Air Dispersion Modeling Report
Revised – July 2026

Canadys Station
Canadys, South Carolina

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1.1 INTRODUCTION

Dominion Energy South Carolina, Inc. ("DESC") and the South Carolina Public Service Authority ("Santee Cooper") (together "Applicant"), plan to construct a new combined-cycle power plant at the site of the former Canadys Steam Plant, located approximately 11 miles north of Walterboro, in an unincorporated part of Colleton County, South Carolina ("Facility" or "Project"). This new combined-cycle power plant, Canadys Station, will be a new major source under the Prevention of Significant Deterioration (PSD) Permit Program under South Carolina Regulation (SC R.) 61-62.5, Standard No. 7. Legacy power generation assets at the site associated with the Canadys Steam Plant were retired in 2013 and have since been demolished and removed.

The new combined-cycle power plant will serve as a baseload power generation station with a nominal net output of approximately 2,200 megawatts (MW). The Project will involve the installation of three (3) advanced-class, multi-shaft, one-on-one (1x1) combined cycle combustion turbine (CCCT) power trains. Each train will include a combustion turbine generator (CTG), a heat recovery steam generator (HRSG) equipped with supplementary firing duct burners, and a steam turbine generator (STG), configured to operate in a combined cycle arrangement. The CCCTs have been designated as Emission Units (EU) EU01, EU02, and EU03.

At the time the modeling protocol was submitted, Applicant was considering advanced class CTGs from different vendors designed for combined-cycle applications capable of meeting baseload generation requirements. This air dispersion modeling report (Report) reflects Applicant's decision to install three (3) Mitsubishi 501JAC CTGs. Project construction is anticipated to begin in 2027, with commercial operations planned to commence in 2032.

PSD permitting is required for a new major stationary source when potential emissions of any regulated New Source Review (NSR) pollutant exceed the applicable PSD permitting threshold of either 250 tons per year (TPY or tons/year) or 100 tons/year. As a fossil fuel-fired steam electric plant with a heat input greater than 250 million British thermal units per hour (MMBtu/hr), the Facility is one of the 28 listed categories under SC R. 61-62.5, Std. §7(B)(32)(a)(i). As such, the appropriate PSD permitting threshold is 100 tons/year.

Emission calculations, provided in Appendix A of the PSD air quality permit application, demonstrate that Facility-wide potential emissions will exceed 100 tons/year for multiple NSR pollutants. As a result, the Project will trigger PSD review for particulate matter (PM), PM with an aerodynamic diameter less than or equal to 10 microns in diameter (PM_{10}), PM with an aerodynamic diameter less than or equal to 2.5 microns in diameter ($PM_{2.5}$), nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compounds (VOCs), sulfur dioxides (SO_2), sulfuric acid (H_2SO_4) mist, and greenhouse gases (GHGs), as potential emissions of these pollutants exceed the PSD significant emission rates (SERs) codified at SC R. 61-62.5, Std. §7(B)(49)(a).

PSD review requires, among other things, analyses to demonstrate that emissions of pollutants triggering PSD review will not:

- Cause or contribute to a violation of the National Ambient Air Quality Standards (NAAQS);
- Cause or contribute to a violation of the maximum allowable increase over established baseline concentrations (allowable PSD increments for designated Class I, Class II, or Class III areas);
- Have an adverse impact on Air Quality Related Values (AQRVs) at any Class I area; or,

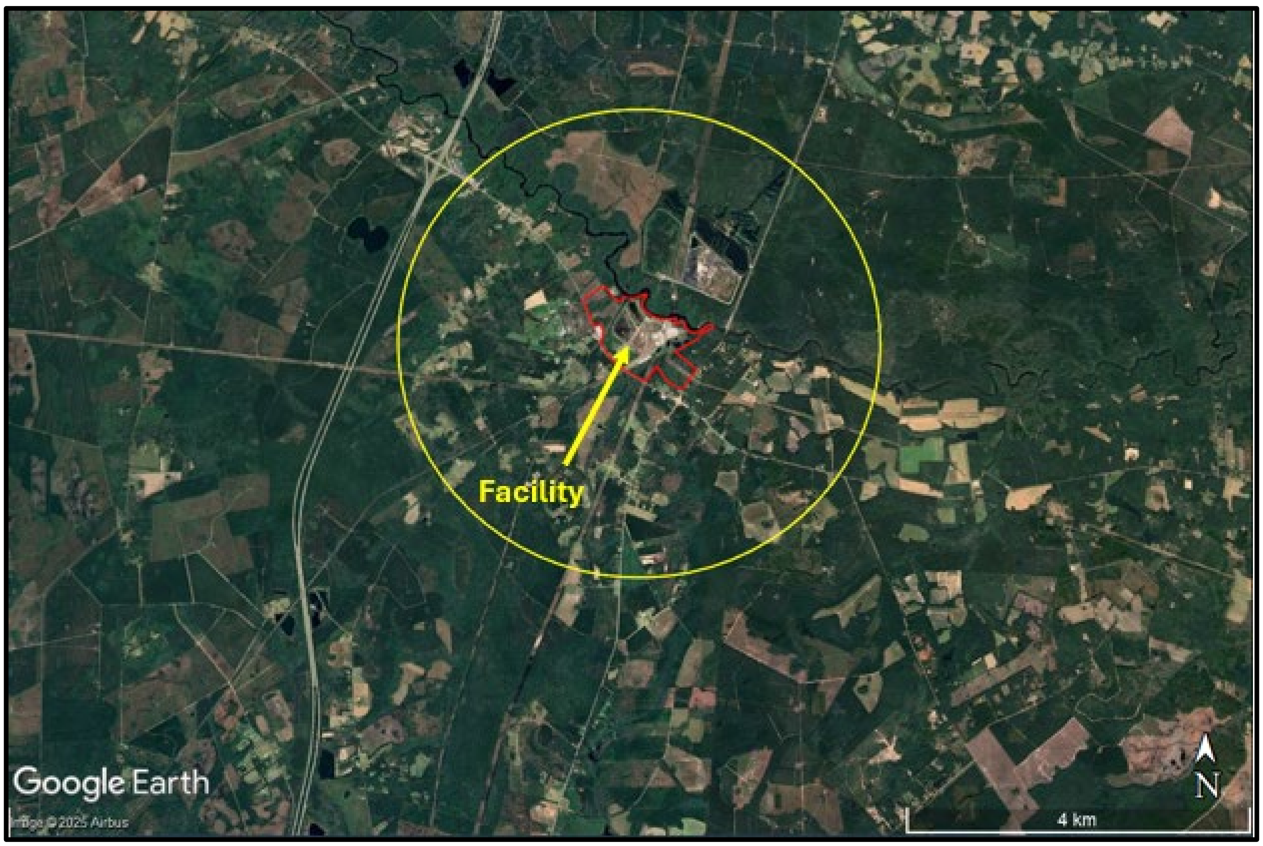
- Impair visibility, soils, or vegetation.[1, 2]

This Report describes the methodologies used to perform the requisite analyses in accordance with Section 7.2 of the South Carolina Department of Environmental Services' (SCDES) *Modeling Guidelines for Air Quality Permits*[3] (Modeling Guidelines). Modeling was performed pursuant to the Air Dispersion Modeling Protocol submitted to the SCDES on 14 October 2025 and comments thereto, which were received on 05 November 2025. Modeling summary tables, manufacturer's performance data, and the 20D (background source inventory) analysis tables are provided in Appendices A, B, and C, respectively.

1.2 PROJECT LOCATION

The Facility is located alongside the Edisto River near Canadys, in an unincorporated part of Colleton County, South Carolina, approximately 11 miles north of Walterboro, SC. The North American Datum of 1983 (NAD83) coordinates of the site are (approximately) 33° 03' 50.48'' N latitude and 80° 37' 27.22'' W longitude. Satellite imagery illustrating the general location of the Facility is depicted in Figure 1-1. A view of the surrounding topography is presented in Figure 1-2.

Figure 1-1 | Facility Location and 3 km Radius Land Use / Aerial Imagery[4]



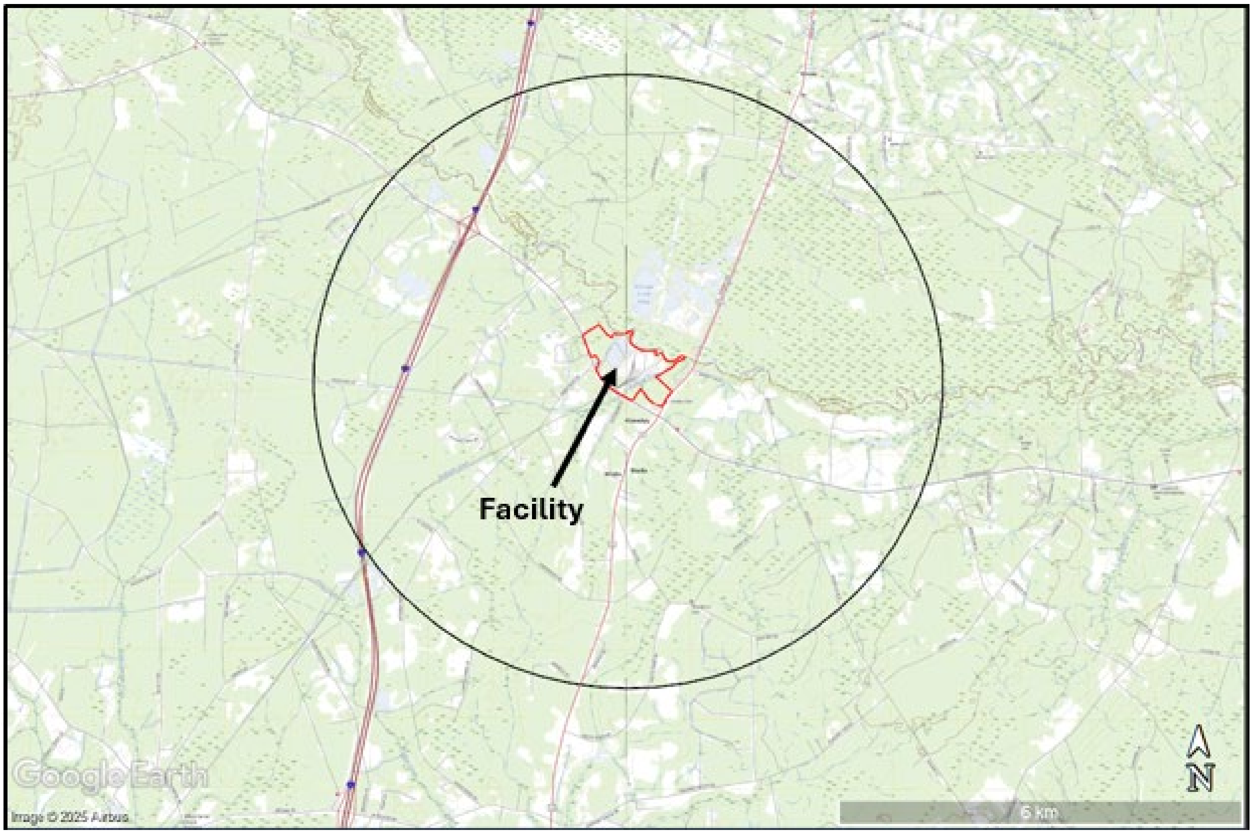
[1] SC R. 61-62.5, Standard No. 7, §(K).

[2] SC R. 61-62.5, Standard No. 7, §(O).

[3] Last updated 09 January 2025.

[4] Aerial imagery from Google Earth. Imagery date 6/5/2025.

Figure 1-2 | Facility Location and 5 km Radius / USGS Topographic Map[5]



The Facility sits approximately 65 feet (ft) above mean sea level (MSL). Terrain within the vicinity of the Facility is relatively flat, varying between 30 ft and 125 ft above MSL within 5 kilometers (km) of the Facility. The average elevation for this area is approximately 50 ft above MSL.

1.3 PROJECT EMISSION SOURCES

Applicant is proposing to install three (3) advanced-class, air-cooled, multi-shaft, one-on-one (1x1) CCCT power trains. Each train will include a CTG, a HRSG equipped with supplementary firing duct burners, and an STG, configured to operate in a combined-cycle arrangement. The combustion turbines will use natural gas as a primary fuel and No. 2 fuel oil with a maximum sulfur content of 15 ppm (fuel oil) as a secondary fuel (limited to 720 hours/year). Emissions from the CCCT power trains will be controlled via selective catalytic reduction (SCR) to control emissions of NO_X and oxidation catalyst systems to control emissions of CO and VOCs.

Ancillary equipment to be installed as part of the Project will include one (1) natural gas-fired auxiliary boiler, three (3) diesel-fired emergency generators and associated belly tanks, two (2) diesel-fired emergency fire water pump engines and associated belly tanks, four (4) natural gas-fired fuel gas heaters, six (6) inlet chilling cooling towers, and three (3) delugable air-cooled heat exchangers.[6] A conceptual layout of the proposed Project equipment is shown in Figure 1-3.

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[5] Topographic map from ngmdb.usgs.gov. Canadys, SC and St. George, SC, 2024.

[6] Additional ancillary equipment will also be installed. However, these emission sources do not impact any air dispersion modeling analysis.

1.3.1 Existing Sources

In addition to the Project sources, the site currently operates one (1), 60 electrical-kilowatt (kWe), diesel-fired emergency generator associated with the onsite communications tower and a second, 20 kWe, natural gas/propane-fired, emergency generator that provides backup power to a communications/security hut. Emissions from these small sources were previously exempt from air permitting requirements when installed; however, they are now included in the Facility-wide emissions profile and the air dispersion modeling analyses discussed herein.[7]

Figure 1-3 | Conceptual Equipment Layout

[7] From herein, any reference to Project sources as a whole includes the two (2) existing emergency generators.

1.4 APPLICABLE AMBIENT AIR QUALITY STANDARDS

The analyses described in this Report were used to demonstrate compliance with the NAAQS, codified at 40 CFR Part 50, the SC Ambient Air Quality Standards (AAQS) codified at SC R. 61-62.5, Standard No. 2, and the PSD increments, incorporated into the SCDES regulations at SC R. 61-62.5, Standard No. 7. The applicable AAQS/NAAQS, PSD increments, Significant Impact Levels (SILs), and Significant Monitoring Concentrations (SMCs) are summarized in Table 1-1.

Pursuant to the General Applicability section of SC R. 61-62.5, Standard No. 8, sources that burn virgin fuel, including natural gas and fuel oil, are exempt from the regulation for modeling toxic air pollutants (TAPs). Therefore, TAP emissions from the combustion turbines, duct burners, emergency generators, auxiliary boiler, fire water pump engines, and fuel gas heaters are exempt from Standard No. 8 modeling requirements. The only emission source to be added at the Facility that will be subject to SC R. 61-62.5, Standard No. 8 are piping components associated with the combustion turbine fuel gas systems and the aboveground fuel oil storage tanks. TAP emissions from these ancillary sources are less than the *de minimis* values provided in Table B.1 of the Modeling Guidelines, thus compliance with SC R. 61-62.5, Standard No. 8 has been demonstrated.

Table 1-1 | Summary of AAQS/ NAAQS, SILs, Increments, & SMCs ($\mu g/m^3$)

Pollutant	Averaging Period	AAQS/ NAAQS[1]	Class II Increment[2]	Class II SIL[3]	Class I Increment[2]	Class I SIL[4]	SMC[3]
PM_{10}	24-hr	150[5],[a]	30[e]	5[f]	8[e]	0.3[f]	10[f]
	Annual	--	17[f]	1[f]	4[f]	0.2[f]	--
$PM_{2.5}$	24-hr	35[5],[b],[c]	9[e]	1.2[d]	2[e]	0.27[d]	4[d],[g]
	Annual	9[d] (15)[d]	4[f]	0.13[7],[d]	1[f]	0.05[d]	--
SO_2	1-hr	196[h]	--	8[d]	--	--	--
	3-hr	(1,300)[6][e]	512[e]	25[f]	25[e]	1.0[f]	--
	24-hr	--	91[e]	5[f]	5[e]	0.2[f]	13[f]
	Annual	(26)[d]	20[f]	1[f]	2[f]	0.1[f]	--
NO_2	1-hr	188[b]	--	8[d]	--	--	--
	Annual	100[5],[f]	25[f]	1[f]	2.5[f]	0.1[f]	14[f]
CO	1-hr	40,000[e]	--	2,000[f]	--	--	--
	8-hr	10,000[e]	--	500[f]	--	--	575[f]

General Notes:

[1] Tables A.1 (Primary) and D.4 (Secondary) of SCDES's Modeling Guidelines and 40 CFR Part 50. Where applicable, secondary AAQS/NAAQS reported in parentheses.

[2] Table D.3 of SCDES's Modeling Guidelines and 40 CFR Part 52.21(c).

[3] Table D.1 of SCDES's Modeling Guidelines.

[4] Table D.2 of SCDES's Modeling Guidelines.

[5] Primary standard equivalent to the secondary standard.

[6] EPA replaced the 3-hr secondary NAAQS with an annual secondary NAAQS in 2024 but the 3-hr NAAQS remains an AAQS.

[7] The SIL for the $PM_{2.5}$ annual standard is given as 0.2 - 0.3 µg/m3 in Table D.1 of SCDES's Modeling Guidelines with a footnote referencing the range as a draft SIL. The SIL was recently updated to 0.13 ug/m^3 via a U.S. EPA guidance document titled: Supplement to the Guidance on Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program (April 30, 2024).

Notes on Form of Modeled Values for Comparison to Standards (SCDES Modeling Guidelines):

[a] 6th high over the five years modeled.

[b] 5-year average 98th percentile (8th high averaged over 5 years) of the daily maximum concentrations (1-hr NO_2) or daily average concentrations (24-hr $PM_{2.5}$).

[c] The primary and secondary 24-hr $PM_{2.5}$ NAAQS are equivalent and have the same form. The form listed in Table D.4 of the Modeling Guidelines appears to be in error.

[d] 5-year average of the 1st high modeled concentrations from each year.

[e] 2nd high modeled concentration across five years.

[f] 1st high modeled concentrations across five years.

[g] The SMC was vacated and is shown for reference only (Sierra Club v U.S. EPA, 706 F.3d 428, DC Circuit, 2013).

[h] 5-year average of the 99th percentile (4th high averaged over 5 years) of the daily maximum concentrations.

The South Carolina AAQS at SC R. 61-62.5, Standard No. 2 will also apply to the Project. The analyses described herein have been used to demonstrate compliance with SC R. 61-62.5, Standard No. 2 for all relevant pollutants. As there is no SIL published for emissions of H_2SO_4 mist, it is not subject to SIL or full impact analyses pursuant to footnote 4 of Table 7.1 in SCDES's Modeling Guidelines.

2.1 MODEL SELECTION AND JUSTIFICATION

The most recent versions of the United States Environmental Protection Agency's (U.S. EPA) AERMOD Modeling System were used for this Project.[8] AERMOD is a U.S. EPA-approved refined air dispersion model for evaluating ambient air impacts from stationary sources and is one of the listed air dispersion models in U.S. EPA's Appendix W Guidance.[9] The AERMOD Modeling System comprises regulatory components (AERMOD, AERMET, and AERMAP) and non-regulatory components (AERSURFACE, AERMINUTE, and BPIPPRM).

The most recent version of AERMOD at the time of analysis was Version 24142, released by the U.S. EPA on 20 November 2024. AERMOD was used to perform the refined air dispersion modeling analysis for flat, elevated, and complex terrain, although no complex terrain surrounds this Project. AERMOD was executed within the BEEST graphical user interface (GUI) software. Default AERMOD control options were used. The CALPUFF model, selected for completing certain Class I modeling demonstrations, is addressed later in this Report.

2.1.1 Model Control Options

Default AERMOD control options were used in the refined modeling analysis consistent with U.S. EPA recommendations, including the following:

- Stack-tip downwash
- Incorporate effects of elevated terrain
- Calm wind processing routine
- Missing data processing routine
- Default wind profile exponents
- Default vertical potential temperature gradients

There are several methods for modeling nitrogen dioxide (NO_2) concentrations using NO_X emission rates. For the NO_2 annual and 1-hour standards, the Tier 2 regulatory default option accounting for the conversion of NOx to NO_2 was used. A discussion of this option is provided below.

Tier 2 – Ambient Ratio Method 2

For the NO_2 annual standards, the Ambient Ratio Method 2 (ARM2) was used. As recommended by the U.S. EPA, this method uses a statistical regression function derived from national monitoring data in the Air Quality System to determine representative equilibrium NO_2/NOx ambient ratios. ARM2 is implemented as a built-in default option within the latest version of AERMOD, and the method applies a variable conversion ratio that reflects typical atmospheric conditions.

