, and commissioning of the facility, the Lincoln County CT Project will help support economic growth in the Charlotte region. Finally, by providing Siemens with the opportunity to test and develop their advanced technology on the grid, DEC is helping to promote competition in the CT manufacturing marketplace which can have long-term benefits for DEC's customers. In addition, Mr. Kevin Poet, Operations

Manager for the Siemens Charlotte Energy Hub, testified at the Lincolnton public hearing to the regional economic development and local job creation that the Lincoln CT Project and future advanced-class turbine orders will create.

EVIDENCE AND CONCLUSION FOR FINDING OF FACT NO. 7

The evidence in support of this finding is based upon the verified application and the testimony and exhibits of Duke Energy Carolinas witness Kalemba, including the 2016 DEC IRP and 2017 DEC IRP Update, the testimony of Public Staff witness Hinton and NRDC/Sierra Club witness Vitolo.

Company witness Kalemba testified to the Company's consideration of DSM, EE and renewables in its 2016 IRP and in its decision to seek approval for the Lincoln CT Project. The comprehensive planning process for the 2016 IRP demonstrates that a combination of renewable resources; EE and DSM programs; and additional baseload, intermediate, and peaking generation are required over the next fifteen years to reliably meet customer demand. Under the no carbon Base Case, which consisted of no CO_2 emission costs and no new nuclear generation, the portfolio consisting of 142 MW (2,202 MW nameplate) of compliance and non-compliance renewable generation, 1,221 MW of new natural gas combined cycle capacity, 2,808 MW of new natural gas CT capacity (including the Lincoln County CT Project), 85 MW of nuclear uprates capacity, 669 MW of demand-side management, and 461 MW of energy efficiency was selected over the planning horizon.

Mr. Kalemba testified in detail as to how DSM and EE programs and renewable resources were analyzed in the Company's IRP. With respect to solar, EE and DSM, only DSM (demand response) programs are truly dispatchable. The Company has already

included its estimate of cost-effective DSM/EE and has identified the 2024 need as an incremental need in addition to its investment in EE and DSM. Further, the proposed Lincoln County CT Project will satisfy a critical resource need that provides not only peaking capacity, but also provides generation ancillary service benefits that are becoming increasingly important as more non-dispatchable and intermittent renewable generation is added to the DEC system. As a result, the Lincoln County CT Project helps to provide additional system flexibility required to enable the integration of intermittent renewable resources into the generation portfolio.

Public Staff witness Hinton and NRDC/Sierra Club witness Vitolo generally discussed the possibility that future changes to the availability and/or cost of DSM/EE or renewables could delay or replace the need for the Lincoln CT Project. Mr. Kalemba, however, testified in rebuttal that the increase in solar generation, along with volatility of customer demand during peak winter periods, is why the Company is now winter planning. Furthermore, Mr. Kalemba explained that solar does not provide significant capacity during peak winter mornings, and as such the increase in solar generation will have very limited impact on the timing of future resource needs. Mr. Kalemba was also asked about DEC's request for proposals ("RFP") for up to 500 MW of wind resources and testified that a significant amount of wind resources are included in the 2017 IRP Update, but it did not shift the first capacity need beyond 2024.

The Commission finds that Duke Energy Carolinas' need for generation cannot be met exclusively through the combination of renewable resources and DSM/EE and that peaking generation is needed. While N.C.G.S. 62-2(3a) requires evaluation of the full

spectrum of DSM and EE, the goal of such an analysis is to ensure that energy planning results in the least cost mix of generation and demand reduction.

EVIDENCE AND CONCLUSION FOR FINDING OF FACT NO. 8

The evidence in support of this finding is based upon the verified application and the testimony and exhibits of Duke Energy Carolinas witness Kalemba.

Company witness Kalemba testified to DEC's evaluation of the wholesale market as part of its decision to pursue a CPCN for the Lincoln CT Project. Mr. Kalemba explained that as the industry and the Carolinas transition to a more modern and efficient generation fleet, it requires the adoption of the most recent developments in natural gas turbine technologies. When reviewing the wholesale market, Mr. Kalemba noted that no existing advanced-class CTs are currently in service in the Carolinas. With respect to new construction, the opportunity to partner with Siemens in their development of an advanced-class CT was compared to the cost that would be incurred with other suppliers. To perform this comparison, Duke Energy Carolinas contracted with Burns & McDonnell to conduct a screening level capital cost estimate, included as Appendix A in Landseidel Exhibit 3, for an advanced-class CT at the Lincoln County site. The site-specific evaluation of the advanced-class turbine was developed based on recent similar project cost information and Lincoln County site information provided by the Company. Based on this review, it was determined that Siemens has offered a significant discount compared to market alternatives for the EPC contractor services including supply of the CT. Given the discount and advanced nature of the technology, the Company concluded that wholesale resources could not take the place of the Lincoln County CT Project.

No intervenor raised any issue with regard to the wholesale evaluation, nor did any intervenor submit testimony on these issues. The Commission concludes that it was appropriate for Duke Energy Carolinas to conclude that wholesale options could not reasonably serve the needs to be met by the Lincoln CT Project. In its August 11, 2008 *Order Holding Docket in Abeyance* in Docket No. E-100, Sub 122, the Commission declined to adopt formal procedures for utilities to assess the wholesale market whenever a utility needs additional generation capacity, but previously explained the wholesale evaluation requirement as follows:

> Accordingly, during future CPCN proceedings, the Commission expects the electric utilities to provide evidence of a robust and thoughtful review of opportunities in the wholesale market. The utilities should also employ the use of competitive bidding and/or third party evaluators as necessary and appropriate to instill confidence that their resource selections are in the public interest. At the end of the day, however, it is the utilities' responsibility to balance the sometimes complex and competing issues so that their customers are assured a reliable electricity supply at reasonable cost.

Because of the unique and substantial cost discount and benefits provided by the Lincoln CT Project, the Commission concludes that Duke Energy Carolinas' process to negotiate the EPC agreement with Siemens and the third party cost estimate prepared by Burns & McDonnell for the Lincoln CT Project adequately assures customers of a reliable electricity supply at reasonable cost.

EVIDENCE AND CONCLUSIONS FOR FINDING OF FACT NO. 9

The evidence in support of this finding is based upon the verified application and the testimony and exhibits of Duke Energy Carolinas witness Landseidel.

Company witness Landseidel testified to the comprehensive siting study that Duke Energy Carolinas conducted to determine the optimum siting location for new CT generation, which is further detailed in Landseidel Exhibit 2. The Lincoln County CT Station scored highest on the siting evaluation by a significant margin. On comprehensive site visits and site studies, no significant issues for the addition of a CT unit at the Lincoln County site have been found. In addition to the utilization of the existing switchyard and transmission capacity, the site provides other cost advantages, including existing fuel oil unloading infrastructure and existing natural gas infrastructure. There are also operating cost synergies associated with the adjacent existing CT units.

As part of the siting process for the Project, Duke Energy Carolinas' cultural resources consultant, Brockington & Associates, Inc., conducted an intensive cultural resources survey for the proposed Project. The North Carolina State Historic Preservation Office concurred with the Brockington's assessment that no historic resources would be affected by the project in the letter included as Appendix B-2 to Landseidel Exhibit 2. In addition to the cultural resources study, Duke Energy Carolinas conducted a Probable Visual Effect Analysis to characterize the existing visual conditions within five miles of the proposed Project and to determine the future plant's effects on the scenic quality of the area. The analysis determined the Lincoln County CT Project will have minimal effects on the visual resources and scenic quality of the area surrounding the proposed site.

The Commission concludes that Duke Energy Carolinas conducted a comprehensive siting process and appropriately selected its existing Lincoln CT generation complex as the site for the Lincoln CT Project.

EVIDENCE AND CONCLUSIONS FOR FINDING OF FACT NO. 10

The evidence in support of this finding is based upon the verified application and the testimony and exhibits of Duke Energy Carolinas witness Landseidel and Public Staff witness Metz.

Company witness Landseidel discussed the environmental controls and permitting for the Lincoln CT Project. Operation of the proposed facility will result in the emission of certain pollutants that are regulated by the US Environmental Protection Agency and the State of North Carolina. Operating impacts from these pollutants will be addressed through the North Carolina Division of Air Quality ("DAQ") air quality permit application process. On August 17, 2017, Duke Energy Carolinas submitted a permit application to DAQ requesting a permit to authorize construction and operation of the combustion turbine units and associated ancillary systems. The new unit will be designed to control emissions via combustion controls as well as a dilution air Selective Catalytic Reduction and Carbon Monoxide Catalyst to Best Available Control Technology; however, due to the size and efficiency of the unit and expected hours of operations, the application is expected to trigger New Source Review under the Prevention of Significant Deterioration program requirements. Duke Energy Carolinas anticipates that a final air permit should be issued within twelve months of submitting the application. Continuous emission monitoring systems will be installed on the turbine's exhaust stack.

The site has a Publicly Owned Treatment Works ("POTW") permit with Lincoln County Public Works, and preliminary plans include the installation of an oil/water separator for treatment of all potential oily waste streams and discharge to the POTW. Other liquid waste streams such as gas turbine wash wastewater will be pumped to tank trucks and hauled off-site for treatment. The following permits may be required in addition to those described above: North Carolina Oil Terminal Registration, Department of Environmental Quality and Lincoln County Storm Water permits, Division of Energy, Mineral and Land Resources Erosion and Sedimentation Control permit, Lincoln County Building permit, and Lincoln County Occupancy permit.

Public Staff witness Metz testified that on August 7, 2017, the State Clearinghouse filed comments in this docket that no further State Clearinghouse review action was needed for compliance with the North Carolina Environmental Policy Act.

No intervenor raised any issue with regard to the environmental impacts from the design of the Lincoln CT Project, nor did any intervenor submit testimony on these issues. The Commission concludes that Duke Energy Carolinas has considered environmental impacts from the Lincoln CT Project as part of the Project design and operation, and that necessary environmental permitting is subject to the jurisdiction of other State agencies.

EVIDENCE AND CONCLUSIONS FOR FINDING OF FACT NO. 11

The evidence in support of this finding is based upon the verified application and the testimony and exhibits of Duke Energy Carolinas witnesses Landseidel and Kalemba and Public Staff witness Metz.

Duke Energy Carolinas submitted confidential cost estimates for the Lincoln CT Project under seal pursuant to N.C. Gen. Stat. §132-1.2 in Landseidel Confidential

Exhibit 3. Public Staff witness Metz testified that the overall cost estimate for the Lincoln CT Project appears reasonable. Although Mr. Metz discussed some concerns about some discrete components of the Company's cost estimate, Mr. Landseidel responded and addressed these in detail in his rebuttal testimony. The independent cost estimate prepared by Burns & McDonnell further validates the significant discount that DEC negotiated with Siemens in the firm-price EPC agreement for the Lincoln CT Project.

No intervenor raised any issue as to the Company's cost estimates or submitted any evidence on this point. The Commission finds that the Company has reasonably forecasted the costs associated with the Lincoln CT Project vis-a-vis other alternatives, as discussed in the testimony of Company witness Kalemba and the Duke Energy Carolinas 2016 IRP, and the cost estimate for the Lincoln CT Project is reasonable and is hereby approved. The Company shall update the cost estimates during construction on an annual basis as required by N.C.G.S. 62-110.1(f).

EVIDENCE AND CONCLUSION FOR FINDING OF FACT NO. 12

The totality of the record before the Commission, and the evidence cited in support of the previous findings, demonstrates that construction of the Lincoln CT Project is required by the public convenience and necessity. The purpose of requiring a CPCN before a generating facility can be built is to prevent costly overbuilding. State ex rel. Utilities Commission v. High Rock Lake Association, 37 N.C. App. 138, 141 (1978). What is essential is establishing the element of public need for the proposed service. Id. In the present case, it has been demonstrated that the State of North Carolina, and Duke Energy Carolinas' customer base, is growing, while at the same time the Company is retiring older, less efficient coal units. In order to continue to reliably meet the growing power

supply needs of the State, and to continue to provide electricity at reasonable prices as is critical for the economic development and well-being of our citizens, Duke Energy Carolinas must take steps now to begin to ensure the possibility that the Lincoln CT Project is commercially available in 2024. The unique opportunity and compelling benefits presented by the partnership to host the first Siemens advanced-class CT unit, which is scheduled to begin providing electricity for the benefit of DEC's customers in 2020 and continuing during the extended commissioning, testing and validation period from 2020-2024 when the unit will progress from Version A to B to C, are in the public interest and further support the public need for the Project. But for the extended commissioning, testing and validation period and the associated terms negotiated with Siemens, DEC and its customers would not enjoy the substantial benefits and significantly reduced costs of the Lincoln CT Project when needed in 2024. Additionally, the Lincoln CT Project will bring economic development and new jobs to Lincoln County and Mecklenburg County and future regional economic benefits from the design and manufacture of the Siemens advanced-class turbines at its Charlotte manufacturing facility. The development of a Siemens advanced-class turbine will also support the entry of an additional advanced-class turbine market supplier to compete with the two existing suppliers, which can provide long-term benefits for DEC customers and the customers of other North Carolina electric suppliers.

The Public Staff proposed two conditions to address the potential timing risks they identified; however, as discussed previously, the Commission does not find these risks to be wholly persuasive and concludes that with the exception of a hybrid of one of the conditions, the Company has already adequately mitigated these risks through the cost

and various provisions negotiated with Siemens, as well as the unprecedented benefit that DEC customers will receive free capacity and energy during the four-year testing and validation period prior to DEC assuming care, custody and control in 2024. In addition, the Commission has sufficient authority in Chapter 62 to protect ratepayers from bearing excessive costs should they arise due to the extended construction period.

The Public Staff's first proposed condition would have delayed DEC's ability to seek cost recovery or request any deferral until the latest of the following three dates: December 1, 2024; the date by which DEC has taken care, custody and control and placed the unit into commercial operation; or the date DEC's 2017-2021 IRP shows a need for the Lincoln CT Project as long as such date is within two years of the date the IRP is approved; along with a requirement for DEC to run a new IRP/CPCN analysis for the Lincoln CT Project every year. The Commission finds that DEC has agreed that it will not seek to recover the capital costs in rates until it assumes care, custody and control of the unit and it goes into commercial operation, even if that date turns out to be later than 2024. Therefore, the Commission will condition the CPCN by prescribing the timeframe for which DEC may seek cost recovery associated with the project. The earliest date DEC can seek cost recovery for the Lincoln CT Project is December 1, 2024, which is the projected date the project will be completed and place into service. This trigger date ensures that ratepayers will not begin paying for the facility prior to the date its capacity is needed, even if construction is completed early and DEC takes possession and commences operations. In the event the Project is delayed beyond December 1, 2024, DEC would be prohibited from seeking rate recovery until it has both actually taken care, custody, and control of the Project and has placed it into commercial operation. This

would ensure that ratepayers will not be saddled with costs of the Project before it becomes used and useful. Witness Kalemba testified that these two trigger dates are consistent with the commitments DEC has already made with respect to the Project.

However, with respect to the third proposed trigger date advocated by the Public Staff, the Commission finds such a condition is unnecessary and unduly burdensome. The Commission finds that with this condition, the Public Staff has proposed that the Company essentially re-run the CPCN and IRP analysis each year, which the Commission concludes is unduly burdensome and unnecessary, especially in light of the overwhelming benefits and positive PVRR analysis which support the decision for the Lincoln CT Project CPCN. Furthermore, the Commission already has the authority under N.C.G.S. 62-110.1(e1) to review a CPCN and modify or even revoke a certificate if the Commission finds that completion of the generation facility is no longer in the public interest.

The Public Staff's second proposed condition asks the Commission to find DEC's construction cost estimate to be reasonable, but also find that there shall be a rebuttable presumption that any costs exceeding the total estimated project costs of **[BEGIN CONFIDENTIAL] [END CONFIDENTIAL]** are unreasonable or imprudently incurred and shall not be recoverable. The Commission finds such a condition to be unnecessary. First, cost recovery issues for the capital costs of new generation facilities are determined in a general rate case pursuant to N.C.G.S. 62-133, and the Commission's approval of a CPCN and its underlying cost estimate as reasonable does not constitute approval of the final costs associated therewith and is without prejudice to the right of any party to take issue with the treatment of the final costs for ratemaking purposes in a future proceeding.

The Commission finds no compelling reason or legal authority to change its longstanding practice of not addressing ultimate cost recovery issues in the context of a CPCN proceeding as the Public Staff would have us do. Second, N.C.G.S. 62-110.1(f) already requires all utilities to file an annual construction progress report and any revision to the construction cost estimate during construction, so the Commission, Public Staff and other parties will be aware of any revisions to the cost estimate during construction of the Lincoln CT Project. This statutory provision reflects the understanding that cost estimates are subject to change, upward or downward. Furthermore, although DEC has negotiated a very favorable cost under the EPC Agreement with Siemens, there could be any number of valid reasons why the final costs of the Lincoln CT Project or any multi-year generation facility construction project could potentially exceed that which is projected now or at the time of the CPCN proceeding, and yet still be reasonable and prudent costs that should be recovered from customers. Accordingly, such decisions should be made in the context of a general rate case, where Duke Energy Carolinas will have the burden of proof as to recovery its costs. The Commission is satisfied that there are safeguards in the North Carolina General Statutes that provide tools and mechanisms to allow the Commission to protect customers when DEC ultimately seeks cost recovery for the Lincoln CT Project, and the Public Staff's proposed conditions are not necessary.

The Commission notes that it retains full jurisdiction and authority to disallow any portion of costs associated with the Lincoln CT Project irrespective of any conditions imposed in this case. The Commission's authority is established throughout Chapter 62 of the General Statutes. Specifically, G.S. 62-133(b)(1) prescribes that public utility property must be "used and useful" or "used and useful within a reasonable time after the

test period." See State ex rel. Utils. Comm'n v. Carolina Water Service, Inc. of North Carolina, 328 N.C. 299 (1991) (affirming Commission's decision to only include the used and useful portion of utility investment in rate base) and State ex rel. Utils. Comm'n v. Carolina Water Service, Inc. of North Carolina, 335 N.C. 493 (1994) (holding costs of plant determined not used or useful should not be included in rate base). North Carolina General Statutes 62-133(d) requires the Commission to "consider all other material facts of record that will enable it to determine what are reasonable and just rates." The Commission has exercised its authority to disallow cost recovery in instances where plant was not used and useful or costs were unreasonable or imprudent.

While the Commission retains full jurisdiction and authority to disallow costs associated with the Lincoln CT Project during a general rate case, the Commission also possesses authority to impose conditions on utilities to help protect ratepayers against possible risks. This Commission has imposed, as conditions to CPCNs, requirements to retire generation units;[1] to investigate retrofitting coal-burning power plants;[2] to provide progress reports on efforts to work with ratepayers to reduce peak load through DSM, EE or other measures and on efforts to site solar and storage capacity;[3] to prohibit the beginning of construction until the Commission has reviewed certain plans and site layouts filed after the issuance of the CPCN;[4] and to file a plan to retire additional unscrubbed coal-fueled generating capacity reasonably proportionate to the amount of

[1] Docket Nos. E-2, Sub 1089, Sub 1066 and E-7, Sub 791 and Sub 832.

[2] Docket No. E-2, Sub 1089.

[3] F

[4] In the Matter of Application of Pantego Wind Energy LLC For a Certificate of Public Convenience and Necessity to Construct a Wind Facility of up to 80 MW in Beaufort County and Registration as a New Renewable Energy Facility, Docket No. EMP-61, Sub 0, Order Granting Certificate and Accepting Registration dated March 8, 2012.

incremental generating capacity authorized by the CPCN above the amount of capacity required to be retired as a condition to the CPCN[5]. In these cases, the Commission has exercised its authority as it considers appropriate to impose conditions to address uncertainty and ensure that the CPCN is executed as proposed by the applicant and in the manner the Commission intends.

As a condition of granting the CPCN in the present case, if the Company requests ongoing review pursuant to G.S. 62-110.1(f) or if the Commission conducts ongoing review by its own motion, the costs of the Lincoln CT shall still be subject to the Commission's authority to disallow any portion of the costs under a used and useful review in a future rate-making proceeding once the Lincoln CT is placed fully in service and as long as the capacity of the CT is not utilized at its intended full capacity, irrespective of G.S. 62-110.1(f1). This condition is in addition to the Company's commitment that it will not seek recovery of capital costs in the plant until it is completed.

In the presentation of its case, the Company acknowledged the Public Staff and NRDC/Sierra Club's concerns that there are uncertainties as to many future factors, including possible changes to future costs, technology advancements, and load growth, DR, EE, battery storage, etc., that could impact the timing and need for the Lincoln CT Project in the future. Such uncertainties are present in every CPCN proceeding, and decisions must be made years in advance of projected IRP capacity needs in order to plan for and provide for a reliable and economic supply of energy for North Carolina. The

[5] In the Matter of Application of Progress Energy Carolinas, Inc. for a Certificate of Public Convenience and Necessity to Construct a 950 Megawatt Combined Cycle Natural Gas Fueled Electric Generation Facility in Wayne County Near the City of Goldsboro and Motion for Waiver of Commission Rule R8-61, Docket No. E-2, Sub 960, Order Granting Certificate of Public Convenience and Necessity Subject to Conditions, dated October 22, 2009.

Company's IRP anticipates these factors and takes them into account. Nevertheless, the Commission agrees with the Public Staff that the unique features of this request, including the long-lead time and experimental nature of this project require an extra measure of scrutiny. The Commission determines that it will monitor the progress of this project more closely than it has in past cases and will make any adjustments necessary, including disallowing costs or future cost estimates that are unreasonable or imprudent, to protect Duke Energy Carolinas' ratepayers from excessive costs. Based upon the best information now available to the Company, and for all the foregoing reasons carefully considered and discussed by the Commission in this Order, the Commission concludes that Duke Energy Carolinas has met its burden of showing that construction of the Lincoln CT Project is in the public convenience and necessity.

The Company has the obligation to submit annual progress reports during construction pursuant to N.C.G.S. 62-110.1(f), as well as annual resource plans and updates pursuant to Rule R8-60, and this Commission will be kept apprised of any developments that could influence the need for and timing of the Lincoln CT Project. Duke Energy Carolinas' decision to pursue the CPCN for the Lincoln CT Project for the benefit of its customers is prudent and is approved. Finally, the Commission takes note of the unique circumstances that drive the timing of this application. Duke Energy Carolinas wishes to participate in the development and field validation of an advancement in technology that, if proven, can offer substantial cost benefits not only to its own ratepayers but also to the broader marketplace. This is commendable, and the Commission believes that it is in accord with the general policy goals expressed in G.S. 62-2(a)(6). However, the Commission cautions that there must be no presumption that the risks inherent in

such development ventures will entirely be shouldered by ratepayers instead of the Company's shareholders. In addition, the circumstances concerning the timing of and the justification for the Company's participation in this project are, if not unique, certainly exceptional. As explained earlier, several factors peculiar to this Project differentiate it from other applications recently disapproved or disallowed by Commission The Commission therefore cautions that this Order should not and cannot be given weight as precedent in any future application by the Company or by other regulated public utilities subject to the Commission's jurisdiction.

IT IS, THEREFORE, ORDERED:

1. That the Application filed in this docket should be, and the same hereby is, approved and a Certificate of Public Convenience and Necessity for the nominal 402 MW Lincoln County CT Project and associated transmission lines is hereby granted with the condition that DEC will not seek cost recovery before the later of December 1, 2024, or the date by which DEC has taken care, custody and control and placed the unit into commercial operation, and this Order shall constitute the certificate;
2. That because the Lincoln CT Project will be built as progressive advanced-class versions A (369 MW), B (382 MW), and C (402 MW), and is subject to potential final configuration as Version A, B or C or as two F-class CTs (468 MW) under the EPC agreement with Siemens, the approval granted by this Order shall apply to the progressive and final version of the unit or units as set forth herein;

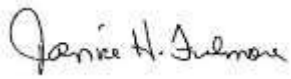
3. That Duke Energy Carolinas shall construct and operate the Lincoln County CT Project in accordance with all applicable laws and regulations, including the provisions of all permits issued by the North Carolina Department of Environmental Quality;
4. That Duke Energy Carolinas shall file with the Commission in this docket a progress report and any revisions in the cost estimates for the CT on an annual basis, with the first report due no later than one year from the issuance of this Order;
5. That for ratemaking purposes, the issuance of this Order and CPCN does not constitute approval of the final costs associated therewith, and that the approval and grant is without prejudice to the right of any party to take issue with the treatment of the final costs for ratemaking purposes in a future proceeding; and
6. That for ratemaking purposes, even if the costs for the CT are subject to ongoing review per DEC's request or by the Commission's own motion, the Commission shall still retain the authority to disallow any portion of the costs under a used and useful review in a future rate-making proceeding. Without limitation on the foregoing, in the event the Commission may later find that changes from the Company's forecasts in its 2016 and 2017 Integrated Resource Plans with respect to actual loads and projected load growth, the utilization of energy efficiency and demand side management measures, the penetration and reliability of renewable resources, the Company's actual mix of generation resources, the Company's reserve margins, or any combination of such factors does not warrant a need for the Lincoln County CT Project until

a time later than the winter of 2024-25, the Commission may require that the Company defer recovery for some or all of the costs of the Project until such need is demonstrated by the Company's most recently approved Integrated Resource Plan.

ISSUED BY ORDER OF THE COMMISSION.

This the 7th day of December, 2017.

NORTH CAROLINA UTILITIES COMMISSION



Janice H. Fulmore, Deputy Clerk

NCUC DOCKET NO. E-7, SUB 1134
LINCOLN COUNTY CT ADDITION PROJECT CPCN

Exhibit 2: Site and Permitting Information

LINCOLN COUNTY COMBUSTION TURBINE ADDITION PROJECT

Exhibit 2: Site and Permitting Information

INTRODUCTION

PRELIMINARY PLANS AND EXHIBITS

1.0 SITE INFORMATION

- **1.1 Site Location, Address, and Ownership**
- **1.2 Site Description**
- **1.3 Site Selection**
  - 1.3.1 Siting Criteria
  - 1.3.2 Siting Results
  - 1.3.3 Recommendation
- **1.4 Site Characteristics**
  - 1.4.1 Local Population
  - 1.4.2 Area Development
    - 1.4.2.1 Existing
    - 1.4.2.2 Future
  - 1.4.3 Visual and Auditory
    - 1.4.3.1 Visual
      - 1.4.3.1.1 Visibility from Residences
      - 1.4.3.1.2 Visibility from Public Roads
    - 1.4.3.2 Auditory
      - 1.4.3.2.1 Existing Community Noise Levels
      - 1.4.3.2.2 Estimated Sound Levels of Existing CTs and Proposed Addition
      - 1.4.3.2.3 Estimated Sound Levels of the Proposed Facility
      - 1.4.3.2.4 Anticipated Effects
  - 1.4.4 Aesthetic/Cultural Resources
    - 1.4.4.1 Historic Sites
    - 1.4.4.2 Archaeological Sites
  - 1.4.5 Geological
    - 1.4.5.1 Geology and Geologic History
    - 1.4.5.2 Dominant Soil Types
  - 1.4.6 Ecological
    - 1.4.6.1 Terrestrial Resources
      - 1.4.6.1.1 Botanical
      - 1.4.6.1.2 Wildlife
    - 1.4.6.2 Aquatic Resources
  - 1.4.7 Meteorological
    - 1.4.7.1 Climatology
    - 1.4.7.2 Air Quality
  - 1.4.8 Seismic
    - 1.4.8.1 Seismic Character and Seismic Hazards
    - 1.4.8.2 Seismic Zones and Magnitude

LIST OF FIGURES WITHIN DOCUMENT

INTRODUCTION

Duke Energy Carolinas (DEC) requests certification to construct a simple-cycle combustion turbine (CT) facility at its existing Lincoln County CT site.

This exhibit provides site and permitting information for construction of the proposed simple-cycle generating facility and for related upgrades to on-site transmission facilities, pursuant to North Carolina Utilities Commission (NCUC) Rule R8-61. All descriptions, illustrations, and information provided herein are based on preliminary engineering and studies, using the most reliable information available to date. The following information is included:

- Facility Layout Map
- Site Location and Address
- Site Ownership
- Site Description
- Site Selection
- Site Analysis
- Site Study Status
- Transmission

PRELIMINARY PLANS AND EXHIBITS

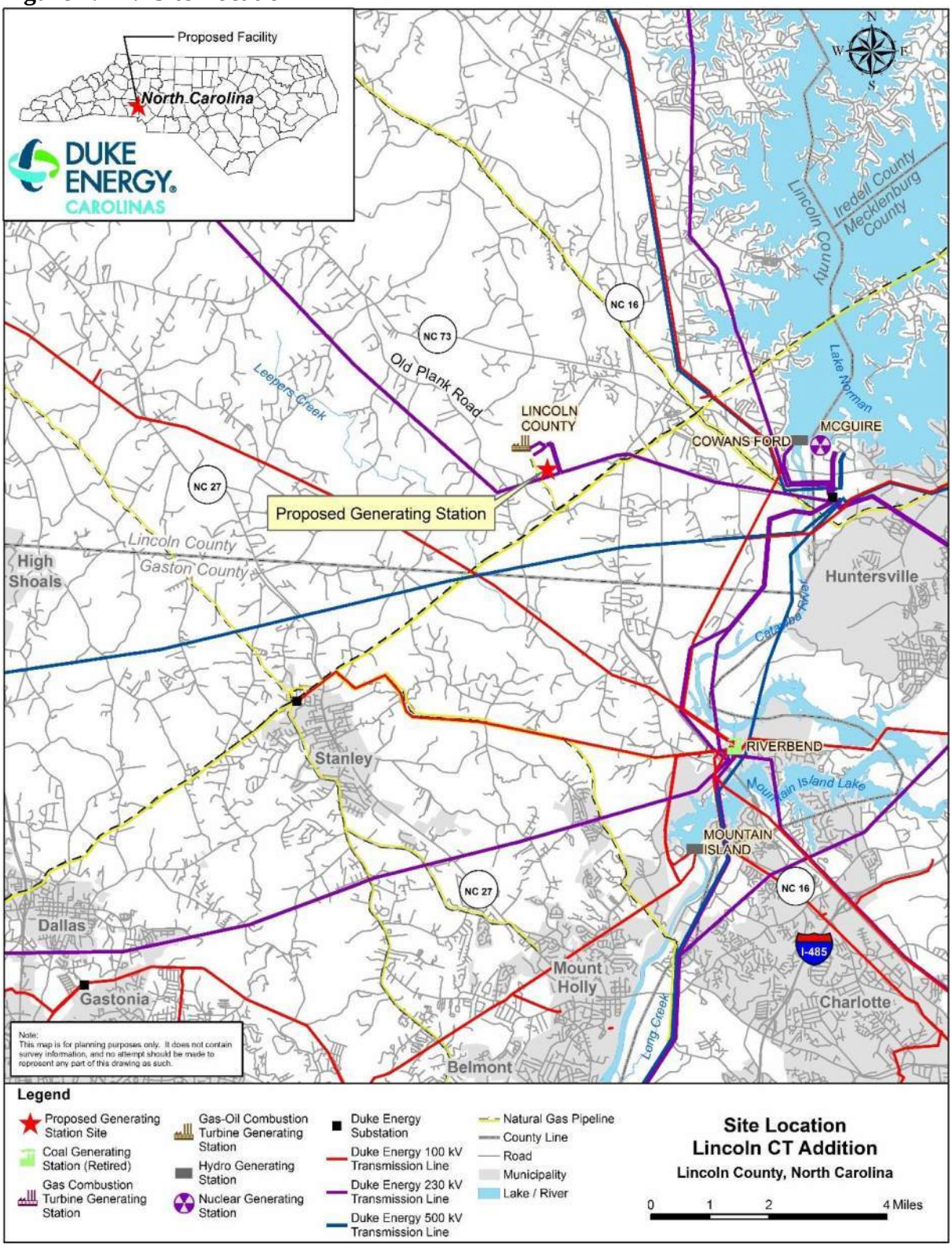
1.0 SITE INFORMATION

DEC contracted with consultants from UC Synergetic (UCS), Brockington & Associates, Inc. (Brockington), terra incognita, HDR, and Stewart Acoustical Consultants (Stewart) to perform research and conduct studies related to the siting of the proposed generating facility, including analyses of local population, area development, visual and auditory resources, aesthetic and cultural resources, geology, ecology, seismicity, water supply, and aviation.

1.1 Site Location, Address, and Ownership

The proposed Lincoln County CT Addition will be owned by DEC and located on DEC-owned property at the Lincoln Combustion Turbine Station (the station) site in southeastern Lincoln County, North Carolina. The proposed facility's address will be 6769 Old Plank Road, Stanley, North Carolina, 28164; its approximate GPS coordinates are 35° 25' 36.54" north and 81° 02' 07.74" west. Figure 1.1-1 is a map showing the location of the proposed facility.

Figure 1.1-1: Site Location

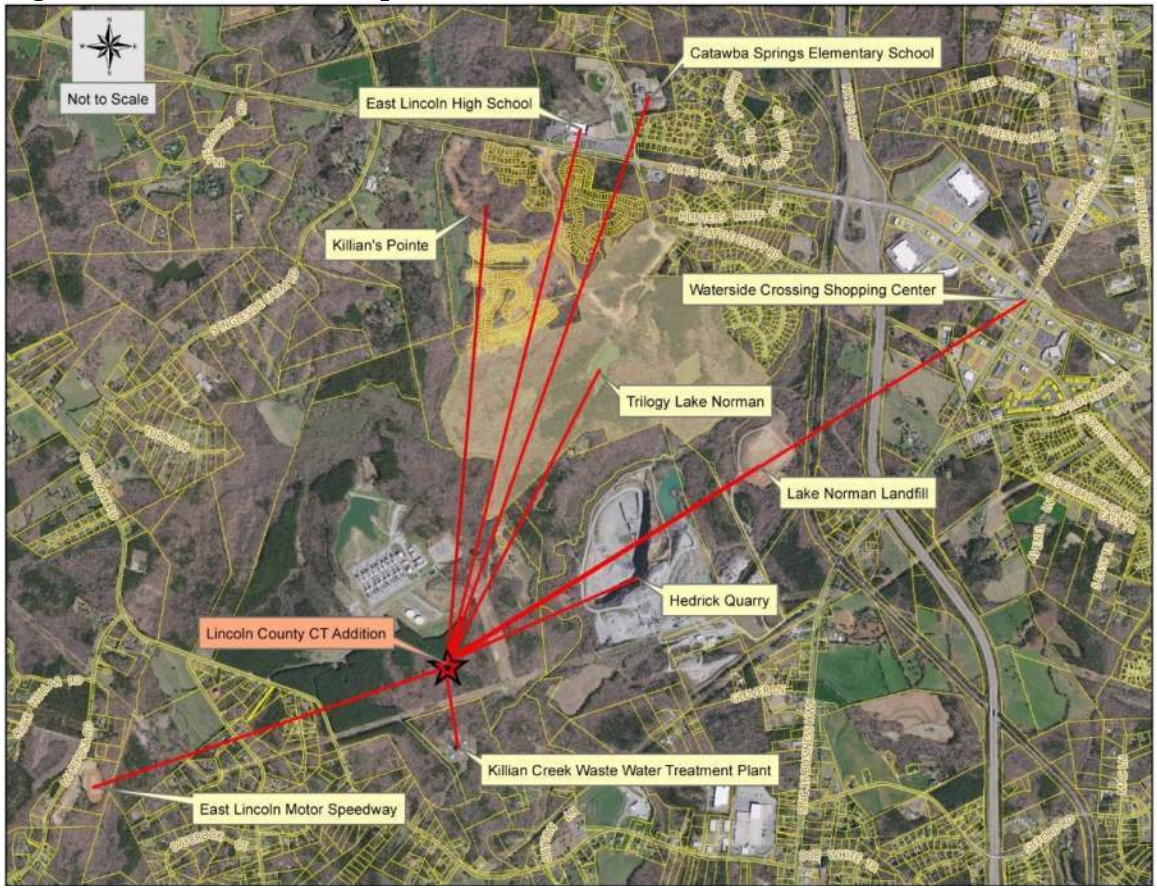


Sources: NCDOT 2016, Hart Energy 2016, Lincoln County GIS/Mapping 2016, Lincoln Count GIS/Mapping (Streets) 2016, Bradley 2016, Gaston County 2016, Iredell County 2016

The area around the station and the proposed facility is a mixture of rural, residential, commercial, and industrial land uses. The existing 1200-megawatt (MW) station has been operating commercially since 1995. Commercial and industrial development in the vicinity includes East Lincoln Motor Speedway (1.2 miles southwest), Hedrick Quarry (0.6 miles east), Killian Creek Waste Water Treatment Plant (0.3 miles southeast), Lake Norman Landfill (1.3 miles northeast), and the Waterside Crossing shopping center at the intersection of North Carolina Highways 16 (Highway 16) and 73 (Highway 73) (2.3 miles northeast). Nearby schools are East Lincoln High School (1.85 miles north) and Catawba Springs Elementary School (2.1 miles north). The communities of Lowesville and Denver are about 1.5 miles to the east and 5.9 miles northwest, respectively; nearby towns include Stanley (5.9 miles south) and Lincolnton (11.5 miles west).

Figure 1.1-2 shows the locations of major commercial, industrial, and residential developments as well as nearby schools.

