NORTH CAROLINA UTILITIES COMMISSION
DOCKET NO. E-2, SUB 1318
DOCKET NO. EC-67, SUB 55

JOINT APPLICATION FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY

PERSON COUNTY ENERGY COMPLEX
COMBINED-CYCLE COMBUSTION TURBINE ADDITION PROJECT

Exhibit 2: Siting Information

March 28, 2024

PERSON COUNTY ENERGY COMPLEX
COMBINED CYCLE ADDITION PROJECT
Exhibit 2: Site and Permitting Information

REFERENCES

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INTRODUCTION

Duke Energy Progress, LLC ("DEP"), requests certification to construct one advanced-class combined-cycle gas turbine ("CCGT") unit with an estimated nominal winter capacity of 1,360 megawatts ("MW") and selective catalytic reduction at the site of its existing Roxboro Steam Plant in Semora, North Carolina ("Roxboro Plant"). The CCGT will consist of two gas turbine generators and one steam turbine generator. Semora is an unincorporated community in Person County that is approximately 11.5 miles northwest of Roxboro, NC, which is the county seat of Person County.

This Exhibit provides site and permitting information related to the construction of the proposed unit and related upgrades to on-site transmission facilities, pursuant to North Carolina Utilities Commission ("NCUC") Rule R8-61. The following information is included in this exhibit:

- Facility Layout Map
- Site Location and Address
- Site Ownership
- Site Description
- Site Selection
- Site Analysis
- Site Study Status
- Natural Gas Supply
- Transmission
- Unit Capacity

PRELIMINARY PLANS AND EXHIBITS

1.0 SITE INFORMATION

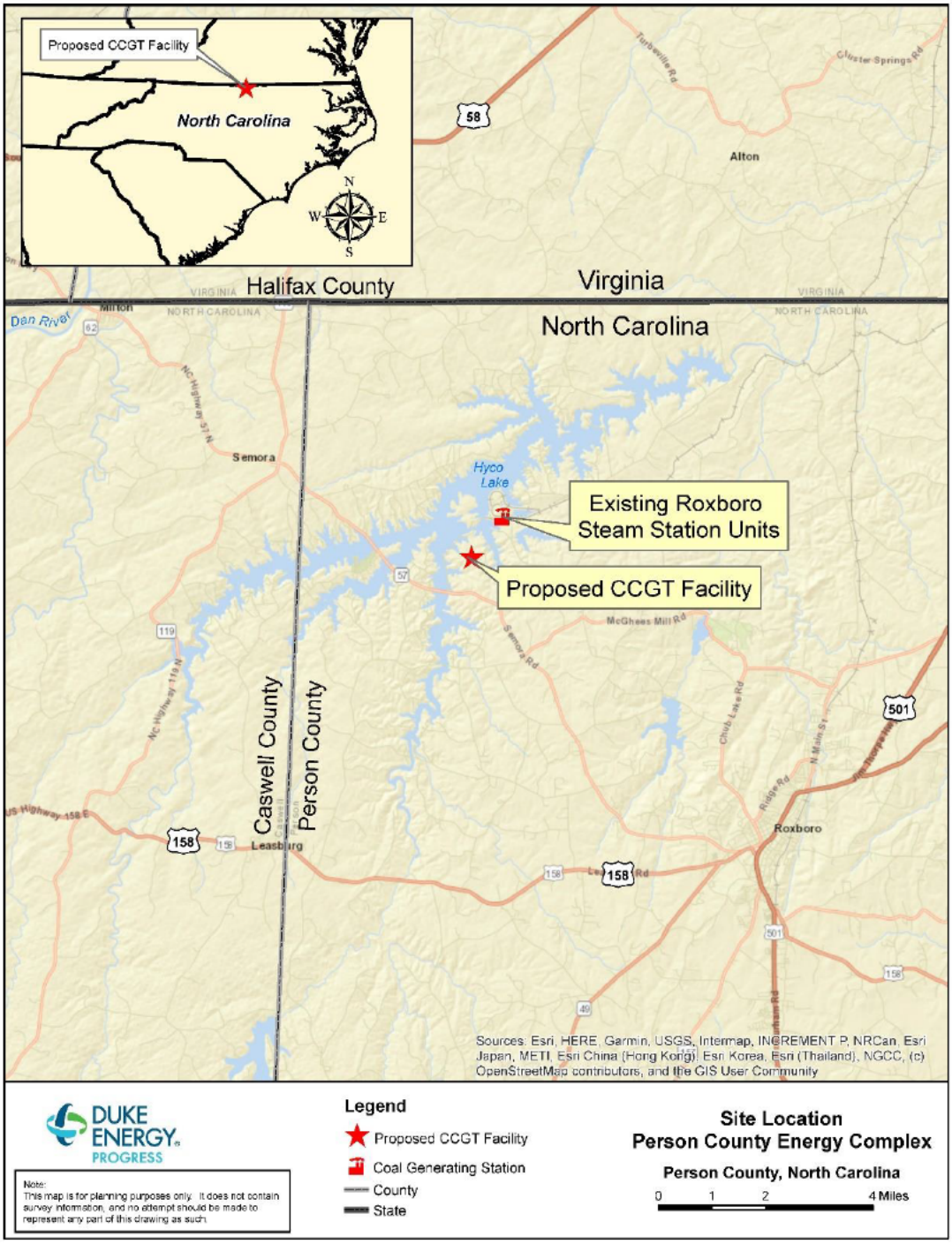
DEP, through its shared services company, Duke Energy Business Services, LLC, contracted with Burns & McDonnell to advise on supplemental engineering issues. DEP further engaged WSP USA Environment and Infrastructure, Inc., for studies on wetlands and soil suitability and All4 Environmental Consulting Services for air permitting analyses. DEP also retained Environmental Resources Management ("ERM") for cultural resource investigations. Finally, DEP contracted with Pike Engineering, LLC ("Pike"), to perform research and conduct studies of local population, area development, visual and auditory resources, aesthetic and cultural resources, and aviation. Pike then contracted with Brockington & Associates, Inc. ("Brockington") for additional aesthetic and cultural resource research and with Stewart Acoustical Consultants ("Stewart") to conduct studies related to auditory resources of the proposed generating facility.

1.1 Site Location, Address, and Ownership

DEP proposes to permanently retire coal-fired Units 1 and 4 at Roxboro Plant and replace them with one CCGT unit. The CCGT unit and its associated facilities will be herein referred to as the "Proposed Facility." The remaining coal-fired Units 2 and 3 and the proposed CCGT unit will collectively be known as the Person County Energy Complex ("PCEC"). The PCEC will be owned by DEP and located on DEP-owned property adjacent to the current Roxboro Plant in northeastern Person County. The PCEC's E911 street address will be 1700 Dunnaway Rd, Semora, NC 27343; its approximate global positioning system coordinates at its approximate center will be 79° 5' 1.807" west and 36° 28' 22.405" north.

Figure 1.1-1 shows the location of the PCEC.

Figure 1.1-1. Site Location



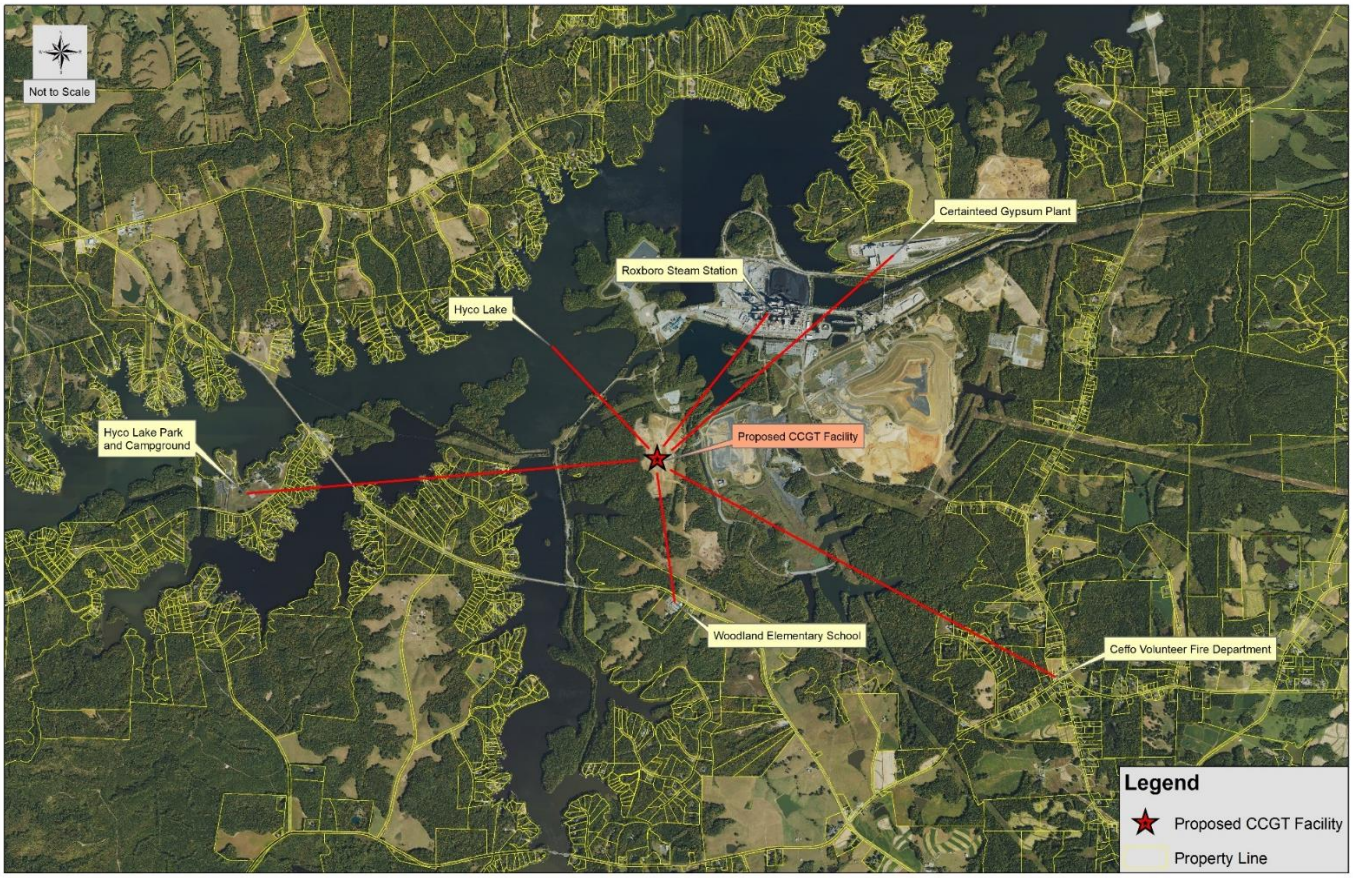
County Boundary Sources: Esri; U.S. Dept, of Commerce, Census Bureau; NOAA; National Ocean Service; National Geodetic Survey

The Roxboro Plant is a four-unit, coal-fired 2,422 MW generating facility. It is one of the largest power plants in the United States and has been operating commercially since 1966. DEP's property surrounding the Roxboro Plant includes extensive forested areas. Outside the DEP-owned property, scattered wooded areas are interspersed with agricultural pastures and Hyco Lake. Lakeside residential developments and recreational land uses are predominant. Terrain in the vicinity is gently rolling and scenic with forests, fields, and views of Hyco Lake.

The immediate area's industrial development is limited to CertainTeed Gypsum (approximately 0.76 miles east). Nearby dining includes Buoy's Bar and Grill (about 1.5 miles west) and Concord Grill (about 2.25 miles southeast); recreational accommodations and facilities include Hyco Lake Park & Campground (about 2 miles west). Zion Level Missionary Baptist Church and cemetery are approximately 1.5 miles northwest. To the southeast are Ceffo Volunteer Fire Department (2.5 miles) and Concord Church of Roxboro and cemetery (about 2.25 miles). Woodland Elementary School is approximately 0.8 miles south.

Figure 1.1-2 shows the locations of some of the nearby commercial and industrial developments, Woodland Elementary School, and other points of interest.

Figure 1.1-2. Land Use



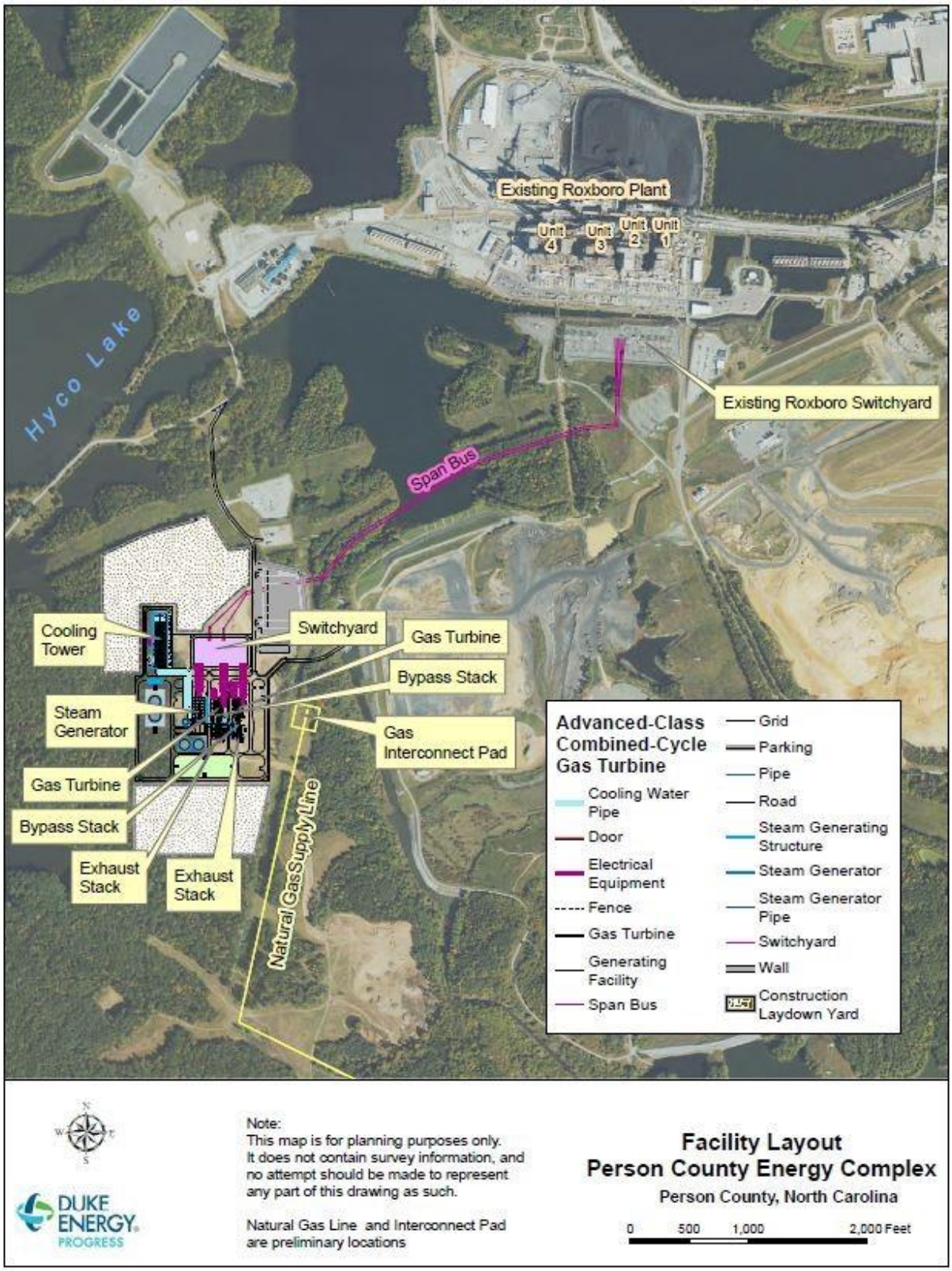
Map Sources: USDA Orthoimagery 2022; Person Co. GIS 2023

1.2 Site Description

The Roxboro Plant is encompassed by a 6,923-acre parcel of land. In proximity to the Roxboro Plant there is an electrical substation, transmission lines, the associated balance of the Roxboro Plant's facilities, buffer lands, and forested areas. The footprint of the Proposed Facility will cover approximately 28 acres of undeveloped land.

Figure 1.2 provides an overall view of the Proposed Facility.

Figure 1.2. Facility Layout



Map Sources: USDA Orthoimagery 2022

1.3 Site Selection

1.3.1 Siting Criteria

The 2022 DEP and Duke Energy Carolinas, LLC ("DEC") proposed Carbon Plan identified a need for additional generation, including approximately 1,200 MW of combined-cycle gas generation in the 2028-2029 timeframe, and the NCUC found in its December 30, 2022, *Order Adopting Initial Carbon Plan and Providing Direction for Future Planning*, in Docket No. E-100, Sub 179 ("Carbon Plan Order"), that planning for up to 1,200 MW of incremental combined-cycle gas generation is a reasonable step.[1] DEP evaluated site locations using the following factors: transmission capacity, natural gas capacity, fuel oil/water availability, long-term future generation needs, operational synergies, rail access, land availability, and projected retirement dates of existing units.

Criteria used to inform site selection are presented in Table 1.3.1, below.

Table 1.3.1. Site Selection Criteria

Criteria	Reason
Transmission Capacity	Available transmission capacity can provide significant cost-saving opportunities, especially if able to be repurposed via Generator Replacement Request (GRR).
Natural Gas Capacity	Available natural gas capacity or nearby existing natural gas infrastructure can provide synergistic opportunities.
Fuel Oil/Water Availability	Existing oil-loading, storage, and water infrastructure provides cost-saving opportunities during the commissioning test and for long-term operation.
Long-Term Future Generation Needs	Site characteristics support long-term operation as a system resource.
Operational Synergies	Existing fossil generation sites are staffed with personnel with a good understanding of the operation and maintenance of generation assets.
Rail Access	Access to nearby rail lowers the cost of turbine and transformer delivery.
Land Availability	Existing generation sites have space constraints due to on-going operations.
Projected Retirement Dates	Coal-fired facility retirement dates projected in the 2022 Carbon Plan and recently filed 2023-2024 Carbon Plan and Integrated Resource Plan affect the transmission capacity available to meet the 2028-2029 timeframe.

[1] Carbon Plan Order at 79.

1.3.2 Siting Results

DEP considered all its generation sites with planned unit retirement dates that aligned with planning need for new combined-cycle gas generation in the 2028-2029 timeframe. Existing generation sites with planned unit retirement dates were considered (as opposed to greenfield locations) because the study process and the construction of new infrastructure—especially transmission facilities—necessary to support a new CCGT at a greenfield location would have prolonged deployment of the unit beyond the identified planning need. Listed below are the primary sites identified, based upon the criteria described in Table 1.3.1-1.

- Roxboro Units (Person County, NC)
- Mayo Unit 1 (Person County, NC)

1.3.3 Recommendation

The Roxboro Plant location had the most positive attributes of all sites evaluated. DEP initially determined that the targeted retirement date for the Roxboro Plant's Units 1 and 2 most closely aligned with the targeted approximate in-service date of the proposed CCGT. However, in a subsequent assessment of the existing units, it was determined that Unit 2's condition is superior to that of Unit 4 and that Units 1 and 4 were therefore more suitable for retirement. Based on a comprehensive site assessment, DEP found no major obstacles to adding a CCGT unit at the Roxboro Plant, and subsequent detailed field work substantiated the preliminary evaluation. The Roxboro Plant location is also closer to existing natural gas facilities than the Mayo location, which means it will be less costly to install natural gas facilities necessary to deliver gas to the Roxboro location than the Mayo location.

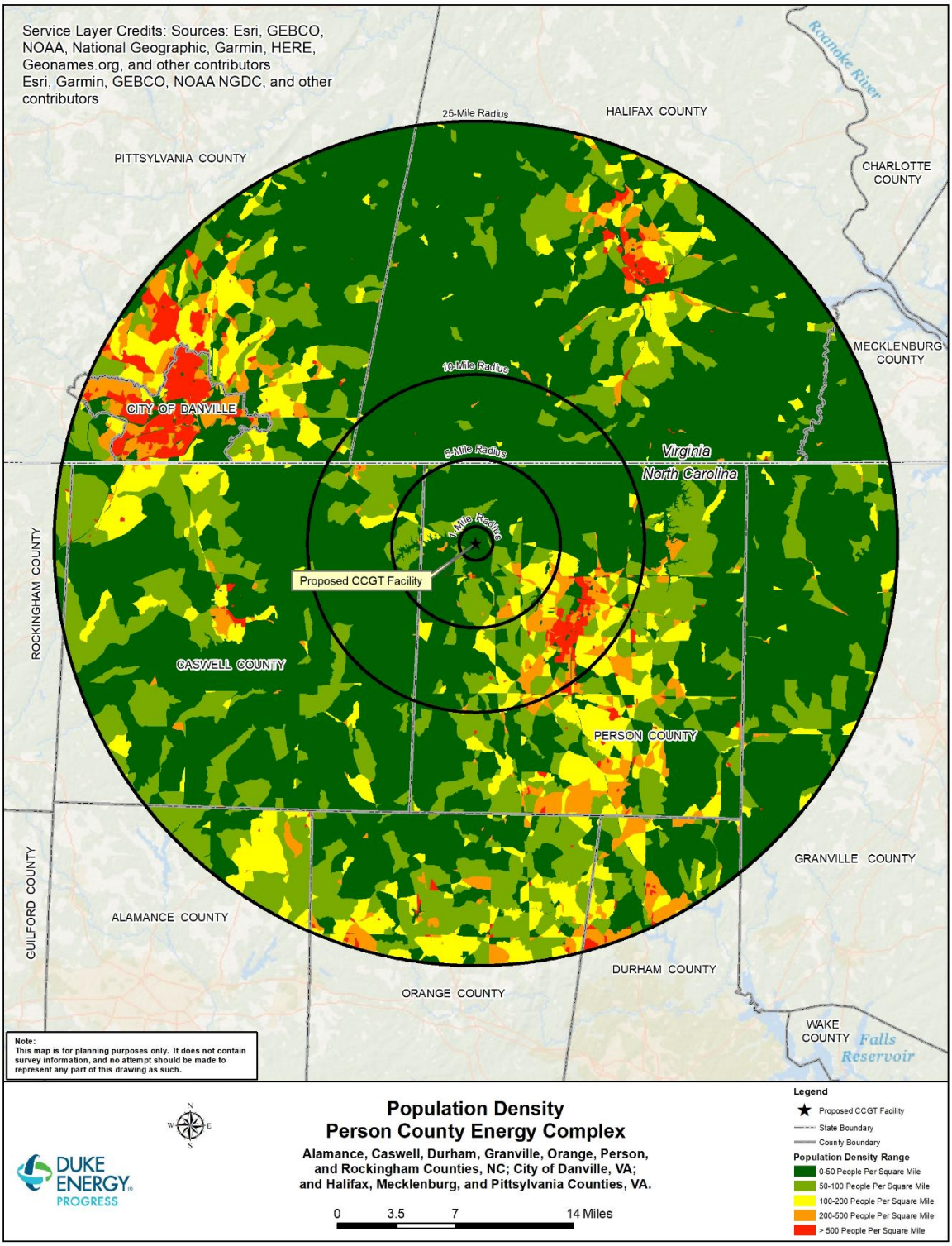
1.4 Site Characteristics

1.4.1 Local Population

According to the U.S. Census Bureau ("USCB"), Person County's April 1, 2020, population was 39,097 (UCSB 2020b); and Roxboro, the county seat, had 8,134 inhabitants (USCB 2020c). The closest city to the Roxboro Plant is Danville, Virginia ("VA"), which has a population of 42,590 (USCB 2020a). Roxboro is the only municipality in Person County.

Within a 25-mile radius of the Proposed Facility, the population is about 182,300 (USCB 2020d). Figure 1.4.1 shows population density in proximity to the Proposed Facility.

Figure 1.4.1. Population Density



Map Sources: Esri, U.S. Dept. of Commerce, U.S. Census Bureau, DOC, NOAA, National Ocean Service, National Geodetic Survey, US 2020 Census Redistricting Blocks (P.L. 94-171).

1.4.2 Area Development

1.4.2.1 Existing

The area of Person County surrounding the PCEC is predominantly rural, with single-family neighborhoods clustered around 3,750-acre Hyco Lake.

There are a few areas dedicated to recreation in proximity to the PCEC. About two miles west, Hyco Lake Park and Campground offers six boat ramps, nature trails, picnic shelters, a natural learning area, a Kraken disc-golf course, primitive and RV campsites, and a few small cottages.

Using field reconnaissance, digital data from Person County, and desktop analysis (which utilizes current aerial photography along with county tax parcel and other digital data), Pike located approximately 430 single-family residences, two churches, three cemeteries, one school, and three communication towers within two miles of the PCEC.

DEP considered various environmental justice aspects of the location of the PCEC and undertook a variety of actions to engage with the community and to discuss mitigation of community impact. Those actions included, but were not limited to, using a three-mile proximity screening radius (notwithstanding that a one-mile radius is standard) and confirming that no areas of subsidized housing were located within that radius. DEP representatives also communicated and engaged with representatives for the Person County Commission, the Person County Economic Development Committee, Piedmont Community College, and residents along Dunnaway Road and near Shore Drive. DEP also considered certain non-DEP projects and activities that could create cumulative impacts to the community and identified known areas, structures, and features of significance to the surrounding community. Through these efforts, DEP did not identify anything that would indicate construction and operation of the PCEC at the site of the existing Roxboro Steam Plant would be problematic from an environmental justice perspective.

1.4.2.2 Future

A DEP representative met with Person County's Planning Director on April 14, 2023, to discuss area development within five miles of the PCEC. The Peninsula at Hyco Lake, approved by the Person County Commissioners in 2018, includes 192 lots on more than 440 acres and 3.5 miles of shoreline (The Peninsula 2017). Phase 1 (with 168 residential lots) has an entry road underway, but there is no specific information available on lot construction (Appendix D). Person County representatives were not aware of any development plans by federal entities.

The PCEC is consistent with the land-use policy goals of Person County and the City of Roxboro. In November 2021, Person County and the City of Roxboro adopted a Joint Comprehensive Land Use Plan ("Plan")—the result of a year-long process involving City and County staff and a steering committee with equal representation from both jurisdictions. The public was invited to participate early in the process by completing a community survey and attending (in person or online) three public meetings to discuss topic areas important to developing the Plan: Economic Development, Agriculture and Natural Resources, and Growth and Development (Person County & City of Roxboro 2021).

After reviewing background research and survey results, the Steering Committee developed four guiding principles for the draft vision of future growth and development in Person County and Roxboro. Using those guiding principles, the Committee drafted a future land use map and implementation strategies. In May of 2021, the public was presented an opportunity to review and comment on the draft guiding principles, future land use map, and implementation strategies during a public meeting. The Steering Committee's final draft of the Plan was approved by the County Board of Commissioners and the Roxboro City Council in November 2021 (Person & Roxboro 2021).

Each guiding principle set forth in the Plan is broken out into several granular "objectives." The Plan contains a detailed discussion regarding how each objective will be achieved. Guiding Principle 2 of the Plan is titled "Facilitating Sustainable Economic Growth," and it is broken out into nine objectives. Objective number 8 is titled "[s]upport the reuse and repurposing of the County's major energy infrastructure sites." The Plan's detailed discussion related to this objective is as follows:

> For many years, a significant portion of the local employment base has been centered on energy production, with major coal-fired power plants located on Hyco Lake and Mayo Lake. These assets not only provided employment opportunities for residents and contributed to the local tax base, but also provided a source of reliable and redundant energy supply for major

> industrial users in the community. It is anticipated that, as the energy industry continues its transition away from coal, these two major power production sites could be taken off-line in the foreseeable future. The City and County should work to advocate for the reuse of one or both of these sites to be redeveloped with a new energy generating plant to both take advantage of the required water resources that exist, as well as to provide a reliable local energy source to help support industrial development in the community.

Construction of the Proposed Facility fits squarely within this objective articulated by Person County and the City of Roxboro.

1.4.3 Visual and Auditory

1.4.3.1 Visual

The degree of visual impact that the Proposed 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 area surrounding the Proposed Facility are typical of those within the Southern Piedmont Physiographic Province, primarily consisting of rolling to hilly terrain. Opportunities for scenic vistas are somewhat limited because there are only a few topographical high points, upon which there are agricultural fields and pastureland (allowing for moderately distant views). These are found generally along Highway 57/Semora Road (which runs southeast to northwest and crosses Hyco Lake) and McGhees Mill Road (which travels southeast to northeast and also crosses Hyco Lake).

Hyco Lake probably offers the most scenic vistas in the area surrounding the Proposed Facility (i.e., for boaters) because of its size and length. The overall project area for the Proposed Facility is largely forested in its southwestern and northeastern quadrants and those quadrants therefore do not offer many opportunities for scenic vistas.