For the modeling analyses required for this Project, Applicant used the default ARM2 settings as follows:

- Minimum NO_2/NOx ratio: 0.5
- Maximum NO_2/NOx ratio: 0.9

[8] The CALPUFF model was also used as discussed in subsequent sections of the Report.

[9] *Guideline on Air Quality Models*, 40 CFR Part 51, Appendix W.

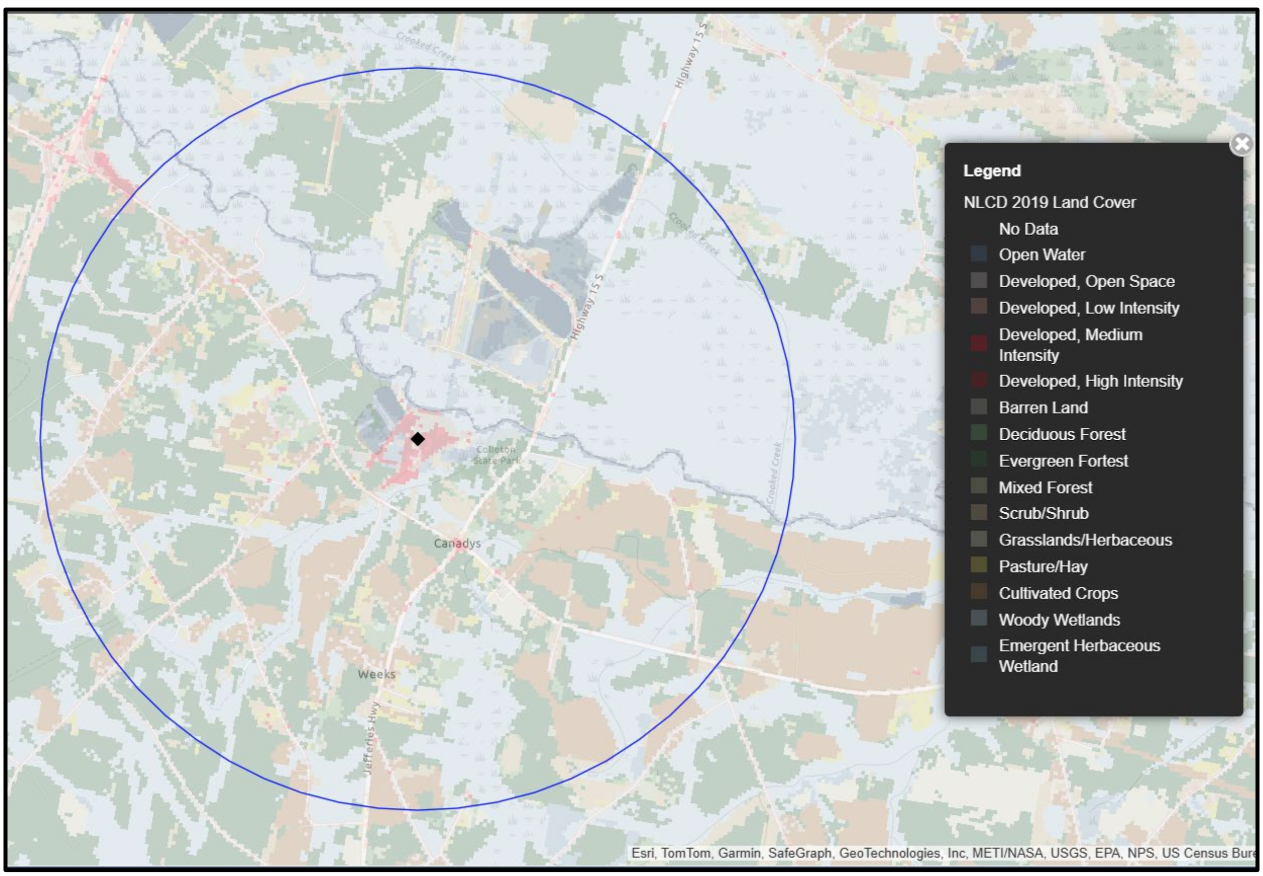
2.2 URBAN/RURAL CLASSIFICATION

For air dispersion modeling evaluations, it is essential to determine whether the area surrounding the proposed new source is classified as urban or rural, as this classification directly affects how AERMOD applies urban boundary layer adjustments when calculating ambient concentrations. If the area surrounding the source is considered urban, then it may be appropriate to use AERMOD's urban source options. The urban source option in AERMOD includes the specification of a population value which parameterizes nighttime dispersion differently than in rural settings by making the atmosphere less stable (similar to a heat island effect). Accordingly, an urban/rural determination was conducted for the Project site.

Determining if an area is urban or rural may be based on one of the following two methodologies described in Section 7.2.1.1 of U.S.EPA's Appendix W Guidance: (i) the Land Use Procedure or (ii) the Population Density Procedure. Of the two, the Land Use Procedure is considered more definitive. Under the Land Use Procedure, if more than 50% of the area within a 3 km radius of the Facility is classified as heavy industrial, light-moderate industrial, commercial, or compact residential, then the area should be considered urban and urban source options should be used in AERMOD. Under the Population Density Procedure, if the population density within the 3 km radius is greater than 750 people per square km (people/km^2), the urban source options should be considered.

As recommended in Section 3.5 of the Modeling Guidelines, the land within 3 km of the Facility was evaluated using SCDES's online Land Use Tool.

Figure 2-1 | Surrounding Land Use Identification



A breakdown of the various land use classifications depicted in Figure 2-1 is provided in Table 2-1.

Table 2-1 | Summary of Land Use Classifications within 3 km of Site [1]

Land Use Classification	Class	Area (m^2)	Percent of Total Area
Open Water	Rural	885,600	3.10%
Developed Open Space	Rural	1,314,000	4.70%
Developed Low Intensity	Rural	397,800	1.40%
Developed Medium Intensity	Urban	126,900	0.40%
Developed High Intensity	Urban	72,000	0.30%
Barren Land	Rural	207,000	0.70%
Deciduous Forest	Rural	501,300	1.80%
Evergreen Forest	Rural	7,732,800	27.40%
Mixed Forest	Rural	200,700	0.70%
Shrub Scrub	Rural	1,296,000	4.60%
Herbaceous	Rural	647,100	2.30%
Hay Pasture	Rural	469,800	1.70%
Cultivated Crops	Rural	3,177,000	11.30%
Woody Wetlands	Rural	10,656,000	37.70%
Emergent Herbaceous Wetlands	Rural	544,500	1.90%
Total Rural Area =		**28,029,600**	**99.3%**

Notes:
[1] Data obtained for site located at 13139 Augusta Hwy, Walterboro, SC, using the following link: https://gis.dhec.sc.gov/landcover/

As shown in the table above, the area within a 3-km radius of the site comprises limited urban land uses, while the majority (~ +99%) of the land is undeveloped. Thus, pursuant to the Land Use Procedure, the area is classified as rural and AERMOD's urban source options were not used.

2.3 TERRAIN DATA

Terrain data were derived from the United States Geological Survey's (USGS) National Elevation Dataset (NED) data available on SCDES's website.[10] The data consists of county divisions at one (1) arc- second (~30 meter) horizontal resolution in GeoTIFF format. The NED data were used to assign terrain elevations and critical hill heights to the modeled receptors, where applicable (receptors, stack base elevation, building base elevation, etc.), via AERMAP. The modeling domain and extents of the NED data were sized to accommodate all terrain that exceeds a 10% slope from any given receptor, verified using the "Calculate Domain" function in BEEST. No complex terrain[11] was identified in the modeling domain.

2.4 AMBIENT BOUNDARY

The analyses described herein were used to demonstrate that the Project will not cause or significantly contribute to "ambient air" impacts in excess of the applicable air quality standards. The U.S. EPA's policy regarding areas that constitute "ambient air" is summarized as follows:

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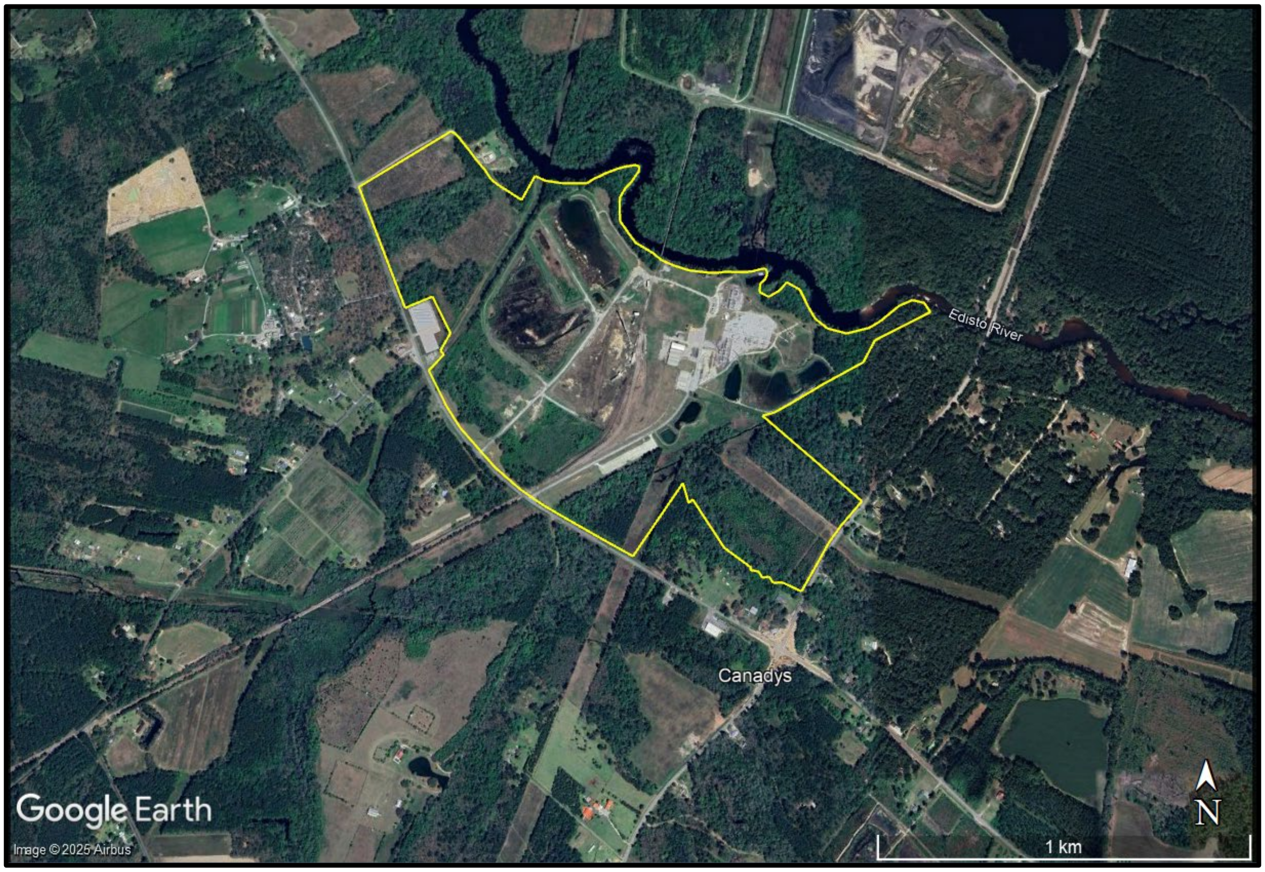
[10] https://des.sc.gov/programs/bureau-air-quality/air-dispersion-modeling-overview/air-dispersion-modeling-data The NED data were last updated on 9 November 2022.

[11] Complex terrain is defined by AERMOD, using the dividing streamline concept, as locations where the terrain is above the plume centerline.

> *Atmosphere over land owned or controlled by the stationary source may be excluded from ambient air where the source employs measures, which may include physical barriers, that are effective in precluding access to the land by the general public.*[12]

The ambient air boundary established for this Project is depicted in Figure 2-2.

Figure 2-2 | Preliminary Ambient Air Boundary[13]



In areas where there may be no physical fencing, public access will be precluded through the use of security cameras, posting of "No Trespassing" signs, security patrolling, and other natural physical barriers (e.g., densely woody terrain with increasing levels of vegetation toward the river). This is consistent with U.S. EPA's December 2019 *Revised Policy on Exclusions from Ambient Air*[13] guidance document, which states:

> *In setting forth this revised ambient air policy, the EPA is making a limited change to the way it applies the "access" element in the regulatory definition of ambient air while maintaining the level of public health protection afforded by the original policy. This narrow change is that the EPA will no longer consider a fence or other physical barriers to be the exclusive means by which public access may be effectively precluded for purposes of excluding an area owned or controlled by the source from ambient air under the regulatory definition. Accordingly, the EPA is replacing a concept in the 1980 letter with a broader concept of measures, which may include physical barriers, that are effective in precluding access by the general public. Thus, the EPA's revised ambient air policy,*

[12] U.S. EPA Memorandum from Andrew R. Wheeler, *Revised Policy on Exclusions from "Ambient Air"*, 02 December 2019.

[13] https://www.epa.gov/sites/default/files/2019-12/documents/revised_policy_on_exclusions_from_ambient_air.pdf

consistent with its discretion available under the regulatory definition of ambient air, is that the atmosphere over land owned or controlled by the stationary source may be excluded from ambient air where the source employs measures, which may include physical barriers, that are effective in precluding access to the land by the general public.

2.5 METEOROLOGICAL DATA

2.5.1 Meteorological Dataset

U.S. EPA air quality modeling guidance recommends the use of one year of onsite meteorological data or five years of representative off-site meteorological data. Because onsite data are not available for the Project site, meteorological data available from the National Weather Service (NWS) were used in this analysis.

Surface and upper-air meteorological data for the 5-year period of 2015-2019 were provided directly by the SCDES.[14] These data are from the NWS and were processed internally by SCDES using AERMET version 24142. Data from the Charleston NWS Office, located at CHS-IA, are the nearest available surface and upper air data to the Facility. Representativeness is an especially important issue when selecting meteorological data where terrain influences can affect wind patterns. The following sections under Section 2.5 discuss the representativeness of the CHS-IA dataset to the Project site.

2.5.2 Predominant Winds and Proximity of Data Measurement Site to Facility

CHS-IA is the nearest official surface and upper-air weather observations site to the Project site. The 5-year wind rose and the location of the Project site in comparison to the CHS-IA are shown in Figure 2-3 and Figure 2-4, respectively. A summary of the relevant information provided by the wind rose is provided in Table 2-2.

[14] Meteorological data provided via email by Greg Quina of the SCDES on 05 November 2025.

Figure 2-3 | 2015 – 2019 CHS-IA Wind Rose

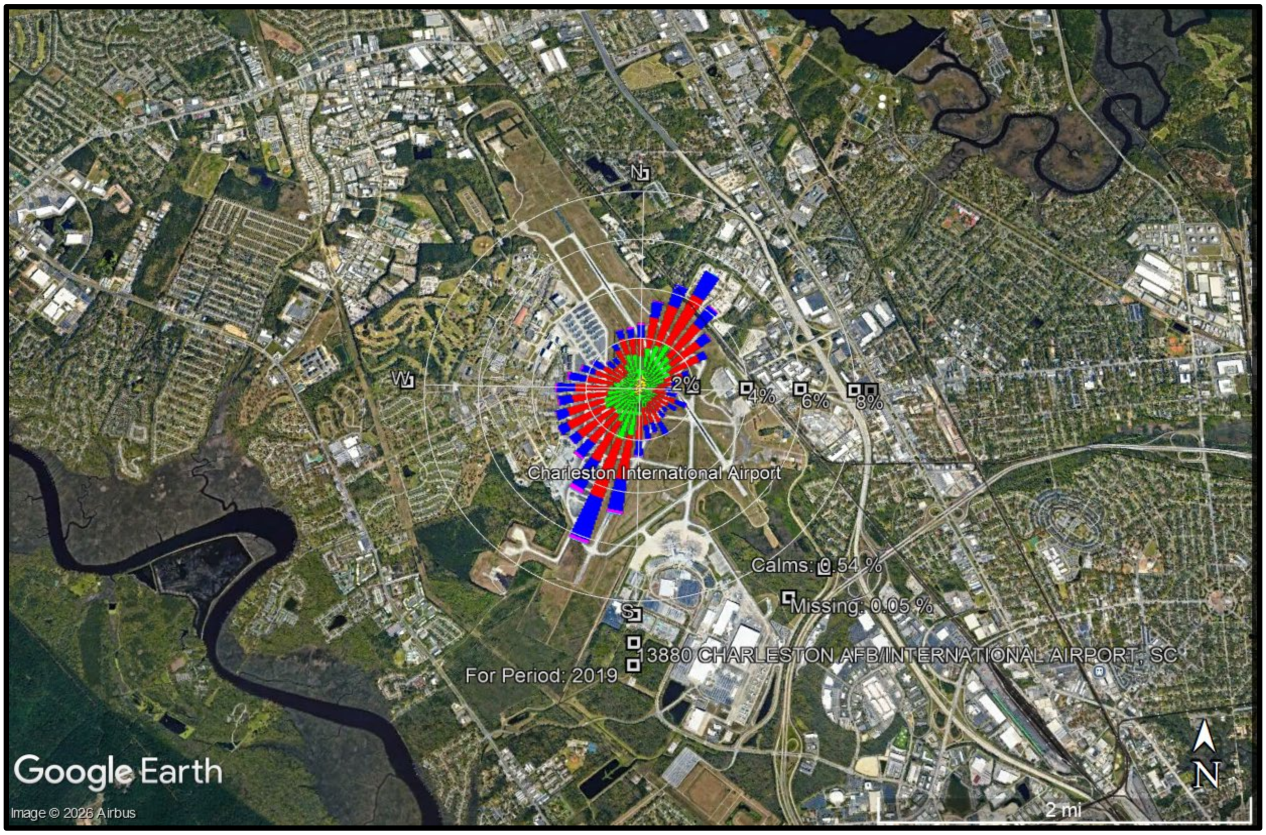


Figure 2-4 | Location of CHS Relative to Canadys Station

Table 2-2 | Summary of Windrose Characteristics (CHS-IA, 2015–2019)

Parameter	Summary
Station ID	13880
Station Address	5777 Aviation Avenue, Charleston, SC
Wind Data Type	Surface Wind Observations
Calm Conditions	0.54%
Missing Data	0.005%
Prevailing Wind Directions	Dominant winds from the south-southwest (SSW) to south (S) and northeast (NE) sectors
Secondary Wind Patterns	Moderate contributions from southwest (SW) and north-northeast (NNE) directions
Maximum Direction Frequency	~ 6 – 8% in the most dominant sectors (SSW/S and NE)
Most Common Wind Speeds	2 – 5 meters per second (m/s) (light to moderate winds dominate)
Higher Wind Speed Occurrence	Winds >8 m/s occur infrequently, primarily from SSW/S directions
Directional Variability	Wind directions are fairly distributed, but with clear directional preferences (bimodal tendency: SSW/S and NE).
Meteorological Interpretation	Wind patterns are consistent with coastal influences, including sea breeze/land breeze effects and regional synoptic flow.

The wind rose developed from 2015–2019 surface observations at the CHS-IA indicates a predominantly bimodal wind pattern, with the highest frequency of winds originating from the south-southwest to south (SSW–S) and a secondary component from the NE. The dominant SSW–S flow results in prevailing transport toward the NNE–NE, while the secondary NE flow produces transport toward the SW.

The Charleston meteorological data site is located approximately 36.5 miles to the east-southeast of the Project site. The wind rose data indicate that the Project site is generally crosswind of the monitoring location under the prevailing SSW–S flow regime, and intermittently upwind during periods of northwesterly flow. The relatively low frequency of calm conditions (0.54%) further suggests that atmospheric dispersion in the region is typically well-developed, supporting representative transport conditions between the monitoring site and the Project area. Overall, the similarity in regional meteorological patterns and the absence of significant terrain or land use discontinuities between the two locations support the use of the CHS-IA wind data as representative of conditions influencing the Project site.