Figure 1.1-2: Land Use Map



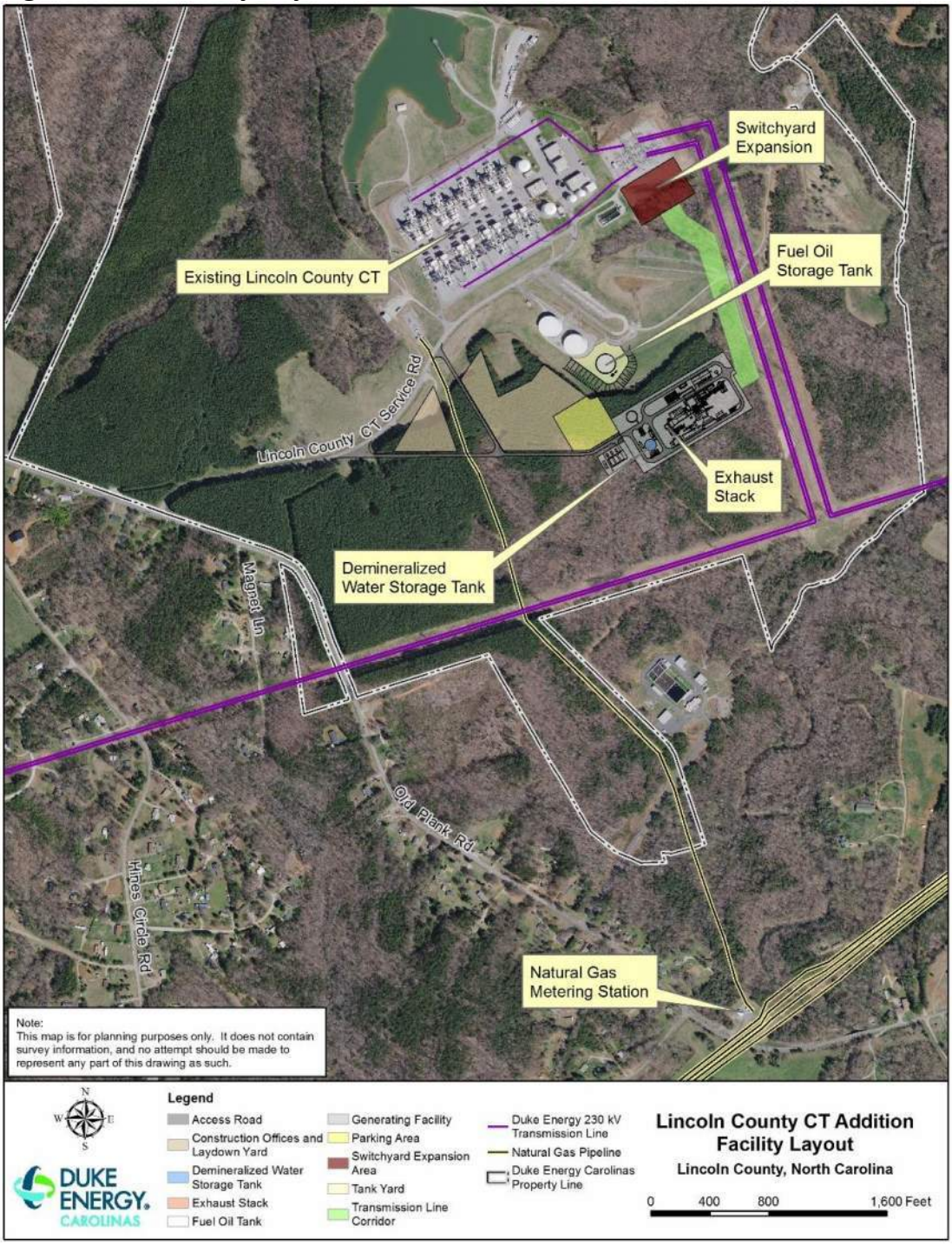
Sources: Lincoln County GIS/Mapping 2016a and 2016b

1.2 Site Description

The plant property encompasses about 746 acres of land, a portion of which is occupied by the existing combustion turbines, an electrical substation, the associated balance of plant facilities, and buffer lands.

Figure 1.2-1 provides an overall view of the proposed facility.

Figure 1.2-1: Facility Layout



Sources: Hart Energy 2016, Lincoln County GIS/Mapping 2016a and 2016b, North Carolina GICC 2015

1.3 Site Selection

1.3.1 Siting Criteria

The site selection was made using a modified Kepner-Tregoe analysis with input from project team members. All of the desired traits of the site were listed and weighted on a scale of one to ten, based on importance. The more important criteria were given a higher weight. After the criteria were established, each site was rated on a one-to-ten scale for each criterion. The score for each site was determined by multiplying each criterion weight by the site score for that criterion. The weighted scores for all criteria were then added to determine each site's total score.

The selected criteria and weighting for the site selection are presented in Table 1.3.1-1 below.

[**BEGIN CONFIDENTIAL**]

Table 1.3.1-1: Site Selection Criteria and Weighting

Criteria	Reason	Weight
Transmission Capacity	Available transmission capacity can provide significant cost-saving opportunities.	8
Natural Gas Capacity	Available natural gas capacity can provide significant cost saving opportunities.	9
Fuel Oil/Water Availability	Existing oil-loading, storage, and water infrastructure provides cost-saving opportunities during the commissioning test and for long-term operation.	3
Long Term Simple Cycle	Site characteristics support long-term operation as a system resource.	10
Combined Cycle Conversion Potential	Site characteristics would support potential conversion to combined cycle at some point in the future.	7
Operational Synergies	Existing sites with gas turbine generation are staffed with personnel with a good understanding of the operation and maintenance of gas turbines.	3
Rail Access	Access to nearby rail lowers cost of turbine and transformer delivery.	3
Proximity to Charlotte	Siemens' manufacturing facility and technical support are located in Charlotte, which would increase efficiency and provide cost-saving opportunities.	3

[**END CONFIDENTIAL**]

1.3.2 Siting Results

All DEC generation sites with existing or planned natural gas infrastructure were considered. Listed below are the sites and the total score for each, based upon the criteria and weights described in Table 1.3.1-1.

- Lincoln (Lincoln County, NC) 416
- Mill Creek (Cherokee County, SC) 293
- Rockingham (Rockingham County, NC) 212
- Dan River (Rockingham County, NC) 208
- Cliffside (Cliffside/Rutherford Counties, NC) 188
- W.S. Lee (Anderson County, SC) 169
- Buck (Rowan County, NC) 133

1.3.3 Recommendation

The Lincoln County CT Station scored highest on the siting evaluation by a significant margin. On a comprehensive site visit, no major issues for the addition of a CT unit at the Lincoln County site were found. Subsequent detailed field work at the Lincoln County site substantiated the preliminary evaluation.

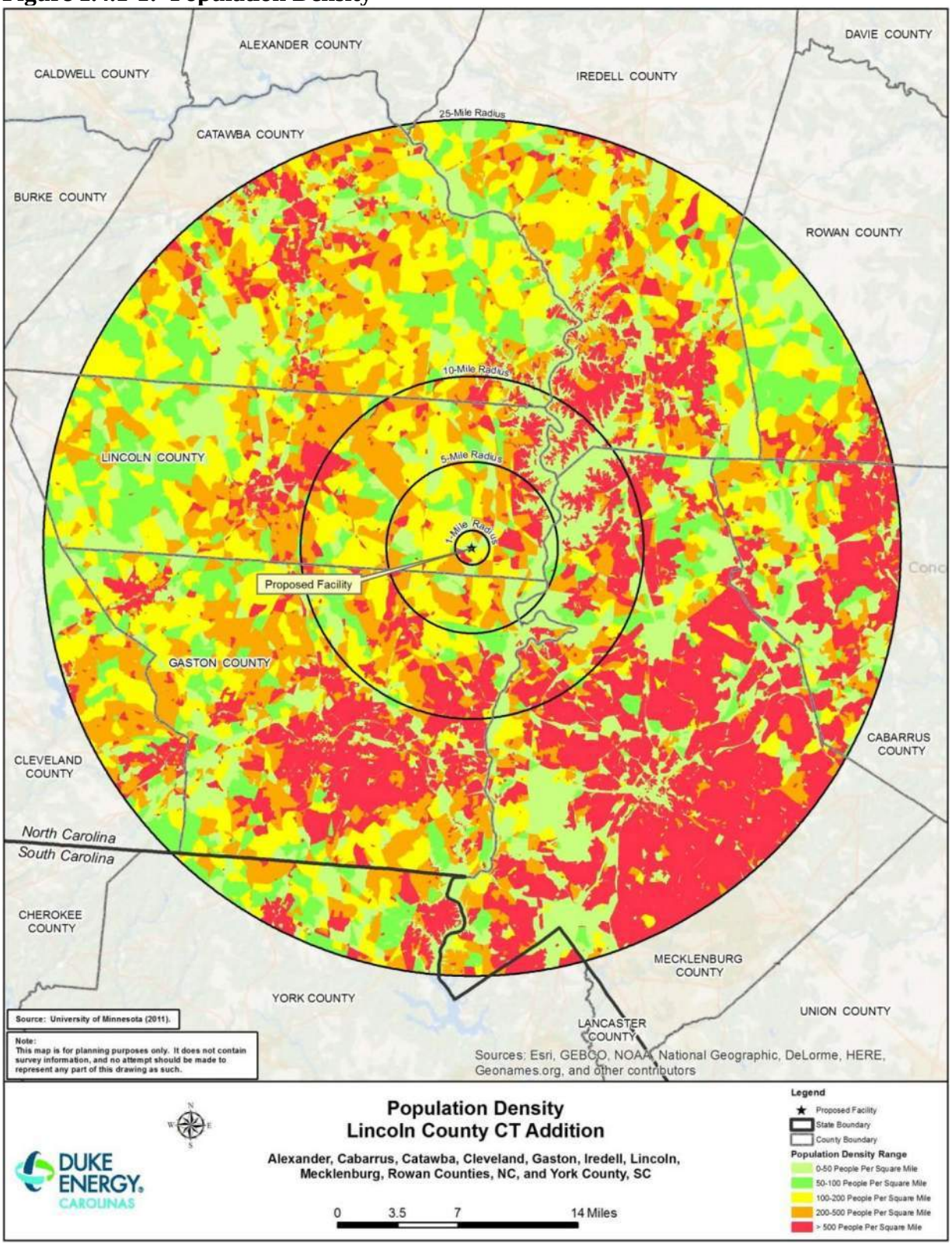
1.4 Site Characteristics

1.4.1 Local Population

According to the U.S. Census Bureau, Lincoln County's 2010 population was 78,265. The towns of Stanley and Lincolnton had 2010 populations of 3,556 and 10,486, respectively. The unincorporated community of Lowesville (a CDP, or census designated place) had a 2010 population of 2,945 (University of Minnesota 2011).

Within a 25-mile radius of the proposed facility, the population is about 1,374,000 (USCB 2015a).

Figure 1.4.1-1: Population Density



Sources: Esri 2016, USCB 2015a, University of Minnesota 2011

1.4.2 Area Development

1.4.2.1 Existing

A UCS representative met with Lincoln County planners on Friday, December 16, 2016, to discuss development in the area. The Trilogy at Lake Norman ([Trilogy], a 606-acre community with a maximum of 1,650 housing units for ages 55+) and the adjacent Killian's Pointe subdivision (all ages), located northeast of the site, are under construction (see Figure 1.1-2). The master plan for Trilogy shows that some units will be about 0.6 miles from the proposed facility (Combs 2016).

The Carrington subdivision has been approved for 87 acres near the intersection of Old NC Highway 16 and Pilot Knob Road, about 1.6 miles east of the proposed facility. This subdivision will have about 302 single-family homes (Combs 2016).

There are scattered rural-residential areas in the vicinity of the proposed facility. Using field reconnaissance, digital data from Lincoln County, and desktop analysis, UCS located approximately 158 single-family and two multi-family residences within one mile. In addition, one church and one community building are located within one mile of the proposed facility.

1.4.2.2 Future

Lincoln and Gaston counties are coordinating future development (industrial/commercial intermixed with conservation and open space) of over 600 acres at a proposed new interchange where new NC Highway 16 crosses the boundary between the two counties, but there are currently no firm plans. The two counties' planning departments developed a "small area plan" for this area, which is about two miles southeast of the proposed facility (Combs 2016).

The 2007 Lincoln County Land Use Plan shows future land uses around the proposed facility as mostly rural, suburban, or mixed

residential (Lincoln County 2016). The Gaston County 2035 Comprehensive Land Use Plan, adopted September 27, 2016, shows future land uses south of the proposed facility as suburban development in addition to rural or rural communities (Gaston County Planning 2016).

1.4.3 Visual and Auditory

1.4.3.1 Visual

The degree of visual impact that the proposed generating facility will have on an existing feature (e.g., scenic vista, cultural resource) is directly related to the visual contrast between the proposed facility and the scenic quality of the existing area or region (i.e., the higher the scenic quality, the greater the potential for adverse visual impacts and vice versa). Scenic quality is derived from the interrelationship of multiple factors, including landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications.

Topographic conditions for the surrounding area are typical of those within the Southern Piedmont Physiographic Province, primarily consisting of rolling to hilly terrain. Opportunities for scenic vistas are limited because there are few topographical high points, and the area is largely forested. Diverse land uses have a direct impact on the scenic quality of the area. Eastern portions of the study area, generally along the Highway 16 corridor, are highly modified by various types of residential, commercial, and industrial development and infrastructure. This area is characterized by a lack of visual definition or connectivity relative to varying land uses, and thus its visual quality relative to other areas has already been diminished. The central and western portions of the study area along Old Plank Road, Mariposa Road, and South Ingleside Farm Road contrast greatly to the highly developed Highway 16 corridor. This area is generally characterized by low-density rural-residential development. Historic resources, such as plantation homes and historic markers, can be discovered along rural tree-lined roads that are intermixed

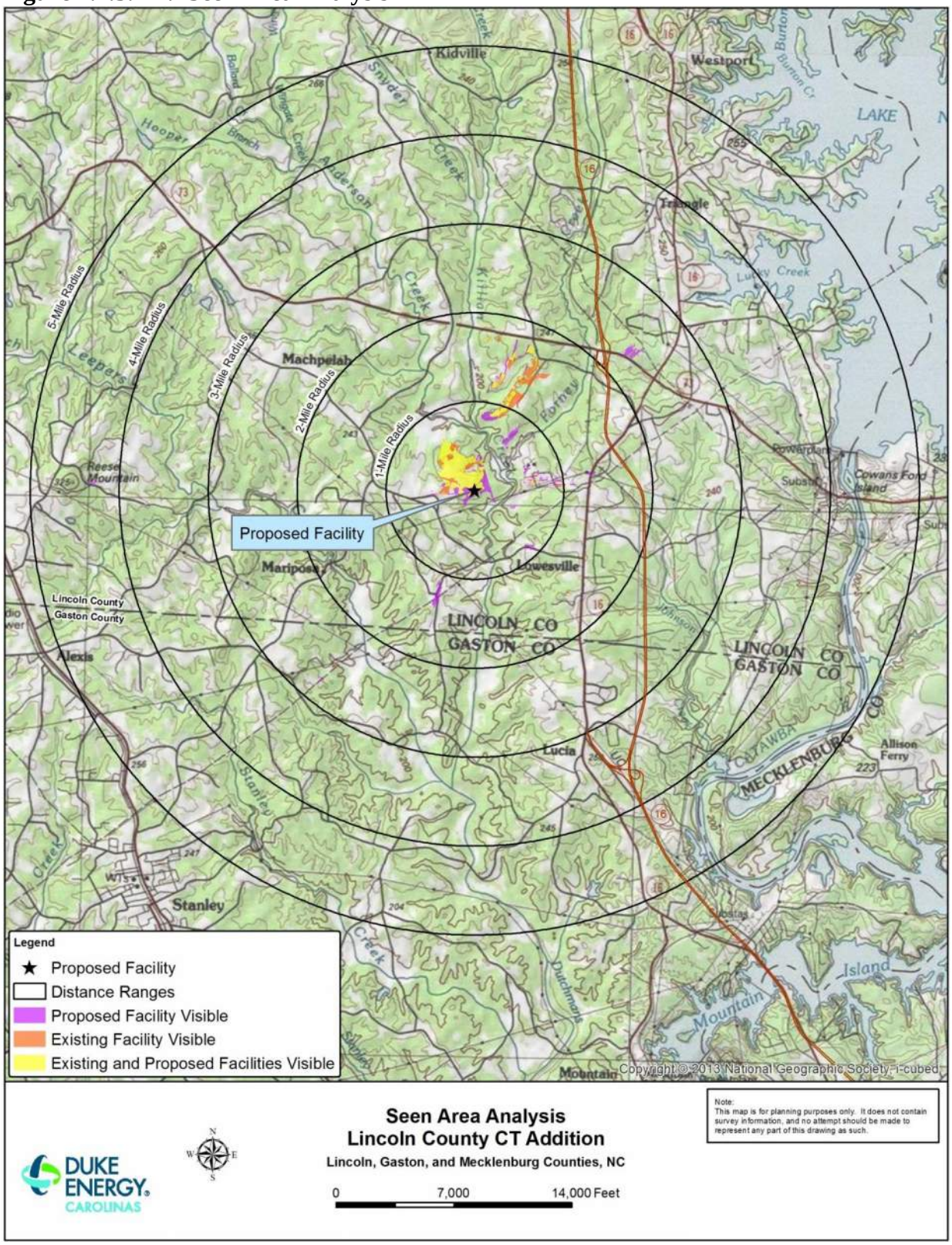
with occasional pockets of pasture. Although there are more contributions to scenic quality in the western portions of the study area than there are along the Highway 16 corridor, the western portions still lack widespread opportunities for scenic enjoyment, such as interesting landscape features.

During a probable visual effects field study, existing residential properties and public roadways were identified as resources with the potential to be most affected by views of the proposed facility, particularly views of the 90-foot-high turbine building and 130-foot-high stack.

Figure 1.4.3.1-1 shows areas within five miles that have a view of the existing simple-cycle plant only, areas with a view of the proposed facility only, and areas predicted to have views of both.

Table 1.4.3.1-1 displays the results of the Seen Area Analysis and Predicted Visual Effects. The data confirms that the proposed facility may be visible from only a minor portion of the surrounding area because of visual obstructions from hills and mature forest cover. Of the total area within five miles of the site (78.54 square miles), the proposed facility will be visible in areas totaling only 0.16 square miles (0.20 percent of the total area) outside the DEC-owned property that is generally inaccessible to the public. UCS further predicts that outside of the DEC-owned property, the future facility will be visible from only 0.11 square miles that do not already have a view of the existing generating facilities (0.14% of the total area).

Figure 1.4.3.1-1: Seen Area Analysis



Sources: ArcGIS 2013, Combs 2016, USDA National Elevation 2016, USDA Orthoimagery 2016

Table 1.4.3.1-1: Seen Area Analysis and Predicted Visual Effects

Visual Effects Probability	View Distance Range from Future Plants (miles)	Total Area (sq. mi.)	Probable Total Area with a View of Only the Existing Plants (sq. mi.) [1]	Probable Total Area with a View of Only the Future Plants (sq. mi.) [1]	Probable Total Area with a View of Both the Existing and Future Plants (sq. mi.) [1]	Probable View Area % of Total Area Where Additional Visual Effects Probability Could Occur[1, 2]
Very High	0.0 - 0.5	0.79	0.00	0.00	0.00	0.00%
High	0.5 - 1.0	2.36	0.01	0.05	0.02	2.12%
Moderate-High	1.0 - 1.5	3.93	0.06	0.03	0.02	0.76%
Moderate	1.5 - 2.0	5.50	0.02	0.01	0.01	0.18%
Low-Moderate	2.0 - 3.0	15.71	0.00	0.02	0.00	0.13%
Low	3.0 - 4.0	21.99	0.00	0.00	0.00	0.00%
Very Low	4.0 - 5.0	28.27	0.00	0.00	0.00	0.00%
Totals	**Totals**	**78.54**	**0.09**	**0.11**	**0.05**	**0.14%**

[1] Visibility not calculated within DEC-owned property.
[2] Areas with additional visual effects were those determined to not have a previous view of the existing Lincoln Plant.

***Very High*:** Plant element(s) will dominate the view because of proximity to the view point and/or the number of elements viewed; because their setting in the landscape commands strong visual attention; or a combination of these factors. Natural landscape elements will be dominated by plant elements.

***High*:** Plant element(s) will be dominant in the view because of their perceived size from the view point or the number of elements viewed; because their setting in the landscape commands strong visual attention; or a combination of these factors. Natural landscape elements will continue to be a moderate influence in the viewshed.

***Moderate-High*:** Plant element(s) will command strong visual attention in the viewshed but will be somewhat mitigated by the influence of the ambient landscape character.

Moderate*:* Plant element(s), though easily recognizable, will be visually subordinate to the ambient landscape character.

Low-Moderate: Plant element(s) will be easily recognized in the ambient landscape setting but command only casual attention in the view.

Low: Plant element(s) will be dominated by the ambient landscape character.

Very Low: Plant element(s) will be totally subordinate to the broader landscape setting and may not command attention from casual viewers.

The visual effects that will result from the addition of the proposed facility will be influenced by several factors, including the following:

- The distance from the viewer to the proposed facility
- The elements of the facility seen (i.e., the emission stack or the entire facility)
- The backgrounds of visible structures (i.e., whether visible structures are seen against backdrops such as vegetation, terrain, or man-made elements, or silhouetted against the skyline)
- The presence or absence of foreground and mid-ground vegetation or man-made elements in the view
- The overall scenic condition (landscape content and quality) of the area from which the facility is viewed

The data derived from the Seen Area Analysis and Predicted Visual Effects were correlated to probable visual effects ranging from Very High to Very Low in Table 1.4.3.1-1.

Using the distance from the viewer to the proposed facility site, UCS predicted (ranked) the visual effects that may occur as a result of the proposed plant. The ranking represents a worst-case scenario, since no attempt was made to reduce the predicted visual effects probability that will inevitably occur when foreground and mid-ground vegetation or backdrops are present. Also, no attempt was made to mitigate predicted view ranking based on existing modifications to natural landscape settings or the fact that only minor plant features may be seen from an area having a probable view. For example, even if only the top segments of the stack (the tallest structure) can be seen from half a mile away, the view effect was ranked as Very High.

1.4.3.1.1 Visibility from Residences

UCS conducted an extensive field investigation to determine the facility's probable visual effects on residential properties within visual proximity. Initial investigations showed that only two residential areas will have potential views of the proposed facility (a few homes near the Old Plank Road and Gold Hill Church Road intersection and the Trilogy residential development along Highway 73). UCS determined that other surrounding areas were sufficiently screened from the existing and proposed facilities by a combination of vegetation and terrain.

Fewer than a dozen homes near the intersection of Old Plank Road and Gold Hill Church Road may have a slight view of the tallest parts of the proposed facility (e.g., the exhaust stack and turbine building) on the horizon. These homes sit on one of only two topographical high points that do not have significant visual obstructions (e.g., tree cover) between the proposed facility's location and the homes (Figure 1.4.3.1.1-1). Although views, if any, will be slight, the visual quality of the area should not be negatively impacted because the distance to the facility (almost a mile) will render the stacks visually inferior to the surrounding environment, which already includes views of commercial development and electrical transmission lines.

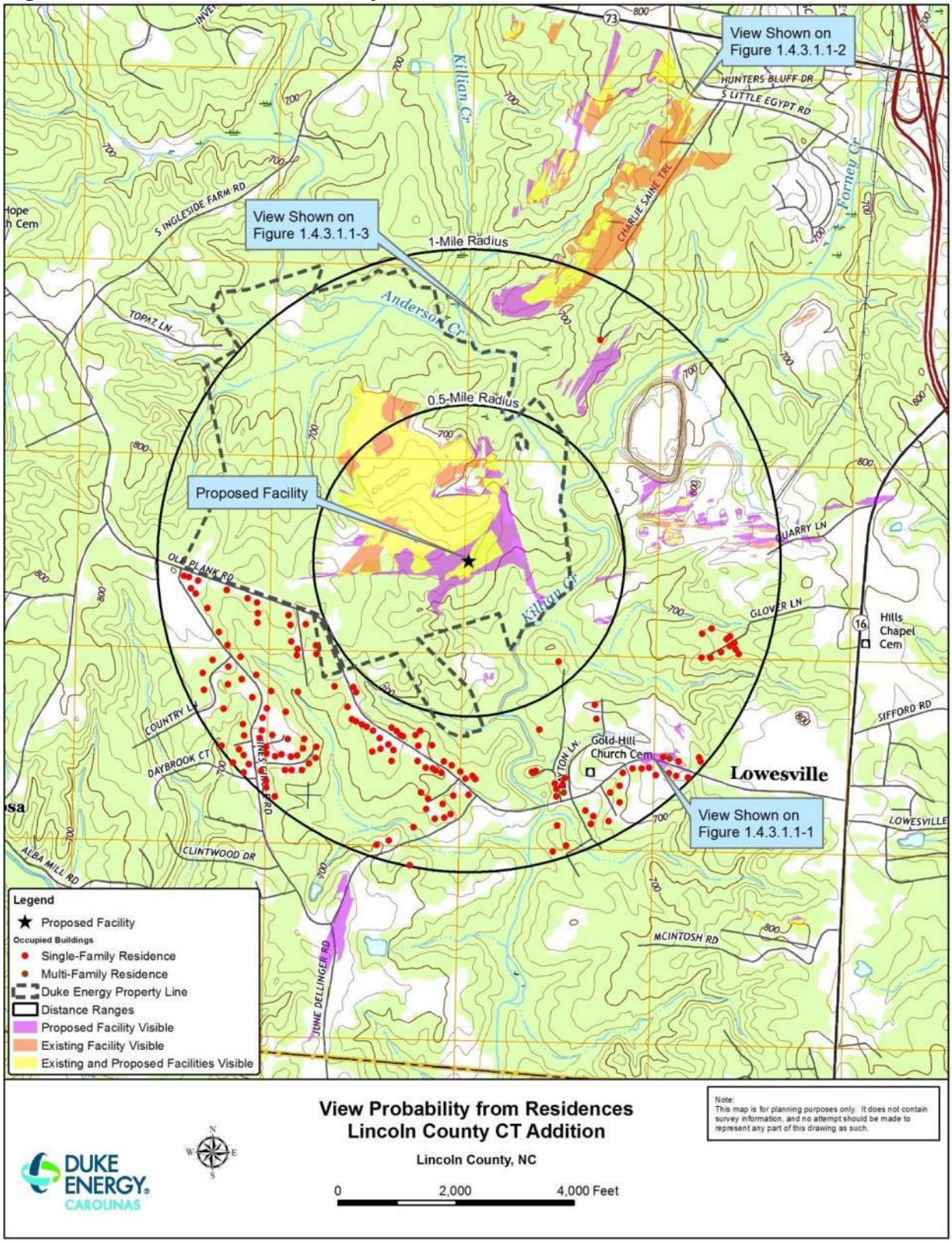
Figure 1.4.3.1.1-1: Old Plank Road Looking Northwest

The Trilogy residential subdivision that is currently being developed along Highway 73 is approximately 1.5 miles north of the proposed facility. This development is located on south-facing slopes that overlook and have open views of the existing station, which are exacerbated by widespread forest clearing within the development (Figure 1.4.3.1.1-2). Although the proposed facility will be visible from parts of the Trilogy property, as the development is built out, new homes and landscaping will provide foreground screening that will mitigate the overall view of the proposed facility.

Figure 1.4.3.1.1-2: S Little Egypt Road Looking South

Figure 1.4.3.1.1-3: Southern Edge of Trilogy Subdivision Looking South

Figure 1.4.3.1.1-4: View Probability from Residences



Sources Combs 2016; Lincoln County GIS/Mapping 2016a, 2016b, and 2016c; USGS 2016, USDA 2016, USDA Orthoimagery 2016

1.4.3.1.2 Visibility from Public Roads

The plant property is surrounded by four arterial or collector roads, including Old Plank Road to the south, South Ingleside Farm Road to the west, Highway 16 and Highway 16 Business to the east, and Highway 73 to the north. Except for a few residential roads within the Trilogy subdivision, only three primary roadways within the area will have a potential view of the proposed facility from any portion of the road. One is Old Plank Road, near its intersection with Gold Hill Church Road. The second is South Ingleside Farm Road, which is designated as a Scenic Byway on Lincoln County's Future Land Use Plan; and the third is Old Lowesville Road-June Dellinger Road, near the intersection with Hines Circle Road. In all of these cases, any views of the tallest parts of the proposed facility's exhaust stack and turbine building will be very slight due to distance and may only be evident momentarily to motorists, if at all.

1.4.3.2 Auditory

DEC contracted with Stewart Acoustical Consultants (Stewart) to conduct a detailed noise study in the vicinity of the proposed facility. A report of the noise study findings is included as Appendix A of this report.

Stewart focused on the following considerations in the study:

1. Existing Community Noise Levels
2. Estimated Sound Levels of Existing CTs and Proposed Addition
3. Estimated Sound Level Propagation of the Existing and Proposed Facilities
4. Anticipated Effects

1.4.3.2.1 Existing Community Noise Levels

Hedrick Quarry, East Lincoln Motor Speedway, Old Plank Road, and overhead aircraft are significant community noise sources. Current noise adjacent to the existing Lincoln CT station is primarily produced by aircraft approaching and leaving Charlotte Douglas International Airport, road traffic noise, mineral processing activities from the nearby quarry, and racecar engines at the speedway. Aircraft noise affects the greatest area around the station during daytime hours, although it drops significantly from midnight to 7:00 in the morning. Charlotte Douglas International Airport is located 18 miles south of the station. The airport's Runway 18C-36C is positioned north-south and nearly in line with the station. Homes near Old Plank Road experience significant levels of road noise due to traffic volume and vehicular speed. Quarry-produced noise (from road grading and machinery startup) can begin as early as 5:30 a.m. and is most significant for neighbors southeast of the station. From late March through September, residences near East Lincoln Motor Speedway experience significant race vehicle noise on Saturday evenings from 7:00 p.m. to 11:00 p.m. Appendix A includes detailed information about sound levels of all these sources.

Sound pressure levels (loudness) are measured by sound level meters in decibels (dB). To account for the relative loudness registered by the human ear (which is less sensitive to low audio frequencies), A-weighting is applied to the dB reading, and the decibel measurements are given as dBA. A quiet classroom or worship space would be about 35 dBA, whereas a normal conversation level would be about 60 dBA. An outdoor condensing fan about 20 feet away could be 50-55 dBA, but a loud siren might be 120 dBA.

The most significant noise levels that are part of the evaluation are shown in Figure 1.4.3.2.4. Although nighttime background noise levels can be as low as 35 dBA in remote locations, several significant existing sources that occur regularly can raise levels substantially. At key locations around the station, many of these sources are 47-60 dBA. Aircraft can generate maximum levels from 62-72 dBA.

1.4.3.2.2 Estimated Sound Levels of Existing CTs and Proposed Addition

Sound power levels are like watts for electricity in a light bulb. They are a measure of how much sound energy is being radiated per second into the air. The brightness of the light depends largely on how far the light is from the receiving location as well as the reflectivity of the surroundings and any objects creating shadows. The loudness of sound (sound pressure level, or sound level for short) generated by the sound power source depends on how far from the source the listener is, density of the ground, topography, and other factors such as blockage by buildings. To understand how much sound is being introduced into a location, one can compare the sound power of an existing source with that of a proposed source.

The anticipated sound level of the proposed facility (123.6 dBA) will be roughly equivalent to the sound level of the existing station's 16 CTs (123.2 dBA), based on estimated sound power levels of the components. Because of the way decibels are added, this leads to an increased total sound power of about 3 dBA. To the human ear, this is a barely noticeable increase.

1.4.3.2.3 Estimated Sound Levels of the Proposed Facility

Sound levels produced by the proposed facility will vary according to location because of distance, topography, and other factors; but no location will experience sound levels greater than 55 dBA with all CTs operating.

Figure 1.4.3.2.3-1 shows sound levels of the 16 existing CTs. Figure 1.4.3.2.3-2 shows sound levels of the proposed addition, and Figure 1.4.3.2.3-3 shows sound levels of both the existing CTs and the proposed CT. Because the combustion turbines will not be located at the exact same area of the Duke site, some neighbors will experience a larger increase than others. The greatest increase is to the southeast, where sound levels from the existing CTs are quite low; these will increase to about 52 dBA at the nearest house and 55 dBA at the nearest property line, a 10-11 dBA increase in Duke CT sound levels. Neighbors to the west should have no measurable sound level change. Neighbors to the southwest will have generally a 3-4 dBA increase (a barely noticeable difference), with one location having a 6 dBA increase (clearly noticeable difference) due to proximity to the proposed CT addition. Neighbors to the north (at the Trilogy property) will see less than a 2 dBA increase from the proposed CT (which is not noticeable to most people).

Figure 1.4.3.2.3-1: Noise Levels from Existing 16 CTs at the Lincoln CT Station

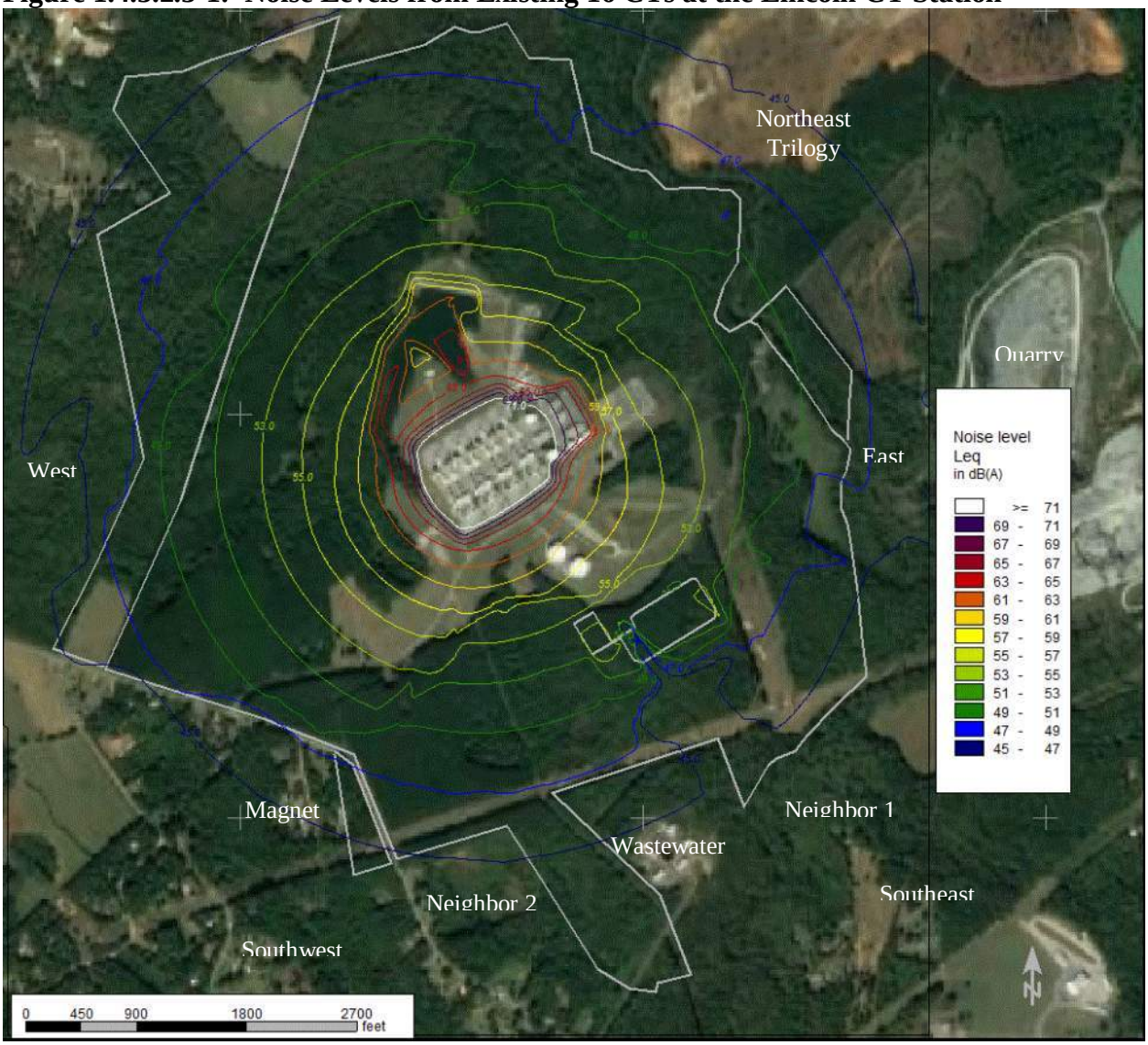


Figure 1.4.3.2.3-2: Noise Levels from the Proposed Facility

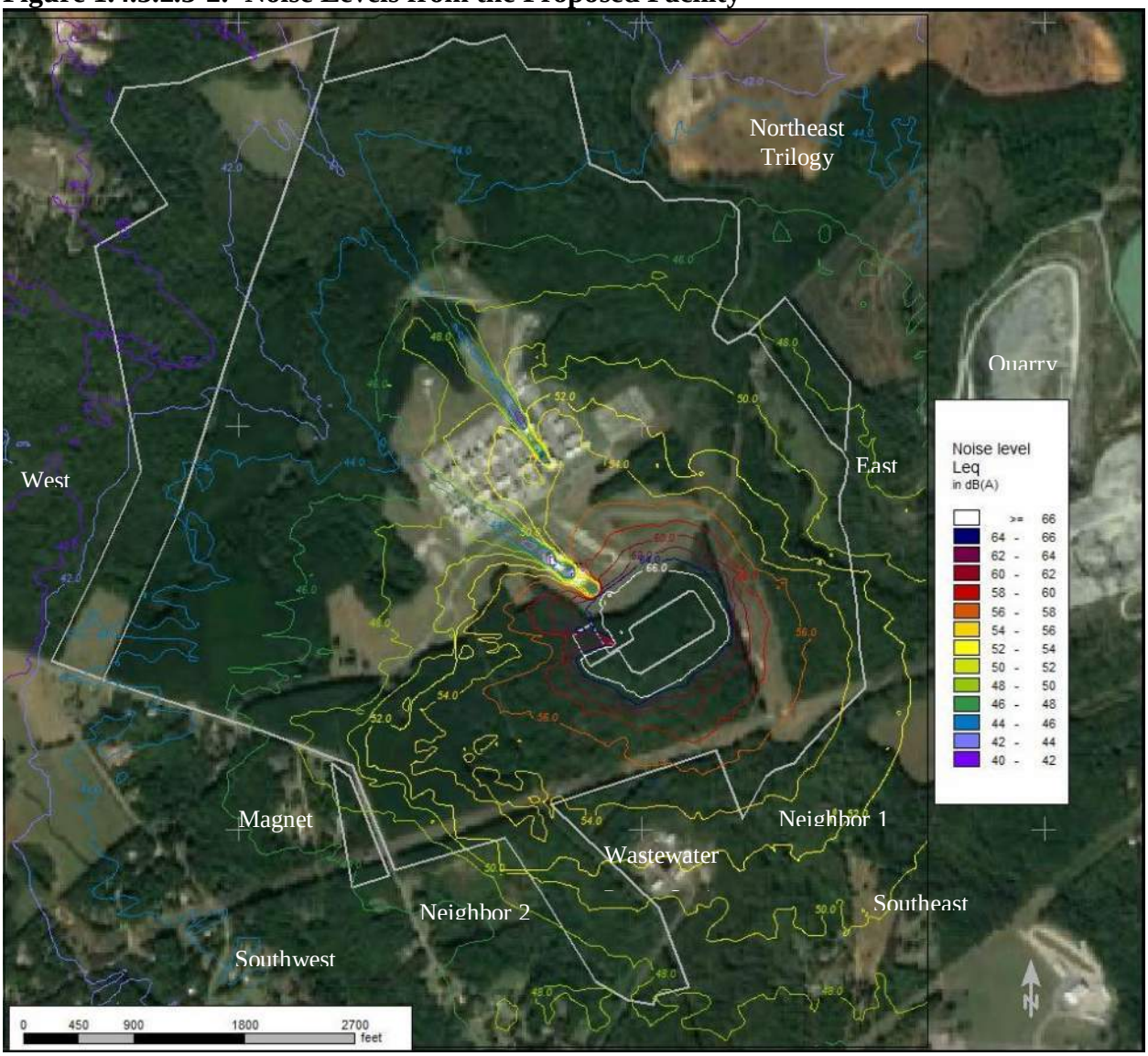
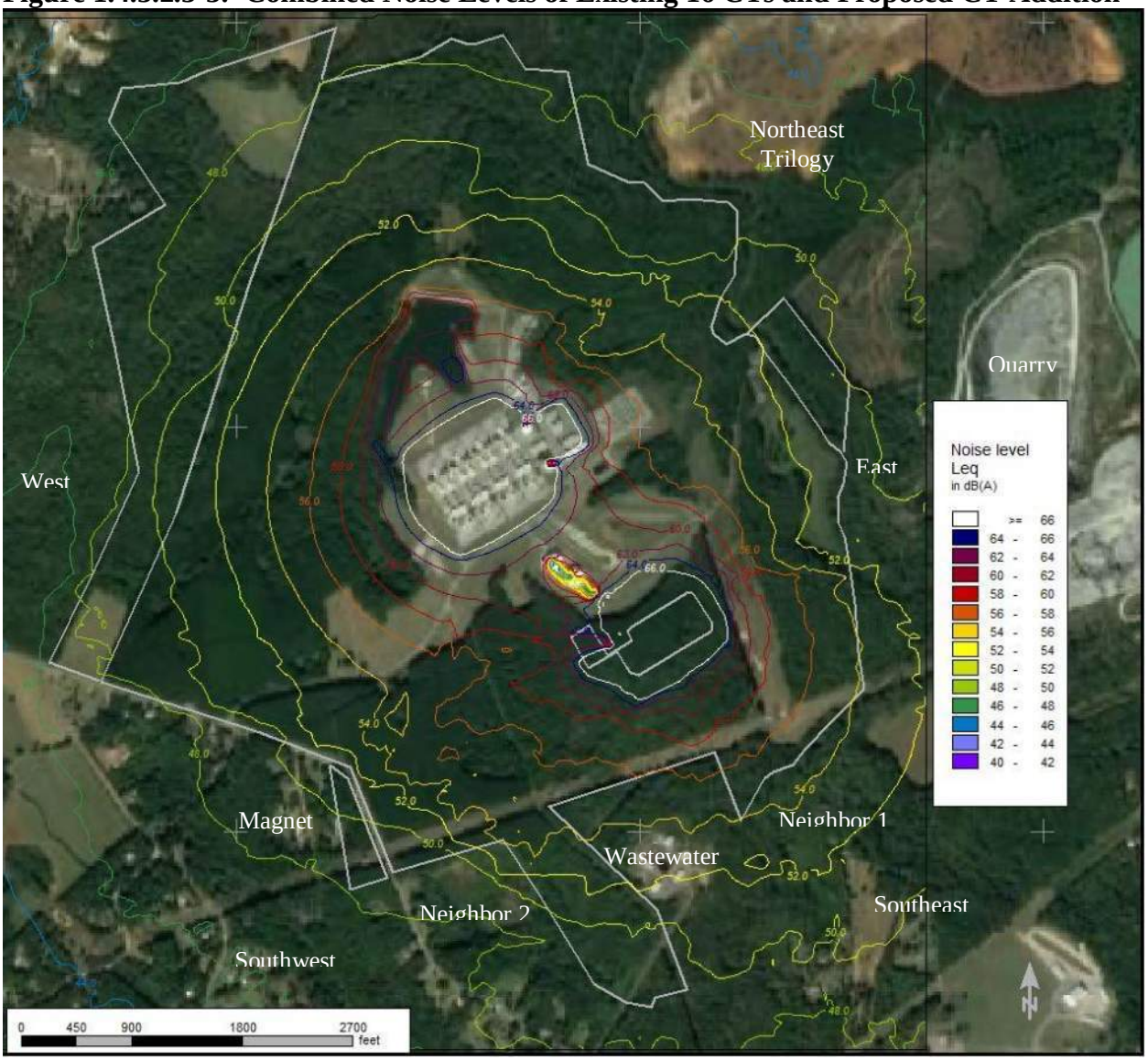


