Andrews, Edward S

From:	Louis M. Militana <lmilitana@aaqsinc.com>
Sent:	Wednesday, December 4, 2019 3:26 PM
To:	McClung, Jon D
Cc:	'Brian Hoyt'; Fewell, David R; McKeone, Beverly D; Andrews, Edward S; Kessler, Joseph R; Pursley, Steven R; lmilitana@aaqsinc.com
Subject:	RE: Air Quality Modeling Protocol and Monitoring Exemption Request/Longview Power Unit 2 Project
Attachments:	Protocol Transmittal Letter R4.pdf; Longview Unit 2 Modeling Protocol Final R4.pdf

Hi Jon
Attached is the revised air quality modeling protocol for the Longview Power Unit 2 Project
I have also included a transmittal letter with an attachment which has responses to each of your comments

The justification for the use of the draft version of AERSURFACE is in Appendix A of the protocol

After reviewing our comments please contact me if you have any questions on our responses

Thanks

Lou

From: McClung, Jon D [mailto:Jon.D.McClung@wv.gov]
Sent: Wednesday, November 20, 2019 10:42 AM
To: Louis M. Militana
Cc: 'Brian Hoyt'; Fewell, David R; McKeone, Beverly D; Andrews, Edward S; Kessler, Joseph R; Pursley, Steven R
Subject: RE: Air Quality Modeling Protocol and Monitoring Exemption Request/Longview Power Unit 2 Project

Lou,

Attached are WV DAQ comments on the revised air quality modeling protocol for the Longview Unit 2 Project. Although we have discussed most of the comments, please contact me with any questions.

Regards,
Jon.

____

Jonathan D. McClung, P.E.
West Virginia DEP
Division of Air Quality
601 57th Street SE
Charleston WV 25304
(304) 926-0499 ext. 1689
Jon.D.McClung@wv.gov

From: Louis M. Militana <lmilitana@aaqsinc.com>
Sent: Monday, September 23, 2019 4:09 PM
To: McClung, Jon D <Jon.D.McClung@wv.gov>
Cc: 'Brian Hoyt' <bhoyt@longviewpower.net>; lmilitana@aaqsinc.com
Subject: RE: Air Quality Modeling Protocol and Monitoring Exemption Request/Longview Power Unit 2 Project

Jon

Attached are the revised air quality modeling protocol and transmittal letter for the Longview Unit 2 Project

Let me know if you have any questions regarding our responses to your comments on the initial protocol

Thanks

Lou

Louis M. Militana, QEP
Partner/Principal Consultant
Ambient Air Quality Services, Inc. (AAQS)
107 Hidden Fox Drive,Suite 101A
Lincoln University, PA 19352-1205
(484) 224-6218 x 101 Voice
(484) 224-6218 Fax
lmilitana@aaqsinc.com

From: McClung, Jon D [mailto:Jon.D.McClung@wv.gov]
Sent: Tuesday, March 12, 2019 11:36 AM
To: Louis M. Militana
Cc: Joseph Douglass; 'Brian Hoyt'; Andrews, Edward S; Kessler, Joseph R; Pursley, Steven R
Subject: RE: Air Quality Modeling Protocol and Monitoring Exemption Request/Longview Power Unit 2 Project

Lou,

Attached are WV DAQ's comments on the protocol. Please contact me to go over any questions you may have.

Regards,
Jon.

____

Jonathan D. McClung, P.E.
West Virginia DEP
Division of Air Quality
601 57th Street SE
Charleston WV 25304
(304) 926-0499 ext. 1689
Jon.D.McClung@wv.gov

From: Louis M. Militana <lmilitana@aaqsinc.com>
Sent: Saturday, February 16, 2019 1:26 PM
To: McClung, Jon D <Jon.D.McClung@wv.gov>
Cc: Joseph Douglass <JDouglass@longviewpower.net>; 'Brian Hoyt' <bhoyt@longviewpower.net>; lmilitana@aaqsinc.com
Subject: Air Quality Modeling Protocol and Monitoring Exemption Request/Longview Power Unit 2 Project

Jon

Enclosed is the Air Quality Modeling Protocol and Monitoring Exemption Request for the air permit application for the proposed Longview Power Unit 2 Project.

After reviewing the protocol if you have any questions please contact me at (484) 224 6218 ext. 101 or by email at lmilitana@aaqsinc.com.

Louis M. Militana, QEP
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December 4, 2019

Jon McClung
WVDEP
Division of Air Quality
601 57th St.
Charleston, WV 25304

RE: **Revised (December 4, 2019) Air Quality Modeling Protocol and Monitoring Exemption Request for the Longview Power Unit 2 Project**

Dear Mr. McClung:

Enclosed is the Revised Air Quality Modeling Protocol and Monitoring Exemption Request for the air permit application for the proposed Longview Power Unit 2 Project.

Also attached are our responses to your November 20, 2019 comments on the revised (Submitted September 23, 2019 via electronic mail) air quality modeling protocol.

After reviewing the revised protocol or comment responses if you have any questions please contact me at (484) 224 6218 ext 101 or by email at lmilitana@aaqsinc.com.

Very truly yours,
AAQS Inc.

Louis M. Militana, QEP
Partner/Principal Consultant

WV DEP Division of Air Quality
Comments on Revised Air Quality Modeling Protocol and Monitoring Exemption Request for the Longview Power Unit 2 Project
Submitted September 23, 2019 via electronic mail November 20, 2019
Revised Final Protocol 4 December 2019

1. **Please indicate whether the diesel fired firewater pump, diesel fired emergency generator, and fuel gas heaters/gas compressor are proposed by the applicant to be intermittent emissions sources. If so, justification needs to be provided in the protocol. Otherwise, these sources need to be modeled continuously for all averaging periods.**

The diesel fired firewater pump and diesel fired emergency generator are intermittent emission sources but will be included in the air quality modeling analysis following the procedure described in USEPA Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard, March 1, 2011.

The emergency generators and fire water pumps will be limited to 100 hrs/year operation by a permit condition. These 100 hours of operations are for periodic testing of the engines to maintain their reliability and operational performance in times of loss of electrical power and/or firefighting events. The most applicable NAAQS for emission associated with these short-term operations of the engines would be the 1-hour NO_2 and SO_2 NAAQS. For the proposed Emergency Generator and Firewater Pump annualized average emission rates (the maximum hourly rate times 100/8760) will be used in the 1-hr NAAQS modeling analysis. This approach accounts for the fact that brief periods of emissions from these units could occur at any time during the year, but the high hourly emission rate (for testing purposes, the units will be started monthly for approximately 20 minutes) would be unlikely to significantly contribute to NAAQS exceedances given the probabilistic form of the 1-hr NAAQS.

The fuel gas preheater is a continuous emission source and will be included in the air quality modeling analysis for all averaging periods using the maximum hourly emission rate.

The gas compressor is an electric driven compressor and thus has no emissions and will not be included in the air quality modeling protocol.

2. **Section 5.4.1 describes the Class I increment screening analysis. The procedure described does not meet the requirements of section 4.2 of 40 CFR 51 Appendix W. The main component of this requirement is to determine the significance of the ambient impacts at or about 50 km from the new or modifying source. Please revise the protocol to conform to Appendix W.**

A Class I NAAQS and PSD increment screening level assessment following the procedure described in Section 4.2 of Appendix W will be performed. Preliminary modeling using the preferred near field refined air quality model (AERMOD) will be performed to determine the significance of the ambient impacts at 50 km from the proposed Longview Power Unit 2 project. If the predicted concentrations are less than the significance levels at 50 km, then no further analysis will be performed for the screening Class I NAAQS/PSD increment screening analysis.

3. **For the Class II visibility analysis using VISCREEN, the protocol needs to state that the site(s) selected for analysis will be made in consultation with WV DEP.**
The selected sites for the Class II visibility analysis using VISCREEN are the Mylan Park and the Morgantown Airport. Both represent areas where visibility is important for either recreational or commercial purposes. Mylan Park and the Morgantown Airport are approximately 10 km southwest and 9 km southeast of the Longview Power Unit 2 site.

4. **The applicant is proposing to use the 2011 National Land Cover Dataset (NLCD) to develop the meteorological data. Instead of using the 1992 NLCD data that can be processed by the current version of AERSURFACE, using the 2011 NLCD data requires the use of the 19039_DRFT version of AERSURFACE. This version is draft and its use for regulatory purposes requires consultation with WV DEP and U.S. EPA Region 3 and this would be the first regulatory use of the draft version in the U. S. The draft version of AERSURFACE has new inputs (percent surface impervious and percent tree canopy) that require additional evaluation and consultation with U.S. EPA Region 3 will require additional time. Justification for using the draft version of AERSURFACE needs to be provided in the protocol. Include and compare land use images in the protocol for 1992, 2011, and the present to demonstrate the selection of the most representative data. Also, the default method of determining surface roughness length (ZORAD) should be used. For the NLCD year of the land cover being processed, if only one of impervious or tree canopy data is available, or neither is available, then the land cover data should be processed by itself without the use of the impervious or canopy data. Land cover data should not be supplemented with impervious data only or canopy data only.**

A detailed justification including satellite images of the project site and Morgantown Airport is contained in Appendix A of the revised Air Quality Modeling Protocol. A brief justification is provided below.

The justification for the use of the draft version of AERSURFACE is:

1. **AERMET/AERMOD Regulatory Requirement**: AERMET and AERMOD data input requires the use of the most **representative** and most **current** data in the air quality modeling analysis including landuse, surface characteristics and meteorological. The 1992 NLCD is not adequately representative of the project site area due to the changes in landuse that has occurred in the project area and Morgantown Airport area.

   Further justification for the use of the most representative and current data is contained in Appendix A to Appendix W of Part, 51—Summaries of Preferred Air Quality Models, A.1 AERMOD (AMS/EPA Regulatory Model), b(i):
   *Data used as input to AERMET should possess an **adequate degree of representativeness to ensure that the wind, temperature and turbulence profiles derived by AERMOD are***

both laterally and vertically representative *of the source impact area. The adequacy of input data should be judged independently for each variable. The values for surface roughness, Bowen ratio, and albedo should reflect the surface characteristics in the vicinity of the meteorological tower or representative grid cell when using prognostic data, and should be* ***adequately representative*** *of the modeling domain. Finally, the primary atmospheric input variables, including wind speed and direction, ambient temperature, cloud cover, and a morning upper air sounding,* ***should also be adequately representative*** *of the source area when using observed data.*

2. **Data Representativeness:** The 1992 NLCD data is significantly out of date (over 27 years old) and not representative of the current land use and surface characteristics of either the Longview Power Unit 2 site or the Morgantown Airport. The landuse at the project site has changed significantly since 1992 by the construction of Longview Power Unit 1. The landuse at the Morgantown Airport has changed since 1992 by the construction of surrounding commercial and residential properties.
3. **Data Period Consistency:** The meteorological data being used in the air quality modeling is 2014-2018 and this data period should align with the NLCD data period to harmonize the surface characteristics which are a component of the atmospheric turbulence reflected in the meteorological measurements. The NLCD 2011 data period more closely aligns to the meteorological data period being used in the air quality modeling period than the NLCD 1992 data period.
4. **Data Availability:** The 1992 NLCD is no longer readily available from the USGS and may be provided by request only.

5. **The protocol states that current satellite imagery was inspected and compared to the 2011 NLCD land use data and 2011 satellite imagery to determine the representativeness of the 2011 land use data. Also, the protocol states that "It was determined that the land use for 2011 is representative of the current conditions." The protocol needs to include a supporting justification for the determination of representativeness, including but not limited to: the images used for comparison, a narrative analysis of the image comparison, and any other analyses used.**

The supporting justification for the use of 2011 NLCD is contained in the justification for the use of the draft version of AERSURFACE. See above and Appendix A of revised Air Quality Modeling Protocol. The satellite imageries used for the determination of representativeness of the 2011 NLCD are included in the modeling protocol.

6. **WV DEP previously commented that a quantitative comparison of albedo, Bowen ratio, and surface roughness length should be included in the protocol. Table 4-1 of the revised protocol contains values for albedo, Bowen ratio, and surface roughness length for the Morgantown Airport and the project site. Large differences between the surface roughness length exist between the Morgantown Airport and the project site. These differences can lead to significant differences in design concentrations. Accordingly, the applicant should perform a site-specific sensitivity analysis as described in the AERMOD**

Implementation Guide (August 2019). This can be performed by developing two sets of meteorological data (one with airport surface characteristics and one with project site surface characteristics) and modeling the project with both sets of data to determine sensitivity to surface roughness length.

A site specific sensitivity analysis will be performed following the AERMOD Implementation Guide (August 2019) which indicates:*" If the reviewing agency is uncertain as to the representativeness of a meteorological measurement site, a site-specific sensitivity analysis may be needed in order to quantify, in terms of expected changes in the design concentration, the significance of the differences in each of the surface characteristics."* AERMOD Implementation Guide (August 2019).

The meteorological data (2014-2018) from Morgantown Airport (MGW) will be processed through AERMET using both the micrometeorological variables (2011 NLCD data for albedo, Bowen ratio, and surface roughness length) associated with MGW as well as the micrometeorological variables associated with the Longview Power Unit 2 site using the draft version of AERSURFACE. The results of the CT/HRSG load analyses for all compounds and averaging periods using both meteorological data sets will be compared to determine the meteorological data set (either MGW/MGW surface or MGW/LVP2 surface) producing the maximum short-term concentrations. The meteorological dataset and CT/HRSG load identified as producing the maximum short-term concentrations will be used for all further refined air quality modeling analyses.

7. **WV DEP previously commented that the applicant needs to provide a proposal to demonstrate the effects of the project on ozone and secondary formation of PM2.5. The revised protocol needs to contain the details on the proposal including, but not limited to, the justification and selection of the MERPs site and the method of including the MERPs results into the dispersion modeling results.**

Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program (USEPA, 2019) will be used to demonstrate the effects of NO_x and VOC emissions from the proposed project on ozone and secondary formation of $PM_{2.5}$. A representative hypothetical source was identified from the Appendix Table A-1 of the guidance document. The hypothetical source selected was Doddridge in West Virginia. The method of including the MERP results into the air quality modeling results will include:

1. Comparing the predicted NO_x 1-hr average, high 8th highest, 5-yr average concentration for the project to the NO_x SIL (as a percentage of the SIL).
2. Comparing the predicted $PM_{2.5}$ 24-hr average, high 8th highest, 5-yr average concentration for the project to the $PM_{2.5}$ SIL (as a percentage of the SIL).
3. Comparing the project's NO_x emission rate to the MERP for Doddridge for $PM_{2.5}$ from NO_x (as a percentage of the MERP).
4. Adding the items 2 and 3 above and comparing resultant to 100%.
5. Comparing the project's NO_x emission rate to the MERP for Doddridge for Ozone (as a percentage).

6. Comparing the Comparing the project's VOC emission rate to MERP (tons/year) Doddridge O_3 from VOC (as a percentage).
7. Adding items 5 and 6 above and comparing resultant to 100%.

8. **The most recent version of AERMOD (v19191) should be proposed in the revised protocol. Version numbers should be identified in the revised protocol for all modeling tools.**

AERMOD (v19191) will be used for the air quality modeling analysis.

Longview Power

REVISED FINAL

AIR QUALITY MODELING PROTOCOL AND MONITORING EXEMPTION REQUEST FOR THE LONGVIEW UNIT 2 PROJECT

Submitted to:
West Virginia Department of Environmental Protection
Division of Air Quality
601 57th Street, SE,
Charleston, WV 25304

Brian Hoyt
Longview Power
Compliance & Environmental Manager

Prepared by:
Ambient Air Quality Services, Inc.
107 Hidden Fox Dr.
Suite 101A
Lincoln University, PA 19352

4 December 2019

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1. INTRODUCTION

1.1 BACKGROUND

Longview Power, LLC (Longview Power) currently owns and operates the Longview Power Plant in Maidsville, WV which is a modern advanced supercritical 700 mw coal-fired Unit 1 facility. Longview Power is proposing to develop a two-phase expansion which includes a which 1,200 megawatt (MW) Combined Cycle Gas fired Turbine (CCGT) Unit 2 facility and a photovoltaic renewable energy Unit 3 that will be up to 50 MW in size. The CCGT facility is referred to as the Longview Unit 2 Project (Project).

The Unit 2 Project is proposed to be a nominally rated 1,200 MW natural gas-fired only (no oil backup), combined-cycle gas turbine (CCGT) located immediately adjacent to the North of the current Unit 1 location. The facility will be designed to achieve a peak electrical output of approximately 1,200 MW. Electricity generated by the Project will be supplied to the PJM power grid and connect to the grid via the existing interconnection used by the Longview Power Plant.

The major components of the proposed project include:

- One combined cycle power train consisting of two state-of-the-art natural gas-fueled advanced class combustion turbines, two heat recovery steam generators (with duct burners), and one steam turbine.
- Diesel fuel-fired firewater pump.
- Diesel fuel-fired emergency generator.
- Wet mechanical draft cooling tower.
- Aqueous ammonia tanks for the selective catalytic reduction pollution control system.

No auxiliary boiler is planned for the project. Any start-up steam requirement will be supplied by the Longview Power auxiliary boiler.

The proposed project will be subject to West Virginia Department of Environmental Protection (WVDEP), Division of Air Quality (DAQ) regulations 45CSR13 and 45CSR14 (known as Part 13 and 14 regulations) and Federal Prevention of Significant Deterioration (PSD).

1.2 PURPOSE

Under the West Virginia Department of Environmental Protection (WVDEP), Division of Air Quality (DAQ) regulations, the proposed the Project will be subject Part 13 and 14 regulations, which require a permit-to-construct for any major/minor stationary source. Since the adjacent Longview Power facility is defined as a 100 ton-per-year (TPY) major source under 40 CFR Part 52.21(2)(i) (i.e., federal PSD regulations) one or more regulated air pollutant emissions from the Project which exceed applicable significant emission threshold levels will require an air quality modeling impact analysis. An ambient impact analysis is also a required component of the DAQ air permit application. The ambient impact analysis utilizes the results of air quality modeling to demonstrate that the project will not cause or contribute to an air quality level which exceeds a state or Federal Ambient Air Quality Standard, a PSD increment and/or Class I Area air quality related value (AQRV).

Prior to conducting any air modeling analysis to support the air permit application, an air quality modeling protocol must be prepared and submitted to the DAQ for review and approval. This document outlines the proposed approach or protocol to be followed in conducting an air quality modeling analysis for Class I and II areas in order to demonstrate compliance with the applicable National Ambient Air Quality Standards (NAAQS), PSD increments and visibility/deposition impacts. The technical approach that is proposed follows accepted U.S. EPA guidance and previous experience. This document also contains a meteorological and ambient air quality monitoring exemption request.

1.3 DOCUMENT ORGANIZATION

Section 2 of the protocol provides a description of the project site and the project components. Section 3 contains the emissions inventory for the proposed emission units. Section 4 describes the air quality model selection and input data, including the selected air dispersion model, land use and topography, receptor grid, meteorological data and "good engineering practice" (GEP) stack height analysis. Section 5 discusses the approach for the summarization and presentation of the air quality modeling results, including the Class I and II area assessment. The air quality/meteorological monitoring exemption request is in Section 6 of the document. Section 7 presents the references referred to in this protocol.

Information provided at this time is based on the preliminary design of the Project. As new or revised information is developed after submission of this document that may significantly affect the proposed design of the facility and its potential impact on air quality, the appropriate portion(s) of the document will be revised and resubmitted to the DAQ.

2. PROJECT LOCATION AND DESCRIPTION

This section of the air quality modeling protocol describes the proposed project location and the proposed project.

2.1 PROJECT LOCATION

The proposed Project will be located on the Longview Power site in Maidsville, Monongalia County, West Virginia. The site is situated approximately 2,500 feet south of the Pennsylvania border, 3,000 feet west of the Monongahela River, and one mile north of Morgantown, West Virginia. The location of the Longview Power site is shown in Figure 2-1.

The geographic coordinates for the approximate center of the proposed project site are:

- Latitude: 39.7124 and Longitude: -79.9608
- UTM Easting: 589,077.73 and Northing: 4,396,353.40
- UTM Zone: 17 (UTM = Universal Traverse Mercator)

The area in which the project will be located is in attainment of all of the National Ambient Air Quality Standards (NAAQS) pollutants.

The dominant land features of the Project area are the Monongahela River and the rapid increase in elevation away from the river. The river elevation is approximately 820 ft. above mean sea level (amsl) (250 m amsl). Terrain of approximately 1,100 ft. amsl occurs within 700 feet (210 m) of the river. Moving further away from the river isolated terrain peaks of 1,300 ft. amsl (400 m amsl) occur within 5,000 ft. (1.5 km) of the Monongahela River. The highest terrain within 15 km of the project site is 2,464 ft. amsl (751 m amsl).

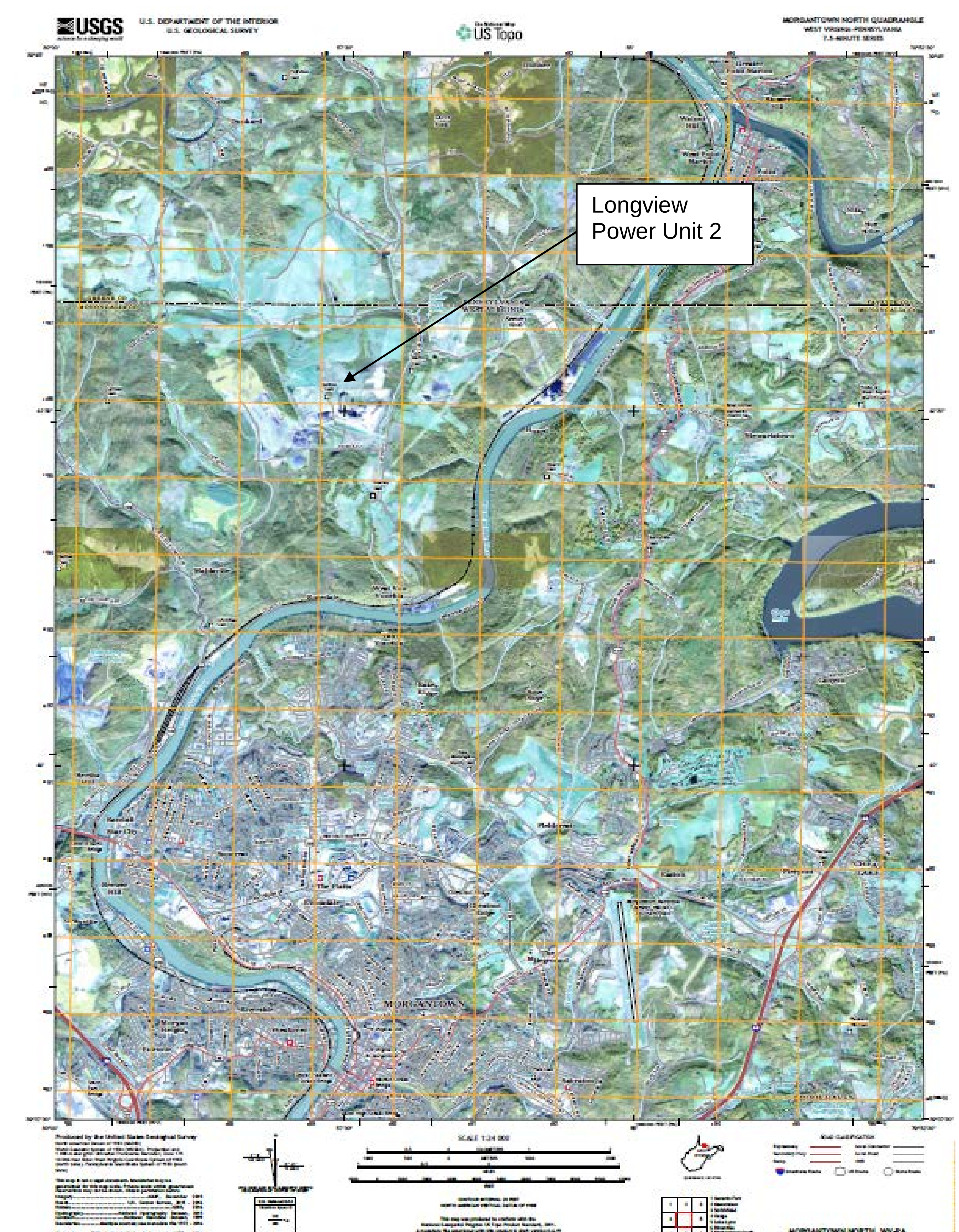

Figure 2-1
Location of Proposed Longview Power Unit 2

2.2 PROJECT DESCRIPTION

The Longview Power Unit 2 Project is proposed to be a nominally rated 1,200 MW natural gas-fired only (no oil backup), combined-cycle power plant located immediately adjacent to the north of the existing Longview Power Unit 1. The Project will be designed to achieve a peak electrical output during the summer season of approximately 1,200 MW. Electricity generated by Unit 2 will be supplied to the PJM power grid and connect to the grid via the existing interconnection used by the Longview Power Unit 1.

The major components of the proposed power plant include: One combined cycle power train consisting of two combustion turbines, two heat recovery steam generators (HRSG) with duct burners, one steam turbine, one diesel fuel-fired firewater pump, one diesel fired emergency generator and one mechanical draft cooling tower.

To enhance the plant's overall efficiency and increase the amount of electricity generated by the Project, the hot exhaust gases from each combustion turbine will be routed to a downstream Heat Recovery Steam Generator. The HRSGs contains a series of heat exchangers designed to recover the heat from the turbine's exhaust gas and produce steam. The Project includes the installation of duct burners to produce additional steam in the HRSGs for additional power output from the steam turbine generator. The duct burners will only fire natural gas. No oil backup is planned for the Project.

Cooled exhaust gas passing through the HRSGs will be vented to the Selective Catalytic Reduction (SCR) and Oxidation Catalyst control system used to control NO_x and CO emissions. Selective Catalytic Reduction involves the injection of aqueous ammonia (NH_3) at a concentration of approximately 19% by weight into the combustion turbine exhaust gas streams. The ammonia reacts with NO_x in the exhaust gas stream in the presence of a catalyst, reducing it to elemental nitrogen (N_2) and water vapor (H_2O). The aqueous ammonia will be stored on-site in dual 60,000 gallon (approximate) storage tanks.

Steam generated in the HRSGs will be routed to a steam driven turbine that will increase the output of the electric generator. This generator will produce additional electricity that will be sold

on the grid. Electricity generated by the combustion turbines and the single steam driven turbine driving the electric generator represents the Project's total electrical output.

The Project will use a condenser and a 14 cell wet mechanical draft cooling tower for steam turbine generator steam condensation and waste heat rejection.

Figure 2-2 provides a General Arrangement Drawing and Figure 2-3 presents a plot plan of the plant. More detailed descriptions of the Project components are in the following subsections.

2.2.1 Combustion Turbines

The combustion turbines (CT) produce shaft power to drive an electric generator. Natural gas and combustion air are combusted producing a high velocity discharge which rotates a turbine shaft. The exhaust gases exiting the combustion turbines are routed to an HRSG to recover heat and generate steam. The combustion turbines will be General Electric (GE) 7HA.02 or equivalent, each with a nominal electric generation capacity of approximately 400 MW and a maximum rated heat capacity of 3,970 MMBtu/hr. [Higher Heating Value (HHV)] at cold day ambient temperature of -5 °F. The combustion turbines will be fired with natural gas only and will be equipped with Dry Low NO_x burners.

2.2.2 Heat Recovery Steam Generators/Steam Turbine

Exhaust gas from the combustion turbine is routed to the HRSG through insulated ductwork, where it passes through the water and steam HRSG heat exchanging sections. The gas is then discharged to the atmosphere through the integral HRSG exhaust stack with a silencer. Heat is transferred by primary convection from the hot CT exhaust gas to the feed water and steam systems. The feed water and steam will flow inside the vertically oriented finned tubes, and the gas flow will be directed horizontally across the tube rows.