2.5.3 Comparison of Surface Parameters

The surface characteristics of albedo, Bowen ratio, and surface roughness were quantified for the CHS-IA and the Facility using U.S. EPA's AERSURFACE model. Data files for land cover, tree canopy, and impervious values for South Carolina were obtained from the USGS's 2024 National Land Cover Database (NLCD 2024). The seasons for this Project were defined as follows:

- Winter (without snow cover) – December through February
- Transitional Spring – March and April
- Summer – May through August

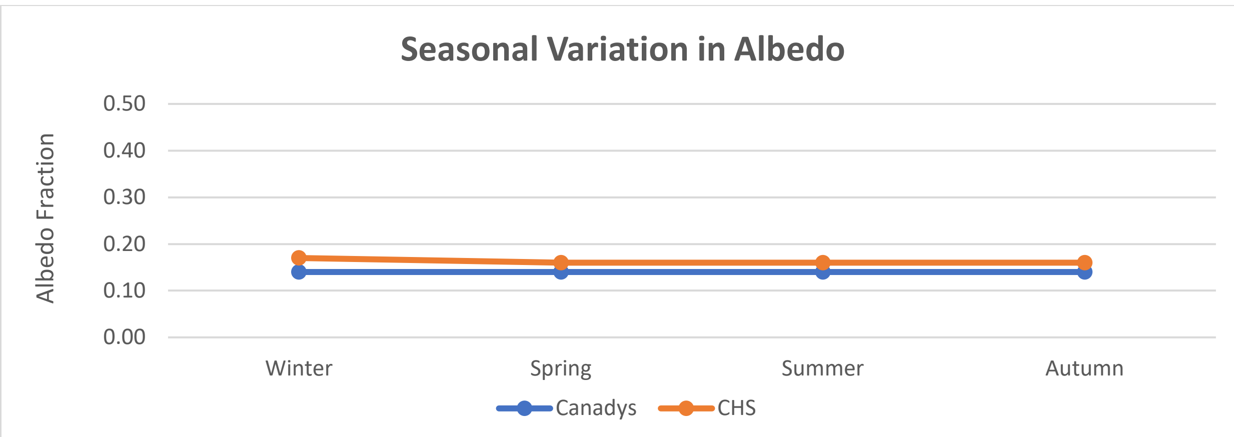
- Autumn – September through November

The area within a 1 km radius of each site was divided into 12 radial sectors of 30 degrees each for analysis and comparison.

2.5.3.1 Albedo

Albedo is the percentage of solar radiation reflected from a surface. A snow-covered ground would have an albedo near 1, whereas an asphalt blacktop would have an albedo near zero. Seasonal changes such as vegetation and the angle of the sun's incidence affect the albedo of a given location. As a result, the noontime albedo was assigned for each location per season. Figure 2-5 compares seasonal albedos for the Facility and CHS-IA. As shown in Figure 2-5, the albedo of both sites is very comparable; with the value of albedo varying 2% or less.

Figure 2-5 | Comparison of Albedo of CHS and Canadys Station



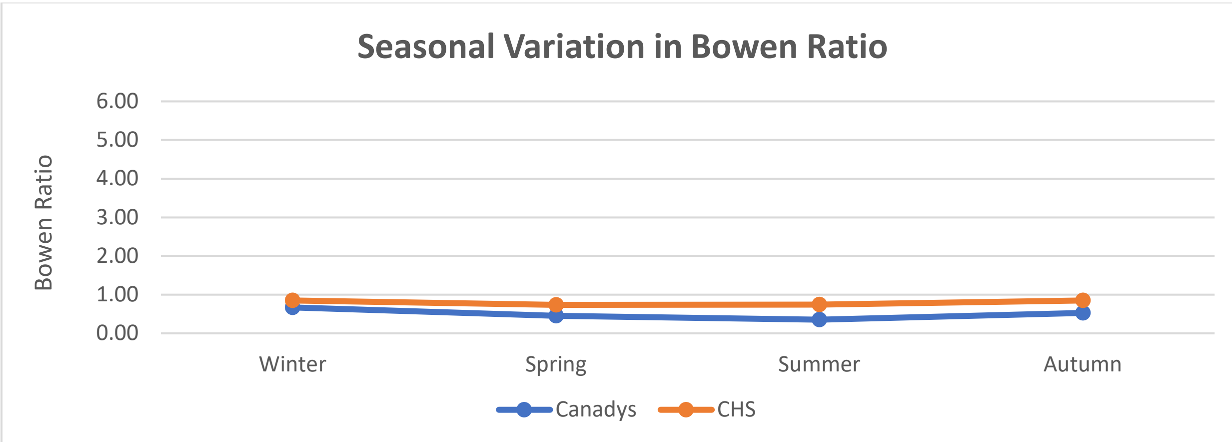
2.5.3.2 Bowen Ratio

The Bowen Ratio represents the ratio of sensible heat flux to latent heat flux. Sensible heat corresponds to heat transfer associated with changes in air temperature and is influenced by factors such as incoming solar radiation and surface albedo. As discussed above, surface albedo is very similar for both the CHS-IA and the Facility. Moreover, the solar incidence of the two sites is essentially equivalent, given the similar latitudes and elevations of the two locations. Therefore, differences in sensible heat flux between the sites are expected to be minimal, and variations in the Bowen ratio are primarily driven by differences in latent heat flux.

For modeling purposes, latent heat represents the energy associated with phase changes of matter, particularly the evaporation of water which occurs without a change in temperature. Because evaporation requires substantial energy, areas with higher moisture availability tend to exhibit greater latent heat flux. As such, moist air retains more energy resulting in a smaller latent heat flux. In other words, the Bowen ratio will be less for humid air and greater for arid air, with typical Bowen ratios ranging from 0 to 10.

AERSURFACE was applied using three moisture regimes (wet, dry, and average precipitation) and the daytime Bowen ratio was averaged for each season. As shown in Figure 2-6, Bowen ratios for both sites are comparable across each season, with all values less than one, indicating moisture-influenced surface conditions. The lowest Bowen Ratios occur during the spring and summer months when higher humidity and increased evaporation would be expected. The site exhibits slightly lower Bowen Ratio values compared to CHS-IA, suggesting relatively higher humidity at the Facility. This is likely attributable to higher soil moisture and the Facility's proximity to the Edisto River.

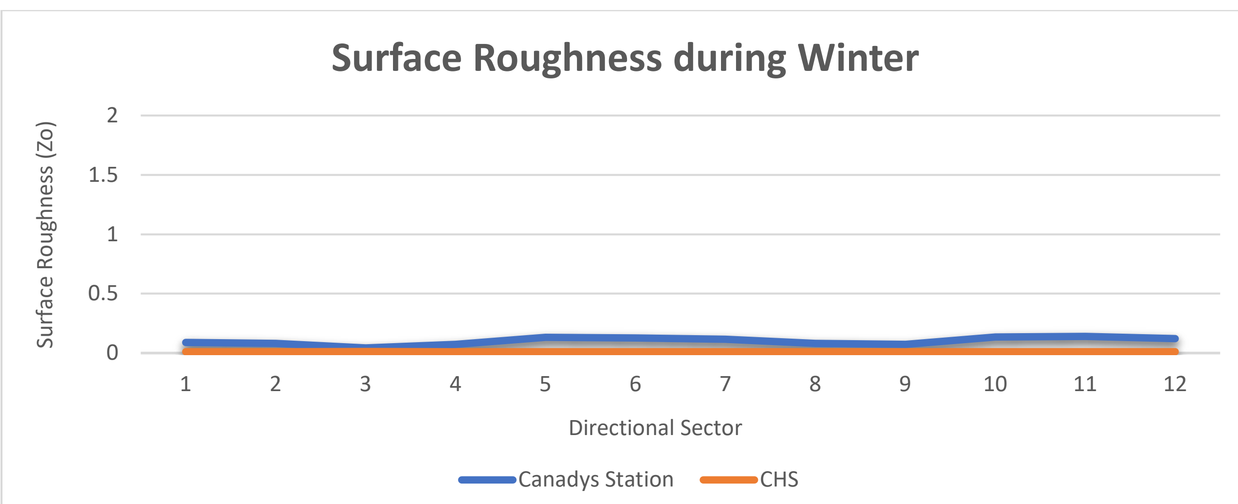
Figure 2-6 | Comparison of Bowen Ratios for CHS and Canadys Station

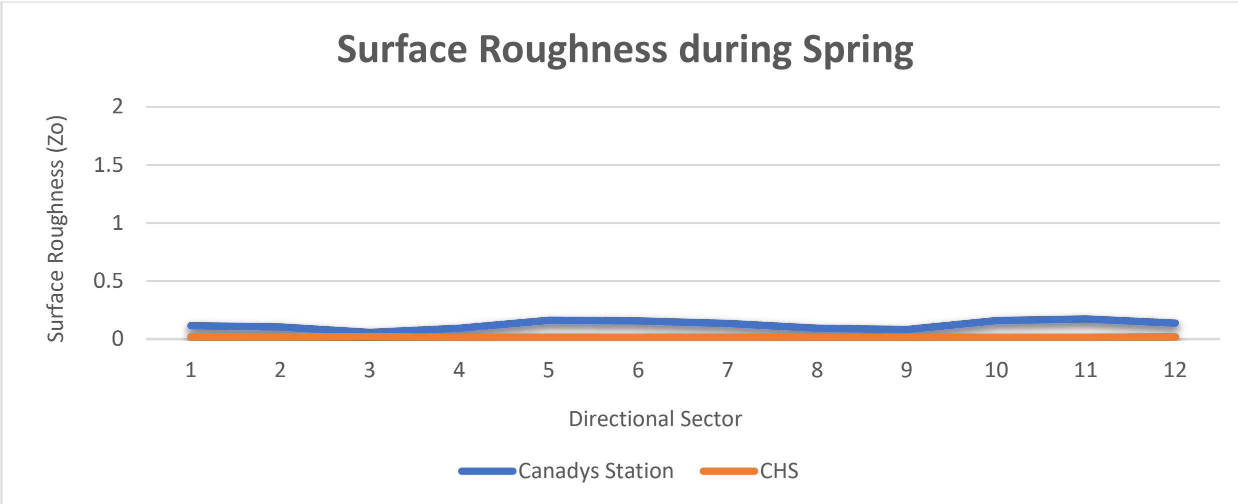


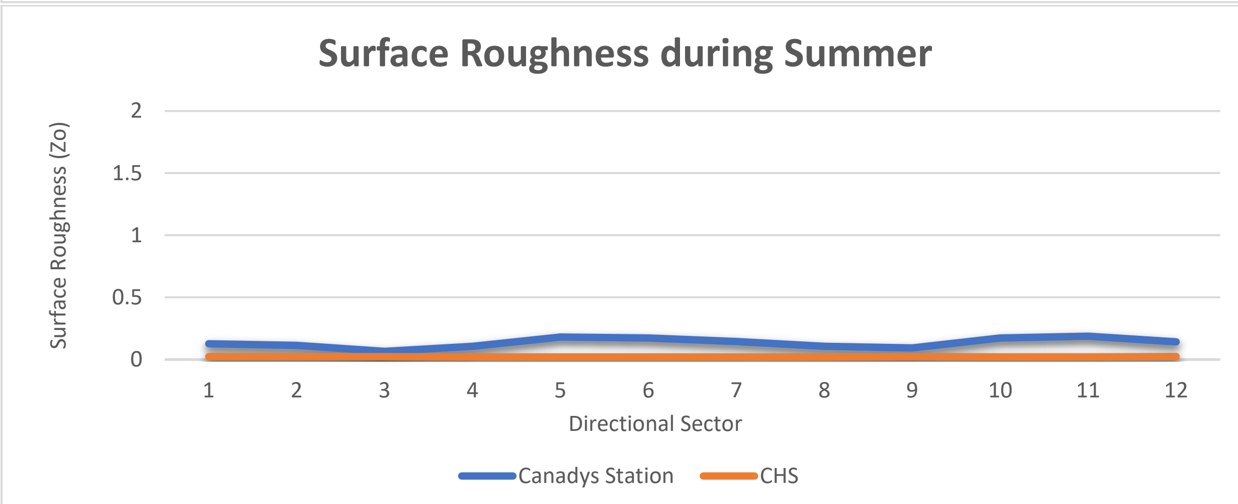
2.5.3.3 Surface Roughness and Terrain Features

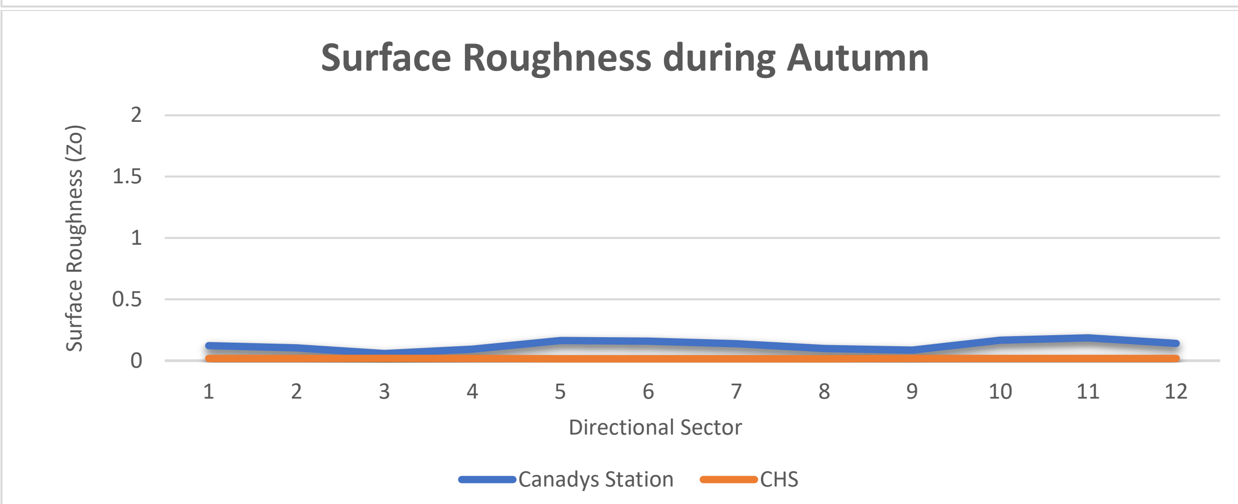
Surface roughness length (Z_o) is a measure of the height (in meters) at which the vertical wind speed profile goes to zero. This represents the top of the atmospheric boundary layer in which the surface creates aerodynamic drag slowing the wind speed and creating turbulent flow. A flat surface such as open waters will have a Z_o near zero, whereas an urban area is likely to have a $Z_o \geq 2$ meters. AERSURFACE utilizes land cover, imperviousness, and tree canopy data (from NLCD2024) within a 1 km radius of the site to calculate the Z_o value for twelve 30° directional sectors (i.e. 0-30°, 30-60°, etc.). Figure 2-7 charts the surface roughness for both sites within each specified sector as a function of the season.

Figure 2-7 | Seasonal Surface Roughness Comparison for CHS and Canadys Station









The charted Z_o values exhibit a consistent pattern across all seasons, indicating minimal seasonal variability in vegetation at both locations. This consistency suggests that land cover characteristics remain relatively stable throughout the year and are unlikely to introduce significant seasonal bias into the meteorological data.

In addition, the terrain at CHS-IA is extremely flat, as expected for a large airport environment, resulting in a surface roughness near zero. The annual average Z_o for CHS-IA is 0.02 meters (~0.79"), which is representative of open, unobstructed terrain with minimal vegetative or structural interference. Canadys Station is located in an area characterized by gently rolling topography and proximity to the Edisto River. These features contribute to slightly higher surface roughness values, with an annual average Z_o of 0.12 meters (~4.72"). While this value is higher than that observed at CHS-IA, it still falls within a range indicative of relatively smooth terrain with limited vegetative density. Overall, both locations are characterized by low surface roughness, indicating that neither complex terrain nor dense vegetation plays a significant role in influencing local meteorological conditions.

The CHS surface meteorological measurements were taken at an elevation of 14 meters (46 ft) above MSL.[15] The location of the Facility is at an elevation of roughly 19.8 meters (65 ft) above MSL as shown in Figure 1-1. The terrain near the Facility consists of some hills to the north-northwest and to the south that rise to an elevation of approximately 125 ft. The Edisto River flows to the north and east of the Facility where the elevation is roughly 59 ft above MSL. These features can be seen in the topographic map depicted in Figure 1-2.

The similarity in terrain, seasonal trends, and the relatively low magnitude of Z_o at both sites further supports the use of the CHS-IA meteorological dataset as representative of conditions at the Facility. When considered collectively, these factors demonstrate that the CHS-IA meteorological dataset is an appropriate and technically sound choice for use in air dispersion modeling for the Canadys Station Project.

2.6 EMISSION UNIT SOURCE DATA

The Project-specific emission sources included as part of the air dispersion modeling evaluations include the three (3) proposed combustion turbines and associated natural gas-fired HRSG duct burners, one (1) natural gas-fired auxiliary boiler, three (3) diesel-fired emergency generators, two (2) fire water pump engines, four (4) fuel gas heaters, six (6) inlet chiller cooling towers, and three (3) delugable air-cooled heat exchangers. In addition to the Project sources, the site currently operates one (1) 60-kW, diesel-fired emergency generator and one (1) 20-kW, natural gas/propane-fired emergency generator which were also included in the air dispersion modeling analyses.

Emissions from all applicable Project sources were modeled as unobstructed, vertical, point sources. Stack locations and release parameters for each source included in the modeling evaluation are provided in Appendix A-2a. Manufacturer-provided performance data are included in Appendix B. The following subsections describe the source characteristics and corresponding emission rates for the Facility sources included in the modeling demonstrations.

2.6.1 Combustion Turbine Load Conditions

The source and emissions profiles for combustion turbines vary significantly based on operating load, ambient conditions, and fuel type. For this analysis, Applicant evaluated a total of sixty-eight (68) different operating scenarios, across both fuel types, to identify (1) a worst-case operating scenario (i.e., the operating scenario producing the greatest modeled concentration) for each fuel type and (2) the design scenario for each fuel type. The complete operating profile for each scenario evaluated via the load screening analysis is presented in Appendix A-3.

[15] Elevation from SCDES's online table titled *NWS Meteorological Data, 2015 – 2019 For Use in AERMOD Modeling in South Carolina – Surface Station Elevations and Surface/Upper-Air Station Pairings.*

2.6.1.1 Design Scenarios

Design load conditions represent the most typical operating scenario for the combustion turbines throughout the calendar year. The 100% load, 59 °F scenario is expected to be the most representative based on anticipated operating conditions and average annual temperatures in Colleton County. As such, the design scenario for each fuel type was defined as follows:

- Natural Gas Firing = 100% load, 59°F, duct burners on at peak firing (~851 MMBtu/hr), inlet chilling on.
- Fuel Oil Firing = 100% load, 59°F.

Release parameters (i.e., exhaust flowrate and temperature) associated with the design scenarios were used when modeling the annual standards.

2.6.1.2 Worst-Case Scenarios

The worst-case operating scenarios were identified during the load screening analysis as described in Section 3.1. A summary of each identified worst-case scenario across both fuel types is provided in Table 2-3.

Table 2-3 | Worst-Case Operating Scenarios

Natural Gas Firing[1]		
Pollutant	**Worst-Case Scenario**	**Corresponding Modeled ID**
PM_{10}	Case 23	NG23
$PM_{2.5}$	Case 23	NG23
NO_X	Case 25	NG25
CO	Case 24	NG24
SO_2	Case 23	NG23
Fuel Oil Firing[2]		
Pollutant	**Worst-Case Scenario**	**Corresponding Modeled ID**
PM_{10}	Case 3	FO3
$PM_{2.5}$	Case 3	FO3
NO_X	Case 3	FO3
CO	Case 3	FO3
SO_2	Case 2	FO2

Notes:

[1] For natural gas firing, operational and exhaust parameters are as follows:

- NG25: 29°F, 100% load, duct burners on, inlet chilling off.
- NG24: 0°F, 100% load, duct burners on, inlet chilling off.
- NG23: -10°F, 100% load, duct burners on, inlet chilling off.

[2] For fuel oil firing, operational and exhaust parameters are as follows:

- FO2: 0°F, 100% load
- FO3: 29°F, 100% load

2.6.2 Modeled Emission Rates & Source Parameters

Modeled emission rates for the Project were derived as summarized in the following sections. The short-term hourly emission rates were used to demonstrate compliance with standards that have a short-term averaging period (1-hr, 3-hr, 8-hr, and 24-hr). The long-term hourly emission rates were used to demonstrate compliance with standards that have an annual averaging period.

2.6.2.1 Combustion Turbines: Short-Term Emission Rates

Applicant obtained the maximum hourly emission rate data from Mitsubishi across a range of load, ambient temperature, and fuel type conditions as described in Section 3.1 Individual emission rates for each operating scenario across both fuel types are documented in the manufacturer's performance data provided in Appendix B.