The area surrounding the Proposed Facility is mostly forested with some agriculture and pastureland and scattered rural residences. It generally lacks a great deal of diversity in land use, with the major exceptions being the Roxboro Plant, CertainTeed Gypsum's plant (highly developed), and residential subdivisions near Hyco Lake. Historic resources, such as plantation

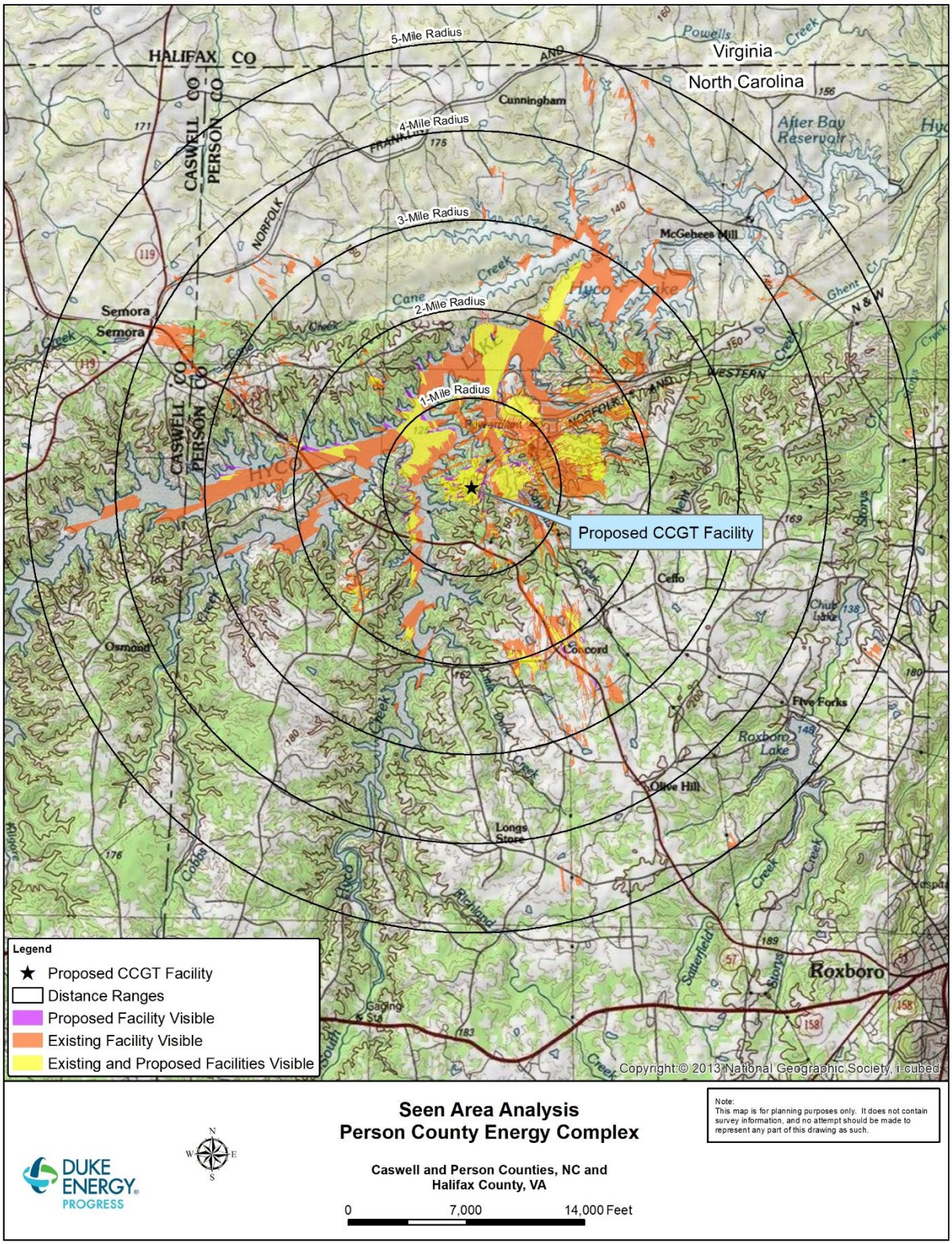
homes and historic markers, can be discovered along rural tree-lined roads that are intermixed with occasional pockets of pasture.

During a probable visual effects field study, Pike identified existing residential properties and public roadways as resources with the potential to be most affected by views of the Proposed Facility.

Figure 1.4.3.1-1 shows areas within five miles of the Proposed Facility that have views of the existing Roxboro Plant stacks only, areas with a view of the Proposed Facility only, and areas predicted to have views of both.

Table 1.4.3.1 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 Proposed Facility (78.54 square miles), the Proposed Facility will be visible in areas totaling only 0.98 square miles (1.25% of the total area) outside the DEP-owned property on which the Proposed Facility will be built and which is generally inaccessible to the public. Pike further predicts that outside of DEP-owned property, the Proposed Facility will be visible from only 0.10 square miles that do not already have a view of the Roxboro Plant (0.13% of the total area). Most of the areas that will have a view of the Proposed Facility are located along the edge of Hyco Lake.

Figure 1.4.3.1-1. Seen Area Analysis



Map Sources: Map Courtesy of the U.S. Geological Survey; Pike Field Reconnaissance 2023, USGS NED 2023, USDA Orthoimagery 2022

Table 1.4.3.1. 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	0.01	0.00	0.00	0.00%
High	0.5 - 1.0	2.36	0.29	0.02	0.22	0.85%
Moderate-High	1.0 - 1.5	3.93	0.61	0.02	0.16	0.51%
Moderate	1.5 - 2.0	5.50	0.77	0.03	0.32	0.55%
Low-Moderate	2.0 - 3.0	15.71	0.87	0.03	0.18	0.19%
Low	3.0 - 4.0	21.99	0.62	0.00	0.00	0.00%
Very Low	4.0 - 5.0	28.27	0.22	0.00	0.00	0.00%
Totals	**Totals**	**78.54**	**3.39**	**0.10**	**0.88**	**0.13%**

[1] Visibility not calculated within DEP-owned property.
[2] Areas with additional visual effects are those without a previous view of the existing Roxboro Plant.

***Very High*:** Plant element(s) will dominate the view because of proximity to the viewpoint 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 viewpoint 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 building the Proposed Facility will be influenced by several factors, including the following:

- The distance between the viewer and the Proposed Facility
- The elements of the Proposed 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.

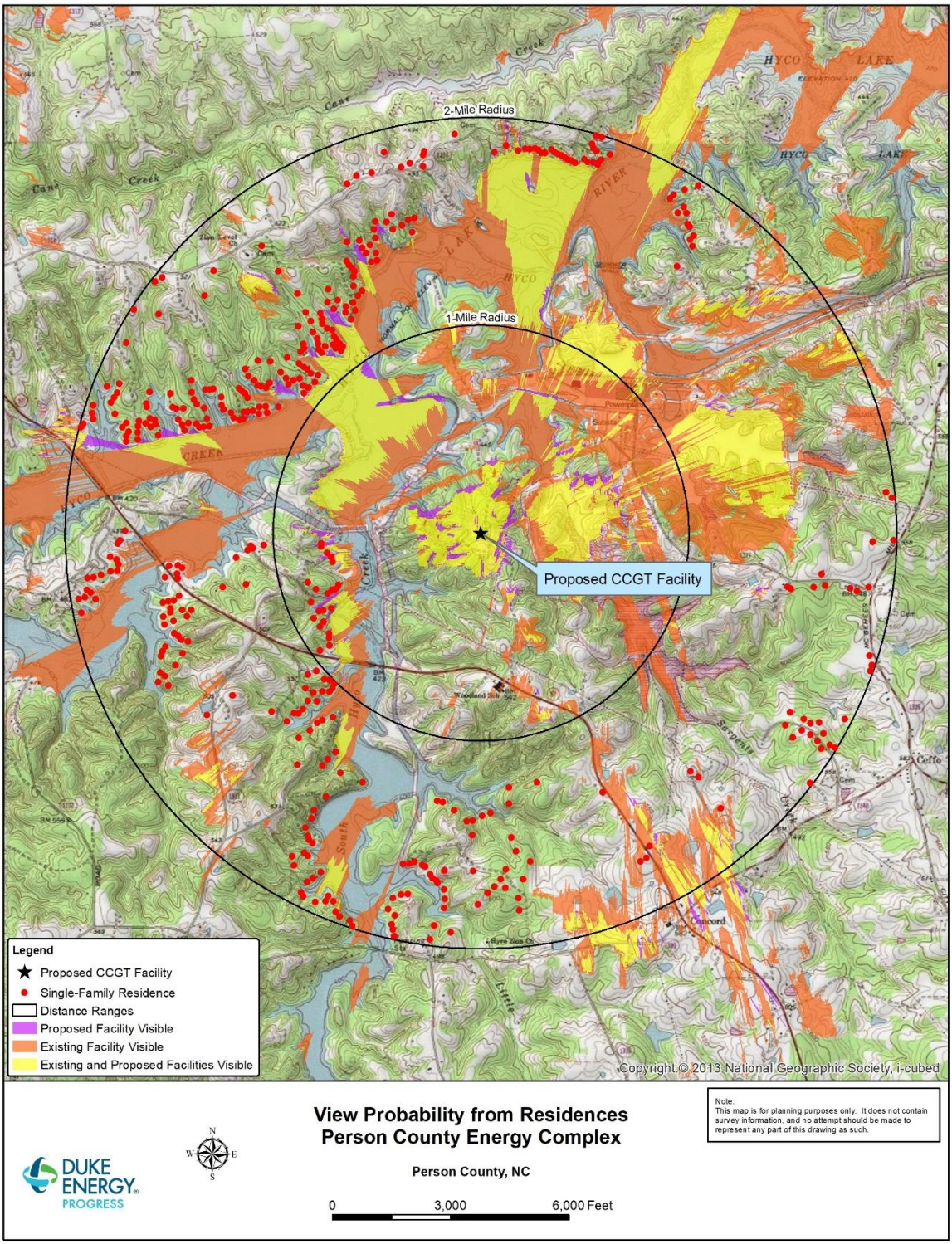
Pike correlated the data derived from the Seen Area Analysis and Predicted Visual Effects to probable visual effects ranging from Very High to Very Low in Table 1.4.3.1.

Using the distance from the viewer to the Proposed Facility, Pike ranked the visual effects that the Proposed Facility may cause. The ranking represents a worst-case scenario; Pike 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, Pike made no attempts to mitigate (1) predicted view ranking based on existing modifications to natural landscape settings; or (2) 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 Proposed Facility's stack (the tallest structure) could be seen from half a mile away, the view effect was ranked as Very High.

Visibility from Residences

Pike conducted an extensive field investigation to determine the Proposed Facility's probable visual effects on residential properties within visual proximity. Initial investigations showed that some residential areas along Hyco Lake will have potential views of the Proposed Facility. More specifically, approximately 64 residences on the edge of the lake that are to the north, west, and southwest of the Proposed Facility will have potential views of the Proposed Facility. Pike determined that a combination of vegetation and terrain sufficiently screened other surrounding areas from the PCEC.

Figure 1.4.3.1-2. View Probability from Residences

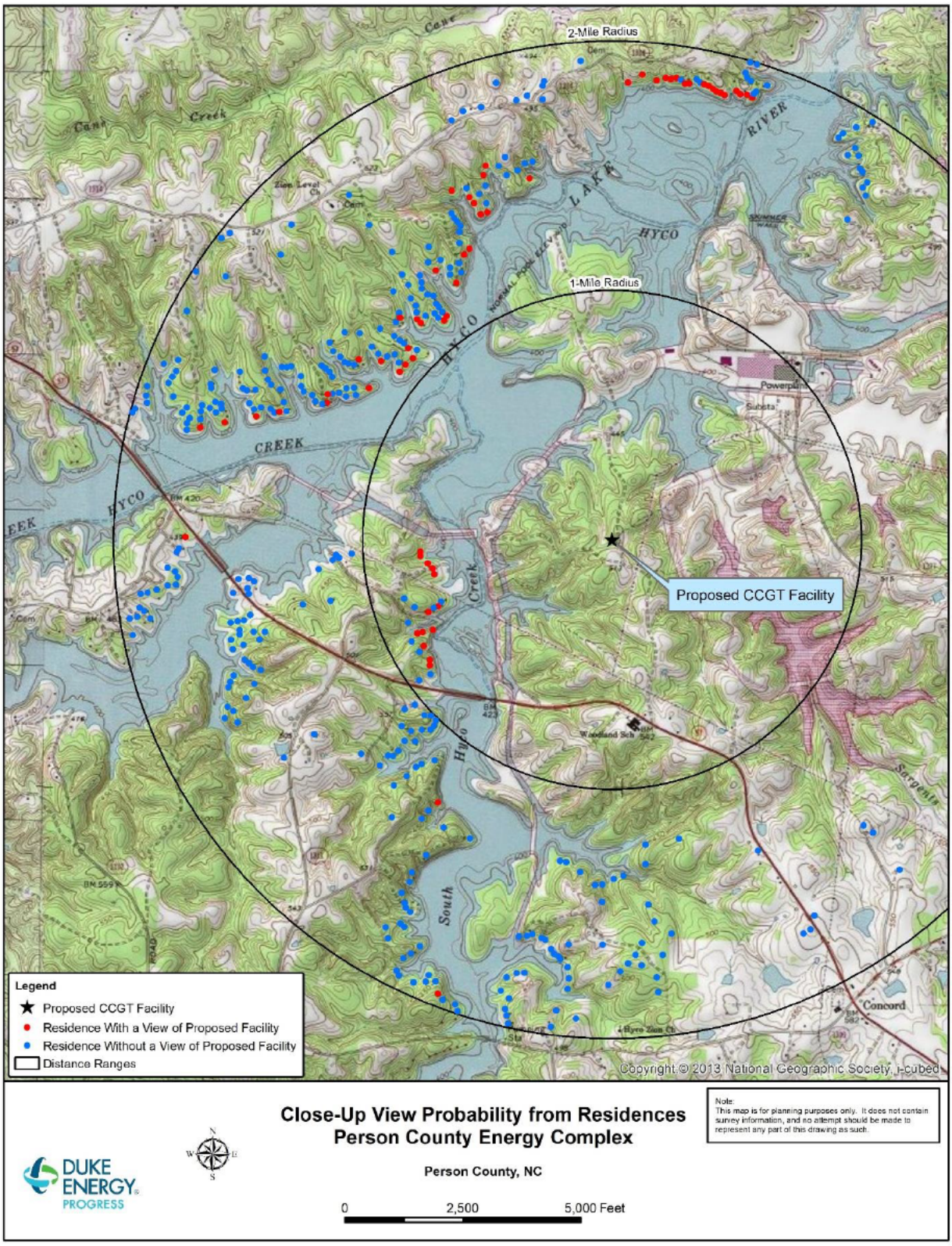


Map Sources: Courtesy of the USGS; Pike Field Reconnaissance 2023, USGS NED 2023, USDA Orthoimagery 2022

The residences noted in Figure 1.4.3.1-2 may have a slight view of the tallest parts of the Proposed Facility (e.g., the exhaust stack and turbine building) on the horizon because there are no significant visual obstructions (e.g., tree cover) between those residences and the Proposed Facility (Figure 1.4.3.1-2). Nevertheless, the visual quality of the area should not be negatively impacted because the distances between the Proposed Facility and the closest residences (between 0.7 and 2 miles) will render the stacks visually inferior to the surrounding environment, which already includes some views of the Roxboro Plant's stacks and electrical transmission lines.

In the Close-Up of View Probability from Residences in Figure 1.4.3.1-3, the red dots represent residences that will have a potential view of the proposed addition or a view of the existing plant plus the proposed addition. The cyan dots represent residences that do not currently have a view of the Roxboro Plant and that will not have a view of the Proposed Facility.

Figure 1.4.3.1-3. Close-Up View Probability from Residences



Map Source: Pike Field Reconnaissance 2023, USGS NED 2023, USDA Orthoimagery 2022

Visibility from Public Roads

The Roxboro Plant property is surrounded by three arterial or collector roads, including Semora Road (NC 57) to the southeast, Concord-Ceffo Road to the south, and McGhees Mill Road to the east. Zion Level Church Road runs north of the plant and Hyco Lake and serves multiple residential developments on the north shore of the lake.

Only three primary roadways within the area will have a potential view of the Proposed Facility from any portion of the road. Semora Road is one of those roadways; and Concord Church Road and Concord-Ceffo Road may each have views near their intersections with Semora Road, approximately 2 miles from the proposed plant. Wagstaff Road, a secondary road, will have a potential brief view from a location more than 1.5 miles to the southwest of the Proposed Facility. Several residential streets on the north side of Hyco Lake (Bolton Road, Rainey Bridge Road, Phifer Lane, Coon Ridge Trail, and Pine Borough East Road) may have limited views of the Proposed Facility. Daisy Thompson Road serves three houses; its potential view is from almost 2 miles south of the Proposed Facility. State Road 1316 serves as access to the CertainTeed Gypsum plant, which is just north and adjacent to the Roxboro Plant. This road will have several limited views of the Proposed Facility in addition to its views of the Roxboro Plant. In all the cases discussed in this paragraph, any views of the tallest parts of the Proposed Facility's stacks and turbine building will be slight because of distance and evident only momentarily to passing motorists, if at all.

1.4.3.2 Auditory

The U.S. Occupational Safety and Health Administration ("OSHA") defines noise as follows:

> Noise and vibration are both fluctuations in the pressure of air (or other media) which affect the human body. Vibrations that are detected by the human ear are classified as sound. We use the term 'noise' to indicate unwanted sound (OSHA 2023).

Sound pressure levels are measured by sound level meters (receptors or monitors) 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. The background noise in a quiet classroom or worship space would be about 30-35 dBA, whereas a normal conversation level would be about 60 dBA from three feet away. An outdoor condensing fan about 20 feet away could be 50-55 dBA, but a loud siren might be 120 dBA at closer distances (Yale 2023).

Sound levels in most non-urban North Carolina residential communities are in the range of 40-50 dBA. Rural residential communities can be below 40 dBA, especially in less densely populated areas; urban settings are often above 50dBA, especially near highways.

Each change of 10 dB indicates that ten times as much sound is present, and doubling sound energy causes an increase of 3 dB. A 3-dB change in sound level means twice (or half) as much sound energy, but to the human ear, this is barely noticeable unless the frequency content or duration changes. A person perceives a 10 dB-change in sound level as twice as loud.

Sound levels are significantly reduced on sunny afternoons, when air near the ground is warmer than air higher in the sky, and the sound curves upward. Generally, the loudest time for sound beyond the first few hundred feet is at sunset until an hour or so after sunrise. Sound levels can be significantly reduced upwind from a source and increase downwind from a source. Trees can provide limited sound reductions over distances of about 300 feet, depending on the season and the density of trees. Over short distances, trees do not provide significant acoustical absorption.

Noise impacts on a community are evaluated by quantifying the existing noise levels and comparing them with the noise levels that would be caused by a proposed noise source, type of noise (speech, music, tonal), time of day, and many other factors. Where noise from a proposed source does not add more than 3 or 4 dB, the impact will not be clearly noticeable. Increases (greater than 5 dBA) over existing noise levels are considered significant impacts.

1.4.3.2.1 Existing Community Noise Levels

Stewart Acoustical Consultants measured sounds at strategic points (using noise-sensitive receptors) to document existing noise levels along the perimeter of the Roxboro Plant (Figure 1.4.3.2.1). These points were at residences north of the Proposed Facility on Rock Point Drive and Beaver Dam Road; a residence west of the Proposed Facility on Warren Lane (the closest site to the future facility); Woodland Elementary School, south of the site on Highway 57; and two points near the CertainTeed Gypsum plant on Roy Carver Road, just north of the CertainTeed plant. Long-term noise monitors were placed on Roxboro Plant Road, west of the Proposed Facility, and at the north end of the coal train loop.

Figure 1.4.3.2.1. Noise-Sensitive Receptor and Long-Term Noise Monitor Locations

Map Source: Stewart Acoustical Consulting (Appendix A)

Ambient daytime noise levels at Monitor 1 were heavily influenced by traffic on Roxboro Plant Road. Maximum vehicular sound levels from Highway 57 reached 75 dBA, with noise quickly rising with a vehicle's approach and subsiding once the vehicle had passed; power boat engine noise was almost 65 dBA but persisted longer than the noise of vehicles. Noise levels of birds chirping were in the 55-60 dBA range, which persisted longer than those of passing vehicles.

The primary noise for Monitor 2 was train coupling, with sound levels up to 75 dBA. Other noises from this site were the clanking of dozer and front-end-loader tracks and backup alarms (up to 56 dBA). Night noise levels did not differ significantly from those during the day. Noises that were unrelated to Roxboro Plant were aircraft (up to 62 dBA), road vehicles (57-64 dBA), and birds.

1.4.3.2.2 Estimated Sound Levels of the PCEC

Sound power levels are a measure of how much sound energy is being radiated per second into the air, similar to how watts measure electricity in a light bulb. With light, the brightness of the light source depends largely on how far the light source is from the receiving location, 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 similarly 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 to that of a proposed source.

To estimate future sound levels for the PCEC, Stewart created a SoundPLAN computer model using sound information of anticipated similar combustion turbines as well as field measurements of the existing coal-fired units. The results varied by location, but no sound levels were more than 55 dBA at any adjoining property lines with all the PCEC's generating units (gas- and coal-fired) operating. Sound level increases to the closest neighbors were just 3.9 dBA when compared to similar full-power generation levels with coal-car shaker noise (existing versus future), and Stewart deemed them to be not clearly noticeable.

Table 1.4.3.2.2. Receptor Noise Levels for Measured, Existing, and Future Maximum Capacity

ID	Location	Measured L_{Aeq*}	Existing Max Steam + Shaker SoundPLAN L_{Aeq*}	Future Max Steam + Shaker +CT SoundPLAN L_{Aeq+}	Increase
1	South Point Trail	41.8	46.5	44.3	No
2	Beaver Dam Road	44.1	45.5	44.5	No
3	Warren Lane	34.8	43.2	47.1	3.9 dBA
4	Woodland Elementary School	58.5	42.7	47.7	No, because of existing traffic on Hwy 57
5	CertainTeed Plant	59.5	57.2	54.9	No
2	Beaver Dam Road	42.1	45.5	44.5	No
3	Warren Lane	38.1	43.2	47.1	3.9 dBA

*Equivalent Continuous Level (a measure of the average sound energy over a given time)

1.4.3.2.3 Anticipated Effects

Residences on Warren Lane, directly west of the Proposed Facility, will be the homes most affected by increased sound levels. However, the anticipated sound level increases at these residences will be only 3.9 dBA more than the Roxboro Plant's current full-power generation

levels with coal-car shaker noise. When the PCEC operates at a power output lower than its full capacity, the sound levels will be lower.

The PCEC will result in higher sound levels at Woodland Elementary School, businesses Pointer & Associates and West & Woodall Real Estate, and the residence at 100 Spinnaker Lane. However, because they are all close to Highway 57, which produces significant vehicle noise, they will not experience a large overall increase in their total environmental noise.

Locations north and east of the Roxboro Plant will experience a noise decrease once Units 1 and 4 are permanently retired. The environmental noise at the CertainTeed plant will be 2.3 dB lower, and the residence on South Point Trail will experience a 2.2 dB noise decrease when Units 1 and 4 have been retired.

Beaver Dam Road residences will experience no noise increase from the PCEC. As expected, locations north and east of the existing plant will experience a noise reduction when the CCGT begins operating and Units 1 and 4 have been retired, and locations west and south of the PCEC will experience a noise increase. The highest expected sound level increase at adjoining properties would be 3.9 dBA, which would not be clearly noticeable.

For more detailed information on sound levels and potential impacts, including more figures, tables, and graphs, see Appendix A.

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 (U.S. Department of Agriculture ("USDA") 2015, U.S. Department of the Interior 1983). Section 106 of the NHPA, 16 United States Code 470, requires federal agencies to consider the effects of their undertakings on properties listed in or eligible for listing on the NRHP. Such undertakings can include issuing Certificates or Authorizations.

Environmental Resource Management

DEP contracted with ERM for a Phase 1 survey to identify historic architectural resources that might be affected by the PCEC. ERM evaluated the Area of Potential Effects ("APE")—a

107.22-acre area surrounding the Proposed Facility—plus a potential viewshed area with a 0.5-mile-radius from the Proposed Facility (assuming that any proposed aboveground construction will be less than 200 feet high). From January 10 through 12, 2023, ERM conducted an architectural literature review and windshield reconnaissance for the Proposed Facility.

Brockington and Associates

Pike contracted with Brockington to conduct a literature review and windshield reconnaissance using a larger APE within a two-mile radius of the Proposed Facility. The assumption of a maximum structure height for the new facility remained 200 feet. Brockington's windshield reconnaissance took place on March 27 and March 28, 2023.

Both surveys were due-diligence efforts to ensure that any potentially significant cultural resources would be considered in siting the Proposed Facility. This effort does not constitute fulfilment of more intensive studies that would be required under Section 106 of the NHPA, should that law become applicable for this project.

1.4.4.1 Architectural Resources

Before beginning fieldwork, ERM and Brockington each reviewed all previously recorded above-ground resources on file through HPOWEB, the North Carolina State Historic Preservation Office's "(NCSHPO") repository of recorded architectural property data. This data includes NRHP-listed properties, resources recorded during Section 106 investigations, determinations of eligibility, properties placed on the state Study List for further research, and resources recorded through surveys for counties and municipalities.

No surveys of historic resources within the search area had been previously conducted, but both researchers discovered that one historic resource within a half-mile of the Proposed Facility's footprint was recorded and listed on the NRHP (Figure 1.4.4.1-1).

The House on Wagstaff Farm, an early nineteenth-century hall-and-parlor one-story dwelling, has a side-gabled, 5-V agricultural metal roof, fieldstone foundation, and exterior rubble stone chimneys with brick stacks on the west and east elevations. It is on the northeast side of NC Route 57/Semora Road, about 0.5 miles southeast of the Proposed Facility's footprint. It was listed on the NRHP in 2006 under Criterion C because, the historian wrote, it "conveys to a remarkable degree its original construction, plan, and details of transitional Georgian-Federal styling" and "retains its agrarian rural setting." (Appendix B-2, ERM Phase 1 Architectural Survey 2023).

Figure 1.4.4.1-1: The House on Wagstaff Farm

Brockington's larger APE yielded another extant NRHP-listed architectural resource—Burleigh, the McGehee-Phifer Plantation, an early nineteenth-century, late Georgian vernacular residential farm associated with Federal and Greek Revival architecture (Figure 1.4.4.1-2). Brockington's associates were only able to view the house from a distance.

Figure 1.4.4.1-2: Burleigh/McGehee-Phifer Plantation

Photo Source: Brockington Associates (Appendix B-1)

Table 1.4.4.1-1 lists previously recorded architectural resources within two miles of the Proposed Facility, including three identified as part of the ERM Reconnaissance.

Table 1.4.4.1-1. Previously Recorded Architectural Resources in the Study Area

Name	Description	Identification/ Year	Reconnaissance Notes	Reconnaissance NRHP Assessment
Burleigh/McGehee-Phifer Plantation	Early 19th century late-Georgian house	NRHP Listed 1980	Extant	NRHP Listed
House on Dunnaway Road	Two-story Greek Revival	N/A	Not Extant	N/A
Wagstaff Barn	Early 19th century barn	N/A	Extant	Potentially Eligible
House on Wagstaff Farm	c.1890, Early 19th century Georgian, single-pile frame house	NRHP Listed 2006	Extant	NRHP Listed
Woodland Elementary School	c. 1930	Ineligible (NCSHPO determination pending)	Extant	Ineligible
House	c.1966, Ranch dwelling	Ineligible (NCSHPO determination pending)	Extant	Ineligible
House	c.1969, Ranch dwelling	Ineligible (NCSHPO determination pending)	Extant	Ineligible

Table 1.4.4.1-2 lists new potentially eligible architectural resources identified as part of the Brockington reconnaissance.

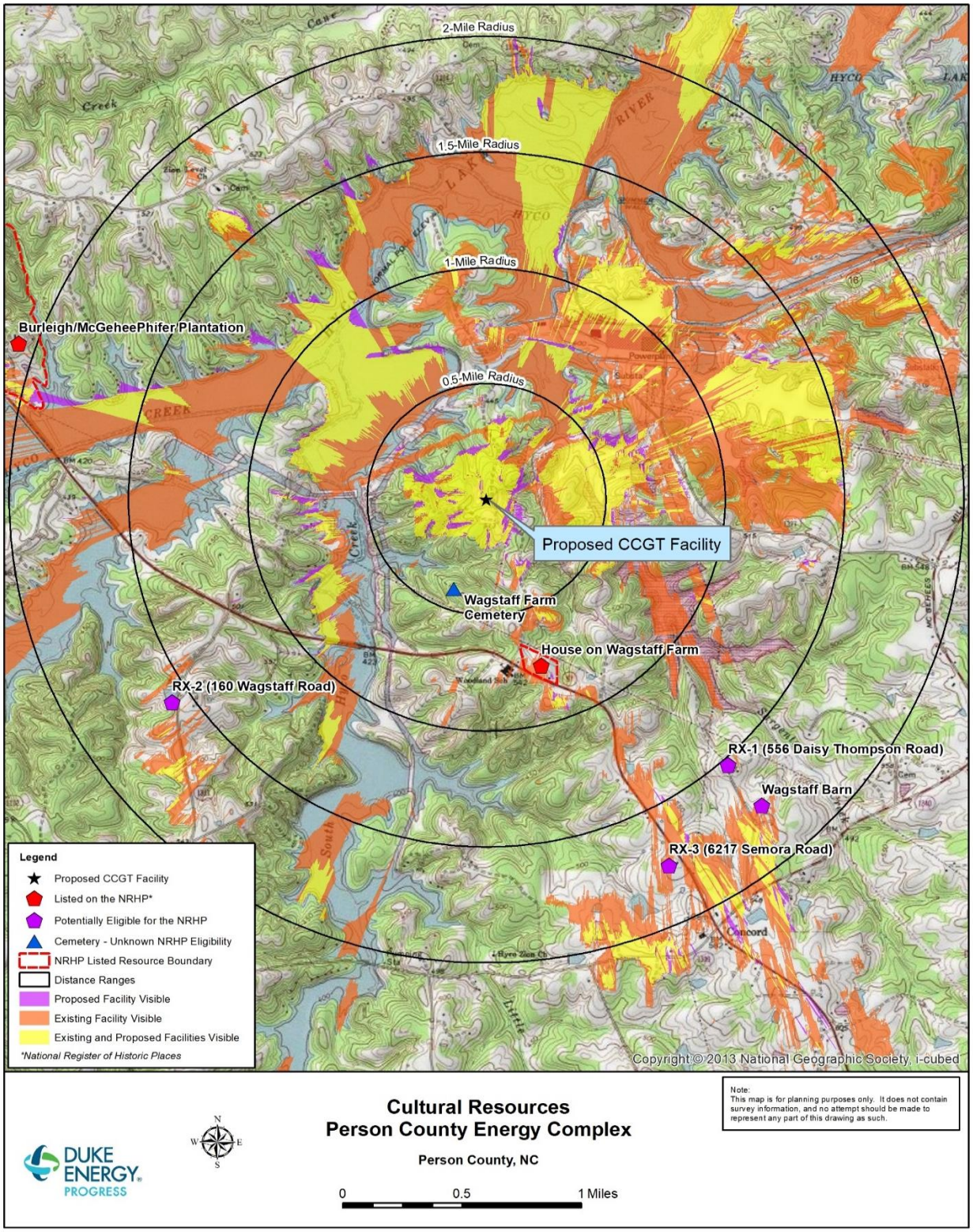
Table 1.4.4.1-2. Potentially Eligible Architectural Resources Identified in 2023 Reconnaissance

Site ID	Location	Description	Reconnaissance NRHP Assessment
RX-1	556 Daisy Thompson Road	c. 1910 Two-Story Pyramidal Farmhouse	Potentially Eligible
RX-2	160 Wagstaff Road	19th Century Single-Story Log cabin	Potentially Eligible
RX-3	6217 Semora Road	c. 1910 Two-Story Farmhouse	Potentially Eligible

Figure 1.4.4.1-3 shows the locations of previously listed NRHP-listed, -eligible, and potentially eligible architectural resources as well as the Wagstaff Farm Cemetery identified in the

ERM and Brockington surveys. Photographs of the architectural resources can be viewed in Appendices B-1 and B-2.