For maximum flexibility, the bottoming cycle portion of a combined cycle is "oversized" to allow for higher output of the steam turbine than what could otherwise be achieved using the exhaust energy produced by the CT alone. The exhaust gases leaving the CT contain enough

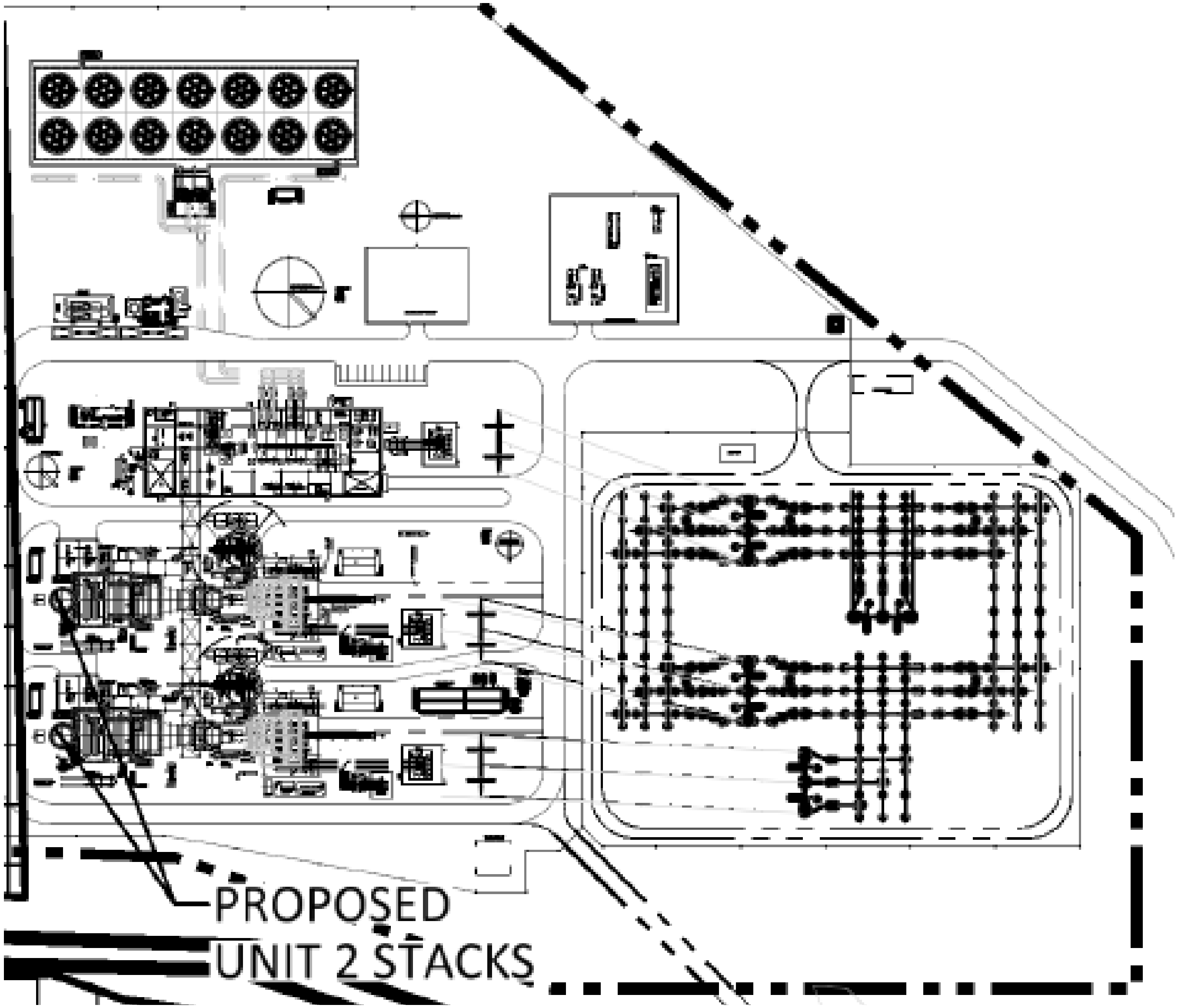

Figure 2 2
General Arrangement Drawing

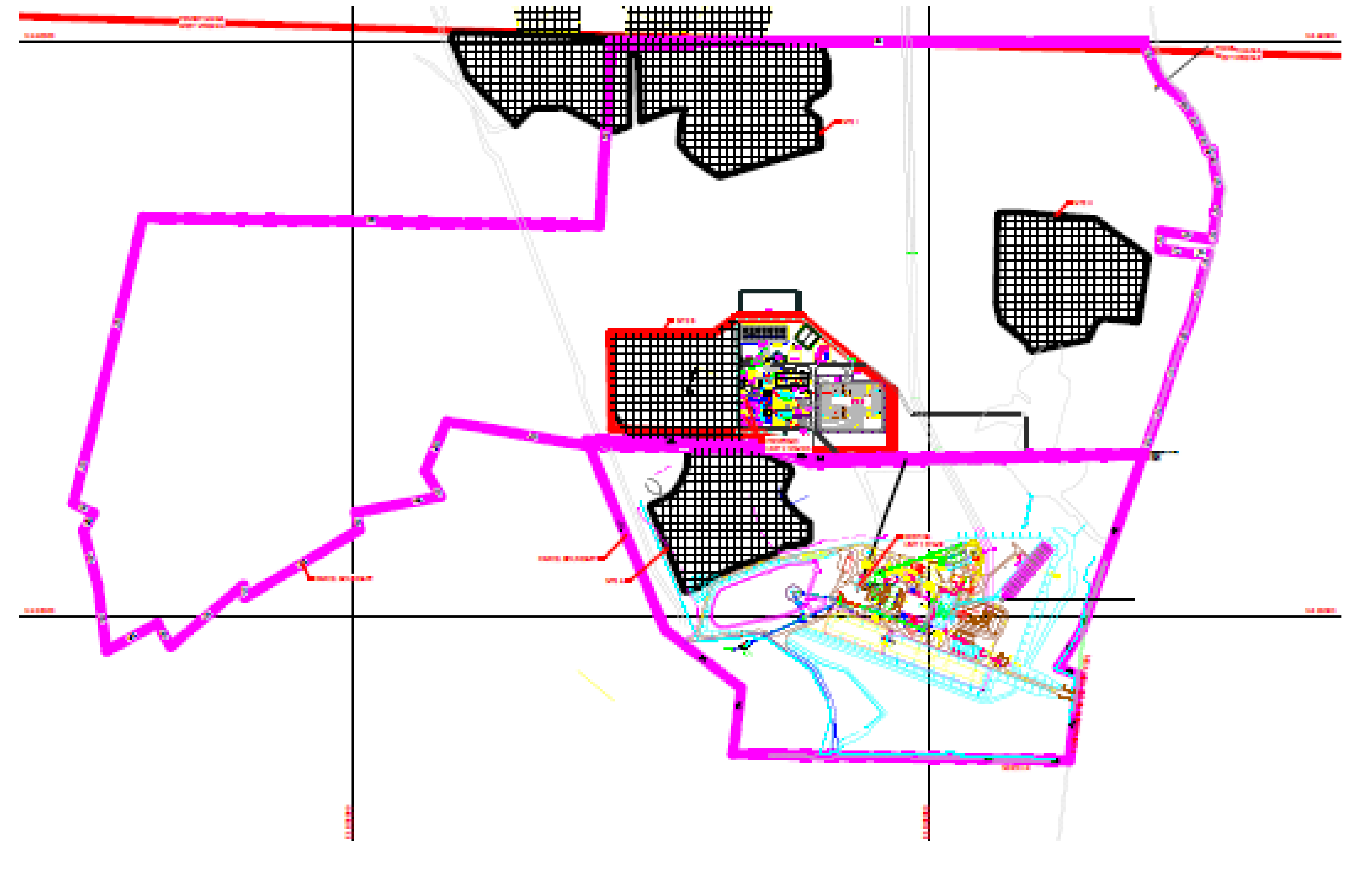

Figure 2-3
Plot Plan

oxygen to support additional combustion of fuels. Additional heat is added to the bottoming cycle using Low NOx duct burners with a maximum rated heat capacity of 250 MMBtu/hr-HHV per HRSG. This additional heat produces additional steam, which is passed through the ST flow path for additional electrical output (approximately 60 MW). The supplemental HRSG duct firing system consists of the duct burners, duct burner management system, duct burner fuel metering and regulation skid, and fuel supply.

The HRSG will be equipped with a selective catalytic reduction (SCR) system to limit NO_x emissions, and a catalytic Oxidation (CO) system to limit carbon monoxide and volatile organic compound emissions. The duct burners will not operate independently of the combustion turbine.

No auxiliary boiler will be constructed for the Project. Instead, via an interconnect with existing Unit 1, steam will be provided via the existing Unit 1 Auxiliary Boiler and also allow for bi-directional steam flow between Units 1 and 2.

2.2.3 Steam Turbine/Generator

The steam turbine/generator will utilize the steam developed in the HRSG to generate electricity. The steam turbine generator will receive steam from the HRSG and will discharge the low-pressure exhaust steam to the condenser. The steam turbines have a maximum rating of 430 MW each (maximum).

2.2.4 Mechanical Draft Cooling Tower

The ST exhausts directly into the condenser, where the steam is condensed by the circulating water passing through the condenser tubes. Condensate formed in the condenser is collected in the hot well. Recoverable steam and condensate from cycle drains and other reclaimable steam are also routed to the condenser hot well. The steam surface condenser relies on the circulating water system to provide cooling water for heat exchange. The circulating water system rejects the waste heat to atmosphere via a wet mechanical draft cooling tower by sensible heat transfer (increasing the temperature of the air passing across the tower) and latent heat transfer (evaporating a portion of the circulating water into the air passing across the tower). The cooling tower is designed to reject heat returned from the steam surface condenser and the plant's auxiliary cooling water system. The now cooled circulating water is collected in the cooling tower basin, and pumped back to the condenser water boxes, repeating the process. A circulating water chemical feed system will be included.

During the cooling process, small water droplets, known as cooling tower drift, escape to the atmosphere through the cooling tower exhaust. To minimize this effect, the cooling tower will be equipped with drift eliminators. The drift eliminators provide multiple directional changes of airflow which helps prevent the escape of water droplets.

2.2.5 Diesel fired firewater pump

A 240 hp, 179 kW standby firewater pump will be used to supply water during emergency conditions. The fire water pump will use ultra-low sulfur diesel (ULSD) fuel, with a sulfur content no greater than 0.0015% by weight. The fire water pump will also be periodically operated for short periods per manufacturer's maintenance instructions to ensure operational readiness in the event of an emergency. The fire water pump is expected to operate less than 100 hours per year.

2.2.6 Diesel fired emergency generator

An emergency generator will be used for emergency backup electric power. The fuel for the emergency generator will be ULSD with a sulfur content no greater than 0.0015% by weight. The emergency generator will be periodically operated for short periods per manufacturer's maintenance instructions to ensure operational readiness in the event of an emergency. The emergency generator is expected to operate less than 100 hours per year.

2.2.7 Fuel Gas Heaters/Gas Compressor

Two (2) fuel gas heaters will be used to preheat the gaseous fuel received by the plant. Preheating the fuel prior to combustion in the CTs increases their efficiency, safeguards the fuel pipelines from icing, and protects the CTs from fuel condensates.

The fuel supply for the Unit 2 CCGT will be provided via a 6.2 mile 20" pipeline interconnecting onto both the Columbia 1804 and 10240 interstate pipelines located near Greensboro, PA. At this interconnection, there will be a metering station allowing connection with the dual supply lines that are integral to the Columbia pipeline. Gas compression equipment will be added to this line and will have those facilities located on the Unit 2 site.

2.3 OPERATING SCENARIOS

The typical range of operating scenarios for the Project is shown in Table 2-1 and includes three load conditions (50%, 75%, and 100%) with the duct burner and/or evaporative cooler either operating or not operating and various start-up and shut-down conditions. Each of the operating scenarios has unique exhaust gas conditions and pollutant emission rates. The typical operating scenario is for the combustion turbine to operate at or near 100% of the design capacity and highest hourly emission rates are associated with winter day, 100% load, with duct firing.

Start-up conditions for the combustion turbines represent periods from initial firing until the system reaches steady state operations.

Start-up modes include:

- cold starts (restarts made more than 72 hours of shutdown).
- warm starts (between 8 and 72 hours of shutdown).
- hot starts (less than 8 hours of shutdown).

Shutdown conditions represent periods where system output is lowered below steady state conditions until the cessation of fuel firing. Shutdown commences when the turbine loads reach less than 50% load with the intent to stop operations. The proposed emission limits for the combustion turbines should not apply during periods of start-up (cold, warm or hot) and shutdown. The annual emissions for the entire facility, which are discussed in Section 3, include 260 start-ups (208 hot startups, 40 warm startups, and 12 cold startups) and 260 shut-down.

Table 2-1
Summary of Potential Operating Scenarios for Selected Design Conditions

	Case Description	CTG Load	Ambient DBT/RH	Inlet Cooling	Duct Firing	Blowdown	Fuel Type	Configuration
1	Summer Day,100% CTG Load, Duct Firing, Evap ON	100	92.0/45.7	On	On	0%	NG	2x1
2	Summer Day,100% CTG Load, Evap ON	100	92.0/45.7	On	Off	0%	NG	2x1
3	Summer Day,100% CTG Load, Duct Firing	100	92.0/45.7	Off	On	0%	NG	2x1
4	Summer Day,100% CTG Load	100	92.0/45.7	Off	Off	0%	NG	2x1
5	Summer Day,75% CTG Load	75	92.0/45.7	Off	Off	0%	NG	2x1
6	Summer Day,50% CTG Load	50	92.0/45.7	Off	Off	0%	NG	2x1
7	Summer Day, MECL CTG Load	MECL	92.0/45.7	Off	Off	0%	NG	2x1
8	Average Day,100% CTG Load, Duct Firing, Evap ON	100	63.0/70.1	On	On	0%	NG	2x1
9	Average Day,100% CTG Load, Evap ON	100	63.0/70.1	On	Off	0%	NG	2x1
10	Average Day,100% CTG Load, Duct Firing	100	63.0/70.2	Off	On	0%	NG	2x1
11	Average Day,100% CTG Load	100	63.0/70.2	Off	Off	0%	NG	2x1
12	Average Day,75% CTG Load	75	63.0/70.2	Off	Off	0%	NG	2x1
13	Average Day,50% CTG Load	50	63.0/70.2	Off	Off	0%	NG	2x1
14	Average Day, MECL CTG Load	MECL	63.0/70.2	Off	Off	0%	NG	2x1
15	Winter Day,100% CTG Load, Duct Firing	100	-5.0/90.0	Off	On	0%	NG	2x1
16	Winter Day,100% CTG Load	100	-5.0/90.0	Off	Off	0%	NG	2x1
17	Winter Day,75% CTG Load	75	-5.0/90.0	Off	Off	0%	NG	2x1
18	Winter Day,50% CTG Load	50	-5.0/90.0	Off	Off	0%	NG	2x1
19	Winter Day, MECL CTG Load	MECL	-5.0/90.0	Off	Off	0%	NG	2x1
20	Summer Day,100% CTG Load, Duct Firing, Evap ON	100	92.0/45.7	On	On	0%	NG	1x1
21	Summer Day,100% CTG ON	100	92.0/45.7	On	Off	0%	NG	1x1
22	Summer Day,100% CTG Load, Duct Firing	100	92.0/45.7	Off	On	0%	NG	1x1
23	Summer Day,100% CTG Load	100	92.0/45.7	Off	Off	0%	NG	1x1
24	Summer Day,75% CTG Load	75	92.0/45.7	Off	Off	0%	NG	1x1
25	Summer Day,50% CTG Load	50	92.0/45.7	Off	Off	0%	NG	1x1
26	Summer Day, MECL CTG Load	MECL	92.0/45.7	Off	Off	0%	NG	1x1
27	Average Day,100% CTG Load, Duct Firing, Evap ON	100	63.0/70.1	On	On	0%	NG	1x1
28	Average Day,100% CTG Load, Evap ON	100	63.0/70.1	On	Off	0%	NG	1x1
29	Average Day,100% CTG Load, Duct Firing	100	63.0/70.2	Off	On	0%	NG	1x1
30	Average Day,100% CTG Load	100	63.0/70.2	Off	Off	0%	NG	1x1
31	Average Day,75% CTG Load	75	63.0/70.2	Off	Off	0%	NG	1x1
32	Average Day,50% CTG Load	50	63.0/70.2	Off	Off	0%	NG	1x1
33	Average Day, MECL CTG Load	MECL	63.0/70.2	Off	Off	0%	NG	1x1
34	Winter Day,100% CTG Load, Duct Firing	100	-5.0/90.0	Off	On	0%	NG	1x1
35	Winter Day,100% CTG Load	100	-5.0/90.0	Off	Off	0%	NG	1x1
36	Winter Day,75% CTG Load	75	-5.0/90.0	Off	Off	0%	NG	1x1
37	Winter Day,50% CTG Load	50	-5.0/90.0	Off	Off	0%	NG	1x1
38	Winter Day, MECL CTG Load	MECL	-5.0/90.0	Off	Off	0%	NG	1x1

Notes: 1. The Duct Firing cases shall be designed to provide approximately a 15% increase over the STG unfired output.
2. CTG - Combustion Turbine Generator, DBT - Dry-Bulb Temperature (deg F), RH - Relative Humidity, NG - Natural Gas, Listed steam conditions: M (kpph), P (psia), T (deg F), MECL - Minimum Emissions Compliance Load

3. EMISSIONS INVENTORY

3.1 PROPOSED PROJECT EMISSION RATES

The emission units associated with the proposed Longview Unit 2 Project include the combustion turbines, HRSG duct burners, emergency generator, fire pump, gas preheaters and gas compressor equipment. All units will be natural gas-fired except the fire water pump and emergency generator, which are diesel fuel fired. The following subsections provide brief summaries of the pertinent emissions data for each emission unit.

3.1.1 Combustion Turbines

3.1.1.1 Normal Operating Condition

The combustion turbine will be a General Electric Frame GE 7HA.02 gas turbine (or equivalent) with supplemental HRSG duct firing with inlet air-cooling and will combust natural gas only. The combustion turbine will have a rated heat input of 3,561.2 MMBtu/hr (approximate) while operating at an average ambient temperature of 62° F. The heat input capacity of the combustion turbine increases at lower ambient temperatures and decreases at higher ambient temperatures.

The combustion turbine will be equipped with dry low NO_x combustor technology to minimize the formation of NO_x. Pollutant emission rates from the combustion turbine are obtained directly from the performance data provided by the vendor (General Electric, or equivalent). The maximum projected emission rates are equal to the highest emission rate over a range of operating conditions (load and ambient air temperature). The temperature and load conditions analyzed are 50%, 75% and 100% load and minimum, average and maximum design temperatures of -5, 63 and 92 ºF, respectively.

A summary of the maximum hourly and annual emission rates for the normal operating conditions of the combustion turbine is provided in Table 3-1.

Table 3-1
Potential Maximum Hourly Emission Rate from one Combustion Turbine/HRSG Set

	Case Description	CTG Load	Ambient DBT/RH	Inlet Cooling	Duct Firing	Blowdown	Fuel Type	Configuration	NO2	CO	VOC	SO2[a]	PM
1	Summer Day,100% CTG Load, Duct ON	100	92.0/45.7	On	On	0%	NG	2x1	28	16.8	5.5	4.13	19.1
2	Summer Day,100% CTG ON	100	92.0/45.7	On	Off	0%	NG	2x1	26.5	16.1	4.6	3.88	13.2
3	Summer Day,100% CTG Load, Duct Firing	100	92.0/45.7	Off	On	0%	NG	2x1	27.1	16.3	5.4	3.99	18.7
4	Summer Day,100% CTG Load	100	92.0/45.7	Off	Off	0%	NG	2x1	25.5	15.5	4.4	3.74	12.9
5	Summer Day,75% CTG Load	75	92.0/45.7	Off	Off	0%	NG	2x1	20.3	12.4	3.6	2.99	10.4
6	Summer Day,50% CTG Load	50	92.0/45.7	Off	Off	0%	NG	2x1	15.7	10.4	7.1	2.32	8.5
7	Summer Day, MECL CTG Load	MECL	92.0/45.7	Off	Off	0%	NG	2x1	15.7	10.4	7.1	2.32	8.5
8	Average Day,100% CTG Load, Duct Firing, Evap ON	100	63.0/70.1	On	On	0%	NG	2x1	28.4	17	5.6	4.18	19.2
9	Average Day,100% CTG Load, Evap ON	100	63.0/70.1	On	Off	0%	NG	2x1	26.8	16.3	4.7	3.93	13.4
10	Average Day,100% CTG Load, Duct Firing	100	63.0/70.2	Off	On	0%	NG	2x1	28.2	17	5.5	4.16	19.2
11	Average Day,100% CTG Load	100	63.0/70.2	Off	Off	0%	NG	2x1	26.6	16.2	4.6	3.91	13.4
12	Average Day,75% CTG Load	75	63.0/70.2	Off	Off	0%	NG	2x1	21.2	12.9	3.7	3.12	10.9
13	Average Day,50% CTG Load	50	63.0/70.2	Off	Off	0%	NG	2x1	16.4	9.8	3.7	2.41	8.7
14	Average Day, MECL CTG Load	MECL	63.0/70.2	Off	Off	0%	NG	2x1	16.4	9.8	3.7	2.41	8.7
15	Winter Day,100% CTG Load, Duct Firing	100	-5.0/90.0	Off	On	0%	NG	2x1	29.1	17.4	5.6	4.28	19.6
16	Winter Day,100% CTG Load	100	-5.0/90.0	Off	Off	0%	NG	2x1	27.5	16.7	4.9	4.03	13.7
17	Winter Day,75% CTG Load	75	-5.0/90.0	Off	Off	0%	NG	2x1	24.5	14.9	4.3	3.59	12.4
18	Winter Day,50% CTG Load	50	-5.0/90.0	Off	Off	0%	NG	2x1	18.2	16	10.5	2.7	9.7
19	Winter Day, MECL CTG Load	MECL	-5.0/90.0	Off	Off	0%	NG	2x1	18.2	16	10.5	2.7	9.7
20	Summer Day,100% CTG Load, Duct ON	100	92.0/45.7	On	On	0%	NG	1x1	28	16.8	5.5	4.13	19.1
21	Summer Day,100% CTG ON	100	92.0/45.7	On	Off	0%	NG	1x1	26.5	16.1	4.6	3.88	13.2
22	Summer Day,100% CTG Load, Duct Firing	100	92.0/45.7	Off	On	0%	NG	1x1	27.1	16.3	5.4	3.99	18.7
23	Summer Day,100% CTG Load	100	92.0/45.7	Off	Off	0%	NG	1x1	25.5	15.5	4.4	3.74	12.9
24	Summer Day,75% CTG Load	75	92.0/45.7	Off	Off	0%	NG	1x1	20.3	12.4	3.6	2.99	10.4
25	Summer Day,50% CTG Load	50	92.0/45.7	Off	Off	0%	NG	1x1	15.7	10.4	7.1	2.32	8.5
26	Summer Day, MECL CTG Load	MECL	92.0/45.7	Off	Off	0%	NG	1x1	15.7	10.4	7.1	2.32	8.5
27	**Average Day,100% CTG Load, Duct Firing, Evap ON**	**100**	**63.0/70.1**	**On**	**On**	**0%**	**NG**	**1x1**	**28.4**	**17**	**5.6**	**4.18**	**19.2**
28	Average Day,100% CTG Load, Evap ON	100	63.0/70.1	On	Off	0%	NG	1x1	26.8	16.3	4.7	3.93	13.4
29	Average Day,100% CTG Load, Duct Firing	100	63.0/70.2	Off	On	0%	NG	1x1	28.2	17	5.5	4.16	19.2
30	Average Day,100% CTG Load	100	63.0/70.2	Off	Off	0%	NG	1x1	26.6	16.2	4.6	3.91	13.4
31	Average Day,75% CTG Load	75	63.0/70.2	Off	Off	0%	NG	1x1	21.2	12.9	3.7	3.12	10.9
32	Average Day,50% CTG Load	50	63.0/70.2	Off	Off	0%	NG	1x1	16.4	9.8	3.7	2.41	8.7
33	Average Day, MECL CTG Load	MECL	63.0/70.2	Off	Off	0%	NG	1x1	16.4	9.8	3.7	2.41	8.7
34	Winter Day,100% CTG Load, Duct Firing	100	-5.0/90.0	Off	On	0%	NG	1x1	29.1	17.4	5.6	4.28	19.6
35	Winter Day,100% CTG Load	100	-5.0/90.0	Off	Off	0%	NG	1x1	27.5	16.7	4.9	4.03	13.7
36	Winter Day,75% CTG Load	75	-5.0/90.0	Off	Off	0%	NG	1x1	24.5	14.9	4.3	3.59	12.4
37	Winter Day,50% CTG Load	50	-5.0/90.0	Off	Off	0%	NG	1x1	18.2	16	10.5	2.7	9.7
38	Winter Day, MECL CTG Load	MECL	-5.0/90.0	Off	Off	0%	NG	1x1	18.2	16	10.5	2.7	9.7

[a] Sulfur content of 0.4 grains/100 scf of natural gas

3.1.1.2 Start-Up and Shutdown Conditions

Emissions during start-up and shutdowns of the combustion turbines were estimated using vendor supplied information and the 260 cold, warm and hot start-ups which would occur each year. A summary of the maximum hourly and annual emission rates (assuming natural gas firing) for startups and shutdowns conditions are provided in Table 3-2.

3.1.2 Heat Recovery Steam Generator Duct Burners

The Heat Recovery Steam Generator (HRSG) duct burner will have a design heat input capacity of 227 MMBtu/hr (HHV) (approximate) and will combust natural gas. The HRSG will primarily operate in the recovery or "unfired" mode (i.e., no duct burner) utilizing heat from the proposed combustion turbine exhaust gases to generate steam. The HRSG and duct burner cannot operate independently from the proposed combustion turbine. The exhaust gases from the combustion turbines and duct burners will be discharged to the atmosphere downstream of the HRSG through a 180-ft stack.

The duct burner will be of a "low-NO_x" design in order to control emissions of nitrogen oxides. Maximum hourly emissions from the duct burner are estimated based on operation at full capacity and on emission factors from performance data sheets for the units as supplied by the manufacturer. Annual emissions are based on 8,500 hours per year of normal operation which assumes 260 hours of startup/shutdown for the balance of the year.

A summary of the maximum hourly and annual combustion turbine and duct burner emission rates (assuming natural gas firing) is provided in Table 3-1.

3.1.3 Other Combustion/Process Sources

The other minor combustion and/or process sources of the Project include:

- Firewater pump
- Emergency generator
- Gas preheaters
- Gas Compressor equipment

Table 3-2
Potential Maximum Annual Emissions from the Start-Up and Shut-Down Conditions

Pollutant		Hot Start	Warm Start	Cold Start	Shutdown	Two CT Units
NOx	lb/event	165	528	1,848	23	
	lb/hr (max)	271	441	523	45	
	tons/year	17	11	11	3	42
CO	lb/event	3,180	7,820	10,200	360	
	lb/hr (max)	3,252	4,838	18,862	2,741	
	tons/year	331	156	61	47	595
VOC (w/formaldehyde)	lb/event	2,860	5,920	6,520	380	
	lb/hr (max)	2,781	4,306	4,306	2,753	
	tons/year	297	118	39	49	504
Formaldehyde	lb/event	780	1,360	1,580	120	
	lb/hr (max)	860	862	862	862	
	tons/year	81	27	9	16	133
Total PM	lb/event	71	125	149	11	
	lb/hr (max)	111	111	111	75	
	tons/year	7	3	1	1	12
Duration	minutes	108	196	229	12	
No of events per year		208	40	12	260	

The fire water pump and emergency generator will be ULSD fuel fired. The fire water pump has a rating of 240 HP and the emergency generator is rated at 1,000 kW. The fire water pumps and emergency generators will be limited to 100 hrs/year of operation, respectively.