2.6.2.2 Combustion Turbines: Startup and Shutdown Emission Rates

The air dispersion modeling analysis evaluated potential air quality impacts associated with combustion turbine startup and shutdown (SU/SD) events as described below. Manufacturer-provided data from Mitsubishi were used to calculate pollutant-specific emission rates for cold, warm, and hot starts, as well as shutdowns, under each fuel firing scenario. The emission rate used to model SU/SD events varied based on the averaging period of the applicable standard. Annual standards were evaluated consistent with the methodology described in Section 2.6.2.3, and the scenario yielding the maximum annualized emission rate, on a per-pollutant basis, was selected for inclusion in the annual modeling demonstrations. The methodology employed for short-term standards (1-hour, 3-hour, 8-hour, and 24-hour) was as follows:

All short-term SU/SD emission rates were developed by evaluating two bounding operating scenarios as follows:

- One (1) SU and one (1) SD event occurring within the averaging period, with all remaining time occupied by the combustion turbine operating at the design scenario.
- One (1) SU event, no SD event occurring within the averaging period, with all remaining time occupied by the combustion turbine operating at the design scenario.

For each pollutant and averaging period, the scenario producing the greater total mass emissions was selected. This total mass was then distributed across the applicable averaging period by dividing by the number of hours in that period to derive a final hourly average emission rate used as the model input. Consistent with the U.S. EPA's *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard* document[16] (1-hr NO_2 Modeling Clarification Guidance), hourly average emission rates for the 1-hour NO_2 and SO_2 probabilistic standards were further refined by annualizing intermittent emissions. This was accomplished by multiplying the hourly emission rate by the ratio of total hours of intermittent operation per year[17] to 8,760 hours.

During a SU/SD event, stack exhaust characteristics are expected to be comparable to those observed at the Minimum Emissions Compliant Load (MECL) (i.e., low load) operating scenarios and will improve progressively as the combustion turbine transitions towards full-load conditions. As a measure of conservatism, MECL exhaust parameters were applied to all SU/SD modeling for short-term standards including the balance of the time where the turbine is operating at the design load. Detailed emission

[16] U.S. EPA, March 1, 2011 memorandum from Tyler Fox, "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard."

[17] The total annual hours of intermittent operation equates to 504.2 hours/year based on the annual profile of startup events. See Appendix A-2b for additional details.

calculations supporting each SU/SD scenario evaluated in the short-term modeling analysis are provided in Appendix A-2b.

2.6.2.3 Combustion Turbines: Long-Term Emission Rates

Potential (controlled/limited) annual emissions (i.e., PTE) for each air pollutant considered both the use of proposed air pollution control equipment and the anticipated operational profile. Potential annual emissions were determined by evaluating emissions across the two fuel firing scenarios: 1) natural gas firing only and 2) fuel oil and natural gas firing. For each fuel firing scenario, emission calculations were further developed as follows:

1. **Normal Operations (No SU/SD):** Emissions were calculated assuming the combustion turbines operate at their design load for the full annual operating profile under each fuel firing condition. This represents emissions at continuous, steady-state operation.
    a. **Natural Gas Only:** ≤8,760 hours per year (hours/year) at design scenario operation, exclusive of SU/SD hours.
    b. Natural Gas and Fuel Oil Firing:
        i. **Fuel Oil:** ≤720 hours/year at design scenario operation, exclusive of SU/SD hours.
        ii. **Natural Gas:** Remaining 8,040 hours/year at design scenario operation.
2. **Normal Operations (w/ SU/SD):** Emissions were calculated by first reducing the annual normal operating hours to account for the time associated with SU/SD events. Emissions generated during SU/SD periods were then added to the adjusted normal-operation emissions to develop complete annual emissions that incorporate both steady-state and SU/SD operating scenarios.
    a. **Natural Gas Firing Only:** ≤8,116 hours/year at design scenario operation; ≤140 SU/SD events/year or 644 hours/year of SU/SD operation.
    b. Natural Gas and Fuel Oil Firing:
        i. **Fuel Oil:** 388 hours/year at design scenario operation; ≤56 SU/SD events/year or 332 hours/year of SU/SD operation.
        ii. **Natural Gas:** 7,396 hours/year at design scenario operation; ≤140 SU/SD events/year or 644 hours/year of SU/SD operation.
3. For each air pollutant, the higher emission value across all four scenarios was selected as the final potential annual emission rate.

The emission calculations described above are presented for a single CCCT power train in Appendix A-2 of the PSD air quality permit application. The derivation of hourly and annual emissions associated with SU/SD operations is provided in Appendix A-3 of the PSD air quality permit application and summarized in Appendix A-2a of this Report.

2.6.2.4 Intermittent Emission Sources: Emergency Engines

The Facility will be equipped with five (5) emergency generators (three (3) Project-specific emergency generators and two (2) existing emergency generators) and two (2) fire pump engines. These units are designed to operate only during routine testing or in response to actual emergency conditions. Non-emergency operation for maintenance and testing will be limited to no more than 100 hours/year per engine. However, for permitting and emissions accounting purposes, potential emissions were conservatively calculated assuming up to 500 hours/year of operation under all scenarios. In practice, Applicant anticipates that each engine will be tested no more than once per week, with each test lasting less than one hour. As a result, the actual annual testing duration for each engine is expected to be no greater than 52 hours.

Therefore, in accordance with U.S. EPA's 1-hour NO_2 Modeling Clarification Guidance, these emergency engines were excluded from the modeling demonstrations for the 1-hour NO_2 and SO_2 standards. For all other pollutants and averaging periods, the emergency engines were included in the modeling analysis. Specifically, for the 3-hour SO_2, 8-hour CO, and 24-hour SO_2, PM_{10}, and $PM_{2.5}$ standards, the hourly emission rate for each engine was divided by the number of hours in the applicable averaging period to simulate that the engine would only be online for at most one hour out of the full averaging period. The standard-specific hourly emission rates, along with the corresponding stack and release parameters for each emergency engine, are presented in Appendix A-2a.

2.6.2.5 Auxiliary Boiler and Fuel Gas Heaters

The Project will also involve the installation of one (1) natural gas-fired auxiliary boiler and four (4) natural gas-fired fuel gas heaters. The standard-specific hourly emission rates, along with the corresponding stack and release parameters for these sources, are presented in Appendix A-2a.

2.6.2.6 Cooling Equipment

Six (6) inlet chilling cooling towers and three (3) delugable air-cooled heat exchangers will be installed as part of the Project. This equipment will be sources of PM only. The standard-specific hourly emission rates, along with the corresponding stack and release parameters for these sources, are presented in Appendix A-2a.

2.7 GOOD ENGINEERING PRACTICE STACK HEIGHT

U.S. EPA's Guideline on Air Quality Models requires an assessment of the potential for nearby physical structures to influence the dispersion of emissions from stack sources. Specifically, emissions from stacks located within a defined distance of buildings may be subject to aerodynamic building downwash effects under certain meteorological conditions, potentially leading to higher ground-level pollutant concentrations.

To evaluate the potential for downwash, the actual stack height of each emission unit was compared to the Good Engineering Practice (GEP) stack height, as defined by U.S. EPA. All modeled emission units were reviewed in relation to surrounding structures to determine whether building-induced flow disturbances would affect dispersion patterns. AERMOD evaluates PRIME downwash for every stack, independent of height, while GEP restricts how much stack height credit may be taken. As defined in U.S. EPA's Appendix W Guidance, the GEP stack height is calculated using the following equation:

- $H_{GEP} = H + 1.5\ L$
  Where;
  - H_{GEP} = GEP Stack Height,
  - H = Height of the structure or nearby structure, and
  - L = Lesser dimension of the structure (height or maximum projected width)

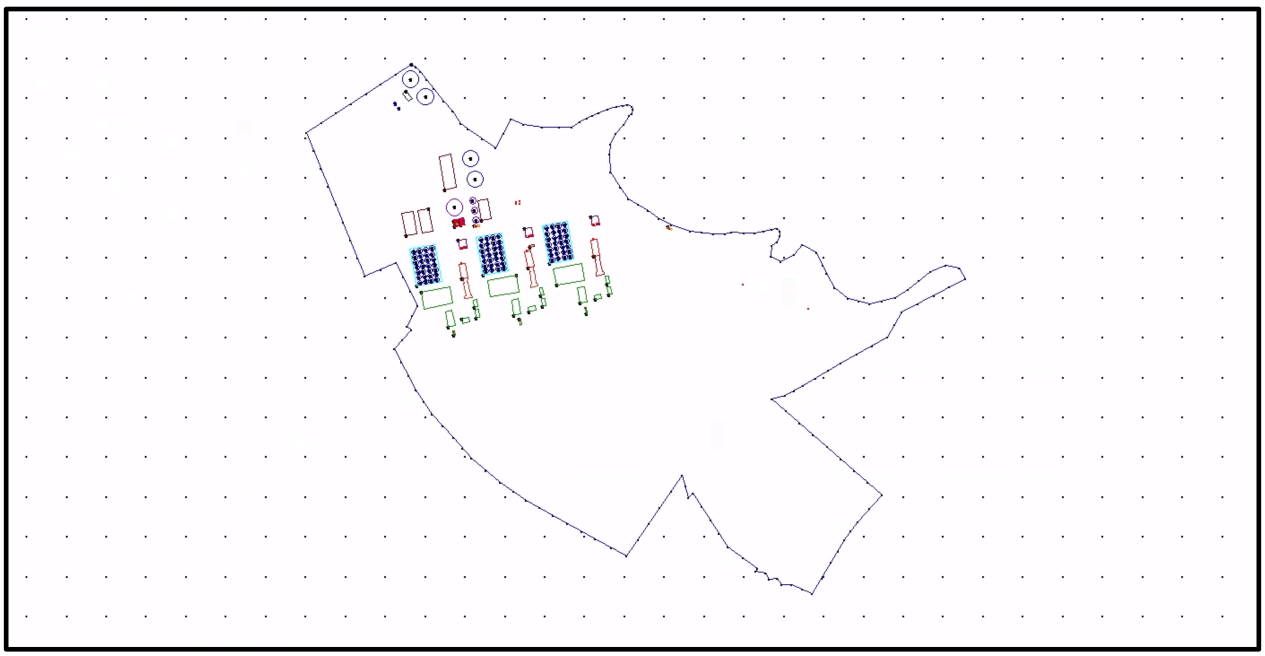
This equation is limited to stacks located within 5L of a structure. Stacks located at a distance greater than 5L are not subject to the wake effects of the structure.

As a part of the modeling demonstrations, Applicant conducted a GEP analysis for all modeled point sources to assess the influence of nearby buildings on the dispersion of emissions. For each stack, all surrounding structures were evaluated to identify the dominant building – i.e., the structure expected to have the greatest impact on dispersion characteristics. The GEP height for each stack was then calculated based on the dominant structure's height and maximum projected width, using the formula defined in 40 CFR §51.100(ii). Pursuant to U.S. EPA's Appendix W Guidance, stack heights exceeding either 65 meters or the calculated GEP height, whichever is greater, cannot take credit for the full stack height in a PSD air quality modeling analysis.

The structures were processed using the U.S. EPA Building Profile Input Program with PRIME downwash algorithms (BPIPPRM) to determine GEP stack heights as well as direction-specific building heights and widths for each 10-degree azimuth direction for each source included in the modeling analysis. All point sources at the Facility have release points below the greater of the GEP formula height calculated by BPIPPRM or 65 m (213 feet). Therefore, building dimensions data output from BPIPPRM were input directly into AERMOD to represent aerodynamic downwash effects on the point sources located at the Facility.

Locational information for the existing property line was obtained from Colleton County's Online GIS Mapping Resource. Locational information for proposed structures was extracted from AutoCAD in UTM, NAD83, Zone 17 coordinates. A figure showing the locations of the various structures included in the modeling demonstrations is provided in Figure 2-8. The structures are further parametrized and defined in Appendix A-2a of this Report.

Figure 2-8 | Significant Structures Included in Modeling Analysis



2.8 REPRESENTATIVE BACKGROUND CONCENTRATIONS

Ambient air quality data are used to represent the contribution to total ambient air pollutant concentrations from non-modeled sources. In accordance with 40 CFR §52.21(m), an application for a PSD permit must contain an analysis of ambient air quality in the vicinity of the proposed Project for each air pollutant subject to PSD review. The objective of reviewing these data is to develop representative background concentrations which, when added to modeled impacts, are used in the NAAQS compliance analysis.

In order to conduct the NAAQS analysis, representative background concentrations were needed for each modeled pollutant and averaging period exceeding a Class II SIL. Background concentrations obtained from monitoring data are considered representative based on monitor location, quality of the data, and currentness of the data.18[18] Background concentrations representative of the Project modeling domain may be obtained from SCDES for the most recent years of certified monitoring data available from monitoring stations in the vicinity of the Project site. The representativeness of concentration data from each monitoring station was justified based on relevant guidance, including:

- Section 8.3 of U.S. EPA's Appendix W Guidance.
- U.S. EPA's 1987 Ambient Monitoring Guidelines for PSD.[18]
- U.S. EPA's 2022 Ozone and Fine Particulate Matter Permit Modeling Guidance.[19]
- U.S. EPA's 2024 Guidance on Developing Background Concentrations for Use in Modeling Demonstrations.[20]
- SCDES's Modeling Guidelines, Section 3.6

Additionally, background air quality should not include the ambient impacts of the project source under consideration, per Section 8.3.1 of U.S. EPA's Appendix W Guidance. Instead, it should account for source impacts not explicitly used in the modeling analysis including:

- Nearby sources
- Natural sources
- Unidentified sources of air pollution
- Regional transport from more distant sources

The SCDES provided a summary of background concentrations at various monitors throughout the State.[21] In addition, the U.S. EPA maintains an Air Quality Design Values interactive map[22] which was used to cross-reference monitor-specific information, such as background concentrations, at various monitoring stations. Monitoring data was evaluated from both resources for each air pollutant and averaging period and evaluated for representativeness as a specific background design value in the NAAQS compliance demonstration. In general, the following criteria were evaluated when determining the "representativeness" of data from air quality monitoring stations:

- Monitor location relative to the Project site and significant impact area (SIA).
- Recentness, quality and completeness of data.
- Monitor measurement scale (e.g. neighborhood, regional, urban).
- Land use surrounding the Facility vs. that of the monitoring location (including urban/suburban/rural as well as comparative proximity of industrial and/or population centers).
- Topography of the area surrounding the Facility vs. that of the monitoring location (including the presence or absence of significant land features).
- Weather regimes, etc., as appropriate.
- Emission levels and population density near the Facility vs. the monitoring location.

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[18] *Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD),* EPA-450/4-87-007, May 1987.

[19] U.S. EPA Memorandum from Richard A. Wayland and Scott Mathias, *Guidance for Ozone and Fine Particulate Matter Permit Modeling*, 29 July 2022.

[20] *Guidance on Developing Background Concentrations for Use in Modeling Demonstrations*, U.S. EPA-454/R-24-003, November 2024.

[21] *Background Concentrations for Modeling Purposes (revised 9/10/2025)*, downloaded from: https://des.sc.gov/programs/bureau-air-quality/air-dispersion-modeling-overview/air-dispersion-modeling-data

[22] U.S. EPA *AirData Air Quality Monitors*, https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors, Last updated on August 11, 2025.

The background monitoring data is considered valid and complete if at least 75% of the values are available.[23] The background concentrations selected for use in the NAAQS compliance demonstration are summarized in Table 2-4.

Table 2-4 | Representative Background Concentrations for Cumulative Impact Analysis

Pollutant	Station Name	Location	Background Concentration[1]			
			1-hr	8-hr	24-hr	Annual
PM_{10}	Jenkins Ave/North Charleston FS	Charleston, SC	--	--	37.0	--
$PM_{2.5}$	North Charleston FS	Charleston, SC	--	--	12.7	7.0
NO_2	Jenkins Ave Fire Station	Charleston, SC	61.5[2]	--	--	11.9
Ozone	Moncks Corner	Berkeley, SC	--	61 ppb	--	--

Notes:
[1] With the exception of ozone, all concentrations are in µg/m^3. Ozone concentration reported in parts per billion (ppb).
[2] Seasonal-diurnal ambient background data, provided by SCDES, was used in the 1-hour NO_2 modeling as described in Section 2.8.1.

Justification demonstrating the representativeness of each chosen monitor is provided in the following subsections.

2.8.1 NO_2 Background Concentrations

Annual Standard

For the NO_2 annual standard, the Jenkins Avenue Fire Station monitor, summarized in Table 2-5, was selected as the most representative monitor.

Table 2-5 | Monitoring Station Information for NO_2

Site Name	County	AQS Site ID	Design Values (µg/m^3)[1]		Measurement Scale[1]	Distance from Facility[2]	Data Completeness[3]	Land Use[4]
			1-hr	Annual				
Jenkins Ave Fire Station	Charleston	45-019-0003	61.5	11.9	Neighborhood	~40 miles	Y	67% rural

Notes:
[1] Obtained from SCDES Background Concentrations for Modeling Purposes (revised 9/10/2025). Neighborhood scale is 500 m – 4 km, or 0.3 – 2.5 miles; urban scale is 4 – 50 km, or 2.5 – 31 miles; and regional scale is (50 – 100s km or 30 – 60+ miles.
[2] Distance is an approximation measured using Google Earth measure tool.
[3] Design value obtained from SCDES Background Concentrations for Modeling Purposes (revised 9/10/2025).
[4] Land use identified using 4 km buffer zone at https://gis.des.sc.gov/landcover/ with results categorized as either rural or urban as defined in Section 2.2.

[23] Completeness needed for valid monitoring data is defined in 40 CFR Part 50: Appendix K Section 2.3(a) and (b), Appendix N Section 3.0(c), Appendix P Section 2.3(b), Appendix R Section 4(c)(i), Appendix S Section 3.1(b) and 3.2(b), Appendix T Section 3(b).

As presented in Table 2-5, the monitoring dataset for the Jenkins Avenue Fire Station meets the applicable data completeness criteria typically recommended for regulatory applications and is located in an area characterized as primarily rural, with a population density generally consistent with the setting of the proposed Facility (see Section 2.2). As such, the Jenkins Avenue Fire Station monitor is considered broadly representative of regional background conditions from a land use and emissions perspective.

Meteorological data indicate that transport patterns in the vicinity of the Facility are generally eastwardly in direction. Accordingly, the Jenkins Avenue Fire Station monitor is located generally downwind of the Facility and is also reasonably close to the site. In addition to its favorable location relative to prevailing winds, the Jenkins Avenue Fire Station monitor is situated within a more developed area. As a result, it is expected to capture the influence of a broader range of regional and local emission sources, including mobile and area sources, and therefore provides a conservative representation of ambient NO_2 concentrations. Given its proximity, downwind orientation, and conservative characteristics, the Jenkins Avenue Fire Station monitor is considered a representative and appropriate source of background NO_2 concentrations for use in the NAAQS compliance demonstration.

1-Hour Standard

For the NO_2 1-hour NAAQS, Applicant utilized ambient background data further refined into seasonal diurnal values provided directly by the SCDES. These data are summarized in Table 2-6.

Table 2-6 | Seasonal / Diurnal 1-hour NO_2 Ambient Background Concentrations ($\mu g/m^3$)

Season	Hour											
	1	2	3	4	5	6	7	8	9	10	11	12
Winter	45.2	46.4	43.3	42.6	44.5	45.2	47.7	53.9	52.7	43.9	39.5	31.4
Spring	38.3	42.6	37.6	40.8	45.2	50.8	52.1	52.1	40.1	24.5	18.8	15.1
Summer	28.2	30.1	24.5	30.7	37.6	40.8	42.6	30.7	25.1	20.7	17.6	14.4
Fall	42.6	39.5	35.1	32.0	36.4	37.6	40.8	42.0	40.1	30.7	23.8	19.4
Season	**Hour**											
	13	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
Winter	23.8	23.8	21.9	22.6	32.0	35.7	43.3	54.6	54.6	53.9	50.2	50.8
Spring	16.3	15.7	13.2	13.2	15.1	16.9	17.6	28.2	31.4	36.4	33.2	37.0
Summer	13.2	13.2	13.2	12.5	15.1	13.8	16.9	21.3	20.7	21.3	23.8	27.6
Fall	14.4	16.9	16.3	13.2	21.3	23.8	35.7	47.0	48.3	47.7	43.3	43.3
Notes: [1] Dataset from the Jenkins Avenue Fire Station monitor located in Charleston, South Carolina.												

2.8.2 PM_{10} Background Concentration

Th North Charleston Fire Station monitor, summarized in Table 2-7, was identified as the most representative for evaluating the PM_{10} 24-hr standard.

Table 2-7 | PM_{10} Monitoring Station Information

Site Name	County	AQS Site ID	24-hr Design Values ($\mu g/m^3$)[1]	Measurement Scale [1]	Distance from Facility[2]	Data Completeness[3]	Land Use[4]
North Charleston Fire Station	Charleston	45-019-0020	37.0	Neighborhood	~41 miles	Y	72% rural

Notes:
[1] Obtained from SCDES Background Concentrations for Modeling Purposes (revised 9/10/2025). Neighborhood scale is 500 m – 4 km, or 0.3 – 2.5 miles; urban scale is 4 – 50 km, or 2.5 – 31 miles; and regional scale is (50 – 100s km or 30 – 60+ miles.
[2] Distance is an approximation measured using Google Earth measure tool.
[3] Design value obtained from SCDES Background Concentrations for Modeling Purposes (revised 9/10/2025).
[4] Land use identified using 4 km buffer zone at https://gis.des.sc.gov/landcover/ with results categorized as either rural or urban as defined in Section 2.2.