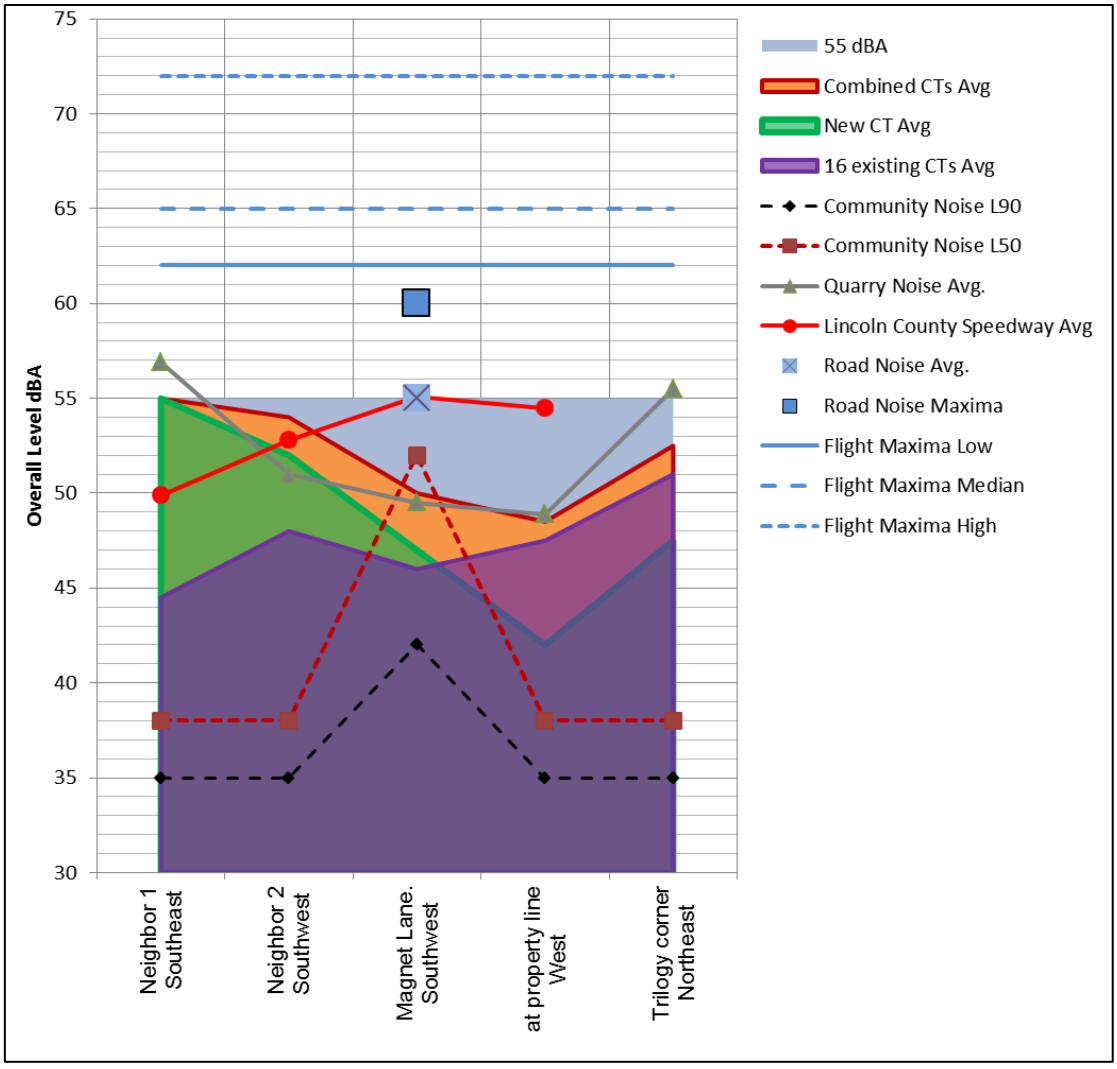
Figure 1.4.3.2.3-3: Combined Noise Levels of Existing 16 CTs and Proposed CT Addition



1.4.3.2.4 Anticipated Effects

Lincoln County's noise ordinance has no specified decibel limits, but it does prohibit noise from "becoming a nuisance to adjacent single-family detached and two-family houses and residential districts" (Unified Development Ordinance 2016). The Unified Development Ordinance does limit noise from race tracks. At night, 10-minute average levels cannot exceed 55 dBA for this kind of source. Stewart used these limits to draw some comparisons.

Figure 1.4.3.2.4: Comparison of Sound Levels at Critical Site Locations



Anticipated noise levels are similar to those of existing sources, meaning a minimal impact to most people. Figure 1.4.3.2.4 below displays various DEC and community noise source levels at the most critical site locations and the 55-dBA limit. Sound levels at most neighbor locations are below 55 dBA; only one location (the property line of Neighbor 1 to the southeast) is as much as 55 dBA. It should be noted, however, that the Neighbor 1 property was sold to Hedrick Quarry in 2016; and the zoning for the property is now listed as Residential Transitional.

For the Neighbor 1/Hedrick Quarry property to the southeast, noise levels from the quarry and race track are estimated to be 57 dBA and 50 dBA respectively. Aircraft from Charlotte Douglas International Airport produce slow A-weighted maximum levels of 62-72 dBA. Although clearly the noise source will be new and thus noticed, it is not more than 55 dBA, and is not more than other sources affecting this property.

Other homes to the southwest show a clear increase from DEC sources, from 50 to 54 dBA with all CTs (existing and proposed) operating (a 3-6 dBA increase); by comparison, racetrack noise levels are estimated to be 53-55 dBA. Sound levels along Plank Road were measured at about 55 dBA.

Sound levels for property to the west and north (Trilogy) are not noticeably changed from those of the existing station, and most of the property is below 50 dBA.

For these reasons, it is anticipated that noise impacts to most of the surrounding neighbors will be minimal. Neighbor 1/Hedrick Quarry and Neighbor 2 will have a clearly noticeable increase in DEC sound levels, but total levels do not exceed 55 dBA; and other sources are generating similar levels at these properties. Thus impacts should not be significant.

1.4.4 Aesthetic/Cultural Resources

The federal government's official list of cultural resources, which includes districts, archaeological sites, aboveground sites (buildings), and objects deemed worthy of preservation, is the National Register of Historic Places (NRHP). The NRHP was established with the passage of the National Historic Preservation Act (NHPA) of 1966 as amended, and traditionally uses four classifications for cultural resources: NRHP Listed, NRHP Eligible, Potentially Eligible, and Not Eligible. Cultural resources consist of historic and archaeological resources (USDA 2015, U.S. Department of the Interior 1983).

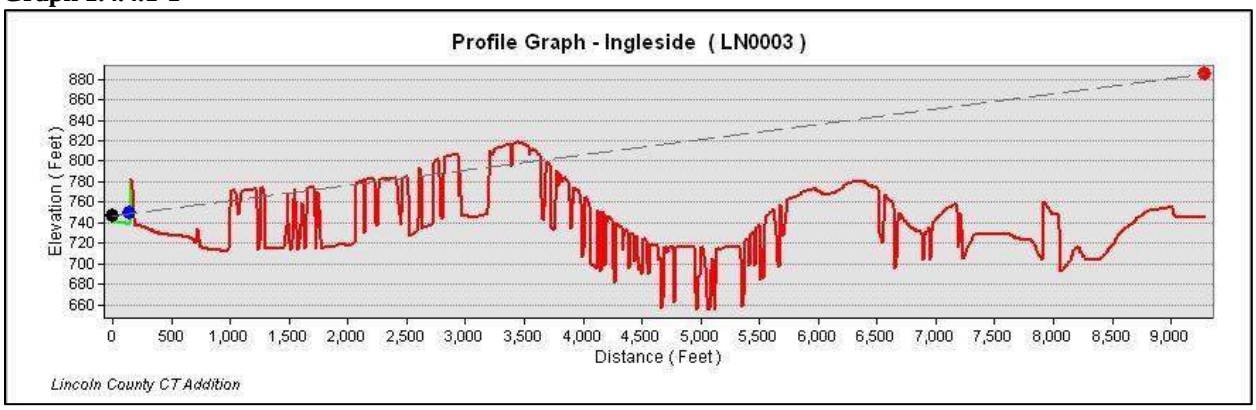
1.4.4.1 Historic Resources

In December 2016, Brockington conducted a records review and architectural windshield survey within a defined area of potential effect (APE) for the proposed facility (Appendix B). Because of the scale and nature of the undertaking, the APE was a 2.5-kilometer (1.5-mile) radius around the proposed CT station.

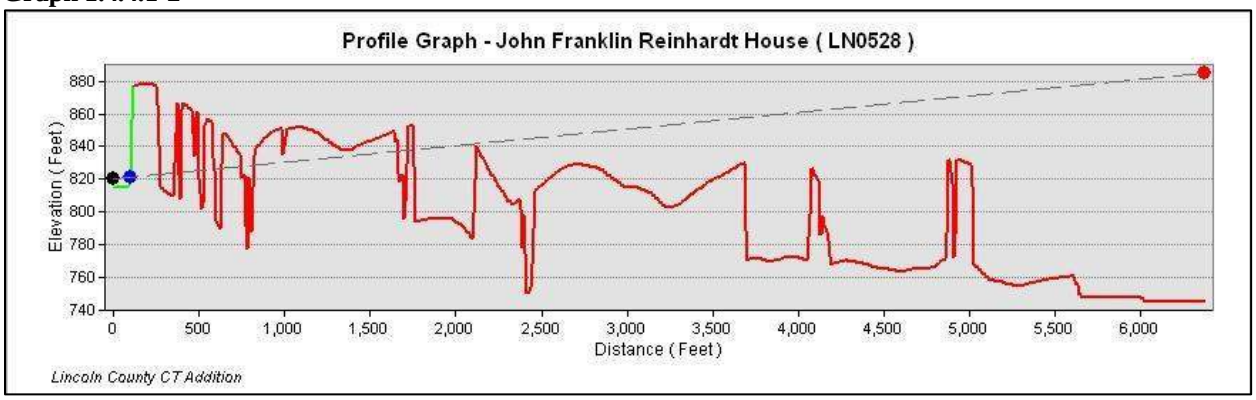
Brockington's data review identified seven previously recorded architectural resources that met the NRHP age criterion of 50 years or older. Of those seven resources, two are listed on the NRHP (LN003 "Ingleside" and LN0528 "John Franklin Reinhardt House/Mount Welcome"), three are eligible for the NRHP (LN0527 "John R. Asbury House", LN0540 "Kincaid Family House", and LN0573 "Mariposa Road Bridge"), and two are potentially eligible for the NRHP (LN0529 "Mariposa Cotton Mill" and LN0585) (Appendix B). Resource LN0585 could not be located during the field reconnaissance investigation and may have been demolished. Brockington also observed a number of other properties which met the NRHP age criterion of 50 years or older but had not been recorded because of architectural integrity issues, severe alterations to the original structures, and/or lack of architectural significance.

Potential visual impacts as a result of the proposed facility were assessed for each of the six identified cultural resources. Because mature forest cover provides foreground screening and because of the distance of 1-2 miles between the resources and the proposed facility, the proposed facility is not expected to be visible from five of the six located resources, as confirmed by the profile graphs below. Viewshed modeling indicates that the John R. Asbury House could have a slight view of the tallest parts of the facility from the adjacent road. Because of the distance (1.5 miles) to the proposed plant and the density of foreground and mid-ground screening provided by mature tree cover, the proposed plant facility will be visually subordinate to the surrounding landscape and thus will have no negative visual impacts on the John R. Asbury House.

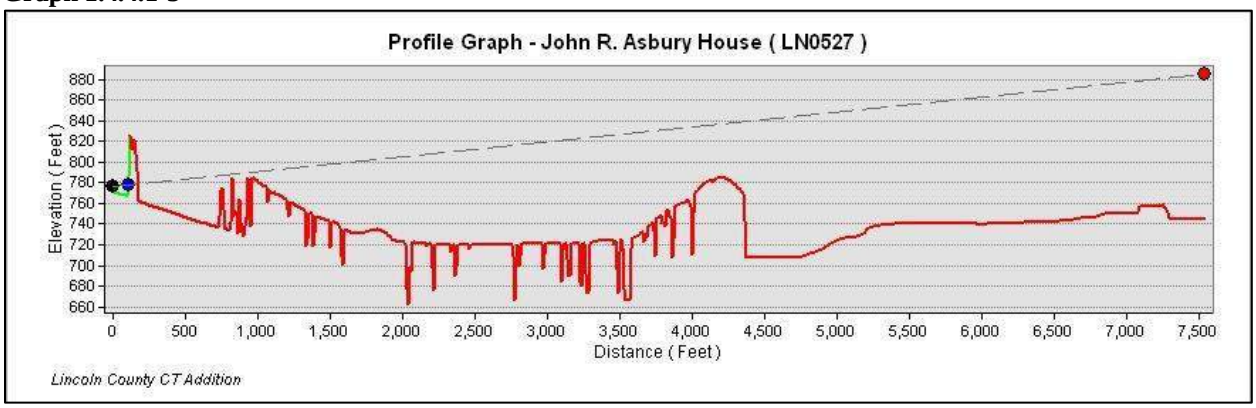
Graph 1.4.4.1-1



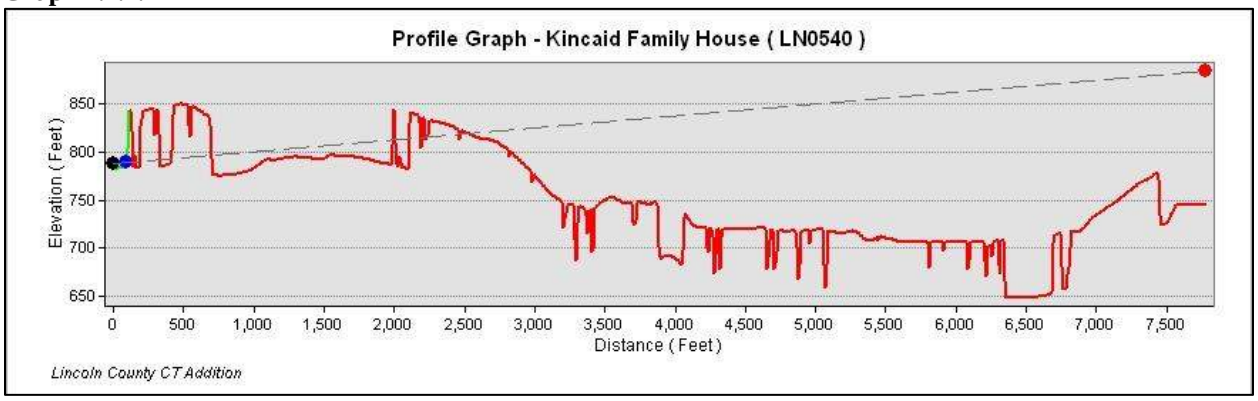
Graph 1.4.4.1-2



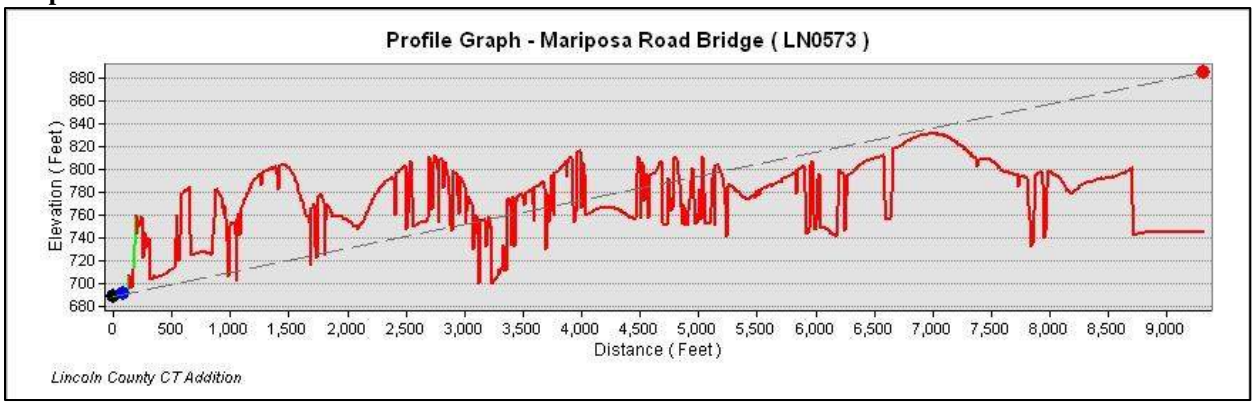
Graph 1.4.4.1-3



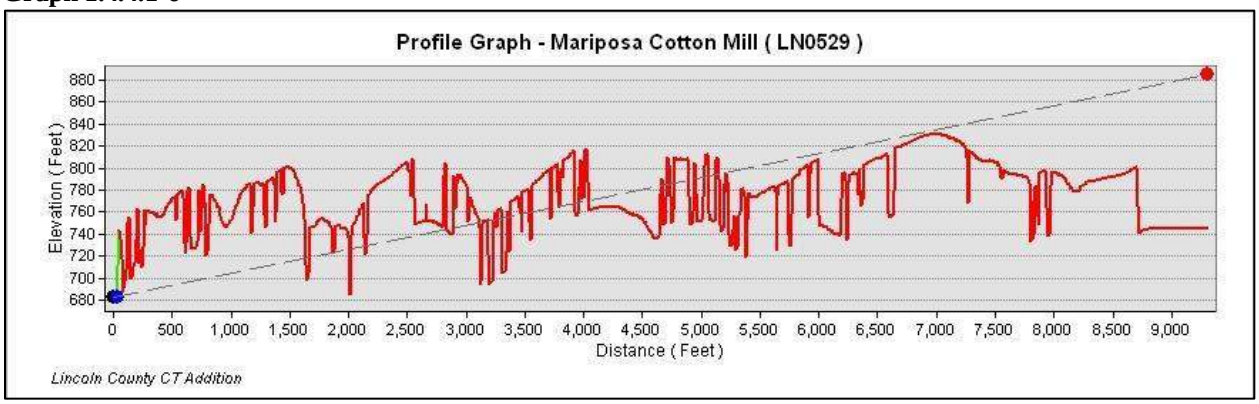
Graph 1.4.4.1-4



Graph 1.4.4.1-5



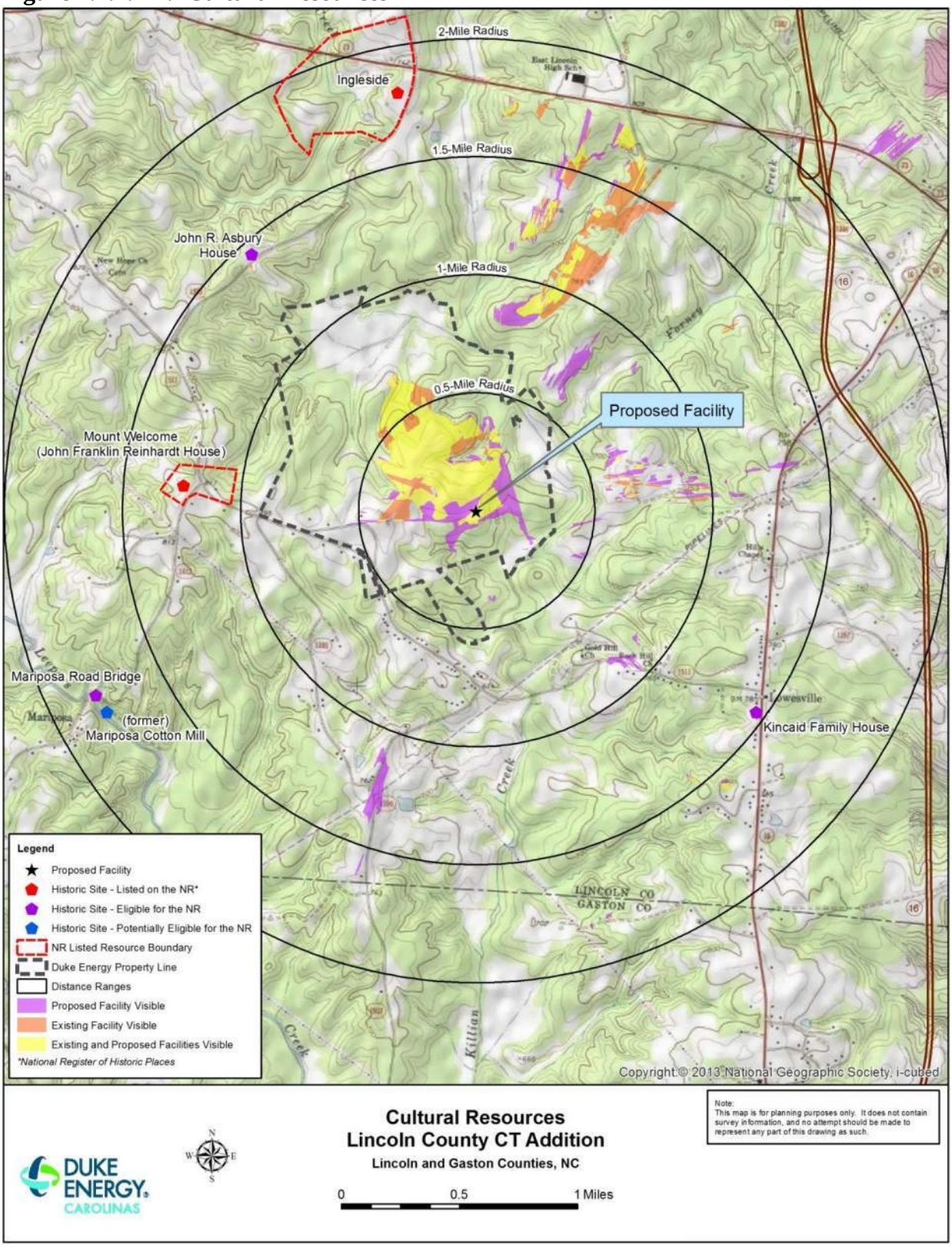
Graph 1.4.4.1-6



Profile Graph Legend

	Probable Visible Terrain/Vegetative Surfaces from the Viewpoint
	Probable Not Visible Terrain/Vegetative Surfaces from the Viewpoint
	Viewpoint at the Resource
	Screening Element (Terrain or Vegetation) on the Line-of-Sight From the Viewpoint to the Top of Proposed Plant Emission Stack
	Top of Proposed Plant Emission Stack Seen
	Top of Proposed Plant Emission Stack Not Seen

Figure 1.4.4.1-1: Cultural Resources



Sources: Topographic Maps 2013, Combs 2016, Lincoln County GIS/Mapping 2016a and 2016b, USDA 2016, USDA Orthoimagery 2016

1.4.4.2 Archaeological Sites

Brockington also visited the North Carolina Office of State Archaeology in Raleigh to conduct a literature review of previous reports and site files for known archaeological resources. Of note, Brockington conducted a 1990 archaeological survey of the Duke Energy Combustion Turbine plant site ("Lowesville Tract") in advance of construction of the present-day station (Appendix B-1). Through this and other previous surveys as well as independent investigations, 48 archaeological sites have been recorded within the APE. One of these sites (Site 31LN78) was determined eligible; however, it was mitigated through data recovery and does not need consideration for planning purposes. Two sites are categorized as "unassessed" and, as they have no formal determination of eligibility, they should be considered potentially eligible. None of the noted unassessed archaeological sites are located within the proposed facility's footprint. The remaining 45 sites are noted on their respective site forms as not eligible for the NRHP.

For specific information concerning cultural resources in the vicinity of the proposed facility, see Brockington's reports (included as Appendix B, Literature Review and Windshield Survey of the Proposed Lincoln County CT Addition, Lincoln County, North Carolina and Appendix B-1, Archaeological Survey and Testing at the Lowesville Tract, Lincoln County, North Carolina).

A request for concurrence with the findings of the Brockington report was sent to the North Carolina State Historic Preservation Office (SHPO), and SHPO responded that, because they are unaware of any historic properties that would be affected by the proposed project, they have no comment (Appendix B-2).

1.4.5 Geological

The study area for the geological assessment is comprised of a five-acre plot of land adjacent to the switchyard of the existing station and an approximately 95-acre plot south of the station, the areas where the proposed transmission switchyard and CT facility, respectively, would be located.

1.4.5.1 Geology and Geologic History

The eastern United States consists of three major physiographic regions: the Blue Ridge Mountain region, the Piedmont region, and the Coastal Plain region. The proposed facility will be located in the Piedmont region, which extends from New Jersey to central Alabama and sits between the Atlantic Coastal Plain and the Blue Ridge and Appalachian Mountains. This approximately 80,000-square-mile region is characterized by undulating hills with broad, semi-dissected valleys; and surface relief typically varies from 200 to 800 feet above mean sea level.

The geology of the region is complex. During the earliest Paleozoic Era (541–252 million years ago [MYA]), North America was situated near the equator, and the current-day Appalachian region was submerged beneath shallow seas. During this time, terrigenous and carbonate sediment was deposited, which later transformed into extensive layers of sedimentary and carbonate rock through lithification. The first significant mountain building event, or orogeny, occurred around 440–480 MYA, and thus the early Appalachian mountain chain began to form. During this event, as well as subsequent mountain-building events, the Appalachian region was folded, faulted, intruded by magma, sheared, uplifted, and metamorphosed. Both the Blue Ridge and Piedmont regions were transported over 100 miles west, telescoping into a series of folded, thrusted crustal sheets.

As a result of continental collision, rocks were accreted onto the present-day North American continent as a patchwork of volcanic islands and fragments of land and former ocean-bottom sediments. This led to the

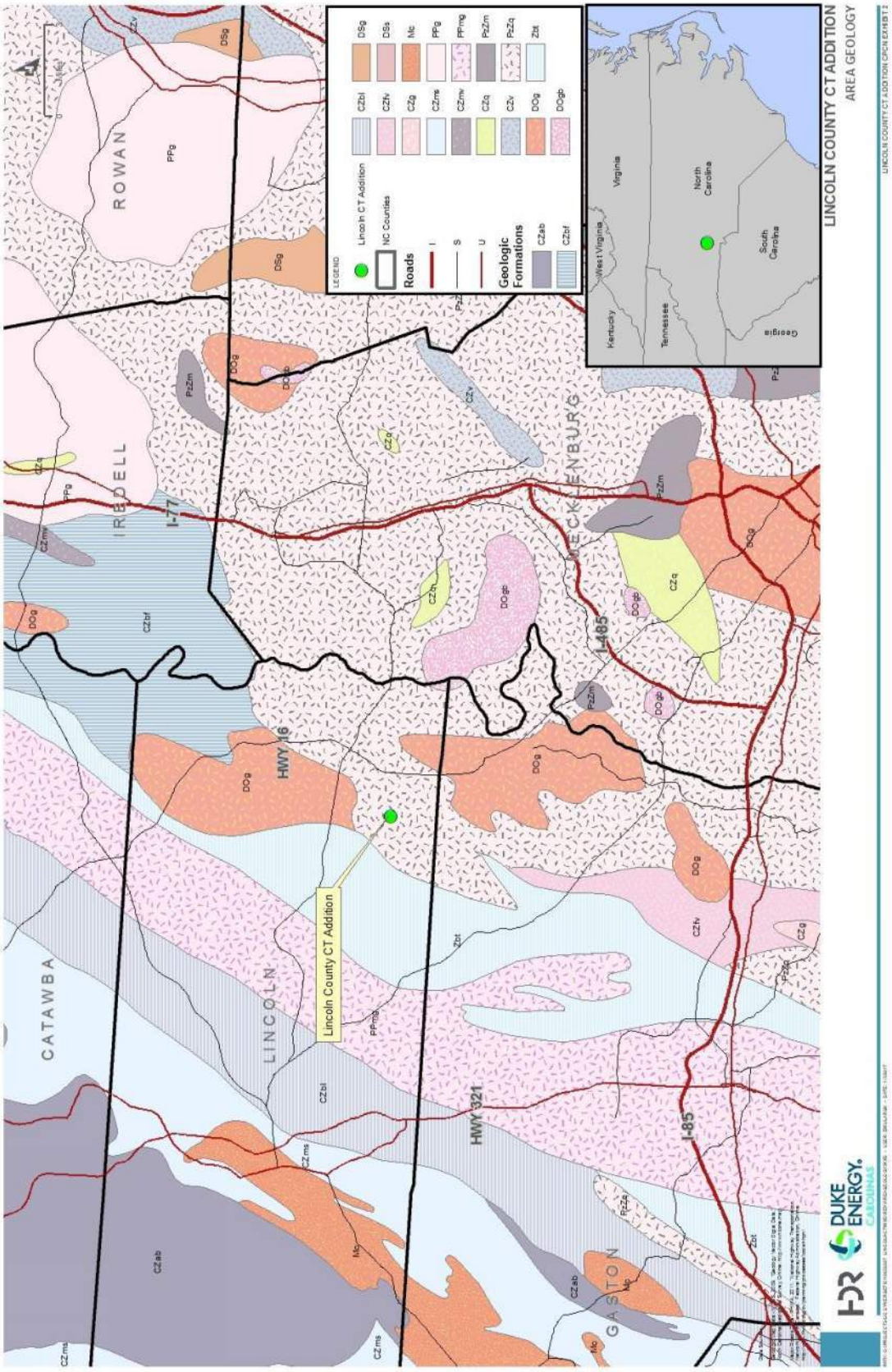
formation of distinct geologic belts, or terranes, that currently trend northeast-southwestward (Hibbard et al. 2002; Secor et al. 1983). The study area is located in the Charlotte terrane of the Inner Piedmont zone, just east of the Kings Mountain belt (see the geologic map shown on Figure 1.4.5.1-1 [NCGS 2009]). The Charlotte terrane is composed of medium- to high-grade metamorphic rocks, including gneiss, schist, amphibolite, diorite, minor quartzite, and aluminosilicate schist. Units are intruded by a variety of pre-and post-kinematic (granitic) plutons (Overstreet and Bell 1965). The Kings Mountain belt is a narrow (10- to 20-mile) elongated area trending northeast-southwest; it is comprised mostly of metasedimentary rocks with some granite gneiss, biotite gneiss, metamorphosed quartz diorite, and intrusive granitic bodies. Also present are other resistant rocks (e.g., quartzite, kyanite, and conglomerate) which form a chain of hills (e.g., Crowders Mountain and Kings Mountain) less than 30 miles west and southwest of the site of the proposed facility.

The bedrock underlying the site is typical of the rocks of the Charlotte terrane (see Figure 1.4.5.1-1, Area Geology). The study area is underlain by intruded, foliated to massive metamorphosed quartz diorite bedrock (PzZq). Locally, there are intrusions of pinkish-gray granitic rock, which may be massive to weakly foliated (DOg); Horneblende is typically present in these granitic intrusive rocks. To the northeast there are additional granitic intrusive rocks (PPg) of Pennsylvanian to Permian age (265–325 MYA), which are typically megacrystic to equigranular. Named intrusions include the Churchland, Landis, and Mooresville intrusives. To the west are metamorphic rocks of the Kings Mountain belt, including the Battleground (Zbt) Formation (quartz-sericite schist with metavolcanics) and the Blacksburg (CZbl) Formation (sericite schist, with graphite, phyllite and banded marble), with strongly foliated fine-grained biotite gneiss (CZbf) to the north of the study area. Additional intrusions in the Kings Mountain belt include the Mississippian-age (351 MYA) Cherryville Granite (Mc), which is massive to weakly foliated with

pegmatites, and granitic rocks (PPmg) of Pennsylvanian to Permian age (270–230 MYA) (i.e., High Shoals Granite).

On-site exploratory drilling has been completed in the areas expected to include structures and roads. The study area's depth to bedrock varies between 3 and 10 meters (m) thick, and the average thickness of the overlying saprolite layer in the region is between 15 to 30 meters (m) thick.

Figure 1.4.5.1-1: Area Geology



1.4.5.2 Dominant Soil Types

Shallow subsurface material of the Inner Piedmont typically consists of thick saprolite (i.e., residual soil) units (15–30m) overlaying fractured bedrock. Saprolite consists of mostly red to brown, clayey subsoils. HDR located, identified, and classified soils within the study area using the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) Gridded Soil Survey Geographic (gSSURGO) Database (Figure 1.4.5.2-1) (NRCS 2016). Based on the soil data (NRCS Gridded Soil Survey 2016), the proposed facility foundation material in the shallow subsurface consists primarily of soils within the Lloyd series (sandy clay loam) and the Pacolet series (sandy clay loam).

The approximately 95-acre plot of the study area consists of Lloyd sandy clay loam (LdB2 and LdC2), accounting for 89.6 percent of the profile, with a very minor percentage of Wynott-Winnsboro-Rowan complex (WyD) (5.2 percent) (Figure 1.4.5.2-1). The difference between the two types of Lloyd series soils is the typical range in slopes: LdB2 typically has slopes of 2 to 8 percent, whereas LdC2 has slopes of 8 to 15 percent. Soils of the Lloyd series are usually deep, well drained, moderately permeable, moderately eroded soils that have formed as the residuum of intermediate and mafic igneous rocks and medium to high-grade metamorphic rocks. This saprolite is typically derived from a diorite, gabbro, diabase, and/or gneiss parent rock. The typical soil profile of the Lloyd series soils is included in Table 1.4.5.2-1.

The five-acre plot is underlain by both LdC2 (2.3 percent) and Pacolet sandy loam (PaD) (2.7 percent). The soils of the Pacolet series consist of very deep, well drained, moderately permeable soils that form in residuum primarily from felsic igneous and metamorphic rocks (granite or gneiss). The PaD series has average slopes ranging from 15 to 25 percent. The typical soil profile is provided in Table 1.4.5.2-1.