The estimated emissions for the fire water pump, emergency generator, and preheaters are presented in Table 3-3.

3.1.4 Facility-Wide Maximum Potential Annual Emission Rates

A summary of the potential annual emission rates for the entire Longview Unit 2 Project (combustion turbines/duct burners, startup/shutdown and engines/pumps) is provided in Table 3-4. The potential annual emissions presented are for two CTs and Operating Case No 27 in Table 3-1 which is an average day, 100% CTG load, duct firing, and evaporation on.

3.2 HAZARDOUS AIR POLLUTANT EMISSIONS

A summary of the potential annual hazardous air pollutant (HAP) emissions from the combustion turbines and duct burners will be provided with the air permit application but have not been included in the air quality modeling protocol.

The emissions for formaldehyde will be developed using USEPA emission for hazardous air pollutants from natural gas-fired stationary gas turbines and duct burners (Hazardous Air Pollutant (HAP) Emission Control Technology for New Stationary Combustion Turbines, Sims Roy, Docket A-95-51, August 21, 2001, Table 3) and then assuming 90% removal for formaldehyde by the catalytic oxidation system. These removal rates are based on information provided by the vendor of the catalytic oxidation system.

It is not expected that the emissions from the Longview Unit 2 Project will exceed 10 tons per year for any single HAP or 25 tons per year for HAPs in aggregate. It is also not expected the total HAP emissions from both Unit 1 and Unit 2 will exceed 10 tons per year for any single HAP or 25 tons per year for HAPs in aggregate. Therefore, the proposed project is not expected to be a major source of HAP emissions and will not be subject to case by case Maximum Achievable Control Technology (MACT).

Table 3-3
Potential Maximum Hourly and Annual Emissions from the Fire Water Pump, Emergency Generator, Spray Dryer and Mechanical Draft Tower

	Fire Water Pump[2]		Emergency Generator		Fuel Gas Preheaters (2)	
Pollutant	**Maximum Hourly Emission Rate (lb/hr)**	**Annual Emissions (tons/year)**	**Maximum Hourly Emission Rate (lb/hr)**	**Annual Emissions (tons/year)**	**Maximum Hourly Emission Rate (lb/hr)**	**Annual Emissions (tons/year)**
NO_x	4.55	0.228	15.2	0.76	0.19	1.70
VOCs	0.302	0.015	1.01	0.051	0.04	0.33
CO	1.27	0.063	8.76	0.44	0.21	1.83
PM_{10}	0.841	0.042	0.505	0.025	0.04	0.37
SO_2	0.492	0.025	0.027	0.001	0.01	0.06
GHG	418	20.9	1,427	71.3	712	6,240

[2] Fire water pump and emergency generator limited to 100 hrs/yr of operation.

Table 3-4
Facility Wide Maximum Potential Annual Emissions

Pollutant	Combustion Turbine and Duct Burner (tons/year)	Other Sources[3] (tons/year)	Startup and Shut down (tons/year)	Total Facility Wide Annual Emissions (tons/year)
NO_x	238	2.69	41.8	283
VOCs	46.8	0.40	504.4	552
CO	143	2.33	595.1	740
PM_{10}	162	0.44	12.2	175
SO_2	35.1	0.09	NA	35.2
H2SO4	29.6	0	NA	29.6
GHG	3,568,513	6332.22	NA	3,574,845

[3] Includes cooling tower, fire water pump and emergency generator. Fire water pump and emergency generator limited to 100 hrs/yr of operation.

3.3 PSD AND NSR APPLICABILITY DETERMINATION

The potential annual emission rates associated with the proposed Longview Unit 2 Project are used to determine the applicability of PSD and non-attainment New Source Review (NSR) requirements. PSD applicability is determined by comparing the potential emission rate from the project for each criteria pollutant that is in attainment with the National Ambient Air Quality Standards (NAAQS) to the respective significant emission threshold levels. The Longview Unit 2 Project will be located in Monongalia County, West Virginia that is designated as "in attainment" or "unclassifiable" for all regulated air pollutants so nonattainment NSR review does not apply.

The Project triggers PSD applicable since it is a new source at a listed 100 TPY source under 40 CFR 52.21 and the project's potential to emit of at least one criteria pollutant is greater the PSD significant emission levels presented in Table 3-5. As seen from this table the proposed project is subject to federal PSD requirements for NO_x, CO, particulates (PM/PM_{10} and $PM_{2.5}$), H_2SO_4 and GHG.

Table 3-5
Comparison of Project Maximum Emissions to PSD Significance Levels

Pollutant	Annual Emissions (tons/year)	PSD Significance Level (tons/year)	PSD Pollutant
NO_x	282	40	Yes
VOCs	552	40	Yes
CO	740	100	Yes
$PM/PM_{10}/PM_{2.5}$	175	25/15/10	Yes
SO_2	35	40	No
H_2SO_4	30	7	Yes
Ozone Precursor (NO_x)	282	40	Yes
Ozone Precursor (VOC)	552	40	Yes
$PM_{2.5}$ Precursor Pollutant (NO_x)	282	40	Yes
$PM_{2.5}$ Precursor Pollutant (SO_2)	35	40	No
Lead	0.00045	0.6	No
Fluorides	0	1	No
Vinyl Chloride	0	1	No
Total Reduced Sulfur	0	10	No
Sulfur Compounds	0	10	No
GHG (CO2e)	3,574,845	100,000	Yes

4. AIR QUALITY MODEL SELECTION AND INPUT DATA

The air quality dispersion models to be used in the air quality modeling analysis of the Longview Unit 2 Project will be both screening and refined U.S. EPA air dispersion models. The procedures used in conducting the modeling analysis will follow the requirements outlined in 40 CFR Part 51 Appendix W "Guideline on Air Quality Models" (U.S. EPA 2017), guidance provided by West Virginia DAQ, and other state and federal regulatory agency documents.

4.1 AIR QUALITY MODEL SELECTION

4.1.1 Screening Air Quality Models

A screening level air quality model will be used to obtain conservative modeled estimates of the air quality impact of the proposed project based on simplified assumptions of the model inputs (e.g., preset, worst-case meteorological conditions). The screening air quality model to be used is the AERSCREEN model (Version 16216). AERSCREEN is the EPA's recommended screening model for simple and complex terrain for single sources including point sources, area sources, horizontal stacks, capped stacks, and flares. AERSCREEN runs AERMOD (a refined air quality model) in a screening mode using a matrix of meteorological conditions.

4.1.2 Refined Air Quality Model

If the screening model indicates that the increase in concentration attributable to the proposed project could cause or contribute to a violation of any NAAQS or PSD increment, then the second level of more sophisticated (Refined) models will be used. The refined air quality modeling analysis will use the AERMOD (**AER**MIC **MOD**el) air dispersion model as the refined air quality model. A description of this model is provided in the following subsections.

4.1.3 AERMOD Model Selection

The **A**MS/**E**PA **R**egulatory **MOD**el (AERMOD, v19191) air dispersion model will be used to perform the air quality modeling analysis. The AERMOD air dispersion model is an approved U.S. EPA air dispersion model for performing refined, multi-source air quality modeling studies. The AERMOD air dispersion model contains sophisticated dispersion algorithms. A description of the AERMOD model is provided below.

The American Meteorological Society (AMS) and the U.S. Environmental Protection Agency (EPA) formed the **A**MS/**E**PA **R**egulatory **M**odel **I**mprovement **C**ommittee (AERMIC) in 1991. The goal of the committee was to introduce planetary boundary layer (PBL) concepts into a new air dispersion model. The use of PBL concepts in AERMOD represents a more sophisticated approach to predicting plume dispersion than the approach used by the ISCST3 model. The PBL concepts include using dispersion parameters (sigma y and sigma z) that are based on either measured or estimated turbulent intensities, accounting for non-homogenous conditions throughout the PBL, improving the treatment of plume rise, and enhancing the way concentrations at complex terrain receptors (i.e. terrain receptors with elevations above stack top elevation) are predicted by incorporating the concept of a critical dividing streamline.

AERMOD uses an abbreviated approach to the three-dimensional terrain feature representation and critical dividing streamline approach that is used by the Complex Terrain Dispersion Model Plus Algorithms for Unstable Situations (CTDMPLUS). The AERMOD approach determines the fraction of the plume that is below the critical dividing streamline height (Φ from 0.0 to 1.0) and then uses that number as a scaling factor. The scaling factor, Φ, is multiplied by the concentration that represents the plume flowing around the terrain feature and then 1- Φ is multiplied by the concentration that represents the plume flowing over the terrain feature. The AERMOD concentration is the sum of the two, scaled concentrations. AERMOD differs from CTDMPLUS in its treatment of flow around a terrain feature by not considering the lateral splitting of the plume that occurs as the plume flows around a terrain feature. In its present form, AERMOD uses the Schulman-Scire and Huber-Synder downwash algorithms that are contained in ISCST3.

The AERMOD modeling system consists of two pre-processors and the dispersion model. AERMET (Version 19191) is the meteorological pre-processor and AERMAP (Version 18081) is the terrain pre-processor that characterizes the terrain and generates receptor elevations. The AERMET pre-processor, which is very similar to the CTDMPLUS meteorological pre-processor (METPRO), produces a file containing an hourly, vertical profile of the atmosphere and a file that includes surface and micrometeorological data. The AERMAP pre-processor is designed to develop receptor grid height information based on United States Geological Survey (USGS) digital elevation model (DEM) data. The development of the receptor grid includes assigning receptor elevations to the receptor locations and also assigning a hill height scale to each receptor. Receptor elevations are determined by finding the four closest DEM elevation points to the receptor location and averaging the elevations to represent the receptor. Hill height scales for all receptors are determined by examining the height and proximity of all DEM points within the modeled domain area to each receptor location. The domain used in AERMAP included the area covered by the Cartesian receptors plus an additional 5,000-meter buffer in the x and y-directions. Surface elevations for all receptors will be obtained from USGS 1:24,000 Level II DEM data when available and Level I when not available.

Other components of this system include AERSURFACE, a surface characteristics preprocessor, and BPIPPRIME (BPIPPRM), a multi-building dimensions program incorporating the GEP technical procedures for PRIME applications.

The AERMOD air dispersion model has various options to simulate a variety of dispersion conditions for emissions from a stack or non-stack source. The U.S. EPA has recommended various default options to be used in dispersion modeling for regulatory purposes. These recommended regulatory default options will be used in the air quality impact analysis as follows:

- Stack-tip downwash.
- Model Accounts for Elevated Terrain Effects.
- Calms Processing Routine Used.
- No Exponential Decay for Rural Mode.
- Upper bound value for “super squat” buildings.
- Missing meteorological data processing used.

4.2 LANDUSE

The land use classification for the area was based on a quantitative review of land use patterns surrounding the proposed project site and Morgantown Airport. Current (2016) satellite imagery from Google Earth was inspected and compared to 2011 satellite imagery (from Google Earth) to determine the representativeness of the 2011 land use data. The satellite imagery for the 2011 and 2016 for the project area and Morgantown Airport are shown in Figures 4-1 and 4-2,

Figure 4-1
2011 and 2016 Satellite Imagery of the Longview Power Unit 2 Area

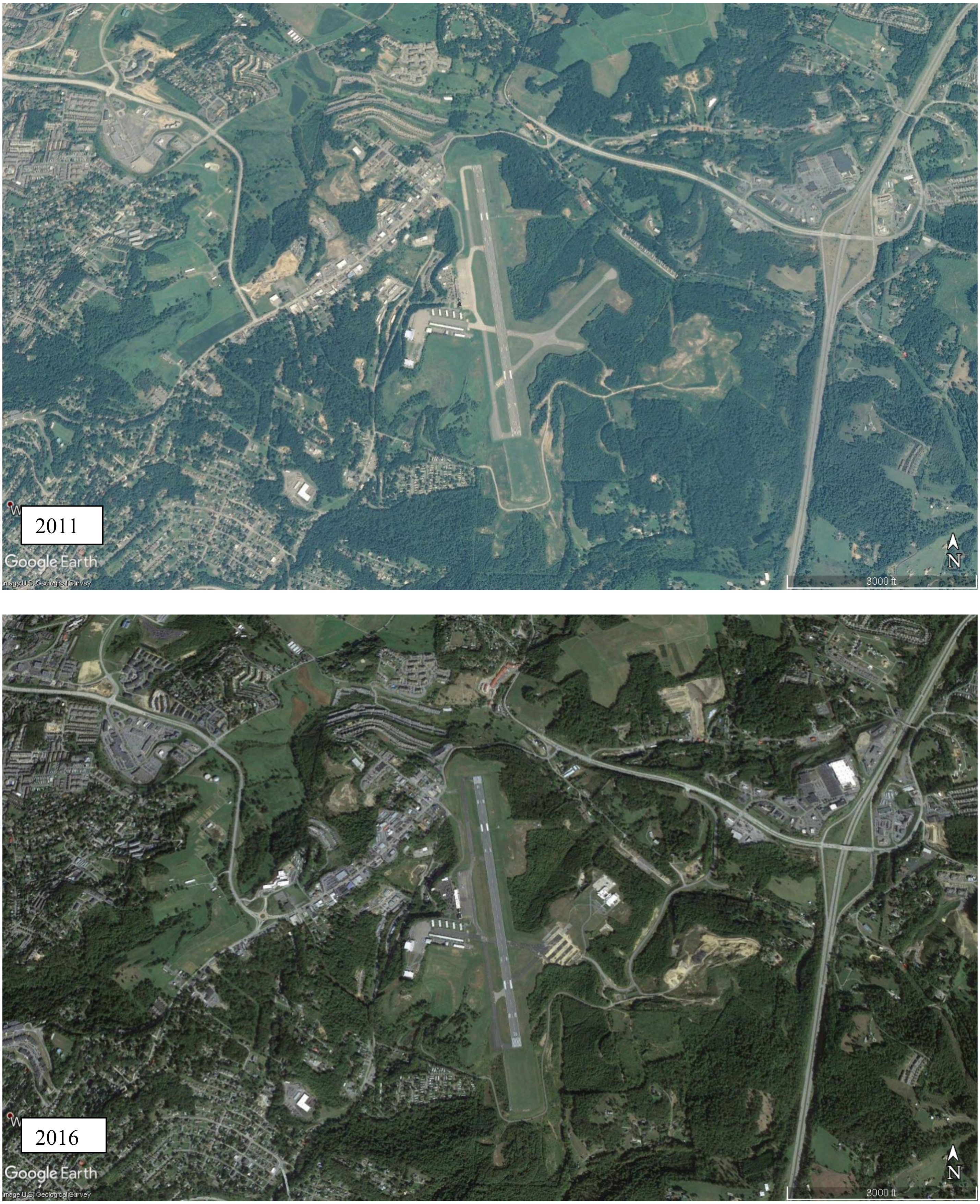

Figure 4-2
2011 and 2016 Satellite Imagery of the Morgantown Airport Area

respectively. A qualitative visual assessment of these imageries indicates that the land use for 2011 is more than adequately representative of the current landuse conditions for both the project site and Morgantown Airport. Therefore, the 2011 National Land Cover Dataset (NLCD) will be used to determine landuse for AERMOD and surface parameters for AERMET processing

The land use analysis followed the procedures recommended by the U.S. EPA (U.S. EPA 2000) and the typing scheme developed by Auer (Auer 1978). The Auer technique established four primary land use types: industrial, commercial, residential, and agricultural. Industrial, commercial, and compact residential areas are classified as urban, while agricultural and common residential areas are considered rural. For air quality modeling purposes, an area is defined as urban if more than 50 percent of the surface within 3 kilometers of the source falls under an urban land use type. Otherwise, the area is determined to be rural.

Although Morgantown, WV is in close proximity to the proposed site and represents a portion of the area that is classified as urban, a review of the gridded digital land use data and the 7.5 USGS topographic maps indicates that 98% of the area within the 3-kilometer radius is classified as rural for air quality modeling purposes (Urban classifications were assumed to be category 22 (high intensity residential) and category 23 (commercial/industrial/transportation)). Based on the rural land use designation, AERMOD will be used in the default (rural) mode to predict the ambient air concentrations associated with emissions from the proposed project.

4.3 RECEPTOR GRID

The AERMOD air quality modeling study will use a Cartesian receptor grid network including fence line receptors. A description of the receptor grids network is provided in the following subsections.

4.3.1 AERMOD Receptor Grid

The receptor network for the AERMOD analysis will minimally cover a square region 20-km on a side, centered on the proposed project site. All receptors will be referenced to the UTM coordinate system (Zone 17), using the North American Datum of 1927 (NAD 27). A rectangular Cartesian coordinate receptor grid will be used as the main receptor grid. The main receptor grid will be centered on the CT stacks and have the following grid spacing:

- 100 meters out to ± 1 kilometer;
- 250 meters out to ± 2 kilometers;
- 500 meters out to ± 5 kilometers;
- 1,000 meters out to ± 10 kilometers.
- 2,000 meters out to ± 20 kilometers

In addition to the rectangular Cartesian coordinate receptor grid, a set of fenceline receptors will be prepared. The fence line receptors will be placed every 50 meters around the site fenced portion of the property.

Concentration contours maps will be developed to determine the refined modeling grid requirements including extending the modeling domain and/or refining the resolution grid spacing. A more refined spaced receptor grid will be developed and used in area of maximum predicted concentrations and the receptor grid will be extended if maximum predicted concentrations occur near the edge of the receptor grid.

Terrain elevations will be assigned to all receptors included in the air dispersion modeling analysis. The terrain elevations for the main receptor grid will be developed using the AERMAP terrain preprocessor.

The AERMAP pre-processor is designed to develop receptor grid height information based on United States Geological Survey (USGS) digital elevation model (DEM) data. The development of the receptor grid includes assigning receptor elevations to the receptor locations and also assigning a hill height scale to each receptor. Receptor elevations are determined by finding the four closest DEM elevation points to the receptor location and averaging the elevations to represent the receptor. Hill height scales for all receptors are determined by examining the height and proximity of all DEM points within the modeled domain area to each receptor location. The domain used in AERMAP included the area covered by the Cartesian receptors plus an additional 5,000-meter buffer in the x and y-direction. Terrain elevations for all receptors were obtained from the USGS 1:24,000 Level II DEM data.

The Cartesian receptor grid will be further refined based on the initial modeling results. Contour plots of the predicted concentrations will be developed for each pollutant and averaging time. The contour plots will be used to determine if refinements to the modeling domain and/or grid resolution are necessary. If maximum or high concentrations are predicted in a coarse section of the grid then that area of the grid will be remodeled with a 50 meter spacing to determine maximum modeled concentrations.

4.4 METEOROLOGICAL DATA

The meteorological data for the AERMOD air dispersion model with include both surface and upper air data from National Weather Service (NWS) observation stations. Section 6 of this document addresses the representativeness and adequacy of the surface meteorological database. A description of the procedures that will be used to process the meteorological data is presented in the following subsections.

4.4.1 AERMOD Meteorological Data

The meteorological database for the AERMOD air dispersion model will consist of five years of surface meteorological data collected at the Morgantown Municipal Airport from 2014-2018. A wind rose for the Morgantown Airport is presented in Figure 4-3. The Morgantown meteorological data was previously used for the Longview Power Project (Unit 1) and a demonstration of the representativeness of the Morgantown Airport meteorological data for the Longview Unit project is presented in Section 6.

The Morgantown surface meteorological data will be processed using the procedures described in the U.S. EPA AERMET meteorological processor. The AERMET preprocessor produces a file containing an hourly, vertical profile of the atmosphere and a file that includes surface and micrometeorological data.

The AERMET analysis will include the use of both the AERMINUTE and the draft version of AERSURFACE. The use of the draft version of AERSURFACE required approval from US. EPA Region 3. The justification for the use of the draft version of AERSURFACE is contained in Appendix A.

The AERMINUTE (Version 15272) meteorological data processor will be used to produce wind speed and direction data based on archived 1-minute and 5- minute ASOS data for Morgantown Airport, for input into AERMET Stage 2. A 0.5 m/s wind speed threshold will be applied to the 1-minute ASOS derived wind speeds in AERMET.

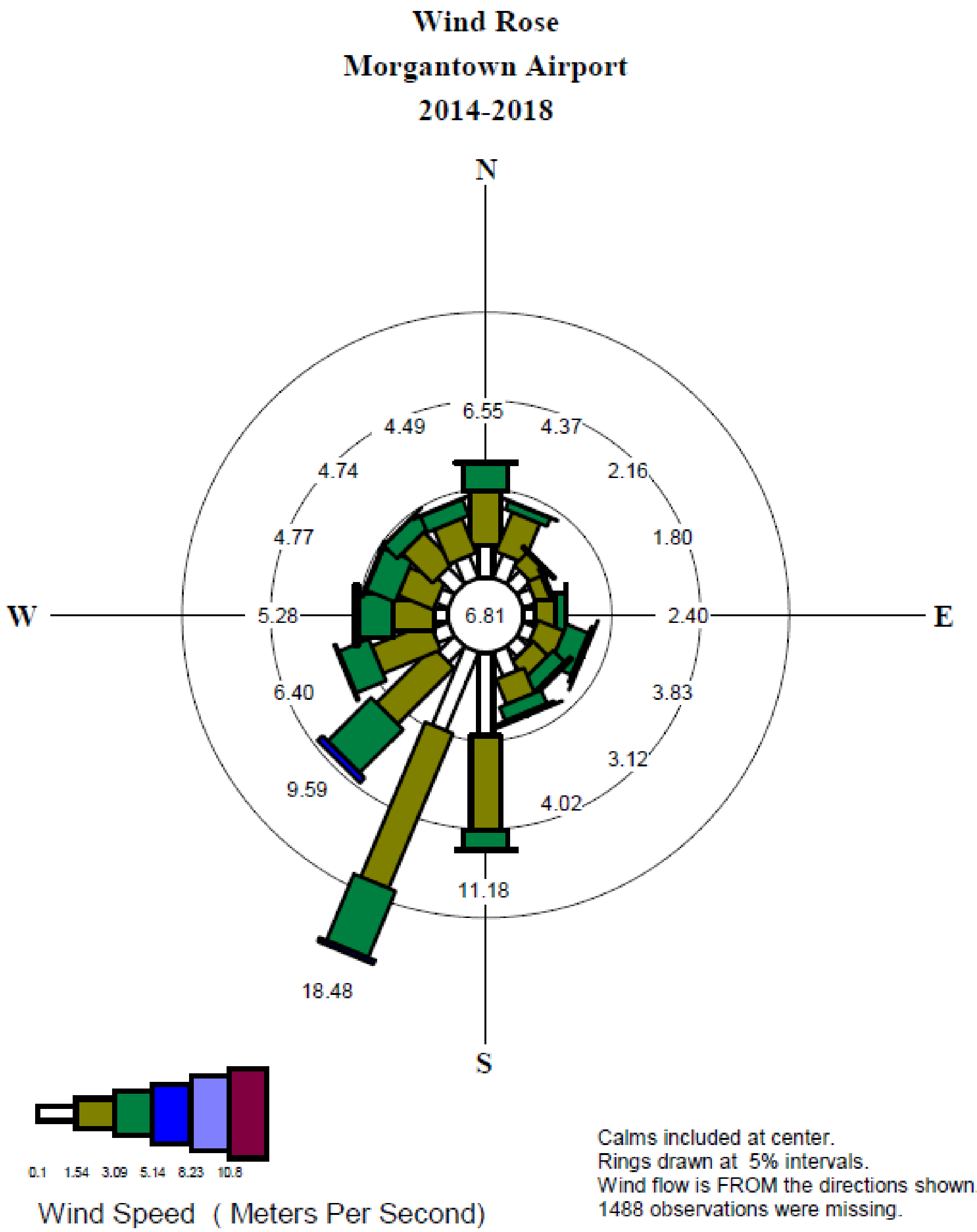

Figure 4-3
Wind Rose for Morgantown Airport (2014-2018)

The AERMET preprocessor also requires several micrometeorological variables for the project site area. The variables included surface roughness, Bowen ratio, and albedo. The values that were used in AERMET were determined using the draft version of the AERSURFACE pre-processor. AERSURFACE used 12 equal sectors by season.

The 2011 NLCD land use was used to develop the surface characteristics of the Morgantown Airport site and the project site. As previously discussed in section 4.2 and in Appendix A, current satellite imagery (2016) was inspected and compared to the 2011 satellite imagery (from Google Earth) to determine the representativeness of the 2011 land use data. It was determined that the land use for 2011 is adequately representative of the current surface conditions.

A comparison of the surface characteristics of the Morgantown Airport site and the project site is presented in Table 4-1. As seen from this table the albedo and Bowen Ratios of the airport is consistent with the project site, but the surface roughness is not. Therefore, a sensitivity analysis of the impact of the difference in surface roughness on the predicted air quality concentrations of the project emission will be performed. The procedure to be used is described in section 4.4.2.

Using the procedures described in AERMET, the surface meteorological data will be combined with concurrent twice-daily rawinsonde data obtained from the NWS observation station in Pittsburgh, Pennsylvania. All NWS upper air and surface meteorological data will be obtained from the National Climatic Data Center (NCDC).

4.4.2 Sensitivity Analysis

A site specific sensitivity analysis will be performed following the AERMOD Implementation Guide (August 2019). The meteorological data (2014-2018) from Morgantown Airport (MGW) will be processed through AERMET using both the micrometeorological variables (2011 NLCD data for albedo, Bowen ratio, and surface roughness length) associated with MGW as well as the micrometeorological variables associated with the Longview Power Unit 2 site using the draft version of AERSURFACE. The results of the CT/HRSG load analyses for all compounds and averaging periods using both meteorological data sets will be compared to determine the meteorological data set (either MGW/MGW surface or MGW/LVP2 surface) producing the maximum short-term concentrations. The meteorological dataset and CT/HRSG load identified

Table 4-1
Comparison of the Surface Characteristics of the Project Site and Meteorological Data Collection Site (Morgantown Airport)

		Morgantown Airport			Project Site					Morgantown Airport			Project Site		
Season	Sector	Albedo	Bowen Ratio	Zo	Albedo	Bowen Ratio	Zo	Season	Sector	Albedo	Bowen Ratio	Zo	Albedo	Bowen Ratio	Zo
1	1	0.17	0.86	0.254	0.17	0.85	0.063	3	1	0.16	0.46	0.65	0.16	0.37	0.3
1	2	0.17	0.86	0.308	0.17	0.85	0.034	3	2	0.16	0.46	0.64	0.16	0.37	0.211
1	3	0.17	0.86	0.151	0.17	0.85	0.035	3	3	0.16	0.46	0.301	0.16	0.37	0.214
1	4	0.17	0.86	0.148	0.17	0.85	0.041	3	4	0.16	0.46	0.323	0.16	0.37	0.183
1	5	0.17	0.86	0.14	0.17	0.85	0.12	3	5	0.16	0.46	0.329	0.16	0.37	0.293
1	6	0.17	0.86	0.128	0.17	0.85	0.035	3	6	0.16	0.46	0.289	0.16	0.37	0.16
1	7	0.17	0.86	0.08	0.17	0.85	0.019	3	7	0.16	0.46	0.145	0.16	0.37	0.108
1	8	0.17	0.86	0.07	0.17	0.85	0.05	3	8	0.16	0.46	0.159	0.16	0.37	0.175
1	9	0.17	0.86	0.159	0.17	0.85	0.071	3	9	0.16	0.46	0.227	0.16	0.37	0.256
1	10	0.17	0.86	0.092	0.17	0.85	0.123	3	10	0.16	0.46	0.143	0.16	0.37	0.401
1	11	0.17	0.86	0.093	0.17	0.85	0.05	3	11	0.16	0.46	0.131	0.16	0.37	0.238
1	12	0.17	0.86	0.052	0.17	0.85	0.039	3	12	0.16	0.46	0.111	0.16	0.37	0.22
2	1	0.15	0.58	0.406	0.15	0.54	0.099	4	1	0.16	0.86	0.634	0.16	0.85	0.3
2	2	0.15	0.58	0.471	0.15	0.54	0.051	4	2	0.16	0.86	0.614	0.16	0.85	0.211
2	3	0.15	0.58	0.228	0.15	0.54	0.053	4	3	0.16	0.86	0.271	0.16	0.85	0.214
2	4	0.15	0.58	0.226	0.15	0.54	0.061	4	4	0.16	0.86	0.299	0.16	0.85	0.179
2	5	0.15	0.58	0.221	0.15	0.54	0.164	4	5	0.16	0.86	0.306	0.16	0.85	0.288
2	6	0.15	0.58	0.204	0.15	0.54	0.079	4	6	0.16	0.86	0.267	0.16	0.85	0.157
2	7	0.15	0.58	0.106	0.15	0.54	0.055	4	7	0.16	0.86	0.129	0.16	0.85	0.108
2	8	0.15	0.58	0.093	0.15	0.54	0.078	4	8	0.16	0.86	0.146	0.16	0.85	0.174
2	9	0.15	0.58	0.199	0.15	0.54	0.112	4	9	0.16	0.86	0.211	0.16	0.85	0.256
2	10	0.15	0.58	0.115	0.15	0.54	0.19	4	10	0.16	0.86	0.127	0.16	0.85	0.401
2	11	0.15	0.58	0.115	0.15	0.54	0.075	4	11	0.16	0.86	0.115	0.16	0.85	0.238
2	12	0.15	0.58	0.072	0.15	0.54	0.066	4	12	0.16	0.86	0.096	0.16	0.85	0.219

as producing the maximum short-term concentrations will be used for all further refined air quality modeling analyses.