As summarized in Table 2-7, data completeness criteria were evaluated, and it was determined that the North Charleston Fire Station monitor meets the 75% data completeness threshold considered suitable for use in developing background concentrations. The monitor is situated in an area characterized by relatively low population density and limited urban influence. These conditions are generally consistent with the rural setting of the Facility, as described in Section 2.2, supporting the use of this monitor as broadly representative of regional background concentrations.

Meteorological conditions were also considered in evaluating monitor representativeness. Prevailing winds in the vicinity of the Facility are predominantly from the west toward the east. As a result, the North Charleston Fire Station monitor is located generally downwind of the Facility and is reasonably close to the site. Accordingly, it is expected to be more representative of regional background concentrations affecting the Facility and is therefore considered the most appropriate monitor for use in this analysis.

2.8.3 $PM_{2.5}$ Background Concentrations

For both the annual and 24-hr averaging periods, the North Charleston Fire Station monitor, summarized in Table 2-8, was selected as the most representative monitor.

Table 2-8 | $PM_{2.5}$ Monitoring Station Information

Site Name	County	AQS Site ID	Design Values (µg/m³)[1]		Measurement Scale [1]	Distance from Facility[2]	Data Completeness[3]	Land Use[4]
			Annual	24-hr				
North Charleston Fire Station	Charleston	45-019-0020	7.0	12.7	Neighborhood	41 miles	Y	72% rural

Notes:
[1] Obtained from SCDES Background Concentrations for Modeling Purposes (revised 9/10/2025). Neighborhood scale is 500 m – 4 km, or 0.3 – 2.5 miles; urban scale is 4 – 50 km, or 2.5 – 31 miles; and regional scale is (50 – 100s km or 30 – 60+ miles.
[2] Distance is an approximation measured using Google Earth measure tool.
[3] Design value obtained from SCDES Background Concentrations for Modeling Purposes (revised 9/10/2025).
[4] Land use identified using 4 km buffer zone at https://gis.des.sc.gov/landcover/ with results categorized as either rural or urban as defined in Section 2.2.

The North Charleston Fire Station monitor is located approximately 41 miles to the southeast of the site. As presented in Table 2-9, the North Charleston Fire Station monitor meets the 75% data completeness threshold. The reported design values range from approximately 78% of the annual $PM_{2.5}$ NAAQS to approximately 36% of the 24-hour $PM_{2.5}$ NAAQS, indicating moderate regional background concentrations relative to applicable standards. The monitoring station is located in an area characterized by relatively low population density and limited urban influence. These settings are generally consistent with the rural nature of the Facility, as described in Section 2.2, supporting its use as representative of regional background conditions.

Meteorological conditions were also evaluated to assess monitor representativeness. Prevailing winds in the vicinity of the Facility are generally from west to east. The North Charleston Fire Station monitor is located generally downwind of the Facility and is reasonably close to the Project site, making it more representative of conditions surrounding the Facility. Therefore, the North Charleston Fire Station monitor was chosen as the most appropriate monitor for use in the $PM_{2.5}$ analyses.

2.8.4 Ozone Background Concentrations

The Moncks Corner monitor, summarized in Table 2-9, was selected as the most appropriate and representative source of background ozone concentrations for use in the quantitative NAAQS analysis.

Table 2-9 | Ozone Monitoring Station Information

Site Name	County	AQS Site ID	Design Values (ppb)[1]	Measurement Scale [1]	Distance from Facility [2]	Data Completeness [3]	Land Use [4]
Moncks Corner	Berkeley	45-015-1002	61	Urban	36 miles	Y	89% rural

Notes:
[1] Obtained from SCDES Background Concentrations for Modeling Purposes (revised 9/10/2025). Neighborhood scale is 500 m – 4 km, or 0.3 – 2.5 miles; urban scale is 4 – 50 km, or 2.5 – 31 miles; and regional scale is (50 – 100s km or 30 – 60+ miles.
[2] Distance is an approximation measured using Google Earth measure tool.
[3] Design value obtained from SCDES Background Concentrations for Modeling Purposes (revised 9/10/2025).
[4] Land use identified using 4 km buffer zone at https://gis.des.sc.gov/landcover/ with results categorized as either rural or urban as defined in Section 2.2.

The Moncks Corner monitor is located approximately 36 miles from the Project site in a predominantly rural area. Although the monitor is classified using an urban measurement scale, ozone is a regionally transported pollutant, and such monitors are still considered suitable for background characterization in rural settings, particularly when they are located in areas with limited local emission influences. The Moncks Corner monitor's proximity to the Facility, data completeness, and predominantly rural surrounding land use make it well-suited to represent background conditions in the immediate Project area. Based on these considerations, the Moncks Corner monitor was selected as the most appropriate and representative source of background ozone concentrations for use in the quantitative NAAQS analysis.

2.9 MINOR SOURCE BASELINE DATES

The PSD regulations prohibit increases in pollution over a baseline concentration in excess of the PSD increment value.[24] The baseline concentration is the concentration attributable to:

- Actual emissions representative of sources in existence on the applicable minor source baseline date.
- Allowable emissions from major stationary sources that commenced construction before the major source baseline date but that were not in operation by the applicable minor source baseline date.[25]

The following changes in pollutant concentrations are not considered part of the baseline concentration and instead impact the amount of available PSD increment:

- Actual emissions from any major stationary source on which construction commenced after the major source baseline date.
- Actual emission increases and decreases at any stationary source occurring after the minor source baseline date.[26]

The major source baseline dates are 06 January 1975 for PM_{10} and SO_2, 08 February 1988 for NO_2, and 20 October 2010 for $PM_{2.5}$.[27] The minor source baseline date is established based on the earliest date following the major source baseline date that a complete PSD application is filed in an area. In South Carolina, minor

[24] SC R. 61-62.5, Standard No. 7, §(C).

[25] SC R. 61-62.5, Standard No. 7, §(B)(6)(a).

[26] SC R. 61-62.5, Standard No. 7, §(B)(6)(b).

[27] SC R. 61-62.5, Standard No. 7, §(B)(31).

source baseline dates are triggered on a county-wide basis. The minor source baseline date is triggered for a county if a PSD project is projected to have a significant impact at a receptor in that county. Minor source baseline dates for Colleton County and the six bordering counties are summarized in Table 2-10.[28]

Table 2-10 | Minor Source Baseline Dates

County	PM_{10} Minor Source Baseline Date	$PM_{2.5}$ Minor Source Baseline Date	SO_2 Minor Source Baseline Date	NO_2 Minor Source Baseline Date
Colleton	--	--	--	--
Charleston	11/30/1977	01/26/2016	11/30/1977	03/07/1989
Dorchester	06/05/1981	--	11/30/1977	01/25/2006
Orangeburg	05/23/1980	03/28/2012	05/23/1980	09/04/1991
Bamberg	--	--	--	--
Hampton	--	--	--	--
Beaufort	07/08/1978	--	07/08/1978	--

As shown in the table above, minor source baseline dates have not been set in Colleton County for PM_{10}, $PM_{2.5}$, SO_2, or NO_2. As such, the proposed Project would establish the minor source baseline dates for each pollutant in Colleton County.

[28] https://des.sc.gov/sites/des/files/media/document/BAQ_Modeling_BaselineDatebyCounty_10162023.pdf

3.1 LOAD SCREENING ANALYSIS

3.1.1 Methodology

Exhaust parameters associated with the combustion turbines proposed for installation at the Facility will vary depending on load and ambient temperature. The first step in the dispersion modeling analysis was to identify the operating scenario(s) that results in the worst-case modeled off-site concentration for each air pollutant and averaging period. Pursuant to Section 8.2.2(d) of the Appendix W Guidance, refined modeling was performed for the identified worst-case scenario(s) and the design scenario across both fuel types.

The combustion turbine manufacturer provided emission rate, exhaust flow rate, and exhaust temperature data for natural gas and fuel oil firing across various ambient temperature conditions, load conditions, and duct burner status for natural gas firing. The provided ambient temperature conditions ranged from -10 °F to 110 °F which reasonably covers any expected ambient condition in the Colleton County area. Exhaust parameters were provided for MECL, various mid-load, and base load (i.e., 100% load) conditions for both fuel firing scenarios. These loads cover the range of reasonably anticipated normal operating conditions. Manufacturer-provided exhaust parameter data across all operating scenarios are provided in Appendix B.

For each release scenario, the proposed CCCTs and stacks have identical operational and exhaust parameters and are located approximately the same distance to the property line. Therefore, for conservatism, releases from all stacks were modeled to determine worst-case impacts. Each operating scenario was set up as a separate source group in AERMOD with an emission rate of one (1) gram per second (g/sec) to calculate maximum 1-hr average ambient concentrations. The resulting 1-hr average concentrations predicted by AERMOD were then multiplied by each operating scenario's pollutant-specific emission rate to determine source-specific concentrations. The natural gas and fuel oil scenarios with the highest modeled off-site concentrations, on a per-pollutant basis, were carried forward as modeled scenarios in the refined modeling analysis, along with the design scenarios for natural gas and fuel oil operation. A summary of the SIL results is shown in Table 3-1. Complete results are provided in Appendix A-3.

Table 3-1 | Load Screening Results Summary

Fuel	Pollutant							
	NO_2		CO		SO_2		$PM_{10}/PM_{2.5}$	
	Conc. ($\mu g/m^3$)	Source ID	Conc. ($\mu g/m^3$)	Source ID	Conc. ($\mu g/m^3$)	Source ID	Conc. ($\mu g/m^3$)	Source ID
Natural Gas[1]	6.36	NG25	7.70	NG24	1.47	NG23	6.85	NG23
Fuel Oil[2]	8.42	FO3	5.72	FO3	0.84	FO2	10.47	FO3

[1] For natural gas firing, operational and exhaust parameters are as follows:
- NG25: 29°F, 100% load, duct burners on, inlet chilling off.
- NG24: 0°F, 100% load, duct burners on, inlet chilling off.
- NG23: -10°F, 100% load, duct burners on, inlet chilling off.

[2] For fuel oil firing, operational and exhaust parameters are as follows:
- FO2: 0°F, 100% load.
- FO3: 29°F, 100% load

In addition to the worst-case scenarios identified above, SU/SD was carried forward into SIL modeling for all pollutants and averaging periods across both fuel types as a measure of conservatism.

3.1.2 Receptor Grid

For the load screening and SIL analyses, a discrete Cartesian receptor grid extending out to 50 km from the Facility was established in AERMOD. Receptor spacing was implemented as follows:

- 50 meter (m) spacing along the ambient boundary (fence line).
- 100 m spacing from out to 1.5 km.
- 250 m spacing from 1.5 km to 5 km.
- 500 m spacing from 5 km to 10 km
- 1,000 m spacing from 10 km to 50 km.

The receptors were established using the same coordinate system as the Project stacks and buildings (i.e., UTM NAD83, Zone 17). Terrain elevations from the USGS's NED were processed using the most recent version of AERMAP (v.24142) to develop the receptor terrain elevations required by AERMOD. An evaluation of the concentration contours confirmed that concentrations were decreasing towards the edge of the receptor grid. In addition, the receptor grid displayed sufficient resolution to detect significant concentration gradients in the areas of maximum off-site impacts. The near-field and far-field (full grid) receptor grid used in the load screen and SIL evaluations are shown in Figure 3-1 and Figure Figure 3-2, respectively.

Figure 3-1 | Near-Field Receptor Grid

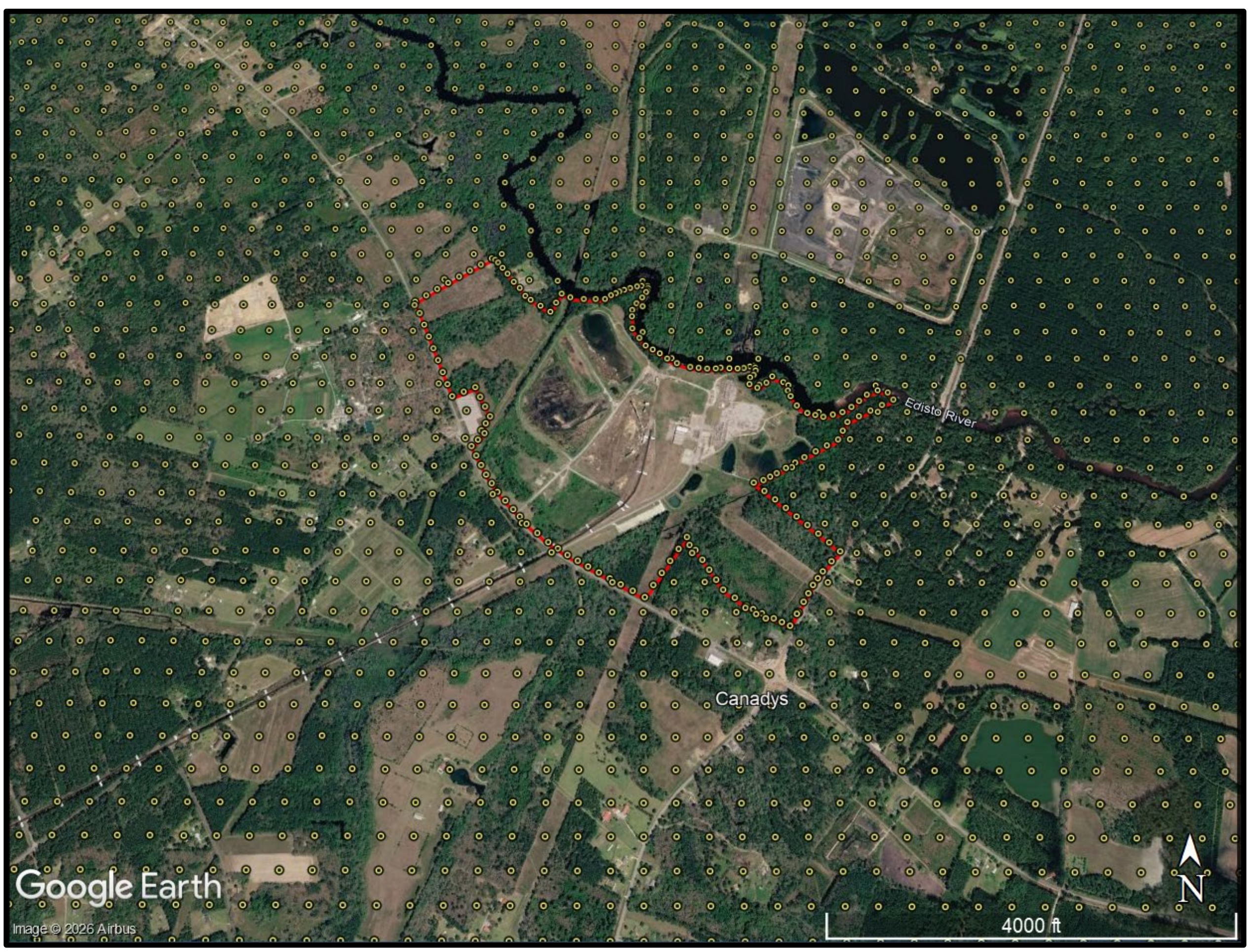
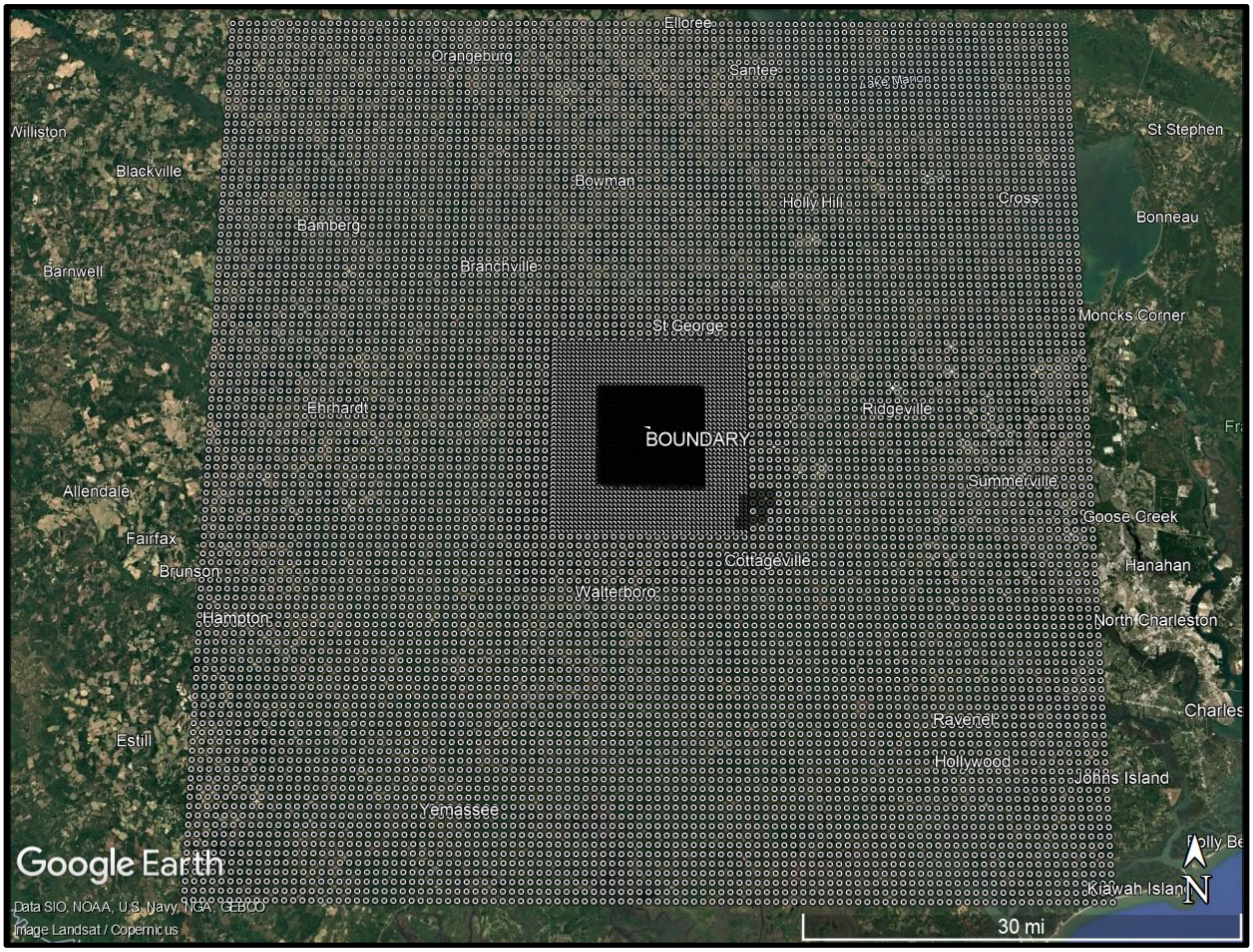


Figure 3-2 | Far-Field Receptor Grid



Note that the full NAAQS and PSD increment evaluations exclude receptor locations where predicted impacts from the proposed Project are below the SILs for the corresponding pollutant and averaging period.

3.2 CLASS II SIGNIFICANT IMPACT ANALYSIS

3.2.1 Significant Impact Analysis Procedure

Applicant conducted an analysis to assess whether ambient air quality model-predicted concentrations attributable to Project sources exceeded any applicable SIL. The results of the SIL analysis determined the need for further air quality modeling that included nearby sources and ambient background (in the case of NAAQS compliance demonstration only) to evaluate compliance with the NAAQS and PSD increments. Depending on the pollutant and corresponding averaging period under evaluation, either the highest first-high or 1st high average model-predicted concentration was compared to the appropriate SIL. The design load, worst-case load, and SU/SD scenarios were run for all pollutants across both fuel types.

The model-predicted concentrations from Facility sources were compared to the SILs for all modeled receptors. For each pollutant and corresponding averaging period for which a concentration was greater than the SIL, the distance to the farthest receptor from the Project exceeding the SIL was used to establish the significant impact area (SIA). Specifically, the SIA was determined as follows:

- The results of the model were analyzed using BEEST's graphic display output and radius of impact (ROI) tool.
- Within the graphical display interface, the ROI tool was selected to specify the SIL.
- For $PM_{2.5}$ analyses where secondary $PM_{2.5}$ impacts from Project sources must be accounted for, the input value into the ROI tool was the SIL minus the secondary $PM_{2.5}$ impacts calculated using U.S. EPA's Modeled Emission Rates for Precursors (MERPs) Guidance (see Section 3.4.1). For all other analyses, the appropriate SIL was input directly into the ROI tool.