Pacolet sandy clay loam (PeC2) comprises a very minor portion (0.2 percent) of the southwest corner of the approximately 95-acre plot

and has a slightly different soil profile from that of PaD as well as steeper slopes (8 to 15 percent). PeC2 is usually weathered from granite, gneiss, and/or schist and the soil profile is included in Table 1.4.5.2-1.

WyD soil units typically have slopes of 15 to 25 percent and are derived from diorite, gabbro, diabase, and/or gneiss parent material. They are well drained soils; and because the soil series is comprised of three individual types (i.e., Wynott, Winnsboro, Rowan), all three typical profiles are included in Table 1.4.5.2-2.

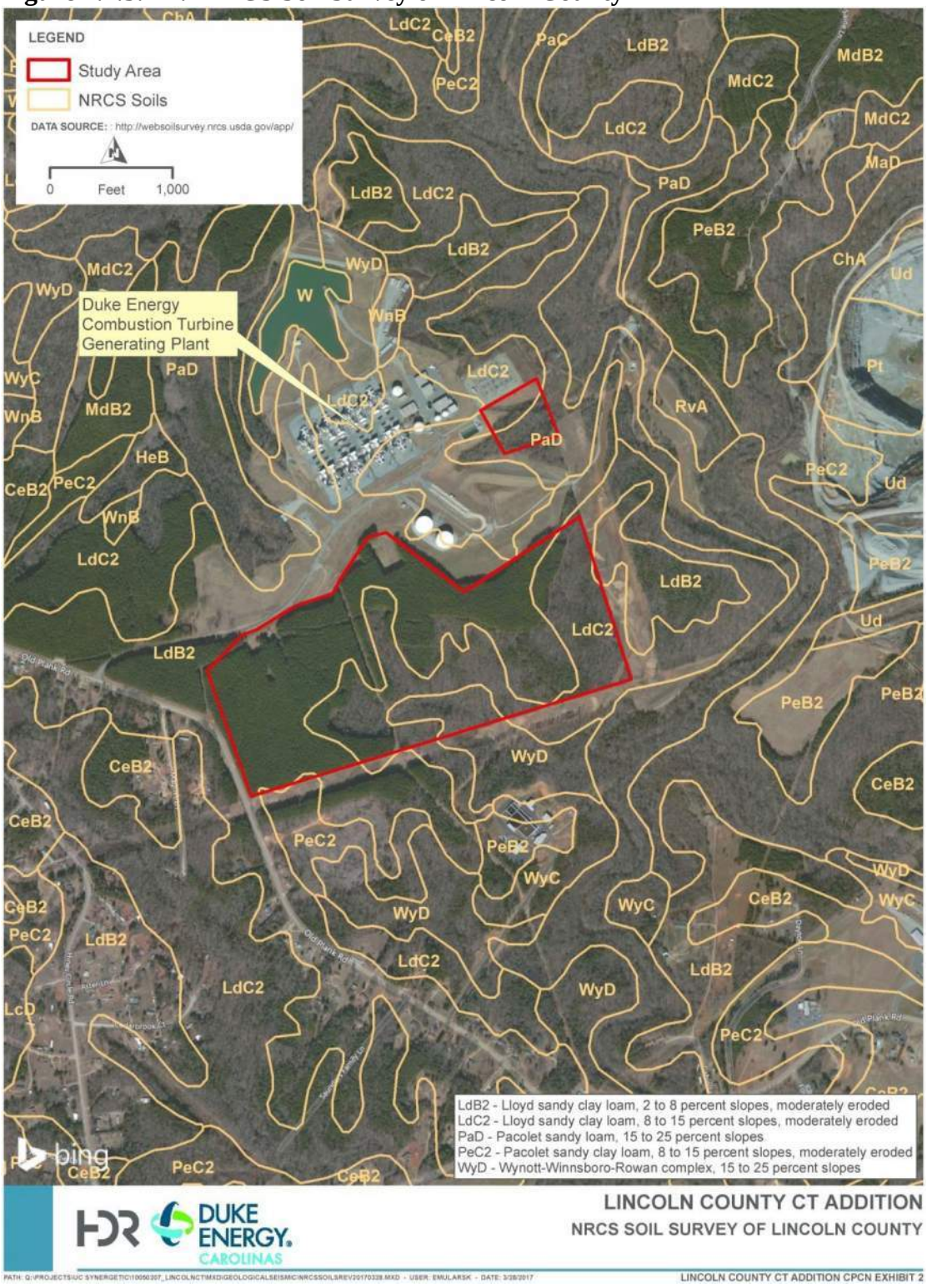
Table 1.4.5.2-1: Typical Subsurface Soil Profiles of the Site (Source: USDA Gridded Soil Survey 2016)

Lloyd Sandy Clay Loam (LdB2 and LdC2)		Pacolet Sandy Loam (PaD)		Pacolet Sandy Clay Loam (PeC2)	
Depth (inch)	**Description**	**Depth (inch)**	**Description**	**Depth (inch)**	**Description**
0-7	Clay loam	0-6	Sandy loam	0-7	Sandy clay loam
7-58	Clay	6-38	Clay	7-24	Clay
58-73	Clay loam	38-80	Sandy clay loam	24-33	Sandy clay loam
73-80	Loam			33-80	Loam

Table 1.4.5.2-2: Typical Subsurface Soil Profiles for Wynott-Winnsboro-Rowan Series (Source: USDA Gridded Soil Survey 2016)

Wynott (WyD)		Winnsboro (WyD)		Rowan (WyD)	
Depth (inch)	**Description**	**Depth (inch)**	**Description**	**Depth (inch)**	**Description**
0-4	Sandy loam	0-8	Fine sandy loam	0-6	Sandy loam
4-14	Sandy loam	8-11	Clay loam	6-20	Clay loam
14-24	Clay	11-32	Clay	20-25	Sandy loam
24-28	Sandy clay loam	32-37	Clay loam	25-80	Loamy sand
28-80	Weathered bedrock	37-60	Loam		

Figure 1.4.5.2-1: NRCS Soil Survey of Lincoln County



Settlement and proper foundation support are concerns that will be assessed by site-specific exploration. Potential settlement of project structures and appropriate foundation support of infrastructure under static and dynamic (earthquake, machinery, etc.) loading will be addressed as part of preliminary and final design for the project structures.

1.4.6 Ecological

The ecological study area for the Lincoln County CT Addition includes a five-acre tract upon which the switchyard expansion will be located and an approximately 95-acre tract where the proposed facility and its associated components will be located. This heavily forested area is surrounded by agricultural, maintained open areas, residential properties, and forested undeveloped lands. Detailed information on the ecological resources of the proposed facility can be found in Appendix C of this report.

1.4.6.1 Terrestrial Resources

1.4.6.1.1 Botanical

Based upon the Classification of the Natural Communities of North Carolina – Fourth Approximation (Schafale 2012), one distinct natural community can be classified as Mesic Mixed Hardwood Forest (Piedmont Subtype); it is located in uplands along the existing drainage areas within the study area. The remaining forested areas are managed planted pine forests. Below is a description of plant species identified during HDR's site visit in each forest community type.

<u>Mesic Mixed Hardwood Forest (Piedmont Subtype)</u>

This community is comprised of mature woody, herbaceous, and vine species including black oak (*Quercus velutina*), northern red oak (*Quercus rubra*), scarlet oak (*Quercus coccinea*), water oak (*Quercus nigra*), white oak (*Quercus alba*),

American sycamore (*Platanus occidentalis*), American beech (*Fagus grandifolia*), American elm (*Ulmus americana*), loblolly pine (*Pinus taeda*), shortleaf pine (*Pinus echinata*), mockernut hickory (*Carya tomentosa*), sweetgum (*Liquidambar styraciflua*), tulip poplar (*Liriodendron tulipifera*), red maple (*Acer rubra*), American holly (*Ilex opaca*), black cherry (*Prunus serotina*), ironwood (*Carpinus caroliniana*), flowering dogwood (*Cornus florida*), possumhaw holly (*Ilex decidua*), redcedar (*Juniperus virginiana*), greenbrier (*Smilax rotundifolia*), Japanese honeysuckle (*Lonicera japonica*), crossvine (*Bignonia capreolata*), strawberry bush (*Euonymus americanus*), lopseed (*Phryma leptostachya*), spotted pipsissewa (*Chimaphila maculata*), Christmas fern (*Polystichum acrostichoides*), ebony spleenwort (*Asplenium platyneuron*), cutleaf grapefern (*Botrychium dissectum*), and arrow-leaved heartleaf (*Hexastylis arifolia*).

Planted Pines

This forested community is dominated by a loblolly pine canopy. Midstory woody species, vines, and herbs are scarce and include immature sweetgum, redcedar, winged elm (*Ulmus alata*), Japanese honeysuckle, and Christmas fern. Routinely maintained open areas and utility line rights-of-way are located along the perimeter of the study area.

Wetlands and Jurisdictional Waters of the U.S.

On December 8, 2016, HDR biologists surveyed the study area for wetlands and jurisdictional waters of the U.S. under Section 404 of the Clean Water Act (CWA). The study area was examined according to the methodology described in the U.S. Army Corps of Engineers (USACE) 1987 Wetland Delineation Manual, USACE Post-Rapanos guidance, USACE Eastern

Mountains and Piedmont Regional Supplement, and North Carolina Division of Water Resources (NCDWR) Methodology for Identification of Intermittent and Perennial Streams and Their Origins (Version 4.11). HDR mapped waters of the U.S. in the field using a Trimble Geo7x GPS unit capable of sub-meter accuracy.

On-site reconnaissance activities revealed that two jurisdictional streams and one jurisdictional wetland occur within the study area. For a summary of delineated jurisdictional waters of the U.S. and figures, see the attached Natural Resources Report (Appendix C). DEC does not anticipate that the construction of the new facility will impact these areas.

Federally Protected Plant Species

HDR obtained and reviewed a list of federally protected plant species for Lincoln County from the U.S. Fish and Wildlife Service (USFWS) website (USFWS 2015), which was last updated on April 2, 2015. HDR's on-site survey also served to identify potential habitat and possible individuals of federally protected species listed for Lincoln County. HDR consulted the North Carolina Natural Heritage Programs (NCNHP) Element Occurrence database for protected plant species distribution and proximity to the site of the proposed facility. The NCNHP database revealed that there are no known occurrences of federally protected species within the study area.

The survey findings indicate that there are a few locations within the study area that have preferred habitat requirements for the federally listed dwarf-flowered heartleaf (*Hexastylis naniflora*), and HDR did identify plants belonging to the *Hexastylis* genus in the five-acre plot during the site visit.

DEC contracted with terra incognita to perform a site inventory for the possible presence of dwarf-flowered heartleaf and other federally listed plant species. The site visit was conducted on February 22, 2017, and the *Hexastylis* species present within the study area was identified as arrow-leaved heartleaf, not dwarf-flowered heartleaf. Arrow-leaved heartleaf is common throughout the Piedmont region of North Carolina, and the juvenile leaves sometimes resemble those of dwarf-flowered heartleaf. Because the federally listed species is not present in the study area, no impacts to dwarf-flowered heartleaf are anticipated.

No habitat was present for the remaining federally listed plant species known to occur in Lincoln County (Appendix C).

The USFWS provided DEC a letter concurring that no federally protected plants or animals are found within the study area, and therefore none would be impacted by the project (Appendix C-1). Furthermore, it is anticipated that neither construction nor operation of the facility will significantly affect the botanical resources of adjacent areas.

1.4.6.1.2 Wildlife

Terrestrial communities in the study area are primarily comprised of forested habitats that may support a diverse number of wildlife species. Representative mammal, bird, reptile, and amphibian species commonly occurring in these habitats are listed below. Individual species and/or evidence of species observed during HDR's field survey are indicated with an asterisk (*). Information on species that typically use these habitats in the Southern Outer Piedmont ecoregion was obtained from relevant literature, mainly the Biodiversity of the Southeastern United States, Upland Terrestrial Communities (Martin et al. 1993).

Mammal species that commonly occur in these habitats include eastern cottontail (*Sylvilagus floridanus*); gray squirrel (*Sciurus carolinensis*)*; various vole, rat, and mice species; raccoon (*Procyon lotor*)*; Virginia opossum (*Didelphis virginiana*); groundhog (*Marmota monax*); white-tailed deer (*Odocoileus virginianus*)*; gray fox (*Urocyon cinereoargenteus*); and red fox (*Vulpes vulpes*). Bird species that commonly use these habitats include American Crow (*Corvus brachyrhynchos*)*, American Robin (*Turdus migratorius*), Blue Jay (*Cyanocitta cristata*)*, Carolina Chickadee (*Poecile carolinensis*)*, Carolina Wren (*Thryothorus ludovicianus*)*, Gray Catbird (*Dumetella carolinensis*), Brown Thrasher (*Toxostoma rufum*), Red-eyed Vireo (*Vireo olivaceus*), Yellow-throated Vireo (*Vireo flavifrons*), Northern Mockingbird (*Mimus polyglottos*)*, Scarlet Tanager (*Piranga olivacea*), Wood Thrush (*Hylocichla mustelina*), Pileated Woodpecker (*Dryocopus pileatus*), Northern Flicker (*Colaptes auratus*)*, Red-bellied Woodpecker (*Melanerpes carolinus*)*, Red-headed Woodpecker* (*M. erythrocephalus*), Downy Woodpecker (*Picoides pubescens*)*, and Hairy Woodpecker (*Picoides villosus*). Raptors in the study area may include Red-shouldered Hawk (*Buteo lineatus*), Red-tailed Hawk (*Buteo jamaicensis*)*; owl species, and Turkey Vulture (*Cathartes aura*)*.

Reptile and amphibian species that may use this terrestrial community include the eastern black rat snake (*Pantherophis alleghaniensis*), eastern corn snake (*P. guttatus*), eastern hognose snake (*Heterodon platirhinos*), copperhead (*Agkistrodon contortrix*), spotted salamander (*Ambystoma maculatum*), slimy salamander (*Plethodon glutinosus*), southern dusky salamander (*Desmognathus auriculatus*), American toad (*Anaxyrus americanus*), Fowlers toad (*A. fowleri*), gray treefrog (*Hyla versicolor*), eastern box turtle (*Terrapene carolina carolina*)*,

eastern fence lizard (*Sceloporus undulatus*), five-lined skink (*Plestiodon fasciatus*), and spring peeper (*Pseudacris crucifer*).

Construction of the proposed facility will require removal of existing intact forested areas and thus will displace wildlife. During construction, wildlife is expected to migrate to adjacent undeveloped forested areas of the property that will provide suitable replacement habitat for game and non-game species. The proposed construction activities are not anticipated to impact the diversity or number of species or interfere with the movement of any resident or migratory species. DEC does not anticipate that daily plant operations, including noise from equipment and vehicle traffic, will affect wildlife beyond the proposed facility's footprint.

Additional information on wildlife that can be found at the proposed facility can be found in Appendix C of this report.

Federally Protected Animal Species

HDR obtained and reviewed a list of federally protected animal species for Lincoln County from the USFWS website (USFWS 2015), which was last updated on April 2, 2015. The northern long-eared bat (*Myotis septentrionalis*) was the only listed animal species. Several mature trees (greater than 12 inches in diameter) that exhibit exfoliating bark (i.e., hickories and oaks) and dead tree snags were observed within the mixed hardwood forest portion of the study area and may serve as potential roosting habitat for the northern long-eared bat. According to the NCNHP database, no known occurrences including hibernacula and/or maternity roost trees have been documented within or within close proximity to the study area. In addition, the proposed facility is located outside any North Carolina USFWS northern long-eared bat consultation area (USFWS 2015).

A USFWS letter concurring with the findings of no federally protected plants or animals found in the study area is attached as Appendix C-1. DEC will endeavor to observe the recommended USFWS June 1 – July 31 cutting moratorium in areas that could be habitat for northern long-eared bat to further reduce the probability of any effect on this species. Thus the proposed project will not impact any federally protected species with its construction and operation.

1.4.6.2 Aquatic Resources

HDR identified two jurisdictional streams within the study area. One tributary to Killian Creek exhibits perennial flow, and fish and macroinvertebrates were identified during the on-site visit. The remaining tributary to Killian Creek exhibits intermittent surface water flow and lacks instream habitat. This system is not likely to support populations of fish and macroinvertebrates year-round. No federally protected aquatic species or critical habitats have been identified in Lincoln County (USFWS 2015). A jurisdictional determination of the jurisdictional resources within the study area has been sent to the U.S. Army Corps of Engineers. As of the time of this report, the determination is pending.

During construction, potential effects related to runoff from the site will be minimized through the implementation of best management practices under an approved, comprehensive erosion-control plan to protect water quality and aquatic resources. Construction of the proposed facility is not anticipated to adversely affect macroinvertebrate or fish communities.

The proposed facility will use a municipal water supply during testing operations. If needed, backup water could be provided from currently permitted withdrawals from Killian Creek; there will be no withdrawals from other area waterbodies. Prior to commercial operations, the existing filtered water system which is sourced from Killian Creek will

be cross-connected to the new facility. There will be no thermal issues associated with discharge from the proposed facility, and thus operations of the proposed facility are not anticipated to adversely affect macroinvertebrate or fish communities.

Low-volume wastewater streams will tie into the existing waste-water system and discharge to the Lincoln County Wastewater Treatment Plant adjacent to the site via the existing Publicly Owned Treatment Works (POTW) permitted discharge. Oily water separators will be constructed according to a Duke Energy-approved design. CT water wash wastewater will be contained for off-site disposal. Oil-filled transformer containments will be designed to contain the oil and the firefighting water that would be used in the event of a transformer failure and/or fire.

1.4.7 Meteorological

1.4.7.1 Climatology

The site of the proposed Lincoln County CT Addition is in the Piedmont region of North Carolina, with the Appalachian Mountains to the west and the Atlantic Ocean to the east. Both of these features play important roles in the climatological conditions of the site. The National Weather Service reporting station at Charlotte, NC (KCLT), located approximately 15 miles south-southeast, is representative of the climate conditions at the proposed facility site.

This region traditionally features a temperate climate in the winter. The proximity of the Atlantic Ocean provides some moderating effects, and the Appalachian Mountains block any direct impact from Arctic air masses approaching from the north and west. In rare instances, however, this location can still be subjected to extreme cold. The record low at KCLT, -5° F, has occurred twice, most recently on January 21, 1985. Typical winter minimums for the area are much milder: the normal daily minimum in January (the coldest month of the year) is 29.6° F, while the normal high is 50.7° F. Overall, 65 days a year on average see minimums

of 32° F or below, but only about one day a year will see a daily maximum at or below 32° F (Fuhrmann 2007).

Winter precipitation events are typically either migratory low-pressure systems which move northeast from the Gulf of Mexico and cross the region from southwest to northeast or low pressure systems that form off the Carolinas' coast and move off to the northeast. Fronts crossing the region from the northwest are also common in winter, but these typically provide much less rainfall because the mountains block a portion of the moisture from reaching the lee side. Rain is the dominant precipitation type in the winter, averaging about 3.25 inches per month at KCLT from December to February (Fuhrmann 2007).

Snowfall can occur between November and March, but the average annual snowfall at KCLT is only 4.3 inches per year. In fact, this region averages only about one day of snowfall greater than 1 inch every year. Heavy snowfalls are possible but rare. The heaviest 24-hour snowfall at KCLT was 12.1 inches in January of 1988 (Fuhrmann 2007).

Sleet and freezing rain are also a winter risk for this region. A phenomenon called "cold air damming" (CAD) commonly occurs when cold, dense air banks against the Appalachian Mountains during times of high pressure to the north of the region. This causes cold air to become trapped at the earth's surface, which can cause freezing rain or sleet if precipitation occurs. CAD events can occur any time of the year but are most frequent in fall and winter. In some instances, this setup can lead to significant ice storms for the region, such as the major ice storms experienced across the region in 2002 and 2005. Based on a climatology study of winters between 1948 and 2003, KCLT has an annual probability of 56% for a 0.25-inch ice event. The probability falls to 26% for a 0.50-inch event (Fuhrmann 2007).

Sub-tropical "Bermuda" high pressure systems dominate the weather in summer, causing a maritime tropical climate characterized by warm, humid days and convectively driven precipitation events. The

normal July daily minimum temperature is 68.1° F, and the normal July daily maximum temperature is 89° F. Daytime maximum temperatures can reach or exceed 100° F, though this is relatively uncommon. The record high of 104° F was most recently reached in July 2012. About 35 days per year reach or exceed 90° F.

Summer precipitation is typically driven by air mass thunderstorms caused by diurnal heating. Showers and thunderstorms often form in the mountain and foothills just to the west of the site in the afternoon and move into the region in the late afternoon and evening. KCLT averages 40 thunderstorm days annually, with 71% of these occurring between May and August. The months of June, July and August each average just below 4 inches of precipitation per month.

Spring and autumn are transitional seasons. Spring is characterized by warming temperatures and a transition from winter stratiform rainfall events to summer events driven by convection. Autumn is characterized by the breakdown of the Bermuda high pressure system and an increasing frequency of cold fronts and intrusions of cool air masses (U.S. Climate Data 2016).

Tornadoes have been recorded in all four seasons across the Carolinas. Spring is the typical peak, although a secondary peak associated with tropical systems and stronger cold fronts occurs in the fall. Since 1970, 18 tornadoes have been reported in Lincoln County, with the most recent in 2010. Fewer than 20 percent of all tornadoes observed since 1950 in North Carolina have been F2/EF2 or higher. Lincoln County statistics are similar to this state-wide value. Four of these 18 tornadoes (22%) were reported as F2/EF2 or higher. The strongest was a F4 tornado that passed through the county on May 5, 1989—to date, the only tornado rated greater than F2 to pass through Lincoln County (NCSU Tornadoes 2016).

Annual precipitation in the region is relatively constant year-round. August is the wettest month of the year (4.22 inches), and April is

typically the driest (3.04 inches) because of the transition from winter's coastal low-pressure systems before the convective-based activity of the summer. The months of September through November can be dry compared to the rest of the year if there is a dearth of tropical storms. The annual normal precipitation at KCLT is 41.6 inches. Table 1.4.7.1-1 shows average seasonal climate data for the region (NCEI 2015).

Table 1.4.7.1-1: Average Seasonal Climate Data (NCEI 2015)

Climate Indicator	Winter (Dec-Feb)	Spring (March-May)	Summer (June-Aug)	Autumn (Sept-Nov)
Average Temperature (ºF)	42.13	59.33	77.03	60.63
Average precipitation (inches)	3.33	3.41	3.88	3.26
Total Precipitation (inches)	9.98	10.23	11.64	9.78

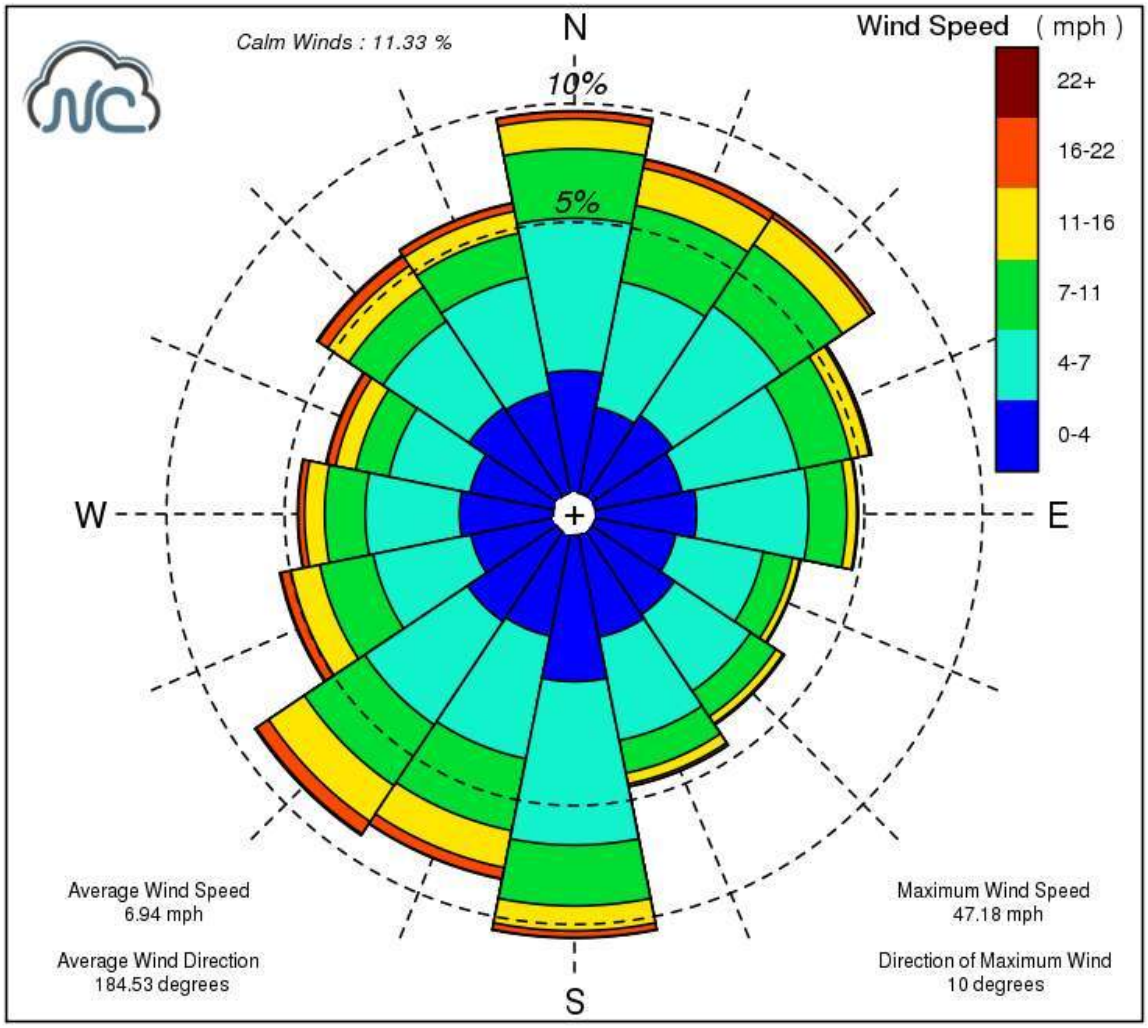
The air dispersion of pollutants in the region is a product of the overall weather pattern combined with the impacts of being near the Appalachian Mountains. Given the right pattern, the mountains can enhance sinking air across the Piedmont, leading to stagnant conditions, mostly in the summer and fall. Afternoon mixing heights decrease significantly from the summer to the fall. Table 1.4.7.1-2 shows the seasonal mixing heights (representing the height at which the atmosphere is mixed due to turbulence) for Charlotte based on data from 1987-2006 (NCDC 2007).

Table 1.4.7.1-2: Seasonal Mixing Heights (in meters)
for Charlotte, NC

	Spring	**Summer**	**Fall**	**Winter**
Morning (minimum)	642	620	510	561
Afternoon (maximum)	1717	1799	1284	1027

In terms of plume transport, winds at KCLT (10-meter level) since 1950 are most frequently from the north and south sectors. A wind rose (a graphic tool used to show wind speed and direction for a particular location over a specified time period) is provided in Figure 1.4.7.1-1.

Figure 1.4.7.1-1: Wind Rose for Charlotte Douglas International Airport (KCLT) January 1, 1950 – January 1, 2015



Source: NCSU Windrose 2016

1.4.7.2 Air Quality

National Ambient Air Quality Standards (NAAQS) have been established by the U.S. Environmental Protection Agency (USEPA) and adopted by the N.C. Department of Environmental Quality (NCDEQ), formerly the N.C. Department of Environment and Natural Resources. These standards, outlined in Chapter 15A of the North Carolina Administrative Code (NCAC), Subchapter 2D (Air Pollution Control Requirements), Section .0400, establish certain maximum limits on parameters of air quality considered necessary for the preservation and enhancement of the state's air resources (USEPA 2016a).

The six criteria air pollutants regulated by the NCDEQ through NAAQS include the following:

- Ozone (O_3)
- Particulate Matter ($PM_{2.5}$ and PM_{10})
- Carbon Monoxide (CO)
- Sulfur Dioxide (SO_2)
- Nitrogen Dioxide (NO_2) and
- Lead (Pb).

The entire state of North Carolina has reached attainment and continues to satisfy the attainment criteria for each of the six listed pollutants. In the past, portions of North Carolina (e.g., Charlotte metropolitan area) have experienced intermittent non-attainment designations for ozone; however, this is not uncommon in larger cities during the warmest periods of the year. Ground-level ozone limits may be exceeded in metropolitan areas and large suburbs during the summer due to increased chemical reactions between vehicle emissions and ultraviolet radiation and sunlight, resulting in (temporarily) increased ozone levels.

The proposed facility's operations will be permitted as part of the Lincoln County Combustion Turbine Station. DEC expects the air permit application to be submitted in the summer of 2017. Potential emissions from the equipment indicate that the facility will be permitted as a "major" modification for the purposes of Prevention of Significant Deterioration (PSD) permitting. As part of the permitting process, the facility will be required to evaluate Best Available Control Technology (BACT) and perform a dispersion modeling analysis. DEC will use Continuous Emissions Monitoring Systems (CEMS) to ensure compliance with the New Source Performance Standards (NSPS) and allowance trading programs such as the Cross-State Air Pollution Rule.

During construction, the proposed facility may be subject to air permitting requirements, depending on the type of equipment used (such as portable generators) and the associated level of air emissions. The primary air quality issue during construction will be fugitive dust—dust

from non-point sources, such as earthwork and construction traffic on unpaved roads. Water trucks will be used to suppress dust as required. Fugitive dust impact is expected to be equivalent to a normal construction project of this magnitude.

Other potential sources of pollutants during construction are mobile internal combustion engines (e.g., earth moving equipment and cranes), temporary sources (e.g., portable generators and air compressors), and increased vehicle traffic by construction workers. Emissions from these sources should have little impact. Any emissions from sources during construction will be addressed through the North Carolina Division of Air Quality's air quality permit application process.

1.4.8 Seismic

1.4.8.1 Seismic Character and Seismic Hazards

Earthquakes that originate in North Carolina are primarily intraplate earthquakes (i.e., earthquakes that occur in the interior of a tectonic plate) and in most cases, occur along existing structural faults. The orientation of these structures within the current-day stress field in the southeast is northeast-southwest. The eastern United States has a low relative recurrence interval for strong earthquakes; however, the rigid and largely intact basement rock enables seismic energy to travel significant distances. Because the type and condition of local and regional geology plays a significant role in earthquake attenuation, even structures in areas of low seismicity should be designed to withstand surface movement.

Tectonism describes the movement of tectonic plates that causes earthquakes, faults, volcanoes, uplift, subsidence, or a number of combinations thereof. Because earthquakes that are felt in North Carolina are typically the result of regional tectonism, they are not associated with the movement of tectonic plates and the significant changes and loss of property that can accompany these seismic events. Intraplate earthquakes, however, are not well understood, and the hazards associated with them

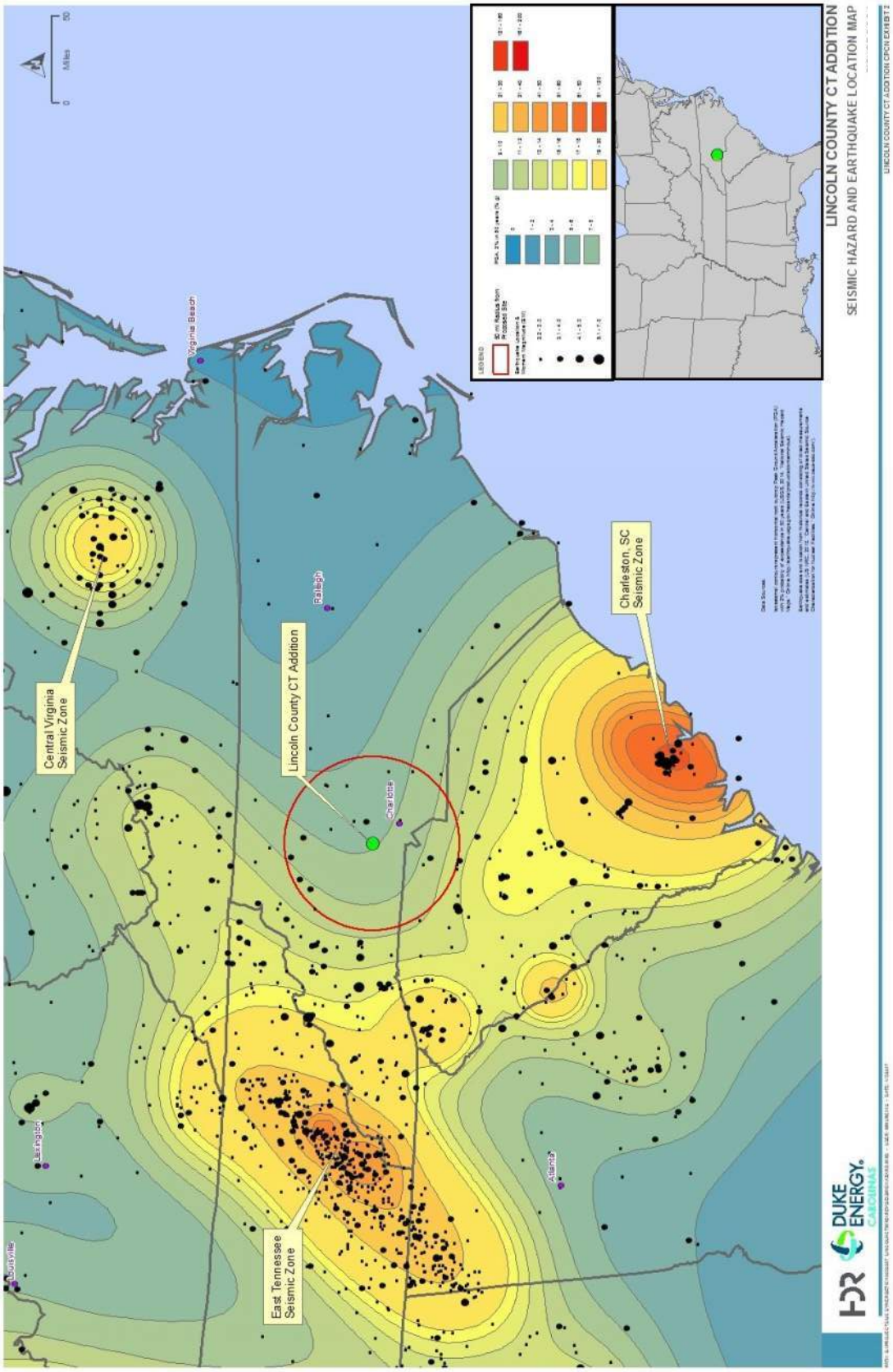
are difficult to quantify. A seismic hazard is the probability that an earthquake will generate an amount of ground motion exceeding the specified reference level in a certain period of time, generally 50 years. Although intraplate earthquakes are typically of low magnitude (M) on the Richter scale, which is a base-10 logarithmic numeric scale used to express the magnitude of an earthquake based on seismograph oscillations, there have been several major intraplate earthquakes that have affected the central and eastern United States. Examples include the Mineral, Virginia, earthquake in 2011; the Charleston, South Carolina, earthquake in 1886; and the New Madrid, Missouri, earthquakes in 1811 and 1812. A more comprehensive discussion of historic seismic activity is included in Appendix D.

The seismic hazard for a particular site or location is based on: (1) the magnitude of and distance from the potential earthquake, (2) the frequency with which those potential earthquakes are likely to occur, and (3) the amount of shaking that is expected to occur as a result of those earthquakes. The Peak Ground Acceleration (PGA) for the study area has been estimated using the U.S. Geological Survey (USGS) National Seismic Hazard Mapping database (2016b). The site of the proposed facility has an estimated value of 0.08 peak ground acceleration, which is expressed as a fraction of standard gravity (g), and has a two percent probability of exceedance in 50 years (USGS 2016a). Figure 1.4.8.1-1 shows the location of the site, the two percent probability of exceedance in 50 years, PGA contours, regional earthquake source information, and the 50-mile radius from the proposed project site. The probability that there would be an earthquake with a magnitude of greater than 5.0 on the Richter scale within 100 years within 30 miles of the study area is very small (0.02 – 0.03%) (USGS 2016b).

Induced seismicity, which has increased in frequency over recent years in the eastern United States, has been linked to an increase in wastewater injection into deep wells. These activities are not accounted

for in the estimated hazards presented above. Because the proposed facility will be in an area of relatively low potential seismic activity and overlies stable basement rock, it should perform satisfactorily in the event of an earthquake if appropriate considerations are made during preliminary and final design.

Figure 1.4.8.1-1: Seismic Hazard and Earthquake Locations



1.4.8.2 Seismic Zones and Magnitude

Three major seismic zones exist in the central and eastern United States: (1) the Charleston, South Carolina, seismic zone, (2) the East Tennessee seismic zone, and (3) the Central Virginia seismic zone (see Figure 1.4.8.1-1). These zones are located approximately 180, 190, and 240 miles from the proposed facility, respectively. Figure 1.4.8.1-1 indicates these three zones; and the clusters of variable-sized black circles represent the locations of previous earthquakes and their respective magnitude on the Richter scale. The magnitude of an earthquake can be expressed as the amount of energy released (in gigajoules). For example, an earthquake with a magnitude of 5.0 is equivalent to a release of 2,000 gigajoules of energy. An earthquake with a magnitude of 2.5 to 5.4 causes minor damage; there are around 30,000 of these each year world-wide. An earthquake with a magnitude of 8.0 is considered a great earthquake and can completely destroy communities near the epicenter. There are, on average, less than five great earthquakes per year world-wide.

The closest recorded earthquake (>4.0 M) to the study area occurred in 1916 near Skyland, North Carolina, in Buncombe County, which is approximately 100 miles west of the study area. This earthquake was estimated to be 5.2 M and was most likely associated with the East Tennessee seismic zone. In more recent history, the largest earthquake that was felt in North Carolina was the earthquake that originated near Richmond, Virginia, in 2011. This earthquake was associated with the Central Virginia Seismic Zone and registered as a 5.8 M on the Richter scale (USGS 2016a). Both the Charleston and East Tennessee seismic zones are considered areas of high seismic hazard by the USGS. More details regarding the history of earthquakes in the region are included in Appendix D.

It is likely that the East Tennessee seismic zone presents the greatest known risk to the site area, but the risk is considered small. The

facility's structures will be designed in accordance with the applicable code, using ground motion data consistent with the required loading.