4.5 GOOD ENGINEERING PRACTICE STACK HEIGHT ANALYSIS

Following U.S. EPA guidance contained in the "Guideline for Determination of Good Engineering Practice (GEP) Stack Height (Revised)" (U.S. EPA 1985), a GEP analysis will be performed to evaluate the potential for building downwash on the stacks. The following procedures will be used to analyze the stacks for downwash effects. The stacks and influencing buildings will be located on a plant map and the coordinates will be manually digitized. The stack height and relevant building dimensions will be evaluated using the U.S. EPA Building Profile Input Program Prime (BPIPPRM, Date 04274). BPIPPRM determines, in each of the 36 wind directions (10° sectors), which building may produce the greatest downwash effects for a stack. The direction-specific dimensions produced by BPIPPRM will be included in the AERMOD air quality modeling studies. Table 4-2 summarizes the building dimensions and structures that influence each stack. The BPIPPRM analysis indicated that the GEP height for all stacks is 250 ft., based on the preliminary height of the HRSG Drum Building. The CT stacks are within 500 ft. (the area of influence) of HRSG Drum Building which produced the controlling GEP heights for all sources. The CT stack height is 180 ft., which are not GEP height and therefore do not avoid building downwash effects. Therefore, direction-specific building downwash dimensions will be included in the AERMOD dispersion modeling analyses.

Table 4-2
Building Dimensions for GEP Height Analysis

Building/Structure	Height (ft.)	Maximum Projected Width (ft.)	Formula GEP height (ft.)	Radius of Influence (ft.)	Controlling Structure for Source(s)
Steam Turbine Building	96	444	240	480	No
HRSG Drum Platform North	100	276	250	500	Yes
HRSG Drum Platform South	100	276	250	500	Yes

4.6 MODELED EMISSION RATES

All loads and operating scenarios for the combustion turbines/HRSG identified in Section 3 will be initially modeled. The load and/or operating scenario which produce the highest short-term ground level air quality concentrations will be identified and those hourly emissions will be used for all further refined modeling including short-term and long-term averaging periods including SIL, cumulative multi-source and visibility analysis. The emissions expected for the startup and shutdown conditions will be modeled by blending the emissions and stack parameters with the worst case normal operating conditions. The lb/event emission for startup or shutdown will be added to the normal operation emissions in lb/hr for the duration of the averaging period

The diesel fired firewater pump and diesel fired emergency generator are intermittent emission sources but will be included in the air quality modeling analysis following the procedure described in USEPA Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard, March 1, 2011.

The emergency generators and fire water pumps will be limited to 100 hrs/year operation by a permit condition. These 100 hours of operations are for periodic testing of the engines to maintain their reliability and operational performance in times of loss of electrical power and/or firefighting events. The most applicable NAAQS for emission associated with these short-term operations of the engines would be the 1-hour NO_2 NAAQS. For the proposed Emergency Generator and Firewater Pump annualized average emission rates (the maximum hourly rate times 100/8760) will be used in the 1-hour NO_2 NAAQS modeling analysis. This approach accounts for the fact that brief periods of emissions from these units could occur at any time during the year, but the high hourly emission rate (for testing purposes, the units will be started monthly for approximately 20 minutes) would be unlikely to significantly contribute to NAAQS exceedances given the probabilistic form of the 1-hour NO_2 NAAQS.

The fuel gas preheater is a continuous emission source and will be included in the air quality modeling analysis using the maximum hourly emission rate.

The gas compressor is an electric driven compressor and thus has no emissions and will not be included in the air quality modeling protocol.

5. AIR QUALITY IMPACTS ANALYSIS

The air quality modeling analysis will be used to determine the predicted ambient air concentrations resulting from emissions from the Longview Unit 2 Project. Air quality modeling analyses will be performed to determine the significant impact area (SIA), the amount of PSD increment consumption, and the level of compliance with the National Ambient Air Quality Standards (NAAQS) and other air quality related values (AQRVs).

5.1 SIGNIFICANCE ANALYSIS

The air quality impact analysis will initially evaluate emissions of CO, PM/PM_{10}/$PM_{2.5}$, SO_2, and NO_x from the project. The results of this air quality modeling analysis will be compared to the ambient air significance levels shown in Table 5-1.

The EPA has historically cautioned states that the use of a SIL may not be appropriate when a substantial portion of any NAAQS or PSD increment is known to be consumed. Therefore, justification of the use of SILs is recommended in support of the PSD review record. To provide justification with respect to use of SILs in the significance and NAAQS analyses, the differences between the NAAQS and background concentrations determined to be representative of the Project impact area for applicable compound and averaging periods were compared to the applicable) values. As shown in Table 5-2, the differences between the NAAQS and background concentrations are much higher than the corresponding SILs. Therefore, it is sufficient for WVDEP to conclude that an air quality modeled impact less than the SIL for each of the applicable compounds will not cause or contribute to a modeled violation of the NAAQS.

If the proposed Longview Power Unit 2 produces no significant impacts (i.e., at or below the ambient air significance levels), then no further analysis is required to demonstrate compliance with the NAAQS or PSD increment consumption in Class II areas. No further analysis is required because the project, by definition, does not significantly contribute to any possible violations of the NAAQS or consume a significant portion of the available increment.

If the highest modeled concentrations are above the ambient air significance levels, then a Significant Impact Area (SIA) will be defined. The SIA will be defined by a circle with a radius

Table 5-1
Significance Impact Levels (μg/m³)

Pollutant	Averaging Time	Class II	Class I EPA	Class I FLM
Sulfur Dioxide	Annual	1	0.1	0.03
	24-hour	5	0.2	0.07
	3-hour	25	1	0.48
	1-hour	7.8		
PM_{10}	Annual	1		
	24-hour	5	0.3	0.27
$PM_{2.5}$	Annual	0.3 0.2 proposed	0.06	
	24-hour	1.2	0.07	
Nitrogen Dioxide	Annual	1	0.1	0.03
	1-hr	7.5		
Carbon Monoxide	8-hour	500		
	1-hour	2,000		

Table 5-2
Comparison of NAAQS, Representative Background Concentrations, and SILs

Pollutant and Averaging Period	**Background**	**Background**	**NAAQS**	**NAAQS**	**SIL**	**Difference**	**Greater than SIL?**
SO_2	**(ppb)**	**(µg/m^3)**	**(ppb)**	**(µg/m^3)**	**(µg/m^3)**	**(µg/m^3)**	
3-hour	20.6	53.8	75	195.8	5	142	YES
1-hour	35	91.4	500	1,305	1	1214	YES
NO_2							
Annual	6.21	11.7	53	99.6	1	88.0	YES
1-hour	45	84.6	100	188	7.5	103	YES
$PM_{2.5}$							
Annual		7.4		12	0.2	4.6	YES
24-hour		23.4		35	1.2	11.6	YES
PM_{10}							
24-hour		135		150	5	15	YES
CO							
8-hour	0.7	798	35	39,900	2,000	39,102	YES
1-hour	0.8	912	9	10,260	5,00	9,348	YES

extending from the reference origin of the proposed plant site out to the greatest radius where a receptor has a maximum concentration equal to the significance levels. The SIA with the largest radial distance among the various pollutants and averaging periods will be used for all further modeling as described in Section 5.2. The further analysis will be performed to determine compliance with the NAAQS and Class I and II PSD increments shown in Tables 5-3 and 5-4, respectively.

5.2 CLASS II AREA- MULTI-SOURCE IMPACT ANALYSIS

A discussion of the Class II area air quality impact analysis is presented in the following sections.

5.2.1 NAAQS Analysis

If the initial significance analysis indicates that the proposed project has significant impacts, then a multi-source impact analysis will be conducted. The multi-source impact analysis will include all sources at the Longview Unit 2 that emit the pollutants that have been determined to result in a modeled concentration above the significance levels. In addition, other sources of the PSD significant pollutants that are located within 25 km of proposed project. The emission inventory for the other local sources will be developed in consultation with the Pennsylvania DEP and West Virginia DAQ.

The multi-source inventory will be converted to maximum allowable emissions and then screened to remove small insignificant sources or fugitive emission sources that are located at significant distances from the Longview Unit project. Other sources will be modeled with AERSCREEN to determine their SIA. Those sources whose SIA does not overlap the SIA of the Longview Unit 2 Project will be eliminated from the multi-source emission inventory.

An analysis of the location of minor sources and background air quality selected for the NAAQS analysis will be performed to determine if the minor sources should be included in the multi-source modeling analysis or whether the existing background air quality data is conservatively high enough to represent the impact of the minor sources.

The NAAQS analyses will be based on the maximum concentration for the form of the NAAQS (i.e., highest second highest, annual maximum, 99^{th} percentile or 98^{th} percentile etc).

A NO to NO_2 conversion factor will be applied to all predicted NO_x concentrations. The NO to NO_2 conversion factor recognizes that most of the NO_x emitted from combustion sources is in

Table 5-3
National Ambient Air Quality Standards

Pollutant		Primary/Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)		primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead (Pb)		primary and secondary	Rolling 3 month average	0.15 µg/m3(1)	Not to be exceeded
Nitrogen Dioxide (NO2)		primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	1 year	53 ppb (2)	Annual Mean
Ozone (O3)		primary and secondary	8 hours	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution (PM)	$PM_{2.5}$	primary	1 year	12.0 $\mu g/m^3$	annual mean, averaged over 3 years
		secondary	1 year	15.0 $\mu g/m^3$	annual mean, averaged over 3 years
		primary and secondary	24 hours	35 $\mu g/m^3$	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24 hours	150 $\mu g/m^3$	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO2)		primary	1 hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

(1) In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m3 as a calendar quarter average) also remain in effect.
(2) The level of the annual NO2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.
(3) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.
(4) The previous SO2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2)any area for which implementation plans providing for attainment of the current (2010) standard have not been submitted and approved and which is designated nonattainment under the previous SO2 standards or is not meeting the requirements of a SIP call under the previous SO2 standards (40 CFR 50.4(3)), A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the require NAAQS.

Table 5-4
Class I and II Areas
PSD Increments (µg/m^3)

Pollutant	Averaging Period	Class I	Class II
SO_2	Annual	2	20
	24-hour	5	91
	3-hour	25	512
PM_{10}	Annual	4	17
	24-hr	8	30
$PM_{2.5}$	Annual	1	4
	24-hour	2	9
NO_2	Annual	2.5	25

the form of NO, which is then eventually converted to NO_2. The NO to NO_2 conversion method described in Ambient Ratio Method 2 (ARM2, Appendix W, 2017) will be used.

The NAAQS compliance assessment will include the Longview Unit 2 Project emissions, the offsite facilities including Longview Unit 1 and representative background concentrations.

5.2.2 PSD Increment Analysis

The PSD increment analysis will include all PSD increment consuming sources identified by both the WV DAQ and Pennsylvania DEP that are located within 50 Km of the SIA for the respective pollutant. It is anticipated that the final multi-source emission inventory will be developed in conjunction with WV DAQ and will be approved prior to conducting the refined multi-source air quality modeling analysis.

The final multi-source inventory will be used to assess PSD increment consumption. The PSD increment consumption assessment will include only PSD sources identified in the inventory. The PSD increment analyses will be based on the maximum concentration for the form of the NAAQS (i.e., highest second highest, annual maximum, 99^{th} percentile or 98^{th} percentile etc).

Air quality increment consumption is tracked by tabulating the actual emissions changes at a stationary source, area source or mobile source since the minor source baseline date and changes in actual emissions at major stationary sources after the major source baseline date. To determine the air quality increment consumed in a region the net actual emissions changes are modeled to obtain an air quality increment consumption concentrations. The changes in emissions from existing sources and increases from proposed new sources since the baseline date are modeled together to determine the incremental change in air quality levels. These incremental changes in air quality levels are compared to the PSD increment.

The PSD major source baseline dates for NO_2, PM_{10}, and SO_2 have been triggered by the Morgantown Energy Associates (MEA) project. This facility is located within the same air quality control region of that the Longview Unit 2 Project is located. The major source baseline year for NO_2, PM_{10}, and SO_2 is 1989.

5.2.3 Visibility Analysis

A screening level visibility assessment using VISCREEN (Version: 13190) will be performed. The model calculates the change in the color difference index (ΔE) and contrast between the plume and the viewing background. If the hourly estimates of ΔE is less than to 2.0, or the absolute value of the contrast values (|C|) is less than 0.05, then no further visibility analysis will be performed.

The selected sites for the Class II visibility analysis using VISCREEN are Mylan Park and the Morgantown Airport. Both represent areas where visibility is important for either recreational or commercial purposes. Mylan Park and the Morgantown Airport are approximately 10 km southwest and 9 km southeast of the Longview Power Unit 2 site.

5.2.4 Secondary Aerosol Formation

Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program (USEPA, 2019) will be used to demonstrate the effects of NO_x and VOC emissions from the proposed project on ozone and secondary formation of $PM_{2.5}$. A representative hypothetical source was identified from the Appendix Table A-1 of the guidance document. The hypothetical source selected was Doddridge in West Virginia. The method of including the MERP results into the modeling results will include:

1. Comparing the predicted NO_x 1-hr average, high 8th highest, 5-yr average concentration for the project to the NO_x SIL (as a percentage of the SIL).
2. Comparing the predicted $PM_{2.5}$ 24-hr average, high 8th highest, 5-yr average concentration for the project to the $PM_{2.5}$ SIL (as a percentage of the SIL).
3. Comparing the project's NO_x emission rate to the MERP for Doddridge for $PM_{2.5}$ from NO_x (as a percentage of the MERP).
4. Adding the items 2 and 3 above and comparing resultant to 100%.
5. Comparing the Comparing the project's NO_x emission rate to the MERP for Doddridge for Ozone (as a percentage).
6. Comparing the Comparing the project's VOC emission rate to MERP (tons/year) Doddridge O_3 from VOC (as a percentage).\
7. Adding items 5 and 6 above and comparing resultant to 100%.

5.3 BACKGROUND AMBIENT AIR DATA

Background ambient air quality values are required as part of the NAAQS analysis. The background values should be representative of the background pollutant concentration levels that could be expected to occur in the vicinity of the Longview Unit 2 Project. Therefore, ambient air data from a West Virginia DAQ monitoring station in Morgantown, WV, Ohio EPA monitoring station in Shadyside, OH and Pennsylvania DEP monitoring station in Charleroi, PA were reviewed in order to select representative background pollutant concentration data. A summary of the air quality data from monitoring stations in Morgantown, WV, Shadyside, OH and Charleroi, PA are presented in Table 5-5. The maximum measured concentrations from these monitoring stations over the previous 3 years (2016-2018) will be used to establish the existing ambient air quality levels for NAAQS compliance evaluation. If necessary a directional specific background concentration will be developed by eliminating those periods from the background measurements when an existing source (included in the multi-source inventory) is impacting the monitor. The procedure described in 40 CFR 51 Appendix W Section 8.3.3 may be used but only after consultation with WV DEP will a directional specific background concentration analysis be utilized.

A demonstration of the representativeness of these monitoring stations for the Longview Unit 2 Project is presented in Section 6.

Table 5-5
Proposed Background
Ambient Air Data for NAAQS Analysis

Pollutant and Averaging Period	2016	2017	2018	Site Location
SO_2 (ppb)				
3-hour	10.6	6	20.6	Morgantown Airport US 119 & Airport Blvd. (AQS Site ID 54-061-0003)
1-hour	23	9	35	
NO_2 (ppb)				
Annual	6.21	5.35	5.29	220 Meddings Road Charleroi, PA (AQS Site ID 42-125-0005)
1-hour	44	43	45	
$PM_{2.5}$ (µg/m3)				
Annual	7.40	7.3	7.2	Morgantown Airport US 119 & Airport Blvd. (AQS Site ID 54-061-0003)
24-hour	20.6	23.4	18.9	
PM_{10} (µg/m3)				
24-hour	135	61	73	2 Ball Park Rd Shadyside, OH (AQS Site ID 39-013-0006)
CO (ppm)				
8-hour	0.7	0.5	0.6	2 Ball Park Rd Shadyside, OH (AQS Site ID 39-013-0006)
1-hour	0.8	0.8	0.8	

5.4 CLASS I AREA ASSESSMENT

An assessment of potential project impacts on increment consumption, visibility and other air quality related values (AQRVs) in Class I areas is a requirement for PSD projects. Air quality impacts at Class I areas must be assessed under PSD regulations if they are within 100 km of the PSD source, or if the PSD source is judged to have a potential effect at Class I areas at distances beyond 100 km.

There are four (4) Class I areas within 250 km of the proposed site of the Longview Unit 2 Project. These areas are the Dolly Sods, Otter Creek and James River Face National Wilderness Areas and the Shenandoah National Park. The Dolly Sods, Otter Creek, James River Face and Shenandoah areas are approximately 91 km southeast, 78 km south-southeast, 237 south-southeast, and 173 km southeast respectively, of the proposed project site. The locations of the Class I areas relative to the proposed plant site are shown in Figure 5-1.

The procedure to assess the impact of the proposed project emission on the Class I areas are described in the following sections.

5.4.1 Increment Analysis

A Class I NAAQS and PSD increment screening level assessment following the procedure described in Section 4.2 of Appendix W will be performed. Preliminary modeling using the preferred near field refined air quality model (AERMOD) will be performed to determine the significance of the ambient impacts at 50 km from the proposed Longview Power Unit 2 project. If the predicted concentrations are less than the significance levels at 50 km, then no further analysis will be performed for the screening Class I NAAQS/PSD increment screening analysis. The nearest Class I area is Otter Creek Wilderness which 78 km south-southeast of the project site.

5.4.2 Visibility and Air Quality Related Values

The initial screening method described in Section 3.2 of the FLAG (2010) document will be used to evaluate the impacts of the proposed Longview Unit 2 Project on the Class I areas. The FLAG member agencies that administer Federal Class I areas (U.S. Forest Service (USFS) the National Park Service (NPS) and U.S. Fish and Wildlife Service (FWS)) will consider a source locating

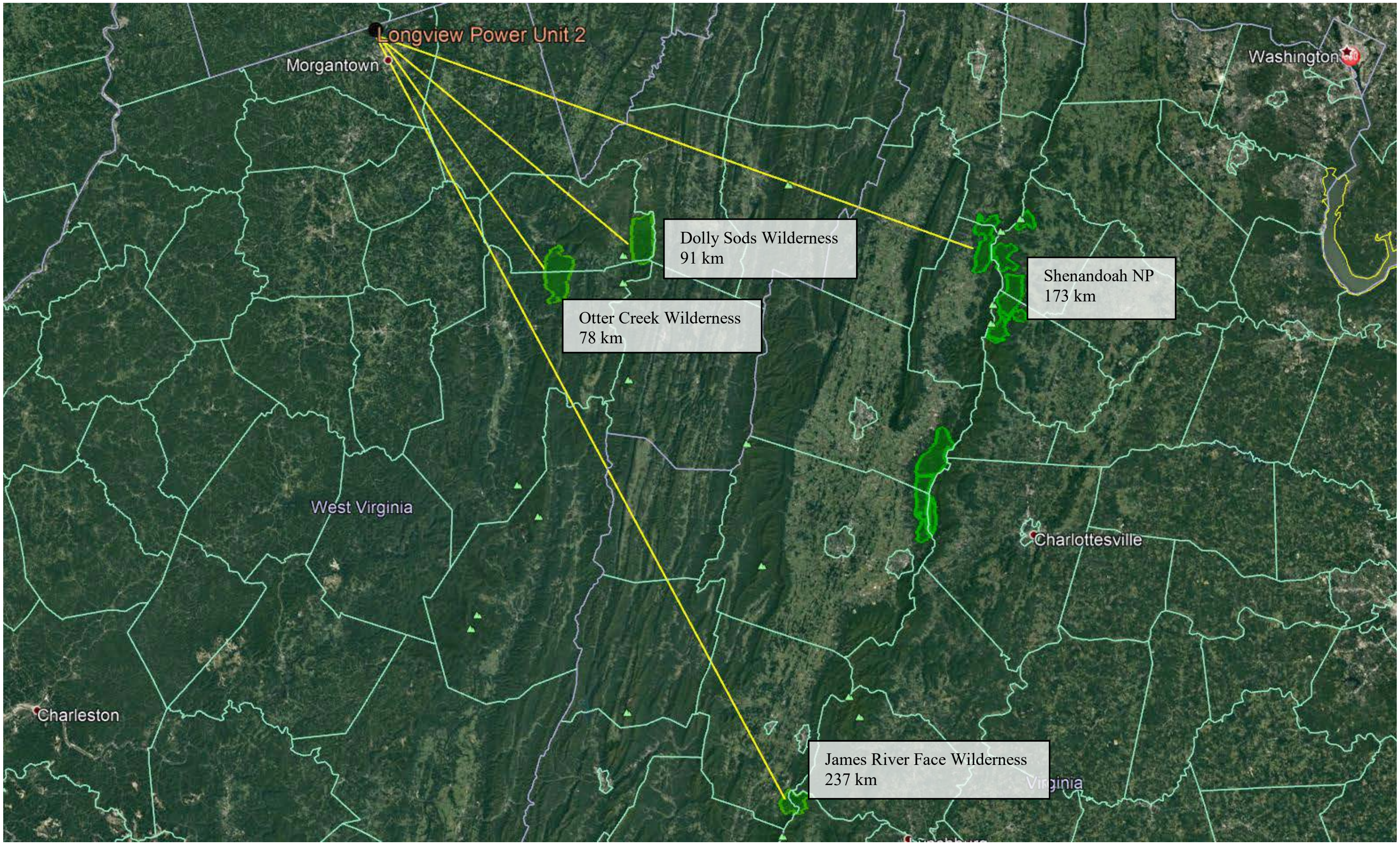

Figure 5-1
Location of Class I Areas

greater than 50 km from a Class I area to have negligible impacts with respect to Class I AQRVs if its total SO_2, NO_x, PM_{10}, and H_2SO_4 annual emissions (in tons per year, based on 24-hour maximum allowable emissions), divided by the distance (in km) from the Class I area (Q/D) is 10 or less. The Agencies would not request any further Class I AQRV impact analyses from such sources. The Q/D calculation for the proposed project is shown in Table 5-6. As seen from this table the Q/D calculation is less than for all four Class I Areas, therefore, no further Class I AQVR impact analysis is required.

5.5 OTHER AIR QUALITY RELATED VALUES ANALYSIS

PSD regulations also require an analysis of the effects of the proposed project on AQRVs in areas surrounding the project. These AQRVs include effects of other growth (residential, commercial, or industrial) associated with the project and possible impacts on sensitive flora, fauna, and soils. Growth-related AQRVs, such as influxes of additional population or increases in vehicular traffic, will not be significantly affected by the proposed project. The electricity produced by the project will be transmitted over a multi-state power grid and will not directly enable or support any additional local commercial, industrial, or residential development. The labor force required to operate the facility will be small and will be drawn from the local communities. Because there are no anticipated effects on growth, no detailed analysis for growth-related AQRVs will be required. The AQRV analysis for sensitive ecological communities will be made based on consultations with West Virginia DEP regarding any sensitive species or ecosystems that may exist within a 10-kilometer radius of the project.

Table 5-6
Q/D Calculations for Class I Areas

Total Project Emissions	**Q (tpy)**		
SO_2, NO_x, PM_{10}, and H_2SO_4	522		
Class I Area	**D (km)**	**Q/D**	**Q/D < 10?**
Shenandoah National Park	173	3.02	Yes
Dolly Sods	91	5.74	Yes
Otter Creek	78	6.70	Yes
James River Face	237	2.20	Yes

6. METEOROLOGICAL AND AMBIENT AIR QUALITY MONITORING EXEMPTION REQUEST

This section presents the results of an evaluation of the suitability of meteorological data collected at Morgantown, WV (surface observations) and Pittsburgh, PA (upper air observations) and air quality data from Morgantown, WV, Shadyside, OH and Charleroi, PA for the air quality modeling analysis of the proposed Longview Unit 2 Project. This evaluation used U.S. EPA approved criteria to demonstrate the adequacy and representativeness of the selected meteorological and air quality databases for the Longview Unit 2 Project.

6.1 METEOROLOGICAL MONITORING DATA

6.1.1 Approach

The meteorological data evaluation criteria contained in the U.S. EPA Guideline on Air Quality Models (40 CFR Part 51, App. W, Section 8.4.1.b) were used to assess the representativeness of the Morgantown, WV meteorological data for the Longview Unit 2 Project area. This document states: "*The meteorological data used as input to a dispersion model should be selected on the basis of spatial and climatological (temporal) representativeness as well as the ability of the individual parameters selected to characterize the transport and dispersion conditions in the area of concern*."

This document establishes the following parameters for selecting and evaluating meteorological data for air quality modeling:

- The proximity of the meteorological monitoring site to the project area under consideration.
- The complexity of the terrain.
- The exposure of the meteorological monitoring site and parameters monitored.
- The period of time during which data are collected.

Each of the parameters was used to evaluate the Morgantown, WV meteorological data. The results are provided in the following subsections.

6.1.2 Proximity of Meteorological Monitoring Site

The Morgantown Airport is located only 4.2 miles (6.4 km) southeast of the proposed Longview Unit 2 Project site and is the closest meteorological monitoring site collecting the parameters required for air quality modeling analysis. This proximity makes the Morgantown Airport the preferred source of meteorological data for evaluating the transport and dispersion of the Longview Unit 2 Project emissions. The locations of the Morgantown Airport and the proposed Longview Unit 2 Project site are shown in Figure 6-1.

6.1.3 Complexity of Terrain

The complexity of terrain surrounding a site is based upon the relationship of the terrain elevation to stack top and final plume height. U.S. EPA defines three categories of terrain for air quality modeling purposes:

- Simple terrain as terrain below stack top elevation.
- Complex terrain as any terrain that exceeds final plume height elevation.
- Intermediate terrain as any terrain between stack top and final plume height.