Figure 1.4.4.1-3. Visibility from Cultural Resources



Map Sources: Courtesy of the USGS; USGS NED 2023, USDA Orthoimagery 2022; Brockington and Associates 2023, ERM 2023

1.4.4.2 Archaeological Resources

To understand the effects of history, geology, soils, and climate on types, locations, and conditions of archaeological resources, see Appendix B-3 (Phase 1 Archaeological Survey, Duke Roxboro Plant) and Appendix B-4 (Examination and Delineation of a Previously Unrecorded Suspected Cemetery on the Roxboro Plant Property).

In late 2022 workers searching for potential borrow-area sites came upon a location approximately 0.4 miles south of the Proposed Facility with several upright native fieldstones arranged in conspicuous rows. They reported the discovery and DEP subsequently contracted with ERM to examine and delineate the area for a possible cemetery. DEP did this to ensure compliance with North Carolina Gen. Stat. §§ 14–148 and 14-149, which generally prohibit defacing or desecrating human grave sites.

ERM consulted multiple online cemetery databases but found no record of a cemetery in this location. Historic maps and aerial photographs from the United States Post Office ("USPO"), the USDA, the United States Geological Survey ("USGS") and NETRonline (a search engine for environmental and property data, public records, and historic aerials) also did not contain a record of a cemetery in this location. A 1938 Person County highway map (North Carolina State Highway and Public Works Commission 1938) does show a cemetery on the north side of what is now Semora Road, across from the current Woodland Elementary School. The cemetery is not associated with a church. None of the available maps show residences near the cemetery.

The part of Semora Road west of Woodland School was constructed sometime between 1928 and 1938. Before that, a road ran north from Concord Church to Woodland School and then continued north to a dead end at Hyco Creek. On both a 1919 rural delivery map (USPO 1919) and a 1928 soil map (USDA 1928), two structures are shown across Semora Road from where Woodland School is now.

The cemetery could be associated with the NRHP-listed House on Wagstaff Farm (see previous Section 1.4.4.1, Architectural Resources). According to Wagstaff family descendants, no family ancestors were known to reside in the House (Phillips 2005). It may have been occupied by tenants for extended periods of time—tenants who would probably have needed a family burial place. Person County had a large African American population (42% in 1900); it is therefore possible that the House could have been associated with the African American community, which commonly used uninscribed markers.

ERM archaeologists conducted field investigations at the site on December 6 and 7, 2022. After mapping the two rows of suspected markers, which were aligned generally east-west, ERM used a blunt-tipped metal probe to penetrate the soil around the markers and then passed a metal detector over each suspected grave site and around the cemetery site area. Results of the systematic probing were inconclusive, but metal detectors revealed a possible border of scattered ferrous metal around the stone markers.

ERM requested a North Carolina state cultural resources trinomial number for the cemetery, and the Office of State Archaeology ("OSA") issued a number for what is now called the Wagstaff Farm Cemetery. ERM believes that the cemetery likely contains human interments and should be protected and avoided, if possible. For more information about this resource, see Appendix B-4.

DEP also contracted with ERM for a Phase 1 survey to identify historic archaeological resources that might be affected by the PCEC.

On January 3, 2023, ERM staff conducted a desktop review of the North Carolina OSA database for information about any previously known surveys, archaeological sites, and cemeteries within one mile of the Proposed Facility. They discovered that, although two archaeological sites with prehistoric and historic artifact scatter within the one-mile buffer area had been recorded, their eligibility for NRHP had not been evaluated; and they were eventually inundated by the creation of Hyco Lake.

Subsequently, ERM conducted archaeological investigations of the area from January 10 through January 12 of 2023. The site is partially forested with high, large ridges that are narrow and long. The east half of the area had been previously cleared for construction of multiple drainage control ponds. Some of the area had been recently cleared and graded, and mounds of dirt had been brought in for construction activities.

ERM scientists were able to perform 182 shovel tests in the area, but they also documented

187 "no dig" locations (mostly because of the area's steep topography, but also because of standing water and saturated soils in much of the previously cleared areas). However, ERM did discover an isolated prehistoric lithic artifact on a high ridgetop about 0.25 miles east of an ephemeral drainage that flows into Hyco Lake. No artifact was found on the surface; one prehistoric primary flake was found 0-10 centimeters below surface. Its raw material is Wolf Den Mountain Rhyolite, common throughout the piedmont of the Carolinas. No features or fire-cracked rock were noted.

The artifact has no discernable cultural period association and was found within the upper deflated stratum; site delineation suggests that cultural remains are limited and have probably eroded off the landform. For these reasons, ERM recommends that the site is not NRHP-eligible and no further archaeological work is needed. Moreover, according to Pike's visibility analyses, the Wagstaff Farm Cemetery will have no view of the Proposed Facility.

1.4.5 Geology

The study area for the geological assessment is a 28-acre site southwest of the Roxboro Plant and approximately 0.16 miles west of Hyco Lake (where the Proposed Facility will be constructed). The study area is immediately adjacent to DEP's existing 230-kV and 115-kV transmission line rights-of-way, as well as a 22.86/13.2-kV distribution line right-of-way. The study area is located entirely on DEP-owned property.

1.4.5.1 Geology and Geologic History

The eastern United States and North Carolina consist of three major physiographic regions: the Blue Ridge Mountain region, the Piedmont region, and the Coastal Plain region. The PCEC will be in the Piedmont region, which extends from New Jersey to central Alabama and sits between the Atlantic Coastal Plain and the Blue Ridge/Appalachian Mountains. This approximately 80,000-square-mile region is characterized by gently rolling, undulating hills with broad, semi-dissected valleys; and surface relief typically varies from 200 to 1,500 feet above sea level. In North Carolina, the Piedmont occupies about 45% of the area of the state. The study area is centered at approximately 500 feet above 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 (i.e., material eroded from the land) and carbonate (i.e., material formed primarily of calcium carbonate) sediment was deposited, and it later transformed into extensive layers of sedimentary and carbonate rock through lithification.

The first significant mountain-building event (orogeny) occurred around 440-480 MYA, and the early Appalachian Mountain chain began to form. During this and 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, transforming into a series of folded, thrusted crustal sheets.

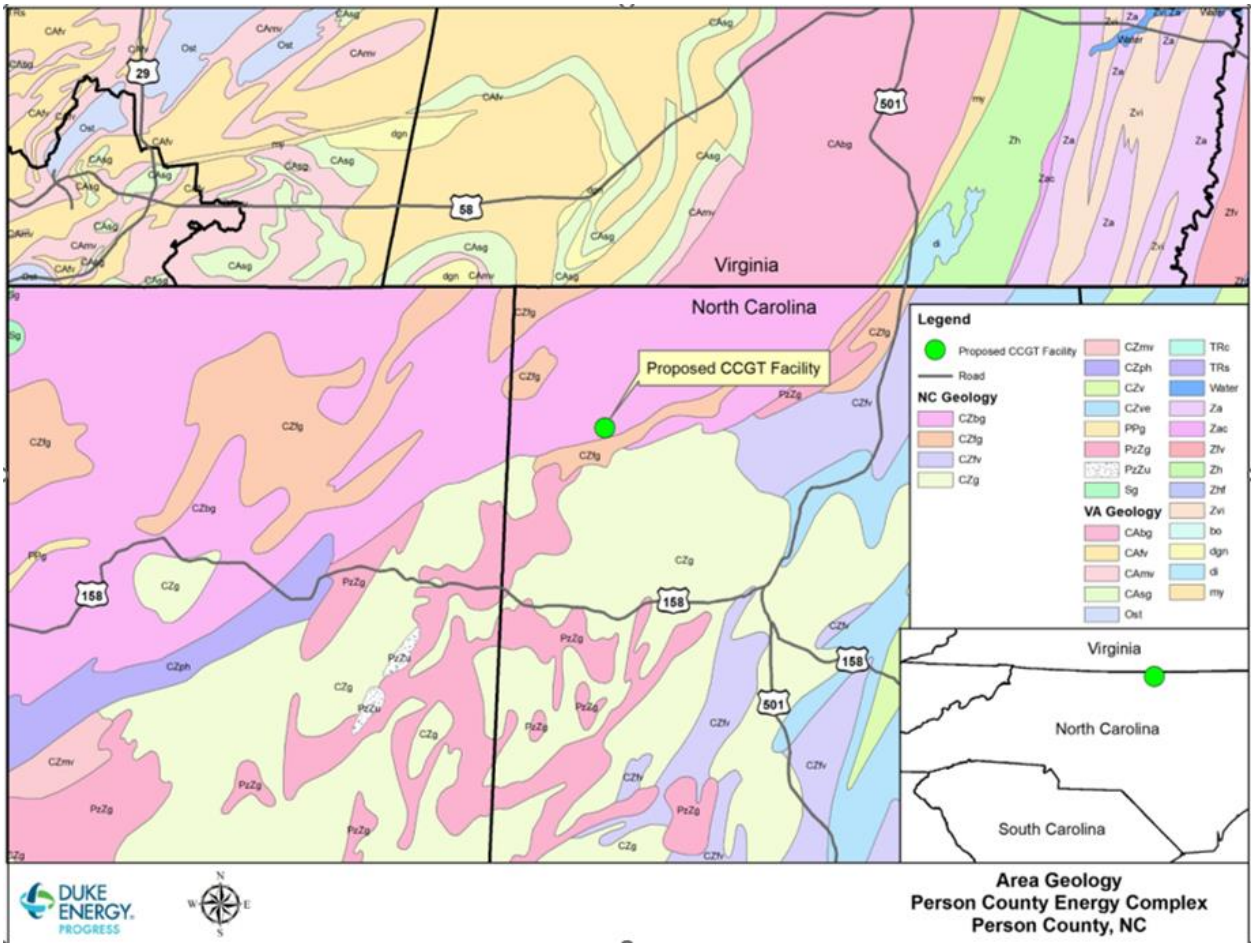
As a result of continental collision, rocks were accreted (i.e., gradually accumulated) onto the present-day North American continent as a patchwork of volcanic islands and fragments of land and former ocean-bottom sediments. This led to the formation of distinct geologic belts, or terranes, that currently trend northeast-southwestward (Hibbard et al. 2002; Secor et al., 1983). The study area is located within the Charlotte and Milton terranes or belts, within the Northern Inner Piedmont zone (Figure 1.4.5.1 (NCDEQ 2023; NCGS 1985)).

The Charlotte and Milton terranes consist of mostly equigranular and megacrystic, abundant biotite gneiss and schist (Cambrian/Late Proterozoic). These metamorphic rocks include gneiss, schist, amphibolite, potassic feldspar and garnet, with small amounts of granite (NCGS 1985). The rocks range in age from about 550 to 650 million years old. They were part of a large chain of ancient volcanic islands that formed off the coast of the ancient continent called Gondwana (NCDEQ 2023).

The Charlotte and Milton terranes of the area surrounding the PCEC are underlain inequigranular potassic feldspar and garnet, interlayered and gradational with calc-silicate rock, sillimanite mica schist, mica schist, and amphibolite (Rock Unit CZbg) (NCDEQ 2023; NCGS 1985). Immediately east of the site, the Charlotte-Milton terranes are underlain by felsic mica gneiss, interlayered with biotite and horneblende gneiss and schist rocks (Rock Unit CZfg) (NCDEQ 2023).

The Carolina Slate Terrane is found just east of the site and to its southeast. It is megacrystic, and well foliated, and locally it contains hornblende. The formation is metamorphosed granitic rock (Rock Unit CZg) (NCDEQ 2023, NCGS 2009).

Figure 1.4.5.1. Area Geology



Map Sources: Area Geology Courtesy of United States Geological Surveys of NC and VA 2023; Esri; TomTom NA, Inc.; i-cubed; County Boundary Sources: Esri; U.S. Dept, of Commerce, Census Bureau; NOAA; National Ocean Service; National Geodetic Survey

1.4.5.2 Dominant Soil Types

As in the majority of the Northern Inner Piedmont, the shallow subsurface material consists of thick saprolite (residual soil) units (15-30 meters) overlaying fractured rock. Saprolite consists mostly of red to brown, clayey subsoils. Based on the soil data (Natural Resource Conservation Service ("NRCS") 2023), the Proposed Facility's foundation material within the shallow subsurface consists primarily of soils within the Siloam soil series (Figure 1.4.5.2). This site has undergone a series of ground disturbances over the last several decades.

The approximately 28-acre study area consists of Siloam loam (SmF), accounting for 63% of the profile, along with Siloam loam (SmB) at 37% of the profile (Figure 1.4.5.2). Siloam loam series are at 2-8 and 15-45% slopes. The series occurs at elevations of 700 to 2,000 feet, typically at hillslope landforms. They are not prime farmland soils. These series, consisting of a profile of

fine sandy loam, sand clay loam, and weathered bedrock, are well drained with no frequency of flooding or ponding; and their typical depth to water table is more than 80 inches (NRCS 2023). The series are derived from saprolite from diorite, and/or gabbro, and/or diabase, and/or gneiss. The typical soil profile of the Siloam loam series is included in Table 1.4.5.2-1).

Table 1.4.5.2-1. Typical Subsurface Soil Profiles of the Site

Siloam Loam (SmF)		Siloam Loam (SmB)	
Depth (inches)	**Description**	**Depth (inches)**	**Description**
0-8	fine sandy loam	0-8	fine sandy loam
8-15	sandy clay loam	8-15	sandy clay loam
15-26	weathered bedrock	15-26	weathered bedrock
26-80	unweathered bedrock	26-80	unweathered bedrock

(Source: NRCS 2023)

DEP will assess any settlement and proper foundation support matters using site-specific geotechnical exploration. Potential settlement of project structures and appropriate foundation support of infrastructure under static and dynamic (e.g., earthquake, machinery, etc.) loading will be addressed as part of the preliminary and final design of the project structures.

Figure 1.4.5.2. NRCS Soil Survey of Person County

DAM	Dam
HaC	Halifax sandy loam, 6 to 10 percent slopes
OnA	Orange loam, 0 to 2 percent slopes
RaB	Rasalo fine sandy loam, 2 to 6 percent slopes
RaC	Rasalo fine sandy loam, 6 to 10 percent slopes
SmB	Siloam loam, 2 to 8 percent slopes
SmD	Siloam loam, 8 to 15 percent slopes
SmF	Siloam loam, 15 to 45 percent slopes
UdB	Udorthents, loamy, gently sloping
Ur	Urban land
W	Water

Map Sources: Soil Survey Geographic Database (SSURGO) 2023, NRCS, USDA Orthoimagery 2022

1.4.6 Ecology

The ecological study area for the Proposed Facility includes a 28-acre tract where it and its associated components (e.g., construction lay-down area, switchyard, administration building) will be located. The eastern portion of the site is significantly disturbed from past and current activities associated with the Roxboro Plant. The area is surrounded by areas of mixed hardwood-pine woodland, Hyco Lake, transmission line corridors, and other disturbed areas associated with the generation station.

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), most of the proposed site can be classified as Mesic Mixed Hardwood (Piedmont Subtype). The proposed project is in uplands surrounded by existing facility infrastructure (e.g., facility access roads and transmission line rights-of-way). These wooded-area remnants and adjacent areas are described below based on known site information and field assessments.

Mesic Mixed Hardwood Forest (Piedmont Subtype)

This community is comprised of mature woody, herbaceous, and vine species including black oak (*Quercus velutina*), northern red oak (*Q. rubra*), scarlet oak (*Q. coccinea*), white oak (*Q. alba*), American beech (*Fagus grandifolia*), loblolly pine (*Pinus taeda*), shortleaf pine (*P. echinata*), mockernut hickory (*Carya tomentosa*), sweetgum (*Liquidambar styraciflua*), tulip poplar (*Liriodendron tulipifera*), red maple (*Acer rubra*), American holly (*Ilex opaca*), black cherry (*Prunus serotina*), flowering dogwood (*Cornus florida*), redcedar (*Juniperus virginiana*), greenbrier (*Smilax spp.*), Japanese honeysuckle (*Lonicera japonica*), crossvine (*Bignonia capreolata*), spotted pipsissewa (*Chimaphila maculata*), Christmas fern (*Polystichum acrostichoides*), ebony spleenwort (*Asplenium platyneuron*), and arrow-leaved heartleaf (*Hexastylis arifolia*). This area will be permanently affected by the Proposed Facility.

Utility Line Rights-of-Way

The Proposed Facility's project area is also immediately adjacent to DEP's existing 230-kV and 115-kV transmission line rights-of-way. These routinely managed corridors, maintained in an early-successional stage, are dominated by grasses, forbs, and woody plants, such as dense broomsedge (*Andropogon virginicus*), broad-leaved panic grass (*Dichanthelium latifolium*), dogfennel (*Eupatorium capillifolium*), fleabane species (*Erigeron spp.*), goldenrod species

(*Solidago spp.*), Japanese honeysuckle, greenbriar, and blackberry (*Rubus allegheniensis*). Sweetgum, red maple, shortleaf pine and redcedar saplings can also be present, based on the timing of the maintenance cycle. These transmission line corridors will not be affected by the Proposed Facility.

Wetlands and Jurisdictional Waters of the U.S.

DEP biologists conducted a reconnaissance-level survey of the Proposed Facility area for wetlands and jurisdictional waters of the United States under Section 404 of the Clean Water Act. The area was examined according to the methodology described in the U.S. Army Corps of Engineers ("USACE") 1987 Wetland Delineation Manual, USACE Eastern Mountains and Piedmont Regional Supplement, the pre-2015 regulatory regime, and the North Carolina Division of Water Resources Methodology for Identification of Intermittent and Perennial Streams and their Origins (Version 4.11), as well as review of the U.S. Fish and Wildlife Service's ("USFWS") National Wetland Inventory database.

A series of drainageways empties into Hyco Lake, at the extreme outer edge of the Proposed Facility's footprint (i.e., head slope or drainageway head). However, these drainageways are within an upland context and have no indicators of channeled ephemeral or perennial flow. Based on the existing information and the survey, no wetlands or waters of the U.S. will be affected by the Proposed Facility.

Federally Protected Plant Species

DEP reviewed a list of federally protected plant species for Person County and the study area (USFWS 2023) as well as DEP's own Natural Resource GIS Viewer database, which includes known element occurrences and critical habitat of federal and state protected species. DEP has also conducted field assessments regarding listed species in the study area over the last several years. Neither the database review nor the site assessments revealed known occurrences of federal or state-protected species within the study area.

A review of the USFWS's Information for Planning and Consultation ("IPaC") tool indicated no protected or proposed federally protected plant species within the general study area and Person County.

1.4.6.1.2 Wildlife

Terrestrial communities in the study area are comprised primarily of small, forested habitats and transmission line corridors that support a diverse number of wildlife species. Representative mammal, bird, reptile, and amphibian species common to these habitats are listed

below. Individual species and/or evidence of species (tracks, scat, sightings) observed during field assessments are indicated with an asterisk (*). DEP obtained information about wildlife species that typically use these habitats in the Southern Outer Piedmont ecoregion from relevant literature, mainly Biodiversity of the Southeastern United States, Upland Terrestrial Communities (Martin et al. 1993).

Common mammal species in these habitats include eastern cottontail (*Sylvilagus floridanus*); gray squirrel (*Sciurus carolinensis*)*; various vole, rat, and mice species; Eastern red bat (*Lasiurus borealis*); big brown bat (*Eptesicus fuscus*); raccoon (*Procyon lotor*)*; Virginia opossum (*Didelphis virginiana*); groundhog (*Marmota monax*); white-tailed deer (*Odocoileus virginianus*)*; gray fox (*Urocyon cinereoargenteus*), red fox (*Vulpes vulpes*), and coyote (*Canis latrans*).

Bird species that commonly use these habitats include American crow (*Corvus brachyrhynchos*)*, blue jay (*Cyanocitta cristata*)*, Carolina chickadee (*Poecile carolinensis*)*, American robin (*Turdus migratorius*)*, brown thrasher (*Toxostoma rufum*)*, northern mockingbird (*Mimus polyglottos*)*, Carolina wren (*Thryothorus ludovicianus*)*, red-eyed vireo (*Vireo olivaceus*)*, summer tanager (*Piranga rubra*)*, white-breasted nuthatch (*Sitta carolinensis*), brown-headed nuthatch (*S. pusilla*)*, red-bellied woodpecker (Melanerpes carolinus)*, downy woodpecker (*Picoides pubescens*)*, pine warbler (*Setophaga pinus*)*, northern cardinal (*Cardinalis cardinalis*)*, song sparrow (*Melopiza melodia*), field sparrow (*Spizella pusilla*)*, and white-throated sparrow (*Zonotrichia albicollis*)*. Raptors in the study area include red-shouldered hawk (*Buteo lineatus*), red-tailed hawk (*Buteo jamaicensis*)*; barred owl (*Strix varia*), black vulture (*Coragyps atratus*)*, turkey vulture (*Cathartes aura*)*, and an occasional bald eagle (*Haliaeetus leucocephalus*).

DEP's field investigations and database reviews indicate that there are no known bald eagle nests within at least 10 miles of the Proposed Facility; thus, DEP expects no construction or operational impacts to an active nest or the associated eagles.

Reptile and amphibian species that may use the associated terrestrial communities include the eastern black rat snake (*Pantherophis alleghaniensis*), eastern corn snake (*P. guttatus*), copperhead (*Agkistrodon contortrix*), eastern fence lizard (*Sceloporus undulatus*), five-lined skink (*Plestiodon fasciatus*), eastern box turtle (*Terrapene carolina carolina)*,* spotted salamander (*Ambystoma maculatum*), slimy salamander (*Plethodon glutinosus*), American toad (*Anaxyrus americanus*), Fowler's toad (*A. fowleri*), gray treefrog (*Hyla versicolor*), and spring peeper (*Pseudacris crucifer*).

Before constructing the Proposed Facility, DEP will need to remove an estimated 36 acres of mixed hardwood forest on the site to account for the Proposed Facility, its switchyard, construction laydown areas, buffer lands, etc. This will displace the wildlife in that area, which is expected to move to adjacent undeveloped forested areas during construction. Since the proposed project footprint is small and localized, construction activities should not impact the diversity or number of species in the area or interfere with the movement of resident or migratory species. DEP does not anticipate that daily facility operations, including noise from equipment and vehicle traffic, will affect wildlife beyond the Proposed Facility's footprint.

Additional information on wildlife at the Proposed Facility can be found in Appendix C-1.

Federally Protected Animal Species

DEP's review of the USFWS IPaC tool revealed three federally protected or proposed protected wildlife species within the general study area and Person County. These include the tri-colored bat (*Perimyotis subflavus*), little brown bat (*Myotis lucifugus*), and monarch butterfly (*Danaus plexippus*).

The tricolored bat (Proposed Endangered) is a small insectivorous bat with unique tricolored fur that often appears yellowish to nearly orange. This once-common species is wide-ranging across the eastern and central United States and portions of southern Canada, Mexico, and Central America. In winter, tricolored bats are often found in caves and abandoned mines, although in the southern United States, where caves are sparse, they often roost in road culverts, where they exhibit shorter torpor bouts and forage during warm nights.

In spring, summer, and fall, tricolored bats may roost in forested habitats, primarily among leaves of live or recently dead deciduous hardwood trees. They may also be found in pine trees—and occasionally even in human structures. Tricolored bats face extinction primarily because of the range-wide impacts of white-nose syndrome, a deadly disease that affects cave-dwelling bats across the continent. The USFWS has proposed that the species be listed as endangered by the fourth quarter of 2023.

The project study area and the site of the Proposed Facility include potential habitat (forest and woodland) for the species. Since the mixed hardwood-pine forest on that site will be cleared, DEP will use acoustic monitoring to assess whether any tricolored bats are present. If the species

is present, DEP will coordinate with the USFWS-Raleigh Ecological Field Office to determine how the Endangered Species Act Section 10 will be implemented.

The little brown bat (proposed to be listed in September 2023, with a final listing in September 2024) is a small insectivorous bat. The once-common species is wide-ranging across the eastern, central, and western United States, including the Piedmont of North Carolina.

Little brown bats use a wide range of habitats and often avail themselves of human-made structures for resting and maternity sites. In winter, they typically roost in caves and mines. They can also be found in trees, artificial structures, and bat houses; under rocks; and in piles of wood during the summer. Foraging habitat requirements are generalized, primarily over streams and other bodies of water, along the margins of lakes and streams, or in woodlands near water. Winter hibernation sites like caves, tunnels, and abandoned mines generally have a relatively stable temperature of about 2° to 12° Celsius. Maternity colonies are commonly found in warm sites within buildings, such as attics, bat houses, other human structures, and infrequently, in hollow trees.

During the spring, summer, and fall, little brown bats are found in forested habitats where they can roost in trees. Like tricolored bats, these bats face extinction primarily from white-nose syndrome, a deadly disease affecting cave-dwelling bats across the continent; but they also are in peril from climate change and habitat loss. Potential habitat (forest and woodland) for the species is found in the study area, specifically in the vicinity of the Proposed Facility. Since the Proposed Facility's footprint will be cleared of mixed hardwoods and pines, DEP will use acoustic monitoring to assess the habitat for the presence or absence of the species. If the species is found to be present, DEP will consult with the USFWS-Raleigh Ecological Field Office for Endangered Species Act Section 10 implementation.

With bright orange wings surrounded by a black border and covered with black veins, the monarch butterfly (Candidate Species, with a proposed listing date of November 2023) is large and conspicuous. In breeding season, monarchs lay their eggs on their obligate milkweed host plant (primarily *Asclepias spp.*), and larvae emerge after two to five days. Multiple generations of monarchs are produced during breeding season.

In many regions, monarchs breed year-round. Individual monarchs in temperate climates, such as eastern and western North America (including the Piedmont of North Carolina), undertake long-distance migration and live for several months. In the fall, in both eastern and western North America, monarchs begin migrating to their respective overwintering sites in Mexico. Habitat for

this species is not found in the proposed project footprint; but marginal habitat (nectar-bearing plants) exists within the immediately adjacent transmission line corridor.

DEP is a partner within the nationwide Monarch Candidate Conservation Agreement with Assurances, and its transmission rights-of-way are managed in a way that is beneficial to the species and associated habitat. The adjacent transmission line rights-of-way will not be affected by the Proposed Facility, and the current Integrated Vegetational Management practices will not be altered because of the project. Thus, this species will not be affected by the project.

On August 1, 2023, DEP sent a consultation letter to the USFWS (Eastern NC) to request guidance concerning potential tree work within the area including Tricolored and Little Brown Bat habitat (Appendix C-2). DEP anticipates that neither constructing nor operating the Proposed Facility will significantly affect federal- and state-listed species or overall botanical resources of the area.

1.4.6.2 Aquatic Resources

DEP has identified no wetlands or jurisdictional waters of the United States within the Proposed Facility's footprint. There are no federally protected aquatic species or critical habitats identified within nearby waterbodies, such as Hyco Lake.

DEP will minimize potential construction-related effects related to runoff from the site by implementing best management practices under an approved, comprehensive erosion-control plan to protect water quality and nearby aquatic resources of Hyco Lake. Constructing the Proposed Facility is not expected to adversely affect aquatic resources such as macroinvertebrates, freshwater mussels, or fish communities.

Hyco Lake will be the source of water for plant testing and operations. No thermal issues will be associated with discharge from the Proposed Facility, and thus operations of the facility are not expected to affect aquatic resources adversely.

DEP will treat low-volume wastewater streams and discharge them through an outfall to Hyco Lake. Oil-water separators will be built according to DEP-approved designs. Turbine water wash and wastewater will be contained for off-site disposal. Oil-filled transformer containment 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.

Based on existing information and site assessments, no aquatic species will be affected by construction or operation of the Proposed Facility.