1.4.9 Water Supply

The study area is located within the Upper Catawba River Basin (HUC 03050101). According to the North Carolina Division of Water Quality's 2010 Catawba River Basin Plan, the land cover within this hydrologic unit code (HUC) is mostly forested (62%) with significant areas of agriculture (17%) and developed land (16%). Agriculture is spread out across the subbasin; the largest urban areas include Morganton, Lenoir, the northern portion of Hickory, Huntersville, Gastonia, and outlying areas northwest of Charlotte (NCDEQ 2010a).

The study area does not occur within a water supply watershed. It drains to Killian Creek, which is classified by the NCDEQ as a Class C water. Class C waters are protected for uses such as secondary recreation, fishing, wildlife, fish consumption, aquatic life (including propagation, survival and maintenance of biological integrity), and agriculture. Secondary recreation includes wading, boating, and other uses involving human body contact with water where such activities take place in an infrequent, unorganized, or incidental manner.

1.4.10 Aviation

Title 14, Code of Federal Regulations, Part 77 (Safe, Efficient Use, and Preservation of the Navigable Airspace) establishes standards for protecting navigable airspace and sets forth requirements for Federal Aviation Administration (FAA) notification of proposed construction that could potentially affect the navigable airspace. Specifically, the notification "triggers" set out in Part 77 that are, or possibly could be, applicable to construction of the Lincoln County CT Addition facility include the following:

- If requested by the FAA, or if any of the following types of construction or alteration are proposed, a notice must be filed with the FAA:

a) Any construction or alteration that is more than 200 feet above ground line at its site
b) Any construction or alteration that exceeds an imaginary surface extending outward and upward from the aviation facility at any of the following imaginary surface slopes:
    i) 100 to 1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway of each public-use airport listed in the Airport/Facility Directory with its longest runway more than 3,200 feet in actual length, excluding heliports
    ii) 50 to 1 for a horizontal distance of 10,000 feet from the nearest point of the nearest runway of each public use airport listed in the Airport/Facility Directory with its longest runway no more than 3,200 feet in actual length, excluding heliports
    iii) 25 to 1 for a horizontal distance of 5,000 feet from the nearest point of the nearest landing and takeoff area of each heliport (U.S. Government Publishing Office 2004)

With these notification triggers in mind, UCS identified two aviation facilities (Esri 2017) in the region of the proposed plant site (see Figure 1.4.10-1):

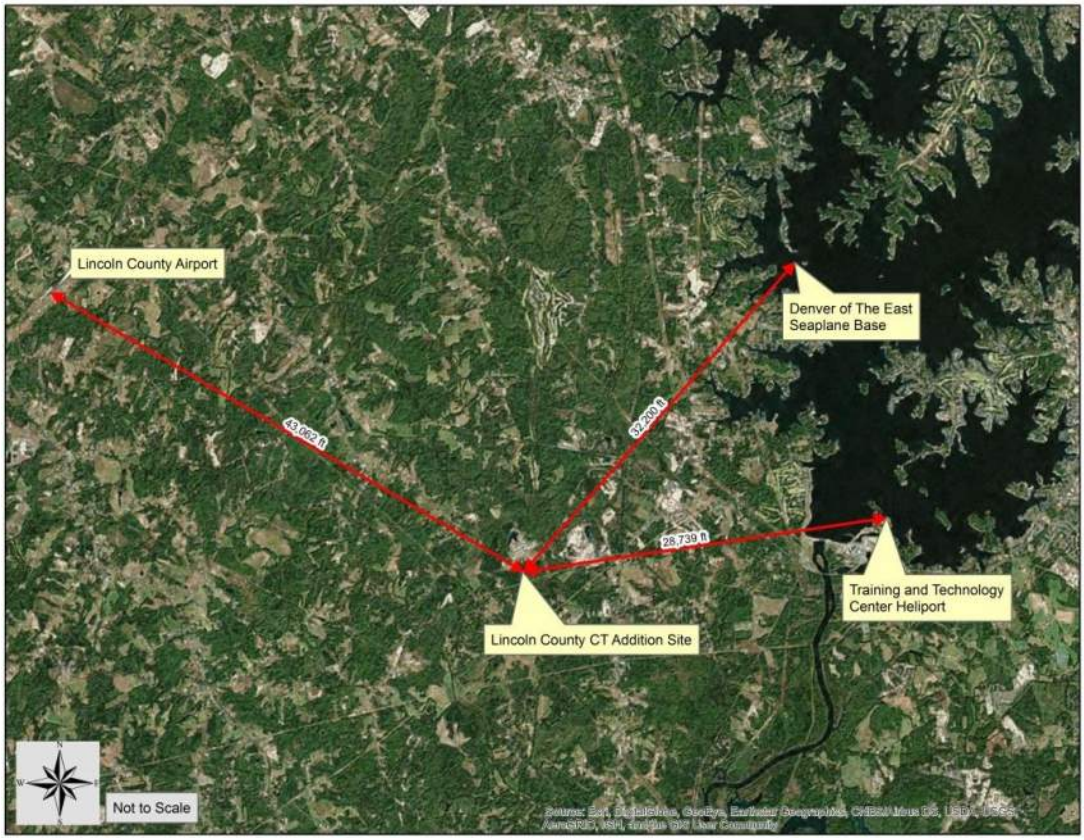
- The Denver of the East Seaplane Base, private, approximately 32,000 (6.1 miles) to the northeast
- Lincoln County Airport, public, approximately 43,000 (8.1 miles) feet to the northwest

UCS has determined that none of the above notification criteria are met, based on distances to the aviation facilities and preliminary engineering of the proposed Lincoln County plant.

UCS used the online FAA Notification Criteria Tool to enter the proposed plant coordinates (latitude/longitude), plant grade elevation, and stack height (140 feet) to determine whether FAA notification would be required. The results from the tool asked that notification Form 7460-1 be filed with the FAA before plant

construction because, even though it did not meet the filing criteria listed above, the plant structure "may impact the assurance of navigation signal reception" in relation to the Lincoln County Airport (FAA 2017). Otherwise, the proposed facility should have no impacts on aviation in the area.

Figure 1.4.10-1: Airfield Locations



1.5 Site Study Status

All necessary studies have been conducted.

1.6 Transmission

The location of the existing Lincoln County CT electrical substation is shown in Figure 1.2-1.

The proposed CT unit will be designed with a single high voltage output breaker and interconnected to the existing 230 kV Lincoln County CT electrical substation. The preliminary plan is to expand the existing substation to the south to accommodate the proposed new CT unit. The high voltage line from the unit will be routed to this new location. Two new circuit breakers will be required at the substation, and as many as seven existing circuit breakers may be replaced, if required by the Interconnect Agreement. No new transmission lines will be constructed outside the Lincoln County CT property, and no transmission upgrades are anticipated.

DEC has filed an application and will conduct studies for the interconnection in accordance with the DEC Open Access Transmission Tariff. The System Impact Study results are expected in the summer of 2017, and the Facility Study results are expected in the fall of 2017. Final design will be determined after the studies have been completed.

1.7 Unit Capacity

The net capacity of the unit at 30° F is 402 megawatts.

2.0 METHODOLOGY

2.1 Population

Total 2010 population numbers for Lincoln County and the nearby towns and communities listed in Section 1.4.1 were derived from information downloaded from the U.S. Census Bureau website. The smallest geographic unit of digital 2010 census data available directly from the U.S. Census Bureau is the census tract. A third-party vendor (University of Minnesota 2011) has contracted with the U.S. Census Bureau to publish and make available census data geographic files and population tables at the block level. This is the finest detail of population data that the U.S. Census Bureau collects. This report analyzes population data to the census block level.

UCS downloaded census block geographic files and population statistical tables for the entire states of North Carolina and South Carolina. ArcGIS was then used to extract census block polygons within a radius of 25 miles from the proposed simple-cycle facility from the two statewide data sets and combine the geographic polygons with the attributes. The resultant file contained an array of population data for each census block polygon. The total population value and geographic area for each census block was then used to calculate the population density, as reported in Section 1.4.1.

It should be noted that for the purposes of this study, UCS assumed that the total population for each census block was evenly distributed throughout its geographic area. Thus, for the census blocks that were split into two parts based on distance, a percentage of the entire block acreage was calculated for each piece (after-split acreage divided by pre-split acreage). This decimal fraction was then multiplied by the total population number for the entire block to assign the population figure to each piece.

2.2 Area Development

UCS researched existing area development through intensive field reconnaissance, desktop mapping (using current aerial photography along with county tax parcel and other digital data), and contacts with governmental officials.

To ascertain future development plans in the vicinity of the proposed facility, UCS consulted planning officials for Lincoln and Gaston counties (Combs 2016). Future land

use documents and mapping were also researched online for both Lincoln and Gaston counties (Gaston County 2016).

2.3 Visual and Auditory

2.3.1 Visual

The Visual Effects Analysis was conducted in three steps.

- First, a comprehensive field study was conducted to identify sensitive visual resources and characterize existing visual conditions. During the Probable Visual Effects field study, existing residential properties and public roadways were identified as resources with the potential to be most affected by views of the proposed plant.

- Second, using National Elevation Dataset (NED) tiles, UCS built a computer-generated Seen Area Analysis model (Figure 1.1.3.1-1) that predicts areas within five miles that will likely have a view of the proposed facility.

  UCS delineated tree cover by using the ArcGIS system to classify georeferenced aerial photography and extract a raster image of tree cover. This digital raster image was converted to polygons representing tree locations. Where these polygons overlapped the NEDs, UCS added 60 feet (an assumed average tree height) to the NED elevations. This information was used to create a five-mile visual probability model that accounts for the screening effects of topography and vegetation. UCS assumed that forested areas were opaque in building viewshed models.

  Next, using the ArcGIS 3-D Analyst module, UCS developed a viewshed map to predict the visibility within five miles of the existing and future facility. A height of 60 feet was used for the emission stacks of the existing 16 simple-cycle units. UCS used the following equipment heights for the proposed facility in the viewshed analysis.

- Generation Building 90 Feet
- Gas Turbine Inlet Filter 95 Feet
- Dilution Selective Catalytic Reactor (DSCR) 56 Feet
- DSCR Stack 140 Feet
- Demineralized Water Tank 30 Feet
- Closed Cooling Water Fin-Fan Cooling Tower 20 Feet
- Administrative Building 20 Feet

- Third, UCS interpreted and analyzed the information and data developed during the first and second steps, taking into account the fact that any visual effects of the proposed plant would be influenced by such factors as distance, the parts of the proposed facility that would be seen, the backgrounds of visible structures, any foreground or mid-ground vegetation in the view, and the scenic condition of the area from which the facility would be viewed.

  The data derived from the Seen Area Analysis and Predicted Visual Effects (Table 1.4.3.1-1) were correlated to probable visual effects ranging from Very High to Very Low.

  Using the distance from the viewer to the proposed plant, UCS predicted (ranked) the visual effects that may occur as a result of the proposed structure. The ranking (Table 1.4.3.1-1) represents a worst-case scenario, since UCS made no attempt to reduce the predicted visual effects probability that will inevitably occur when foreground and mid-ground vegetation or backdrops are present. Also, no attempt was made to mitigate predicted view ranking based on existing modifications to natural landscape settings or the fact that only minor plant features may be seen from an area having a probable view. For example, even if only the top segment of the emission stack can be seen from within one-half mile, the view effect was ranked as Very High.

  UCS conducted an extensive field investigation to determine the probable visual effects of the proposed facility on residential properties and public roadways.

2.3.2 Auditory

Stewart used a Casella 633C sound analyzer to measure current sound levels along the perimeter of the station and in the surrounding neighborhoods and to document the existing sounds at various community locations. Measurements for this study were made during one 42-hour period with two long-term monitors (Larson Davis 831s). Samples were taken on Tuesday, March 28, 2017, from 9:00 a.m. to 10:00 a.m. and on Thursday, March 30, from 1:00 a.m. to 2:00 a.m. Shorter, five-minute samples were made on Friday, March 24, during the initial site visit and on Saturday evening, March 25, during a Lincoln County Speedway event. Atmospheric conditions varied over the measurement period. Temperature, relative humidity, and wind conditions at the nearby airport were recorded from online sources to allow some evaluation of these effects on the noise distribution. The sound was measured in octave bands as well as the overall A-weighted level to provide a better understanding of the noise situation. Statistical sampling was used to see the variation within each measurement period.

Existing and proposed combustion turbine equipment sound power levels were estimated.

- DEC provided information about the existing CT units (which could not be operated during the noise survey phase) to estimate their sound power levels. Stewart considered the distribution of sources, the sound level specification that the equipment supplier met for one and all 16 units, the layout of the units, and spectral information of similar combustion turbines at another site. From this, the sound power of each unit in each octave band could be reasonably estimated.
- The proposed turbine is a new model size that has not yet been constructed, and therefore no field measurements are available. The manufacturer, Siemens, estimated the sound power of each piece of equipment and provided CadnaA (sound propagation analysis software) drawings to illustrate the location and size of each sound source and building that could impact sound radiation. Stewart then reconstructed the

proposed CT SoundPlan, using the CadnaA plot, drawings, and sound power data.

- Stewart modeled the acoustical hardness/softness and general topography of the ground, other major pieces of equipment, and existing and proposed sound sources in SoundPlan. Then sound level results from the computer sound propagation modeling software were computed for the DEC sources. This included three plots of sound levels (overall A-weighted sound pressure level [dBA]): one plot with all 16 existing combustion turbines running, another plot with only the proposed CT addition running, and a final plot with both existing and proposed CTs running. For Soundplan, ISO 9613-2:1996 is employed, which considers ground effects, distance, barrier effects, reflection, etc., in a standardized approach.
- Stewart evaluated the anticipated DEC-generated noise levels by comparing existing DEC-site noise levels, community noise levels, and available Lincoln County regulations.

2.4 Cultural Resources

The cultural resources identification survey for the project included identification of architectural historic resources and archaeological resources. Brockington designed the survey to identify all architectural and archaeological resources that may be present in the project area and to obtain sufficient information to make recommendations based on their potential eligibility to the NRHP. To accomplish this, Brockington conducted documentary research and architectural survey work in compliance with the NHPA of 1966 (NHPA-PL89-665); the Archaeological and Historic Preservation Act of 1974, Executive Order 11593; and relevant sections of 36CFR60 and 36CFR800. Because comprehensive archaeological field testing was conducted in 1990 before the existing generating facility was constructed (see Appendix B-1), Brockington did not repeat field testing for this study. The archaeological and architectural investigations were conducted with reference to state and federal guidelines (Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation* [United States Department of the Interior 1983]) for conducting archaeological

and architectural investigations. This report was prepared in accordance with the Office of State Archaeology's (OSA) *Guidelines for Preparation of Archaeological Survey Reports in North Carolina* (North Carolina DNCR 1988).

Prior to architectural fieldwork, Brockington consulted architectural data and tax records from the North Carolina State Historic Preservation Office's (NCSHPO) online database and architectural data housed in the NCSHPO's Raleigh, North Carolina, office for properties located within the 2.5-kilometer (1.5-mile) APE to determine which buildings met the NRHP 50 years or older age criteria as of 2016. Background research also focused on relevant sources of local historical information and available historical maps, which were examined to provide historical context for the study area and to check for any buildings and other cultural features present within the APE.

With consideration to the background research, Brockington conducted an architectural windshield survey within the APE of the proposed facility. This entailed a survey of each resource 50 years or older within the defined APE. Resources which retained architectural integrity, were representative of type, and/or differed from resources within the APE were recorded photographically. Resources which retained little architectural integrity or were severely altered were not recorded. Due to private property issues, resources not visible from public rights-of-way and resources located down private roads posted with "No Trespassing" signs were also not surveyed.

UCS utilized Seen Area Analysis modeling data as described in Section 2.3.1 to further assess visual impacts to architectural resources within the APE. Line-of-sight graphs were prepared to display any obstructions, or lack thereof, that lie in the visual path of the proposed facility. The graphs also show the elevation, distance, and amount of elements contributing to screening as well as areas where additional screening elements could be implemented to mitigate any negative visual effects incurred by the construction of the facility.

2.5 Geological

HDR geologists performed a review of existing germane literature regarding the geology and geologic history of the southeastern Piedmont region. Data generated from the published geologic map of North Carolina was obtained from the North Carolina Geological

Survey and evaluated for site-specific bedrock type, terrane, structural features, formations, and presence of intrusions. Finally, site-specific data reports were generated from the United States Department of Agriculture Natural Resources Conservation Service database for soil types, soil conditions, and soil profiles typical of the study area.

2.6 Ecological

HDR provided Duke Energy with a detailed Natural Resources Assessment Report for the Lincoln CT Addition Project (Appendix C). This study involved a desktop review of publicly available data and an on-site investigation that included surveys for jurisdictional wetlands and waters of the U.S., federally protected species habitat, and classification of natural/vegetation communities.

On December 8, 2016, HDR biologists surveyed the study area for jurisdictional wetlands and waters of the U.S. under Section 404 of the CWA. The study area was examined according to the methodology described in the USACE 1987 Wetland Delineation Manual, USACE Post-Rapanos guidance, USACE Eastern Mountains and Piedmont Regional Supplement, and NCDWR Methodology for Identification of Intermittent and Perennial Streams and Their Origins (Version 4.11). Results of the jurisdictional wetlands and waters survey are provided in the Natural Resources Assessment Report (Appendix C).

Existing vegetative communities are described in the Natural Resources Assessment Report based on the Classification of the Natural Communities of North Carolina – Fourth Approximation (Schafale 2012).

2.7 Meteorological

DEC conducted an extensive online review of pertinent reports from the National Climatic Data Center, the Environmental Protection Agency, North Carolina State University, and the State Climate Office of North Carolina.

2.8 Seismic

HDR geologists reviewed the United States Geological Survey National Seismic Hazard Mapping database to obtain current seismic data as well the estimated Peak Ground Acceleration (PGA) for the study area. The USGS Probabilistic Seismic Hazard Analysis

Model, which is part of the Seismic Hazard Mapping program, was used to predict the probability of an earthquake (>5.0 M) near the study area. The USGS Earthquake Track website was accessed to identify and compile documented historic and recent earthquakes, the distance of earthquake epicenters from the study area, the depth of the earthquake from the surface, and magnitude of the individual event. USGS publications (Open File Reports and Research Letters) were also reviewed for information regarding seismic character in the southeastern United States.

2.9 Water Supply

HDR reviewed information from the North Carolina Department of Environmental Quality to compile the information on water quality.

2.10 Aviation

UCS reviewed aerial photographs; Lincolnton East, NC, Lowesville, NC, and Lake Norman South, NC, United States Geological Survey 7.5-minute Quadrangle Maps (USGS 2013); aeronautical charts; and airport diagrams to determine the locations of airfields in the region surrounding the proposed facility. Two airfields were located, and records for each were reviewed. A preliminary assessment was conducted for each site.

The airports are located approximately 32,000 feet to the northeast and 43,000 feet to the northwest of the proposed facility.

FAA notification criteria were reviewed. The plant location coordinates, pad elevation, and stack height were also entered into the FAA Notice Criteria Tool on the FAA website (Federal Aviation Administration 2017).

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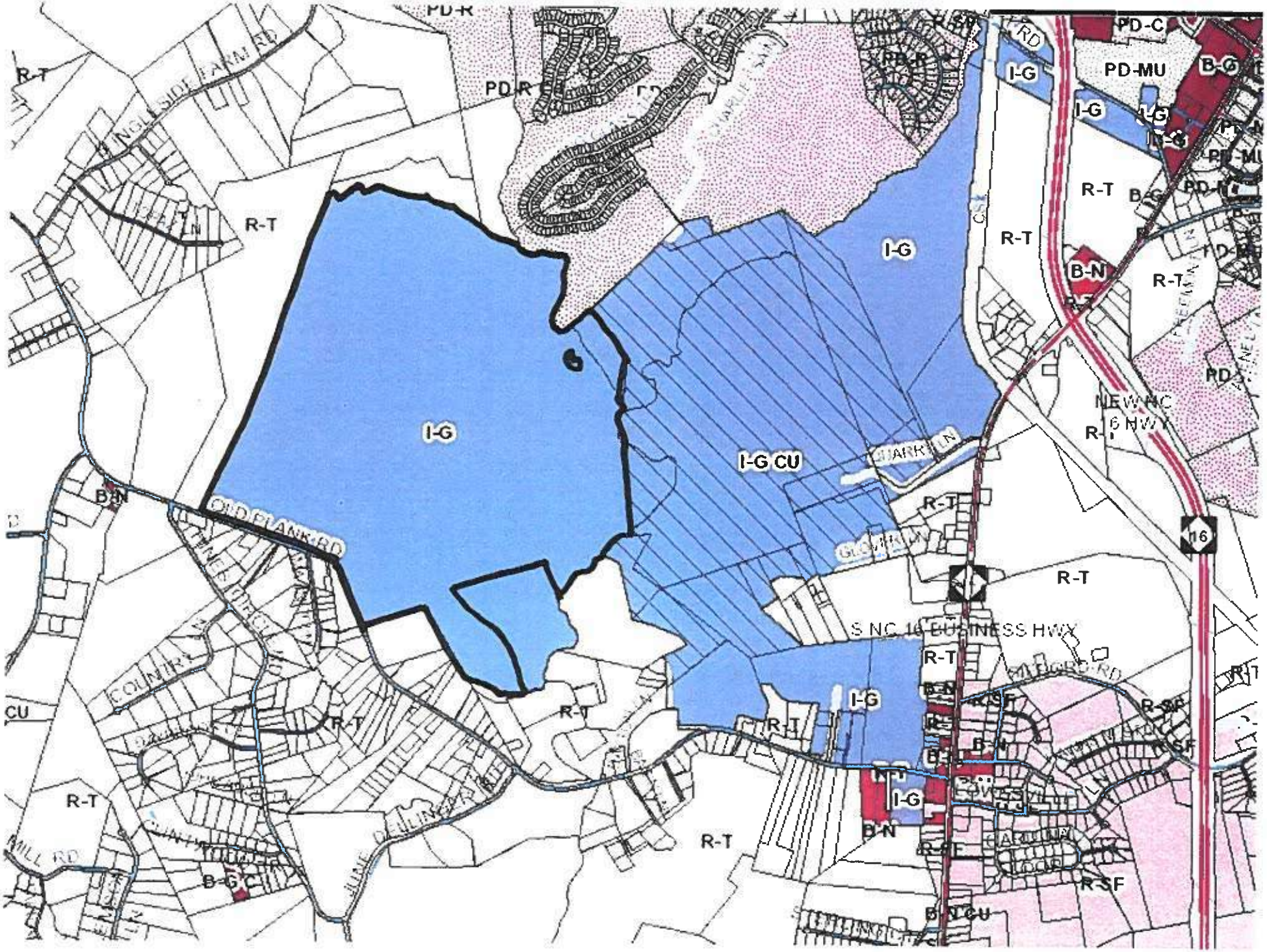

I-G
I-G CU
R-T
B-N
B-G
PD-C
PD-MU
PD-R
R-SF
OLD PLANK RD
S NC 16 BUSINESS HWY
NEW NC 16 HWY
16
MILL RD

ATT 2

LEGEND

- EXISTING ONSITE ROADS
- PLANNED ONSITE ROADS
- TEMPORARY FACILITIES
- EXISTING PIPELINE
- TRANSMISSION LINE AND CORRIDOR
- LIMIT OF DISTURBANCE
- PROPERTY BOUNDARY
- PUBLIC ROADS
- WATER SUPPLY BASIN
- USGS NATIONAL HYDROGRAPHY DATASET
- HDR DELINEATED STREAMS
- NON-JURSDICTIONAL LINEAR CONVEYANCE
- USFWS NATIONAL WETLANDS INVENTORY
- HDR DELINEATED WETLANDS
- TOPOGRAPHIC CONTOUR

DATA SOURCE:
USGS National Hydrography Dataset (NHD)
USFWS National Wetlands Inventory (NWI)
ESRI Aerial Imagery
NCDOT Road Data
LCCT Plant Data from Siemens and Duke Energy

N

0 Feet 500

EXISTING WATER SUPPLY BASIN
EXISTING SWITCHYARD
FUTURE SWITCHYARD
EXISTING LINCOLN COUNTY COMBUSTION TURBINE (LCCT) PLANT
EXISTING TRANSMISSION LINE AND BUFFER
EXISTING FUEL OIL STORAGE
FUTURE 230 kV TRANSMISSION LINE
FUTURE 230 kV TRANSMISSION LINE 125' BUFFER
FUTURE FUEL OIL STORAGE
LCCT ADDITION PLANT PARKING
FUTURE LCCT ADDITION
TEMPORARY CONSTRUCTION OFFICES
FACILITY DRIVEWAY
FUTURE GUARD HOUSE
FUEL GAS RECEIVING AREA
OLD PLANK RD
TESTING AND INSTRUMENTATION BUILDINGS
SEDIMENTATION BASIN (1 OF 5)
EXISTING CULVERT
MAGNET LN
COUNTRY LN
VINES CIRCLE RD
Killian Creek
Forney Creek

HDR SIEMENS

LINCOLN COUNTY CT ADDITION

SITE PLAN

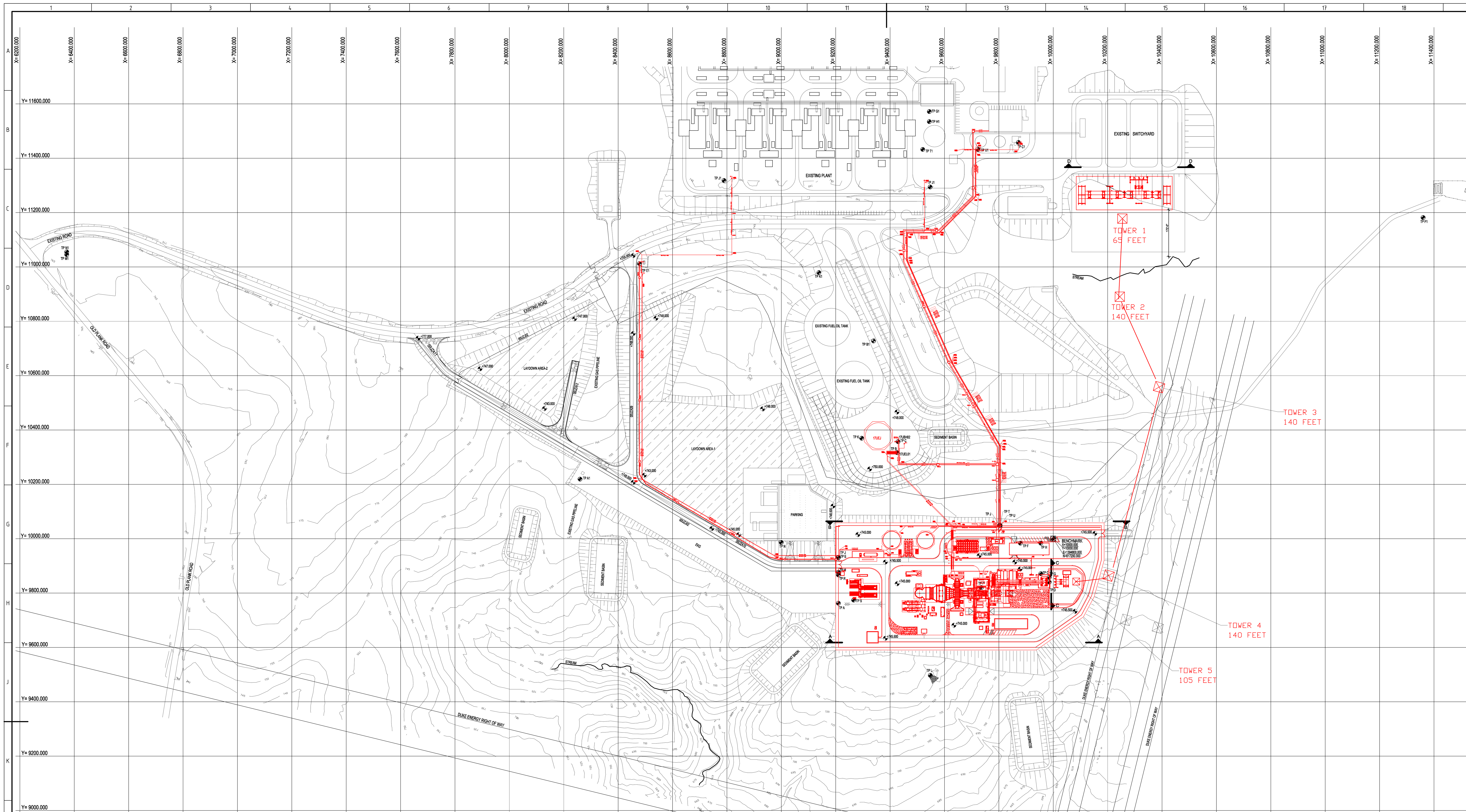
FIGURE 1

PATH: \\CLT-SRV02\GIS\PROJECTS\SEIMENS_ENERGY\10079460_SEI_PERMITPLAN_SW_DRAINAGE\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\CUP SITE PLAN_20180405.MXD - USER: IHOLDEMA - DATE: 4/5/2018

DUKE ENERGY®

DUKE LINCOLN COUNTY CT ADDITION PROJECT

This visualisation is intended to give an impression of the overall coherence of the power plant. Potential deviations in the detail design may occur.



BUILDING LEGEND

17UBA01-02	STRUCTURE FOR GT POWER DISTRIBUTION CENTER
17UBA09	STRUCTURE FOR TESTING INSTRUMENTATION POWER DISTRIBUTION CENTER AREA (TEMPORARY)
17UBA91	STRUCTURE FOR FIN-FAN COOLER / PUMP & BOP POWER DISTRIBUTION CENTER
17UBA92	STRUCTURE FOR BACK END POWER DISTRIBUTION CENTER
17UBA93	STRUCTURE FOR MV POWER DISTRIBUTION CENTER
17UBA94	STRUCTURE FOR SEE/SFC POWER DISTRIBUTION CENTER
17UBA95	STRUCTURE FOR BATTERY POWER DISTRIBUTION CENTER
17UBD01	STRUCTURE FOR SEE TRANSFORMER
17UBD02	STRUCTURE FOR SFC TRANSFORMER
17UBD03	STRUCTURE FOR LV TRANSFORMER
17UBD04	STRUCTURE FOR LV TRANSFORMER
17UBD05	STRUCTURE FOR LV TRANSFORMER
17UBE	STRUCTURE FOR AUXILIARY TRANSFORMER
17UBF	STRUCTURE FOR GENERATOR STEP UP TRANSFORMER
17UBH01-02	STRUCTURE FOR OIL / WATER SEPARATOR
17UBK01	STRUCTURE FOR CONSTRUCTION / STAND BY POWER SUPPLY SUBSTATION
17UBX	STRUCTURE FOR GENERATOR CIRCUIT BREAKER
00UCA/UST/UYC	STRUCTURE FOR ADMIN / CONTROL ROOM / WAREHOUSE BUILDING
17UCL/UCX	STRUCTURE FOR MEASURING / TESTING INSTRUMENTATION BUILDING (TEMPORARY)
17UEJ	STRUCTURE FOR FUEL OIL STORAGE TANK
17UEK	STRUCTURE FOR FUEL GAS HEATER (TEMPORARY)
17UEL01	STRUCTURE FOR FUEL OIL FORWARDING PUMP
17UEN01-02	STRUCTURE FOR FUEL GAS COMPRESSOR & CONDITIONING
17UEN03	STRUCTURE FOR FUEL GAS FINAL FILTER
17UEX	STRUCTURE FOR FUEL GAS DRAIN TANK
17UGA01	STRUCTURE FOR SERVICE WATER STORAGE TANK
17UGA02	STRUCTURE FOR SERVICE WATER FORWARDING PUMP
17UGC01	STRUCTURE FOR DEMIN WATER STORAGE TANK
17UGC02	STRUCTURE FOR DEMIN WATER FORWARDING PUMP
17UGX01	STRUCTURE FOR SERVICE WATER INLET
17UGX02	STRUCTURE FOR DEMIN WATER INLET
17UHQ	STRUCTURE FOR DILUTION SCR
17UHN	STRUCTURE FOR EXHAUST STACK
17UHX01-02	STRUCTURE FOR CEMS
17UMB	STRUCTURE FOR GAS TURBINE
17UMK	STRUCTURE FOR NITROGEN GENERATOR
17UMX	STRUCTURE FOR ROTOR AIR COOLER FIN-FAN
17UPX	STRUCTURE FOR CLOSED COOLING WATER PUMP SKID
17URB	STRUCTURE FOR CLOSED COOLING WATER FIN-FAN COOLER
17URX01-02	STRUCTURE FOR FUEL GAS COMPRESSOR FIN-FAN COOLER
17USC	STRUCTURE FOR AIR COMPRESSOR
17UTG01	STRUCTURE FOR HYDROGEN / CO2 STORAGE TANK
17UTG02	STRUCTURE FOR CO2 STORAGE TANK
17UTX	STRUCTURE FOR OIL / WASTE STORAGE
17UVA	STRUCTURE FOR EXHAUST GAS HEAT EXCHANGER (TEMPORARY)
17UVE	STRUCTURE FOR AMMONIA STORAGE / UNLOADING
17UYX01-02	STRUCTURE FOR SAFETY SHOWER
00UZA01-10	ROADS
00UZA11-12	ROAD (TEMPORARY)
00UZD01	PARKING
00UZD02	PARKING (TEMPORARY)
00UZJ01	PLANT FENCE
00UZJ02	SITE FENCE
17UZJ01	SWITCHYARD FENCE
00UZX01	PARKING FOR FUTURE HYDROGEN TRAILER
00UZX02	PARKING FOR DEMIN WATER TRUCK

BUILDING LEGEND

1	MB	GAS TURBINE
2	UHQ	DILUTION SCR
3	UBF	GENERATOR STEP UP TRANSFORMER
4	UBH01-02	OIL/WATER SEPERATOR
5	UBX	RELAY & CONTROL ENCLOSURE
6	UCA/UST/UYC	ADMIN./CONTROL RM./WAREHOUSE BUILDING
7	URB	CLOSED COOLING WATER FIN FAN COOLER
8	UMB	COMBUSTION TURBINE BUILDING
9	UGC	DEMIN. WATER STORAGE TANK
10	UGA	SERVICE WATER STORAGE TANK
11	EK	FUEL GAS COMPRESSOR & CONDITIONING
12	EKR01	FUEL GAS DRAINS TANK
13	UE	FUEL OIL STORAGE AREA
14	UGX04	SERVICE WATER BOOSTER PUMPS
15	UZA01	PLANT ENTRANCE ROAD
16	UZA02	HEAVY HAUL ROAD
17	UZD03	PARKING
18	UZJ01	FENCE & GATES
19	UGH	STORM WATER RETENTION POND AREA
20	UZX	NITROGEN TUBE BANK TRAILER PARKING (TEMPORARY)
21	UCL/UCX	MEASURING/TESTING INSTRUMENTATION & ENG. BUILDING (TEMPORARY)
22	HLD	EXHAUST GAS HEAT EXCHANGER (TEMPORARY)
23	UZD04	ADDITIONAL STAFF PARKING (TEMPORARY)
24	UZC	LAYDOWN AREA (TEMPORARY)
25	UZJ02	OFFICES/PARKING/LAYDOWN AREA FENCE & GATES (TEMPORARY)
26	UYE	GUARD HOUSE (TEMPORARY)
27	UY	CONSTRUCTION OFFICES/BUILDINGS (TEMPORARY)
28	UAA	SWITCHYARD (BY OTHERS)
29	EKA	FUEL GAS MAIN PIPE LINE (BY OTHERS)
30	EKR02	FUEL GAS PIG LAUNCHER/RECEIVER AREA (BY OTHERS)
31		EXISTING POWER PLANT
32		EXISTING SWITCHYARD
33		EXISTING FUEL OIL STORAGE AREA
34		EXISTING FUEL GAS YARD
35		EXISTING TRANSMISSION POWER LINES
36		EXISTING LEACH FIELD
37		EXISTING GAS PIPELINE
38		EXISTING ENTRANCE GATE
39		EXISTING ROAD
40		EXISTING FENCE

DRAWING LEGENDS

- HARDSTAND AREA
- TEMPORARY ROAD
- ROAD RAMP
- EXISTING FENCE
- SITE FENCE
- PLANT FENCE
- EKG — FUEL GAS PIPELINE
- UPPER SIDE / LOWER SIDE — EMBANKMENT
- SHOULDER / ROAD / SHOULDER — TYPICAL ARRANGEMENT FOR ROAD AND SHOULDER
- BENCHMARK
- TERMINAL POINT
- +745.50 — SPOT LEVEL
- ASL — ABOVE SEA LEVEL
- FFL — FINISHED FLOOR LEVEL
- FGL — FINISHED GROUND LEVEL
- RGL — ROUGH GRADE LEVEL

NOTES:-

1. ALL DIMENSIONS & LEVELS ARE IN FEET- INCHES (U.N.0). ALL COORDINATES ARE IN FEET (U.N.O.).
2. PLANT LEVELS
   - FINISH BUILDING FLOOR LEVEL (FFL) = +100.000' = + 746.000' (ASL)
   - FINISHED GROUND LEVEL (FGL) = +99.500' = + 745.500' (ASL)
   - ROAD CENTER LINE LEVEL = +99.500' = +745.500' (ASL)
   - ROUGH GRADE LEVEL (RGL) = +99.000' = + 745.000' (ASL)
3. PLANT COORDINATES OF BENCH MARK
   - X = 10000.000' CORRESPONDS TO E= 1394800.000'
   - Y = 10000.000' CORRESPONDS TO N= 617200.000'

PIPING CODES AND STANDARDS

CODE No.	TITLE
ASME	American Society of Mechanical Engineers
ASME B1.1	Unified Inch Screw Threads (UN and UNR Thread Form)
ASME B16.1	Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250
ASME B16.5	Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard
ASME B16.9	Factory Made Wrought Butt-welding Fittings
ASME B16.11	Forged Steel Fittings, Socket-Welding and Threaded
ASME B16.20	Metallic Gaskets for Pipe Flanges - Ring Joint, Spiral Would, and Jacketed
ASME B16.21	Non metallic Flat Gaskets for Pipe Flanges
ASME B16.25	Butt-welding Ends
ASME B18.2.1	Hexagonal Bolt Dimensions
ASME B18.2.2	Nuts for General Applications
ASME B31.1	Power Piping
ASME B36.10	Welded and Seamless Wrought Steel Pipe
ASME B36.19	Stainless Steel Pipe
ASME BPVC Section IX	Welding, Brazing and Fusing Qualifications
ASTM	ASTM International
AASHTO	American Association for State Highway and Transportation Officials
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
NC Building Code	Plumbing
Other Local Codes	Applicable Local Codes and Laws

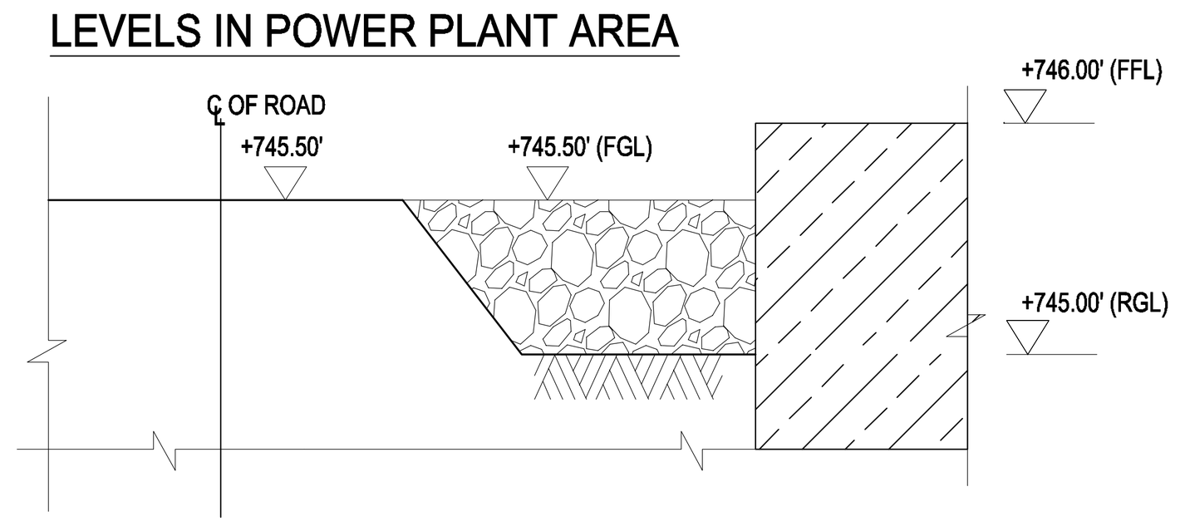
TERMINAL POINTS

A	FUEL GAS SUPPLY
B	FUEL OIL SUPPLY
C	OILY WATER EFFLUENT
D	HV POWER
E	POTABLE WATER SUPPLY
F	SANITARY SEWER
G	COMMUNICATIONS WITH COLLECTOR BUS
H	UTILITIES (COMMUNICATION, DCS, ETC.)
J	FIRE WATER CONNECTION
K	FIRE FOAM SUPPRESSION CONNECTION
L	SITE DRAINAGE (STORM WATER)
M	TEMPORARY CONSTRUCTION POWER
N	TEMPORARY COMMUNICATIONS (PHONE, INTERNET, ETC.)
P	FALSE START DRAIN TANK / COMPRESSOR WASH EFFLUENT (MANUAL DISCHARGE)
R	STAND BY POWER
S	FUEL GAS DRAINS TANK EFFLUENT (MANUAL DISCHARGE)
T	SERVICE WATER FROM EXISTING TANK
U	DEMIN WATER FROM EXISTING TANK

TIE-IN WORK TERMINAL POINTS

A1	FUEL GAS SUPPLY (BY OTHERS)
B1	FUEL OIL SUPPLY
C1	OILY WATER EFFLUENT (MANUAL DISCHARGE)
E1	POTABLE WATER SUPPLY
F1	SANITARY SEWER
G1	COMMUNICATIONS WITH COLLECTOR BUS
H1	UTILITIES (COMMUNICATION, DCS, ETC.)
J1	FIRE WATER CONNECTION
K1	FIRE FOAM SUPPRESSION CONNECTION
M1	TEMPORARY CONSTRUCTION POWER
N1	TEMPORARY COMMUNICATIONS (PHONE, INTERNET, ETC.)
T1	SERVICE WATER FROM EXISTING TANK
U1	DEMIN WATER FROM EXISTING TANK

LEVELS IN POWER PLANT AREA



CIVIL CODES AND STANDARDS

The design of the Civil Sitework portion of this Project shall conform to the 2012 NC State Building Code (NCSBC), and the applicable editions of the following codes and standards:

American Association of State Highway and Transportation Officials (AASHTO)

American National Standard Institute (ANSI)

American Society for Testing and Materials (ASTM)
ASTM C478 Standard Specification for Circular Precast Manhole Sections
ASTM C913 Standard Specification for Precast Concrete Water and Wastewater Structures

American Society of Civil Engineers (ASCE)
ASCE 7-05 Minimum design Loads for Buildings and Other Structures including Supplement No. 1 and 2, excluding Chapter 14 and Appendix 11A. ASCE 38 Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data
ASCE 38 Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data

North Carolina Administrative Code and Policies

North Carolina Department of Environmental and Natural Resources (NCDENR)

NC Erosion and Sediment Control Planning and Design Manual (Erosion Control Manual)

North Carolina Department of Transportation (NCDOT) Standard Specification for Roads and Structures

North Carolina State Building Code Council 2012 North Carolina State Building Code: Building Code

US Department of Labor, Occupational Health and Safety Standards (OSHA) 29 CFR
Part 1910 Occupational Safety and Health Standards
Part 1926 Safety and Health Regulations for Construction

US Environmental Protection Agency (EPA)
National Pollutant Discharge Elimination System (NPDES)

American Composite Manufacturers Association (ACMA)
Fiberglass Grating Manual

American Concrete Institute (ACI)

American Iron and Steel Institute (AISI)

American Institute of Steel Construction (AISC)

GRAPHIC SCALE

0 150' 300' 450' 600' 750'

1"-150'

Drawing-No. / Document-No.