For air quality modeling analysis in simple terrain regions, meteorological data from the closest National Weather Service (NWS) station is usually satisfactory while for complex terrain and intermediate terrain locations onsite meteorological data may be required. Elevations of the terrain features surrounding the proposed Longview Unit 2 Project site and the expected final plume height for the CT stacks are discussed below.

The topography of the local area surrounding the Longview Unit 2 Project site is shown in Figure 6-2 which was adapted from the United States Geologic Survey (USGS) digital elevation data

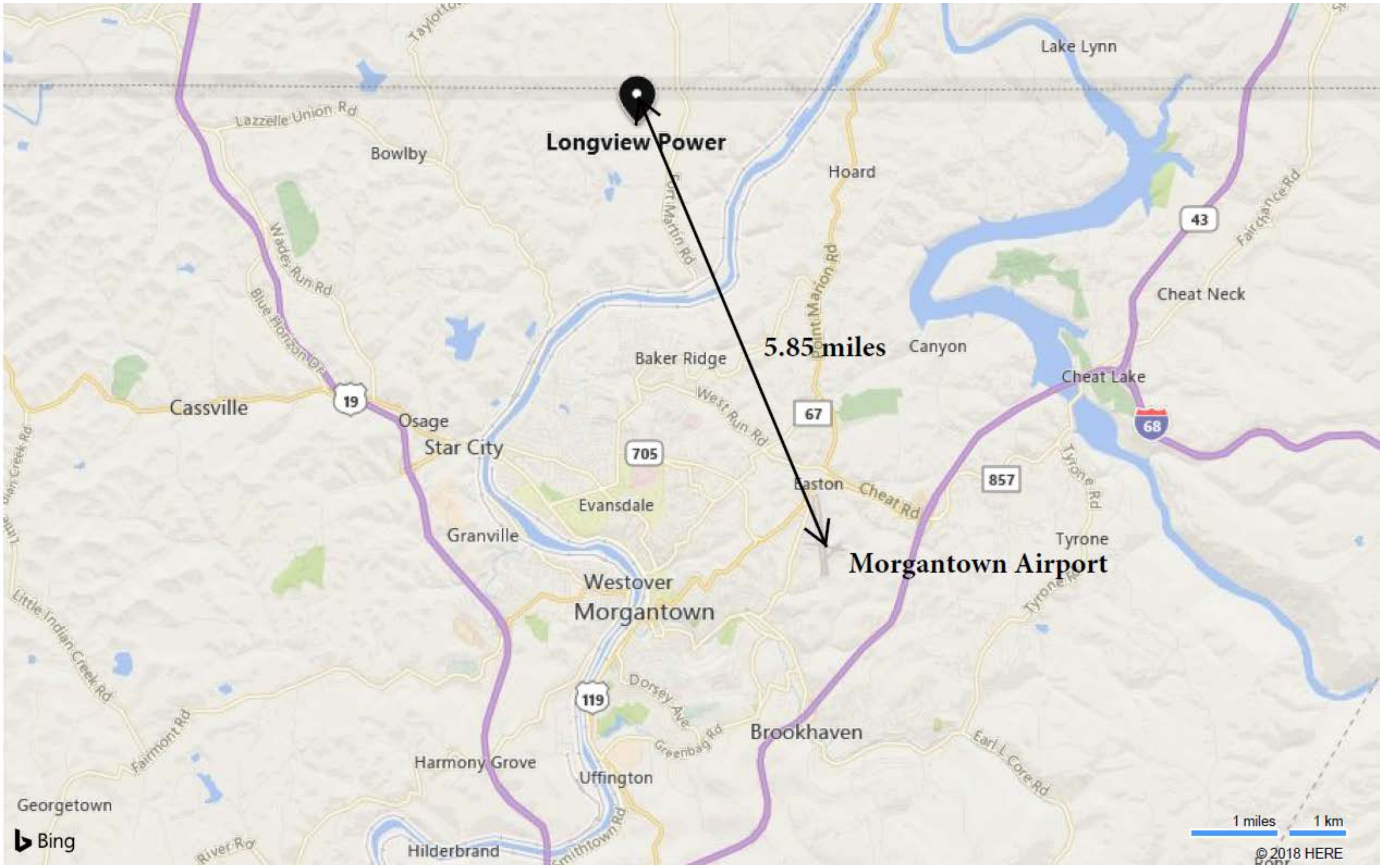

Figure 6 1
Location of the Longview Unit 2 Project
and Morgantown Airport

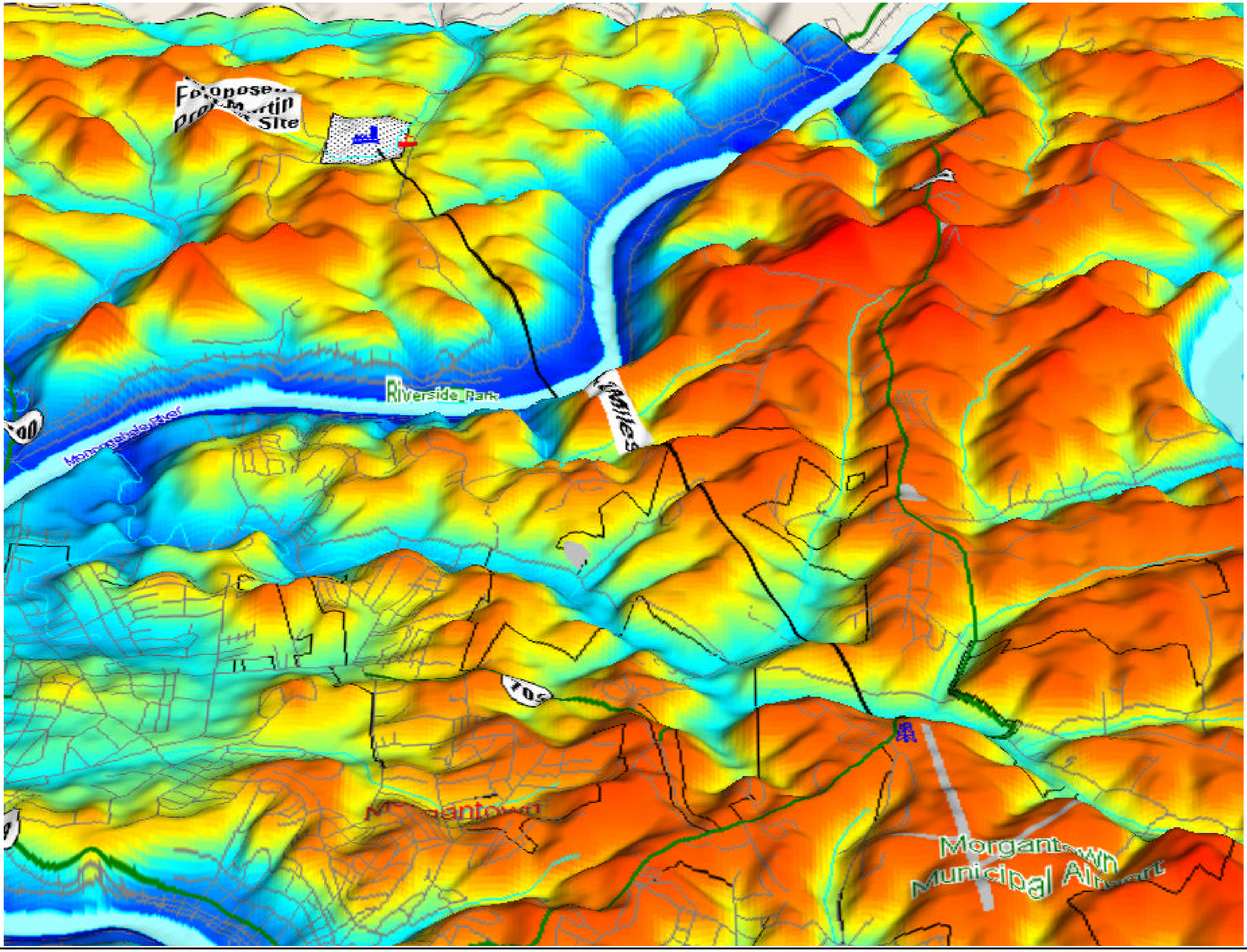

Figure 6-2 Topographic Map of the Fort Martin, WV Area

(DEM) for the Morgantown, WV area. The location of the project is also indicated in this figure.

The dominant feature of the Fort Martin area is the rapid increase in elevation away from the Monongahela River. The river elevation is approximately 820 ft. above mean sea level (amsl) (250 m amsl). Terrain of approximately 1,100 ft. amsl occurs within 700 feet (210 m) of the river. Moving further away from the river isolated terrain peaks of 1,300 ft. amsl (400 m amsl) occur within 5,000 ft. (1.5 km) of the Monongahela River. The highest terrain within 15 km of the project site is 2,464 ft. amsl (751 m amsl).

The elevation of the project site is approximately 1,150 ft. amsl (350 m amsl) and the elevation of the Morgantown Airport is 1,215 amsl (370 m amsl). Both of these locations exhibit some of the highest terrain in the project area. The height of the CT stack for the proposed Longview Unit 2 Project is 180 ft. above grade (54.9 m above grade). This places the stack top elevation at 1,330 ft. amsl (405 m amsl). The minimum expected plume elevation for the CT stack is 2,267 ft. amsl (691 m amsl) based on the stack exit parameters. The stack top elevation and the minimum plume elevation exceed all terrain elevations within 7 and 15 km, respectively of the project site. Thus, emissions from the CT stacks enter the atmosphere well above the surrounding terrain and the terrain immediately surrounding the stack is considered simple terrain by U.S. EPA definition.

Figure 6-3 presents the locations within 15 km of the Longview Unit 2 Project site where the terrain exceeds the minimum plume height. As indicated in Figure 6-3, the major feature between the Morgantown Airport and the Longview Unit 2 Project site is the Monongahela River valley. Also, the area between the airport and the Longview Unit 2 Project is considered simple terrain for air quality modeling purposes, based on the expected minimum plume height and height of the CT stack.

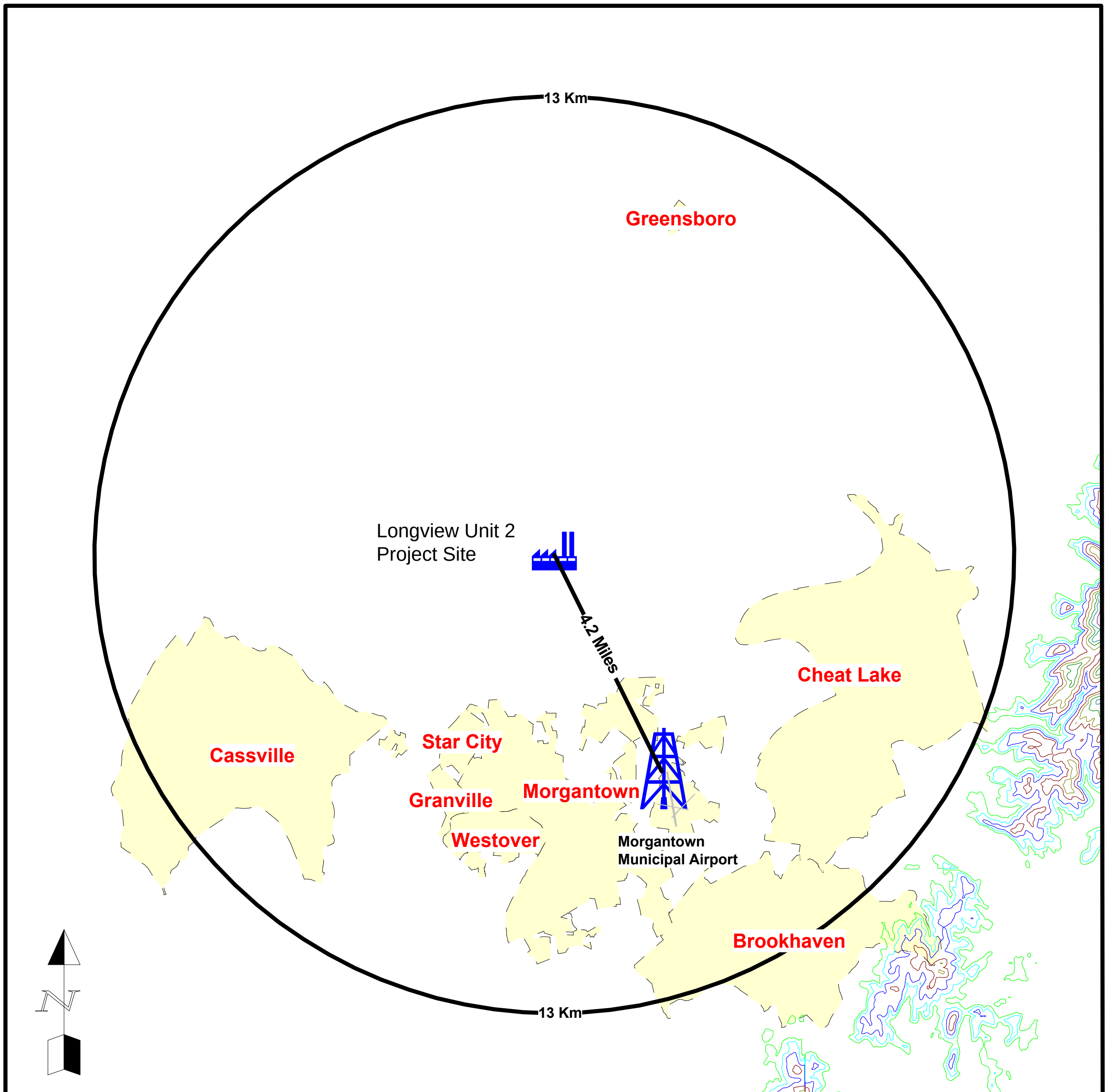

Figure 6-3
Location Of Terrain Above Minimum Plume Height

Scale In Kilometers

0 5 10

370 **Elevation Meters**

Approxmiate Source Location

Location of Morgantown Airport Meteorological Monitoring System

City Boundary

z:\genpower\dem\Figure6_3.Wor

6.1.4 Exposure/Monitoring Parameters

The meteorological measurements from the Morgantown Airport are made at approximately 6 meters above ground. This level is sufficient to represent the pollutant transport between the Project's CT stacks and the receptors of interest since there are no significant terrain features between the two sites.

The meteorological observations from the Morgantown Airport include hourly measurements sufficient to support the U.S. EPA AERMOD air quality model. These measurements include:

- Wind speed.
- Wind direction.
- Ambient temperature.
- Cloud cover.

6.1.5 Time Period

Five years of meteorological data are available from Morgantown Airport, which is sufficient to ensure that worst-case meteorological data are represented in the air quality modeling analysis of the Longview Unit 2 Project emissions. The most recent five-year data period with acceptable data recovery rates (i.e. greater than 95%) is 2014-2018 This data period is sufficient to support air quality modeling since it complies with the following U.S. EPA recommendations for meteorological data:

- A five (5) year data period.
- Collected at a National Weather Service (NWS) station.
- Consecutive years of data from the most recent, readily available period.

A wind rose for the five year period (2014-2018) for Morgantown Airport is presented in Figure 6-4. As seen from this figure, the prevailing winds are from the southwest, which occur

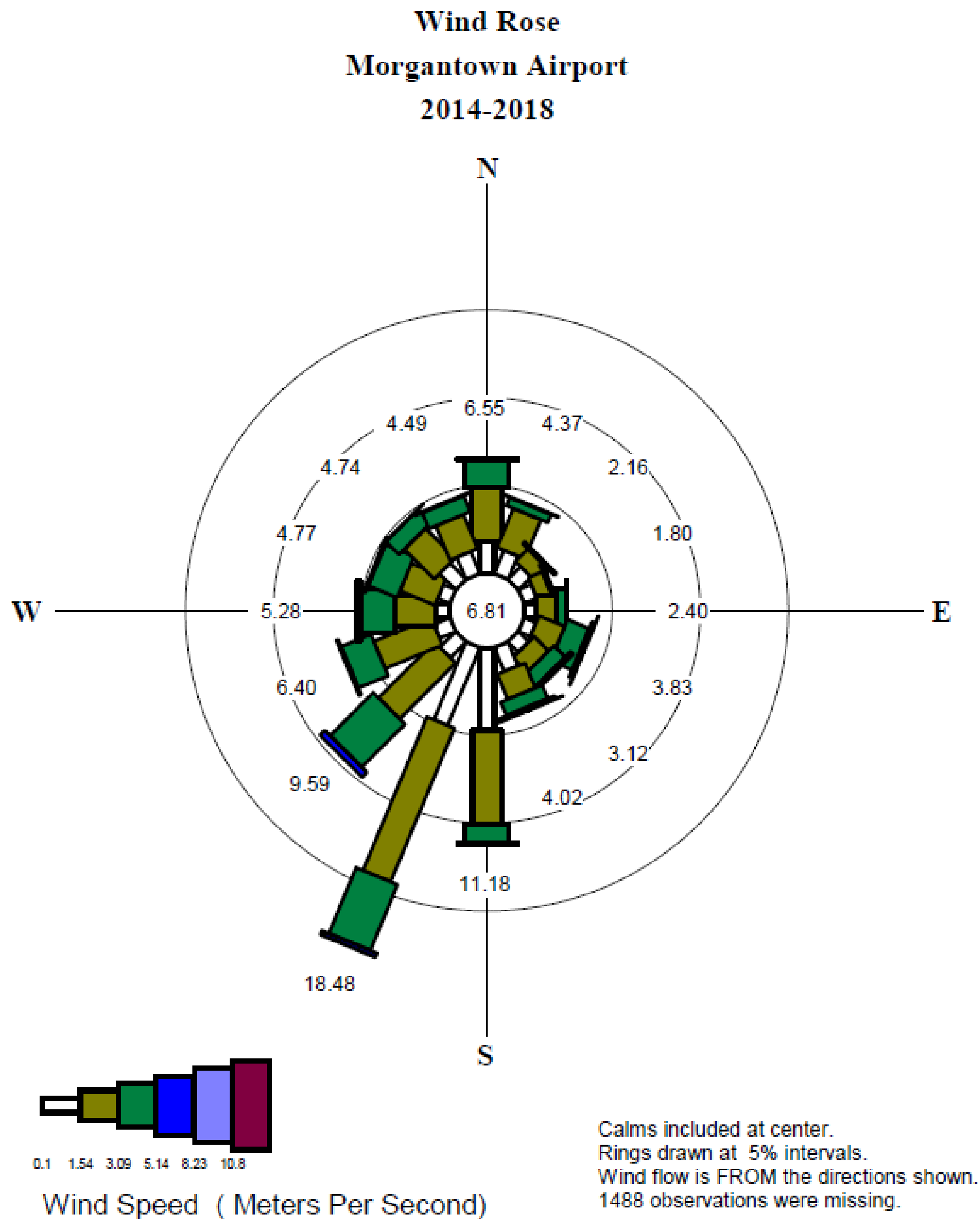

Figure 6-4
Wind Rose for Morgantown Airport (2014-2018)

approximately 14% of the time during the 5 year period, 2014-2018. Winds from the south quadrant (west southwest, south, and south-southwest) occur approximately 35% of the time. This wind pattern is typical of the synoptic scale flow for the Mid-Atlantic region of the United States. There is no evidence in the wind rose of the influence of any of the local terrain features in the Morgantown area.

6.1.6 Upper Air Monitoring Station

In addition to surface meteorological data from the Morgantown Airport, the air quality modeling of the Longview Unit 2 Project will require an upper air meteorological database. Upper air data are collected at a limited number of stations across the continental United States. The closest and most representative upper air station for the Longview Unit 2 Project is the Pittsburgh, NWS station. The data from this upper air station are routinely used for air quality modeling analyses in Northern West Virginia and are considered the most representative station available since it measures the same synoptic scale meteorological conditions at the Project site.

6.2 AMBIENT AIR QUALITY MONITORING DATA

The air quality data evaluation criteria contained in the U.S. EPA Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD) (U.S. EPA, 1987) were used to assess the representativeness of the existing WV DEP air quality monitoring data for the Project site.

This document establishes the following parameters for selecting and evaluating existing air data for air quality modeling:

- Air quality monitoring location.
- Data quality.
- Currentness of Data.

Each of the parameters was used to evaluate the existing air quality data from the WV DEP monitoring stations in Morgantown, WV. The results are provided in the following subsections.

6.2.1 Monitor Locations

This document establishes that the existing monitoring data should be representative of the following:

- The location of maximum concentration increase from the proposed source or modification.
- The location(s) of the maximum air pollutant concentration from existing sources.
- The location(s) of the maximum air pollutant concentration from both existing and proposed new source combined.

For a proposed source in an area of multi-source emissions and basically flat terrain (terrain below stack top) then the use of existing data from a nearby monitoring site may be used if:

- The existing monitoring is within 10 km of the points of proposed emissions

The previously subsections demonstrated that the Project area is considered flat terrain based on the proposed stack height and a base elevation of the Longview Unit 2 Project. Therefore, the air quality data from the existing monitoring station within 10 km can be used for the Longview Unit 2 Project. The locations of the existing monitoring station are presented in Figure 6-5. As seen from this figure, the existing monitors in Morgantown are all within 10 km of the proposed Longview Unit 2 Project. Therefore, the existing WV DEP monitors can be used to establish the existing air quality levels for the NAAQS compliance assessment of the air quality modeling analysis.

Since the DAQ monitoring station in Morgantown, WV does not measure PM_{10}, NO_x or CO levels, the air quality data from the Shadyside, OH and Charleroi, PA will also be used.

6.2.2 Data Quality

The existing monitoring data should be of similar quality as required by the PSD monitoring guidance (U.S. EPA, 1987). The monitoring stations in Morgantown, WV, Shadyside, OH and Charleroi, PA are all part of the State and Local Ambient Monitoring System (SLAMS) and meet all data quality requirements of the PSD monitoring guidance.

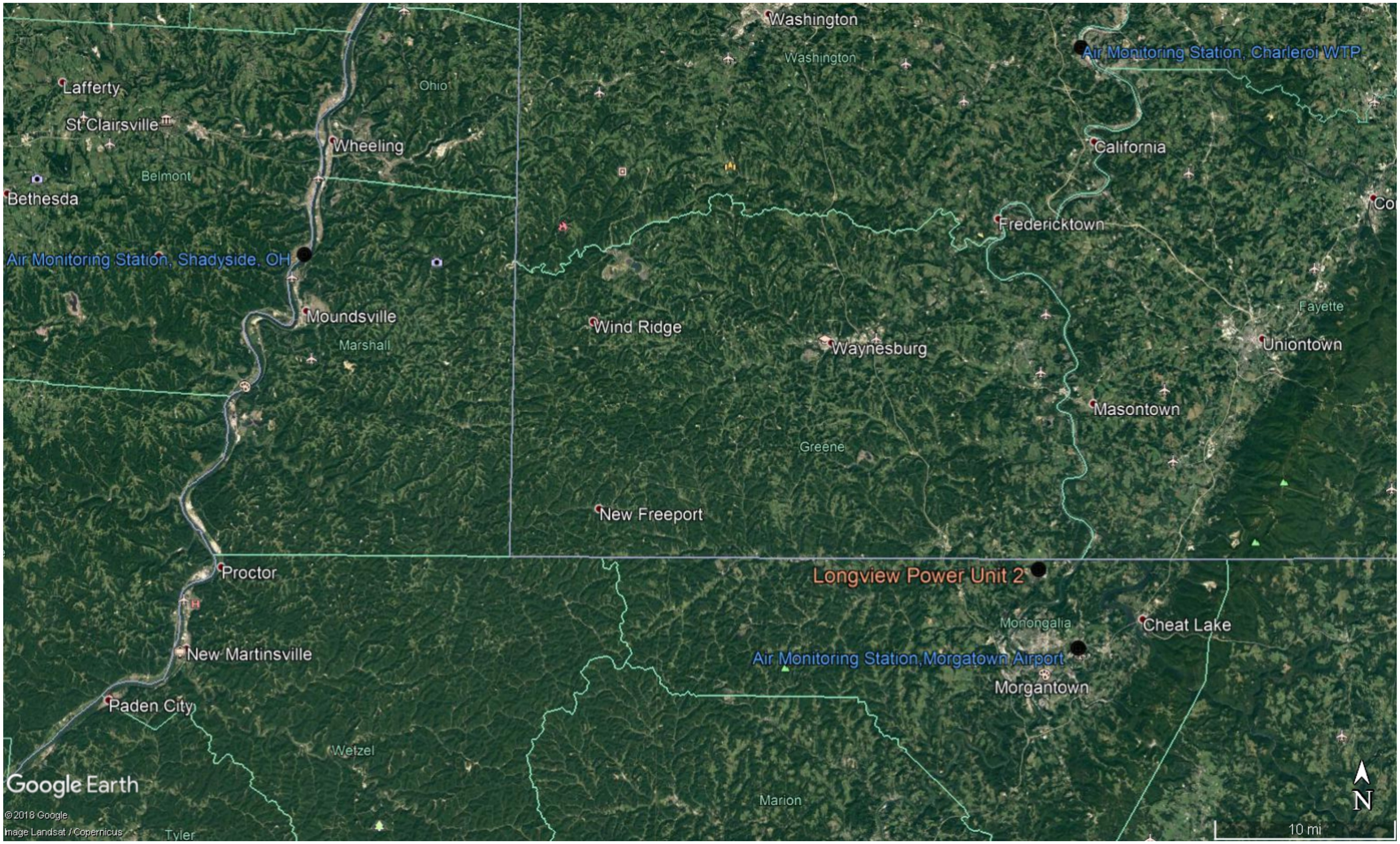

Figure 6-5
Location of Existing Air Quality Monitoring Stations

6.2.3 Currentness of Data

The air quality monitoring data should be current in order to represent the existing air quality levels. Generally, the air quality data must be collected within 3 years of the air quality permit application. The existing air quality data from the monitoring stations in Morgantown, WV, Shadyside, OH and Charleroi, PA are current since they are continuously operated by the state agencies. The most 3-year period available is 2016-2018

6.3 CONCLUSIONS

Based on the results of the evaluation presented in subsections 6.1 and 6.2 the air quality data from Morgantown, WV, Shadyside, OH and Charleroi ,PA and the meteorological data from Morgantown, WV, and Pittsburgh, PA are representative and adequate for the air quality modeling analysis of the Longview Unit 2 Project. This conclusion is reached based on the following considerations:

6.3.1 Meteorological Data

1. The Morgantown Airport is only 4.2 miles (6.4 km) southwest of the Longview Unit 2 Project Site.
2. The regional terrain is generally simple, non-complex terrain for air quality modeling purposes based on the elevation of the project site, the CT stack height and the expected minimum plume height of the CT stacks.
3. There are no intervening terrain between the project site and the Morgantown Airport to make the Morgantown meteorological data nonrepresentative of conditions at the Longview Unit 2 Project site
4. The exposure of the Morgantown Airport meteorological sensors is sufficient to represent the pollutant transport between the Longview Unit 2 Project site and the receptors of interest.
5. The time period of the Morgantown Airport data (5-year database) is sufficient to ensure that worst-case meteorological data are represented in the air quality modeling of the project emissions.
6. The meteorological measurements from the Morgantown Airport and Pittsburgh NWS station satisfy the data requirements of the U.S. EPA AERMOD air quality dispersion model.

7. The upper air station at Pittsburgh NWS station measures the same synoptic scale conditions as those experienced at the Project site.

6.3.2 Air Quality Data

1. The exiting WV DEP air quality monitor in Morgantown, WV is within 10 km of the proposed Longview Unit 2 Project and is of sufficient data quality and is current data.