1.4.7 Meteorology

1.4.7.1 Climatology

Person County is north of Durham, NC, southeast of Danville, VA, and south of South Boston, VA. In the northern half of the county are both Hyco Lake and Mayo Lake. The local subbasin for Hyco Lake is oriented southwest to northeast (Figure 1.1-1). The Hyco River and Mayo Creek stream flows merge about one mile north-northeast of Mayo, NC, and continue downstream to the eastern end of Virginia's Dan River, joining the Roanoke River (John H. Kerr Reservoir) at Staunton River State Park north of Buffalo Springs, Virginia (Google Maps 2023).

DEP's Roxboro Plant is approximately 44 miles northwest of the National Weather Service's ("NWS") surface observation site for Raleigh, NC (Raleigh-Durham International Airport at Morrisville, NC ("KRDU")), and about 54 miles northeast of the NWS surface observation site at Greensboro, NC (Piedmont-Triad International Airport ("KGSO")). Person County Airport (Raleigh Regional Airport at Person County ("KTDF")) is about 14 miles southeast of Hyco Lake, just west of Timberlake, NC (Google Maps 2023).

Person County abuts the North Carolina-Virginia border in central North Carolina's northern Piedmont. Land use in the area is mainly forest and agricultural, although residential uses are gradually increasing. The northern Piedmont's terrain consists of rolling hills between the Blue Ridge Mountains in the Appalachian chain to the west and the Atlantic coast to the east. The mountains provide the region with partial protection from cold air masses in the winter, although there are a few days when temperatures drop below 20°F. The climate is mild, with a normal daily maximum temperature of 69.8 - 72°F annually and a normal daily minimum of 47.5 - 50.5°F, based on NWS historical records from the Greensboro (GSO) and Raleigh (RDU) airport surface observation sites. The first freezing temperatures (32°F or less) typically begin in late October, and the last occurrence is usually in early April. Humid, tropical air is common over central and eastern North Carolina in the summer, with maximum daily temperatures at or above 90°F on about 25% of summer days (NOAA/NCEI (Raleigh/Durham) 2023, NOAA/NCEI (Greensboro) 2023).

The region's monthly rainfall is typically between 2 and 4 inches, with higher typical monthly amounts from July to September, ranging from 4.1 to 5.2 inches. The region's annual rainfall totals are 43 to 46 inches. The maximum monthly rainfall records range from 21.79 inches (September 1999) at Raleigh to 13.26 inches (September 1947) at Greensboro. Soil moisture can decrease in the growing season during dry periods between rainfall in the spring and summer (NOAA/NCEI (Raleigh/Durham) 2023, NOAA/NCEI (Greensboro) 2023). For example, below-normal rainfall in the summer of 1999 was followed by a wet autumn, with rainfall from both

Hurricane Floyd and Tropical Storm Dennis in September 1999 (NOAA/NWS – Newport/Morehead City, NC (MHX) 2023). From May to August 1999, RDU received only 48% of its normal rainfall (7.94 inches, versus a normal of 16.6 inches) (NOAA/NCEI (Raleigh/Durham) 2023, NOAA/NCEI (Greensboro) 2023).

Thunderstorms provide most summertime rainfall. Tropical systems impact the area mostly through rain, with winds decreasing as storms move inland. Although the area's mean monthly wind speeds range between five and nine miles per hour ("mph"), brief high winds and hail can occur, usually with thunderstorms. Wintery precipitation, commonly associated with northeast and easterly winds, as well as winds from the south and southwest (NOAA/NCEI (Raleigh/Durham) 2023, NOAA/NCEI (Greensboro) 2023), occurs each year but excessive snow accumulations are rare.

Prevailing winds in Person County come from the southwest (SW) and south-southwest (SSW), with next highest frequencies from the north, northeast, and south sectors. Least frequent wind directions are from the southeast quadrant (ESE - SE). The historical two-minute averaged peak (i.e., sustained) windspeed observed at the Person County Airport was 33.1 mph on March 8, 2008 (NOAA/DOD/FAA/US Navy 1998). Higher sustained windspeeds have been observed across the region: 55.2 and 63.3 mph at the NWS KRDU and KGSO stations, respectively.

Figures 1.4.7.1-1, 1.4.7.1-2, and 1.4.7.1-3 show wind roses from the NC State Climatology Office for Raleigh-Durham International Airport (KRDU), Person County Airport (KTDF), and Greensboro's Piedmont Triad International Airport (KGSO) (North Carolina State Climatology Office 2023).

Figure 1.4.7.1-1. Wind Rose for KRDU

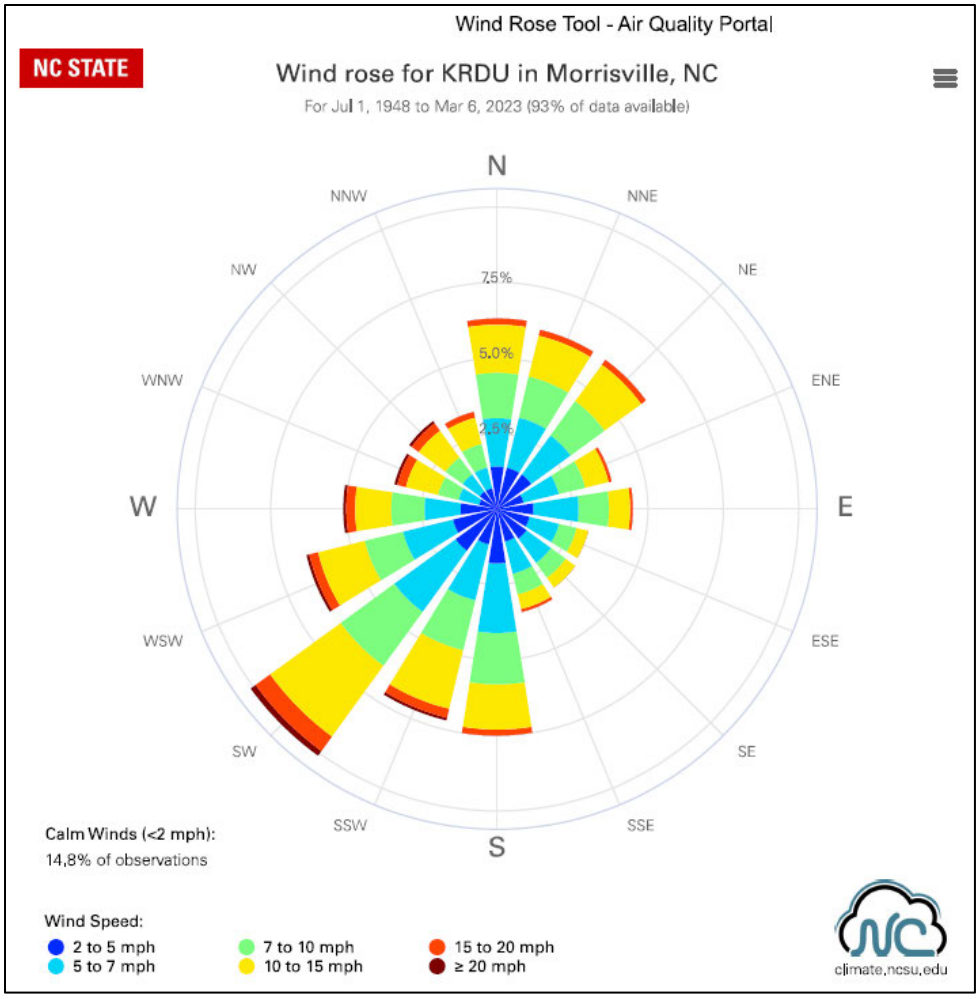


Figure 1.4.7.1-2. Wind Rose for KTDF

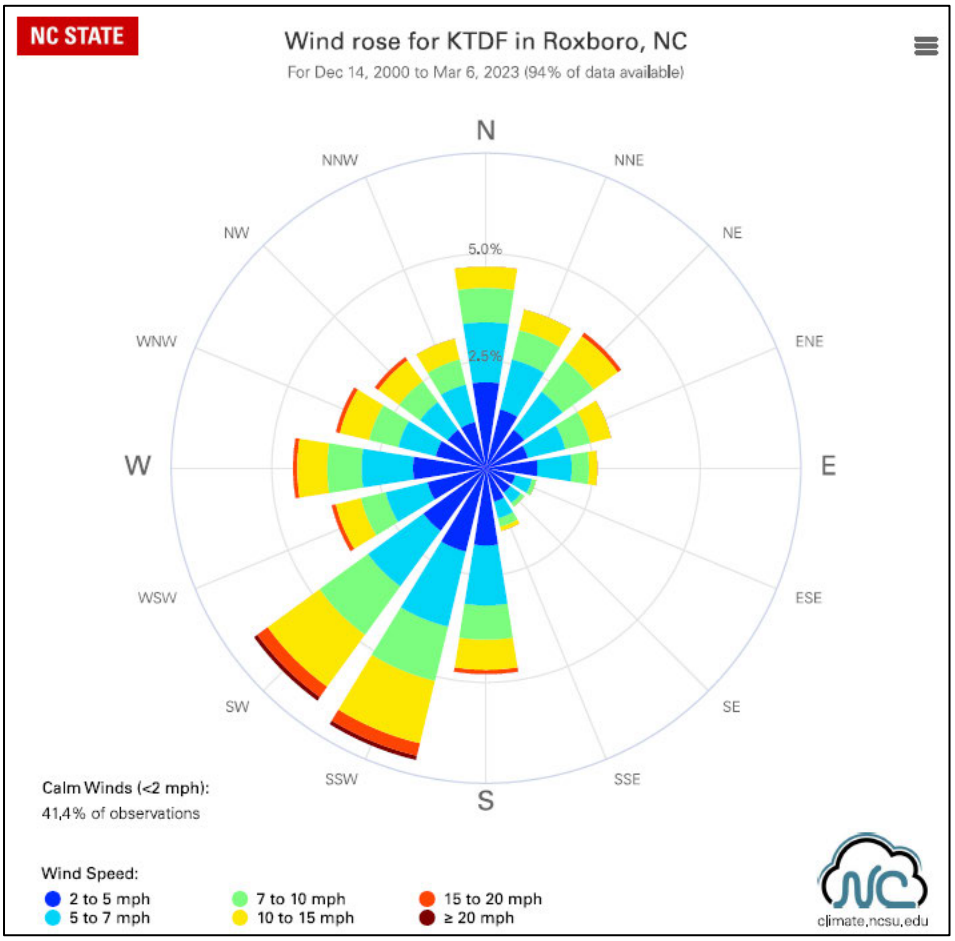


Figure 1.4.7.1-3. Wind Rose for KGSO

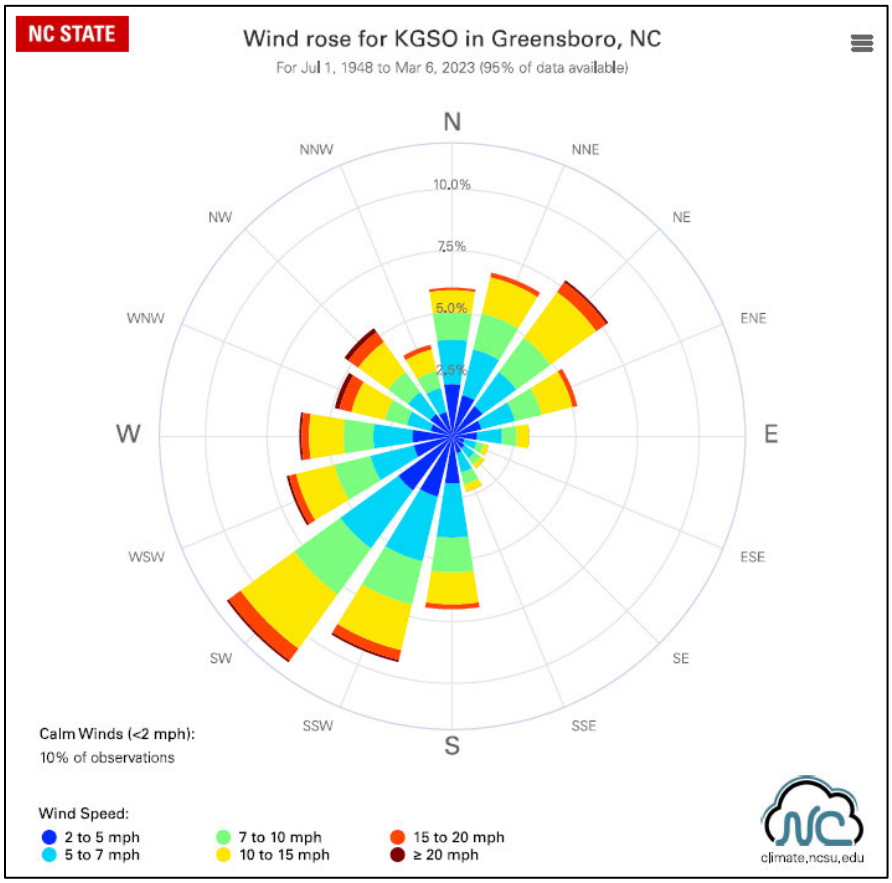


Table 1.4.7.1-1 lists maximum wind speeds and associated date/time and wind direction during the observation period for each site (e.g., 63.3 mph at KGSO) (NCSU 2023).

Table 1.4.7.1-1. Historical Two-Minute Averaged Peak Windspeeds

NWS Airport Observation Site	Data Period	Two-Minute Avg. Peak Windspeed	Wind Direction (from)	Date
KTDF Person County	December 14, 2000 – March 6, 2023	33.1 mph	SSW	March 8, 2008 11:40 a.m.
KRDU Raleigh-Durham International	July 1, 1948 – March 6, 2023	55. 2mph	NW	Oct. 15, 1984 2 p.m.
KGSO Piedmont Triad International	July 1, 1948 – March 6, 2023	63.3 mph	S	June 23, 1961 1 a.m.

(Sources: NCSU 2023, NOAA/DOD/FAA/US Navy 1998)

Table 1.4.7.1-2 provides a brief overview of the region's climatological extremes for highest and lowest daily temperatures, maximum three-second gusts, maximum precipitation, maximum snow depth and 24-hour snowfall, based on the period of record from NOAA/National Center for Environmental Information (NOAA/NCEI (Raleigh/Durham) 2023, NOAA/NCEI (Greensboro) 2023).

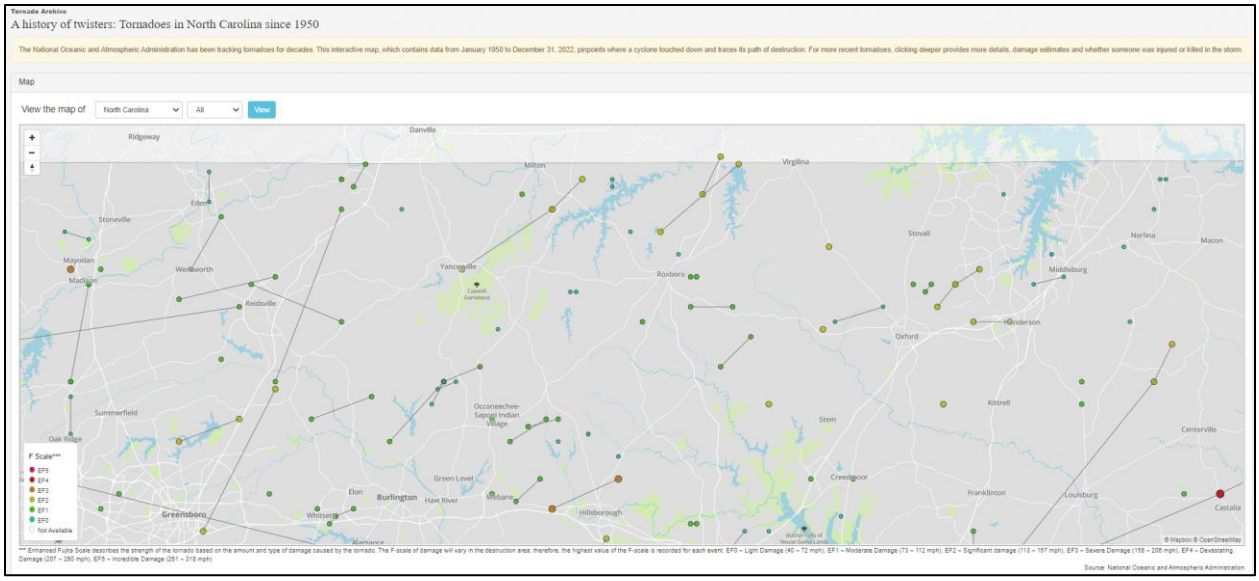
Table 1.4.7.1-2. Historical Climatological Extremes for NWS KRDU and KGSO

Description	Extreme Value	Date	NWS Station
Highest Daily Maximum Temperature (°F)	105 103	July 2012 August 1988	RDU GSO
Lowest Daily Minimum Temperature (°F)	-9 -8	January 1985	RDU GSO
Maximum 3-Second Gust (mph)/ Wind Direction	86 (220 degrees) 82 (260 degrees	January 2014 May 2000	RDU GSO
Maximum 24-Hour Precipitation (inches)	6.47 7.49	October 2016 September 1947	RDU GSO
Maximum Snow Depth (inches)	20 15	January 2000 January 1966	RDU GSO
Maximum 24-Hour Snowfall (inches)	17.9 14.3	January 2000 December 1930	RDU GSO

(Sources: NOAA/NCEI Raleigh/Durham, 2023; NOAA/NCEI Greensboro, 2023)

Tornado activity in North Carolina historically increases in spring months (April - May) with a smaller peak again in autumn (August - October). This is because strong low-pressure systems and their cold fronts are more likely to produce severe thunderstorms, and the autumn hurricane season has thunderstorms and tornadoes embedded in rainbands of tropical systems. A few EF0, EF1, and EF2 tornadoes have occurred near Hyco Lake in Person County, NC (Figure 1.4.7.1-4), but they occur more frequently in the eastern North Carolina sandhills and coastal plain than in the north Central Piedmont. The closest EF3 tornado occurred on November 23, 1992, near Hillsborough, NC, approximately 25 miles south of Hyco Lake. An EF4 tornado originated east of the Raleigh-Durham International Airport (about 45 miles southeast of the Proposed Facility, in the William B. Umstead State Park) and tracked northeast to the vicinity of Castalia, NC, (approximately 63 miles southeast of Hyco Lake) on the night of November 27-28, 1988. The EF4 tornado continued to the northeast side of Pleasant Grove, NC, before dissipating (~92 miles east of Hyco Lake). This EF4 tornado had a path length of 83 miles and affected 4 counties (Google Maps 2023, Citizen Times 2023, CBS17.COM 2021, NCEI 2023, NCSU 2023b).

Figure 1.4.7.1-4. Tornados in North Carolina since 1950



1.4.7.2 Air Quality

The U.S. Environmental Protection Agency ("USEPA") has established National Ambient Air Quality Standards ("NAAQS"), and the N.C. Department of Environmental Quality ("NCDEQ") has adopted them. These standards, outlined in Title 15A of the North Carolina Administrative Code, Chapter 2D (Air Pollution Control Requirements), § .0400, establish certain maximum limits on parameters of air quality considered desirable for the preservation and enhancement of North Carolina's air resources.

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

- Ozone
- Particulate Matter
- Carbon Monoxide
- Sulfur Dioxide
- Nitrogen Dioxide, and
- Lead.

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., the Charlotte metropolitan area) have experienced intermittent non-attainment designations for ozone; but this is not uncommon in larger cities during the warmest periods of the year. In summer, ground-level ozone limits may be exceeded in metropolitan areas and large suburbs because

increased chemical reactions between vehicle emissions and ultraviolet radiation and sunlight can cause (temporarily) increased ozone levels.

Operations at the PCEC will be permitted as part of the Roxboro Plant. DEP is submitting the air permit application contemporaneously with its Joint Application seeking a certificate of public convenience and necessity authorizing construction of the Proposed Facility. The Company does not expect the application to trigger a Prevention of Significant Deterioration review under the Clean Air Act's New Source Review program requirements. DEP will use continuous emissions monitoring systems on the exhaust stacks.

During construction, the primary air quality issue will be fugitive dust—dust from non-point sources, such as earthwork and construction traffic on unpaved roads. DEP will use water trucks 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 DAQ's air quality permit application process.

The USEPA's recently proposed changes to Clean Air Act ("CAA") Section 111 – which would impose more stringent emissions limitations on new and existing natural gas units than the current rules – could impact the PCEC if Section 111 is finalized in its current proposed form. DEP has reviewed and commented on the CAA Section 111 Proposed Rule and continues to monitor its development.

1.4.8 Seismology

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). In most cases, they occur along existing structural faults. The orientation of these tectonic plates within current stress fields in the southeast is northeast-southwest. The eastern United States has a low relative recurrence interval for strong earthquakes, but its rigid and largely intact basement rock enables seismic energy to travel significant distances. Because the types and conditions of local and regional geology play a significant role in earthquake attenuation, even structures in areas of low seismicity should be

designed to withstand surface movements.

Tectonism describes the movement of tectonic plates that causes earthquakes, faults, volcanoes, uplift, subsidence, or any combinations thereof. Because earthquakes that are felt in North Carolina typically result from regional tectonism, they are not associated with tectonic plate movement 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 a specified reference level in a certain time, generally 50 years. Although intraplate earthquakes are typically low in magnitude ("M") on the Richter Scale (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.

The seismic hazard for a particular site or location is based on the following:

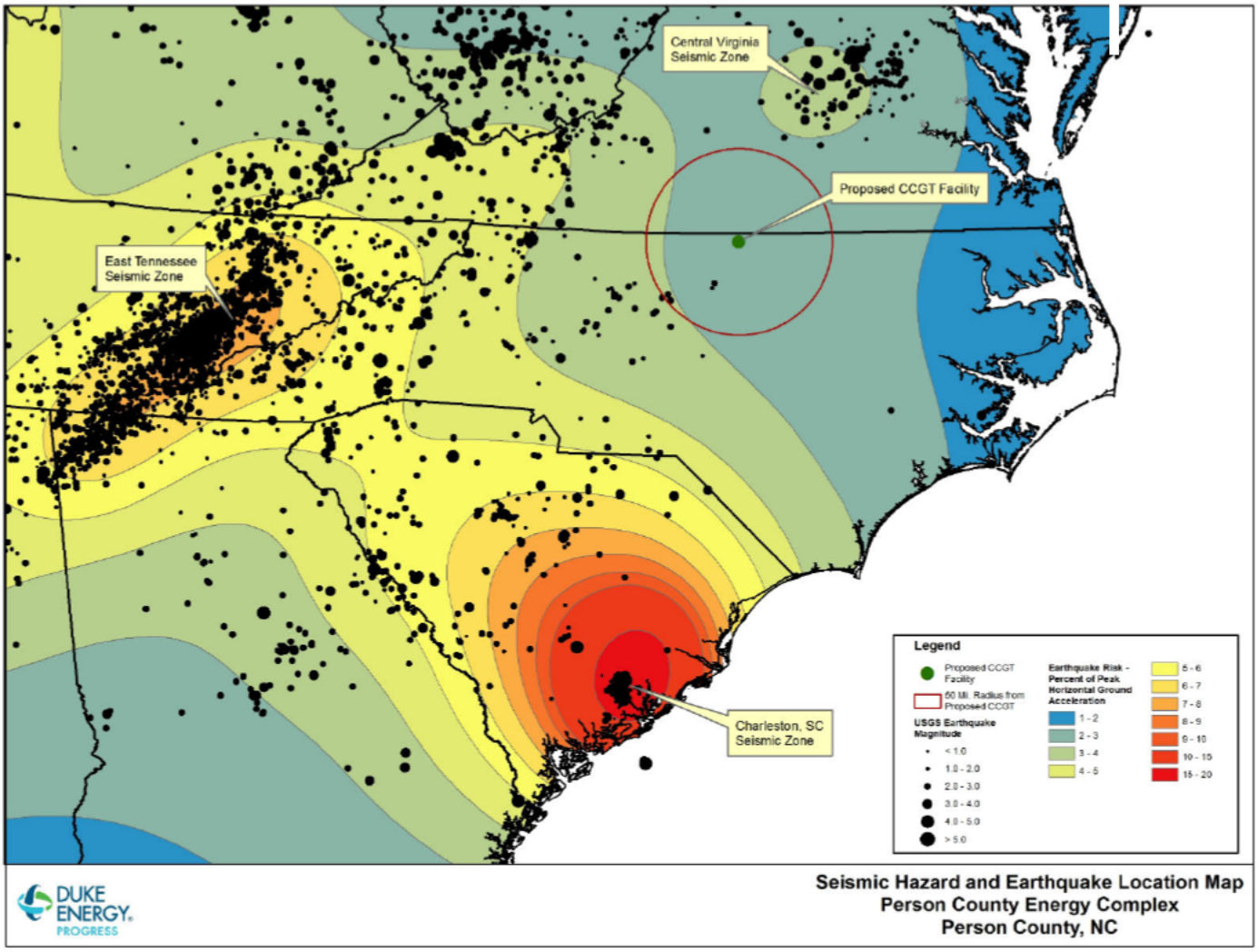
- the magnitude of and distance from the potential earthquake,
- the frequency with which those potential earthquakes are likely to occur, and
- the amount of shaking that is expected to occur because of those earthquakes.

Peak Ground Acceleration ("PGA") for the area surrounding the Proposed Facility was estimated using the USGS National Seismic Hazard Mapping database (2018). The study area has 10 to 14% (as expressed as a fraction of standard gravity) of exceedance in 50 years (USGS 2014). Figure 1.4.8.1-1 shows the location of the site, the 2% probability of exceedance in 50 years, PGA contours, regional earthquake source information, and the 50-mile radius from the proposed project site.

The probability of an earthquake with a magnitude of greater than 5.0 on the Richter Scale within 100 years and within 30 miles of the Proposed Facility is very small (0.02-0.03%) (USGS 2014). The seismic hazard map shows peak ground accelerations having a 2-3% probability of being exceeded in 50 years for a firm rock site. The map is based on the most recent USGS models for the conterminous U.S. (2018), Hawaii (1998), and Alaska (2007). The models, based on seismicity and fault-slip rates, consider the frequency of earthquakes of various magnitudes.

Induced seismicity has increased in frequency over recent years in the eastern United States, and it has been linked to an increase in wastewater injection into deep wells. These activities are not accounted for in the estimated hazards presented above. The Proposed Facility will be in an area of relatively low potential seismic activity, and it overlies stable basement rock. As a result, 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. Seismic Hazard and Earthquake Locations



Map Sources: Seismic Hazard and Earthquake Locations Map Courtesy of the U.S. Geological Survey; County Boundary Sources: Esri; U.S. Dept, of Commerce, Census Bureau; NOAA; National Ocean Service; National Geodetic Survey

1.4.8.2 Seismic Zones and Magnitude

The central and eastern United States have three major seismic zones: (1) the Charleston, South Carolina, seismic zone; (2) the East Tennessee seismic zone; and (3) the Central Virginia seismic zone (Figure 1.4.8.1-1). These zones are located approximately 334, 343, and 165 miles from the Proposed Facility, respectively. Figure 1.4.8.1-1 delineates these three zones; and the clusters of various-sized black circles represent the locations of previous earthquakes and their respective magnitudes on the Richter Scale.

The magnitude of an earthquake can be expressed as the amount of energy released, measured 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 worldwide each year. An earthquake with a magnitude of 8.0 is considered a great earthquake; it can demolish communities near the epicenter. There are, on average, less than five great earthquakes per year world-wide.

The closest recorded earthquake with a magnitude greater than 4.0 that originated in North Carolina occurred in 1916 near Skyland, Buncombe County—205 miles west of the proposed Person County Energy Complex. Estimated at 5.2 M, this earthquake was most likely associated with the East Tennessee seismic zone. In more recent history, the largest earthquake felt in North Carolina originated near Richmond, Virginia, in 2011. It was associated with the Central Virginia seismic zone and registered as a 5.8 M on the Richter Scale. Both the Charleston and East Tennessee seismic zones are considered areas of high seismic hazard by the USGS.

It is likely that the East Tennessee seismic zone presents the greatest known risk to the site area, but that risk is considered small. The facility's structures will be designed in accordance with the applicable seismic code, using ground motion data consistent with the required loading.

1.4.9 Water Supply

The Proposed Facility is located within the lower portion of the Roanoke River Basin (HUC 0301044). According to the NC Division of Water Quality's 2018 Roanoke River Basin Restoration Priorities Plan (NCDEQ 2009), the land cover for this hydrologic unit code is mostly forested (57.2%), with significant areas of agricultural land (19.2%) and developed lands (5.01%). Agricultural lands are spread across the landscape and the largest developed areas, including Roxboro, Semora, and Timberlake.

The study area is located within the Storys Creek Water Supply Watershed, a NCDEQ-protected area. The Storys Creek Watershed is classified as a Water Supply ("WS")-II watershed because it is a source of water for drinking, culinary, or food processing purposes where a WS-I classification is not feasible. WS-II waters are generally in predominantly undeveloped watersheds, and all WS-II waters are High Quality Waters by supplemental classification.

These waters are also protected for Class C uses—propagating aquatic life, survival and maintenance of biological integrity (including fishing and fish), wildlife, secondary contact recreation, and agriculture. Secondary contact recreation is considered wading, boating, and other uses not involving human body contact with water, or activities involving human body contact with water that occur only on an infrequent, unorganized, or incidental basis.

The Proposed Project's footprint is less than 0.5 miles from Hyco Lake.

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 Proposed 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 of:
  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 slopes:
     i) 100 to 1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway of each airport listed in 14 CFR § 77.9(d), 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 airport listed 14 CFR § 77.9(d) 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 listed in 14 CFR § 77.9(d).