Projekt/Project	LINCOLN COUNTY CT ADDITION				PKZ/PC	US1440
UNID			DCC/UA Type	&CLD011	Inhaltskennzeichen Contents code	17UZ
Variante Variant			Zähl-Nr. Serial no.			
Ursprung-Nr. Origin no.	erstellt mit Created with	AutoCAD 2016	Abtlg. Dept.	EN SPEL		

Index Rev.	Datum Date	bearb. Coord.		geprüft Checked		nderungshinweise/Details of revision
A	2018-04-05	RUPALI S.	sgd	ROHAN P.	sgd	FIRST ISSUE

Gewicht Weight	Format Format: ANSI E	Maßstab Scale: 1"-150'
	Datum	Name
gezeich. Drawn	2018-04-05	SACHIN B. sgd
bearb. Coord.	2018-04-05	RUPALI S. sgd
geprüft Checked	2018-04-05	ROHAN P. sgd

Spez. Specs.

Titel/Title
PLANT LAYOUT PLAN VIEW

Handhabung Handling: Restricted

Zeichnungs-Nr. Drawing no.

Index/Rev.: A

Blatt-Nr. Sheet no.: 1/1

Maße nicht abgreifbar / Not to scale

UC SYNERGETIC
Innovative Thinking. Engineered Solutions.

April 20, 2018

Mr. Rob Neihaus, P.E., P.M.P.
Project Director – Project Development and Initiation
Duke Energy

Re: Lincoln CT Visual Impact Assessment

After analyzing multiple views of the proposed Lincoln Combustion Turbine Plant addition, UC Synergetic ("UCS") has concluded that the impact of probable views will be negligible. UCS focused on areas that showed the highest propensity to have probable views, including locations along Old Plank Road, June Dellinger/Old Lowesville Road, and Quarry Lane. Focusing on the viewshed to and from the Trilogy at Lake Norman community ("Trilogy"), existing conditions give a significant indicator of the potential visibility of the new generating facility after construction.

Our recent modeled findings support earlier conclusions that the tallest portions of the proposed plant's stack and buildings will be potentially visible. Because of both the distance of the viewer from the proposed addition and the small scale of the new facility relative to the landscape environment, visibility will be very slight. With the proper color scheme, the stack and any other visible portions of the facility will be subordiante to the surrounding environment (see Figure 26 for view locations). Views of the facility will not negatively impact the visual quality of the surrounding area.

The ground elevation at the existing generating facility fence is approximately 770' and will be graded down to the designed finished floor pad elevation of 746'. The exhaust stack is slated for 140', the tallest object, which would place only 116' of stack elevation above the existing grade. Most of the structures and components will be significantly shielded due to the approximate 24' the site will be lowered in grading. The closest home sites to the Lincoln CT are screened by existing deciduous trees and will be afforded additional visual buffer by residential structures as they are built (Figures 14 & 15).

Trilogy will have the highest population density in the area, so UCS focused heavily on the visual impact of sight lines from within Trilogy toward the proposed facility. The first photosimulation was prepared from Location A, which was photographed in late 2016. Only the very tops of the facility's stack and turbine building are predicted to be seen from this location (Figures 1, 2, and 3). From late 2016 to the present, the continuing construction of houses within the community has generally blocked sight lines to the new facility. With the spacing of the residential development and the terraced grading style Trilogy has employed, this viewshed from Location A will continually be interrupted by rooflines of neighboring houses and residual greenspaces that were left intact.

One of the main views of the new generating facility from Trilogy that is likely to remain uniterrupted as the subdivison is built out with new homes is the entrace road to and from the clubhouse (Figures 11, & 13). Even with the distance of over 5,900', the existing generating facility is largely visible because of the contrast between the light colored buildings and dark tree cover in the background. The new generating facility is anticipated to blend in more with its surroundings, and it will largely be screened by the remaining trees in the foreground.

With only a few exceptions, Location B is still devoid of houses as of the date of this assessment. However, mature evergreen tree cover southeast of Trilogy should screen the planned expansion of the Lincoln CT

plant (Figures 4, 5, 6, & 7). With the continued construction of homes, even views of the existing facility will become diminished.

Location C represents Trilogy's highest elevation that has sight lines into the existing or proposed facilities. Even from this vantage point, the proposed facility expansion will be screened because of its proximity to the trees at the southern property edge (Figures 8, 9, & 10). Again, with the continued construction of homes, street tree plantings, and residential landscapes, even views of the existing facility will become diminished.

The UCS View Probability Analysis indicates the possibility of views from Old Plank Road. This particular area has viewsheds from road alignment, residential properties, and a church that puts the proposed facility within a potential line of site. UCS produced a photo-simulation from Location D showing that current tree cover generally screens the future facility from view (Figures 16, 17, & 18). UCS used a photo from the end of the driveway at 758 Old Plank Road (Location E) to prepare a second simulation (Figures 19 ,20, & 21). Location D is at a slightly higher elevation than Location C, and it is farther from the midground tree cover screening. Therefore, the models prepared by UCS predict that while the the top portions of the stack may be slightly visible, views will likely not be noticeable to the casual viewer.

The View Probability Analysis indicates a slim possibility of views from the intersection of Hines Circle Road and Old Lowesville Road (before its name changes to June Dellinger Road). A photo-simulation was produced from Location F along Old Lowesville Road (Figures 22, 23, and 24). The stack may be slightly visible from a certain angle, although it will probably not be noticeable to the casual viewer.

In summary, UCS predicts that only a few areas outside of Duke-owned property will have even slight views of the new facility. Because of its small scale and distance from the viewer, the proposed facility will be visually subordinate to the landscape environment as a whole. The visual assesment completed April 20, 2018, accounting for current conditions, supports the previous conclusions that the tallest portions of the proposed plant's stack and buildings will be potentially visible. However, additional mitigating steps can be taken to further minimize recognition of the new facility from these few vantage points. The existing CT plant (Figure 25) has a combination of color schemes. Any visible portion of the existing plant reads as a "white" color from the range of all of our view locations. Views from outside of Duke property are from such a great distance that, even if shorter structures are viewed at an angle that shows them extending above the treeline and into the skyline, the buildings will more readily read as part of the undulating treeline. Existing light-colored structures are highlighted by the sun angle and the background of darker vegetation. In summary, UCS recommends a scheme of dark colors for all the new structures of the facility. Sherwin-Williams Protective & Marine Coatings Color System 4000 Series has an Enviro Green SW4024 LRV 15% coating that would be the primary suggestion. Rain Forest SW 4071 LRV 8%, a darker shade, is a second choice, but one with greater fade potential.

Figure 1: **Location A** from within Trilogy prior to housing construction. (Late 2016)

Figure 2: Trilogy **Location A** with proposed facility constructed. (View is now screened primarily by residential development).

Figure 3:Trilogy **Location A** focused on proposed facility constructed and existing/proposed transmission lines. (View is now screened primarily by residential development).

Figure 4: Current **Location B** from within the Trilogy development (Mid 2017).

Figure 5: Current **Location B** from within the Trilogy development showing only possible views of the current station.

Figure 6: Current **Location B** from within the Trilogy development focused on proposed facility constructed and existing/proposed transmission lines.

Figure 7: Current **Location B** from within the Trilogy development demonstrating Trilogy's southern tree buffer blocking all views of the proposed development (Early 2018).

Figure 8: Current **Location C** from the top of a stockpile berm (approx. elevation 785') within the Trilogy development. (Mid 2017)

Figure 9: Current **Location C** from the top of a stockpile berm (approx. elevation 785') from within the Trilogy development showing only possible views of the current station.

Figure 10: Current **Location C** from the top of a stockpile berm (approx. elevation 785') within the Trilogy development focused on proposed facility constructed and existing/proposed transmission lines.

Figure 11: Current view from within the Trilogy development (Early 2018).

Figure 12: Current view from within the Trilogy development with proposed facility constructed. (Slight visibility of the new station)

Figure 13: Current view from within the Trilogy development focused on proposed facility constructed and existing/proposed transmission lines.

Figure 14: Current view from within the Trilogy development (Early 2018). Demonstrating the existing screening in place for the residential units closest to the facility.

Figure 15: Current view from within the Trilogy development (Early 2018). Demonstrating the existing screening in place for the residential units closest to the facility.

Figure 16: Current **Location D** from Old Plank Road near Gold Hill Missionary Baptist Church. (Mid 2017)

Figure 17: Current **Location D** from Old Plank Road near Gold Hill Missionary Baptist Church with a faded overlay of the proposed facility to demonstrate the screened views.

Figure 18: Current **Location D** from Old Plank Road near Gold Hill Missionary Baptist Church focused in on a faded overlay of the proposed facility to demonstrate the screened views.

Figure 19: Current **Location E** from the driveway of residence at 758 Old Plank Road.

Figure 20: Current **Location E** from the driveway of residence at 758 Old Plank Road with a faded overlay of the proposed facility to demonstrate potential visibility.

Figure 21: Current **Location E** from the driveway of residence at 758 Old Plank Road focused in on a faded overlay of the proposed facility to demonstrate potential visibility of the proposed facility.

Figure 22: Current **Location F** from June Dellinger/Old Lowesville Road.

Figure 23: Current **Location F** from June Dellinger/Old Lowesville Road focused in on a faded overlay of the proposed facility to demonstrate potential visibility of the proposed facility.

Figure 24: Current **Location F** from Old Lowesville Road focused in on a faded overlay of the proposed facility to demonstrate potential visibility of the proposed facility.

Figure 25: Existing Combustion Turbine facility, demonstrating the existing color scheme.

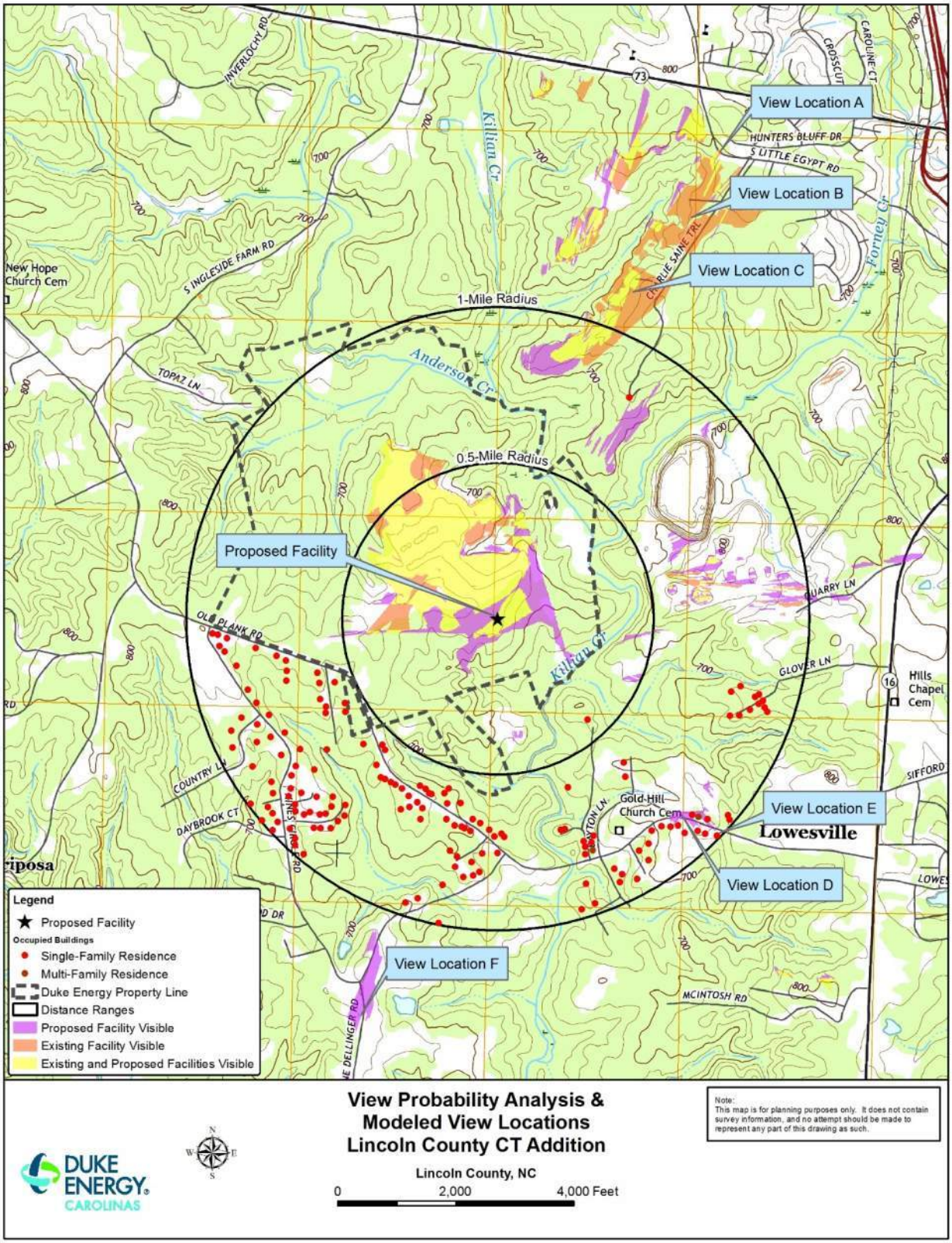


Figure 26: View Locations in reference to the View Probability Modeling

Lincoln County Combustion Turbine Plant CT addition
CPCN Noise Impact Study

Prepared for

UC Synergetic

By

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Joseph F. Bridger, MSME, ASA, INCE

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Stewart Acoustical Consultants

7330 Chapel Hill Rd, Suite 201

Raleigh, NC 27607

919-858-0899

May 17th, 2017

List of Figures

Executive Summary

The four major aspects of this noise report are:

1. Current community and environmental noise levels at areas surrounding the Lincoln County Combustion Turbine plant.
2. Estimation of existing and proposed combustion turbine equipment sound power levels.
3. Sound Level results from computer sound propagation modeling of Duke Energy sources - existing and with the future CT addition (sound levels).
4. Evaluation of the noise impact.

In this summary we will only discuss the important conclusions from each portion of the report.

Existing Community Noise Levels

The existing quarry, speedway, aircraft and Old Plank Road are significant community noise sources. Current noise adjacent to the CT plant is primarily produced by aircraft approaching and leaving Charlotte Douglas airport, road traffic noise, mineral processing activities from a nearby quarry and race vehicles at a nearby speedway. Aircraft noise affects the greatest area around the CT plant during the day hours. Aircraft noise drops significantly from midnight to 7 AM. The Charlotte Douglas airport is located 18 miles south of the CT plant. Runway 18C-36C at the Charlotte Douglas airport runway is orientated north-south and nearly in line with the CT plant. Homes near Old Plank Road experience significant levels of road noise due to volume of traffic and speed of vehicle. Quarry produced noise is heard starting near 5:30 AM to 8:30 AM. Quarry noise is due to road grading and machinery startup. Noise is most significant from the quarry at neighbors to the southeast of the Duke Energy plant. Residences in the vicinity of the East Lincoln Motor Speedway will experience significant race vehicle noise on Saturday evening from 7 pm to 11 pm from late March through the end of September. Levels from all these sources are reported in great detail in the report.

These most significant noise levels are part of the evaluation the evaluation section. Although the background noise levels can be as low as 35 dBA during the night in remote locations, these existing sources occur regularly and raise levels substantially when they are occurring. Many of these sources are 47-60 dBA at key locations around the plant. Aircraft events have maximum levels from 62-72 dBA.

Sound Power Levels of Duke Existing CT's and Proposed simple cycle CT addition

The new simply cycle CT Addition only increases the total sound power from the plant 3 dBA. Sound power is similar to watts for electricity in a light bulb. It is a measure of how much sound energy is being radiated per second into the air. The brightness of the light for a bulb is largely dependent on how far the receiving location is from the light, and the reflectivity of the surrounds and any objects creating shadows. The loudness of sound (sound pressure level or sound level for short) generated by the sound power source (the bulb) is dependent on how far from the source you are, how soft the ground is, the land topography, and other factors such as blockage by buildings. However, a quick comparison of how much sound is being introduced into a location is to compare the sound power of the existing source and the proposed source.

The existing 16 Combustion Turbines (CTs) and proposed single CT have an approximately equivalent sound power level (overall) (123.2 for the existing CTs and 123.6 dBA for the addition) based on estimated sound power levels of the components. Due to the way decibels are added, this leads to an increased total sound power of about 3 dBA. Due to the way humans hear this is a barely noticeable increase.

Future Sound Levels from the proposed CT addition

Future sound levels and resulting change varies by location but sound levels are not more than 55 dBA with all CT's operating at any adjoining property lines. The sources (existing CTs and proposed CT addition) are not located at the exact same area of the Duke site and therefore we have some neighbors that will see a much larger increase than others. The greatest increase is to the southeast where currently levels from the existing CTs are quite low, and will now be about 52 dBA at the nearest house and 55 dBA at the nearest property line. Neighbors to the west will see no measureable change. Neighbors to the southwest will see generally a 3-4 dB increase (a barely noticeable difference), with one location seeing a 6 dB increase (clearly noticeable difference) due to proximity to the new CT addition. Neighbors to the north at the Trinity property will see less than a 2 dB increase with the new CTs (which is not noticeable to most).

Evaluation of Future Duke Energy generated noise levels by comparing to existing Duke site noise levels, community noise levels, and the Lincoln County race track night time noise limits.

Lincoln County's noise ordinance has no specified decibel limits, but does prohibit noise from "becoming a nuisance to adjacent single-family detached and two-family houses and residential districts" (Lincoln County 2016). The universal development ordinance does have limits that apply to race tracks. At nighttime, 10 minute average levels cannot exceed 55 dBA at the receiving residential property for this kind of source. These limits were used to draw some comparisons.

Future noise levels are similar to sound levels of existing sources, meaning a minimal impact to most. Most neighbor locations are below 55 dBA with only one location right at 55 dBA (property line of one neighbor to the southeast).

Noise levels from the quarry and race track at the neighbor to the southeast (Neighbor 1) are estimated to be 57 dBA and 50 dBA respectively. Aircraft events from CLT have slow A-weighted maximum levels of 62-72 dBA. Although clearly the noise source will be new and thus noticed, it is not more than 55 dBA (level used to regulate race tracks at night in Lincoln county), and is not more than other sources affecting this property.

Other homes showing a clear increase from Duke Energy sources to the southwest are 50-54 dBA with all CT's (existing and proposed) operating (3-6 dB increase), but race track noise levels are estimated to be 53-55 dBA and are thus similar. Also, noise from Plank Road (for those homes in close proximity to the road) is generating sound levels of about 55 dBA.

Property to the west and north (Trinity property) are not noticeably changed in sound levels from the Duke Energy plant and most of the property is below 50 dBA.

It is our opinion that noise impacts are minimal to most of the surrounding neighbors. Neighbors 1 and 2 will see a clearly noticeable increase in Duke Energy levels, but total levels do not exceed 55 dBA and other sources are generating similar levels at these properties, thus impacts should not be significant.

Measurement Methodology

Introduction - Goals for noise analysis

The proposed new combustion turbine will be capable of producing up to 500 megawatts of electricity compared to 80 megawatts electricity for each of the current 16 combustion turbines now existing at the plant. The new proposed turbine is the first or one of the first of its type, and hence, the noise levels produced are of concern. It is the goal of this study to determine the noise impact of the new proposed CT addition and the combined noise impact of the current 16 CTs with the new proposed CT addition.

It is also a goal of this report to document measured community noise levels and compare to predicted noise levels of the existing and proposed combustion turbines. Noise measurements were made at properties adjacent and in the surround neighborhood to the Lincoln County Duke Energy site.

Background on sound and sound levels

Sound is produced by rapid fluctuation in air pressure on top of barometric pressure. Sound strength, whether pressure or power, is measured in decibels (dB) which is a way of expressing the ratio of any two "power-like" quantities as a logarithmic ratio. By choosing a standardized reference value, absolute values of sound level can be expressed in decibels. A pressure of 1 Pascal (Pa) is equivalent to 94dB sound pressure level and 20 µPa is the reference for 0dB. We should note that each change of 10 dB indicates 10 times as much sound present and a doubling of sound present is only 3 dB. A sound that is 60 dB louder than another, for example, has a million times as much sound energy. Note that the human hearing system does not respond proportionately to the "amount" of sound present or changes in stimulus frequency. A 3 dB change in level means twice or half as much actual sound, but is generally just barely noticeable unless there is something else different about the sound. A 5-6 dB change is three to four times as much sound and is very clearly noticeable even if the sound is otherwise the same. A 10 dB change is dramatically noticeable, judged at least twice as loud, and is 10 times as much sound present. The human hearing system does not respond to very low or high pitched sounds as well as sounds in the speech range. We make up for this in the measurements we collect by employing frequency weighting filters. The most popular in use is the A-weighting filter. When an A weighting filter is used we usually report the results labeled as dBA.

Typical speech at a distance of 1 meter is around 60 dBA, typical office ventilation sound 35-45 dBA, and most North Carolina residential communities are in the range of 40-50 dBA but can be below 40 dBA at times, especially in less densely populated areas or above 50dBA in more densely populated areas or near highways.

Instantaneous sound levels are measured with "fast" or "slow" time weighting. Fast corresponds to a 125 millisecond time constant. Slow corresponds to a 1 second time constant. This can be visualized as how fast the needle on a meter can move. Fast response corresponds better to perception when levels are changing rapidly, but a slow response setting is easier to read on a manual meter and corresponds better to slower moving changes in the sound in terms of analysis results.

Sound levels over a period can be "average levels" and they can also be analyzed to look at maximum levels. Analyzing sound by assigning percentiles to levels exceeded for specific percentages of a time period can be used to get an idea of how steady the sound is. We sometimes use 1%, and 10% levels to

indicate higher intermittent levels from the average value and 90 or 99 % to indicate the steady part of the sound. "Fast" or "slow" response is chosen as part of all these measurements. These measurements are often labeled L% so the level exceeded 90% of the time would be labeled L90.

When we contemplate studying sound propagation over distance, the first factor we generally look at is that the sound level from a point source drops 6dB per doubling of distance. This is derived from the inverse square law which applies to sound (intensity) and light and gravity as well. Interaction with soft ground can further reduce the sound level when the sound travels from source to a receiver ear close to ground – but when listeners are very high above the ground there is less effect. Over long distances, atmospheric absorption reduces primarily the high frequency part of the sound. This is an effect of a number of dB per 1000 feet. Beyond a 1000 feet or so this effect overcomes the inverse square effect so the higher frequencies are typically not significant. Another consideration is terrain. The presence of changes in topography can create shadow zones where sound is attenuated some from a sound source because the line of sight is blocked. The extent of the effect depends on how well the source is blocked and the size of the blocking object or terrain. It also depends on how close the source or receiver is to the element creating the shadow.

Sound levels are significantly reduced on sunny afternoons when air near ground is warmer than air higher in the sky and the sound curves upward. The loudest time for sound beyond the first few hundred feet is at sunset until an hour or so after sunrise. During this period or if downwind, sound that starts upward will curve back downward, often not passing through intervening trees etc. As one might expect, sound levels can be significantly reduced upwind from a source. Another factor is trees. 300 feet of trees can reduce levels about 5 dB if sound passes through them. Over long distances sound can pass over the top of the trees due to the atmospheric curvature effect, so the benefit is obtained only from trees nearest the source and receivers.

When using SoundPLAN for environmental noise modelling, ISO 9613-2:1996 is employed which considers ground effects, distance, barrier effects, reflection etc. in a standardized approach.

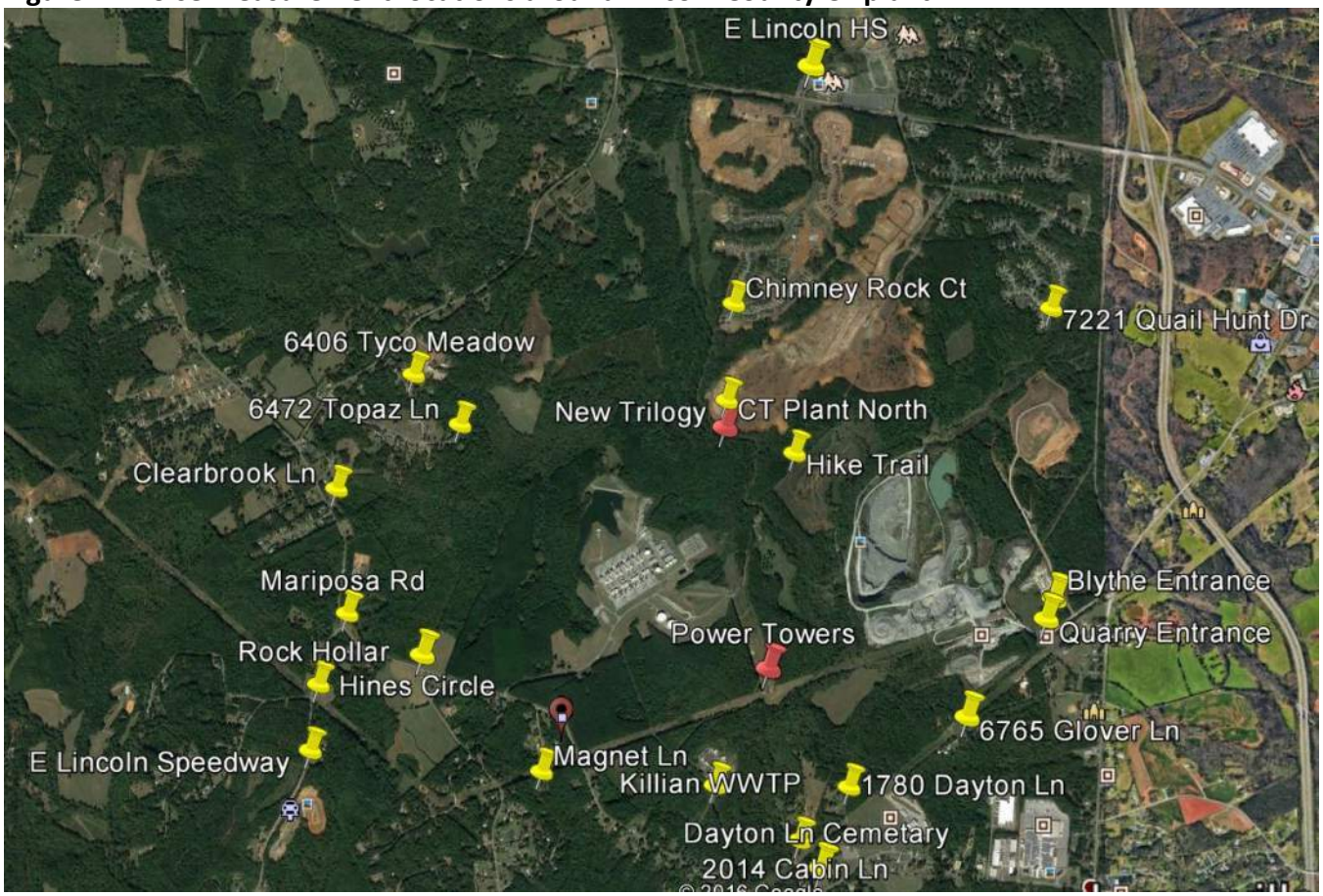
Noise Measurement Goals and Procedures

Current sound levels were measured in the surrounding neighborhood and along the plant perimeter of the Duke Energy Lincoln County combustion turbine plant. The purpose of the sound measurements was to document the existing sound at various community locations. The sound will vary with time of day, time of year, atmospheric conditions, and plant operating conditions. This study was limited to measurements made during one 42-hour period for long term monitors from Tuesday 9-10 AM on March 28 to Thursday 1-2 AM on March 30, and shorter 5 minute samples made on Friday, March 24 during the initial site visit and Saturday evening, March 25 during a Lincoln County Speedway event. Atmospheric conditions varied over the measurement period. Temperature, relative humidity, and wind conditions at the nearby airport were recorded from online sources to allow some evaluation of these effects on the noise distribution. The sound was measured in octave bands as well as the overall A-weighted level to provide a better understanding of the noise situation. Statistical sampling was used to see the variation within each measurement period.

Current noise levels at locations around current CT and proposed CT addition

Figure 1 provides an aerial view of the Duke Energy Lincoln County Combustion Turbine plant and adjacent properties. The yellow thumbtacks indicate noise measurement locations obtained over a five minute time period at various dates and times of day. The two red thumbtacks provide locations where 42 hour noise monitoring occurred. **Table 1** provides the sound measurements obtained on Friday, March 24 from 11:45 AM to 5:00 PM. **Table 2** provides the sound measurements obtained on Saturday, March 25 from 7:00 PM to 8:00 PM. **Table 3** provides the sound measurements obtained on Tuesday, March 28 from 2:00 PM to 3:00 PM. **Tables 1, 2 and 3** provides sound measurement location (refer to figure 1), GPS coordinates, the measurement file number, average level (L_{Aeq}), maximum sound level (L_{ASmax}), level exceeded 10%, 50% and 90% of the time (L_{10}, L_{50} , L_{90}). Also given in **tables 1, 2 and 3** is anything significant to note during the sound measurements.

Figure 1. Noise measurement locations around Lincoln County CT plant



Sound measurements identified by the yellow thumbtacks were obtained with a Casella 633C sound analyzer, SN 3148034. The Casella 633C was calibrated with a B&K 4230 sound calibrator, SN 1576946. The red thumbtacks were obtained with Larson Davis 831 sound analyzers (long term monitoring), SN 2544 and SN 3542. The LD 831 were calibrated by a Larson Davis CAL200 sound calibrator, SN 13269.

Table 1. Sound measurements obtained Friday, March 24, 11:45 AM to 5 PM.

Location	GPS N	GPS W	File	Time	L_{Aeq}	L_{Asmax}	L_{10}	L_{50}	L_{90}	Note
Blythe Entrance	35^0 25' 45.66"	81^0 0' 48.58"	381	11:57	57.9	64.4	60.0	57.5	54.5	Truck noise
Quarry Entrance	35^0 25' 42.29"	81^0 0' 50.23"	382	12:09	71.2	87	73.5	61.5	53.5	Truck noise
6765 Glover Ln	35^0 25' 25.99"	81^0 1' 6.34"	384	12:20	48.1	51.6	50.5	48.0	45.5	Birds, Jets
Dayton Ln Cemetery	35^0 25' 0.84"	81^0 1' 36.11"	385	12:42	65.3	80.4	69.5	53.0	45.0	Jets, Cars,
1780 Dayton Ln	35^0 25' 14.66"	81^0 1' 30.29"	386	12:52	57.5	75.4	53.0	44.5	39.5	
2014 Cabin Ln	35^0 25' 5.78"	81^0 1' 40.38"	387	13:09	57.6	67.6	63.5	51	46.5	Jet, Bird
Killian WWTP	35^0 25' 14.88"	81^0 1' 57.66"	388	13:21	41.6	49.4	43.5	41.5	39.5	
Magnet Ln	35^0 25' 30.31"	81^0 2' 33.05"	389	13:36	61	74.5	65	51.5	42.5	Road noise
Hines Circle	35^0 25' 36.34"	81^0 2' 57.41"	390	13:45	48.2	57.3	52.5	44	42	Road noise
Mariposa Rd	35^0 26' 43.53"	81^0 3' 12.65"	391	13:53	56.2	65.3	61.5	50	45	Road noise
Clearbrook Ln	35^0 26' 4.23"	81^0 3' 14.98"	392	14:04	68.4	83.4	72.5	56.5	48.5	Traffic noise
6472 Topaz Ln	35^0 26' 14.97"	81^0 2' 49.99"	393	14:15	43.4	55	46.5	43	40.5	
6406 Tyco Meadows	35^0 26' 23.31"	81^0 2' 59.51"	394	14:28	43.1	56.1	46.5	41	38.5	Motorcycle, Chimes
Chimney Rock Ct	35^0 26' 35.24"	81^0 1' 53.83"	395	15:06	52.1	58.8	55.5	50.5	47.5	Construct Equip, Jet
E. Lincoln HS	35^0 27' 14.31"	81^0 1' 38.18"	396	15:17	60.9	63.1	62.5	60.5	57.5	
7221 Quail Hunt Dr.	35^0 26' 34.43"	81^0 0' 48.58"	397	15:28	53.6	65.9	57.5	46.5	42	
Blythe Entrance	35^0 25' 45.66"	81^0 0' 48.58"	398	15:42	50.3	54.6	53	49.5	46.5	381
Quarry Entrance	35^0 25' 42.29"	81^0 0' 50.23"	399	15:48	47.3	55.7	49	46.5	45	382
6765 Glover Ln	35^0 25' 25.99"	81^0 1' 6.34"	400	15:55	42.9	50.8	45	42.5	40.5	384
Dayton Ln Cemetery	35^0 25' 0.84"	81^0 1' 36.11"	401	16:06	65.1	73.7	71	57.5	46.5	385 Road noise
1780 Dayton Ln	35^0 25' 14.66"	81^0 1' 30.29"	402	16:13	43.3	55.1	45	42.5	39.5	386
2014 Cabin Ln	35^0 25' 5.78"	81^0 1' 40.38"	403	16:17	58.1	68	65	46	44.5	387 jet
Killian WWTP	35^0 25' 14.88"	81^0 1' 57.66"	404	16:26	60.3	69.8	64.5	56	50.5	388 near Old Plank
Magnet Ln	35^0 25' 30.31"	81^0 2' 33.05"	405	16:32	55.9	65.1	60.5	52	39	389
Hines Circle	35^0 25' 36.34"	81^0 2' 57.41"	406	16:36	54.1	64.8	57.5	49.5	39	390 Jet
Mariposa Rd	35^0 26' 43.53"	81^0 3' 13.65"	407	16:41	60.2	68.7	64.5	56	42	391
Clearbrook Ln	35^0 26' 4.23"	81^0 3' 14.98"	408	16:48	63.6	74.2	69.5	54	46.5	392 Road noise
6472 Topaz Ln	35^0 26' 14.97"	81^0 2' 49.99"	409	16:53	44	51	48	43	39	393 Jet, Bird

Table 2. Sound measurements obtained Saturday, March 25, 7 PM to 8 PM.