The results of the significance analysis are summarized in the following series of tables. The maximum model-predicted concentrations for the Facility exceed the SILs for the 1-hour and annual NO_2, 24-hour PM_{10}, and 24-hour and annual $PM_{2.5}$ standards across both fuel types and operating conditions (i.e., design vs. worst-case). For all other pollutants, the predicted concentrations were below the applicable SILs; therefore, compliance with the NAAQS and PSD increments for those standards is demonstrated and no further analysis is required.

Table 3-2 | Class II Short-Term SIL Results – Design Scenario (NG30, FO4)

Pollutant	Averaging Period	AERMOD Predicted Concentrations (μg/m³) 2015 - 2019	Class II SIL (μg/m³)	Exceeds SIL? (Y/N)	SIA (km)
Natural Gas Firing					
SO_2	1-hour	2.24	8	N	--
	3-hour	6.86	25	N	--
	24-hour	1.16	5	N	--
CO	1-hour	278.91	2,000	N	--
	8-hour	87.24	500	N	--
NO_2	1-hour	137.15	8	Y	9.68
PM_{10}	24-hour	6.23	5	Y	1.48
$PM_{2.5}$[1]	24-hour	4.62	1.2	Y	3.53
Fuel Oil Firing					
Pollutant	**Averaging Period**	**AERMOD Predicted Concentrations (μg/m³) 2015 - 2019**	**Class II SIL (μg/m³)**	**Exceeds SIL? (Y/N)**	**SIA (km)**
SO_2	1-hour	1.37	8	N	--
	3-hour	6.86	25	N	--
	24-hour	0.45	5	N	--
CO	1-hour	278.91	2,000	N	--
	8-hour	87.24	500	N	--
NO_2	1-hour	137.15	8	Y	11.49
PM_{10}[2]	24-hour	4.92	5	N	--
$PM_{2.5}$[1],[2]	24-hour	4.46	1.2	Y	6.94

Notes:
[1] The total reported concentration for $PM_{2.5}$ includes the contribution of secondary $PM_{2.5}$ from Project sources. See Section 3.4.1.2 for additional details.
[2] The results for this scenario are similar to the results of the natural gas firing scenario due to the enhanced dispersion characteristics. See Appendix A-3 for details.

Table 3-3 | Class II Short-Term SIL Results – Worst Case[1]

Pollutant	Averaging Period	AERMOD Predicted Concentrations ($\mu g/m^3$) 2015 - 2019	Class II SIL ($\mu g/m^3$)	Exceeds SIL? (Y/N)	SIA (km)
Natural Gas Firing					
SO_2	1-hour (NG23)	2.25	8	N	--
	3-hour (NG23)	6.86	25	N	--
	24-hour (NGSSSO24)	1.75	5	N	--
CO	1-hour (NGSS_CO1)	404.96	2,000	N	--
	8-hour (NGSS_CO8)	147.78	500	N	--
NO_2	1-hour (NG25)	137.15	8	Y	9.68
PM_{10}	24-hour (NGSSPM10)	8.91	5	Y	1.83
$PM_{2.5}$[3]	24-hour (NGSSPM25)	5.79	1.2	Y	3.78
Fuel Oil Firing					
Pollutant	**Averaging Period**	**AERMOD Predicted Concentrations ($\mu g/m^3$) 2015 - 2019**	**Class II SIL ($\mu g/m^3$)**	**Exceeds SIL? (Y/N)**	**SIA (km)**
SO_2	1-hour (FO4)	1.37	8	N	--
	3-hour (FO2)	6.86	25	N	--
	24-hour (FOSSSO24)	0.51	5	N	--
CO	1-hour (FOSS_CO1)	1,378.24	2,000	N	--
	8-hour (FOSS_CO8)	214.44	500	N	--
NO_2	1-hour (FO3)	137.15	8	Y	12.18
PM_{10}	24-hour (FOSSPM10)	6.78	5	Y	1.56
$PM_{2.5}$[3]	24-hour (FOSSPM25)	4.99	1.2	Y	9.97

Notes:

[1] The worst-case concentrations reported in this table reflect the maximum concentration between the worst-case operating scenarios identified via the load screening analysis and startup/ shutdown operations. The source group producing the maximum concentration is identified in parentheses for each pollutant and corresponding averaging period shown in the table.

[2] The total reported concentration for $PM_{2.5}$ includes the contribution of secondary $PM_{2.5}$ from Project sources. See Section 3.4.1.2 for additional details.

Table 3-4 | Class II Annual SIL Results

Dual Fuel Firing (Natural Gas & Fuel Oil)									
Pollutant	**Averaging Period**	**AERMOD Predicted Concentrations ($\mu g/m^3$)**					**Class II SIL ($\mu g/m^3$)**	**Exceeds SIL? (Y/N)**	**SIA (km)**
		2015	**2016**	**2017**	**2018**	**2019**			
SO_2	Annual	0.10	0.12	0.12	0.10	0.10	1.0	N	--
NO_2	Annual	8.17	8.97	10.09	9.05	9.34	1.0	Y	2.75
PM_{10}	Annual	0.95	0.98	1.06	0.98	0.99	1.0	Y	0.41
$PM_{2.5}$[1]	Annual	0.90					0.13	Y	4.32

Notes:
[1] The total reported concentration for $PM_{2.5}$ includes the contribution of secondary $PM_{2.5}$ from Project sources. See Section 3.4.1.2 for additional details.

Detailed SIL results are provided in Appendix A-4.

3.3 SIGNIFICANT MONITORING CONCENTRATION ANALYSIS

A pre-construction ambient air monitoring waiver must be obtained for sources subject to PSD review to be exempt from the preconstruction ambient air monitoring requirements specified in SC R. 61-62.5, Std. No. 7, §(M)(1). Consistent with these requirements, an applicant may be exempted from conducting preconstruction monitoring if modeled ambient concentrations associated with the proposed project are below the SMCs. The SMCs, summarized in Table 1-1, represent pollutant- and averaging period-specific thresholds used to determine whether a proposed source has the potential to cause significant ambient concentrations that would warrant the collection of site-specific monitoring data. If a project cannot be exempted from preconstruction monitoring based on modeling results, the applicant may propose the use of existing monitoring data for the reviewing authority's consideration if appropriate justification is provided.

As shown in Appendix A-4, the results of the significance analysis indicate that Project concentrations are below the applicable SMCs for all pollutants and averaging periods, except for the 24-hour $PM_{2.5}$ standard. Consistent with 40 CFR §52.21, when modeled impacts exceed the applicable SMC, the applicant may request a waiver from the preconstruction monitoring requirement by demonstrating that existing ambient air quality data are representative of conditions in the project area and are sufficient to characterize background concentrations. Accordingly, Applicant proposes to rely on existing representative ambient monitoring data in lieu of conducting preconstruction monitoring for $PM_{2.5}$.

As described in Section 2.8.3, the ambient monitoring network in the vicinity of the Project provides adequate spatial coverage to characterize $PM_{2.5}$ concentrations within the local airshed. The selected monitor is considered representative of the Project area based on factors including proximity, regional emission source influences, terrain characteristics, and meteorological conditions. In addition, the available dataset meets applicable data quality and completeness criteria and is sufficiently current for use in this analysis.

3.4 SECONDARY FORMATION OF $PM_{2.5}$ AND OZONE ANALYSIS

Ozone and $PM_{2.5}$ are regulated NSR pollutants under the PSD permitting program. Ambient ozone concentrations are addressed directly through the regulation of its precursors, NO_X and VOCs, while ambient concentrations of $PM_{2.5}$ are addressed through the regulation of both direct $PM_{2.5}$ emissions and its precursors, NO_X and SO_2. The most recent version of the U.S. EPA's Appendix W Guidance recommends the use of MERPs as a screening tool to evaluate a proposed project's potential impact on ambient ozone and secondary $PM_{2.5}$ concentrations in the surrounding airshed. The Appendix W Guidance, and associated 2019 MERPs Guidance Document,[29] outlines a two-tiered framework for assessing single-source impacts:

- **Tier 1** demonstrations rely on technically credible relationships between precursor emissions (SO_2, NO_X and VOCs) and downwind ambient concentrations, as established in existing hypothetical modeling studies.
- **Tier 2** demonstrations involve a case-specific application of chemical transport modeling, typically employing Eulerian grid or Lagrangian models, to explicitly simulate ozone and secondary $PM_{2.5}$ formation attributable to project-related emissions.

For this Project, Applicant utilized the Tier 1 approach as discussed in the following section.

3.4.1 MERPS Analysis

Applicant selected the hypothetical stack located in Allendale, South Carolina as the most representative surrogate for the Project sources in evaluating secondary $PM_{2.5}$ and ozone formation. This selection was based on proximity, regional similarity, and comparable geographical and climatological characteristics between the two locations.

The Allendale source is the nearest available hypothetical stack to the Facility, located approximately 70 km to the west-southwest. The surrounding land use in Allendale is predominantly rural, consisting of agricultural areas and forested lands, which is consistent with the setting of the Facility. Both locations are situated within relatively flat coastal plain terrain and lack significant nearby urban development or large industrial emission sources that could substantially influence local atmospheric chemistry.

The hypothetical Allendale stack is located at latitude 32.973° N and longitude 81.407° W, within the Savannah River basin, while The Facility is located at latitude 33.064° N and longitude 80.626° W, within the Edisto River basin. Despite being in adjacent watersheds, both locations are within the same broader regional airshed of the southeastern United States and are therefore expected to experience similar large-scale meteorological patterns, including temperature, solar radiation, and atmospheric transport conditions that influence secondary pollutant formation. Given the close proximity, similar rural land use, comparable terrain, and shared regional climatology, the Allendale hypothetical stack is considered an appropriate and representative surrogate for assessing secondary $PM_{2.5}$ and ozone impacts from the Facility using the MERPs framework.

Secondary impacts were calculated using Equation (1) as follows:

$$\text{Equation (1): Impact}\left(\frac{\mu g}{m^3}\right) = \text{Precursor Emission Rate}\left(\frac{\text{tons}}{\text{yr}}\right) * \frac{\text{Modeled Impact from Hypothetical Source}\left(\frac{\mu g}{m^3}\right)}{\text{Modeled Emission Rate from Hypothetical Source}\left(\frac{\text{tons}}{\text{yr}}\right)}$$

Class II MERPs used to develop secondary ozone and $PM_{2.5}$ concentrations are provided in Appendix A-12. The distance-weighted MERPs, used in the Class I significance evaluation described in Section 5, are provided in Appendix A-13.

3.4.1.1 Secondary Ozone

The potential contribution of ozone to ambient air quality from precursor emissions associated with the Project was calculated to be approximately 4.2 ppb. Because this value exceeds the applicable SIL of 1.0

[29] U.S. EPA Memorandum, Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier I Demonstration Tool for Ozone and PM2.5 under the PSD Permitting Program, 30 April 2019.

ppb for ozone, further analysis was required. To assess the Project's impact in the context of existing air quality, Applicant reviewed monitored ambient ozone concentrations from the most representative active monitoring site, the Moncks Corner monitor (see Section 2.8.4). This monitor has a current design value of 61 ppb. When the Project's estimated contribution is added to the monitored design value, the resulting total concentration is 65.2 ppb. As this combined concentration is below the NAAQS of 70 ppb for 8-hour ozone, the Project is not expected to cause or contribute to a violation of the ozone NAAQS. Therefore, no further analysis is warranted.

Complete calculations for secondary ozone formation are provided in Appendix A-15.

3.4.1.2 Secondary $PM_{2.5}$

Secondary $PM_{2.5}$ concentrations attributable to Project sources were quantified using the U.S. EPA's MERPs approach and are summarized in Table 3-4.

Table 3-5 | Secondary $PM_{2.5}$ Concentrations

Averaging Period	Class I	Class II
	Project Sources ($\mu g/m^3$)	Project Sources ($\mu g/m^3$)
24-hr	5.31E-02	8.20E-02
Annual	2.52E-03	4.13E-03

For the Class I SIL evaluation, Project-specific secondary $PM_{2.5}$ concentrations were calculated using the methodology described in Section 3.4.1, incorporating the distance-weighted MERPs to assign hypothetical concentrations for use in Equation 1. These secondary $PM_{2.5}$ concentrations were added to the modeled primary $PM_{2.5}$ concentrations for comparison to the 24-hour and annual SILs. Similarly, for the Class II SIL evaluation, Project-specific secondary $PM_{2.5}$ concentrations were combined with modeled primary $PM_{2.5}$ concentrations for direct comparison to the 24-hour and annual SIL thresholds.

For the NAAQS compliance demonstration, the calculated secondary $PM_{2.5}$ concentration attributable to Project sources was added to the sum of modeled primary $PM_{2.5}$ impact and representative background concentrations for comparison to the 24-hour and annual standards. For the PSD Class II increment analysis, secondary $PM_{2.5}$ concentrations from Project-specific sources was combined with modeled primary $PM_{2.5}$ concentrations to evaluate compliance with the applicable increments. Secondary $PM_{2.5}$ impacts associated with precursor emissions from Project sources were conservatively assumed constant across the modeling domain. Detailed calculations supporting the secondary $PM_{2.5}$ analysis are provided in Appendix A-13 (Class II Secondary $PM_{2.5}$) and A-14 (Class I Secondary $PM_{2.5}$).

4 CLASS II CUMULATIVE IMPACT MODELING APPROACH

Maximum model-predicted concentrations from Project sources are predicted to exceed the Class II SILs for three air pollutants. Specifically, the SILs were exceeded for 1-hour and annual NO_2, 24-hour PM_{10}, and 24-hour and annual $PM_{2.5}$. Therefore, a cumulative (interactive source) impact analysis was performed to assess the combined impacts of emissions from Project sources, interacting (nearby) sources, and ambient background (for the NAAQS analysis). The following sections summarize the cumulative source impact analysis methodology and results.

4.1 CUMULATIVE IMPACT MODELING PROCEDURE

The cumulative impact analysis was performed with AERMOD, using the inputs and assumptions (control options, terrain, meteorological data, and downwash parameters) described in Section 2 of this Report. Project sources were modeled using the same stack parameters and emission rates used in the significant impact analysis discussed in Section 3.2.

The receptor grids utilized for the cumulative impact analyses were developed based on the results of the various significant impact analyses. Specifically, the significant receptor export tool in BEEST was used to extract only those receptors where a significant concentration attributable to the Project was expected to occur for specific pollutants and averaging periods that exceeded the SILs. For each pollutant and corresponding averaging period, the same receptor grid was used for the NAAQS and PSD Class II increment demonstrations.

4.2 OFFSITE SOURCES

4.2.1 NAAQS Analyses

Potentially interacting off-site sources were identified through a review of county-specific source inventory data obtained from the SCDES for all counties within or intersected by a circle having a radius equal to the maximum SIA (12.18 km) plus 50 km (the "Screening Area"). All off-site sources within the SIA were included in the NAAQS cumulative impact analysis. Off-site sources located outside of the SIA but within the screening area were evaluated for exclusion from the cumulative impact analyses using the "20D" screening methodology, per Section 7.4.3 of SCDES's Modeling Guidelines. Specifically, a source located outside of the SIA but within the Screening Area was excluded from the cumulative impact modeling analysis if:

$$Q < 20 \times D$$

Where:

Q = Facility-wide allowable emission rate associated with the offsite source, in tons/year.
D = Distance, in km, from the offsite source to the Facility for short-term standards or the distance from the offsite source to the SIA for annual standards.

The following approach was used to complete the 20D analysis:

- "Q" was calculated based on the sum of direct pollutant emissions from all sources at an individual off-site facility and all sources located within two (2) km of each other.
- UTM coordinates were provided by the SCDES in NAD83 and utilized for calculating the distance to the Facility for short-term standards or the distance from the offsite source to the SIA for annual standards.

Sources within the SIA and those that were not screened out via the 20D analysis were included in the NAAQS cumulative impact analysis.[30] The results of the 20D analysis performed for this Project are summarized in Appendix C. A summary of off-site sources included in the NAAQS cumulative impact analysis is presented in Appendix B-8.

4.2.2 Class II PSD Increment Analysis

Per Section 7.4.3.1 of the Modeling Guidelines, increment consumption is attributable to emission increases from new or modified sources that have occurred since the MSBD was established in the counties that fall within the SIA for a project. As such, the offsite sources used in the NAAQS compliance demonstration can be further refined based on the installation date of specific emission sources. However, in accordance with Section 7.4.3.1 of the Modeling Guidelines, the full NAAQS offsite inventory can be used as a conservative option to evaluate the Class II PSD increments. Therefore, Applicant elected to use the full NAAQS offsite inventory when evaluating the Class II PSD increments.

4.3 CUMULATIVE IMPACT ANALYSIS RESULTS

Cumulative impacts modeling was performed for each pollutant and corresponding averaging period exceeding a SIL. The analyses were performed using the significant receptor grids discussed in Section 4.1. The following methodology was used when evaluating the $PM_{2.5}$ NAAQS and Class II Increments.

- **NAAQS Compliance Demonstration:** The calculated secondary $PM_{2.5}$ concentration (see Appendix A-13) attributable to Project sources was added to the sum of modeled primary $PM_{2.5}$ impact and representative background concentrations for comparison to the 24-hour and annual standards.
- **Class II PSD Increments:** The calculated secondary $PM_{2.5}$ concentration (see Appendix A-13) from Project-specific sources was combined with modeled primary $PM_{2.5}$ concentrations to evaluate compliance with the applicable increments. Background concentrations are not considered for increment evaluations.

The results of the NAAQS and PSD Class II increment cumulative impact analyses are summarized in the following sections. The results demonstrate that the Project will comply with the NAAQS and Class II PSD Increments for all relevant standards.

[30] Other analyses may be applied to screen out sources remaining after the 20D analysis, including a significant concentration gradient analysis. However, such analyses were not used for this Project.

4.3.1 NAAQS Modeling Results

Table 4-1 | Short-Term NAAQS Modeling Results: Design Scenarios (NG30, FO4)

Natural Gas Firing						
Pollutant	**Averaging Period**	**AERMOD Predicted Concentrations (μg/m^3)** **2015 – 2019**	**Background Concentration (μg/m^3)**	**Total Concentration (μg/m^3)**	**NAAQS (μg/m^3)**	**Below NAAQS?**
PM_{10}	24-Hour	4.51	37.00	41.51	150	Y
$PM_{2.5}$[1]	24-Hour	3.51	12.7	16.29	35	Y
NO_2	1-Hour	171.07	Note 3	171.07	188	Y
Fuel Oil Firing[2]						
Pollutant	**Averaging Period**	**AERMOD Predicted Concentrations (μg/m^3)** **2015 – 2019**	**Background Concentration (μg/m^3)**	**Total Concentration (μg/m^3)**	**NAAQS (μg/m^3)**	**Below NAAQS?**
$PM_{2.5}$[1]	24-Hour	3.48	12.7	16.26	35	Y
NO_2	1-Hour	171.08	Note 3	171.08	188	Y

Notes:
[1] The total reported concentration for $PM_{2.5}$ includes the contribution of secondary $PM_{2.5}$ from Project sources. See Section 3.4.1.2 for additional details.
[2] Based on the results of the SIL analysis, the design and worst-case scenarios for fuel oil firing did not have to be carried forward into cumulative impacts modeling for the PM_{10} 24-hour NAAQS.
[3] Seasonal diurnal background values used. Therefore, background included in the modeled concentration value.

Table 4-2 | Short-Term NAAQS Modeling Results: Worst-Case Scenarios (NG23, NG25 and FO3)

Natural Gas Firing						
Pollutant	**Averaging Period**	**AERMOD Predicted Concentrations (μg/m^3)** **2015 – 2019**	**Background Concentration (μg/m^3)**	**Total Concentration (μg/m^3)**	**NAAQS (μg/m^3)**	**Below NAAQS?**
PM_{10}	24-Hour	4.52	37.0	41.52	150	Y
$PM_{2.5}$[1]	24-Hour	3.51	12.7	16.30	35	Y
NO_2	1-Hour	171.07	Note 3	171.07	188	Y
Fuel Oil Firing[2]						
Pollutant	**Averaging Period**	**AERMOD Predicted Concentrations (μg/m^3)** **2015 – 2019**	**Background Concentration (μg/m^3)**	**Total Concentration (μg/m^3)**	**NAAQS (μg/m^3)**	**Below NAAQS?**
$PM_{2.5}$[1]	24-Hour	3.48	12.7	16.26	35	Y
NO_2	1-Hour	171.08	Note 3	171.08	188	Y

Notes:
[1] The total reported concentration for $PM_{2.5}$ includes the contribution of secondary $PM_{2.5}$ from Project sources. See Section 3.4.1.2 for additional details.
[2] Based on the results of the SIL analysis, the design and worst-case scenarios for fuel oil firing did not have to be carried forward into cumulative impacts modeling for the PM_{10} 24-hour NAAQS.
[3] Seasonal diurnal background values used. Therefore, background included in the modeled concentration value.