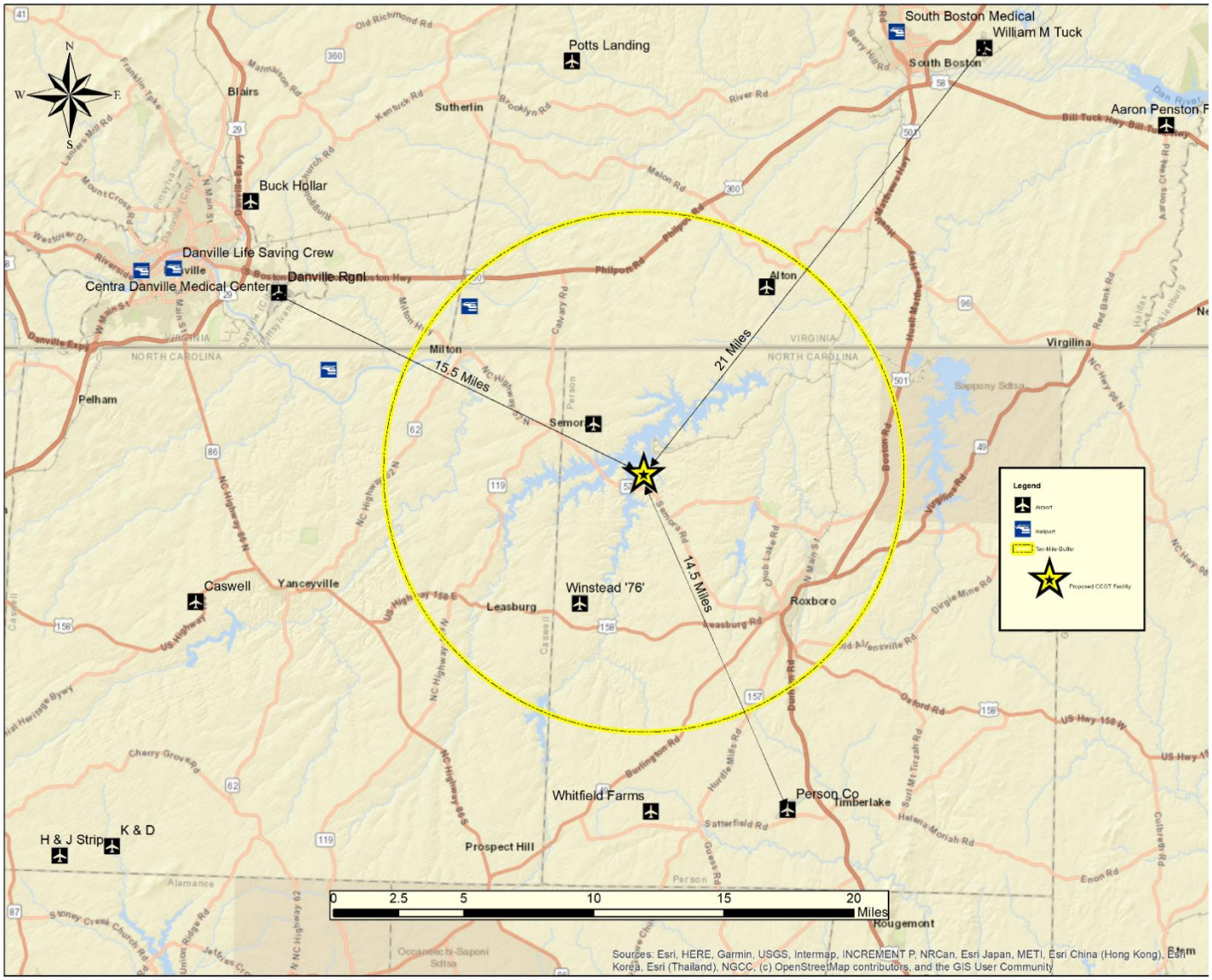
(14 CFR § 77.9(b)).

14 CFR § 77.13(a) further includes the following as a supplemental notice requirement:

> Any object of natural growth, terrain, or permanent or temporary construction or alteration, including equipment or materials used and any permanent or temporary apparatus.

With these notification triggers and supplemental standards in mind, Pike reviewed the Cincinnati Sectional Aeronautical Chart and the FAA Airport Database published by the U.S Department of Transportation, Federal Aviation–Aeronautical Information Services (08/06/2019) to determine the location of any aviation facilities within 10 miles of the Proposed Facility (see Figure 1.4.10-1).

Figure 1.4.10-1. Airfield Locations



Map Sources: FAA 2023, Air Traffic Organization, Mission Support Services, Aeronautical Information Services, SkyVector

Within 10 miles of the project site are three private airports and one private heliport:

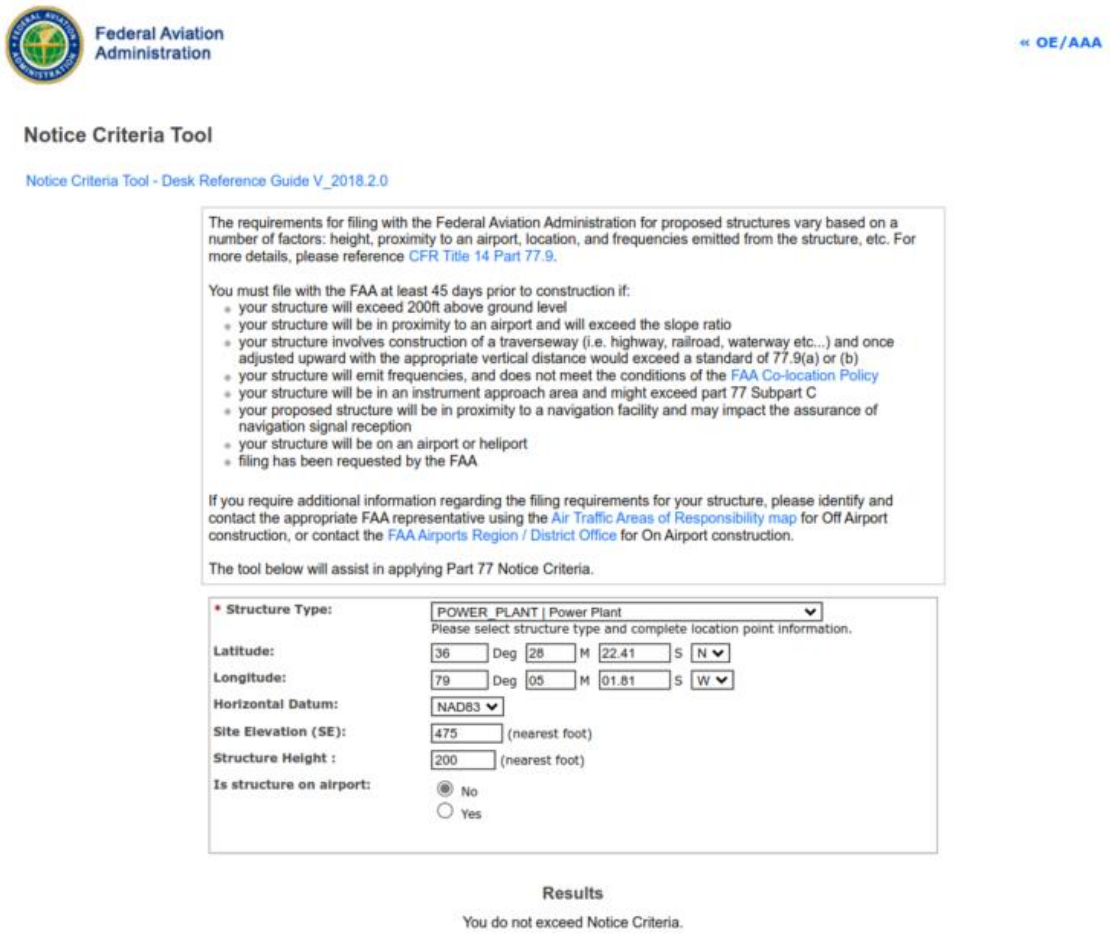
- Holeman Field Airport (NC40), 734 Fox Lair Trail, Semora, NC 27343
- Vaughan Airport (00VA), 2045 Snow Hill Road, Alton, VA 24520
- Winstead '76' Airport (68NC), Route 1, Box 104J, Leesburg, NC 27291
- O'Gara Tech Training Facility Heliport (VA40), 1120 Euro Rally Road, Alton, VA 24520

The closest public airports are the following:

- Raleigh Regional Airport at Person County (KTDF), 385 Montgomery Dr, Timberlake, NC 27583; about 14.4 miles south-southeast of the site
- William M. Tuck Airport (W78), 1145 Tuck Airport Rd, South Boston, VA 24592; about 21 miles northeast of the site
- Danville Regional Airport (KDAN), 424 Airport Drive, Danville, VA 24540; 15.5 miles northwest of the site

Pike entered proposed plant coordinates (latitude/longitude), plant grade elevation, and maximum possible stack height (200 feet) into the online FAA Notification Criteria Tool. The tool indicated that FAA notification would not be required. Based on Pike's review of the information above, distances to the airfields and preliminary engineering of the proposed Person County facility additions, and the results of the online tool, no FAA notification is required. If the height of the stack (or any other part of the facility) exceeds 200 feet above ground level, DEP will be required to submit a notice to the FAA. Figure 1.4.10-2 shows the completed FAA Notice Criteria Tool.

Figure 1.4.10-2. FAA Notice Criteria Tool



1.5 Site Study Status

All necessary studies have been conducted.

1.6 Natural Gas Supply

Natural gas will be transported to the Proposed Facility by a pipeline and associated facilities which will be constructed by Public Service Company of North Carolina, Inc. d/b/a Dominion Energy North Carolina ("PSNC"). PSNC was planning to install this pipeline independent of the PCEC to maintain compliance with federal safety regulations and to accommodate customer growth (the projected path of this pipeline is shown in Figure 1.6). DEP has contracted with PSNC to modernize and expand its existing natural gas transmission pipeline infrastructure, and PSNC changed the scope of the project to accommodate incremental facilities to serve the CCGT. **[BEGIN CONFIDENTIAL]** [redacted] **[END CONFIDENTIAL]** PSNC will also enhance the interconnection facilities with upstream interstate natural gas transportation facilities.

The incremental facilities to the Proposed Facility will include a nine-mile, **[BEGIN CONFIDENTIAL]** [redacted] **[END CONFIDENTIAL]** additional compression at PSNC's existing Ruffin facility to provide the required delivery pressure to the Proposed Facility, and metering and regulation at the DEP site (the proposed locations of the gas supply line and the interconnect pad with metering and regulation equipment can be seen on Figure 1.2). These incremental PSNC facilities will enable DEP to attain the required intrastate firm transportation volumes for the Proposed Facility's full load burn. DEP contracted with PSNC for these services through a new Construction and Transportation Service Agreement. PSNC filed this Agreement with the NCUC for its review and approval on October 16, 2023, in Docket No. G-5, Sub 668.

Figure 1.6. Proximity of Proposed Facility to PSNC's Natural Gas Facilities

1.7 Transmission

Figure 1.2, which shows the location of the existing Roxboro Plant electrical substation, also shows that one proposed gas turbine generator and the steam turbine generator will supply, each through its own breaker, a 230 kV 0.88-mile span bus line that will be connected to the Roxboro 230-kV switchyard adjacent to the Roxboro Plant. The second gas turbine generator will supply, through a breaker, an additional 230-kV 0.88-mile span bus line that will also be connected to the Roxboro 230-kV switchyard adjacent to the Roxboro Plant.

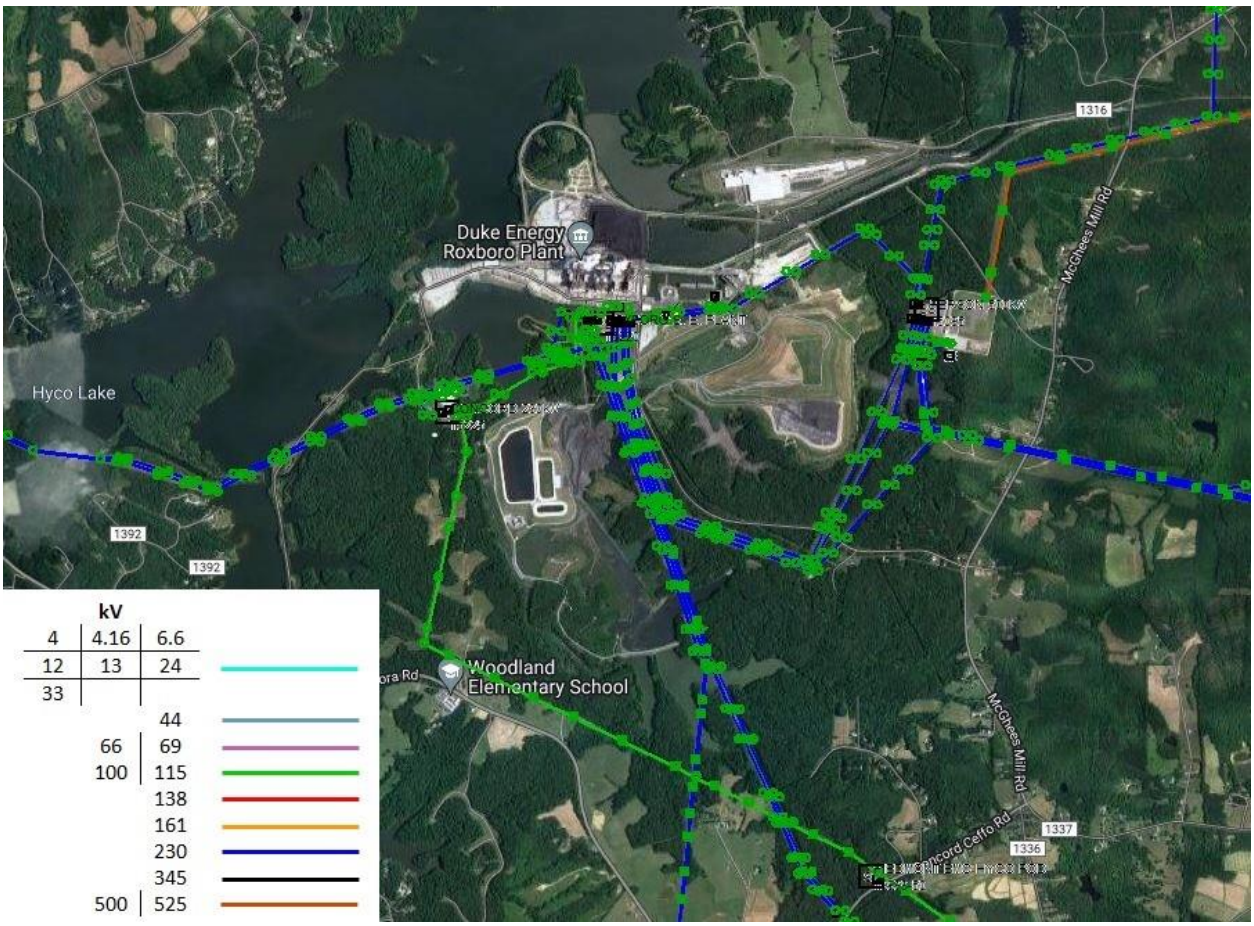
Several 230-kV breakers in the Roxboro switchyard are required to complete the breaker-and-a-half scheme to create the Proposed Facility's point of interconnection. The routing of the two new span bus lines will require relocating two existing 230-kV transmission lines to prevent line crossings and open a location for the point of interconnection.

DEP has submitted a Generation Replacement Request ("GRR") under the Companies' Large Generator Interconnection Process to utilize the roughly 1,053 MW of transmission interconnection rights from Roxboro's coal-fired units. The GRR Facilities Study indicated that limited network upgrades are necessary and DEP has now executed an associated GRR Large Generator Interconnection Agreement to support interconnecting the replacement MW. For the

Proposed Facility's incremental MW beyond those included in the GRR, DEP submitted an Interconnection Request into the 2023 Definitive Interconnection System Impact Study ("DISIS") Cluster Study process. The DISIS Phase I study report indicated limited network upgrades are necessary to support the incremental MW. Phase II of the DISIS study is underway and DEP expects to receive results in May 2024.

The transmission lines currently emanating from the Roxboro Plant can be seen on Figure 1.7.

Figure 1.7. Transmission Line Routes Emanating from the PCEC



1.8 Unit Capacity

The estimated nominal winter net capacity of the Proposed Facility at 20° F is 1,360 MW and 1,390 gross MW in alternating current. The projected nameplate capacity of the Proposed Facility at 20° is 1,390 MW in alternating current subject to final determination.

2.0 METHODOLOGY

2.1 Population

The smallest geographic unit of digital 2020 census data available directly from the U.S. Census Bureau is the census block. Esri, a third-party vendor, offers census data geographic files and population tables at the block level, which the above population analysis uses to analyze population data to the census block level.

Esri's census-block geographic files and population statistical tables for the states of North Carolina and Virginia contain an array of population data for each census-block polygon. Pike's Geographic Information Systems ("GIS") specialist downloaded the files for North Carolina and Virginia, extracted the data within 25 miles of the Proposed Facility, and then calculated population density using the area (in square miles) and total population of each census block.

It should be noted that for the purposes of this study, Pike 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 from the Proposed Facility, Pike calculated a percentage of the entire block acreage for each piece (after-split acreage divided by pre-split acreage). Pike then multiplied the resultant decimal fraction by the total population number for the entire block to calculate the population figure applicable to each piece.

2.2 Area Development

Pike and DEP 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, DEP consulted Person County planning officials (Letter 2023), and Pike researched future Person County land use documents and mapping online.

2.3 Visual and Auditory

2.3.1 Visual

Pike conducted the Visual Effects Analysis in three steps.

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

- Second, using the USGS National Elevation Dataset ("NED"), which is "a seamless mosaic of best-available elevation data" (Product Description 2023), Pike built a computer-generated Seen Area Analysis model (Figure 1.4.3.1-1) that predicts areas within five miles that will likely have a view of the Proposed Facility.

  Pike 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, Pike added 60 feet (an assumed average tree height) to the NED elevations to create a five-mile visual probability model that accounts for the screening effects of topography and vegetation. Pike assumed that forested areas were opaque in building viewshed models.

  A viewshed is used to highlight what is visible from a given point (Analyze Viewshed 2023). Using the ArcGIS Spatial Analyst module, Pike developed a viewshed map to predict the visibility of the existing and future facilities within five miles, using an estimated maximum height of 200 feet for the emission stacks of the Proposed Facility and 800 feet for the existing stacks.

- Third, Pike 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.

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

Using the distance from the viewer to the Proposed Facility, Pike predicted (ranked) the visual effects that may occur because of the Proposed Facility. The ranking (Table 1.4.3.1) represents a worst-case scenario, since Pike made no attempt to: (1) reduce the predicted visual effects probability that will inevitably occur when foreground and mid-ground vegetation or backdrops are present; or (2) 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 could be seen from within one-half mile, Pike ranked the view effect as Very High.

Pike 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

Community noise impacts are based on the increase in noise levels compared to other noise sources already present, the general level of the noise source, and 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).

To confidently predict noise levels for the PCEC, Stewart first had to identify area noise-sensitive receptors—places where the land use is more sensitive to ambient noise levels than others. Some typical noise-sensitive receptors are libraries, churches, schools, hospitals, and residential areas.

Stewart used a sound analyzer to measure and document existing sounds at six nearby noise-sensitive receptors (Figure 1.4.3.2.1) and two NTI Audio long-term monitors along the perimeter of the PCEC to record typical noise variations. Long-term Monitor 1 was placed directly west of the Proposed Facility on Roxboro Plant Road; Monitor 2 was placed at the north end of

the existing coal-train loop at the Roxboro Plant. Measurements were taken on April 12, 13, and 14, 2023—a sufficient time to record sound in octave bands and the overall A-weighted levels for typical variations in time, temperature, wind speed and direction, and humidity.

The Roxboro Plant's maximum noise condition occurs when all four coal-fired units are at maximum capacity. On April 14, Unit 1 produced 380 MW and Unit 3B, 350 MW (dual unit – one boiler operating).

To determine the sound power of Units 1 and 3B, Stewart needed sound pressure level measurements at known distances from the operating units or their individual noise radiating pieces of equipment. Stewart determined three calibration points (locations shown in Appendix A) at different directions and distances. Calibration Point 2, nearly equidistant from all units, was most helpful. Stewart modeled the noise source in SoundPLAN and then calibrated the sound power radiating from the two operating units so that the sound level in the model matched the sound levels measured at the field calibration points. The calculated total sound power level of the two units was 131.4 dBA.

To calculate sound level with all four units operating at total capacity (Units 3 and 4 producing 700 MW each, Unit 1 producing 380 MW, and Unit 2 producing 670), Stewart needed to scale the acoustic energy based on the power increase—in acoustics, using a scaling of 10 LOG ($MW_{\text{all units running}}/MW_{\text{units 1 and 3b}}$) or +5.26 dBA. Thus, the total sound with all units running becomes 136.6 dBA.

Stewart used a similar scale to predict the future sound power with Units 1 and 4 retired: $MW_{(\text{units 2 and 3})}/MW_{(\text{all units running})}$. This predicted a -2.5 dBA change, with the total sound power at 134.1 dBA.

The Roxboro Plant received no coal deliveries during the monitoring period, but there was one limestone delivery; and sound levels for this event were not noticeable above plant noise at the closest monitoring location. Although available public resources estimate coal shaker noises at 122-129 dBA, Stewart has its own historical measurements from certain Duke Energy generating stations. Stewart opted to estimate the sound power level at 129.2 dBA, based on the data it collected from the Marshall Steam Station in Catawba County, NC.

Roxboro Plant personnel estimate that the plant receives 240 coal deliveries per year, with each coal train requiring 3.5 hours to unload. This means noise from coal deliveries is generated for approximately 840 hours per year. Considering there are 8,760 hours in a (non-leap) year, this means coal delivery noise at the Roxboro Plant is generated for 9.6% of the year.

Although DEP has not selected a specific CCGT for the project, its design will incorporate advanced-class turbines with SCR (selective catalytic reduction). The manufacturer will be required to limit the noise generated at each stack exit by each turbine to an average operating sound power level of 117 dBA. Figure 1.2 shows the location of the turbine in the southwest corner of the project footprint.

Burns and McDonnell produced a basic noise study of the combustion turbine that provides a table of sound power levels for most sources (Appendix A). Stewart used that table to create a library of sources for their own sound model.

With inputs of field measurements from the existing Roxboro Plant and auditory information from similar combustion turbine units, Stewart's SoundPLAN computer model indicated that, at all adjoining property lines, sounds levels would not be higher than 55 dBA with all generating units operating (Units 2 and 3 plus the proposed combined-cycle combustion turbine). The highest expected sound level increase would be 3.9 dBA, which would not be clearly noticeable.

2.4 Cultural Resources

ERM conducted background research online using the NCSHPO's Online Mapping System for information regarding previously identified historic resources within 0.5 miles (0.8 kilometers) of the Proposed Facility. Cultural resource staff consulted and reviewed USGS topographic quadrangles, historical plat maps, aerial photographs, and soils data to assess the portions of the project area that might possess a higher potential for containing previously unidentified archaeological sites.

Brockington's cultural resources online identification survey was conducted in the same manner as ERM's, but its APE extended to a two-mile radius from the Proposed Facility. 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 36CFR § 60 and 36 CFR § 800.

Both archaeological and architectural investigations were conducted with reference to state and federal guidelines (OSA *Archaeological Investigation Standards and Guidelines for Background Research, Field Methodologies, Technical Reports, and Curation* [2017] and the 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. Reports were prepared in accordance with the Office of State Archaeology (OSA).

Prior to architectural fieldwork, Brockington consulted architectural data and tax records from the NCSHPO's online database and architectural data housed in the NCSHPO's Raleigh, North Carolina office for properties located within the two-mile APE to determine which buildings met the NRHP 50-years-or-older age criteria as of 2023. Background research also focused on relevant sources of local historical information and available historical maps, which Brockington 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 and ERM conducted architectural windshield surveys within their respective APEs. These efforts entailed a survey of each resource 50 years or older within the defined APE. Resources that retained architectural integrity were representative of type, and/or differed from resources within the APE were recorded photographically. Resources that retained little architectural integrity or were severely altered were not recorded. Due to private property issues, resources not visible or easily accessible from public rights-of-way were also not surveyed.

Pike used 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 number 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.

For archaeological field methods, ERM navigated the survey area using a handheld global positioning system (GPS) unit and recorded survey data through standardized digital forms and the field director's daily log. ERM used standard archaeological survey methods during the field study, including a combination of surface inspection and shovel-testing techniques. ERM visually inspected the entire survey area, and, where appropriate, ERM conducted subsurface shovel testing.

In locations where surface visibility was less than 50 percent, ERM performed shovel testing along transects at 30-meter intervals. All shovel tests were approximately 30 centimeters (cm) in diameter and excavated to a minimum of 10 cm into the subsoil. All excavated soils from shovel tests were screened through ¼-inch hardware mesh. In the location of the one positive shovel test, ERM delineated site boundaries by making radial shovel tests at 5- to 10-m intervals outward until two consecutive shovel tests were negative for cultural material, or a natural feature (slope, wetland, disturbed area) precluded performing additional shovel tests.

For safety reasons, ERM limited its survey of existing roadways and active heavy machinery construction zones to pedestrian survey and because no intact archaeological deposits are expected in such areas. ERM also utilized pedestrian survey with visual inspection to survey areas with surface visibility greater than 50 percent, areas with visual evidence of subsurface disturbance, areas with standing water, and areas of slope. These locations were marked as "no digs" along the transects and field conditions were photographed.

2.5 Geology

DEP scientists reviewed the existing geology-related general literature and maps of the southeastern Piedmont region and the study area. Using North Carolina Geological Survey Data maps, Pike was able to generate maps and find information about site-specific bedrock types, terranes/belts, structural features, formations, and presence of intrusions. Finally, DEP and Pike used the United States Department of Agriculture, Natural Resources Conservation Service database (including Web Soil Survey) to generate site-specific data reports for soil types, soil conditions, landforms, and soil profiles typical of the study area and the proposed project footprint.

2.6 Ecology

DEP scientists performed a desktop review of publicly available data, reviewed up-to-date in-house databases and GIS Natural Resource Viewers, and conducted on-site investigations that included an assessment for jurisdictional wetlands and waters of the U.S., federally and state protected species, and natural and vegetation communities.

DEP biologists conducted a reconnaissance-level survey of the proposed project area for wetlands and jurisdictional waters of the United States under Section 404 of the Clean Water Act (CWA). DEP used the methodology described in the U.S. Army Corps of Engineers (USACE) 1987 Wetland Delineation Manual, USACE Eastern Mountains and Piedmont Regional Supplement, the pre-2015 regulatory regime, and the North Carolina Division of Water Resources (NCDWR) Methodology for Identification of Intermittent and Perennial Streams and their Origins (Version 4.11) to examine the area and to review the USFWS's National Wetland Inventory (NWI) database. Within this exhibit, existing vegetative communities are described based on the Classification of the Natural Communities of North Carolina - Fourth Approximation (Schafale 2012).

2.7 Meteorology

DEP 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 Seismology

DEP scientists reviewed the USGS National Seismic Hazard Mapping database to obtain seismic data and the estimated Peak Ground Acceleration for the study area. They used the USGS Probabilistic Seismic Hazard Analysis Model that is part of the Seismic Hazard Mapping program to predict the probability of an earthquake (>5.0 magnitude) near the study area and assessed the USGS Earthquake Track website to identify and compile documented historic and recent earthquakes, the distance of earthquake epicenters from the study area, the depth of earthquakes from the surface, and magnitudes of the individual events. DEP scientists also reviewed USGS publications for information about seismic character in the southeastern United States.

2.9 Water Supply

DEP reviewed information from the North Carolina Department of Environmental Quality as well as internal databases and site data to compile the information regarding water supply, uses, and classification.

2.10 Aviation

Pike reviewed the Cincinnati Sectional Aeronautical Chart and the FAA Airport Database published by the U.S Department of Transportation, Federal Aviation–Aeronautical Information Services (08/06/2019) to determine the location of any aviation facilities within ten miles of the proposed facility. There are three private airports and one heliport located within ten miles of the Proposed Facility. There are three public airports located within 25 miles of the Proposed Facility.

Pike reviewed FAA notification criteria and entered the Proposed Facility's location coordinates, pad elevation, and stack height into the FAA Notice Criteria Tool on the FAA's website (Federal Aviation Administration 2017). The FAA's Notice Criteria Tool indicated that no notice is required.

If the highest structure and/or any construction equipment exceeds 200 feet, DEP would be required to submit a notice.

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PERSON COUNTY ENERGY COMPLEX

APPLICATION FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY

APPENDIX A

PERSON COUNTY ENERGY COMPLEX COMBINED-CYCLE GAS TURBINE ADDITION PROJECT NOISE IMPACT STUDY

Person County Energy Complex Combined-Cycle Gas Turbine Addition Project Noise Impact Study

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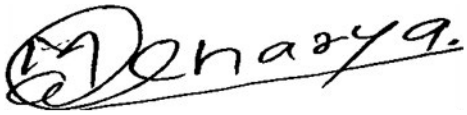

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Executive Summary

Existing Roxboro Steam

The existing Steam Station is located at 1700 Dunnaway Rd, Semora, North Carolina and has four coal-fired steam plants. The faceplate power generating capacity of the plants in megawatts (MW) are Unit 1-411 MW; Unit 2-657 MW; Unit 3-745 MW and Unit 4-745 MW. The plants operate based on energy load requirements. Thus, as few as one or as many as four plant units may be in operation. Plant units 3 and 4 are further separated into two independent subunits, i.e., subunits 3A, 3B, 4A and 4B. Subunits 3A, 3B, 4A and 4B can run independently from each other at half the capacity (350 MW).