7. MODELING RESULTS

The air quality modeling results will be summarized and described in a section of the PSD application. At a minimum the modeling results a discussion of the modeling procedures followed and include:

- Summary tables containing the pollutants, averaging periods, highest (and fourth, eighth, etc. highest, if appropriate) modeled concentration, background concentration, total concentration, and applicable ambient quality standards
- Summary table of the PSD increment analysis showing the increment consumed and the PSD increment (both Class I and Class II)
- Summary table of the Class I other AQRV analysis and threshold values.
- Summary table of the visibility impact (Class I and II)
- Concentration contour maps showing the extent of the air quality impacts.

Submitted with the PSD application will be all modeling input/output files (e.g., AERSCREEN, AERMOD, AERMET, AERMAP, AERSURFACE, BPIP-PRIME) and all files needed to construct and replicate the modeling analysis.

8. REFERENCES

U.S. EPA 1985 – "Guidelines for Determination of Good Engineering Practice Stack Height (Technical Support Document for Stack Height Regulations) Revised" EPA-450:4-80-023R, June 1985.

U.S. EPA 1987 – "Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD) May 1987.

U.S. EPA 1993 – "User's Guide to the Building Profile Input Program", October 1993.

U.S. EPA 2018 – "Users Guide for the AERMOD Terrain Preprocessor (AERMAP) Revised – Draft" April 2018.

U.S. EPA 2017 – 40 CFR Part 51 Appendix W "Guideline on Air Quality Models (Revised)", January 17, 2017

U.S. FS 2010 – "Federal Land Managers' Air Quality Related Values Workgroup (FLAG) Phase I Report" 2010.

APPENDIX A
JUSTIFICATION FOR USE OF DRAFT VERSION OF AERSURFACE

A. JUSTIFICATION OF THE USE OF DRAFT AERSURFACE

The Longview Power Unit 2 project is proposing to use the 2011 National Land Cover Dataset (NLCD) to develop the meteorological data as input to the AERMOD model for the air quality modeling analysis. Currently, the US EPA approved version of the AERSURFACE program can only use the 1992 NLCD data set. The justification for the use of the more current NLCD data set with the draft version of the AERSURFACE program is presented below:

A1.AERMET/AERMOD Regulatory Requirement:

AERMET and AERMOD data input requires the use of the most representative and most current data in the air quality modeling analysis including landuse, surface characteristics and meteorological. The 1992 NLCD is not adequately representative of the project site area due to the changes in landuse that has occurred in the project area and Morgantown Airport area. This is illustrated in Figures A-1 and A-8.

Figures A-1 and A-2 are 1996 and 2016 satellite imagery, respectively, of the Longview Power Unit 2 project site area and A-3 is a color coded change index for the change in the land use from 2001 through 2016. Both the visible inspection of the satellite imagery and the color code change index show evidence of a significant change in the land use in the project area principally due to the construction of Longview Power Unit 1. The area extent of the change in landuse for the project area is shown in Figure A-4. The total acreage with significant change due to the construction of the Longview Power Unit 1 is approximately 1.4 square km.

Therefore, the use of the 1992 data for landuse in the project site area does not represent the current land use.

Figure A-4 and A-5 are 1996 and 2016 satellite imagery, respectively, of the Morgantown Airport area and A-3 is a color coded change index for the change in the land use from 2001 through 2016. Both the visible inspection of the satellite imagery and the color code change index show evidence of a significant change in the land use in the Morgantown Airport area principally due to the commercial development to the east and northeast and residential development to the north of the airport. The area extent of the change in landuse for the Morgantown Airport area is shown in Figure A-8. As seen from this figure there are 2 areas to the north, 1 area to the east and 1 area to the northeast of the airport with significant landuse changes. The total acreage of these changes is approximately 0.6 square km. Therefore, the use of the 1992 data for landuse in the Morgantown Airport area does not represent the current land use.

Further justification for the use of the most representative and current data is contained in Appendix A to Appendix W of Part, 51—Summaries of Preferred Air Quality Models,

A.1 AERMOD (AMS/EPA Regulatory Model), b(i):

Data used as input to AERMET should possess an adequate degree of representativeness to ensure that the wind, temperature and turbulence profiles derived by AERMOD are both laterally and vertically representative of the source impact area. The adequacy of input data should be judged independently for each variable. The values for surface roughness, Bowen ratio, and albedo should reflect the surface characteristics in the vicinity of the meteorological tower or representative grid cell when using prognostic data, and should be adequately representative of the modeling domain. Finally, the primary atmospheric input variables, including wind speed and direction, ambient temperature, cloud cover, and a morning upper air sounding, should also be adequately representative of the source area when using observed data.

The data representativeness requirements of Section A.1,b(i) can only be satisfied with the use of the 2011 NLCD and draft version of AERSURFACE as significant changes have occurred since 1992.

A2. Data Representativeness:

The 1992 NLCD data is significantly out of date (over 27 years old) and not representative of the current land use and surface characteristics of either the Longview Power Unit 2 site or the Morgantown Airport. As discussed and illustrated previously, the landuse at the project site has changed significantly since 1992 by the construction of Longview Power Unit 1 and the landuse at the Morgantown Airport has changed since 1992 by the construction of surrounding commercial and residential properties.

A3. Data Period Consistency:

The meteorological data being used in the air quality modeling is 2014-2018 and this data period should align with the NLCD data period to harmonize the surface characteristics which are a component of the atmospheric turbulence reflected in the meteorological measurements. The NLCD 2011 data period more closely aligns to the meteorological data period being used in the air quality modeling period than the NLCD 1992 data period.

A4. Data Availability:

The 1992 NLCD is no longer readily available from the USGS and may be provided by only request and it is not certain the data will be made available for the air quality modeling analysis of the Longview Power Unit 1 project.

Figure A-1
1996 and 2011 Satellite Imagery of the Longview Power Unit 2 Area

Figure A-2
2011 and 2016 Satellite Imagery of the Longview Power Unit 2 Area

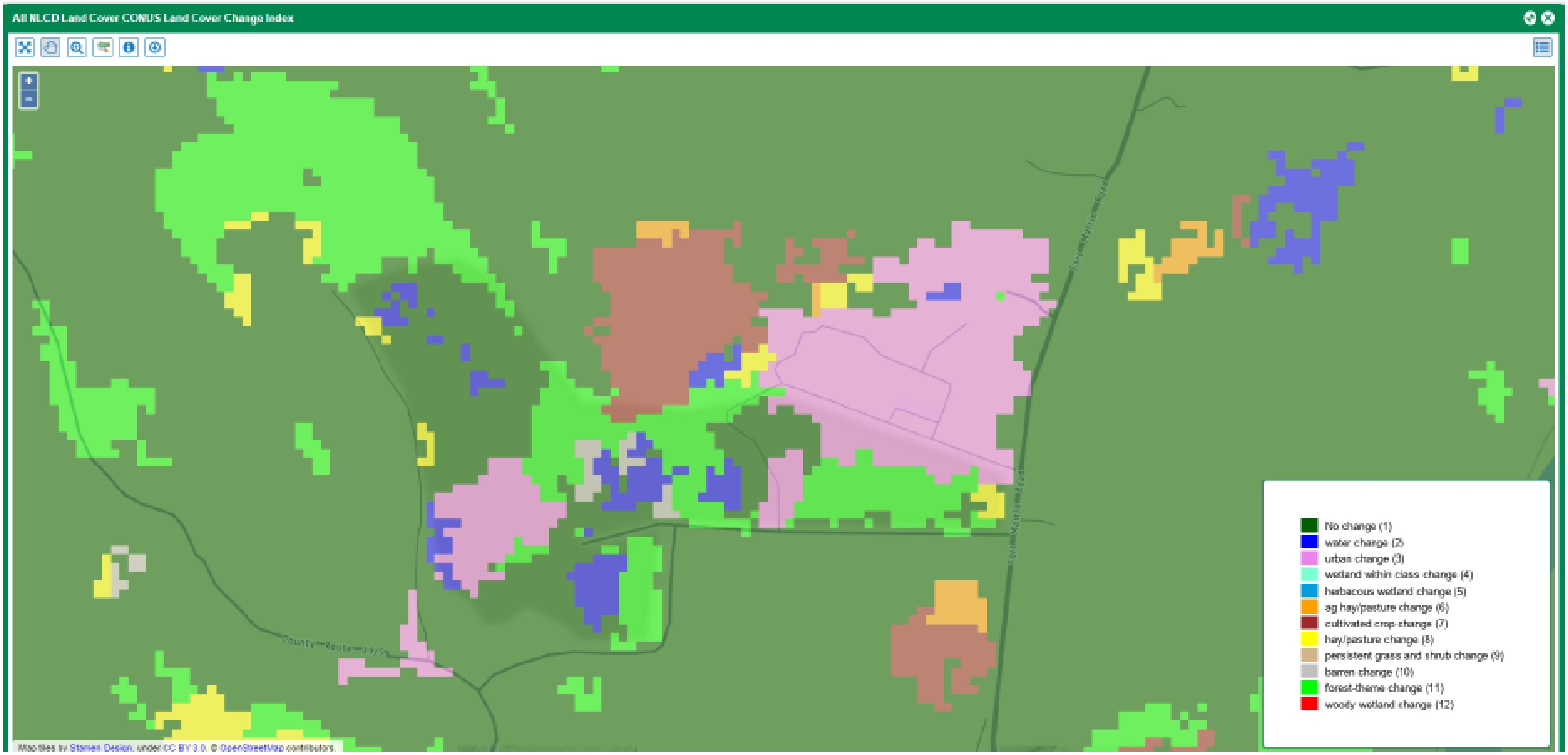

Figure A-3
NLCD Land Cover Change Index
2001-2016
Longview Power Unit 2 Site

Figure A-4
Areal Extent of Landuse Changes
Longview Power Unit 2 Area

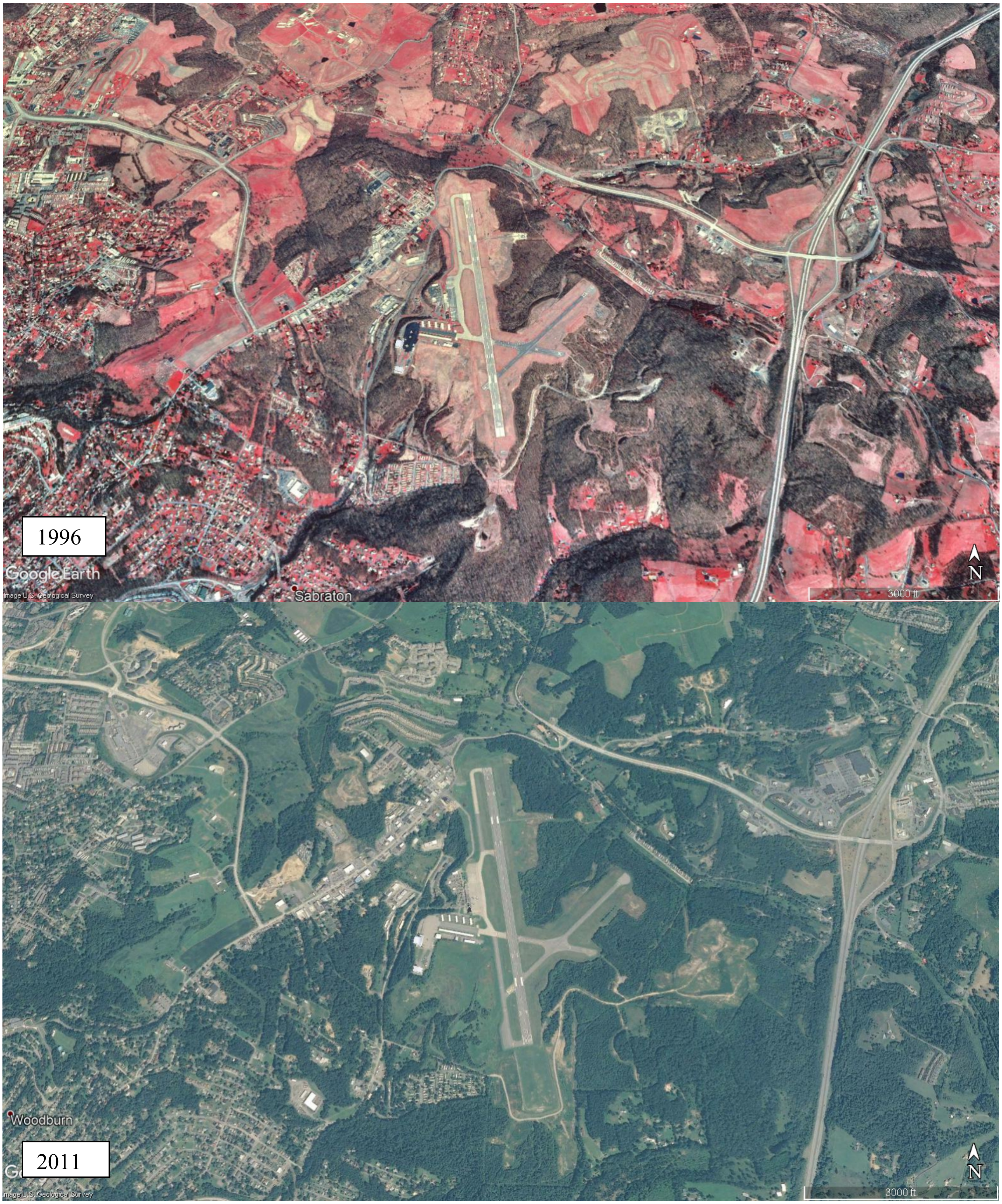

Figure A-4
1996 and 2011 Satellite Imagery of the Morgantown Airport Area

Figure A-4
2011 and 2016 Satellite Imagery of the Morgantown Airport Area

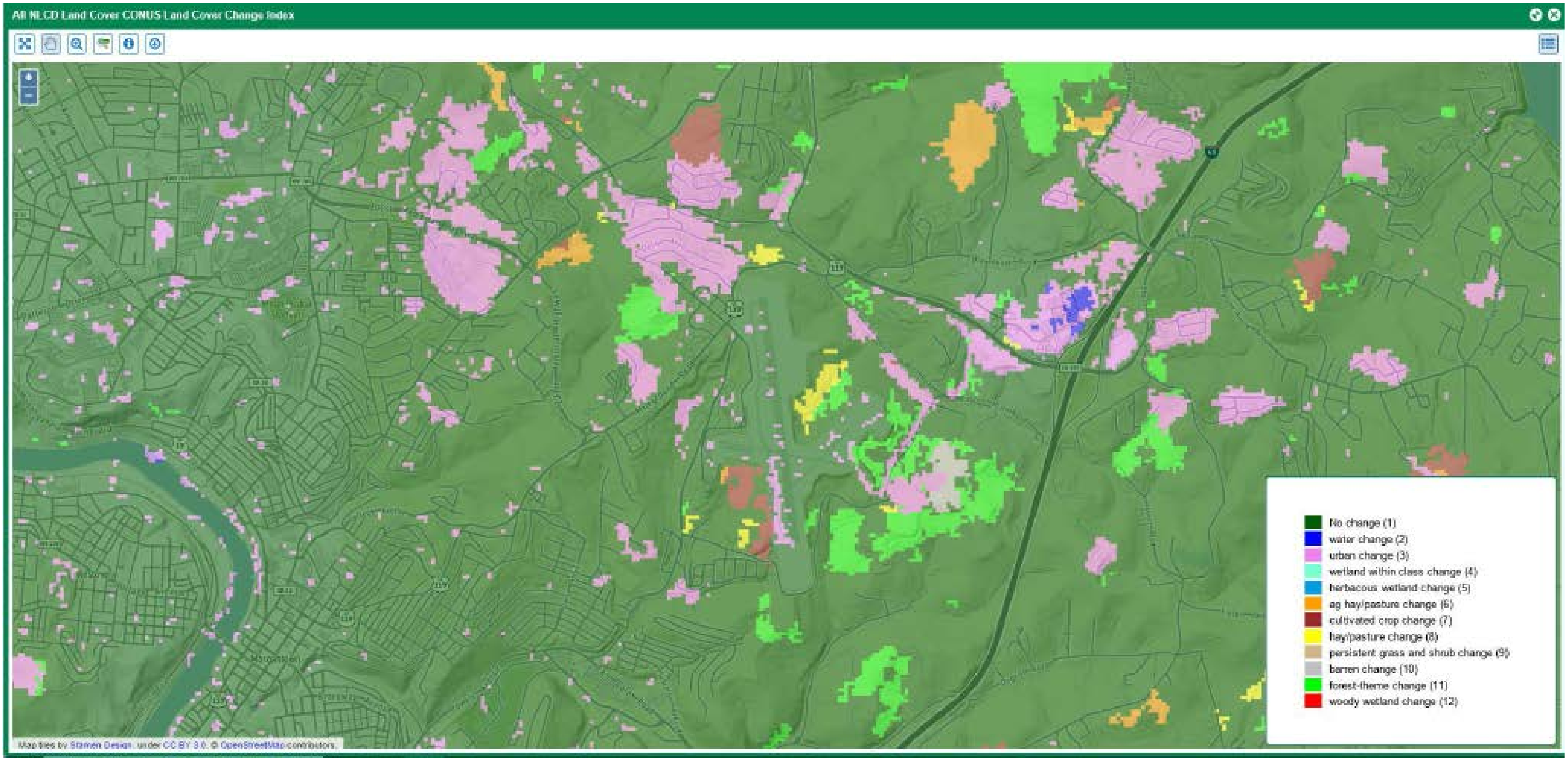

Figure A-6
NLCD Land Cover Change Index
2001-2016
Morgantown Airport

Figure A-8
Areal Extent of Landuse Changes
Morgantown Airport Area

Andrews, Edward S

From:	McClung, Jon D
Sent:	Wednesday, November 20, 2019 10:42 AM
To:	Louis M. Militana
Cc:	'Brian Hoyt'; Fewell, David R; McKeone, Beverly D; Andrews, Edward S; Kessler, Joseph R; Pursley, Steven R
Subject:	RE: Air Quality Modeling Protocol and Monitoring Exemption Request/Longview Power Unit 2 Project
Attachments:	Comments on 9 23 19 revised protocol.pdf

Lou,

Attached are WV DAQ comments on the revised air quality modeling protocol for the Longview Unit 2 Project. Although we have discussed most of the comments, please contact me with any questions.

Regards,
Jon.

____

Jonathan D. McClung, P.E.
West Virginia DEP
Division of Air Quality
601 57th Street SE
Charleston WV 25304
(304) 926-0499 ext. 1689
Jon.D.McClung@wv.gov

From: Louis M. Militana <lmilitana@aaqsinc.com>
Sent: Monday, September 23, 2019 4:09 PM
To: McClung, Jon D <Jon.D.McClung@wv.gov>
Cc: 'Brian Hoyt' <bhoyt@longviewpower.net>; lmilitana@aaqsinc.com
Subject: RE: Air Quality Modeling Protocol and Monitoring Exemption Request/Longview Power Unit 2 Project

Jon

Attached are the revised air quality modeling protocol and transmittal letter for the Longview Unit 2 Project

Let me know if you have any questions regarding our responses to your comments on the initial protocol

Thanks

Lou

Louis M. Militana, QEP
Partner/Principal Consultant
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107 Hidden Fox Drive,Suite 101A
Lincoln University, PA 19352-1205
(484) 224-6218 x 101 Voice

(484) 224-6218 Fax
lmilitana@aaqsinc.com

From: McClung, Jon D [mailto:Jon.D.McClung@wv.gov]
Sent: Tuesday, March 12, 2019 11:36 AM
To: Louis M. Militana
Cc: Joseph Douglass; 'Brian Hoyt'; Andrews, Edward S; Kessler, Joseph R; Pursley, Steven R
Subject: RE: Air Quality Modeling Protocol and Monitoring Exemption Request/Longview Power Unit 2 Project

Lou,

Attached are WV DAQ's comments on the protocol. Please contact me to go over any questions you may have.

Regards,
Jon.

____

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From: Louis M. Militana <lmilitana@aaqsinc.com>
Sent: Saturday, February 16, 2019 1:26 PM
To: McClung, Jon D <Jon.D.McClung@wv.gov>
Cc: Joseph Douglass <JDouglass@longviewpower.net>; 'Brian Hoyt' <bhoyt@longviewpower.net>; lmilitana@aaqsinc.com
Subject: Air Quality Modeling Protocol and Monitoring Exemption Request/Longview Power Unit 2 Project

Jon

Enclosed is the Air Quality Modeling Protocol and Monitoring Exemption Request for the air permit application for the proposed Longview Power Unit 2 Project.

After reviewing the protocol if you have any questions please contact me at (484) 224 6218 ext. 101 or by email at lmilitana@aaqsinc.com.

Louis M. Militana, QEP
Partner/Principal Consultant
Ambient Air Quality Services, Inc. (AAQS)
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Ambient Air Quality Services, Inc.

WV DEP Division of Air Quality
Comments on Revised Air Quality Modeling Protocol and Monitoring Exemption Request for the Longview Power Unit 2 Project
Submitted September 23, 2019 via electronic mail
November 20, 2019

1. Please indicate whether the diesel fired firewater pump, diesel fired emergency generator, and fuel gas heaters/gas compressor are proposed by the applicant to be intermittent emissions sources. If so, justification needs to be provided in the protocol. Otherwise, these sources need to be modeled continuously for all averaging periods.
2. Section 5.4.1 describes the Class I increment screening analysis. The procedure described does not meet the requirements of section 4.2 of 40 CFR 51 Appendix W. The main component of this requirement is to determine the significance of the ambient impacts at or about 50 km from the new or modifying source. Please revise the protocol to conform to Appendix W.
3. For the Class II visibility analysis using VISCREEN, the protocol needs to state that the site(s) selected for analysis will be made in consultation with WV DEP.
4. The applicant is proposing to use the 2011 National Land Cover Dataset (NLCD) to develop the meteorological data. Instead of using the 1992 NLCD data that can be processed by the current version of AERSURFACE, using the 2011 NLCD data requires the use of the 19039_DRFT version of AERSURFACE. This version is draft and its use for regulatory purposes requires consultation with WV DEP and U.S. EPA Region 3 and this would be the first regulatory use of the draft version in the U. S. The draft version of AERSURFACE has new inputs (percent surface impervious and percent tree canopy) that require additional evaluation and consultation with U.S. EPA Region 3 will require additional time. Justification for using the draft version of AERSURFACE needs to be provided in the protocol. Include and compare land use images in the protocol for 1992, 2011, and the present to demonstrate the selection of the most representative data. Also, the default method of determining surface roughness length (ZORAD) should be used. For the NLCD year of the land cover being processed, if only one of impervious or tree canopy data is available, or neither is available, then the land cover data should be processed by itself without the use of the impervious or canopy data. Land cover data should not be supplemented with impervious data only or canopy data only.
5. The protocol states that current satellite imagery was inspected and compared to the 2011 NLCD land use data and 2011 satellite imagery to determine the representativeness of the 2011 land use data. Also, the protocol states that "It was determined that the land use for 2011 is representative of the current conditions." The protocol needs to include a supporting justification for the determination of representativeness, including but not limited to: the images used for comparison, a narrative analysis of the image comparison, and any other analyses used.
6. WV DEP previously commented that a quantitative comparison of albedo, Bowen ratio, and surface roughness length should be included in the protocol. Table 4-1 of the revised protocol contains values for albedo, Bowen ratio, and surface roughness length for the Morgantown Airport and the project site. Large differences between the surface roughness length exist between the Morgantown Airport and the project site. These differences can lead to significant differences in design concentrations. Accordingly, the applicant should perform a site-specific

sensitivity analysis as described in the AERMOD Implementation Guide (August 2019). This can be performed by developing two sets of meteorological data (one with airport surface characteristics and one with project site surface characteristics) and modeling the project with both sets of data to determine sensitivity to surface roughness length.

7. WV DEP previously commented that the applicant needs to provide a proposal to demonstrate the effects of the project on ozone and secondary formation of PM2.5. The revised protocol needs to contain the details on the proposal including, but not limited to, the justification and selection of the MERPs site and the method of including the MERPs results into the dispersion modeling results.

8. The most recent version of AERMOD (v19191) should be proposed in the revised protocol. Version numbers should be identified in the revised protocol for all modeling tools.

Andrews, Edward S

From:	McClung, Jon D
Sent:	Tuesday, September 24, 2019 7:00 AM
To:	Andrews, Edward S; Kessler, Joseph R; Pursley, Steven R
Subject:	FW: Air Quality Modeling Protocol and Monitoring Exemption Request/Longview Power Unit 2 Project
Attachments:	Protocol Transmittal Letter REVISED FINAL.pdf; Longview Unit 2 Modeling Protocol Final R3.pdf

All,

Please take a look at your respective areas in the attached protocol and send me any comments.

Thanks,
Jon.

From: Louis M. Militana <lmilitana@aaqsinc.com>
Sent: Monday, September 23, 2019 4:09 PM
To: McClung, Jon D <Jon.D.McClung@wv.gov>
Cc: 'Brian Hoyt' <bhoyt@longviewpower.net>; lmilitana@aaqsinc.com
Subject: RE: Air Quality Modeling Protocol and Monitoring Exemption Request/Longview Power Unit 2 Project

Jon

Attached are the revised air quality modeling protocol and transmittal letter for the Longview Unit 2 Project

Let me know if you have any questions regarding our responses to your comments on the initial protocol

Thanks

Lou

Louis M. Militana, QEP
Partner/Principal Consultant
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From: McClung, Jon D [mailto:Jon.D.McClung@wv.gov]
Sent: Tuesday, March 12, 2019 11:36 AM
To: Louis M. Militana
Cc: Joseph Douglass; 'Brian Hoyt'; Andrews, Edward S; Kessler, Joseph R; Pursley, Steven R
Subject: RE: Air Quality Modeling Protocol and Monitoring Exemption Request/Longview Power Unit 2 Project

Lou,

Attached are WV DAQ's comments on the protocol. Please contact me to go over any questions you may have.

Regards,
Jon.

____

Jonathan D. McClung, P.E.
West Virginia DEP
Division of Air Quality
601 57th Street SE
Charleston WV 25304
(304) 926-0499 ext. 1689
Jon.D.McClung@wv.gov

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Sent: Saturday, February 16, 2019 1:26 PM
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Jon

Enclosed is the Air Quality Modeling Protocol and Monitoring Exemption Request for the air permit application for the proposed Longview Power Unit 2 Project.

After reviewing the protocol if you have any questions please contact me at (484) 224 6218 ext. 101 or by email at lmilitana@aaqsinc.com.

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Ambient Air Quality Services, Inc.

September 23, 2019

Jon McClung
WVDEP
Division of Air Quality
601 57th St.
Charleston, WV 25304

RE: **Revised Air Quality Modeling Protocol and Monitoring Exemption Request for the Longview Power Unit 2 Project**

Dear Mr. McClung:

Enclosed is the Revised Air Quality Modeling Protocol and Monitoring Exemption Request for the air permit application for the proposed Longview Power Unit 2 Project.

Also attached are our responses to your comments on the initial air quality modeling protocol.

After reviewing the revised protocol or comment responses if you have any questions please contact me at (484) 224 6218 ext 101 or by email at lmilitana@aaqsinc.com.

Very truly yours,
AAQS Inc.

Louis M. Militana, QEP
Partner/Principal Consultant

Longview Power Response to:

West Virginia Division of Air Quality
Comments on Air Quality Modeling Protocol and Monitoring Exemption Request for the Longview Power Unit 2 Project
Protocol Dated February 15, 2019
Revised Final Protocol Dated 18 September 2019

1. **The final version of the modeling protocol needs to be signed by a responsible official for Longview Power.**
The revised modeling protocol cover page has been signed by Mr. Brian Hoyt, a responsible official for Longview Power.