Location	GPS N	GPS W	File	Time	L_{Aeq}	L_{Asmax}	L_{10}	L_{50}	L_{90}	Distance Speedway (ft)	Note
Hines Circle	35^0 25' 36.34"	81^0 2' 57.41"	410	19:07	51.6	57.8	55	50.5	46	2700-3100	Cars
Mariposa Rd	35^0 26' 43.53"	81^0 3' 13.65"	411	19:15	61.5	68.7	65.5	58.5	55.5	2840-3390	Motorcycle, Gunshots
Rock Hollar	35^0 25' 31.78"	81^0 3' 18.37"	412	19:20	48.7	53.9	51.5	48	46.5	1680-2300	
Speedway	35^0 25' 20.88"	81^0 3' 19.95"	413	19:28	70.2	77.1	73.5	69.5	66	385-900	Engines revving
Speedway	35^0 25' 20.88"	81^0 3' 19.95"	414	19:31	67.2	74	70.5	65.5	62.5	385-900	Engines revving
Speedway	35^0 25' 20.88"	81^0 3' 19.95"	415	19:35	71.7	81.7	76	66	61	385-900	Engines revving
Speedway	35^0 25' 20.88"	81^{0}3' 19.95"	416	19:41	71.1	81	76	64	59	385-900	Engines revving

Table 3. . Sound measurements obtained Tuesday, March 28, 2 PM to 3 PM.

Location	GPS N	GPS W	File	Time	L_{Aeq}	L_{Asmax}	L_{10}	L_{50}	L_{90}	Note
Hiking trail	35^0 26' 10.18"	81^0 1' 41.36"	418	14:14	36.5	49.2	38.5	34	32.5	
New Trilogy	35^0 26' 19.00"	81^0 1' 55.30"	419	14:51	44.1	53.5	49.5	38	33	Jet, chainsaw
New Trilogy	35^0 26' 19.00"	81^0 1' 55.30"	420	14:58	35.1	41.2	37.5	34	32	very quiet

Observations of five minute noise measurements

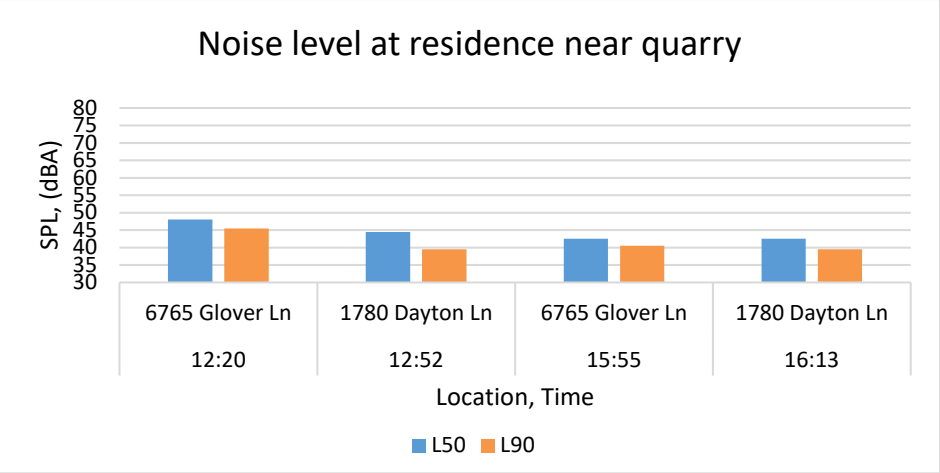
Quarry noise

Sound measurements made down Quarry lane near the Blythe Construction and Lake Norman Quarry entrances produced maximum sound levels of 64.4 dBA and 87 dBA respectively. The primary source of the noise was dump trucks traveling to and from the quarry. The Blythe and Quarry measurement locations were 100 feet and 10 feet from the quarry gravel road that the dump trucks traveled on. While there, the frequency of trucks entering or leaving the quarry was about two minutes. **Table 4** provides the measured sound pressure levels of residences closest to the quarry. Because the quarry is a large area, the closest (minimum) and farthest (maximum) distances from the two residences to the quarry are given in **table 4**. From **table 4** and **figure 2,** it is seen that the L_{90} is near 40 dBA, or stated differently, 90% of the time, the sound level at these two residence will be louder than 40 dBA. From **table 4** and **figure 2** the average noise level (L_{50}) for these two residences without jet flyover is from 42.5 dBA to 44.5 dBA. During the time of day that these sound measurements were obtained (12:15 PM to 1 PM and from 3:45 PM to 4:15 PM), the quarry noise was not dominant.

Table 4. Residences closest to quarry

Location	GPS N	GPS W	Min Dist. (ft)	Max Dist. (ft)	Time	L_{50}	L_{90}	Note
6765 Glover Ln	35^{0}25' 25.99"	81^0 1' 6.34"	530	4200	12:20	48.0	45.5	Birds, Jet
1780 Dayton Ln	35^{0}25' 14.66"	81^0 1' 30.29"	3000	5750	12:52	44.5	39.5	
6765 Glover Ln	35^{0}25' 25.99"	81^0 1' 6.34"	530	4200	15:55	42.5	40.5	
1780 Dayton Ln	35^{0}25' 14.66"	81^0 1' 30.29"	3000	5750	16:13	42.5	39.5	

Figure 2. Noise level at residence near quarry



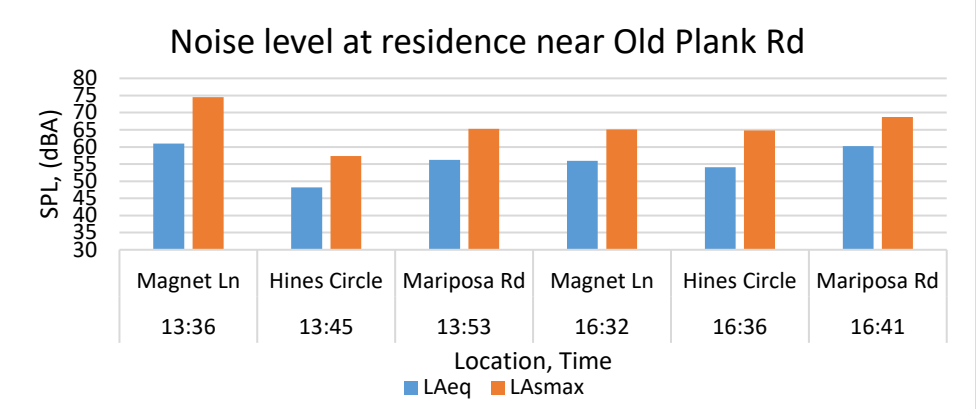
Noise near residences by Old Plank Road

Sound measurements were made near residences that lived close to Old Plank Road. Old Plank has a 45 mph speed limit and hence, vehicles are frequently traveling at a relatively high rate of speed. Residences on the streets just off of Old Plank Road are Magnet Lane, Hines Circle and Mariposa Road. **Table 5** and **figure 3** provides the average and maximum sound levels obtained at these locations. The average noise levels from vehicle noise ranged from 48 dBA to 61 dBA. The maximum noise levels due to vehicle noise ranged from 57.3 dBA to 74.5 dBA. People living just off of Old Plank Road will experience average levels from 48 dBA to 61 dBA and maximum levels up to 74.5 dBA

Table 5. Sound levels at residences near Old Plank Road from vehicle traffic.

Location	GPS N	GPS W	File	Time	L_{Aeq}	L_{Asmax}	Note
Magnet Ln	35^0 25' 30.31"	81^0 2' 33.05"	389	13:36	61	74.5	Road noise
Hines Circle	35^0 25' 36.34"	81^0 2' 57.41"	390	13:45	48.2	57.3	Road noise
Mariposa Rd	35^0 26' 43.53"	81^0 3' 12.65"	391	13:53	56.2	65.3	Road noise
Magnet Ln	35^0 25' 30.31"	81^0 2' 33.05"	405	16:32	55.9	65.1	
Hines Circle	35^0 25' 36.34"	81^0 2' 57.41"	406	16:36	54.1	64.8	Jet
Mariposa Rd	35^0 26' 43.53"	81^0 3' 13.65"	407	16:41	60.2	68.7	

Figure 3. Sound levels at residences near Old Plank Road from vehicle traffic.

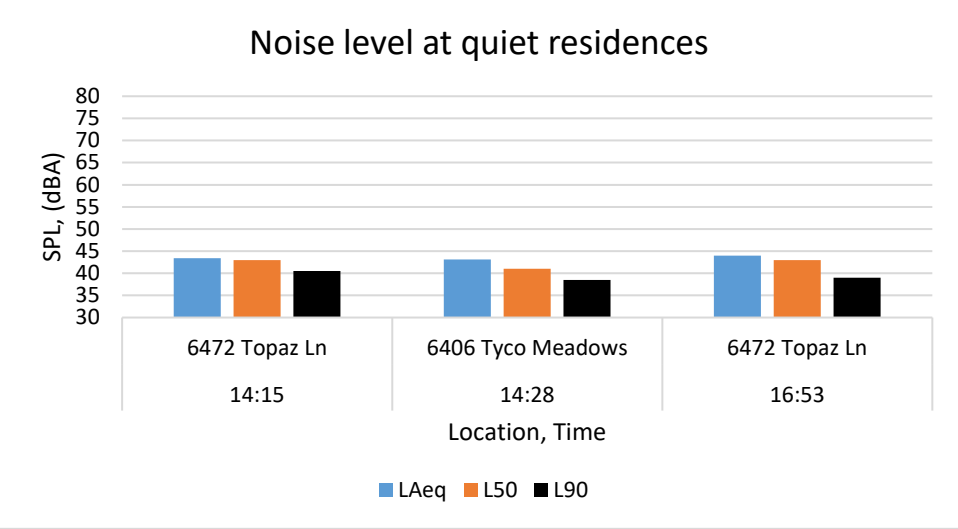


Measurements were also made at residences that were down non-outlet roads. These non-outlet road locations were 6472 Topaz Lane and 6406 Tyco Meadows. The average noise levels at these two locations were 43 dBA and 41 dBA respectively. The residences on Topaz and Tyco Meadows currently are not experiencing high noise levels from non-combustion turbine noise sources such as racetrack noise and quarry noise.

Table 6. Noise levels at quiet residences

Location	GPS N	GPS W	File	Time	L_{Aeq}	L_{50}	L_{90}	Note
6472 Topaz Ln	35° 26' 14.97"	81° 2' 49.99"	393	14:15	43.4	43	40.5	
6406 Tyco Meadows	35° 26' 23.31"	81° 2' 59.51"	394	14:28	43.1	41	38.5	Motorcycle, Chimes
6472 Topaz Ln	35° 26' 14.97"	81° 2' 49.99"	409	16:53	44	43	39	393 Jet, Bird

Figure 4. Noise levels at quiet residences



East Lincoln Motor Speedway noise

The East Lincoln Motor Speedway is approximately 1 mile from the proposed combustion turbine site. The 2017 schedule for the speedway is on Saturday night from 7 pm to 11 pm. Sound measurements were made the Saturday evening, March 25 from 7 pm to 8 pm. The closest sound measurement location to the racetrack was 385 feet. At a distance of 385 feet from the racetrack, racetrack maximum sound levels exceeded 81 dBA. Average sound levels at a distance of 385 feet from the racetrack were from 64 to 69.5 dBA. The racetrack noise contained a high content of low frequency rumble. From sound pressure levels at the 385 distance from the race track, the sound power level of a race car was estimated. The equation used for the estimation of the race car sound power and sound pressure levels at other locations is taken from International Electrotechnical Commission IEC TS 61973:2012. The estimate assumed hemi-spherical sound spreading and that the noise was created by four vehicles distributed at different locations on the racetrack. Calculated estimate of sound pressure levels at three locations were made (**table 7)**. The three locations were the intersections of 1. Mariposa and Rock Hollar, Mariposa and Old Plank and Hines Circle and Old Plank Rd. In addition, racetrack noise predictions were made at locations near the proposed CT turbine addition (**table 8**). **Table 8** shows that

at a distance of near 7400 feet from the center of the racetrack, the sound pressure levels from racetrack noise decreases to 50 dBA.

Table 7. Estimate of sound pressure level at locations from East Lincoln Speedway

Location	GPS N	GPS W	Distance Speedway (ft)	L_{Aeq}	L_{Asmax}	L_{10}	L_{50}	L_{90}
Hines Circle & Old Plank	35^0 25' 36.34"	81^0 2' 57.41"	2700-3100	56.3	66.3	61.3	53.3	49.3
Mariposa Rd & Old Plank	35^0 26' 43.53"	81^0 3' 13.65"	2840-3390	55.8	65.8	60.8	52.8	48.8
Rock Hollar & Mariposa	35^0 25' 31.78"	81^0 3' 18.37"	1680-2300	59.7	69.7	64.7	56.7	52.7

Table 8. Estimate of sound level at locations from East Lincoln Speedway nearer proposed CT Plant

Location	GPS N	GPS W	Distance Speedway (ft)	L_{Aeq}
Magnet Lane & Old Plank Rd	35^0 25' 30.31"	81^0 2' 33.05"	4058	55.1
Killian WWTP	35^0 25' 14.88"	81^0 1' 57.66"	6705	51.6
Neighbor 1 from sound modeling	35^0 25' 30.95"	81^0 1' 45.15"	7392	49.9
Neighbor 2 from sound modeling	35^0 25' 25.93"	81^0 2' 11.85"	5280	52.8
West Placement from sound modeling	35^0 25' 22.69"	81^0 2' 26.27"	4334	54.5
South Placement from sound modeling	35^0 25' 14.81"	81^0 1' 45.47"	7656	49.6

Trilogy community under construction

Sound measurements were made in the Trilogy community under development located north of the CT plant. Two locations were measured, one was on the hiking trail in the woods on the east side of the housing and the other was on the far south edge of the housing construction. During sound measurements, construction was not being undertaken. The average sound pressure levels on the hiking trail and south housing were 34 dBA respectively. A chainsaw was heard farther south of the housing development down a slope towards the creek bed. During that operation of the chainsaw, the average sound pressure level increased to 38 dBA.

Fourtytwo hour noise monitoring

Two LD 831 noise monitors were set up on the Lincoln CT plant boundaries. The locations are shown in figure 1 at the two red thumbtacks. The first location was just south of the proposed new CT addition at the intersection of the east-west power tower clearing and north-south power tower clearing. The second location was on the north property line 20 feet between the creek bed separating the south edge of the Trilogy property from the north end of the CT plant property. The LD 831s were configured to audio record loud sounds so that the sounds could be listened to and identified. **Figures 5 and 6** provides the L_{Aeq} and L_{Asmax} time histories at the power towers and north property line respectively. **Figures 7 and 8** provides the L_{10}, L_{50} and L_{90} time histories at the power towers and north property line respectively.

Figure 5. LA_{eq} and LA_{smax} time histories at the power towers

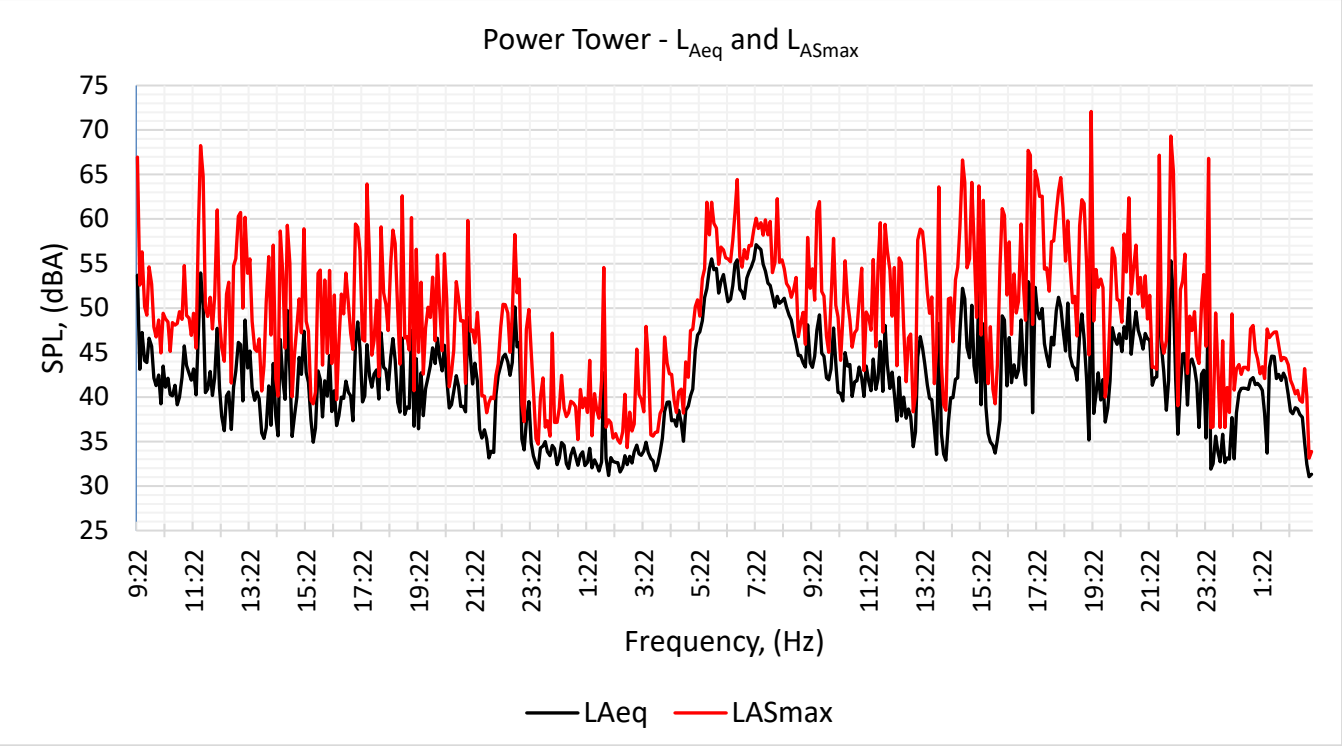


Figure 6. LA_{eq} and LA_{smax} time histories at the north property line

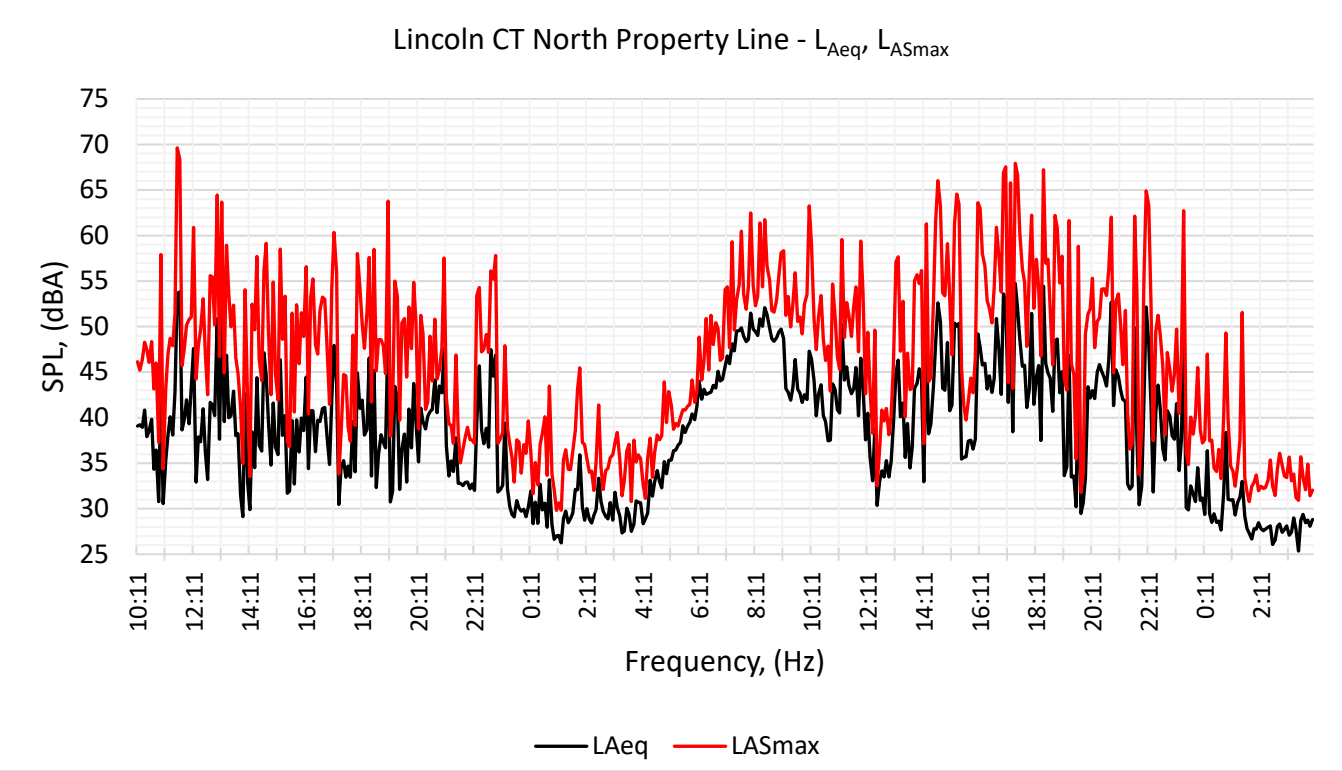


Figure 7. L_{10}, L_{50} and L_{90} time histories at the power towers

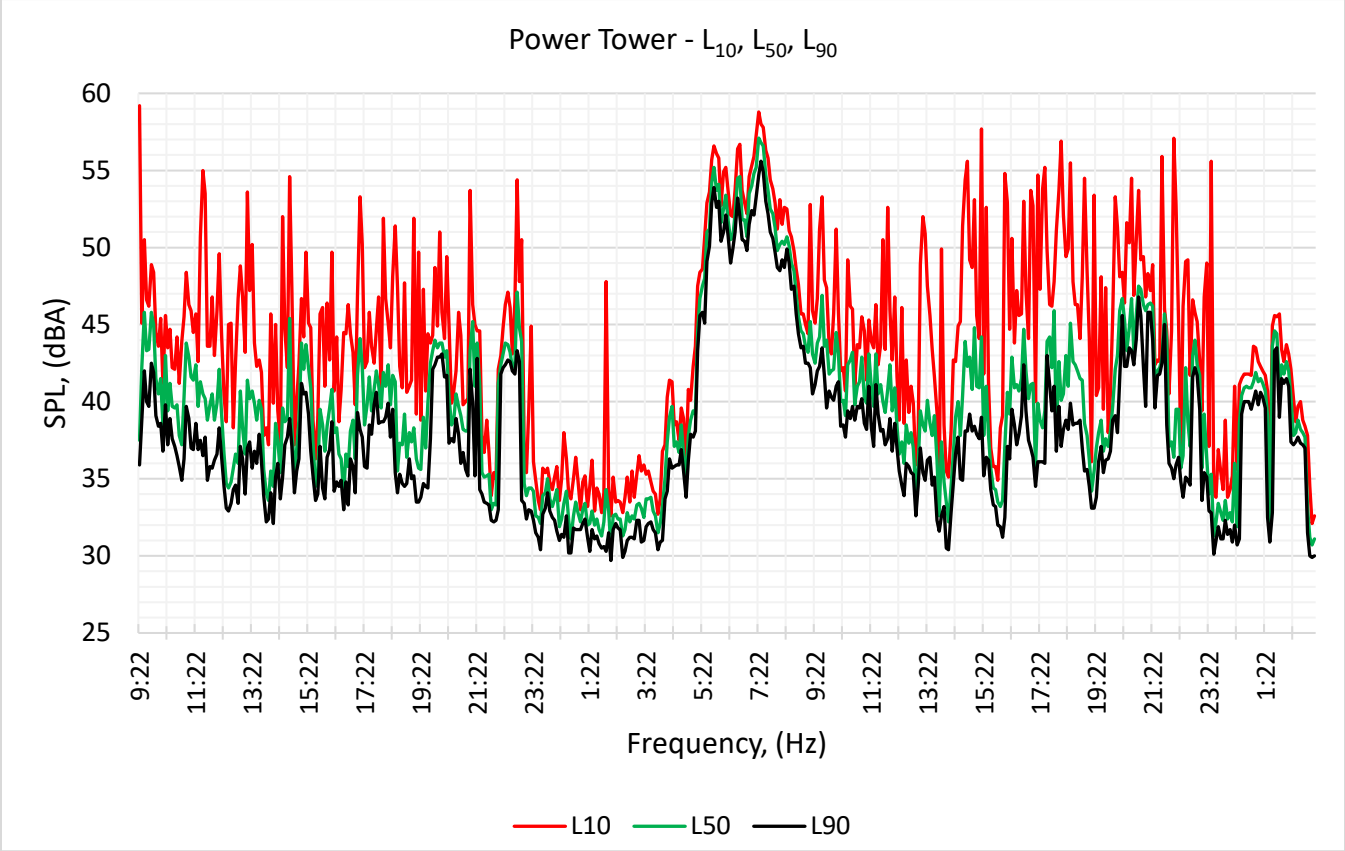
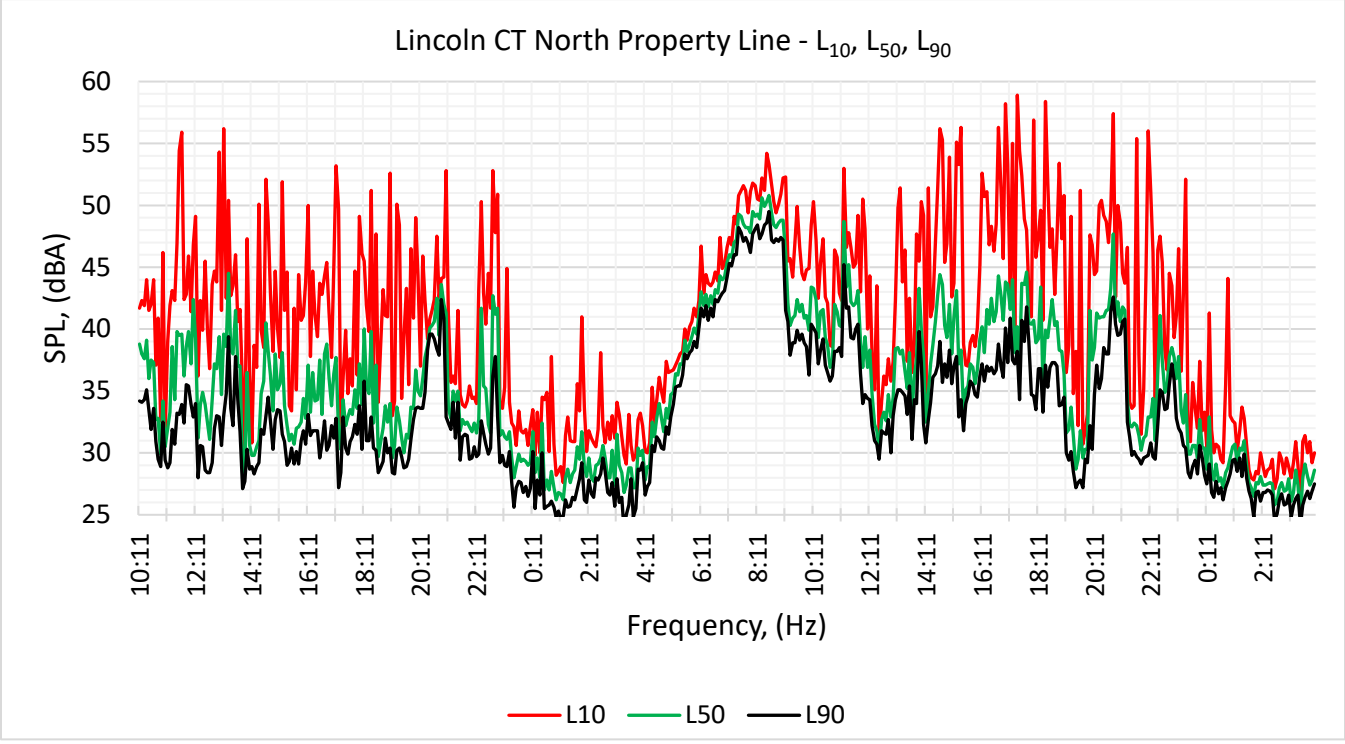


Figure 8. L_{10}, L_{50} and L_{90} time histories at the north property line



Power lines location- General noise

At the power lines, the most frequent source of high noise levels was aircraft flyover. Aircraft flyover noise occurred from 7:30 AM to midnight. At midnight, there appeared to be an abrupt halt of aircraft noise that was from flights originating or terminating at Charlotte Douglas airport until 7:30 AM. However, on Wednesday morning at 1:57 AM there was a high altitude flyover that appears in figure 5 and 7. In figure 7 starting near 1 AM and continuing to 2:15 AM there is a low level constant noise that was below the audio recording trigger level of the sound level meter. Hence it is unknown what was occurring from 1 AM to 2:15 near the power towers. Generally speaking average noise levels will be in the mid 40 decibels when sound propagation conditions are not favorable and there is absence of aircraft flyover noise.

Power lines location – Quarry noise

At the power towers other sources of high noise levels were birds and quarry machinery such as equipment backup alarms and construction vehicle tracks. On Wednesday morning, March 29, quarry noise was most prevalent from 5:30 AM to 8:30 AM and had an average noise levels of in the range of 53 to 57 dBA. After 8:30 AM, the average sound pressure levels dropped to 50 dBA or less. **Table 9** provides the calculated estimated sound pressure level during from 5:30 AM to 8:30 AM when atmospheric conditions are favorable to sound propagation for the two residences close to the quarry (Glover Ln and Dayton Ln) and for two locations used for sound modeling prediction designated as neighbor 1 and neighbor 3. Also provided in **table 9** is the estimated distance from the quarry that will produce a sound pressure level of 50 dBA during the hours of 5:30 AM and 8:30 AM when atmospheric conditions are favorable. At a distance of 6400 feet from the quarry, under favorable sound propagation conditions, the sound pressure level due to quarry noise will be near 50 dBA.

Table 9. Estimated closest neighbors to quarry L_{Aeq} during 5:30 AM to 8:30 AM

Location	GPS N	GPS W	Dist. (ft)	Estimate L_{Aeq} 5:30 AM-8:30 AM
6765 Glover Ln	35^0 25' 25.99"	81^0 1' 6.34"	2022	60.0
1780 Dayton Ln	35^0 25' 14.66"	81^0 1' 30.29"	3550	55.1
Neighbor 1	35^0 25' 30.95"	81^0 1' 45.15"	2904	56.9
Neighbor 3	35^0 26' 03.55"	81^0 1' 50.88"	3387	55.5
50 dBA Contour			6400	50

North property line location – General noise

At the north property line of the CT plant, the most frequent source of high noise levels was aircraft flyover. Like the power tower location other high level noise sources at the north property line were birds, quarry noise and banging. The banging occurred near 5 pm on Wednesday, March 29. The banging may have been related to repair of a foot bridge over a small creek.

Power towers and North property line location - Aircraft flyover noise

Maximum noise levels at the power towers were caused by aircraft flyover with over 21 occurrences of maximum noise levels between 62 to 72 dBA over the 42 hour time period of monitoring. Maximum noise levels at the CT plant north property line were caused by aircraft flyover with over 25 occurrences of maximum noise levels between 62 to 70 dBA over the 42 hour time period of monitoring. Otherwise, average noise levels are in the 45 dBA range.

Sound Power Estimation

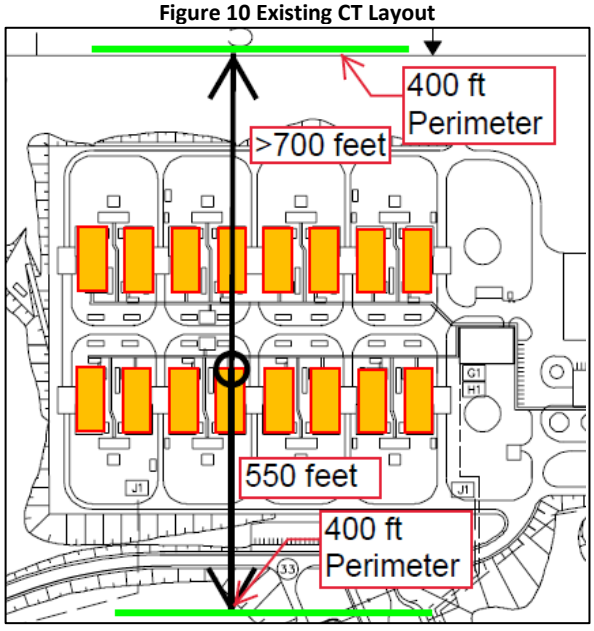
Sound Power Estimation for the Existing Turbine Plant

There was limited information available for the 16 existing combustion turbines (CTs) at the Duke Progress Lincoln County Plant. **Error! Reference source not found.** shows the levels that had to be met for the initial CT units. This included 61 dBA maximum level for a single unit measured 400 ft from the perimeter of the single unit, and a 65 dBA maximum level for all 16 units measured 400 ft from the nearest CT.

Figure 9 - Existing CT Sound Level Specification

25.2.4.5.2	A maximum far field A-weighted sound emission (400 ft. from the perimeter of the nearest CT) of 61 dB for a single unit, in accordance with paragraph 2.3 of ANSI B133.8-1977, "Gas Turbine Installation Sound Emissions."
25.2.4.5.3	A maximum far field sound emission (400 ft. from the perimeter of the nearest CT) of 81 dB at 31.5 Hz for a single unit, in accordance with paragraph 2.3 of ANSI B133.8-1977.
25.2.4.5.4	A maximum far field A-weighted sound emission (400 ft. from the perimeter of the nearest CT) of 65 dB for a sixteen (16) unit site when arranged in a back-to-back fashion, with the centerlines of the compressor inlet flanges 270 ± 30 ft. apart, in accordance with paragraph 2.3 of ANSI B133.8-1977.
25.2.4.5.5	A maximum far field sound emission (400 ft. from the perimeter of the nearest CT) of 90 dB at 31.5 Hz for a sixteen (16) unit site when arranged in a back-to-back fashion, with the centerlines of the compressor inlet flanges 270 ± 30 ft. apart, in accordance with paragraph 2.3 of ANSI B133.8-1977.

Figure 10 Existing CT Layout



According to Figure 9, this means going from 1 to 16 units only increases maximum levels 4 dBA. If we could take all 16 CT sources and place them at the exact same distance from the measuring location and could have the same noise directed in that direction, they would be 12 dB louder than one unit or 73 dBA at 400 ft. So how is it, that it is only 4 dB (not 12 dB) louder? This is an 8 dB difference. The key wording here is "when arranged in a back-to-back fashion with the centerlines of the compressor inlet flanges 270 ft (+/- 30 ft) apart". The basic fact that the sources are distributed accounts for a 4-5 dB of this difference. A majority of the units are significantly further away than the closest units and do not contribute as much. This is both because of arranging them in two rows, and the arrangement in a line. We also believe the back to back arrangement means the noisier side of the unit is farthest from the perimeter and has some shielding/source directivity benefits. In other words, with the expanded perimeter we are no longer 400 feet from the inlet when all 16 are running. Instead we are over 700

feet from the backside in the unshielded direction and nearly 550 feet in shielded direction. This provides the remaining 3-4 dB of benefit. The layout is illustrated in Figure 10.

All of this is important, because to project noise to greater distances, we must know the sound source properties of the 16 units and translate these requirements to sources we can model. For purposes of this study, we took these effects into account and computed a point source equivalent CT sound power level (dBA) for a single CT and modeled 16 point sources. The A-weighted sound power we estimated for a single unit is about 111 dBA. The spectral frequency shape of the sound power was derived from work performed on the CTs at the Asheville site when those CTs were added in the mid 90's. The results are shown in **Figure 11**

Figure 11 – Existing CT Estimated Individual Sound Power Levels

Sound Power	31 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 KHz	2 KHz	4 KHz	8 KHz	Overall
Unweighted	119.6	114.0	115.4	112.4	110.7	105.0	95.9	91.0	97.2	dBA
A-weighted	80.2	87.8	99.3	103.8	107.5	105.0	97.1	92.0	96.1	111.2

This sound power information is then added to our SoundPLAN outdoor propagation model in the form of 16 point sources. Since our concern was accuracy at a greater distance, there is no directivity assigned to each individual CT.

Estimation of Sound Power Levels for the new Siemens combined cycle CT.

This particular combined cycle unit has not been produced yet. Therefore, it was necessary for Siemens to use a similar program (CadnA) to model all of the various source components, enclosures, silencers, barriers, and structures and provide estimates of sound power for each component. These are educated engineering guesses in some cases where the particular noise source has never been built on that particular scale before, and in other cases known sound power levels of individual pieces of equipment.

The equipment drawing is shown in **Figure 13**. **Figure 12** shows the Siemens CadnaA results and how they modeled sources. **Figure 14** has the Siemens estimated sound power levels assumed for over 20 different types of sources. The buildings and other blocking elements were also modeled that provided shielding. This helps one get a sense of the complexity of the estimation process Siemens has used and that we replicated in SoundPLAN. Each component was identified, dimensioned, and sound power assigned per the Siemen's estimates provided.

The equipment layout and sound power level estimates are after agreed noise control measures (between Siemens and Duke Energy) were implemented and design changes fine-tuned.