Proposed Project

The proposed project will be to shut down coal-fired Units 1 and 4 permanently leaving Units 2 and 3 still running and construct a 2x1 combined-cycle combustion turbine ("CCGT") with heat recovery generators and steam turbine generators. The new system according to Duke Energy will have a total capacity of 1360 MW. It is in the southwest area of the property.

Existing Community Noise Levels

Noise measurements were performed north, west, and southwest of the Duke Energy Steam plant and future Combustion Turbine plant property lines to document the ambient noise levels at the nearest noise sensitive receptors. Two long term monitors were set up that measured noise continuously for over 40 hours, and two-minute duration handheld measurements were obtained. Measurement locations are indicated in Figure 1. Measurement results are documented in figures 3, 4, 5 and 6 and Appendix A, tables A1, A2 and A3. The L_{dn}'s for 24-hour noise monitors were L_{dn} 54.8 for monitor 1 and L_{dn} 61.8 for monitor 2. The loudest hourly L_{Aeq} (no penalty) for monitor 1 was 54.3 dBA on April 13 at 6 AM and for monitor 2 was 64.1 dBA on April 13 at midnight.

Noise Criteria

Based on review of available noise ordinances in Person and Caswell Counties, where we found a limit set for wind power and from our own experience, we are also limiting levels from Duke Power at their residential property lines to L_{Aeq} 55 dBA as criteria for considering an impact. The EPA document "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety" provides outdoor activity interference and annoyance effect of $L_{dn} \leq 55$ dBA for outdoors in residential areas and farms and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use and $L_{Aeq} \leq 55$ dBA for outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.

Impact of Future Project to Community

A SoundPLAN computer model was created using sound information of anticipated similar combustion turbines and measurements in the field of the existing coal-fired plant.

Future sound levels and resulting changes vary by location, but sound levels are not more than 55 dBA with all CCGT's and steam plants 2 and 3 operating at any adjoining property lines. Increases at the nearest neighbor to future plants is 3.9 dBA when comparing similar full power generation levels with coal car shaker noise (existing versus future) and thus not considered clearly noticeable.

Introduction

This report provides an evaluation of the potential noise impacts of proposed modifications to the Roxboro Steam Station in Semora, North Carolina. The modifications to be performed will be to shut down two coal-fired units and include a CCGT on the southwest portion of the property.

The noise impact evaluation is based on a comparison of the anticipated noise levels from the Roxboro Plant and CCGT with the County of Person and City of Roxboro Noise Ordinance and the existing ambient noise conditions.

Background on Sound and Sound Levels

Sound is produced by minute fluctuation in air pressure. Sound strength, whether pressure or power, is measured in decibels (dB), expressing the ratio of any two "power-like" quantities as a logarithmic ratio. 20 µPa is the reference for 0dB, making pressure of 1 Pascal (Pa) is equivalent to 94dB sound pressure level. Each change of 10 dB indicates 10 times as much sound present; doubling of sound energy results in an increase of 3 dB. The human hearing does not respond proportionately to the increase in energy of sound. A 3 dB change in sound level means twice or half as much sound energy, but to humans is just barely noticeable unless the frequency content or duration changes. A 5-6 dB change is three to four times as much sound energy and is noticeable to humans. A human perceives a 10 dB change in sound level as twice as loud.

The human hearing system does not respond to very low- or high-pitched sounds as well as those sounds in the speech range especially for lower amplitudes. A series of frequency weighting filters was developed to better report human reaction to sound amplitudes based on frequency content. Because ambient noise levels tend to be lower in amplitude, the most frequently used frequency filter to evaluate environmental noise is the A-weighting filter. When an A weighting filter is used, we usually report the results labeled as dBA.

Typical speech at 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. Typically, rural residential communities can be below 40 dBA, especially in less densely populated areas. More urban settings are often above 50dBA, especially near highways.

If there are instantaneous events, maximum noise levels are often used instead. 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. The slow time weighting was developed to better mimic a human ear's reaction to changes in sound pressure level. The fast response can be used levels are changing rapidly. To evaluate environmental noise sound levels are averaged over a period of time.

Sound is often reported as an average sound level over a specific period of time. The equivalent sound level, L_{Aeq}, is the level of a constant sound which has the same sound energy as does the time-varying sound over the same period-of-time. The time interval over which the measurement is taken should always be specified. Typically, this is done in one-hour increments for environmental sound.

The Community Noise Equivalent Level (CNEL) is defined as the equivalent sound level during a 24-hour day and calculated by adding the sound energy during the daytime (0700 to 1900 hours) to 3 times the sound energy during the evening hours (1900 to 2200) to 10 times the sound energy during the nighttime (2200 to 0700 hours). This is equivalent to a 3 dBA amount added in the evening and a 10 dBA amount added at night to better adjust reflect higher annoyance levels during these times.

The Day Night Level (DNL or L_{dn}) is defined as the equivalent sound level during a 24-hour day and calculated by adding the sound energy during the daytime and evening (0700 to 2200 hours) to 10 times the sound energy during the nighttime (2200 to 0700 hours). This is equivalent to a 10 dBA amount added at night, to better adjust reflect higher annoyance levels during these times.

Sound can also be described with specific percentages of a period of time to better document human reactions. Percentiles allow the consultant to document both the instantaneous noise events, as well as the consistent ambient noise levels. 1, and 10% levels (sound exceeded 1 and 10 % of the time) are used to indicate higher intermittent levels from the average value and 90% or 99% (sound exceeded 90 and 99% of the time) are used to indicate the steady part of the sound. "Fast" or "slow" response is chosen as part of all these measurements. These measurements are labeled L% so the level exceeded 90% of the time would be labeled L90.

Sound is determined by evaluating contributions from the sources, the effects of the path, and the location of the receivers. As the point source propagates over distance, the energy is distributed over a larger surface area. This corresponds to 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 a source to a receiver close to the ground. When the sound path propagates high above the ground there is less ground absorption impacting the energy reduction. Over long distances, atmospheric absorption reduces sound (primarily at the higher frequencies). Beyond 1000 feet or so this effect overcomes the inverse square effect at higher frequencies, thus higher frequencies are typically not significant at long distances. The presence of changes in topography can create shadow zones where sound from a sound source is attenuated 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 the ground is warmer than air higher in the sky and the sound curves upward. Generally, the loudest time for sound beyond the first few hundred feet is at sunset until an hour or so after sunrise. During this period, sound that starts upward will curve back downward, often not passing through sound reducing components such as the ground. Sound levels can be significantly reduced upwind from a source and increase downwind from a source. Trees can provide limited sound reduction over distances of approximately 300 feet. This is also dependent on the season and density of trees. Over short distances, the trees do not provide enough acoustical absorption to be significant. Over long distances sound can pass over the top of the trees due to the atmospheric curvature effect, limiting the sound reduction benefit.

Existing Roxboro Steam Station

The existing Roxboro Steam Station is located at 1700 Dunnaway Rd, Semora, North Carolina. Semora is an unincorporated community in Caswell County with some parts in Person County, North Carolina. The existing station has four coal-fired steam plants. The faceplate power generating capacity of the plants in megawatts (MW) are Unit 1-411 MW; Unit 2-657 MW; Unit 3-745 MW and Unit 4-745 MW. The plants operate based on energy load requirements. Thus, as few as one plant may be in operation and as many as all four plants may be in operation. Plant units 3 and 4 are further separated into two independent subunits, i.e., subunits 3A, 3B, 4A and 4B. Subunits 3A, 3B, 4A and 4B can run independently from each other at half the capacity (350 MW). During the site visit dates of April 12, 13 and 14, 2023, plant units 1 and 3B were operating.

Proposed Project

The proposed project will be to shut down coal-fired Units 1 and 4 permanently and construct a 2x1 combined-cycle plant, consisting of two advanced-class gas turbines, two heat recovery steam generators, and a steam turbine. The new system according to Duke Energy will have a total capacity of 1360 MW. The turbines have not yet been selected. However, as part of the project, the manufacturer will be required to limit the noise generated by each turbine to an average sound power level of 117 dBA during operation. The new combustion turbine plant will be in the southwest area of the property. Figure 1 shows the location.

Figure 1. Location of Future Roxboro CCGT

Noise Sensitive Receptors

Since the new combustion turbines will be operating on the southwest part of the property, Noise Sensitive Receptors in this area were evaluated. The Noise Sensitive Receptors evaluated are indicated in Figure 2 below. Receptor 1 is a residence to the north of the project site on Rock Point Drive. Receptor 2 is also a residence north of the project site on Beaver Dam Road. Receptor 3 is a residence west of the project site and the closest Noise Sensitive Receptor to the future combustion turbine plant. Receptor 4 is Woodland Elementary school located south of the project. Receptor 5 is the CertainTeed plant. The CertainTeed plant was chosen as a receptor to determine what type of environmental noise it contributes. Receptor 6 is on Roy Carver Road, just north of the CertainTeed plant.

In addition to the Roxboro Steam Plant, noise sources contributing to the existing ambient noise level include traffic on Roxboro Plant Road and Hwy 57. Power boat activity on Hyco Lake will impact the ambient noise level at Receptors 1, 2, and 3 primarily during the daytime. Figure 2 below identifies the Noise Sensitive Receptors.

Figure 2. Noise Sensitive Receptors

Ambient Noise Measurements

The existing ambient noise levels were measured along the perimeter of the Duke Energy Roxboro Steam Plant. Ambient noise levels will vary with time of day, time of year, atmospheric conditions, and plant operating conditions. Measurements were performed on April 12th, 13th, and 14th, 2023 for long term monitor locations 1 and 2. Noise measurements were obtained long enough data to record typical variations under current operating conditions. Long term monitors were manufactured by NTI Audio, model XL2. Serial numbers for Monitors 1 and 2 are A2A-18143-E0 and A2A-19429-E0, respectively.

Atmospheric conditions varied over the measurement period. Table 1 provides the weather during April 12 through 14 for Roxboro, NC. Roxboro is located 10 miles to the southeast of the Roxboro steam plant.

Table 1. Weather Conditions during Environmental Noise Measurements

Date:	April 12				April 13				April 14			
Time:	12 AM	6 AM	12 PM	6 PM	12 AM	6 AM	12 PM	6 PM	12 AM	6 AM	12 PM	6 PM
Hi Temp (F):	55	75	82	77	61	75	82	79	64	72	79	66
Low Temp (F):	48	48	79	61	52	52	81	66	61	63	70	64
Wind Speed (MPH):	5	4	8	5	6	7	8	7	3	3	4	4
Wind Direction:	WSW	WSW	W	WSW	WSW	WSW	WSW	S	S	E	N	NW
Humidity (%):	61	52	26	40	58	55	33	47	77	86	73	92

The sound was measured in octave bands as well as the overall A-weighted level. Statistical sampling was used to see the variation within each measurement period. A summary of the ambient noise measurements is reported in Table 2 below. Detailed overall hourly noise levels are reported in the Appendix. Figure A1 and A3 in the Appendix provides for the time histories of L_{ASmax} and L_{Aeq} for monitors 1 and 2, respectively. Figure A2 and A4 provides the statistical values over 1-hour time increments for L_{10}, L_{50}, L_{90}.

Table 2. Long-Term Measurements Summary

Location	L_{dn} 24-hour period	Loudest Hourly Leq and Time of Occurrence	Quietest Hourly Leq and Time of Occurrence
Long Term Measurement 1	L_{dn} 54.8, 10:00 PM, 4-12-2023 to 10:00 PM, 4-13-2023	L_{Aeq} 54.3 dBA @ 6:00 AM, 4-13-2023	L_{Aeq} 30.4 dBA @ 12:00 AM 4-13-2023
Long Term Measurement 2	L_{dn} 61.8, 10:00 PM, 4-12-2023 to 10:00 PM, 4-13-2023	L_{Aeq} 64.1 dBA @ 12:00 AM, 4-13-2023	L_{Aeq} 38.5 dBA @ 12:00 PM, 4-13-2023

Referring to Figure 2, Long-Term Monitor 1 is located directly west of the future combustion turbine plant near Roxboro Plant Road. Ambient daytime noise levels at monitor 1 were controlled by traffic on Roxboro Plant Road. The maximum vehicle sound levels reached 75 dBA. Vehicle noise levels quickly rose as the vehicle approached and subsided once the vehicle passed.

Other noise events heard were birds chirping, geese honking, insects, power boat engines, and an occasional propeller aircraft. The noise levels of birds chirping were in the 55-60 dBA range but persisted longer than cars passing. The maximum power boat engine noise was near 65 dBA and gradually increased and decreased compared to the automobiles due to the watercraft traveling at a slower speed. Insects were primarily heard starting in early evening. The nearest residential neighbors to monitor 1 are across the water 900 feet to the west. The quietest hour Leq was 30.4 dBA. Despite the traffic, the L_{dn} was 54.8 dBA and loudest hour L_{Aeq} was 54.3 dBA. Late night and very early morning hours had lower levels due to reduced road traffic noise on Roxboro Plant Road.

Monitor 2 is located at the north end of the coal train loop for the Roxboro steam plant. Train coupling is the primary noise. Train coupling noise was up to 75 dBA. Other plant noise heard was dozer/front end loader tracks clanking and their backup alarms. Dozer tracks and backup alarms were up to 56 dBA. An intercom/outdoor paging system could be heard also. Nighttime noise levels did not change significantly from daytime. This may be due to work activities at the Roxboro plant being around the clock continuous.

Monitor 2 noises measured that were not steam-plant related were aircraft, road vehicles and birds. Both jet and propeller aircraft could be heard at noise levels up to 62 dBA. Road vehicles were about 57-64 dBA. The nearest residential neighbors to monitor 2 are across the water to the north 2,770 feet and to the east at 2,000 feet. The quietest hour Leq was 38.5 dBA. The loudest hour was 64.1 dBA and the L_{dn} was 61.8 dBA. Levels reaching neighbors would be noticeably less since the tracks were near to the monitors.

Noise Criteria

The City of Semora, NC, is partially in Person and Caswell County.

The Caswell County Code of Ordinances, Article II, section 22-35, parts (a) and (b) are given below. It does not provide any noise limits.

(a) The following words, terms and phrases, when used in this article, shall have the meanings ascribed to them in this subsection, except where the context clearly indicates a different meaning:

Noise means any sound which annoys or disturbs humans or is unwanted or which causes or tends to cause an adverse psychological effect on human beings.

Noise disturbance includes any sound which endangers or injures the health of humans or disturbs a reasonable person of normal sensitivities.

(b) The use or maintenance of the following items or activities are prohibited if they create a noise or noise disturbance:

(1) Radios, television sets, musical instruments;

(2) Loudspeakers;

(3) Animals;

(4) Loading operations;

(5) Construction between the hours of 9:00 p.m. and 7:00 a.m.;

(6) Horns and signaling devices.

The Person County North Caroline Code of Ordinances does not provide noise level limits in terms of a measurable metric. It states:

> "It shall be unlawful for any person, or group of persons, regardless of number, to willfully make, continue, or cause to be made or continue, or assist in making or continuing, any loud, raucous and disturbing noise. For the purposes of this ordinance, such noise shall mean any sound which, because of its volume level, duration, and character, (i) annoys, disturbs, injures, or endangers the comfort, health, peace or safety of reasonable persons of ordinary sensibilities within Person County, or (ii) interferes seriously with neighboring residents' reasonable use and enjoyments of their properties."

From the Roxboro Unified Development Code (UDC), section 7.46.5 for Windfarm Noise it is stated:

> "Audible sound from a Wind Turbine shall not exceed fifty-five (55) dBA, as measured at any off-site occupied building of a Non-Participating Landowner."

From Roxboro UDC section 9.46.3 for Screening of Utilities and Mechanical Equipment it is stated:

> Locate noise-generating equipment to mitigate the impact on adjacent properties and public rights-of-way. Equipment that generates more than 60 decibels shall not be located next to a residential development or must incorporate mufflers or other noise-reducing equipment."

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 increase by 5 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.

Since the municipal code limits wind farms to 55 dBA at non-participating buildings, and mechanical equipment is limited to 60 dBA, this report has used 55 dBA L_{Aeq}, the stricter of the two requirements, as the Threshold of Significant Impact. Significant increases (greater than 5 dBA) over existing noise levels from all sources are also considered a significant impact.

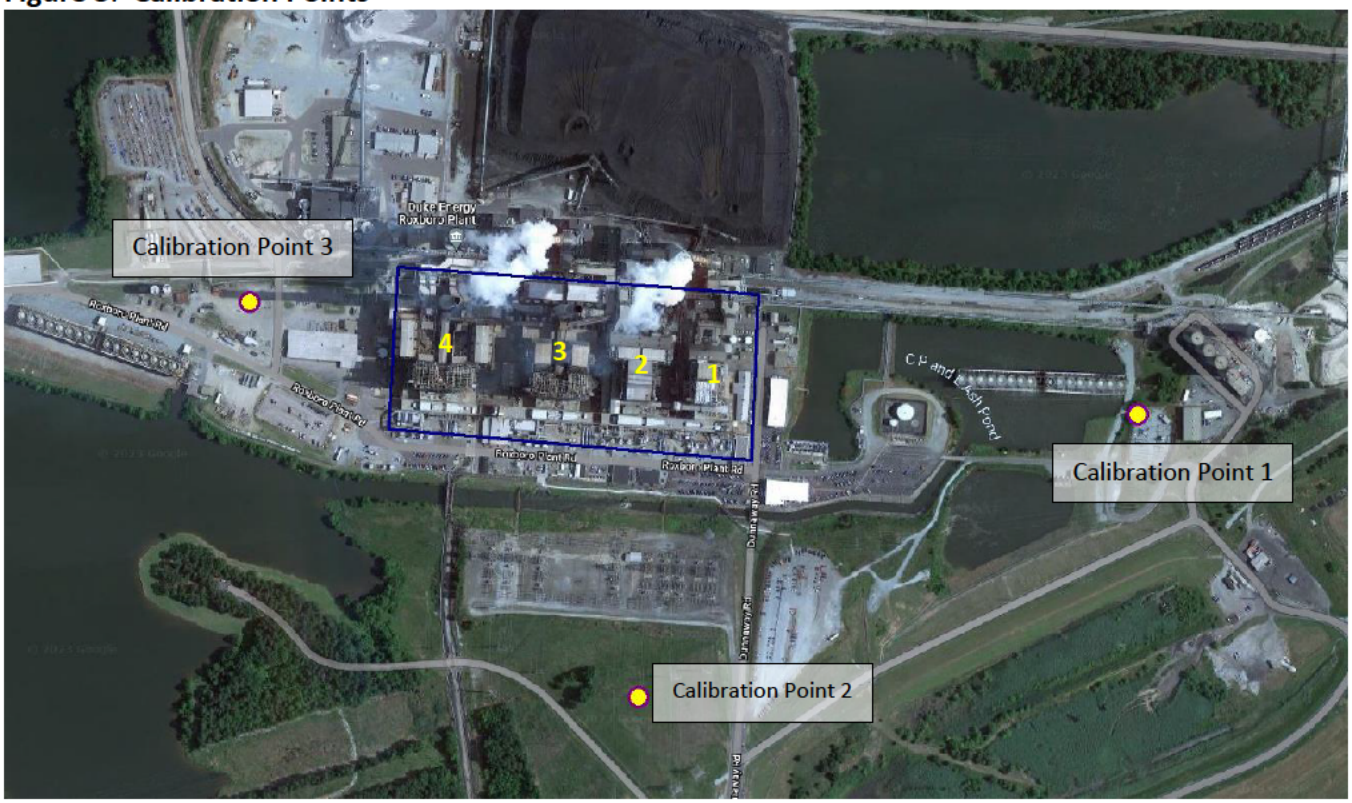
Sound Power Estimation

Sound Power Estimation for the Existing Coal-Fired Plant (Units 1-4)

The maximum noise condition of the existing coal-fired plant occurs when all four units are at maximum capacity. The maximum generating capacity of the plants on the nameplate is 2558 MW. We were provided slightly different numbers for power generation as Unit 1 with 380 MW, Unit 2 with 670 MW, and Units 3 and 4 producing 700 MW each for a total of 2,450 MW. On April 14th, Unit 1 produced 380 MW and Unit 3B 350 MW (dual unit – one boiler operating). We needed to determine the sound power of these operating units, then we could scale the sound power to an estimated overall sound power with all four units running at maximum capacity.

To determine the sound power of Units 1 and 3B, we needed sound pressure level measurements at known distances from the operating units or their individual noise radiating pieces of equipment. This is an open plant design with a significant number of exposed sound-radiating pieces of equipment. Fortunately, we were able to get some distance from the units and still measure sound levels well above the background noise of any other sources. This allowed us to get a very accurate overall sound power of the equipment that was operating without having to measure the many smaller pieces of equipment. We were able to obtain 3 calibration points at locations shown in Figure 6 below, which were all at different directions and distances. The most useful was calibration point 2, as it is nearly equidistant from all units. We modeled the noise source in SoundPLAN and then calibrated the sound power radiating from the two operating units such that the sound level in the model matched the sound levels we measured in the field at the calibration points.

Figure 3. Calibration Points



The total sound power level (Lw) of these two units was calculated to be **131.4 dBA**. This is typical of what we would expect for units of this type, very reasonable.

Existing Sound Power (all units running) - Next, the Lw (sound power level) has been corrected to all four units are operating at total capacity, with Units 3 and 4 producing 700 MW each, Unit 2 generating 670 MW, and Unit 1 producing 380 MW. The simplest scaling method, given most of the equipment has dual boilers or single boilers at 350-380 MW, was to scale the acoustic energy based on the increase in power (MW). In acoustics, this is done by using a power like scaling of 10 LOG ($MW_{(all\ units\ running)}/MW_{(units\ 1\ and\ 3b)}$) or +5.26 dBA. This is a reasonable assumption and is the best we can do without measuring each unit when it is operating. Thus, the total sound power with all four units running is **136.6 dBA**.

Future Sound Power (Units 2 and 3) - From this we then needed to estimate the future sound power of this equipment once Units 1 and 4 are offline for the future condition. To do this, we similarly performed a 10 LOG ($MW_{(units\ 2\ and\ 3)}/MW_{(all\ units\ running)}$) which results in -2.5 dBA change and total sound power of **134.1 dBA**. The footprint of our future condition model source was also reduced to match the footprint of units 2 and 3.

Thus, it is important to note that the change in noise level of the coal-fired plants is estimated to be only -2.5 dBA. If for some reason units 2 and 3 are significantly quieter than units 1 and 4 (which we did not observe for 3b versus 1), the reduction could be more.

Coal and Limestone Rail-Car Shakers

Figure 4. Shaker Locations

There were no deliveries of coal during our visits or the monitoring. We did have one limestone delivery during the monitoring period. Levels were not noticeable above plant noise for this delivery at the nearest monitoring location. We have historical data for this kind of source that we relied on. Only one shaker will operate at a time, so we chose to represent the sound from the coal-car shaker location. Available public resources indicate sound powers (calculated from known distances and sound pressure levels in some cases) for this type of shaker (open) range from 122-129 dBA. Other kinds that rotate the entire unit are less. Our own measurements at Lee County Steam Station (when it was still operating) and the Asheville plant had sound power levels of 134-137 dBA. We chose to estimate the sound power (Lw) at **129.2 dBA** using data collected from Marshall Steam Station in Catawba County. This is approximately in the middle of this range.

The number of trains per year was estimated using the information from personnel at Duke Energy to be 240. Each train takes 3.5 hrs. to unload. This is thus 840 hours a year out of a total of 8760 hours in the year or 9.6% of the year. This is significant. We chose to show the sound levels with the coal car shaker as a result in evaluating impact of this CCGT addition.

Estimation of Sound Power Levels for the New CCGT plant.

Burns and McDonnell (B&M) produced a basic noise study of the future plant that provided a table of sound power levels for most sources, and the interior sound pressure level for buildings with an STC rating of the construction provided (attachment 1 – p.5). We created a library of sources for use in our model from this table. We had to guestimate the construction to ensure controlled to the stated 85 dBA at 3 ft. It should be noted it took 14 ga steel to do that, as lighter construction let too much low frequency energy radiate from the building. Using the provided site plan contained in that report (Figure 2.1) and other project maps provided by Duke Energy, we located these sources on a site plan. For the buildings we estimated the height from 3d views provided of the buildings.

We made some different decisions about ground absorption than B&M (we have treated water surfaces and hard surfaces different than natural areas) and we may have a different topography that we used (we did our best to level the site based on the range of the levels of the natural site). That said, we have good agreement with their data when we compare noise contours close to the site layout. We assumed the roofs to be radiating the same as the walls. It is not clear whether B&M modeled the roof as radiating or not. Our levels at a distance from just the Combustion Turbine plant are higher than the B&M (+6.5 dB at the critical receiver). The buildings are more important than the Cooling towers because atmospheric absorption reduces cooling tower noise quite well. 2-3 dBA of the increase is from the reflective water and plant surface. 0-2 dBA may be from topography differences. The rest (2-4.5 dBA) may be due to differences in how the buildings were modeled. One likely difference is the amount of lower frequency noise radiating from the building (which is less influenced by ground, topography, and air absorption effects). Another difference could be how/if the roof radiated noise. Up close, near the site, there is no difference in our contours.

The color-coded figure that follows shows the contributions of the various noise sources. Please note how the spectrum and level of the building sources is different, as the B&M results were based on an interior sound pressure level and an unspecified STC 32 construction, and not presented as total sound

power. For ease of ranking sources, we have shown this total sound power for each surface of each building.

Their total sound power with all equipment including the buildings is **124.0 dBA**. The 8-cell cooling tower has a sound power of **119.9 dBA** – 39% of the total sound power.> The sound power of the CCGT, BFP (2), and STG buildings is **119.3 dBA** (about half from the roofs), 34% of the total sound power. The balance of equipment makes up the remaining 27% **(118.4 dBA)**. Again, notice the red from the buildings in the lower frequencies. This propagates further than the cooling towers.