2. **For all loads, operating scenarios, startup/shutdown processes, etc., the protocol needs to specifically state which and how each will be modeled. Scenarios and/or equipment that is proposed by the applicant to be considered an intermittent emissions scenario needs to be identified as such and justified. Whether the proposed units are considered base load or peaking needs to be described and considered as any part of an intermittent emissions related discussion. Also, how and which loads/scenarios will be modeled in SIL analysis, cumulative analysis, visibility analysis, etc. needs to be described.**
All loads, operating scenarios and startup/shutdown processes (intermittent emissions) will be initially modeled. The loads, operating scenario startup/shutdown processes (intermittent emissions) which produces the highest short-term ground level air quality concentrations will be selected and use for all further refined modeling including any SIL, cumulative multi-source analysis and visibility analysis. Section 4.6 of the modeling protocol has been revised to include a more detailed discussion of the various operating scenarios.

3. **The AERMAP buffer of 500m and 1,000m beyond the receptor domain is probably not sufficient to accurately render the hill height scale if significantly higher terrain is beyond the buffer. The applicant should go 5km beyond the domain in both the x and y direction but specifically to the east where the terrain rises significantly past Cheat Lake (~900 ft) and heads up into the Allegheny Mountains (~2300 ft).**
The domain used in AERMAP will include the area covered by the Cartesian receptors plus an additional 5,000-meter buffer in both the x-direction and in the y-direction. Section 4.1.3 of the modeling protocol has been revised to include a discussion of the additional buffer areas.

4. **The applicant should include the Q/D calculations in the protocol. The calculations should be based on FLAG guidance to estimate the worst-case Q as based on 24-hour emissions scaled up to 365 days/yr.**
The Q/D calculation has been added to the revised modeling protocol (Section 5.4.2 and Table 5-6) and is based the total emissions from the operating scenario with the highest short-term (hourly) emission rates scaled to 8,500 hr/year, plus startup/shutdowns (260 hr/year), fuel gas preheaters, auxiliary generator and fire water pump to obtain tons/year emissions.

5. **The applicant should perform a Class I increment screening level assessment per**

Section 4.2 of Appendix W.
A Class I increment screening level assessment per Section 4.2 of Appendix W will be performed and the modeling protocol (Section 5.4.1) has been revised to discuss this assessment.

6. **A Class II screening level visibility assessment needs to be proposed and performed by the applicant.**
A Class II screening level visibility assessment using VIZSCREEN will be performed and the air quality modeling protocol (Section 5.2.3) has been revised to discuss this assessment.

7. **The proposed receptor grid is to be considered a starting point in determining the maximum impacts from the proposed emission sources. For each pollutant and averaging time, the applicant needs to construct and analyze contour plots of the predicted concentrations. The analysis of the resulting contour plots needs to determine if refinements to the modeling domain and/or grid resolution is necessary. For example, if concentration gradients are increasing near the edge of the modeling domain, the domain should be extended. If maximum or high concentrations are predicted in a coarse section of the grid then that area of the grid should be remodeled with a finer resolution to determine maximum modeled concentrations. The language in the modeling protocol should be modified to include these concepts. The receptor grid should initially extend, in all directions, at least 20 km from the proposed project.**
The discussion of the receptor grid (Section 4.3.1) has been revised in the modeling protocol to include a discussion of contouring to determine refined modeling requirements including extending the modeling domain and/or refiner resolution grid spacing. A more refined spaced receptor grid will be developed and used in area of maximum predicted concentrations and the receptor grid will be extended if maximum predicted concentrations occur near the edge of the receptor grid. The initial Cartesian receptor grid will extend 20 km from the proposed project and will be extended as needed based on the location of maximum predicted concentrations.

8. **The land-use/land-cover data used to develop the meteorological data set needs to be proposed and justified. For example, if 1992 NLCD data is proposed, a demonstration that the 1992 land-use/land-cover is representative of current conditions is necessary. A comparison between 1992 conditions and current conditions via satellite imagery would likely be useful.**

The 2011 National Land Cover Dataset (NLCD) was used to develop the meteorological data set. Current satellite imagery was inspected and compared to the 2011 NLCS land use data and 2011 satellite imagery (from Google Earth) to determine the representativeness of the 2011 land use data. It was determined that the land use for 2011 is representative of the current conditions. The air quality modeling protocol (Section 4.2) has been revised to include a discussion of the NLCD used to develop the meteorological data set.

9. **As part of the demonstration of representativeness of meteorological data collection site to the proposed project site, a quantitative and qualitative comparison of albedo, bowen ratio, and surface roughness length should be included in the protocol.**

The modeling protocol has been revised (Section 4.4.1) to include a comparison of the surface characteristics (albedo, Bowen ration and surface roughness length) of the project site and meteorological data collection site (Morgantown Airport). The surface characteristics surrounding the airport is consistent with the surface characteristics at the project site, therefore the surface characteristics at the airport was used with AERSURFACE to develop the AERMET data for AERMOD model input

10. **The applicant needs to provide a proposal to demonstrate the effects of the project on ozone and secondary formation of $PM_{2.5}$. Guidance exists that may be applied to estimate modeled emission rates of precursors (MERPs) to assess a project's emissions of precursor pollutants as they relate to ozone and secondary formation of $PM_{2.5}$. Note too that SO_2 should be included as a precursor to secondary formation of PM2.5 even though it is below the (primary) significant emission rate PSD threshold for NSR. Secondary formation of $PM_{2.5}$ should also be considered in the significant impact analysis.**
"Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and PM2.5 under the PSD Permitting Program" will be used to demonstrate the effects of the project on ozone and secondary formation of $PM_{2.5}$. The modeling protocol (section 5.4.2) has been revised to include a discussion of the MERPs approach.

11. **The applicant should modify Table 3-3 to include ozone and include precursor pollutants and thresholds for ozone and secondary formation of $PM_{2.5}$.**

12. Table 3-3 of the modeling protocol has been revised to include precursor pollutants and thresholds for ozone and secondary formation of $PM_{2.5}$.

13. **A table should be added that summarizes the applicable pollutant air quality standards, averaging periods, Class II increments, and SILs.**
The air quality modeling protocol has been revised to include tables 5-1, 5-3 and 5-4 that presents the SILs, ambient air quality standards and Class I and II increments (respectively), applicable to the proposed project.

14. **In Table 5-1, the statistical form of the averaging period should be added to the table for each pollutant. For example, for 1-hour NO_2, the statistical form of the NAAQS is the 98 percentile of the daily maximum, averaged over three years.**
Table 5-3 of the air quality modeling protocol has been be revised to include the statistical form of the NAAQS.

15. **Page 5-3 states that concentrations from monitoring stations over the previous 3 years (2016- 2018) will be used to establish the existing ambient air quality levels for NAAQS compliance evaluation. However, Table 5-1 lists only a single year for each pollutant and averaging period to be used for background data. The applicant should update the table to be consistent.**
Table 5-5 of the air quality modeling protocol has been revised to include the previous 3 years (2016-2018) of air quality data from the monitoring stations.

16. **A discussion of whether AERMINUTE is appropriate for use and whether it will be used should be included.**
The air quality modeling protocol (Section 4.4.1) has been revised to include a discussion of the use of AERMINUTE. AERMINUTE will be used to produce wind speed and direction data based on archived 1-minute and 5- minute ASOS data for Morgantown Airport.

17. **Since the project is subject to PSD review for NO_2, Section 5.1 should include the interim SIL for 1-hr NO_2 of 4 ppb (7.5 µg/m^3) that WV DEP adopted on January 28, 2014. SILs should also be included for $PM_{2.5}$. The use of any SILs should be justified by ensuring that the difference between the NAAQS and the representative background concentration is greater than the SIL.**
The air quality modeling protocol (Section 5.1, Table 5-2) has been revised to include a discussion of the justification of the SIL for 1-hr NO2 and PM2.5.

18. **For NO to NO2 conversion, the Tier 2 uniform National Default Ratio of 0.75 (Appendix W, 2005) proposed by the applicant has been replaced by the Ambient Ratio Method 2 (ARM2, Appendix W, 2017).**
The air quality modeling protocol (Section 5.2.1) has been revised to replace the discussion of the Tier 2 uniform National Default Ratio of 0.75 with Ambient Ratio Method 2 (ARM2, Appendix W, 2017).

19. **Although identifying sources farther from the project source will be informative, the cumulative source NAAQS analyses should focus on considering sources within approximately 25km. Consultation with WV DEP to identify the appropriate source inventory is necessary and those sources whose SIA does not overlap the SIA of the Longview Unit 2 Project should not be automatically eliminated from the multi-source emission inventory.**
The air quality modeling protocol (Section 5.2.2) has been revised to state that final multi-source emission inventory will be developed in conjunction with WV DAQ and will be approved prior to conducting the refined multi-source air quality modeling analysis.

20. **Please label Figure 2-3, Plot Plan.**
Figure 2-3 has been labeled Plot Plan in the revised air quality modeling protocol.

21. **The protocol proposes surface meteorological data from the Morgantown Municipal Airport from 2013 to 2017. The most recent five years of data should be used. It appears that 2018 data is available from the Morgantown Municipal Airport**.
The air quality modeling protocol (Section 4.4.1) has been revised to indicate that meteorological data from the Morgantown Municipal Airport for the period 2014-2018 will be used in the air quality modeling analysis.

22. **Figure 4-1 notes that calms are excluded from the wind rose. The percentage of calms should be noted on the figure.**
Figure 4-1 has been revised to include the percentage of calms.

23. **A description of the analysis for determining land use surrounding the source (i.e., urban vs. rural) should be included. For any land use data, a demonstration that the time-frame (i.e. 1992) of the land-use/land-cover is representative of current conditions is necessary.**

AERSURFACE was run for the future Longview Unit 2 site to determine the land use surrounding the source (either rural or urban for air quality modeling purposes). NLCS land use data and 2011 satellite imagery (from Google Earth) was used to determine the representativeness of the 2011 land use data. It was determined that the land use for 2011 is representative of the current conditions.

24. **The most recent version of BPIPPRM should be used, version dated 04274.**

The air quality modeling protocol (Section 4.5) has been revised to indicate that BPIPPRM version dated 04274 will be used.

25. **As part of the Good Engineering Practice Stack Height Analysis, Section 4.4, a labeled diagram of all existing and proposed structures at the facility should be included.**

A figure showing all existing and proposed structures will be included in the air quality modeling section of the final air permit application.

26. **The applicant needs to consult with WV DEP prior to implementing a directional specific background concentration methodology as described in Section 5.3.**

The air quality modeling protocol (Section 5.3) has been revised to indicate that only after consultation with WV DEP will a directional specific background concentration analysis be utilized.

27. **A discussion of the modeling results that will be provided by the applicant should be included in the protocol. Modeling Results: the modeling results should be provided as follows:**

a) **summarized and presented in tabular format that includes pollutants, averaging periods, highest (and fourth, eighth, etc. highest, if appropriate) modeled concentration, background concentration, total concentration, and applicable ambient standards.**

b) **include graphics (e.g., contour maps) that show the extent of the air quality impacts.**

The air quality modeling protocol (Section 7) has been revised to indicate the modeling results including summary tables and contour plots that will be provided with the air quality permit application.

28. **Modeling Files: submittal of all modeling input/output files (e.g., AERSCREEN, AERMOD, AERMET, AERMAP, AERSURFACE, BPIP-PRIME) and all files needed to construct and replicate the modeling analysis.**

The air quality modeling protocol (Section7) has been revised to identify all the modeling input/output files that will be submitted with the air permit application.

29. **Section 5.3 of the protocol proposes to use NO_2 and CO background concentration data from a monitoring station in Shadyside, OH in the cumulative NAAQS analysis. Section 6.2.1 of the protocol indicates that NO_2 and CO data from a monitoring station in Greene County, PA will be used. Please identify which monitoring station will be used for the modeling analysis. Include monitor ID numbers**.
Section 6.2.1 of the air quality modeling protocol has been be revised to indicate that NO2 and CO air quality data from Shadyside, OH will be used and the monitor ID numbers have been added to Table 5-5.

REVISED FINAL

AIR QUALITY MODELING PROTOCOL AND MONITORING EXEMPTION REQUEST FOR THE LONGVIEW UNIT 2 PROJECT

Submitted to:
West Virginia Department of Environmental Protection
Division of Air Quality
601 57th Street, SE,
Charleston, WV 25304

Brian Hoyt
Longview Power
Compliance & Environmental Manager

Prepared by:
Ambient Air Quality Services, Inc.
107 Hidden Fox Dr.
Suite 101A
Lincoln University, PA 19352

18 SEPTEMBER 2019

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1. INTRODUCTION

1.1 BACKGROUND

Longview Power, LLC (Longview Power) currently owns and operates the Longview Power Plant in Maidsville, WV which is a modern advanced supercritical 700 mw coal-fired Unit 1 facility. Longview Power is proposing to develop a two-phase expansion which includes a which 1,200 megawatt (MW) Combined Cycle Gas fired Turbine (CCGT) Unit 2 facility and a photovoltaic renewable energy Unit 3 that will be up to 50 MW in size. The CCGT facility is referred to as the Longview Unit 2 Project (Project).

The Unit 2 Project is proposed to be a nominally rated 1,200 MW natural gas-fired only (no oil backup), combined-cycle gas turbine (CCGT) located immediately adjacent to the North of the current Unit 1 location. The facility will be designed to achieve a peak electrical output of approximately 1,200 MW. Electricity generated by the Project will be supplied to the PJM power grid and connect to the grid via the existing interconnection used by the Longview Power Plant.

The major components of the proposed project include:

- One combined cycle power train consisting of two state-of-the-art natural gas-fueled advanced class combustion turbines, two heat recovery steam generators (with duct burners), and one steam turbine.
- Diesel fuel-fired firewater pump.
- Diesel fuel-fired emergency generator.
- Wet mechanical draft cooling tower.
- Aqueous ammonia tanks for the selective catalytic reduction pollution control system.

No auxiliary boiler is planned for the project. Any start-up steam requirement will be supplied by the Longview Power auxiliary boiler.

The proposed project will be subject to West Virginia Department of Environmental Protection (WVDEP), Division of Air Quality (DAQ) regulations 45CSR13 and 45CSR14 (known as Part 13 and 14 regulations) and Federal Prevention of Significant Deterioration (PSD).

1.2 PURPOSE

Under the West Virginia Department of Environmental Protection (WVDEP), Division of Air Quality (DAQ) regulations, the proposed the Project will be subject Part 13 and 14 regulations, which require a permit-to-construct for any major/minor stationary source. Since the adjacent Longview Power facility is defined as a 100 ton-per-year (TPY) major source under 40 CFR Part 52.21(2)(i) (i.e., federal PSD regulations) one or more regulated air pollutant emissions from the Project which exceed applicable significant emission threshold levels will require an air quality modeling impact analysis. An ambient impact analysis is also a required component of the DAQ air permit application. The ambient impact analysis utilizes the results of air quality modeling to demonstrate that the project will not cause or contribute to an air quality level which exceeds a state or Federal Ambient Air Quality Standard, a PSD increment and/or Class I Area air quality related value (AQRV).

Prior to conducting any air modeling analysis to support the air permit application, an air quality modeling protocol must be prepared and submitted to the DAQ for review and approval. This document outlines the proposed approach or protocol to be followed in conducting an air quality modeling analysis for Class I and II areas in order to demonstrate compliance with the applicable National Ambient Air Quality Standards (NAAQS), PSD increments and visibility/deposition impacts. The technical approach that is proposed follows accepted U.S. EPA guidance and previous experience. This document also contains a meteorological and ambient air quality monitoring exemption request.

1.3 DOCUMENT ORGANIZATION

Section 2 of the protocol provides a description of the project site and the project components. Section 3 contains the emissions inventory for the proposed emission units. Section 4 describes the air quality model selection and input data, including the selected air dispersion model, land use and topography, receptor grid, meteorological data and "good engineering practice" (GEP) stack height analysis. Section 5 discusses the approach for the summarization and presentation of the air quality modeling results, including the Class I and II area assessment. The air quality/meteorological monitoring exemption request is in Section 6 of the document. Section 7 presents the references referred to in this protocol.

Information provided at this time is based on the preliminary design of the Project. As new or revised information is developed after submission of this document that may significantly affect the proposed design of the facility and its potential impact on air quality, the appropriate portion(s) of the document will be revised and resubmitted to the DAQ.

2. PROJECT LOCATION AND DESCRIPTION

This section of the air quality modeling protocol describes the proposed project location and the proposed project.

2.1 PROJECT LOCATION

The proposed Project will be located on the Longview Power site in Maidsville, Monongalia County, West Virginia. The site is situated approximately 2,500 feet south of the Pennsylvania border, 3,000 feet west of the Monongahela River, and one mile north of Morgantown, West Virginia. The location of the Longview Power site is shown in Figure 2-1.

The geographic coordinates for the approximate center of the proposed project site are:

- Latitude: 39.7124 and Longitude: -79.9608
- UTM Easting: 589,077.73 and Northing: 4,396,353.40
- UTM Zone: 17 (UTM = Universal Traverse Mercator)

The area in which the project will be located is in attainment of all of the National Ambient Air Quality Standards (NAAQS) pollutants.

The dominant land features of the Project area are the Monongahela River and the rapid increase in elevation away from the river. The river elevation is approximately 820 ft. above mean sea level (amsl) (250 m amsl). Terrain of approximately 1,100 ft. amsl occurs within 700 feet (210 m) of the river. Moving further away from the river isolated terrain peaks of 1,300 ft. amsl (400 m amsl) occur within 5,000 ft. (1.5 km) of the Monongahela River. The highest terrain within 15 km of the project site is 2,464 ft. amsl (751 m amsl).

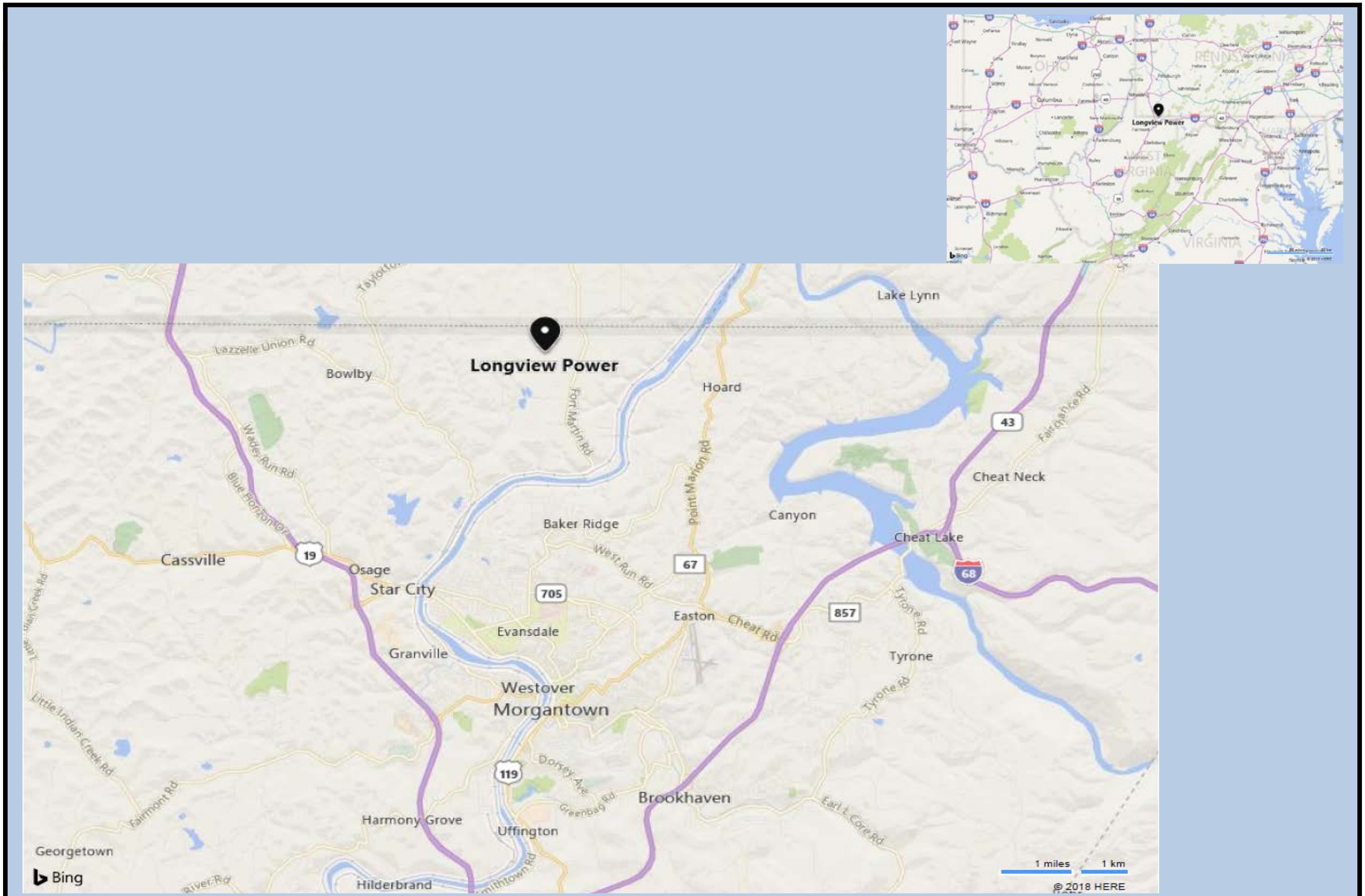

Figure 2-1
Location of Proposed Longview Power Unit 2 Project

2.2 PROJECT DESCRIPTION

The Longview Power Unit 2 Project is proposed to be a nominally rated 1,200 MW natural gas-fired only (no oil backup), combined-cycle power plant located immediately adjacent to the north of the existing Longview Power Unit 1. The Project will be designed to achieve a peak electrical output during the summer season of approximately 1,200 MW. Electricity generated by Unit 2 will be supplied to the PJM power grid and connect to the grid via the existing interconnection used by the Longview Power Unit 1.

The major components of the proposed power plant include: One combined cycle power train consisting of two combustion turbines, two heat recovery steam generators (HRSG) with duct burners, one steam turbine, one diesel fuel-fired firewater pump, one diesel fired emergency generator and one mechanical draft cooling tower.

To enhance the plant's overall efficiency and increase the amount of electricity generated by the Project, the hot exhaust gases from each combustion turbine will be routed to a downstream Heat Recovery Steam Generator. The HRSGs contains a series of heat exchangers designed to recover the heat from the turbine's exhaust gas and produce steam. The Project includes the installation of duct burners to produce additional steam in the HRSGs for additional power output from the steam turbine generator. The duct burners will only fire natural gas. No oil backup is planned for the Project.

Cooled exhaust gas passing through the HRSGs will be vented to the Selective Catalytic Reduction (SCR) and Oxidation Catalyst control system used to control NO_x and CO emissions. Selective Catalytic Reduction involves the injection of aqueous ammonia (NH_3) at a concentration of approximately 19% by weight into the combustion turbine exhaust gas streams. The ammonia reacts with NO_x in the exhaust gas stream in the presence of a catalyst, reducing it to elemental nitrogen (N_2) and water vapor (H_2O). The aqueous ammonia will be stored on-site in dual 60,000 gallon (approximate) storage tanks.

Steam generated in the HRSGs will be routed to a steam driven turbine that will increase the output of the electric generator. This generator will produce additional electricity that will be sold

on the grid. Electricity generated by the combustion turbines and the single steam driven turbine driving the electric generator represents the Project's total electrical output.

The Project will use a condenser and a 14 cell wet mechanical draft cooling tower for steam turbine generator steam condensation and waste heat rejection.

Figure 2-2 provides a General Arrangement Drawing and Figure 2-3 presents a plot plan of the plant. More detailed descriptions of the Project components are in the following subsections.

2.2.1 Combustion Turbines

The combustion turbines (CT) produce shaft power to drive an electric generator. Natural gas and combustion air are combusted producing a high velocity discharge which rotates a turbine shaft. The exhaust gases exiting the combustion turbines are routed to an HRSG to recover heat and generate steam. The combustion turbines will be General Electric (GE) 7HA.02 or equivalent, each with a nominal electric generation capacity of approximately 400 MW and a maximum rated heat capacity of 3,970 MMBtu/hr. [Higher Heating Value (HHV)] at cold day ambient temperature of -5 °F. The combustion turbines will be fired with natural gas only and will be equipped with Dry Low NO_x burners.

2.2.2 Heat Recovery Steam Generators/Steam Turbine

Exhaust gas from the combustion turbine is routed to the HRSG through insulated ductwork, where it passes through the water and steam HRSG heat exchanging sections. The gas is then discharged to the atmosphere through the integral HRSG exhaust stack with a silencer. Heat is transferred by primary convection from the hot CT exhaust gas to the feed water and steam systems. The feed water and steam will flow inside the vertically oriented finned tubes, and the gas flow will be directed horizontally across the tube rows.