Table 4-3 | Short-Term NAAQS Modeling Results: SU/SD

Natural Gas Firing						
Pollutant	**Averaging Period**	**AERMOD Predicted Concentrations (µg/m³)**	**Background Concentration (µg/m³)**	**Total Concentration (µg/m³)**	**NAAQS (µg/m³)**	**Below NAAQS?**
		2015 – 2019				
PM_{10}	24-Hour	4.70	37.0	41.70	150	Y
$PM_{2.5}$[1]	24-Hour	3.59	12.7	16.37	35	Y
NO_2	1-Hour	171.07	Note 3	171.07	188	Y
Fuel Oil Firing[2]						
Pollutant	**Averaging Period**	**AERMOD Predicted Concentrations (µg/m³)**	**Background Concentration (µg/m³)**	**Total Concentration (µg/m³)**	**NAAQS (µg/m³)**	**Below NAAQS?**
		2015 – 2019				
PM_{10}	24-Hour	4.85	37.0	41.85	150	Y
$PM_{2.5}$[1]	24-Hour	3.64	12.7	16.42	35	Y

Notes:
[1] The total reported concentration for $PM_{2.5}$ includes the contribution of secondary $PM_{2.5}$ from Project sources. See Section 3.4.1.2 for additional details.
[2] As agreed to by the SCDES in its response to the Canady's Air Dispersion Modeling Protocol submitted in October 2025, SU/SD operations under fuel oil firing were not evaluated for the 1-hour NO_2 standard.
[3] Seasonal diurnal background values used. Therefore, background included in the modeled concentration value.

Table 4-4 | Annual NAAQS Modeling Results

Dual Fuel Firing (Natural Gas & Fuel Oil)[1]						
Pollutant	**Averaging Period**	**AERMOD Predicted Concentrations (µg/m³)**	**Background Concentration (µg/m³)**	**Total Concentration (µg/m³)**	**NAAQS (µg/m³)**	**Below NAAQS?**
		2015 – 2019				
$PM_{2.5}$[2]	Annual	0.92	7.0	7.92	9	Y
NO_2[3]	Annual	11.16	11.9	23.06	100	Y

Notes:
[1] Annual standards were evaluated as described in Section 2.6.2.3.
[2] The total reported concentration for $PM_{2.5}$ includes the contribution of secondary $PM_{2.5}$ from Project sources. See Section 3.4.1.2 for additional details.
[3] The NO_2 annual model was run using 5 separate years of meteorological data. The maximum concentration is reported above. See Appendix A-9 for individual concentrations.

Complete results for the NAAQS cumulative impact analysis are provided in Appendix A-9.

4.3.2 Class II PSD Increment Results

Table 4-5 | Class II Short-Term PSD Increments: Design Scenarios (NG30, FO4)

Natural Gas Firing										
Pollutant	**Averaging Period**	**AERMOD Predicted Concentrations (µg/m³)**						**Total Conc. (µg/m³)**	**Increment (µg/m³)**	**Below Increment?**
		2015	**2016**	**2017**	**2018**	**2019**	**Max.**			
PM_{10}	24-Hour	4.53	4.49	4.68	4.12	4.40	4.68	4.68	30	Y
$PM_{2.5}$ [1]	24-Hour	4.14	4.21	4.46	3.97	4.18	4.46	4.54	9	Y
Fuel Oil Firing[2]										
Pollutant	**Averaging Period**	**AERMOD Predicted Concentrations (µg/m³)**						**Total Conc. (µg/m³)**	**Increment (µg/m³)**	**Below Increment?**
		2015	**2016**	**2017**	**2018**	**2019**	**Max.**			
$PM_{2.5}$ [1]	24-Hour	4.18	4.29	4.20	3.94	4.13	4.29	4.37	9	Y

Notes:
[1] The total reported concentration for $PM_{2.5}$ includes the contribution of secondary $PM_{2.5}$ from Project sources. See Section 3.4.1.2 for additional details.
[2] Based on the results of the SIL analysis, the design and worst-case scenarios for fuel oil firing did not have to be carried forward into cumulative impacts modeling for PM_{10} 24-hour.

Table 4-6 | Class II Short-Term PSD Increments: Worst-Case Scenarios (NG23 and FO3)

Natural Gas Firing										
Pollutant	**Averaging Period**	**AERMOD Predicted Concentrations (µg/m³)**						**Total Conc. (µg/m³)**	**Increment (µg/m³)**	**Below Increment?**
		2015	**2016**	**2017**	**2018**	**2019**	**Max.**			
PM_{10}	24-Hour	4.51	4.49	5.00	4.13	4.41	5.00	5.00	30	Y
$PM_{2.5}$ [1]	24-Hour	4.12	4.21	4.78	3.97	4.19	4.78	4.86	9	Y
Fuel Oil Firing[2]										
Pollutant	**Averaging Period**	**AERMOD Predicted Concentrations (µg/m³)**						**Total Conc. (µg/m³)**	**Increment (µg/m³)**	**Below Increment?**
		2015	**2016**	**2017**	**2018**	**2019**	**Max.**			
$PM_{2.5}$ [1]	24-Hour	4.18	4.29	4.21	3.94	4.13	4.29	4.37	9	Y

Notes:
[1] The total reported concentration for $PM_{2.5}$ includes the contribution of secondary $PM_{2.5}$ from Project sources. See Section 3.4.1.2 for additional details.
[2] Based on the results of the SIL analysis, the design and worst-case scenarios for fuel oil firing did not have to be carried forward into cumulative impacts modeling for the PM_{10} 24-hour NAAQS.

Table 4-7 | Class II Short-Term PSD Increments: SU/SD

Natural Gas Firing										
Pollutant	**Averaging Period**	**AERMOD Predicted Concentrations ($\mu g/m^3$)**						**Total Conc. ($\mu g/m^3$)**	**Increment ($\mu g/m^3$)**	**Below Increment?**
		2015	**2016**	**2017**	**2018**	**2019**	**Max.**			
PM_{10}	24-Hour	4.56	4.64	7.05	4.24	4.78	7.05	7.05	30	Y
$PM_{2.5}$[1]	24-Hour	4.20	4.35	6.79	4.07	4.49	6.79	6.88	9	Y
Fuel Oil Firing										
Pollutant	**Averaging Period**	**AERMOD Predicted Concentrations ($\mu g/m^3$)**						**Total Conc. ($\mu g/m^3$)**	**Increment ($\mu g/m^3$)**	**Below Increment?**
		2015	**2016**	**2017**	**2018**	**2019**	**Max.**			
PM_{10}	24-Hour	4.79	5.13	5.52	5.15	4.91	5.52	5.52	30	Y
$PM_{2.5}$[1]	24-Hour	4.50	4.89	5.44	5.00	4.56	5.44	5.53	9	Y

Notes:
[1] The total reported concentration for $PM_{2.5}$ includes the contribution of secondary $PM_{2.5}$ from Project sources. See Section 3.4.1.2 for additional details.

Table 4-8 | Class II Annual PSD Increments

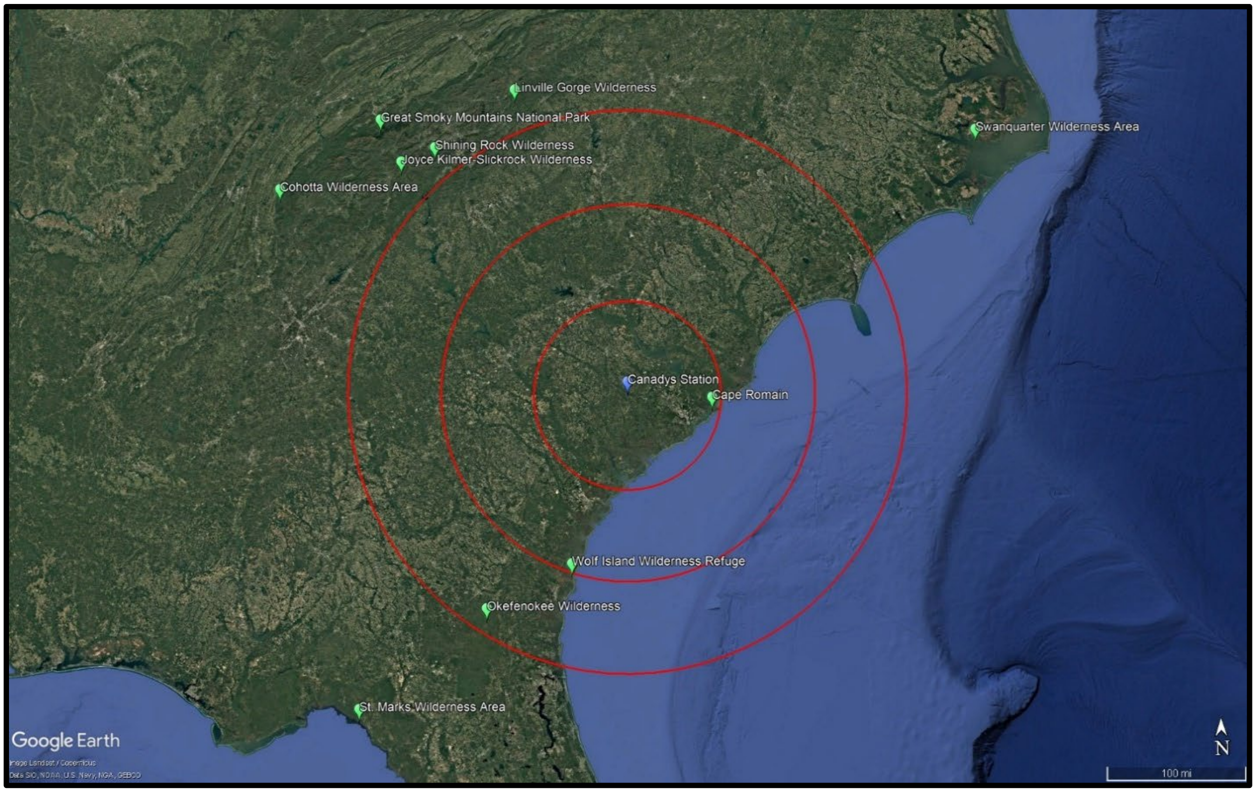
Dual Fuel Firing (Natural Gas & Fuel Oil)[1]										
Pollutant	**Averaging Period**	**AERMOD Predicted Concentrations ($\mu g/m^3$)**						**Total Conc. ($\mu g/m^3$)**	**Increment ($\mu g/m^3$)**	**Below Increment?**
		2015	**2016**	**2017**	**2018**	**2019**	**Max.**			
NO_2	Annual	9.32	9.94	11.16	10.08	10.44	11.16	11.16	25	Y
PM10	Annual	0.95	1.01	1.09	1.01	1.02	1.09	1.09	17	Y
$PM_{2.5}$[2]	Annual	0.89	0.91	0.98	0.91	0.93	0.98	0.99	4	Y

Notes:
[1] Annual standards were evaluated as described in Section 2.6.2.3.
[2] The total reported concentration for $PM_{2.5}$ includes the contribution of secondary $PM_{2.5}$ from Project sources. See Section 3.4.1.2 for additional details.

The complete results of the PSD Class II increment cumulative impact analysis are provided in Appendix A-10.

Sections 160-169 of the Clean Air Act established a detailed policy and regulatory framework to ensure the enhanced protection of air quality including in specific regions of the United States classified as Class I areas. Class I areas are designated as pristine natural areas and include places such as national parks, national wilderness areas, and other areas of natural significance. Federal law precludes the deterioration of Class I air quality to any significant degree and requires an extensive evaluation to confirm that emissions from a major source will not result in deleterious effects to a Class I area. Figure 5-1 shows the proposed Project location relative to Class I areas within a 300 km radius of the Site.

Figure 5-1 | Project Location Relative to Class I Areas (100/200/300 km Radii)



The nearest Class I Area, Cape Romain National Wildlife Refuge (Cape Romain), is approximately 93 km from the Facility at its closest border. Identification and approximate distances to all Class I areas within 300 km of the Facility are as follows:

Table 5-1 | Approximate Distance to Applicable Class I Areas

Class I Area	Approximate Distance from Project (km)
Cape Romain National Wildlife Refuge	93
Wolf Island	202
Okefenokee Swamp	286

Air quality impacts must be addressed for all Class I areas within 300 km of a PSD project. Class I analyses are comprised of the following:

- Air Quality Related Values (AQRV) analysis.
- Class I SIL analysis.
- PSD increment analysis (if concentrations exceed Class I SIL values).

A discussion of these components is provided in the subsequent sections.

5.1 AQRV ANALYSIS

5.1.1 Q/D Analysis

The SCDES's Modeling Guidelines define an AQRV as a resource that may be adversely affected by a change in air quality such as regional haze, or specific scenic, cultural, physical, biological, ecological, or recreational resource. Federal land managers (FLMs) have discretion in determining which sources must conduct an AQRV analysis and will specify which AQRVs should be evaluated. The FLM's *Air Quality Related Values Work Group Phase I Report*[31] (FLAG) provides guidance for assessing potential AQRV impacts and includes a screening procedure intended to identify projects that are unlikely to cause significant impacts to nearby Class I areas. This screening approach is based on the ratio of emissions to distance (Q/D), where *Q* represents the annual steady-state equivalent emission rate (in tons per year) calculated as the sum of NO_X, SO_2, filterable PM_{10}, and H_2SO_4 emissions, using maximum 24-hour emission rates, and *D* represents the distance (in kilometers) from the source to the Class I area.

According to FLAG, a Q/D value less than or equal to 10 is generally considered indicative of a low likelihood of significant AQRV impacts, thereby screening the project from the need for refined analysis. The results of the preliminary screening evaluation are summarized in Table 5-2. Complete results are presented in Appendix A-16.

Table 5-2 | Q/D Analysis

Natural Gas Firing			
Class I Area	**Approximate Distance (km)**	**Q (tons/year)**	**Q/D**
Cape Romain National Wildlife Refuge	93	1,523.6	16.4
Wolf Island	202		7.5
Okefenokee Swamp	286		5.3
Fuel Oil Firing			
Class I Area	**Approximate Distance (km)**	**Q (tons/year)**	**Q/D**
Cape Romain National Wildlife Refuge	93	2,867.3	30.8
Wolf Island	202		14.2
Okefenokee Swamp	286		10.0

As shown in Table 5-2, preliminary screening calculations for the Project indicate that the Q/D threshold of 10 is exceeded for Cape Romain for both natural gas and fuel oil firing, and Wolf Island and Okefenokee Swamp for fuel oil firing only. Accordingly, a refined AQRV analysis was conducted to further evaluate potential impacts at each of the Class I areas. The analysis utilized the CALPUFF modeling system,

[31] Revised 2010.

consistent with FLAG recommendations, to assess visibility impairment and deposition impacts at all three (3) Class I areas.[32]

5.1.2 CALPUFF Analysis

The regulatory version of the CALPUFF modeling system (version 5.8.5) was used to determine ambient concentrations and deposition fluxes of both directly emitted and secondarily formed air pollutants. The modeling analysis was conducted in accordance with the AQRV Protocol submitted to the SCDES and FLM on 01 April 2026. A summary of the key elements used in the CAPUFF modeling analysis are as follows:

- Use of three years (2019 - 2021) of Weather Research and Forecasting (WRF) prognostic meteorological data extracted using the Mesoscale Model Interface Program (MMIF – version 4.1.1) at 12 km resolution. See Appendix D for MMIF meteorological data evaluation completed for Georgia Power Company.
- Use of the same stack parameters and emission rates associated with the design scenarios for natural gas and fuel oil firing that were used in the significant impact analysis discussed in Section 3.2.
- Use of the emission rates and stack/release parameters for the ancillary equipment discussed in Section 2.6.
- Use of Gaussian vertical distribution in the near field (MGAUSS = 1).
- Use of partial plume path adjustment to terrain (MCTADJ = 3).
- Use of transitional plume rise (MTRANS = 1).
- Disabled vertical wind shear modeled above stack top (MSHEAR = 0).
- Disabled puff splitting (MSPLIT = 0).
- Use the MESOPUFF II chemical transformations (MCHEM = 1).
- Activate wet and dry deposition (MWET = 1 and MDRY = 1).
- Disabled gravitational settling (plume tilt) (MTILT = 0).
- Applied U.S. EPA-default PG dispersion coefficients (MDISP = 3).
- Disabled PDF for dispersion under convective conditions (MPDF = 0).
- Activated partial plume penetration of elevated inversion modeled for point sources (MPARTL = 1).
- Use constant ozone background of 65 ppb (BCKO3 = 12*65) and constant ammonia background of 3 ppb, as recommended by the appropriate FLM.[33]
- Set a computational domain large enough to include all sources and FLM-defined receptors representing the Class I areas plus a 50 km buffer.
- Use of CALPUFF modeling to quantify the magnitude and location of model-predicted concentrations and deposition fluxes of applicable pollutants.
- Use of POSTUTIL to re-compute the HNO_3/NO_3 partition using the MNITRATE=1 option.
- Use of CALPOST Method 8 (MVISBK=8) and sub-mode five (M8_MODE=5). Method 8 (new IMPROVE equation) allows a split among large and small sulfate, nitrate, and organic particles when calculating natural background conditions and change in light extinction.

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[32] Based on the Q/D analysis, additional evaluation for the Okefenokee Swamp was not warranted, as Q/D values were less than or equal to 10 for both fuel firing scenarios. However, for conservatism, potential Air Quality Related Value (AQRV) impacts at all three (3) Class I areas were further evaluated using CALPUFF.

[33] Values recommended for use by Tim Allen of U.S. Fish and Wildlife via email on 13 March 2026.

- Use of park-specific, Raleigh scattering coefficient, sea salt concentrations, and monthly relative humidity adjustment factors as listed in tables 6 to 9 of FLAG.
- Evaluated the 98th percentile (8th highest) of the delta deciview and compared against the threshold of 0.5.
- Evaluated annual total deposition fluxes of nitrates and sulfates against the Deposition Analysis Threshold (DAT) of 0.01 kilograms per hectare per year (kg/ha/yr) established for the eastern U.S. by the FLM.[34]

Since the meteorological domain is much larger than the required modeling domain, the CALPUFF computational grid was set to include all Class I receptors and Project source locations with a 50-km buffer in the cardinal directions. As a result, the computational grid extended 360 km in the X-direction and 456 km in the Y-direction. The MMIF and CALPUFF domains are presented in Figure 5-2 along with the Class I receptors, the Project location, and the terrain basemap as captured by CALPUFF.