Table 3 – B&M Estimated Sound Power Levels of Proposed CCGT Addition Equipment

Sound power levels of future CCGT plant addition major noise sources									
Name	63.0	125.0	250.0	500.0	1000.0	2000.0	4000.0	8000.0	A-weighted overall level
037 Cooling Tower	95.8	103.9	108.4	109.8	113.0	113.2	114.0	110.9	119.9
STG BLDG-Roof 01	107.4	109.5	104.0	96.4	82.6	68.8	51.6	28.5	112.8
CCGT BLDG-Roof 01	109.4	108.5	102.0	96.4	85.6	72.8	58.6	34.5	112.7
STG BLDG-Facade 02	102.9	105.0	99.5	91.9	78.1	64.3	47.1	24.0	108.3
STG BLDG-Facade 04	102.9	105.0	99.5	91.9	78.1	64.3	47.1	24.0	108.3
CCGT BLDG-Facade 01	104.3	103.4	96.9	91.3	80.5	67.7	53.5	29.4	107.6
CCGT BLDG-Facade 03	104.3	103.4	96.9	91.3	80.5	67.7	53.5	29.4	107.6
045 Generator Step Up	77.8	91.9	99.4	104.8	92.0	88.2	81.0	73.9	106.3
045 Generator Step Up	77.8	91.9	99.4	104.8	92.0	88.2	81.0	73.9	106.3
045 Generator Step Up (@STG BLDG)	77.8	91.9	99.4	104.8	92.0	88.2	81.0	73.9	106.3
025 Gas Turbine Air Inlet 1	78.8	84.9	85.4	86.8	91.0	97.2	105.0	93.9	106.2
025 Gas Turbine Inlet Face 2	78.8	84.9	85.4	86.8	91.0	97.2	105.0	93.9	106.2
001 HRSG Upstream	103.8	92.9	84.4	80.8	78.0	96.2	92.0	79.9	105.7
001 HRSG 2 Upstream	103.8	92.9	84.4	80.8	78.0	96.2	92.0	79.9	105.7
002 HRSG 1 Stack	85.8	85.9	85.4	83.8	100.0	103.2	96.0	85.9	105.7
002 HRSG 2 Stack	85.8	85.9	85.4	83.8	100.0	103.2	96.0	85.9	105.7
025 Gas Turbine Air Inlet House	71.8	82.9	90.4	88.8	88.0	103.2	100.0	81.9	105.3
025 Gas Turbine Air Inlet House 2	71.8	82.9	90.4	88.8	88.0	103.2	100.0	81.9	105.3
STG BLDG-Facade 01	99.8	101.9	96.4	88.8	75.0	61.2	44.0	20.9	105.2
STG BLDG-Facade 03	99.8	101.9	96.4	88.8	75.0	61.2	44.0	20.9	105.2
007 HRSG Blowdown Tank Sump and Pumps	66.8	84.9	96.4	98.8	99.0	96.2	92.0	67.9	104.1
007 HRSG Blowdown Tank Drain Sump and Pumps	66.8	84.9	96.4	98.8	99.0	96.2	92.0	67.9	104.1
CCGT BLDG-Facade 02	100.4	99.5	93.0	87.4	76.6	63.8	49.6	25.5	103.8
CCGT BLDG-Facade 04	100.4	99.5	93.0	87.4	76.6	63.8	49.6	25.5	103.8
001 HRG Transistion	83.8	83.9	83.4	81.8	98.0	101.2	94.0	83.9	103.6
001 HRSG 2 Transition	83.8	83.9	83.4	81.8	98.0	101.2	94.0	83.9	103.6
019 GT4s Cooler 1	82.8	91.9	96.4	96.8	98.0	93.2	87.0	78.9	103.0
019 GT4s Cooler	82.8	91.9	96.4	96.8	98.0	93.2	87.0	78.9	103.0
BFP BLDG 1-Roof 01	98.7	97.8	93.3	89.7	88.9	74.1	53.9	25.8	102.6
011 Ammonia Control Flow Unit	78.8	82.9	90.4	92.8	95.0	95.2	94.0	87.9	101.1
011 Ammonia Control Flow Unit	78.8	82.9	90.4	92.8	95.0	95.2	94.0	87.9	101.1
013 Enhanced Cooling Air Pumps	52.8	72.9	80.4	87.8	97.0	96.2	92.0	77.9	100.6
046 Auxiliary Transformer 1	68.8	82.9	87.4	98.8	94.0	85.2	80.0	71.9	100.5
046 Auxiliary Transformer 2	68.8	82.9	87.4	98.8	94.0	85.2	80.0	71.9	100.5
BFP BLDG 2-Roof 01	96.4	95.5	91.0	87.4	86.6	71.8	51.6	23.5	100.3
002 HRSG 1 Stack Exit	96.8	94.9	88.4	83.8	82.0	81.2	77.0	54.9	100.3
002 HRSG 2 Stack Exit	96.8	94.9	88.4	83.8	82.0	81.2	77.0	54.9	100.3
012 Duct Burner Skid	76.8	88.9	88.4	83.8	89.0	94.2	95.0	89.9	99.7
012 Duct Burner Skid 2	76.8	88.9	88.4	83.8	89.0	94.2	95.0	89.9	99.7
006 HRSG Blow down tank 1	61.8	79.9	91.4	93.8	94.0	91.2	87.0	62.9	99.1
006 HRSG Blowdown tank 2	61.8	79.9	91.4	93.8	94.0	91.2	87.0	62.9	99.1
BFP BLDG 1-Facade 02	94.4	93.5	89.0	85.4	84.6	69.8	49.6	21.5	98.3
BFP BLDG 1-Facade 04	94.4	93.5	89.0	85.4	84.6	69.8	49.6	21.5	98.3
BFP BLDG 1-Facade 01	93.3	92.4	87.9	84.3	83.5	68.7	48.5	20.4	97.2
BFP BLDG 1-Facade 03	93.3	92.4	87.9	84.3	83.5	68.7	48.5	20.4	97.2
013 Cooling Air Cooler Pump	68.8	80.9	88.4	90.8	91.0	88.2	89.0	83.9	97.0
016 Cooling Air Skid	68.8	80.9	88.4	90.8	91.0	88.2	89.0	83.9	97.0
016 Cooling Air Skid	68.8	80.9	88.4	90.8	91.0	88.2	89.0	83.9	97.0
016 Cooling Air Skid Pump 1	68.8	80.9	88.4	90.8	91.0	88.2	89.0	83.9	97.0
052 GT2C Cooler	68.8	80.9	88.4	90.8	91.0	88.2	89.0	83.9	97.0
052 GT2C Cooler 2	68.8	80.9	88.4	90.8	91.0	88.2	89.0	83.9	97.0
079 Fuel Pump 2	68.8	80.9	88.4	90.8	91.0	88.2	89.0	83.9	97.0
079 Fuel Oil Forwarding Pump 1	68.8	80.9	88.4	90.8	91.0	88.2	89.0	83.9	97.0
079 Fuel Oil Forwarding Pump 3	68.8	80.9	88.4	90.8	91.0	88.2	89.0	83.9	97.0
079 Fuel Oil Forwarding Pump 4	68.8	80.9	88.4	90.8	91.0	88.2	89.0	83.9	97.0
BFP BLDG 2-Facade 02	92.5	91.6	87.1	83.5	82.7	67.9	47.7	19.6	96.4
BFP BLDG 2-Facade 04	92.5	91.6	87.1	83.5	82.7	67.9	47.7	19.6	96.4
001-HRSG 1 Downstream	94.8	82.9	74.4	68.8	67.0	84.2	79.0	66.9	96.2
001 HRSG 2 Downstream	94.8	82.9	74.4	68.8	67.0	84.2	79.0	66.9	96.2
BFP BLDG 2-Facade 01	91.9	91.0	86.5	82.9	82.1	67.3	47.1	19.0	95.8
BFP BLDG 2-Facade 03	91.9	91.0	86.5	82.9	82.1	67.3	47.1	19.0	95.8

Predicted Noise Levels from Plant

The noise contour for the maximum power output (2450 MW) operating condition for the existing Roxboro steam plant (including coal car shaker) is shown in Figure 5. The noise contour of the future CCGT operating and with Units 2 and 3 operating at their maximum capacity (1370 MW) with the coal-car shaker is shown in Figure 6.

The noise level difference between the future CCGT with coal-fired steam plant (remaining units 2 and 3) at maximum operating condition and coal car shaking minus the current steam plant maximum operating condition with coal car shaking is shown in Figure 7. From the Noise Criteria section, noise level increases of 3-4 dB over the current steam plant will not be clearly noticeable. At an increase of noise from the power plants of 5 or more decibels, then other community noise sources present are a more significant factor as is the overall sound level.

Figure 8 provides the existing Roxboro steam plant at maximum output (2450 MW) with no coal car shaking. As stated in the body of the report, the rail car shaker is a part of the maximum noise condition that will be experienced and thus is included in making comparisons between future and existing conditions. However, it is not a dominant noise source for the plant, as can be seen in comparing Figure 8 and Figure 5.

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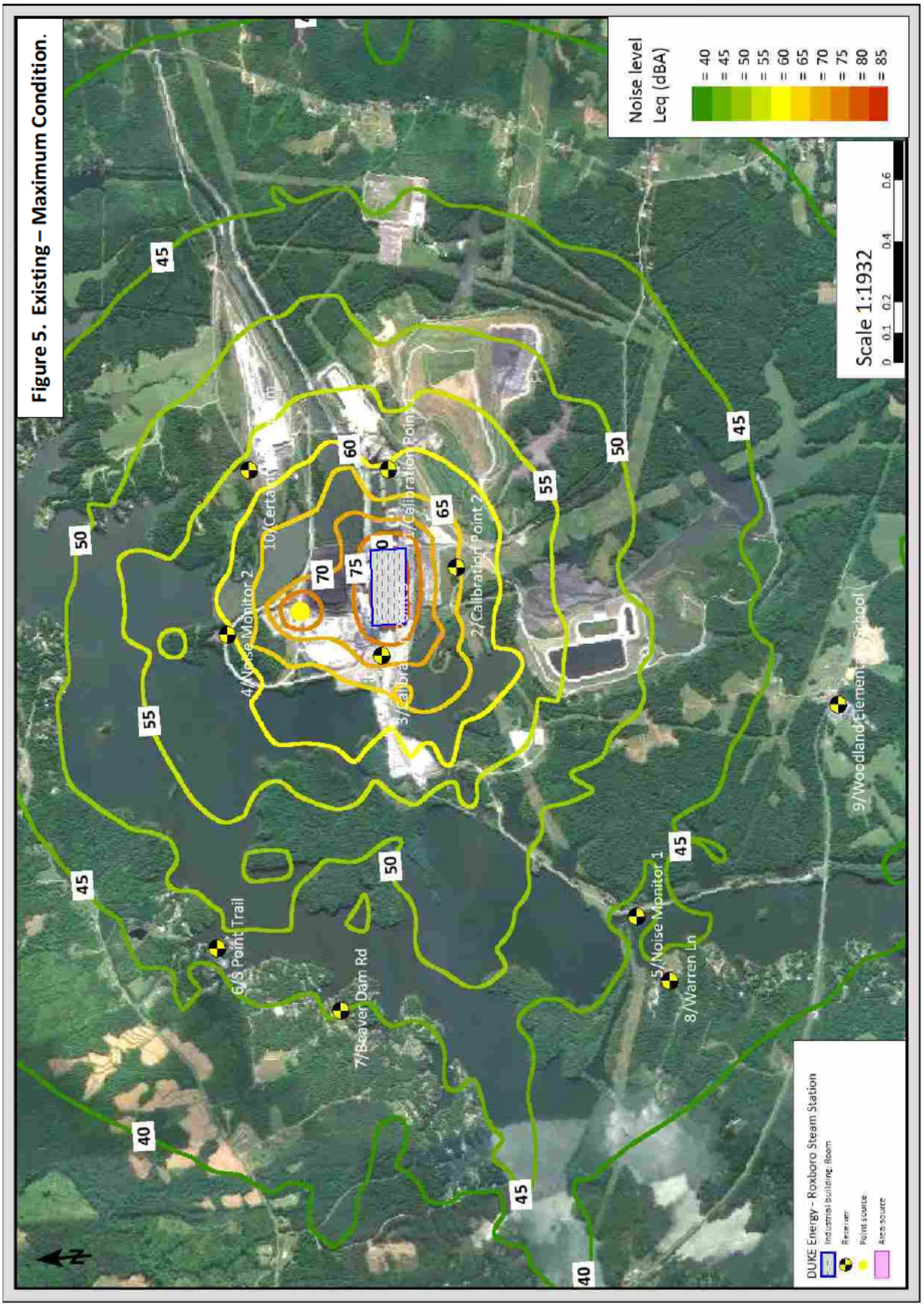

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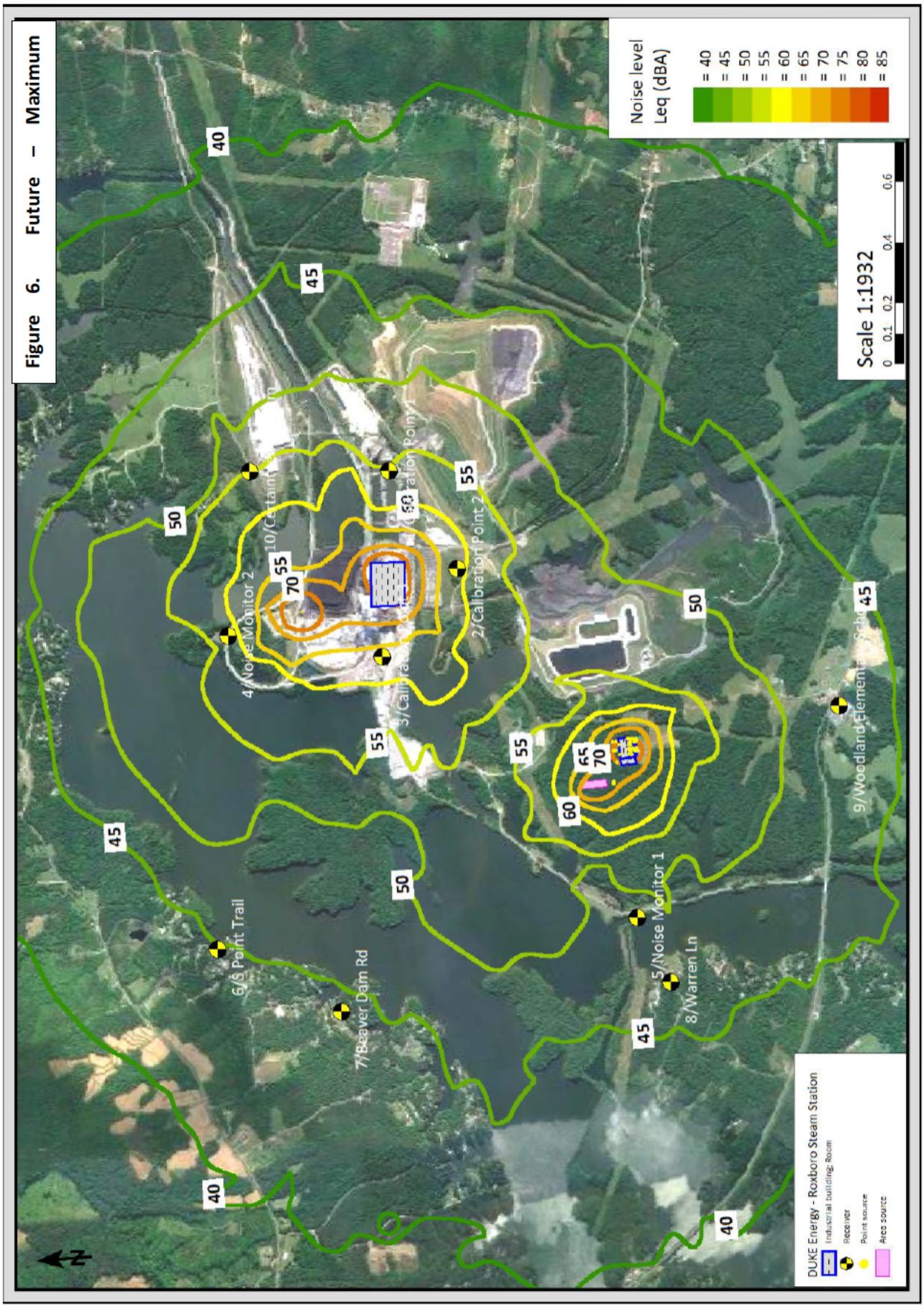
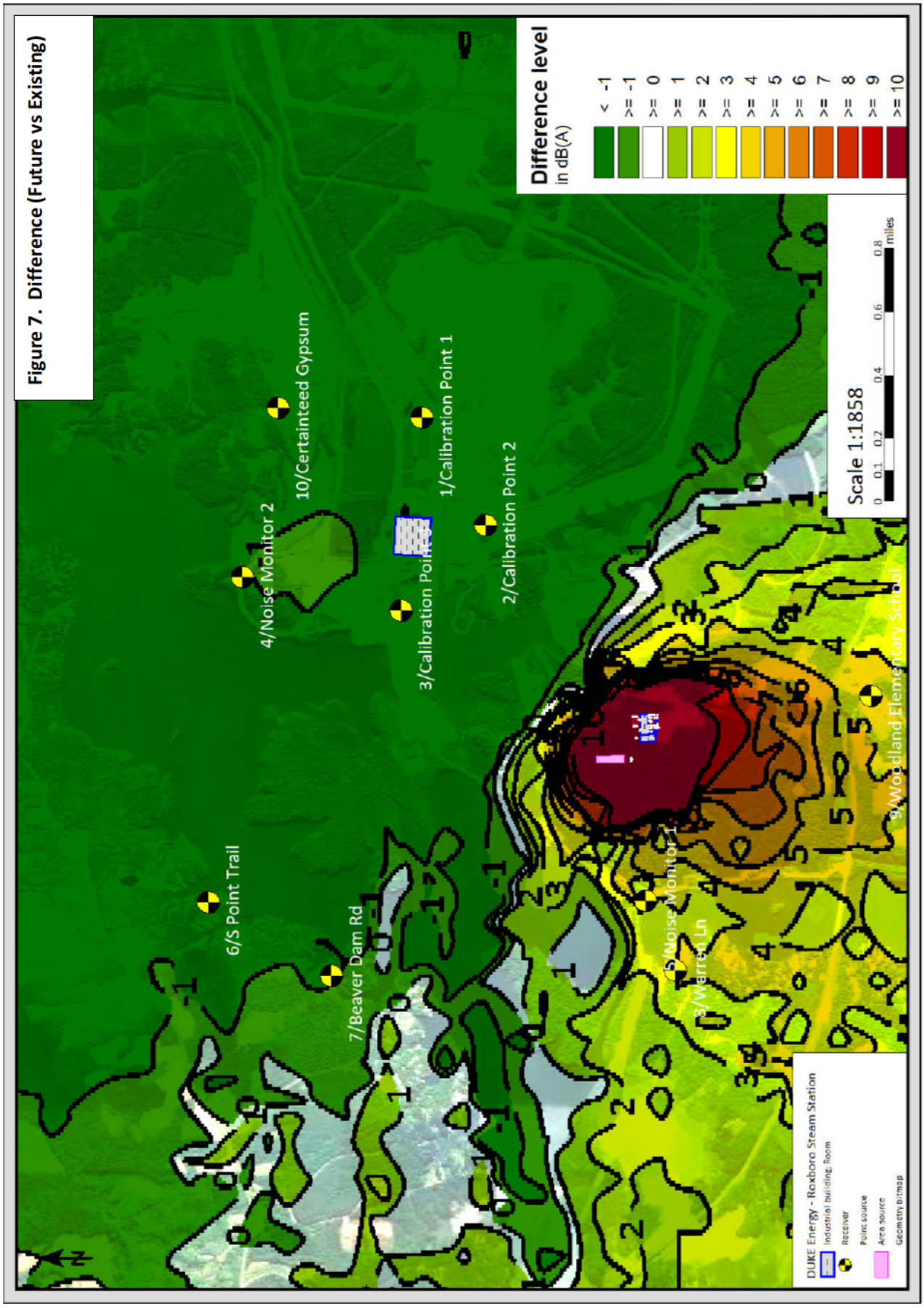


Figure 6. Future – Maximum



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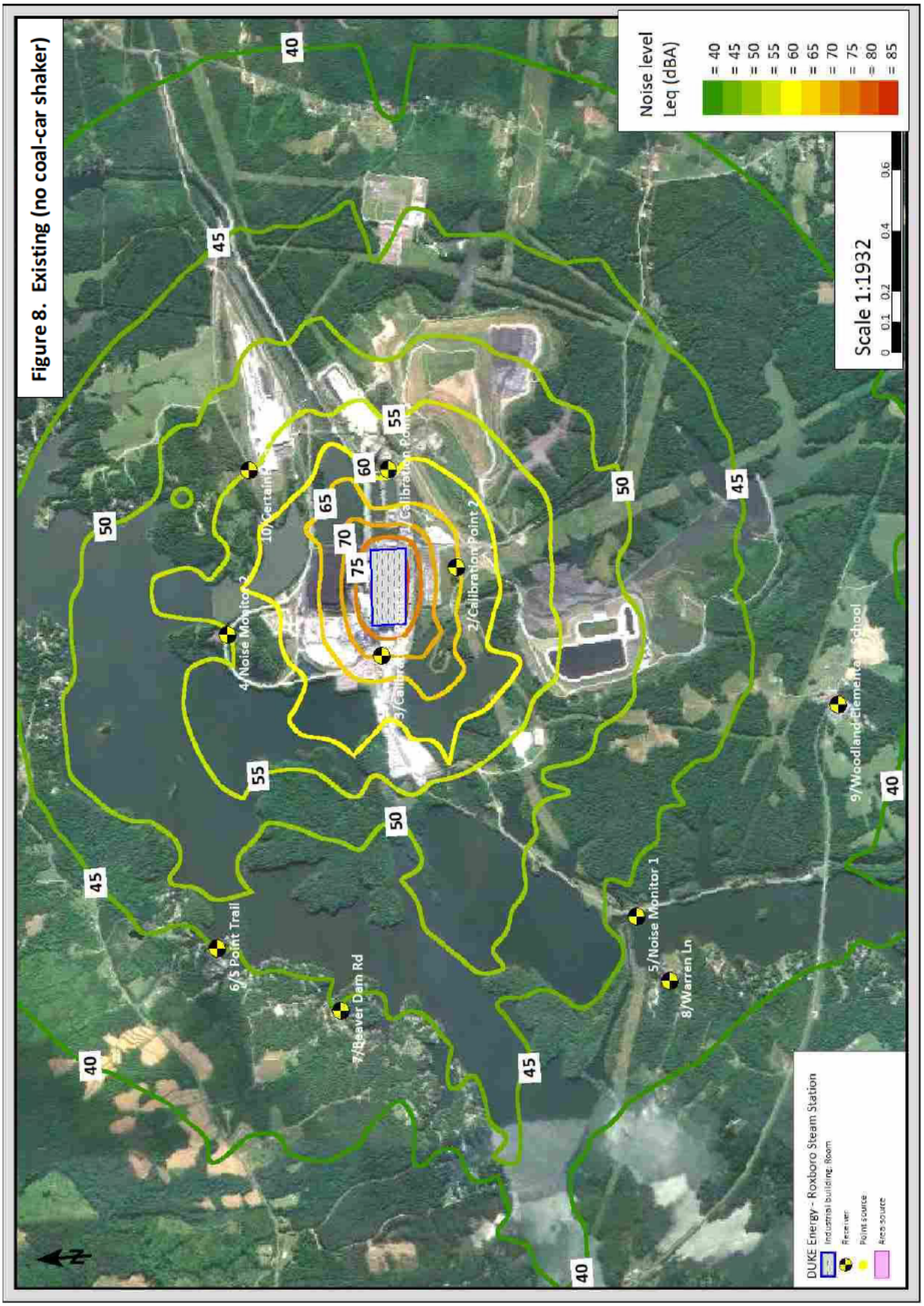


Noise Impact Evaluation

Table 4 shows the measured noise levels at noise receptors and those calculated at SoundPLAN for existing conditions with the steam plant at maximum operating condition (2450 MW) and at the maximum operating condition for the future CCGT and steam plant.

Table 4. Noise Levels at Receptors for Measured, Existing Maximum Capacity, Future Maximum Capacity.

Loc ID	Location	Measured L_{Aeq}	Existing Max Steam + Shaker SoundPLAN L_{Aeq}	Future Max Steam + Shaker +CCGT SoundPLAN L_{Aeq}	Increase
1	South Point Trail	41.8	46.5	44.3	No
2	Beaver Dam Road	44.1	45.5	44.5	No
3	Warren Lane	34.8	43.2	47.1	3.9 dBA
4	Woodland Elementary School	58.5	42.7	47.7	No, because of existing traffic on Hwy 57
5	CertainTeed Plant	59.5	57.2	54.9	No
2	Beaver Dam Road	42.1	45.5	44.5	No
3	Warren Lane	38.1	43.2	47.1	3.9 dBA

The residences on Warren Lane, which is directly west of the new CCGT plant will be the residences most affected by the addition of the new CCGT plant. However, increases are only 3.9 dBA from what they experience now when in full operation and levels are below 50 dBA. Residences on Spinnaker Lane will also be affected to a lesser extent. The results presented in Table 4 are for the CCGT plant operating at maximum capability. The CCGT plant operating at lower power output will have lower sound power, and lower sound levels.

Near Hwy 57 (Semora Rd), Woodland Elementary School, businesses Pointer & Associates and West & Woodall Real Estate, and residence at 100 Spinnaker Lane will have higher sound levels with the future CCGT plant than currently exists with the Roxboro steam plant. However, due to Hwy 57 producing significant vehicle noise, the school, businesses, and residents being close to Hwy 57 will not experience a large overall increase in their total environmental noise.

The locations to the north and east of the current steam plant will experience a noise decrease when steam plants 1 and 4 are permanently retired. The environmental noise at the CertainTeed plant will experience a 2.3 dB lower noise level when steam plants 1 and 4 are retired. The residence on South Point Trail will experience a 2.2 dB noise decrease with the retirement of steam plants 1 and 4.

Beaver Dam Road residences are located such that they will experience no noise increase when the CCGT is operating, and steam plants 1 and 4 are retired. As expected, locations north and east of the current steam station will experience a noise reduction when the CCGT plant starts to operate and steam plants 1 and 4 are also retired. Also, as expected, locations west and south of the future CCGT plant will experience a noise increase.

Sound levels are not more than 55 dBA with all CCGT's operating at any adjoining property lines. Increases at the nearest neighbor to the future plant is 3.9 dBA when comparing similar full power generation levels with coal car shaker noise (existing versus future) and thus not considered clearly noticeable.

Appendix A – Detailed Sound Measurements

Table A1. Noise sensitive receptor sound measurements obtained Friday, April 13 and 14, 2023.

Loc ID	Location	GPS N	GPS W	File	L_{Aeq}	L_{ASmax}	L_{10}	L_{50}	L_{90}
1	Rock Pointe Drive	36.492379°	-79.093334°	014	41.8	49.7	44.2	40.2	38.1
2	Beaver Dam Road	36.486644°	-79.097694°	015	44.1	54.2	47.7	39.5	35.8
3	Warren Lane	36.470932°	-79.097085°	016	34.8	39.4	35.8	34.5	33.7
4	Woodland Elementary School	36.462090°	-79.081344°	017	58.5	69.4	63.8	51.8	38.3
5	CertainTeed Plant	36.489004°	-79.065130°	018	59.5	60.6	60.1	59.4	59.0
6	Roy Carver Road	36.490150°	-79.061128°	019	47.4	48.7	48.1	47.3	46.3
2	Beaver Dam Road	36.486644°	-79.097694°	027	42.1	51.7	46.5	37.5	35.4
3	Warren Lane	36.470932°	-79.097085°	028	38.1	43.7	40.4	37.9	33.8

Table A2. Noise Monitor 1, Location GPS N 36.472229°, GPS W -79.093069°, April 12, 13 and 14, 2023, A-weighted (dBA)

Type	Start	Duration	LASmax	LAeq	L_{10}	L_{50}	L_{90}
60'	2023-04-12 12:00:00	0:48:00	73.1	50.2	49.1	36.4	29.6
60'	2023-04-12 13:00:00	1:00:00	77.2	51.5	49.0	33.0	28.8
60'	2023-04-12 14:00:00	1:00:00	79.0	52.5	49.6	35.3	30.5
60'	2023-04-12 15:00:00	1:00:00	74.6	51.4	47.8	36.9	32.0
60'	2023-04-12 16:00:00	1:00:00	75.2	49.4	44.2	36.0	31.6
60'	2023-04-12 17:00:00	1:00:00	76.1	51.7	47.9	38.3	34.2
60'	2023-04-12 18:00:00	1:00:00	76.0	51.5	48.9	38.5	34.4
60'	2023-04-12 19:00:00	1:00:00	66.2	46.1	48.5	38.6	32.9
60'	2023-04-12 20:00:00	1:00:00	63.4	44.6	46.9	41.1	37.2
60'	2023-04-12 21:00:00	1:00:00	57.1	41.8	43.6	35.9	30.5
60'	2023-04-12 22:00:00	1:00:00	51.2	36.4	39.7	32.4	25.8
60'	2023-04-12 23:00:00	1:00:00	54.5	36.2	38.3	28.3	21.9
60'	2023-04-13 00:00:00	1:00:00	50.1	30.4	33.6	23.7	21.3
60'	2023-04-13 01:00:00	1:00:00	52.7	32.3	34.8	25.6	21.3
60'	2023-04-13 02:00:00	1:00:00	48.9	30.7	33.4	22.9	20.8
60'	2023-04-13 03:00:00	1:00:00	64.8	36.6	36.1	23.8	20.5
60'	2023-04-13 04:00:00	1:00:00	71.8	45.3	40.1	32.8	25.8
60'	2023-04-13 05:00:00	1:00:00	73.3	53.6	52.0	40.1	31.1
60'	2023-04-13 06:00:00	1:00:00	74.9	54.3	53.3	45.4	40.2
60'	2023-04-13 07:00:00	1:00:00	69.4	49.7	48.3	43.9	40.5
60'	2023-04-13 08:00:00	1:00:00	73.3	48.3	46.5	41.6	38.2
60'	2023-04-13 09:00:00	1:00:00	77.6	51.1	50.1	39.5	35.5
60'	2023-04-13 10:00:00	1:00:00	76.4	52.2	48.5	40.9	35.1
60'	2023-04-13 11:00:00	1:00:00	81.8	53.9	47.2	42.6	39.6
60'	2023-04-13 12:00:00	1:00:00	74.0	51.5	47.9	40.3	31.2
60'	2023-04-13 13:00:00	1:00:00	73.9	48.2	48.2	37.7	31.5
60'	2023-04-13 14:00:00	1:00:00	73.8	49.2	47.1	37.6	32.5
60'	2023-04-13 15:00:00	1:00:00	69.7	49.7	50.0	38.2	33.7
60'	2023-04-13 16:00:00	1:00:00	75.5	50.8	48.4	38.4	34.4
60'	2023-04-13 17:00:00	1:00:00	72.3	49.7	49.2	41.4	37.5
60'	2023-04-13 18:00:00	1:00:00	78.4	52.5	48.8	42.5	38.4
60'	2023-04-13 19:00:00	1:00:00	64.7	45.2	46.8	40.3	36.7
60'	2023-04-13 20:00:00	1:00:00	64.9	44.3	46.7	41.2	35.3
60'	2023-04-13 21:00:00	1:00:00	60.8	43.0	45.4	40.6	31.5
60'	2023-04-13 22:00:00	1:00:00	48.8	35.2	38.6	32.2	27.1
60'	2023-04-13 23:00:00	1:00:00	46.2	33.9	36.7	32.3	28.3
60'	2023-04-14 00:00:00	1:00:00	45.4	31.8	33.5	29.4	23.7
60'	2023-04-14 01:00:00	1:00:00	53.4	32.0	30.7	24.0	21.4
60'	2023-04-14 02:00:00	1:00:00	51.6	29.4	32.3	22.7	20.5
60'	2023-04-14 03:00:00	1:00:00	66.3	37.0	33.7	26.1	21.9
60'	2023-04-14 04:00:00	0:46:06	57.6	35.5	33.6	24.8	21.9

Figure A1. Monitor 1 - L_{Aeq} and L_{ASmax} Time Histories West of New CCGT Site.