Figure 12 – Siemens CadnaA Modeling

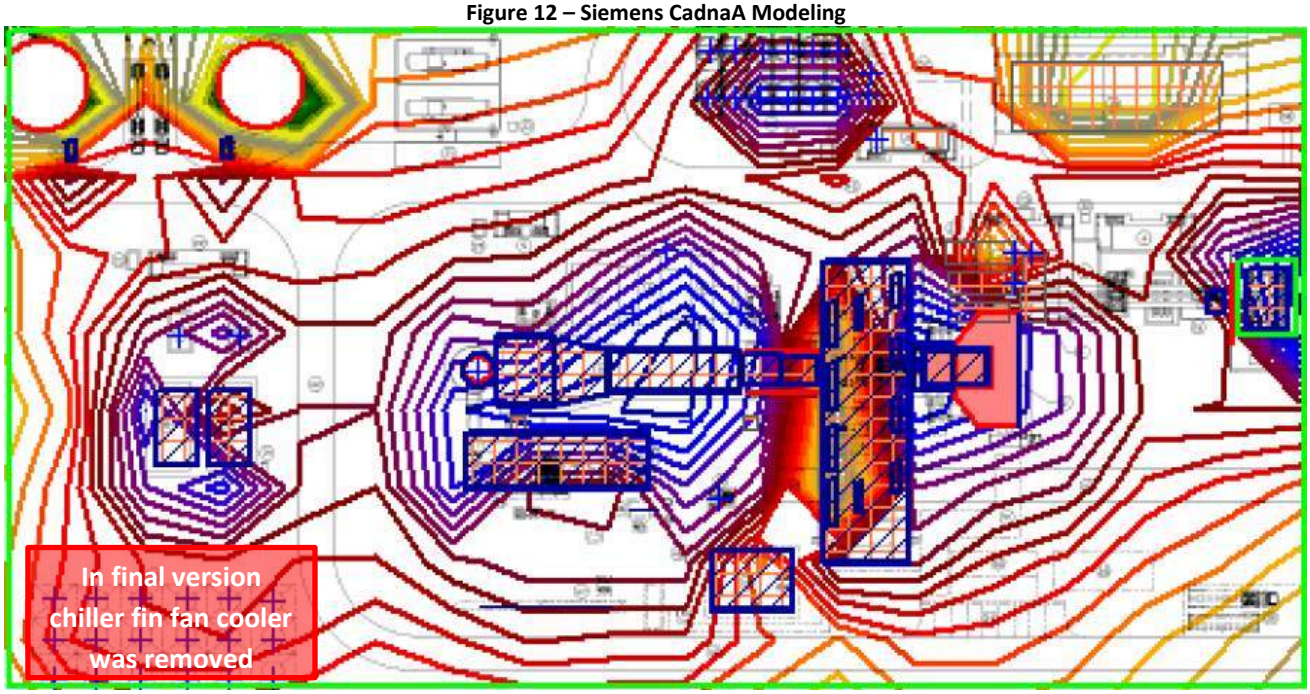
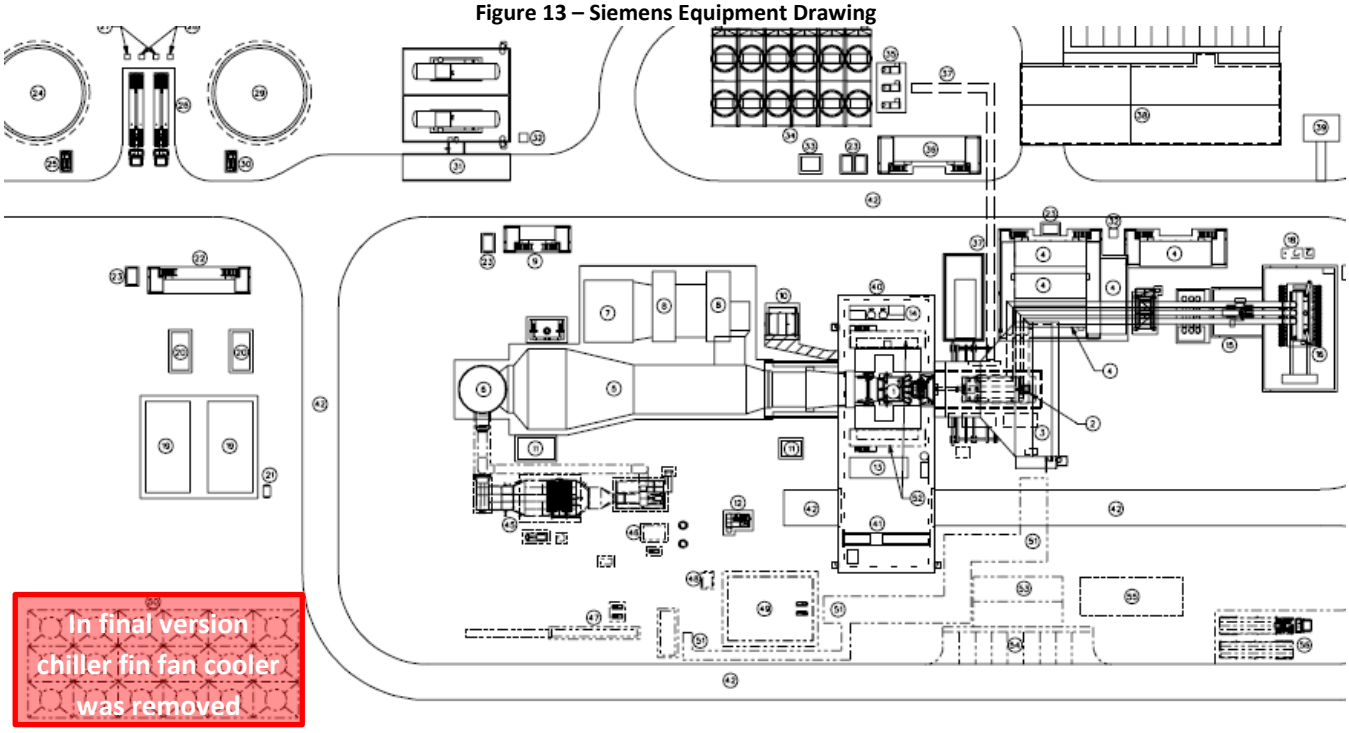


Figure 13 – Siemens Equipment Drawing



Strictly looking at the loudest sound levels at 400 ft for Siemens, the resulting sound level maximum was 64 dBA, averaging closer to 62-63 dBA. This maximum is only 3 dB higher than from a single CT existing unit maximum of 61 dBA. At large distances the 16 existing CTs have a combined sound power output of 123.2 dBA. The new combined cycle CT has an equivalent sound power output estimated at 123.6 dBA. This is essentially the same as the existing equipment at large distances.

Figure 14 – Siemens Estimated Sound Power Levels of Proposed CT addition Equipment

Name	Sound Power Level PWL Day (dB(A))									
	31.5	63.0	125.0	250.0	500.0	1000.0	2000.0	4000.0	8000.0	A-weighted overall level
GT Inlet Filter Face (h=18m)	88.1	92.0	98.6	98.0	90.8	102.0	85.5	102.0	106.6	109.8
Inlet filter casing outdoor	68.5	76.1	85.7	82.1	83.9	106.1	100.3	96.1	89.1	107.5
Inlet filter chiller	85.3	94.5	87.7	87.8	82.0	78.4	77.0	62.6	45.3	96.6
GT building, in all	89.1	102.1	95.9	98.3	98.4	102.9	103.7	103.5	101.2	110.5
HVAC	62.8	83.1	81.9	90.3	94.7	99.1	103.0	102.8	100.9	108.1
Building (h=30m)	89.1	102.0	95.7	97.5	96.0	100.6	95.4	95.1	90.0	106.9
S-Gen6-3000W Generator (h=6m)	77.6	103.7	108.2	111.0	113.2	114.6	113.2	111.3	103.1	120.4
GT Exhaust Diffuser Duct (h=6m)	85.5	98.7	100.8	102.3	106.7	110.9	103.1	95.9	65.8	113.6
Dilution SCR, in all	95.0	109.1	106.1	105.9	107.1	105.7	98.7	94.4	74.2	114.2
Transition duct (h=6m)	84.9	96.1	96.2	96.7	100.1	102.3	94.5	87.3	59.2	106.4
Inlet duct (h=8m) and main Body (h=24m)	89.2	99.2	99.4	98.8	99.7	100.7	96.1	92.9	68.8	107.2
DSRC Stack	90.5	108.1	89.2	74.6	74.9	77.1	73.3	70.1	46.0	108.2
DSRC Stack Outlet (h=43m)	89.5	96.9	104.3	104.2	105.0	99.4	86.1	83.5	72.5	110
DSCR Forced draft fans, in all	74.4	87.6	95.7	100.2	101.6	102.8	101.0	93.8	86.7	108
Exhaust gas heat exchanger	36.4	61.6	80.7	96.2	100.6	101.8	106.0	106.8	87.7	110.8
GT Transformer, in all	63.7	81.8	95.9	93.6	108.9	93.8	92.3	84.3	77.1	109.4
Auxiliary	47.6	60.8	74.9	79.4	90.8	86.0	77.2	72.0	63.9	92.5
GSU	63.6	81.8	95.9	93.4	108.8	93.0	92.2	84.0	76.9	109.3
Rotor Air Cooler Fin Fan	67.6	78.8	83.9	87.4	90.8	89.0	86.2	84.0	77.9	95.6
Fuel gas heater	65.5	74.7	86.8	84.3	83.7	84.9	86.1	82.9	76.8	92.9
Inlet filter air heater	71.7	80.9	93.0	90.5	89.9	91.1	92.3	89.1	83.0	99.2
Fuell gas final filter	38.6	54.8	69.9	77.4	83.9	90.0	92.2	95.0	82.0	98
Closed cooling water fin fan cooler, in all	72.8	73.4	90.9	94.4	101.4	101.3	96.0	91.4	90.0	105.8
Closed cooling water pump skid	48.6	63.8	75.9	89.4	92.8	92.0	90.0	88.0	83.9	98
Compressor fin fan cooler, in all	63.6	76.8	89.9	89.4	95.8	94.0	93.2	89.0	83.9	100.6
Fuel gas compressor, in all	77.4	85.6	96.7	100.2	103.6	98.8	94.0	101.8	101.7	108.9
Water Forwarding Pumps, in all	51.6	58.8	68.9	79.4	91.8	98.0	100.2	96.0	85.9	103.6

Predicted Noise Levels from Plant

Existing Lincoln Duke Progress CT Noise Levels (SoundPLAN estimated)

Figure 15 shows the Existing CT noise level predicted with all 16 operating.

To the Southeast - The level at neighbor 1 to the southeast just under 45 dBA. It should be noted, however, that the Neighbor 1 property was sold to Hedrick Quarry in 2016; and the zoning for the property is now listed as Residential Transitional. Topography is adding some benefit. To the southeast, the contour lines are closer in than to the southwest. It appears the the hill itself is obstructing some of the sound energy, and the new CT buildings some as well.

To the Southwest - The closest neighbors to the southwest are seeing levels approaching 48 dBA. Most of these neighbors are closer to 47 dBA. Neighbor 2 is where it increases and rises to 48 dBA in the nearest corner. Just across Old Plank Road near Magnet Lane levels are around 45-47 dBA.

To the West – Levels do not exceed 48 dBA to the west at adjoining properties and are generally less.

To the North – The future Trilogy Property to the Northeast is estimated to have noise levels of 47- 48 dBA at the property line when all sixteen are running, and falling off from there. One small corner of the property approaches 51 dBA. The topography is reducing levels a couple dB for some of the shared Trilogy property line as can be seen by the reduced radius for the 49 dBA contour line.

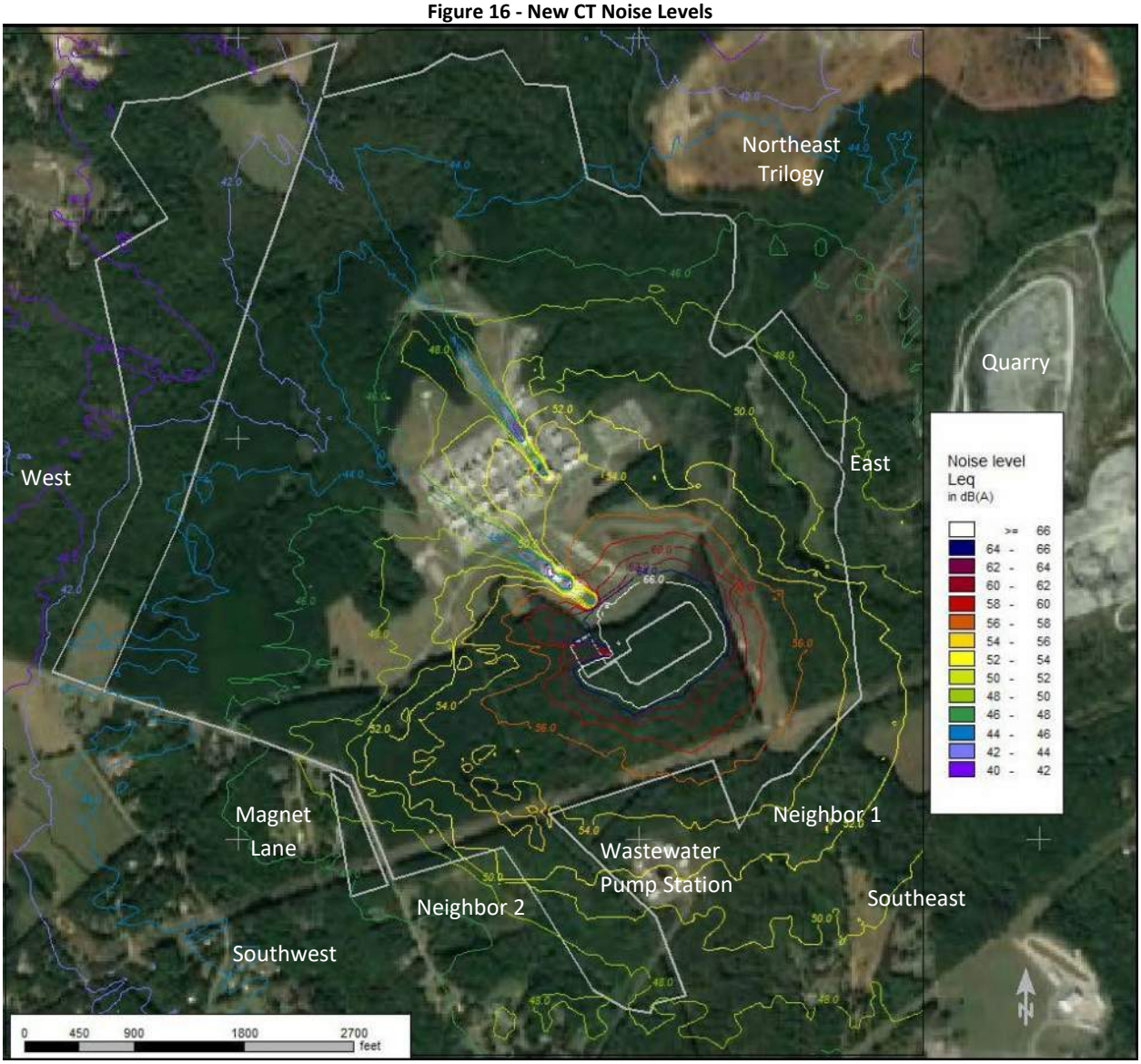
Figure 15 Existing CTs - All Sixteen Operating

New CT Addition Noise Levels

The location of this unit is on a hill, and more complex modeling of buildings and sources leads to less smooth contour lines and more minor movements as these effects slightly change propagation results.

To the Southeast - Levels at neighbor 1 peak at 55 dBA. At the nearest home on that property levels are 52 dBA. The next home is around 50 dBA.
To the Southwest - Properties to the Southwest are in the mid 40's, except at neighbor 2 where it increases and rises to 52 dBA in the nearest corner. Also, just across Old Plank Road near Magnet Lane levels are around 46-48 dBA.
To the West – Levels do not exceed 45 dBA to the west at adjoining properties.
To the North – The Trilogy property has one small corner where levels approach 48 dBA in the one corner, with most of the property line below 46 dBA, and dropping to around 45 dBA and below for the cleared area on the Trilogy property.

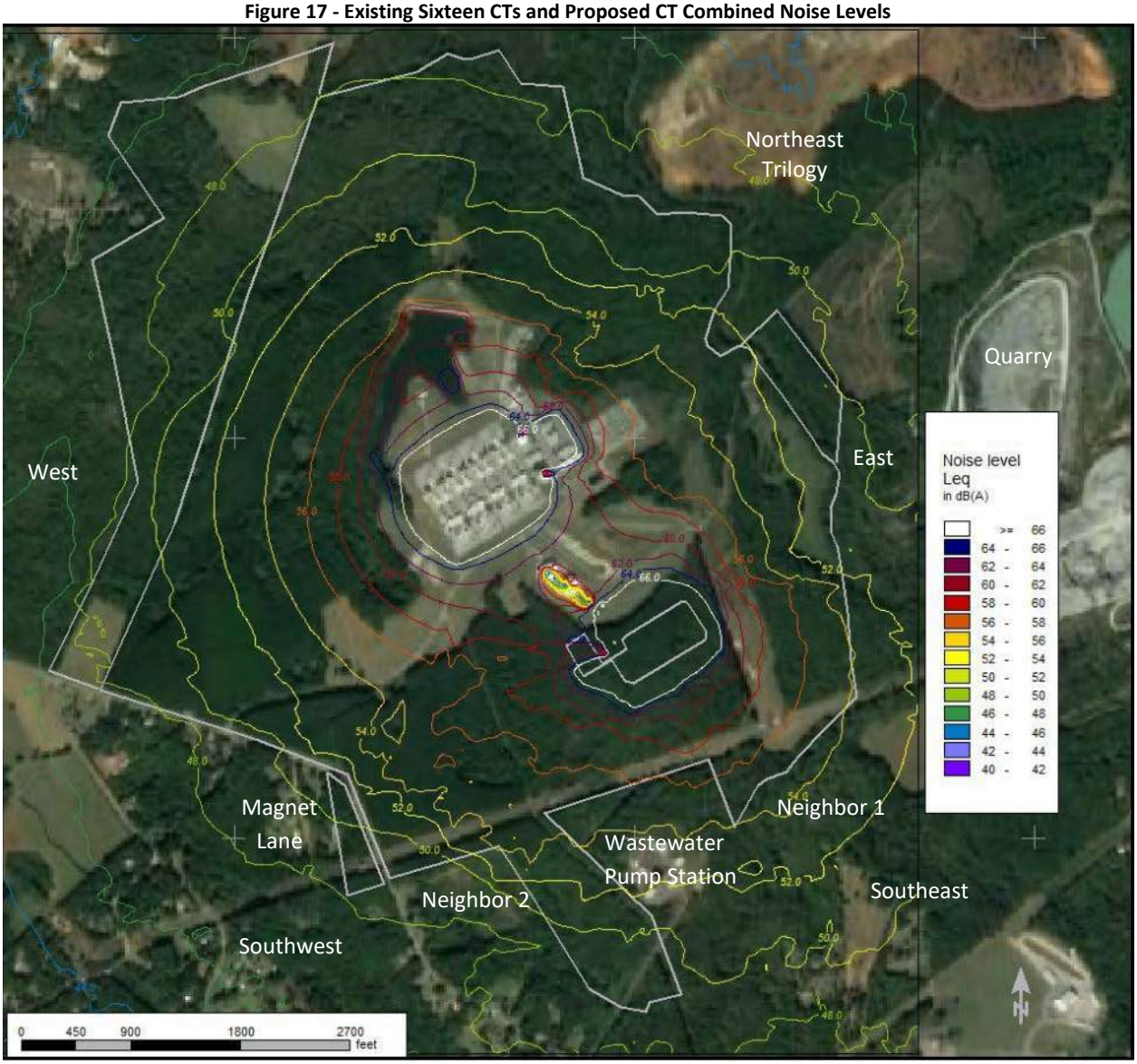
Figure 16 - New CT Noise Levels



Both existing CTs and proposed CT Addition

The levels for both existing and proposed CT's are shown in Figure 17.

Figure 17 - Existing Sixteen CTs and Proposed CT Combined Noise Levels



To the Southeast - Levels are essentially the same as with just the proposed CT which makes since given there is an 10-11 dB difference in the individual sound levels from these two sources. 8-9 dB of this difference in sound levels from the two sources at this location is due to proximity. The source strength is essentially the same for the two source groups. The remaining minor difference appears to be a combination of the benefit of greater ground attenuation and shielding by the hill between this neighbor and the existing CT's than the new unit receives from the topography. This neighbor will of course therefore see an increase in noise from Duke Energy of 10-11 dB at the property line when the proposed CT operates. However, levels will be 52-55 dBA, just meeting the same night time limits that are currently in use for the specific use of race tracks in Lincoln County. There are currently no specific requirements for a project of this type. However, this shows Duke Energy approximately meets

requirements the county has imposed on a specific type it has chosen to apply a limit. The existing noise sources affecting this property are in the same range as these levels. It is estimated from our measurements of the quarry that quarry operations are about 57 dBA and operates in the early morning hours. The race track is less in level but still around 50 dBA. Aircraft flyovers of course can be louder (we measured 62 dBA to 72 dBA maximum sound levels), but do not last as long. Although there is no doubt that this will be a new source of sound, it is estimated to be no louder than other currently occurring sources on this property.

To the Southwest –neighbor 2 and others on Magnet Lane are more equidistant from the existing and proposed CT's and thus levels are essentially the same. At neighbor 2 levels are 54 dBA with both sources on, with 52 dBA from the new CT and 48 dBA from the existing CTs. At Magnet Lane we have 47 dBA from existing CTs, and 46-48 dBA from the new CT. Thus overall levels are about 50 dBA there. Again, there will be an increase of Duke Energy generated noise in this direction of about 3 dBA on Magnet Lane and 6 dBA at the 'neighbor 2' worst case location in this direction. Levels from the race track are estimated to be 53-55 dBA at neighbor 2 and Magnet Lane respectively. Road noise from Plank Road at residences for Magnet Lane were reported in the mid 50's (and some higher). Therefore, this increase is on par with other noise sources in this direction, and is under 55 dBA.

To the Northeast – The Trilogy property has one small corner where levels approach 53 dBA in the one corner, with most of the property line below 50 dBA. Existing CTs were 51 dBA in the one corner and 47-48 dBA mostly elsewhere. Therefore the increase of less than 2 dB is not a clearly noticeable change and is well below 55 dBA.

To the West – The difference in sound levels between both old and new CTs running versus only the Existing CTs is a fraction of a dB. This is due to the proximity effect of being significantly closer to the existing CTs than the new proposed CT. Therefore, there is no measurable increase in noise levels in this direction with the new CTs.

Noise Impact Evaluation

Methodology of Evaluation

An evaluation of the future Duke Energy generated noise levels was made by comparing to existing Duke site noise levels, community noise levels, and the Lincoln County race track night time noise limits. Lincoln County's noise ordinance has no specified decibel limits, but does prohibit noise from "becoming a nuisance to adjacent single-family detached and two-family houses and residential districts" (Lincoln County 2016). The universal development ordinance does have limits that apply to race tracks. At nighttime, 10 minute average levels cannot exceed 55 dBA at the receiving residential property for this kind of source. Thus these limits were used to draw some comparisons.

§4.4.14 Racetrack

A. The maximum sound level at the property boundary shall remain at or below the limits set herein for the following receiving land use districts when measured at the boundary or at any point within the property affected by the noise. dB(A) shall remain at or below the maximum sound level maximum. dB(A) shall be calculated on a 10-minute average.

Table of Maximum Permitted Sound Level [dB(A)]		
Receiving Use District	Day (7 a.m.-10 p.m.)	Night (10 p.m.-7 a.m.)
Residential	60	55
Commercial	65	60
Industrial	75	75

Noise impacts on a community are based on the amount of increase in noise levels compared to other existing noise sources present in the community (including existing noise from the noise producer who is adding a noise source), the general level of the noise source, and many other factors (nature of the source – speech or music, impulsive, tonal, time of day, periodic nature, whether neighbors are already concerned, or are supportive of the noise producer to name a few). Where noise levels from the plant are not increasing more than 3 or 4 dB, the impact will not be clearly noticeable. Where noise levels from the plant will increase5 or more decibels, then the other community noise sources present are a more significant factor as is the overall sound level. In the end, individual responses will vary to a new noise source. We can only provide an opinion of what the reaction may be based on the character, frequency, and level of existing noise sources versus the new noise source and its overall level.

Results

Figure 18 illustrates the current levels being experienced by the community from itself, nearby roads, aircraft, quarry, and a nearby speedway. It also shows the levels of the existing CTs at the Lincoln plant, and estimated future noise levels with the new proposed CT. Future noise levels are similar to sound levels of existing sources, meaning a minimal impact to most. Most neighbor locations are below 55 dBA with only one location right at 55 dBA (property line of one neighbor to the southeast).

Noise levels from the quarry and race track at the neighbor to the southeast (Neighbor 1) are estimated to be 57 dBA and 50 dBA respectively. Aircraft events from CLT have slow A-weighted maximum levels of 62-72 dBA. Although clearly the noise source will be new and thus noticed, it is not more than 55 dBA

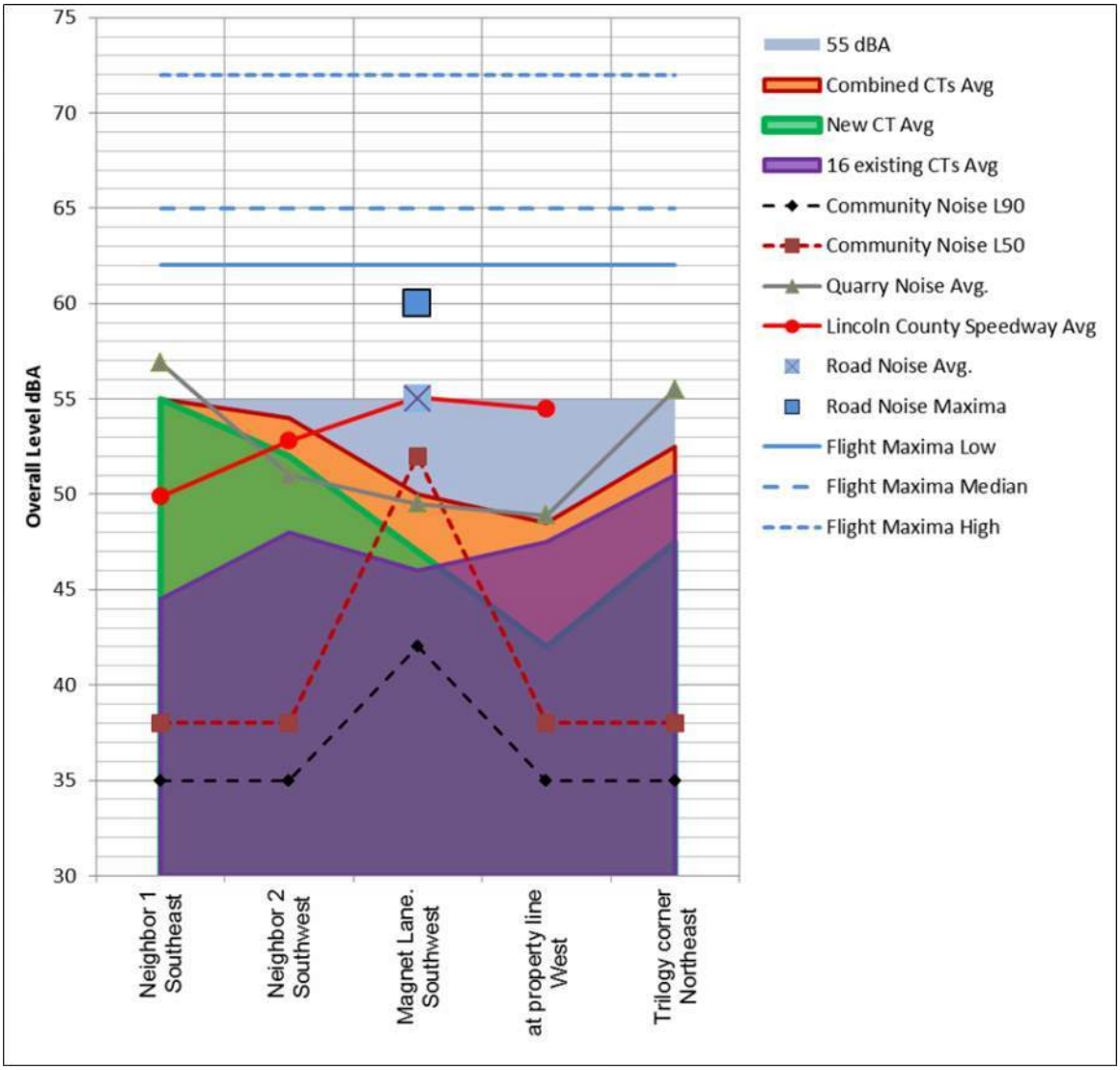
(level used to regulate race tracks at night in Lincoln county), and is not more than other sources affecting this property.

Other homes showing a clear increase from Duke Energy sources to the southwest are 50-54 dBA with all CT's (existing and proposed) operating (3-6 dB increase), but race track noise levels are estimated to be 53-55 dBA and are thus similar. Also, noise from Plank Road (for those homes in close proximity to the road) is generating sound levels of about 55 dBA.

Property to the west and north (Trinity property) are not noticeably changed in sound levels from the Duke Energy plant and most of the property is below 50 dBA.

It is our opinion that noise impacts are minimal to most of the surrounding neighbors. Neighbors 1 and 2 will see a clearly noticeable increase in Duke Energy levels, but total levels do not exceed 55 dBA and other sources are generating similar levels at these properties, thus impacts should not be significant.

Figure 18 - Summary of Community Noise, Existing and Proposed Duke Lincoln CT Noise Levels



COMMUNITY MEETING REPORT
Petitioner: Duke Energy Carolinas, LLC

This Community Meeting Report is being filed with the Lincoln County Planning and Inspections Department as part of the requirements for the rezoning process.

PERSONS AND ORGANIZATIONS CONTACTED WITH DATE AND EXPLANATION OF HOW CONTACTED:

A representative of Lincoln County mailed a written notice of the date, time and location of the Community Meeting to the individuals and organizations set out on Exhibit A attached hereto. A copy of the written notice is attached hereto as Exhibit B.

DATE, TIME AND LOCATION OF MEETING:

The Community Meeting was held on Thursday, May 10th, 2018 at 7:00 p.m. at the East Lincoln Community Center, 8160 Optimist Club Road, Denver, North Carolina.

PERSONS IN ATTENDANCE AT MEETING (see attached copy of sign-in sheet):

The Community Meeting was attended by those individuals identified on the sign-in sheet attached hereto as Exhibit C. The Petitioner was represented at the Community Meeting by Robin Nicholson, Gary Thompson, and Rob Niehaus, Paul Beatty, Rick Rhodes as well as by Petitioner's agents, Richard Loose with Siemens and Brittany Lins with K&L Gates.

SUMMARY OF PRESENTATION/DISCUSSION:

A representative of the Petitioner, Robin Nicholson, welcomed the attendees and introduced the Petitioner's team. Ms. Nicholson explained that the purpose of the meeting was to discuss the proposed expansion of a combustion-turbine (CT) power plant at the existing Duke Energy facility on Old Plank Road. The existing facility has been in operation for twenty-five years and currently contains 16 units. Ms. Nicholson stated that a CT plant functions as a "peaking plant" in order to provide power in times of high demand.

Ms. Nicholson explained that the proposed expansion has been developed in coordination with Siemens. Siemens intends to build and operate "Unit #17" which will reflect the most innovative technology on the market at this time.

Ms. Nicholson stated that the expansion proposal is going through the rezoning process in part due to a height issue with the current zoning. The conditional site plan requests height to accommodate a 90-foot high turbine building and 140-foot tall stack.

Ms. Nicholson stated that the remainder of the meeting would be in an Open House format with Petitioner's agents dispersed in various stations throughout the room in order to efficiently address attendees' comments and questions. The stations included: existing power plant operations, proposed expansion project (Gary Thompson, Rob Niehaus, Rick Loose), educational opportunities (Melissa, Lincoln County Schools), marketing and relations (Lisa Parrish), and general land use and rezoning process questions (Brittany Lins).

The Petitioner's agents continued to answer questions and engage in discussion with the attendees until approximately 8:00 p.m.

With the exception of one couple, most of the attendees were interested in learning more about the plant operations, expansion plans and whether additional properties would be needed for this expansion from the surrounding property owners. The one exception related to noise concerns from the existing plant operations. The Roche's who live at the back side of the Trilogy Neighborhood stated there were two nights during the winter when the plant operated all night and was so loud they were unable to sleep.

For reference, this was the first complaint regarding noise levels from any Trilogy residents and was the first Duke Energy had been made aware of this couple's concerns. In response to this concern, we have verified the plant did operate on two dates in January; Jan 2 and Jan 7, 2018.

Respectfully submitted, this 15th day of May, 2018.

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CLARK GEORGE W REVOCABLE TRUST
437 S INGLESIDE FARM RD
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PROPERTY TAX DIVISION/ST22M
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C/O ARTHUR L SANDERS
633S BRIDLEWOOD LANE
CHARLOTTE, NC 2821S

HUNTER EVELYN
1S44 POSTON CIR
GASTONIA, NC 280S4

LOWERY FRANKLIN EUGENE
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P O BOX 436
DAVIDSON, NC 280360000

MACKINS JOE
C/O HAZEL DOOMS
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BERKLEY, WV 2S8010000

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FORNEY ELIZABETH ANDERSON
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% LEWIS SANDERS
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STANLEY, NC 28164

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APT F
CHARLOTTE, NC 28216

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LINCOLN COUNTY PLANNING & INSPECTIONS DEPARTMENT
302 NORTH ACADEMY STREET, SUITE A, LINCOLNTON, NORTH CAROLINA 28092
704-736-8440 OFFICE 704-736-8434 INSPECTION REQUEST LINE 704-732-9010 FAX

PROPOSED EXPANSION OF COMBUSTION-TURBINE PLANT

Duke Energy Carolinas, LLC, is requesting the rezoning of 611 acres from I-G (General Industrial) to PD-I (Planned Development-Industrial) to permit an expansion of a combustion-turbine power plant by adding a combustion turbine and associated facilities, including a 90-foot-tall turbine building and a 140-foot-tall stack. The property (Parcel ID# 52075) is located at 6769 Old Plank Road, Stanley, N.C.

A community involvement meeting will be held on Thursday, May 10, 2018, at 7:00 p.m. at the East Lincoln Community Center at 8160 Optimist Club Rd., Denver, N.C., to provide information about the proposal and to receive comments prior to a public hearing.

For more information, contact the Lincoln County Planning and Inspections Department at (704) 736-8440.

COMMUNITY MEETING FOR LINCOLN CT EXPANSION PROJECT

Meeting Date: 5/10/2018

Place/Room: East Lincoln Community Building

Name	Address	Phone	E-Mail
Melissa Dellinger		980.429.0359	mdellinger@lincoln.k12.nc.us
Carrie L. Hunter (William A. Hunter)	313 Dakota St. Kannapolis, NC 28083	704-932-7783	Real estate interest jcanngraham@roadrunner.com
Jorge Cuarenla	1690 Magnetlin	704-7050038	Jorge400@ICloud.Ca
Vickie Roche *	233 Chimney Rock Ct	704 966-4310	Vroche@Netzero.com Neighbors - Sound levels
Milton Sigmon	5044 Hwy 73	704 735 0857	milton-sigmon@ATT.net
Keith Gaskill	465 Timber Rd	704-736-9665	keith_gaskill@yahoo.com
John Marino	534 Flat Rock Dr	704-966-4788	JohnMarino47@AOL.com

COMMUNITY MEETING FOR LINCOLN CT EXPANSION PROJECT

Meeting Date: 5/10/2018

Place/Room: East Lincoln Community Building

Name	Address	Phone	E-Mail
Eric Huhn	7203 Oxford Bluff Dr. Stanley, NC 28164	(704)615-4052	ericthehuhn@outlook.com

DUKE ENERGY CAROLINAS, LLC

CONDITIONAL REZONING

DEVELOPMENT STANDARDS

5/14/2018

Development Data Table:

Site Area:	+/- 612 acres
Tax Parcel:	52075
Existing Zoning:	I-G (General Industrial)
Proposed Zoning:	PD-I (Planned Development - Industrial)
Maximum Building Height:	140’

I. General Provisions

1. These Development Standards form a part of the Rezoning Plan associated with the Rezoning Petition filed by Duke Energy Carolinas, LLC (the “Petitioner”) to accommodate the expansion of an existing combustion-turbine power plant on that approximately 612 acre site located at 6769 Old Plank Road, Stanley, North Carolina, more particularly depicted on the Rezoning Plan (the “Site”). The Site is comprised of Tax Parcel Number 52075.

2. Development of the Site will be governed by the Rezoning Plan, these Development Standards and the applicable provisions of the Lincoln County Unified Development Ordinance (the “Ordinance”).

3. Unless the Rezoning Plan or these Development Standards establish more stringent standards, the regulations established under the Ordinance for the PD-I zoning district shall govern the development and use of the Site.

4. The development and uses depicted on the Rezoning Plan are schematic in nature and are intended to depict the general arrangement of such uses and improvements on the Site. Accordingly, the ultimate layout, locations and sizes of the development and site elements depicted on the Rezoning Plan are graphic representations of the proposed development and site elements, and they may be altered or modified in accordance with the setback, yard, landscaping and tree save requirements set forth on this Rezoning Plan and the Development Standards, provided, however, that any such alterations and modifications shall not materially change the overall design intent depicted on the Rezoning Plan.

II. Permitted Uses

The Site may be devoted only to a combustion-turbine power plant and associated facilities, including those currently in existence, and the addition of the proposed expansion area, including a 90-foot-tall turbine building and a 140-foot tall stack, as permitted in the PD-I zoning district.

III. Architectural Standards

1. Architectural standards for the combustion-turbine power plant shall consist of the following:

    a. 90 foot tall turbine building and 140 foot tall stack as permitted in the PD-I zoning district
    b. The plant will have a color scheme of dark colors for all new structures of the facility. The primary color suggestion is Sherwin-Williams Enviro Green causing views of the structures from outside of Duke property which are viewed at an angle to be more readily read as part of the undulating tree line.