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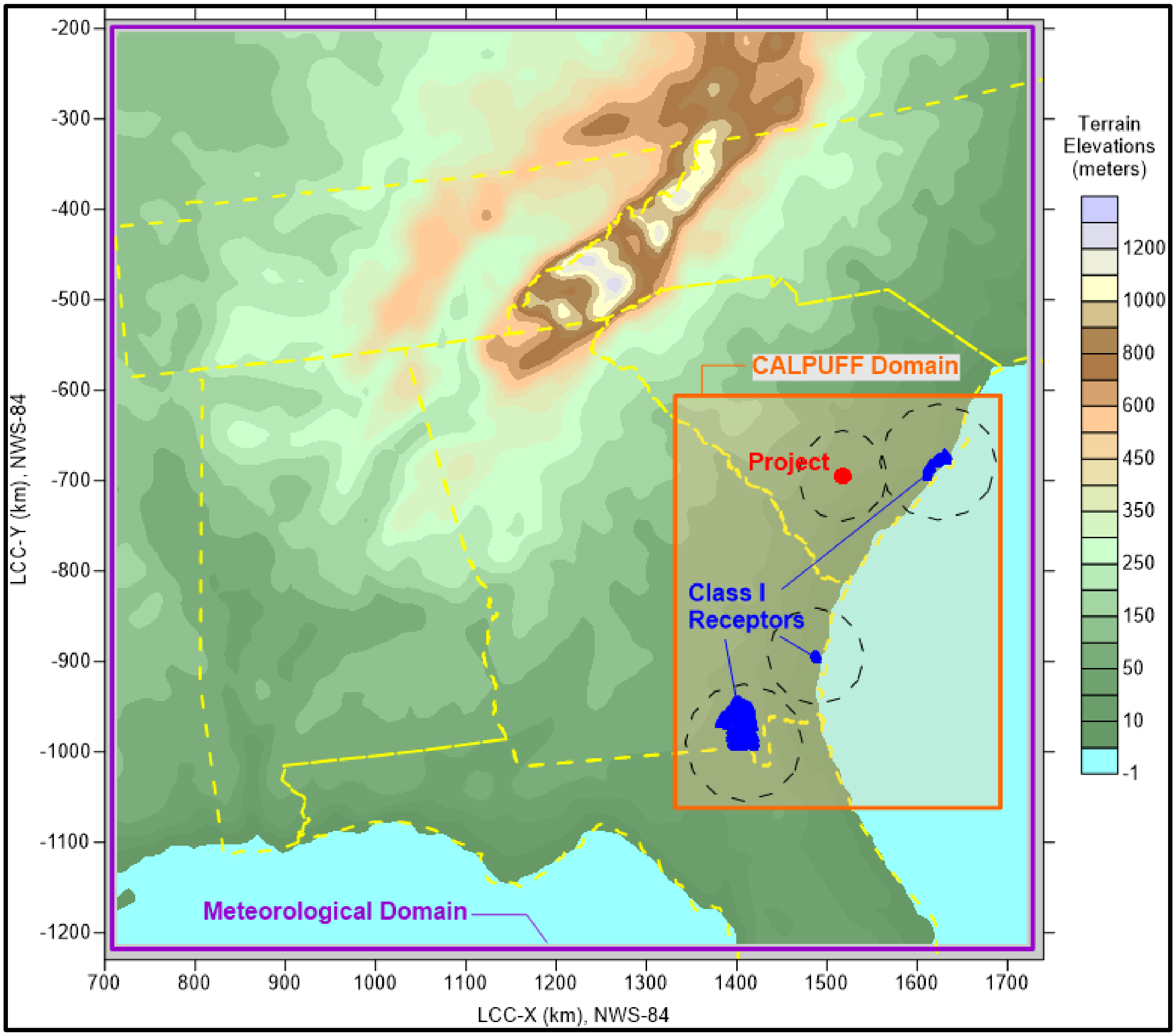
[34] The U.S. Forest Service (USFS) indicates that the minimum detectable increase in wet deposition of sulfates or nitrates is 0.5 kg/ha/yr. For conservative screening purposes, the USFS recommends a significance level equal to one-tenth of this value (0.05 kg/ha/yr). In addition, the FLMs have developed a DAT of 0.01 kg/ha/yr for use in the eastern United States as a screening threshold to determine the need for further analysis, rather than as an indicator of adverse impact (Porter, 2004). Because all Class I areas evaluated in this analysis are located east of the Mississippi River, a DAT of 0.01 kg/ha/yr was selected.

Figure 5-2 | CALPUFF and Meteorological Modeling Domains



The results, summarized in the subsequent sections, demonstrate that the Project will not cause adverse AQRV impacts to any Class I area within 300 km of the Facility.

5.1.2.1 Regional Haze Impacts

CALPUFF (Version 5.8.5) and CALPOST (Version 6.211) were used with the MMIF meteorological data to compute the maximum 24-hour average potential change in light extinction at Cape Romain, Wolf Island, and Okefenokee Swamp due to emissions of SO_2, SO_4, NO_X, PM_{10}, and $PM_{2.5}$ from the Project. The results of the analysis are summarized in Table 5-3.

Table 5-3 | Class I Areas – Visibility Analysis

Class I Area	Rank	Scenario	Year	Visibility Extinction (%)	Below 5%?
Cape Romain	8	FO04	2019	2.57	Yes
		FO04	2020	2.94	Yes
		FO04	2021	4.01	Yes
		NG30	2019	1.97	Yes
		NG30	2020	2.07	Yes
		NG30	2021	2.43	Yes
Okefenokee	8	FO04	2019	1.04	Yes
		FO04	2020	0.99	Yes
		FO04	2021	1.18	Yes
		NG30	2019	0.59	Yes
		NG30	2020	0.70	Yes
		NG30	2021	0.71	Yes
Wolf Island	8	FO04	2019	1.77	Yes
		FO04	2020	1.21	Yes
		FO04	2021	1.35	Yes
		NG30	2019	1.19	Yes
		NG30	2020	0.81	Yes
		NG30	2021	0.87	Yes

As shown above, all visibility impacts are below the 5% change in extinction at the 98th percentile impact level for each modeled year at all applicable PSD Class I areas. As such, no additional modeling is required.

5.1.2.2 Acidic Deposition Impacts

CALPUFF (Version 5.8.5) and CALPOST (Version 6.211) were used with MMIF meteorological data described above to obtain upper limit values of annual wet and dry deposition of sulfur and nitrogen compounds (kg/ha/yr) associated with emissions from the Project at Cape Romain, Wolf Island, and Okefenokee Swamp. Specifically, CALPUFF was used to model both wet and dry deposition of nitrates and nitric acid, as well as dry deposition of NO_X, to assess the maximum annual wet and dry deposition of nitrogen at the Class I areas. Similarly, CALPUFF was used to simulate the total SO_2 and SO_4 deposition fluxes to evaluate the maximum annual sulfates in the Class I areas. The results of the analysis are summarized in Table 5-4.

Table 5-4 | Class I Areas – Acidic Deposition Analysis

Class I Area	Species	DAT Threshold Value (Kg/Ha/Yr)	Model Year	Maximum Modeled Deposition (Kg/Ha/Yr)	Below Threshold?
Cape Romain	Sulfate	0.01	2019	9.21E-04	Yes
			2020	1.06E-03	Yes
			2021	8.72E-04	Yes
	Nitrate	0.01	2019	1.65E-03	Yes
			2020	1.87E-03	Yes
			2021	1.44E-03	Yes
Okefenokee	Sulfate	0.01	2019	1.45E-04	Yes
			2020	1.01E-04	Yes
			2021	1.98E-04	Yes
	Nitrate	0.01	2019	2.80E-04	Yes
			2020	2.23E-04	Yes
			2021	4.49E-04	Yes
Wolf Island	Sulfate	0.01	2019	4.18E-04	Yes
			2020	3.01E-04	Yes
			2021	3.71E-04	Yes
	Nitrate	0.01	2019	7.87E-04	Yes
			2020	2.92E-04	Yes
			2021	4.62E-04	Yes

As shown above, all deposition impacts are below the 0.01 kg/ha/yr DAT. Consequently, no additional modeling is required.

5.2 SIL ANALYSIS

Applicant performed a Class I significant impact analysis to determine the concentrations from Project emissions on Class I areas located within 300 km of the Facility. Projected concentrations below the Class I SILs would generally indicate that the Project will not cause or contribute to a violation of the PSD Class I increment without requiring a PSD Class I increment cumulative impact analysis. First, Applicant evaluated potential Project impacts on the three (3) Class I areas reported in Table 5-1 using AERMOD. Given that the areas are located beyond the generally accepted extents for AERMOD applicability[35], a polar receptor grid was placed at a range of 50 km from the Facility in accordance with Section 7.5.1 of the Modeling Guidelines. Receptors were spaced at 1-degree increments for a total of 360 receptors.[36] The receptor grid is illustrated in Figure 5-3. Ambient concentrations due to Project emissions were determined using the same terrain and meteorological files described in Sections 2.3 and 2.5, respectively and the same source group parameters as described in Section 2.6.

[35] 50 km is considered the generally accepted limit of AERMOD applicability.

[36] Receptor spacing does not exceed 1-km.

Figure 5-3 | 50 km Class I SIL Receptor Grid

With the exception of the receptor grid, the Class I area significant impact analysis followed the same methodology used for the Class II area significant impact analysis described in Section 3.2 of this Report.

5.2.1 AERMOD-Based Class I SIL Results

The results of the Class I significant impact analysis, conducted using AERMOD, are summarized in Tables 5-5, 5-6, and 5-7.

Table 5-5 | Class I Short-Term SIL Results: Design Scenario (NG30, FO4)

Natural Gas Firing				
Pollutant	**Averaging Period**	**AERMOD Predicted Concentrations ($\mu g/m^3$)**	**Class I SIL ($\mu g/m^3$)**	**Exceeds SIL? (Y/N)**
		2015 - 2019		
SO_2	3-hour	0.26	1.0	N
	24-hour	0.06	0.2	N
PM_{10}	24-hour	0.297	0.3	N
$PM_{2.5}$[1]	24-hour	0.31	0.27	Y
Fuel Oil Firing				
Pollutant	**Averaging Period**	**AERMOD Predicted Concentrations ($\mu g/m^3$)**	**Class I SIL ($\mu g/m^3$)**	**Over SIL? (Y/N)**
		2015 - 2019		
SO_2	3-hour	0.15	1.0	N
	24-hour	0.03	0.2	N
PM_{10}	24-hour	0.45	0.3	Y
$PM_{2.5}$[1]	24-hour	0.41	0.27	Y

Notes:
[1] The total reported concentration for $PM_{2.5}$ includes the contribution of secondary $PM_{2.5}$ from Project sources. See Section 3.4.1.2 for additional details.

Table 5-6 | Class I Short-Term SIL Results: Worst Case[1]

Natural Gas Firing				
Pollutant	**Averaging Period**	**AERMOD Predicted Concentrations (μg/m³)**	**Class I SIL (μg/m³)**	**Exceeds SIL? (Y/N)**
		2015 - 2019		
SO_2	3-hour (NG23)	0.27	1.0	N
	24-hour (NGSSSO24)	0.07	0.2	N
PM_{10}	24-hour (NGSSPM10)	0.32	0.3	Y
$PM_{2.5}$[3]	24-hour (NGSSPM25)	0.32	0.27	Y
Fuel Oil Firing				
Pollutant	**Averaging Period**	**AERMOD Predicted Concentrations (μg/m³)**	**Class I SIL (μg/m³)**	**Exceeds SIL? (Y/N)**
		2015 - 2019		
SO_2	3-hour (FO2)	0.15	1.0	N
	24-hour (FOSSSO24)	0.04	0.2	N
PM_{10}	24-hour (FOSSPM10)	0.58	0.3	Y
$PM_{2.5}$[3]	24-hour (FOSSPM25)	0.53	0.27	Y

Notes:
[1] The worst-case concentrations reported in this table reflect the maximum concentration between the worst-case operating scenarios identified via the load screening analysis and startup/ shutdown operations. The source group producing the maximum concentration is identified in parentheses for each pollutant and corresponding averaging period shown in the table.
[2] The total reported concentration for $PM_{2.5}$ includes the contribution of secondary $PM_{2.5}$ from Project sources. See Section 3.4.1.2 for additional details.

Table 5-7 | Class I Annual SIL Results

Natural Gas & Fuel Oil								
Pollutant	**Averaging Period**	**AERMOD Predicted Concentrations (μg/m³)**					**Class I SIL (μg/m³)**	**Exceeds SIL? (Y/N)**
		2015	**2016**	**2017**	**2018**	**2019**		
SO_2	Annual	0.005	0.004	0.005	0.004	0.005	0.1	N
NO_2	Annual	0.04	0.04	0.04	0.03	0.04	0.1	N
PM_{10}	Annual	0.03	0.02	0.03	0.02	0.03	0.2	N
$PM_{2.5}$[1]	Annual	0.03					0.05	N

Notes:
[1] The total reported concentration for $PM_{2.5}$ includes the contribution of secondary $PM_{2.5}$ from Project sources. See Section 3.4.1.2 for additional details.

Detailed SIL results are provided in Appendix A-5.

5.2.2 CALPUFF-Based Significant Impact Analysis Results

The results of the AERMOD-based Class I SIL analysis indicated that additional evaluation was required for the PM_{10} and $PM_{2.5}$ 24-hour standards. As such, CALPUFF was used to evaluate impacts of these pollutants at the boundaries of each Class I area reported in Table 5-1. The results, summarized in Table 5-8, are below their respective SILs and therefore demonstrate that the Project will not cause or contribute to a violation of the PSD Class I increment. Consequently, no additional Class I modeling evaluations were required.

Table 5-8 | CALPUFF-Based Class I SIL Results

Pollutant	Emission Scenario	24-hour CALPUFF Predicted Concentrations (μg/m³)				Total Concentration[2] (μg/m³)	SIL (μg/m³)	Below SIL?
		2019	2020	2021	Max.			
Cape Romain Wilderness								
PM_{10}	FO4	0.20	0.21	0.19	0.21	0.21	0.32	Yes
	NGSS	0.14	0.14	0.11	0.14	0.14	0.32	Yes
$PM_{2.5}$	NGSS	0.14	0.14	0.11	0.14	0.20	0.27	Yes
	FOSS	0.20	0.216	0.19	0.216	0.269	0.27	Yes
Okefenokee Wilderness								
PM_{10}	FOSS	0.10	0.06	0.11	0.11	0.11	0.32	Yes
	NGSS	0.07	0.03	0.05	0.07	0.07	0.32	Yes
$PM_{2.5}$	FOSS	0.10	0.06	0.11	0.11	0.16	0.27	Yes
	NG30	0.07	0.04	0.05	0.07	0.12	0.27	Yes
Wolf Island Wilderness								
PM_{10}	FO4	0.16	0.07	0.11	0.16	0.16	0.32	Yes
	NGSS	0.07	0.03	0.07	0.07	0.07	0.32	Yes
$PM_{2.5}$	FO4	0.16	0.07	0.11	0.16	0.21	0.27	Yes
	NGSS	0.07	0.03	0.07	0.07	0.12	0.27	Yes

Notes:
[1] Only the maximum for each fuel is summarized in the table. Complete results are presented in Appendix A-6.
[2] For $PM_{2.5}$, total concentration includes the contribution of secondary $PM_{2.5}$ from project sources.

6 ADDITIONAL IMPACT ANALYSIS

Projects triggering PSD review must perform additional analyses to evaluate the potential for impairment to visibility, soils, and vegetation that would occur as a result of the Project. Also, such projects must evaluate the potential for air quality impacts due to general commercial, residential, industrial, and other secondary growth associated with the Project.[37] These additional analyses are further described in the following sections.

6.1 VISIBILITY IMPAIRMENT ANALYSIS

The PSD program also requires an evaluation of potential Class II visibility impairment for designated visibility-sensitive areas such as airports and state parks with scenic vistas. Consistent with Section 7.4.5.3 of the Modeling Guidelines, Applicant conducted a screening-level assessment to determine whether any such visibility-sensitive areas are located within the largest SIA of any 24-hour or annual averaging period. As documented in Appendix A-4, the maximum 24-hour or annual SIA identified for the Class II SIL analyses was 12.18 km, corresponding to the 1-hour NO2 SIL under the FO3 operating scenario.

Based on a review of publicly available geographic data, state park resources, and site-specific aerial imagery, the only potential visibility-sensitive area located within this 12.2 km radius is Colleton County State Park. A detailed qualitative assessment of this area indicates that it does not meet the criteria of a visibility-sensitive area with scenic vistas. Specifically, Colleton County State Park is a relatively small, low-relief recreational area characterized by dense vegetative cover, including mature hardwood stands and evergreen species that substantially limit long-range lines of sight. The park lacks elevated terrain features, overlooks, or designated viewpoints that would provide expansive or unobstructed visual perspectives of the surrounding landscape.

Furthermore, available park descriptions and land use characteristics indicate that the primary function of the park is local recreation (e.g., picnicking, short nature walks). The dense canopy and flat topography inherently constrain visibility to short distances, thereby precluding the type of valued scenic resources typically associated with visibility-sensitive Class II areas. As such, there are no identified visual resources within Colleton County State Park that would be susceptible to perceptible impairment from Project-related emissions. Accordingly, because no visibility-sensitive areas with scenic vistas are present within the maximum SIA, the Project is not expected to result in adverse Class II visibility impacts, and no further refined visibility analysis is warranted.

6.2 SOILS AND VEGETATION IMPACT ANALYSIS

Projects triggering PSD review must perform an impact analysis to assess impairment to sensitive vegetation and soils. Per Section 7.4.5.2 of the Modeling Guidelines, such an analysis needs only to consider vegetation with commercial or recreational value. An evaluation of potential impacts on sensitive vegetation and soils was performed by comparing the maximum modeled concentrations from the Project to screening concentrations provided in the U.S. EPA document titled *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals*[38] and to the secondary NAAQS standards. The screening levels represent the minimum concentrations in either plant tissue or soils at which adverse growth effects or tissue injury were reported in the literature. The NAAQS secondary standards were set to protect public welfare, including protection against damage to crops, vegetation, and visibility.[39] Therefore,

[37] SC R. 61-62.5, Standard No. 7, §(O)(1) & (2).

[38] Published 1980.

[39] Welfare effects of PM considered in the review of the PM secondary standards completed in 2020, and reconsidered more recently, include effects on visibility, climate, and materials damage (88 FR 5558, January 27, 2023).

comparing the modeled concentrations to the screening concentrations and the NAAQS secondary standards provides an indication as to whether adverse impacts are likely to occur to vegetation and soils.

The results of the soils and vegetation analysis are summarized in Table 6-1.

Table 6-1 | Soils & Vegetation Analysis

Pollutant	Averaging Period	Maximum Concentration[1] ($\mu g/m^3$)	Screening Levels ($\mu g/m^3$)	Secondary NAAQS ($\mu g/m^3$)
NO_2[2]	4-hour	171.08	3,760	--
	8-hour	171.08	3,760	--
	1-month	171.08	564	--
	Annual	23.06	94	100
SO_2[3]	1-hour	[4]	917	--
	3-hour		786	1,300
	Annual		18	26
CO[5]	Weekly		1,800,000	--
PM_{10}	24-hour	41.85	--	150
$PM_{2.5}$[6]	24-hour	16.42	--	35
	Annual	7.92	--	15

Notes:
[1] Maximum concentrations are the worst-case between design load and worst-case load across both fuels.
[2] For the 4-hour, 8-hour, and 1-month NO_2 averaging periods, the maximum model-predicted 1-hour NO_2 concentration for all normal operations scenarios was conservatively used.
[3] The SO_2 annual secondary NAAQS was established by the U.S. EPA on 10 December 2024 and replaces the 3-hour secondary NAAQS previously established. However, the secondary standard is still reported in South Carolina Regulation 61-62.5 Standard No. 2 and is therefore reported in the above table.
[4] Results for all Class I and Class II SIL evaluations were below the SIL for each applicable averaging period. As such, no adverse impacts to soils or vegetation in the area are anticipated from these emissions.
[5] For the weekly CO averaging period, the maximum model-predicted 8-hour CO concentration was conservatively used.
[6] Includes the contribution of secondary formation of $PM_{2.5}$.

As shown in the table above, the maximum model-predicted impacts from the Project will not exceed any of the applicable screening concentrations or NAAQS secondary standards. Therefore, the analysis demonstrates that emissions from the Project will not cause or contribute to air pollution that would adversely impact vegetation or soils in the area.

6.3 ASSOCIATED GROWTH ANALYSIS

An evaluation of the potential air quality impacts associated with general commercial, residential, industrial, and other growth attributable to the Project has been conducted. This assessment considers whether the Project would induce substantial secondary development that could, in turn, contribute to a measurable deterioration of ambient air quality in the surrounding area.

As discussed in Section 2.2, the Project is located outside of Walterboro, South Carolina in a predominantly rural, unincorporated, portion of Colleton County. The surrounding area is characterized by low population density, limited industrial development, and a land use pattern dominated by forestry and agricultural activities. Existing infrastructure and zoning in the vicinity are not indicative of conditions that would support rapid or large-scale secondary development. Construction of the Facility is anticipated to require a workforce of several hundred temporary construction personnel. However, these positions are transient in nature and will not result in permanent population increases or sustained demand for residential or commercial expansion. Construction workers are anticipated to utilize existing regional housing and services, consistent with similar large-scale infrastructure projects.

Upon commencement of operations, it is anticipated that the Facility will employ approximately 50 – 75 full-time personnel. This relatively small permanent workforce is not expected to induce significant residential growth or associated commercial development in the immediate area. Any incremental population increase associated with these employees would be minor and readily accommodated within existing housing capacity in Colleton County and nearby communities. Commercial and industrial growth in the region is expected to occur gradually and in accordance with existing local and regional planning trends, independent of the Project. To the extent that future growth includes new or modified stationary sources of air emissions, such sources will be subject to applicable federal and state permitting requirements, including NSR and PSD review, as appropriate. These regulatory programs ensure that emissions from future development are controlled and that compliance with the NAAQS and PSD increments is maintained.

Based on the nature and scale of the Project, the limited number of permanent employees, and the rural setting, the Project is not expected to induce significant associated growth that would result in a measurable deterioration of ambient air quality. Therefore, secondary growth impacts attributable to the Project are considered to be minimal and adequately accounted for within the existing air quality analysis.