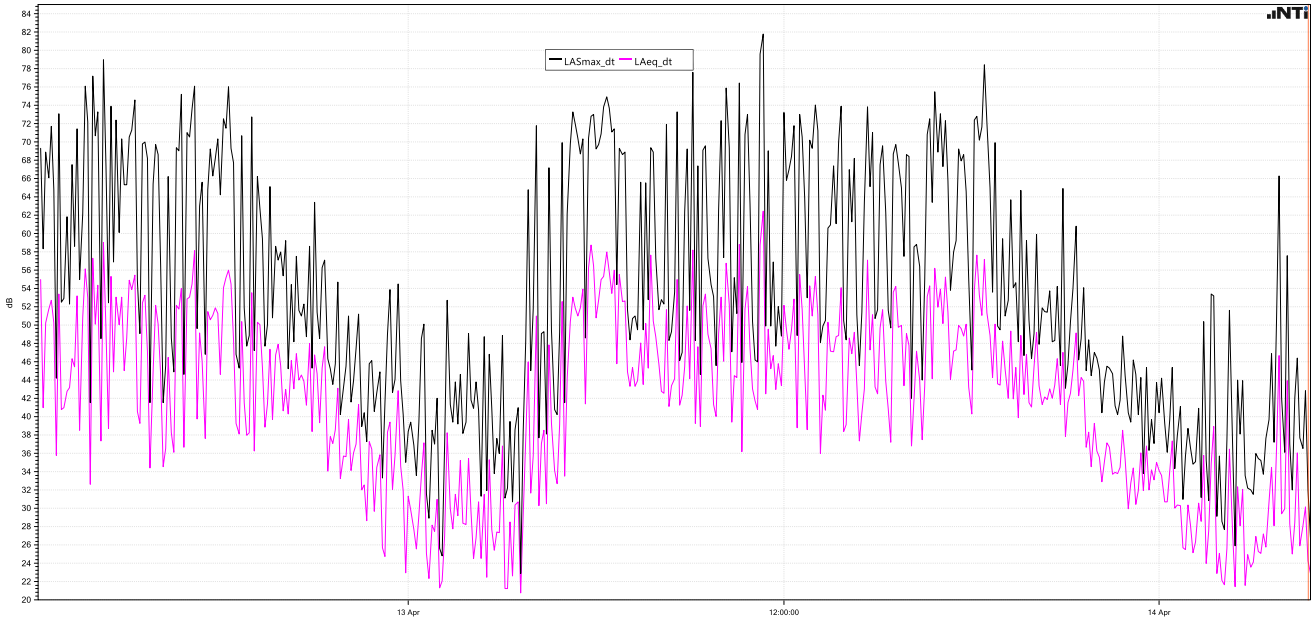


Figure A2. Monitor 1 - L_{10}, L_{50} and L_{90} Time Histories West of New CCGT site.

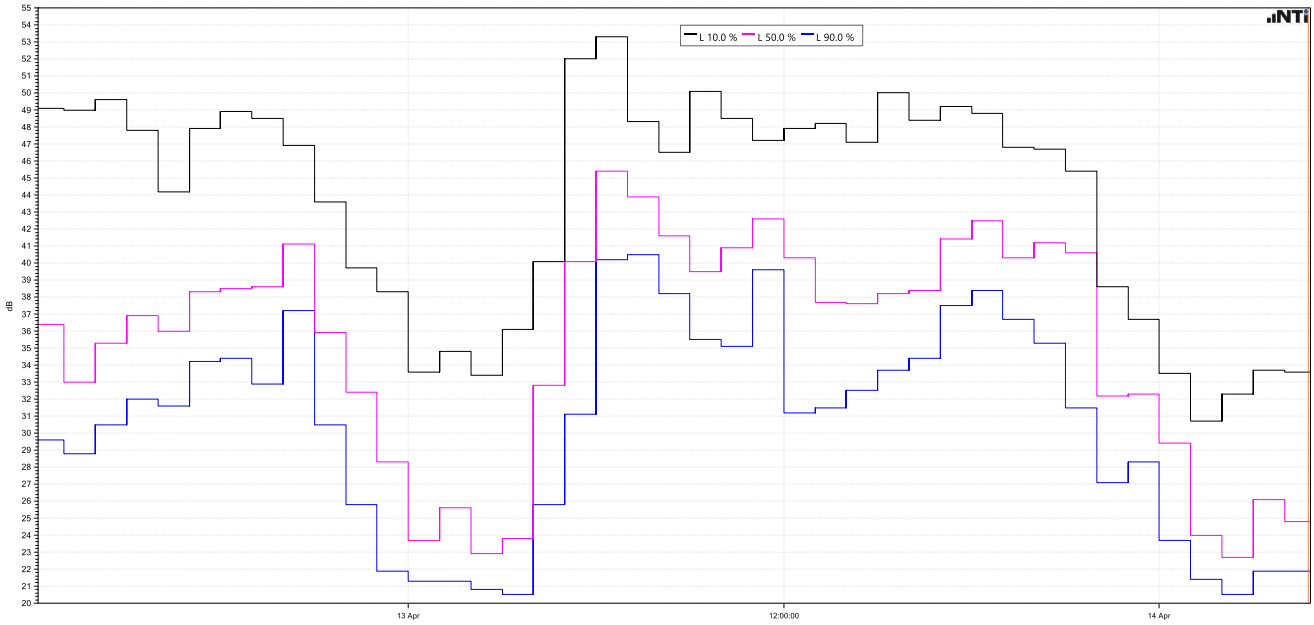


Figure A1 provides the time history for L_{ASmax} and L_{Aeq}. Figure A2 provides the statistical values over 1-hour time increments for L_{10}, L_{50}, and L_{90}.

Table A3. Noise Monitor 2, Location GPS N 36.491038°, GPS W -79.074937°, April 12, 13 and 14, 2023, A-weighted (dBA)

Type	Start	Duration	L_{ASmax}	L_{Aeq}	L_{10}	L_{50}	L_{90}
60'	2023-04-12 16:00:00	0:44:08	86.7	55.6	45.8	37.3	34.9
60'	2023-04-12 17:00:00	1:00:00	66.5	41.9	39.4	36.7	35.3
60'	2023-04-12 18:00:00	1:00:00	62.4	41.3	42.2	38.9	37.6
60'	2023-04-12 19:00:00	1:00:00	52.9	41.6	43.7	40.8	38.6
60'	2023-04-12 20:00:00	1:00:00	60.6	47.5	49.3	46.0	42.8
60'	2023-04-12 21:00:00	1:00:00	60.9	48.3	48.6	47.6	46.1
60'	2023-04-12 22:00:00	1:00:00	63.5	49.9	53.5	46.8	44.4
60'	2023-04-12 23:00:00	1:00:00	65.5	48.8	51.5	45.6	44.7
60'	2023-04-13 00:00:00	1:00:00	82.3	64.1	57.2	45.5	44.4
60'	2023-04-13 01:00:00	1:00:00	78.8	56.3	60.6	45.8	44.3
60'	2023-04-13 02:00:00	1:00:00	67.5	49.8	50.7	47.1	45.5
60'	2023-04-13 03:00:00	1:00:00	54.5	48.6	50.4	48.2	46.4
60'	2023-04-13 04:00:00	1:00:00	61.7	49.8	52.3	48.4	46.4
60'	2023-04-13 05:00:00	1:00:00	62.1	47.7	49.7	45.4	43.8
60'	2023-04-13 06:00:00	1:00:00	64.9	48.1	50.3	45.0	42.3
60'	2023-04-13 07:00:00	1:00:00	58.4	44.4	46.6	42.2	40.2
60'	2023-04-13 08:00:00	1:00:00	64.9	47.9	47.7	40.0	38.2
60'	2023-04-13 09:00:00	1:00:00	54.4	40.0	42.2	38.2	36.5
60'	2023-04-13 10:00:00	1:00:00	64.7	46.6	47.7	39.1	35.9
60'	2023-04-13 11:00:00	1:00:00	64.3	42.0	44.1	36.4	34.7
60'	2023-04-13 12:00:00	1:00:00	56.6	38.5	39.7	35.6	34.1
60'	2023-04-13 13:00:00	1:00:00	63.8	46.9	45.5	40.2	36.9
60'	2023-04-13 14:00:00	1:00:00	63.2	43.7	45.2	41.3	39.6
60'	2023-04-13 15:00:00	1:00:00	59.9	44.3	46.1	41.8	39.6
60'	2023-04-13 16:00:00	1:00:00	53.5	41.9	43.0	40.7	38.8
60'	2023-04-13 17:00:00	1:00:00	61.2	43.2	44.1	41.2	39.8
60'	2023-04-13 18:00:00	1:00:00	59.3	42.0	42.8	41.1	39.8
60'	2023-04-13 19:00:00	1:00:00	53.1	43.5	46.0	42.3	40.1
60'	2023-04-13 20:00:00	1:00:00	60.9	47.7	49.2	46.6	45.5
60'	2023-04-13 21:00:00	1:00:00	52.4	46.3	47.4	46.0	45.1
60'	2023-04-13 22:00:00	1:00:00	59.2	45.3	46.3	44.7	43.6
60'	2023-04-13 23:00:00	1:00:00	60.0	46.5	48.9	44.5	42.9
60'	2023-04-14 00:00:00	1:00:00	56.9	43.0	45.0	42.3	41.2
60'	2023-04-14 01:00:00	1:00:00	46.9	42.2	43.5	41.9	41.0
60'	2023-04-14 02:00:00	1:00:00	56.1	42.5	43.5	42.2	41.0
60'	2023-04-14 03:00:00	1:00:00	52.2	43.6	44.3	43.3	42.4
60'	2023-04-14 04:00:00	1:00:00	55.4	43.9	46.3	43.0	40.3
60'	2023-04-14 05:00:00	1:00:00	54.1	40.2	42.9	38.4	35.1
60'	2023-04-14 06:00:00	1:00:00	65.7	47.3	50.9	43.6	38.4
60'	2023-04-14 07:00:00	1:00:00	63.0	46.2	49.1	41.8	37.4
60'	2023-04-14 08:00:00	1:00:00	64.6	46.5	50.2	38.8	35.7
60'	2023-04-14 09:00:00	1:00:00	65.7	46.9	47.3	38.2	35.2
60'	2023-04-14 10:00:00	1:00:00	86.0	58.0	57.6	48.3	40.2
60'	2023-04-14 11:00:00	1:00:00	67.1	49.4	51.1	45.3	38.3
60'	2023-04-14 12:00:00	1:00:00	68.5	47.8	49.5	39.6	34.6
60'	2023-04-14 13:00:00	0:32:39	68.1	48.9	51.4	38.6	35.2

Figure A3 provides the time history for L_{ASmax} and L_{Aeq}. Figure A4 provides the statistical values over 1-hour time increments for L_{10}, L_{50}, and L_{90}.

Figure A3. Monitor 2 - L_{Aeq} and L_{Asmax} Time Histories North of Coal Rail Track Loop

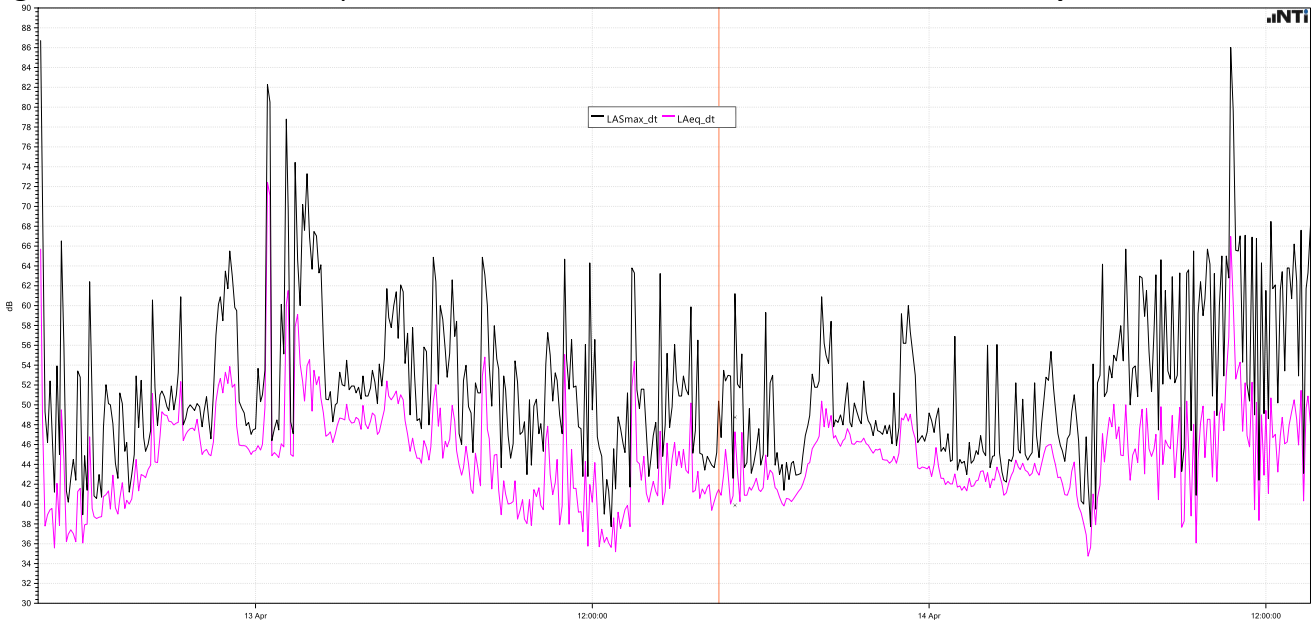
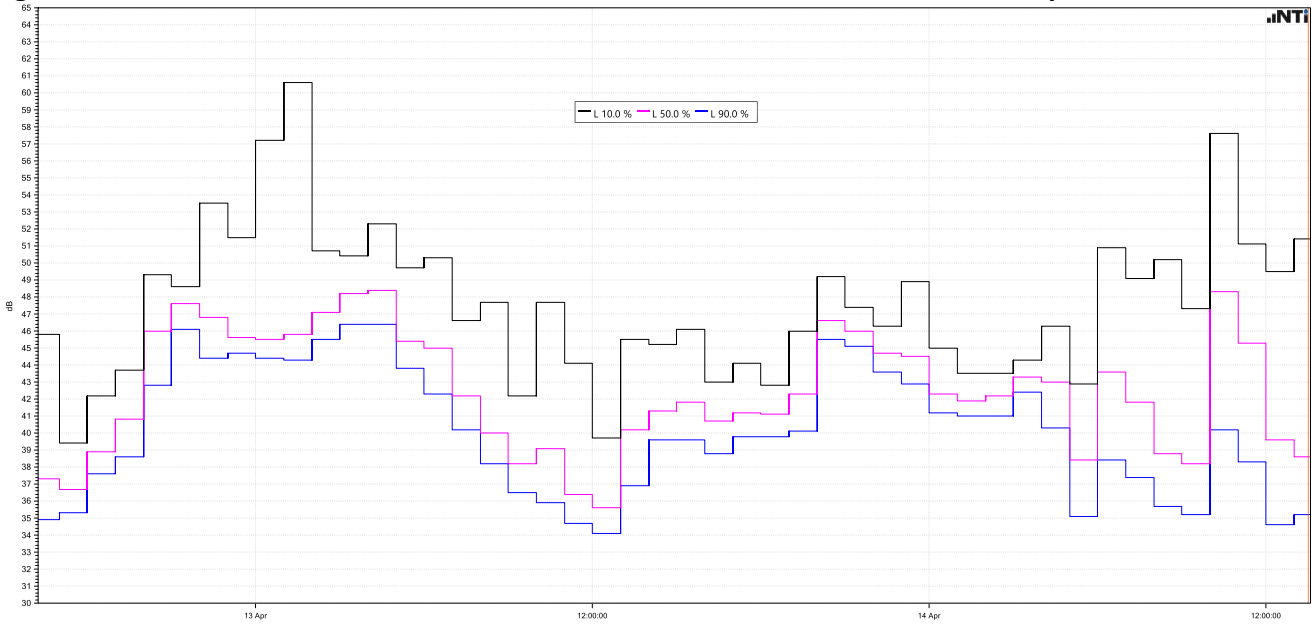


Figure A4. Monitor 2 - L_{10}, L_{50} and L_{90} time histories North of Coal Rail Track Loop .



PERSON COUNTY ENERGY COMPLEX

APPLICATION FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY

APPENDIX B-1

BROCKINGTON'S WINDSHIELD RECONNAISSANCE OF THE ROXBORO PLANT

Mr. Henry Jenkins
Pike Engineering
123 North White Street
Fort Mill, SC 29715

July 5, 2023

Re: Windshield Reconnaissance of the Duke Roxboro Plant, Person County, North Carolina

Dear Mr. Jenkins:

On March 14, 2023, Pike Engineering contracted with Brockington and Associates, Inc. (Brockington) to conduct an architectural literature review and windshield reconnaissance for new project construction at Duke Energy's Roxboro Plant in Person County, North Carolina. The study area is in northeastern Person County and consists of approximately 8,042.2 acres. This investigation is a due-diligence effort designed for planning purposes in sitting the plant so that any potentially significant cultural resources may be considered during the sitting process. This level of effort does not constitute fulfillment of more intensive studies that would be required under Section 106 of the National Historic Preservation Act (NHPA), should that law become applicable in this project.

North Carolina State Historic Preservation Office HPOWEB Research for Known Cultural Resources

Historic Architecture

This research included a review of all previously recorded above-ground resources on file through the HPO Web, the North Carolina State Historic Preservation Office (NCSHPO) repository of recorded architectural property data. This data includes the National Register of Historic Places (NRHP) listed properties, resources recorded during Section 106 investigations, determinations of eligibility (DOEs), properties placed on the state Study List for further research, and resources recorded through surveys for counties and municipalities. NCSHPO records identify a total of seven previously recorded architectural resources in the study area. These include two NRHP listed resources: Burleigh or the McGehee-Phifer Plantation (PR0011), a House on Wagstaff Farm (PR0295), one non-extant NRHP listed resource: House on Dunnaway Road (PR0050), one potentially eligible previously recorded resource: Wagstaff Barn (PR0124) and three not eligible resources: Woodland Elementary School (PR0549), single ranch dwelling (PR0833), and additional single ranch dwelling (PR0834). Due to vegetation, PR0011, PR0833, and PR0834 were not visible from the public right-of-way. Of note, three of the resources (PR0549, PR0833, and PR0834) were recently recorded for proposed construction work at Duke Energy's Roxboro Plant and are not yet in the HPO Web (Langmyer et al. 2023). These resources were recommended as ineligible for the NRHP, and the NCSHPO has not yet rendered a formal opinion. Table 1 itemizes the known recorded architectural resources.

We also considered any locally significant properties that may not be formally listed with the state. We also reviewed relevant county planning documents, but no additional resources beyond those itemized in the SHPO records (Table 1) were identified. Prior to the windshield survey, we also reviewed historic maps and aerials to obtain locations of potential historic properties and guide our field effort.

Table 1. Previously Recorded Architectural Resources (n=71) in the Study Area.

Site ID	Name	Description	Identification/ Year	Reconnaissance Notes	Reconnaissance NRHP Assessment
PR0011	Burleigh/McGehee-Phifer Plantation	Early 19th-century late Georgian house	NRHP Listed 1980	Extant	NRHP Listed
PR0050	House on Dunnaway Road	No Longer Extant; Two-story Greek Revival	N/A	Not Extant	N/A
PR0124	Wagstaff Barn	Early 19th-century barn	N/A	Extant	Potentially Eligible
PR0295	House on Wagstaff Farm	ca. 1890, Early 19th century Georgian, single-pile frame house	NRHP Listed 2006	Extant	NRHP Listed
PR0549	Woodland Elementary School	ca. 1930	Ineligible (SHPO determination pending)	Extant	Ineligible
PR0833	House	ca. 1966, Ranch dwelling	Ineligible (SHPO determination pending)	Extant	Ineligible
PR0834	House	ca. 1969, Ranch dwelling	Ineligible (SHPO determination pending)	Extant	Ineligible

Windshield Reconnaissance for Historic Architecture

On March 27 – 28, 2023, the project historian conducted a windshield reconnaissance of the Roxboro study area. As outlined in National Register Bulletin #24, a windshield reconnaissance-level survey is useful in ascertaining "a general picture of the distribution of different types and styles [of architectural resources], and of the character of different neighborhoods" (Parker 1985:35-36). Windshield surveys are also useful for making preliminary assessments of eligibility based on the architectural integrity of properties, but not in ascertaining the historical associations a property might possess.

The reconnaissance consisted of a vehicular inspection of architectural resources visible from all publicly accessible roads within the study area. When a comparison of current

and historic topographic or aerial maps indicated properties located along private roads or abandoned and existing field roads, we supplemented our work through a review of aerial photography or online tax records if possible. In general, winter vegetation enabled good visibility to most properties, although some private properties distanced from roadways were not visible. The purpose of our windshield reconnaissance was to:

1. Evaluate all previously recorded architectural resources (if any);
2. Locate/assess architectural resources not previously recorded and that appear to meet the minimum fifty-year age requirement for the NRHP, and
3. Identify potentially eligible NRHP properties and mark in the GIS data set.

In general, our windshield survey employed the following approach to assessing previously recorded properties for the NRHP. Properties that do not have a formal determination of eligibility on file with the NCSHPO were liberally assessed as eligible as they may have significant local historical associations beyond the purview of this study. However, properties with substantial and irreversible architectural alterations were assessed as not eligible. Properties not visible from the public right-of-way or those with moderate alterations were assessed as potentially eligible. Those with recent formal evaluations retain the official NCSHPO determination of eligibility.

Any newly identified properties were assessed based on a review of their architectural integrity as visible from the public right-of-way, any historical associations uncovered during the literature review, and in consideration of any recent NCSHPO determinations for comparable types of architecture. Finally, photographs were taken of previously recorded and newly identified resources where practicable. Photographs are provided in Attachments A and B. Resources that could not be photographed due to visibility or safety reasons are noted in the GIS dataset.

The Roxboro study area is in northeastern Person County near the communities of Semora to the north and Concord to the south with arterial roads, including Zion Level Church Road, Semora Road (NC 57), Phifer Lane, Concord Church Road, Daisy Thompson Road, and Dunnaway Road. NC57 bisects the northeastern periphery of the study area near the Burleigh/McGehee-Phifer Plantation (PR0011). There are numerous other smaller neighborhood roads, including those surrounding portions of Hyco Lake. Historic aerials indicate broader agricultural land usage in the study area until the creation of Hyco Lake in the early 1960s, which covers 3,750 acres. Since that time, the area has transitioned to smaller farms and pasturage, though some large tracts still exist. The study area is largely agricultural with some residential, along with few examples of industrial or commercial development. One notable exception is the Roxboro (Hyco) Plant in the southeastern quadrant of the study area.

The study area contains numerous resources that are at least 50 years of age, but the vast majority have been modified by non-historic materials and/or incompatible alterations. The oldest building stock is a series of log cabins that are sporadically placed throughout the study area. Each of these cabins is severally dilapidated and is no longer eligible for the NRHP. There is also a moderate degree of early- to mid-twentieth-century style houses, including Minimal Traditional and Ranch. Many of the ranch houses retain much of their

architectural integrity; however, none appear to exhibit expressive ranch features beyond their basic linear form. Some of the best examples were captured during a 2023 ERM survey (Langmyers et al. 2023) conducted for Duke Energy's proposed construction work at the Roxboro Plant, and these were recommended not eligible for the NRHP. The most recent resources (post-1967) are largely concentrated along the shores of Hyco Lake and dedicated subdivisions stemming from arterial roadways. Others are dispersed throughout the study area where farmland has been subdivided over time.

The study area includes the Burleigh/McGehee-Phifer Plantation (PR011), which includes a late Georgian, vernacular residential form that is associated with the Federal and Greek Revival (Brown et al. 1979). After our visual reconnaissance, we concur with this recommendation. We also reviewed the study area for any potential historic districts, but no cohesive collection of architecture was identified.

There is one modern church congregation within the study area. This includes the Zion Level Baptist Church. The Church has an associated ineligible cemetery, and no other cemeteries were visible from the public roadways except for the one cemetery directly associated with the existing church. The church does not meet the minimum age requirement for NRHP consideration.

There are seven previously recorded architectural properties within the study area. The two NRHP-listed properties (PR0011 "Burleigh/McGehee-Phifer Plantation" and PR0295 "House on Wagstaff Farm") are eligible under Criterion C. Resource PR0011 was not visible from the public right-of-way. Three of the previously recorded properties were recently recorded and evaluated as not eligible for the NRHP; these have not been formally reviewed by the SHPO, but we concur with those recommendations. Table 1 provides additional detail on each of the properties. Attachment A provides photographs.

During the reconnaissance, Brockington identified three additional resources that appear to 1) retain sufficient architectural integrity and 2) possess architectural significance to be potentially eligible for the NRHP. This includes three residential structures within the project area. Table 2 itemizes the resources and Attachment B provides photographs.

Table 2. Potentially Eligible Architectural Resources Identified During the Reconnaissance.

Site ID	Location	Description	Reconnaissance NRHP Assessment
RX-1	556 Daisy Thompson Road	c1910 two-story pyramidal farmhouse	Potentially Eligible
RX-2	160 Wagstaff Road	19th c. single-story log cabin	Potentially Eligible
RX-3	6217 Semora Road	c1910 two-story farmhouse	Potentially Eligible

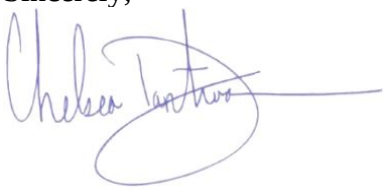
Where possible, architectural properties identified as listed, eligible, or potentially eligible for the NRHP should be avoided and visual effects considered during project planning.

Finally, we observed numerous other properties that appear to be 50 years old (thus, meeting the minimal standard for NRHP eligibility consideration) distributed throughout the study area; these are properties that would be recorded by an architectural historian to satisfy NHPA Section 106 if that regulatory compliance is required. These properties might possess

historical significance that could only be determined through more detailed archival research for eligibility under Criterion C for the NRHP. We did not attempt to plot each of these resources in our GIS dataset.

The attached Resources Map (Figure 1) details the findings from the windshield reconnaissance. The projection used to develop the map and shapefiles was NAD 1927 UTM Zone 17. Should you have any questions about the GIS data or property recommendations, please do not hesitate to send me an email (chelseadantuma@brockingtoncrm.com) or call 843-881-3128.

Sincerely,



Chelsea Dantuma, MCP
Architectural Historian/Project Manager

References Cited

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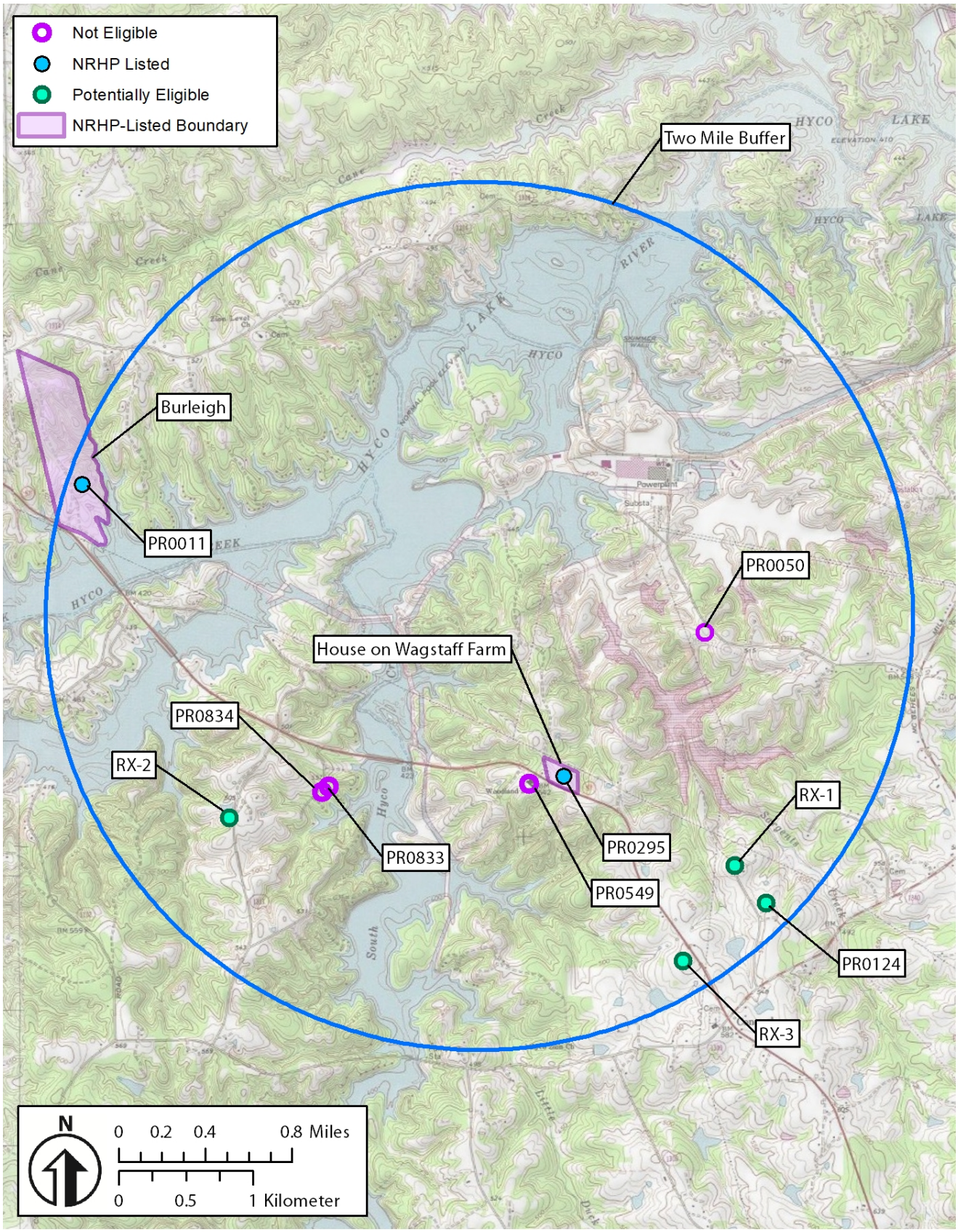

Figure 1. Roxboro Plant Resources Map (see GIS data for additional detail).