For maximum flexibility, the bottoming cycle portion of a combined cycle is "oversized" to allow for higher output of the steam turbine than what could otherwise be achieved using the exhaust energy produced by the CT alone. The exhaust gases leaving the CT contain enough

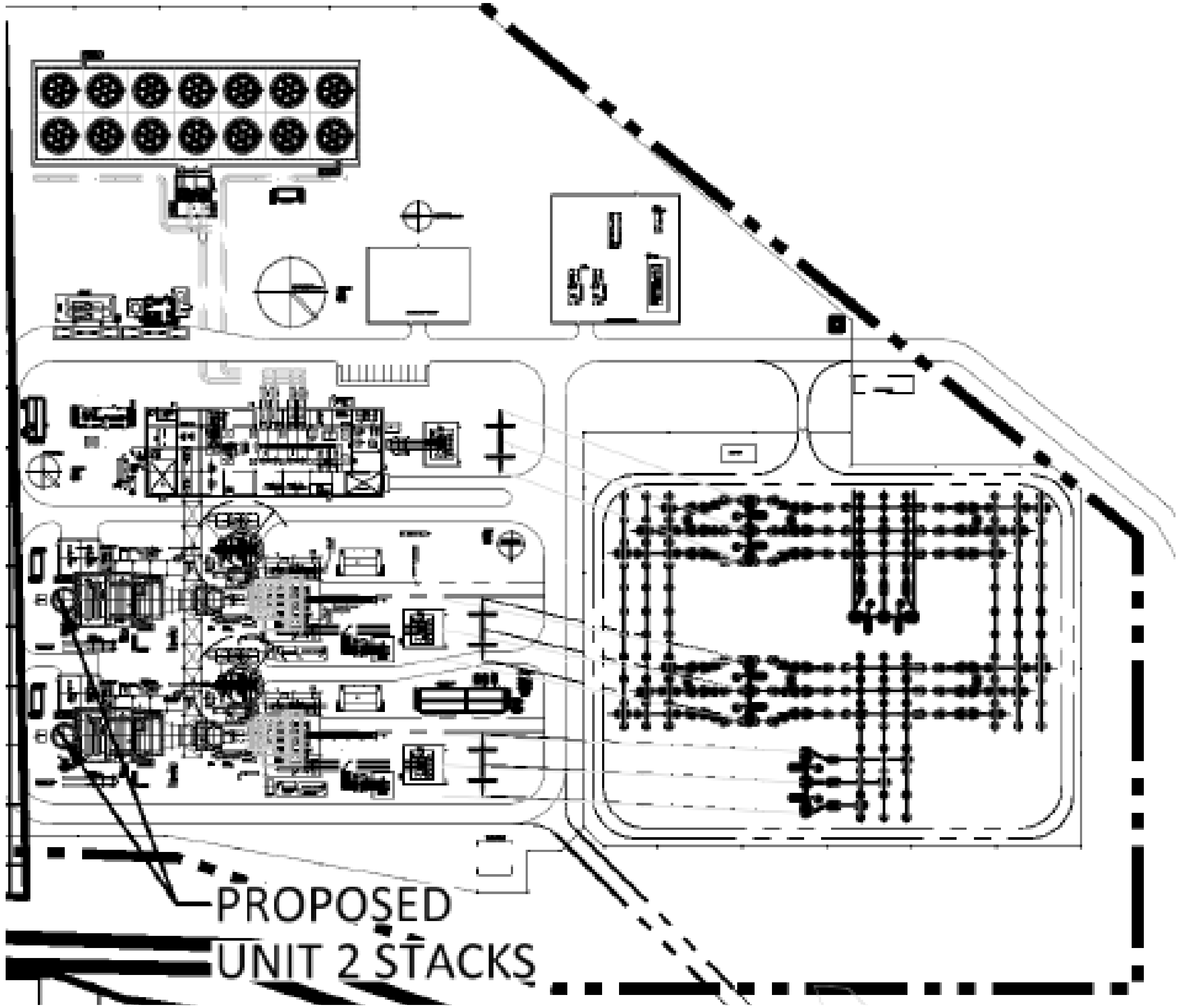

Figure 2 2
General Arrangement Drawing

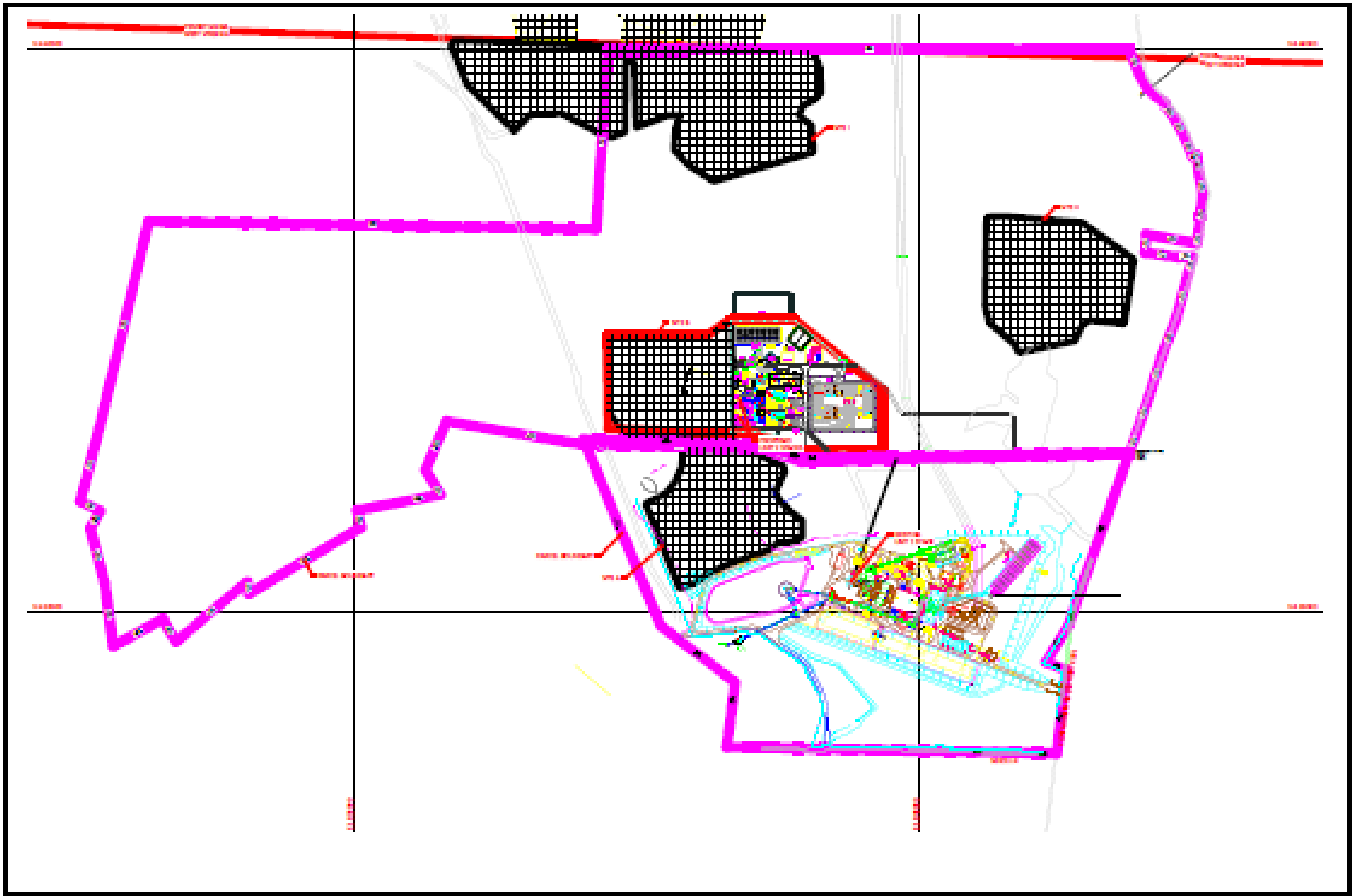

Figure 2-3
Plot Plan

oxygen to support additional combustion of fuels. Additional heat is added to the bottoming cycle using Low NOx duct burners with a maximum rated heat capacity of 250 MMBtu/hr-HHV per HRSG. This additional heat produces additional steam, which is passed through the ST flow path for additional electrical output (approximately 60 MW). The supplemental HRSG duct firing system consists of the duct burners, duct burner management system, duct burner fuel metering and regulation skid, and fuel supply.

The HRSG will be equipped with a selective catalytic reduction (SCR) system to limit NO_x emissions, and a catalytic Oxidation (CO) system to limit carbon monoxide and volatile organic compound emissions. The duct burners will not operate independently of the combustion turbine.

No auxiliary boiler will be constructed for the Project. Instead, via an interconnect with existing Unit 1, steam will be provided via the existing Unit 1 Auxiliary Boiler and also allow for bi-directional steam flow between Units 1 and 2.

2.2.3 Steam Turbine/Generator

The steam turbine/generator will utilize the steam developed in the HRSG to generate electricity. The steam turbine generator will receive steam from the HRSG and will discharge the low-pressure exhaust steam to the condenser. The steam turbines have a maximum rating of 430 MW each (maximum).

2.2.4 Mechanical Draft Cooling Tower

The ST exhausts directly into the condenser, where the steam is condensed by the circulating water passing through the condenser tubes. Condensate formed in the condenser is collected in the hot well. Recoverable steam and condensate from cycle drains and other reclaimable steam are also routed to the condenser hot well. The steam surface condenser relies on the circulating water system to provide cooling water for heat exchange. The circulating water system rejects the waste heat to atmosphere via a wet mechanical draft cooling tower by sensible heat transfer (increasing the temperature of the air passing across the tower) and latent heat transfer (evaporating a portion of the circulating water into the air passing across the tower). The cooling tower is designed to reject heat returned from the steam surface condenser and the plant's auxiliary cooling water system. The now cooled circulating water is collected in the cooling tower basin, and pumped back to the condenser water boxes, repeating the process. A circulating water chemical feed system will be included.

During the cooling process, small water droplets, known as cooling tower drift, escape to the atmosphere through the cooling tower exhaust. To minimize this effect, the cooling tower will be equipped with drift eliminators. The drift eliminators provide multiple directional changes of airflow which helps prevent the escape of water droplets.

2.2.5 Diesel fired firewater pump

A 240 hp, 179 kW standby firewater pump will be used to supply water during emergency conditions. The fire water pump will use ultra-low sulfur diesel (ULSD) fuel, with a sulfur content no greater than 0.0015% by weight. The fire water pump will also be periodically operated for short periods per manufacturer's maintenance instructions to ensure operational readiness in the event of an emergency. The fire water pump is expected to operate less than 100 hours per year.

2.2.6 Diesel fired emergency generator

An emergency generator will be used for emergency backup electric power. The fuel for the emergency generator will be ULSD with a sulfur content no greater than 0.0015% by weight. The emergency generator will be periodically operated for short periods per manufacturer's maintenance instructions to ensure operational readiness in the event of an emergency. The emergency generator is expected to operate less than 100 hours per year.

2.2.7 Fuel Gas Heaters/Gas Compressor

Two (2) fuel gas heaters will be used to preheat the gaseous fuel received by the plant. Preheating the fuel prior to combustion in the CTs increases their efficiency, safeguards the fuel pipelines from icing, and protects the CTs from fuel condensates.

The fuel supply for the Unit 2 CCGT will be provided via a 6.2 mile 20" pipeline interconnecting onto both the Columbia 1804 and 10240 interstate pipelines located near Greensboro, PA. At this interconnection, there will be a metering station allowing connection with the dual supply lines that are integral to the Columbia pipeline. Gas compression equipment will be added to this line and will have those facilities located on the Unit 2 site.

2.3 OPERATING SCENARIOS

The typical range of operating scenarios for the Project is shown in Table 2-1 and includes three load conditions (50%, 75%, and 100%) with the duct burner and/or evaporative cooler either operating or not operating and various start-up and shut-down conditions. Each of the operating scenarios has unique exhaust gas conditions and pollutant emission rates. The typical operating scenario is for the combustion turbine to operate at or near 100% of the design capacity and highest hourly emission rates are associated with winter day, 100% load, with duct firing.

Start-up conditions for the combustion turbines represent periods from initial firing until the system reaches steady state operations.

Start-up modes include:

- cold starts (restarts made more than 72 hours of shutdown).
- warm starts (between 8 and 72 hours of shutdown).
- hot starts (less than 8 hours of shutdown).

Shutdown conditions represent periods where system output is lowered below steady state conditions until the cessation of fuel firing. Shutdown commences when the turbine loads reach less than 50% load with the intent to stop operations. The proposed emission limits for the combustion turbines should not apply during periods of start-up (cold, warm or hot) and shutdown. The annual emissions for the entire facility, which are discussed in Section 3, include 260 start-ups (208 hot startups, 40 warm startups, and 12 cold startups) and 260 shut-down.

Table 2-1
Summary of Potential Operating Scenarios for Selected Design Conditions

	Case Description	CTG Load	Ambient DBT/RH	Inlet Cooling	Duct Firing	Blowdown	Fuel Type	Configuration
1	Summer Day,100% CTG Load, Duct Firing, Evap ON	100	92.0/45.7	On	On	0%	NG	2x1
2	Summer Day,100% CTG Load, Evap ON	100	92.0/45.7	On	Off	0%	NG	2x1
3	Summer Day,100% CTG Load, Duct Firing	100	92.0/45.7	Off	On	0%	NG	2x1
4	Summer Day,100% CTG Load	100	92.0/45.7	Off	Off	0%	NG	2x1
5	Summer Day,75% CTG Load	75	92.0/45.7	Off	Off	0%	NG	2x1
6	Summer Day,50% CTG Load	50	92.0/45.7	Off	Off	0%	NG	2x1
7	Summer Day, MECL CTG Load	MECL	92.0/45.7	Off	Off	0%	NG	2x1
8	Average Day,100% CTG Load, Duct Firing, Evap ON	100	63.0/70.1	On	On	0%	NG	2x1
9	Average Day,100% CTG Load, Evap ON	100	63.0/70.1	On	Off	0%	NG	2x1
10	Average Day,100% CTG Load, Duct Firing	100	63.0/70.2	Off	On	0%	NG	2x1
11	Average Day,100% CTG Load	100	63.0/70.2	Off	Off	0%	NG	2x1
12	Average Day,75% CTG Load	75	63.0/70.2	Off	Off	0%	NG	2x1
13	Average Day,50% CTG Load	50	63.0/70.2	Off	Off	0%	NG	2x1
14	Average Day, MECL CTG Load	MECL	63.0/70.2	Off	Off	0%	NG	2x1
15	Winter Day,100% CTG Load, Duct Firing	100	-5.0/90.0	Off	On	0%	NG	2x1
16	Winter Day,100% CTG Load	100	-5.0/90.0	Off	Off	0%	NG	2x1
17	Winter Day,75% CTG Load	75	-5.0/90.0	Off	Off	0%	NG	2x1
18	Winter Day,50% CTG Load	50	-5.0/90.0	Off	Off	0%	NG	2x1
19	Winter Day, MECL CTG Load	MECL	-5.0/90.0	Off	Off	0%	NG	2x1
20	Summer Day,100% CTG Load, Duct Firing, Evap ON	100	92.0/45.7	On	On	0%	NG	1x1
21	Summer Day,100% CTG ON	100	92.0/45.7	On	Off	0%	NG	1x1
22	Summer Day,100% CTG Load, Duct Firing	100	92.0/45.7	Off	On	0%	NG	1x1
23	Summer Day,100% CTG Load	100	92.0/45.7	Off	Off	0%	NG	1x1
24	Summer Day,75% CTG Load	75	92.0/45.7	Off	Off	0%	NG	1x1
25	Summer Day,50% CTG Load	50	92.0/45.7	Off	Off	0%	NG	1x1
26	Summer Day, MECL CTG Load	MECL	92.0/45.7	Off	Off	0%	NG	1x1
27	Average Day,100% CTG Load, Duct Firing, Evap ON	100	63.0/70.1	On	On	0%	NG	1x1
28	Average Day,100% CTG Load, Evap ON	100	63.0/70.1	On	Off	0%	NG	1x1
29	Average Day,100% CTG Load, Duct Firing	100	63.0/70.2	Off	On	0%	NG	1x1
30	Average Day,100% CTG Load	100	63.0/70.2	Off	Off	0%	NG	1x1
31	Average Day,75% CTG Load	75	63.0/70.2	Off	Off	0%	NG	1x1
32	Average Day,50% CTG Load	50	63.0/70.2	Off	Off	0%	NG	1x1
33	Average Day, MECL CTG Load	MECL	63.0/70.2	Off	Off	0%	NG	1x1
34	Winter Day,100% CTG Load, Duct Firing	100	-5.0/90.0	Off	On	0%	NG	1x1
35	Winter Day,100% CTG Load	100	-5.0/90.0	Off	Off	0%	NG	1x1
36	Winter Day,75% CTG Load	75	-5.0/90.0	Off	Off	0%	NG	1x1
37	Winter Day,50% CTG Load	50	-5.0/90.0	Off	Off	0%	NG	1x1
38	Winter Day, MECL CTG Load	MECL	-5.0/90.0	Off	Off	0%	NG	1x1

Notes: 1. The Duct Firing cases shall be designed to provide approximately a 15% increase over the STG unfired output.
2. CTG - Combustion Turbine Generator, DBT - Dry-Bulb Temperature (deg F), RH - Relative Humidity, NG - Natural Gas, Listed steam conditions: M (kpph), P (psia), T (deg F), MECL - Minimum Emissions Compliance Load

3. EMISSIONS INVENTORY

3.1 PROPOSED PROJECT EMISSION RATES

The emission units associated with the proposed Longview Unit 2 Project include the combustion turbines, HRSG duct burners, emergency generator, fire pump, gas preheaters and gas compressor equipment. All units will be natural gas-fired except the fire water pump and emergency generator, which are diesel fuel fired. The following subsections provide brief summaries of the pertinent emissions data for each emission unit.

3.1.1 Combustion Turbines

3.1.1.1 Normal Operating Condition

The combustion turbine will be a General Electric Frame GE 7HA.02 gas turbine (or equivalent) with supplemental HRSG duct firing with inlet air-cooling and will combust natural gas only. The combustion turbine will have a rated heat input of 3,561.2 MMBtu/hr (approximate) while operating at an average ambient temperature of 62° F. The heat input capacity of the combustion turbine increases at lower ambient temperatures and decreases at higher ambient temperatures.

The combustion turbine will be equipped with dry low NO_x combustor technology to minimize the formation of NO_x. Pollutant emission rates from the combustion turbine are obtained directly from the performance data provided by the vendor (General Electric, or equivalent). The maximum projected emission rates are equal to the highest emission rate over a range of operating conditions (load and ambient air temperature). The temperature and load conditions analyzed are 50%, 75% and 100% load and minimum, average and maximum design temperatures of -5, 63 and 92 ºF, respectively.

A summary of the maximum hourly and annual emission rates for the normal operating conditions of the combustion turbine is provided in Table 3-1.

Table 3-1
Potential Maximum Hourly Emission Rate
from one Combustion Turbine/HRSG Set

	Case Description	CTG Load	Ambient DBT/RH	Inlet Cooling	Duct Firing	Blowdown	Fuel Type	Configuration	NO2	CO	VOC	SO2[a]	PM
1	Summer Day,100% CTG Load, Duct ON	100	92.0/45.7	On	On	0%	NG	2x1	28	16.8	5.5	4.13	19.1
2	Summer Day,100% CTG ON	100	92.0/45.7	On	Off	0%	NG	2x1	26.5	16.1	4.6	3.88	13.2
3	Summer Day,100% CTG Load, Duct Firing	100	92.0/45.7	Off	On	0%	NG	2x1	27.1	16.3	5.4	3.99	18.7
4	Summer Day,100% CTG Load	100	92.0/45.7	Off	Off	0%	NG	2x1	25.5	15.5	4.4	3.74	12.9
5	Summer Day,75% CTG Load	75	92.0/45.7	Off	Off	0%	NG	2x1	20.3	12.4	3.6	2.99	10.4
6	Summer Day,50% CTG Load	50	92.0/45.7	Off	Off	0%	NG	2x1	15.7	10.4	7.1	2.32	8.5
7	Summer Day, MECL CTG Load	MECL	92.0/45.7	Off	Off	0%	NG	2x1	15.7	10.4	7.1	2.32	8.5
8	Average Day,100% CTG Load, Duct Firing, Evap ON	100	63.0/70.1	On	On	0%	NG	2x1	28.4	17	5.6	4.18	19.2
9	Average Day,100% CTG Load, Evap ON	100	63.0/70.1	On	Off	0%	NG	2x1	26.8	16.3	4.7	3.93	13.4
10	Average Day,100% CTG Load, Duct Firing	100	63.0/70.2	Off	On	0%	NG	2x1	28.2	17	5.5	4.16	19.2
11	Average Day,100% CTG Load	100	63.0/70.2	Off	Off	0%	NG	2x1	26.6	16.2	4.6	3.91	13.4
12	Average Day,75% CTG Load	75	63.0/70.2	Off	Off	0%	NG	2x1	21.2	12.9	3.7	3.12	10.9
13	Average Day,50% CTG Load	50	63.0/70.2	Off	Off	0%	NG	2x1	16.4	9.8	3.7	2.41	8.7
14	Average Day, MECL CTG Load	MECL	63.0/70.2	Off	Off	0%	NG	2x1	16.4	9.8	3.7	2.41	8.7
15	Winter Day,100% CTG Load, Duct Firing	100	-5.0/90.0	Off	On	0%	NG	2x1	29.1	17.4	5.6	4.28	19.6
16	Winter Day,100% CTG Load	100	-5.0/90.0	Off	Off	0%	NG	2x1	27.5	16.7	4.9	4.03	13.7
17	Winter Day,75% CTG Load	75	-5.0/90.0	Off	Off	0%	NG	2x1	24.5	14.9	4.3	3.59	12.4
18	Winter Day,50% CTG Load	50	-5.0/90.0	Off	Off	0%	NG	2x1	18.2	16	10.5	2.7	9.7
19	Winter Day, MECL CTG Load	MECL	-5.0/90.0	Off	Off	0%	NG	2x1	18.2	16	10.5	2.7	9.7
20	Summer Day,100% CTG Load, Duct ON	100	92.0/45.7	On	On	0%	NG	1x1	28	16.8	5.5	4.13	19.1
21	Summer Day,100% CTG ON	100	92.0/45.7	On	Off	0%	NG	1x1	26.5	16.1	4.6	3.88	13.2
22	Summer Day,100% CTG Load, Duct Firing	100	92.0/45.7	Off	On	0%	NG	1x1	27.1	16.3	5.4	3.99	18.7
23	Summer Day,100% CTG Load	100	92.0/45.7	Off	Off	0%	NG	1x1	25.5	15.5	4.4	3.74	12.9
24	Summer Day,75% CTG Load	75	92.0/45.7	Off	Off	0%	NG	1x1	20.3	12.4	3.6	2.99	10.4
25	Summer Day,50% CTG Load	50	92.0/45.7	Off	Off	0%	NG	1x1	15.7	10.4	7.1	2.32	8.5
26	Summer Day, MECL CTG Load	MECL	92.0/45.7	Off	Off	0%	NG	1x1	15.7	10.4	7.1	2.32	8.5
27	**Average Day,100% CTG Load, Duct Firing, Evap ON**	**100**	**63.0/70.1**	**On**	**On**	**0%**	**NG**	**1x1**	**28.4**	**17**	**5.6**	**4.18**	**19.2**
28	Average Day,100% CTG Load, Evap ON	100	63.0/70.1	On	Off	0%	NG	1x1	26.8	16.3	4.7	3.93	13.4
29	Average Day,100% CTG Load, Duct Firing	100	63.0/70.2	Off	On	0%	NG	1x1	28.2	17	5.5	4.16	19.2
30	Average Day,100% CTG Load	100	63.0/70.2	Off	Off	0%	NG	1x1	26.6	16.2	4.6	3.91	13.4
31	Average Day,75% CTG Load	75	63.0/70.2	Off	Off	0%	NG	1x1	21.2	12.9	3.7	3.12	10.9
32	Average Day,50% CTG Load	50	63.0/70.2	Off	Off	0%	NG	1x1	16.4	9.8	3.7	2.41	8.7
33	Average Day, MECL CTG Load	MECL	63.0/70.2	Off	Off	0%	NG	1x1	16.4	9.8	3.7	2.41	8.7
34	Winter Day,100% CTG Load, Duct Firing	100	-5.0/90.0	Off	On	0%	NG	1x1	29.1	17.4	5.6	4.28	19.6
35	Winter Day,100% CTG Load	100	-5.0/90.0	Off	Off	0%	NG	1x1	27.5	16.7	4.9	4.03	13.7
36	Winter Day,75% CTG Load	75	-5.0/90.0	Off	Off	0%	NG	1x1	24.5	14.9	4.3	3.59	12.4
37	Winter Day,50% CTG Load	50	-5.0/90.0	Off	Off	0%	NG	1x1	18.2	16	10.5	2.7	9.7
38	Winter Day, MECL CTG Load	MECL	-5.0/90.0	Off	Off	0%	NG	1x1	18.2	16	10.5	2.7	9.7

[a] Sulfur content of 0.4 grains/100 scf of natural gas

3.1.1.2 Start-Up and Shutdown Conditions

Emissions during start-up and shutdowns of the combustion turbines were estimated using vendor supplied information and the 260 cold, warm and hot start-ups which would occur each year. A summary of the maximum hourly and annual emission rates (assuming natural gas firing) for startups and shutdowns conditions are provided in Table 3-2.

3.1.2 Heat Recovery Steam Generator Duct Burners

The Heat Recovery Steam Generator (HRSG) duct burner will have a design heat input capacity of 227 MMBtu/hr (HHV) (approximate) and will combust natural gas. The HRSG will primarily operate in the recovery or "unfired" mode (i.e., no duct burner) utilizing heat from the proposed combustion turbine exhaust gases to generate steam. The HRSG and duct burner cannot operate independently from the proposed combustion turbine. The exhaust gases from the combustion turbines and duct burners will be discharged to the atmosphere downstream of the HRSG through a 180-ft stack.

The duct burner will be of a "low-NO_x" design in order to control emissions of nitrogen oxides. Maximum hourly emissions from the duct burner are estimated based on operation at full capacity and on emission factors from performance data sheets for the units as supplied by the manufacturer. Annual emissions are based on 8,500 hours per year of normal operation which assumes 260 hours of startup/shutdown for the balance of the year.

A summary of the maximum hourly and annual combustion turbine and duct burner emission rates (assuming natural gas firing) is provided in Table 3-1.

3.1.3 Other Combustion/Process Sources

The other minor combustion and/or process sources of the Project include:

- Firewater pump
- Emergency generator
- Gas preheaters
- Gas Compressor equipment

Table 3-2
Potential Maximum Annual Emissions from the Start-Up and Shut-Down Conditions

Pollutant		Hot Start	Warm Start	Cold Start	Shutdown	Two CT Units
NOx	lb/event	165	528	1,848	23	
	lb/hr (max)	271	441	523	45	
	tons/year	17	11	11	3	42
CO	lb/event	3,180	7,820	10,200	360	
	lb/hr (max)	3,252	4,838	18,862	2,741	
	tons/year	331	156	61	47	595
VOC (w/formaldehyde)	lb/event	2,860	5,920	6,520	380	
	lb/hr (max)	2,781	4,306	4,306	2,753	
	tons/year	297	118	39	49	504
Formaldehyde	lb/event	780	1,360	1,580	120	
	lb/hr (max)	860	862	862	862	
	tons/year	81	27	9	16	133
Total PM	lb/event	71	125	149	11	
	lb/hr (max)	111	111	111	75	
	tons/year	7	3	1	1	12
Duration	minutes	108	196	229	12	
No of events per year		208	40	12	260	

The fire water pump and emergency generator will be ULSD fuel fired. The fire water pump has a rating of 240 HP and the emergency generator is rated at 1,000 kW. The fire water pumps and emergency generators will be limited to 100 hrs/year of operation, respectively.

The estimated emissions for the fire water pump, emergency generator, and preheaters are presented in Table 3-3.

3.1.4 Facility-Wide Maximum Potential Annual Emission Rates

A summary of the potential annual emission rates for the entire Longview Unit 2 Project (combustion turbines/duct burners, startup/shutdown and engines/pumps) is provided in Table 3-4. The potential annual emissions presented are for two CTs and Operating Case No 27 in Table 3-1 which is an average day, 100% CTG load, duct firing, and evaporation on.

3.2 HAZARDOUS AIR POLLUTANT EMISSIONS

A summary of the potential annual hazardous air pollutant (HAP) emissions from the combustion turbines and duct burners will be provided with the air permit application but have not been included in the air quality modeling protocol.

The emissions for formaldehyde will be developed using USEPA emission for hazardous air pollutants from natural gas-fired stationary gas turbines and duct burners (Hazardous Air Pollutant (HAP) Emission Control Technology for New Stationary Combustion Turbines, Sims Roy, Docket A-95-51, August 21, 2001, Table 3) and then assuming 90% removal for formaldehyde by the catalytic oxidation system. These removal rates are based on information provided by the vendor of the catalytic oxidation system.

It is not expected that the emissions from the Longview Unit 2 Project will exceed 10 tons per year for any single HAP or 25 tons per year for HAPs in aggregate. It is also not expected the total HAP emissions from both Unit 1 and Unit 2 will exceed 10 tons per year for any single HAP or 25 tons per year for HAPs in aggregate. Therefore, the proposed project is not expected to be a major source of HAP emissions and will not be subject to case by case Maximum Achievable Control Technology (MACT).

Table 3-3
Potential Maximum Hourly and Annual Emissions from the Fire Water Pump, Emergency Generator, Spray Dryer and Mechanical Draft Tower

	Fire Water Pump[2]		Emergency Generator		Fuel Gas Preheaters (2)	
Pollutant	**Maximum Hourly Emission Rate (lb/hr)**	**Annual Emissions (tons/year)**	**Maximum Hourly Emission Rate (lb/hr)**	**Annual Emissions (tons/year)**	**Maximum Hourly Emission Rate (lb/hr)**	**Annual Emissions (tons/year)**
NO_x	4.55	0.228	15.2	0.76	0.19	1.70
VOCs	0.302	0.015	1.01	0.051	0.04	0.33
CO	1.27	0.063	8.76	0.44	0.21	1.83
PM_{10}	0.841	0.042	0.505	0.025	0.04	0.37
SO_2	0.492	0.025	0.027	0.001	0.01	0.06
GHG	418	20.9	1,427	71.3	712	6,240

[2] Fire water pump and emergency generator limited to 100 hrs/yr of operation.

Table 3-4
Facility Wide Maximum Potential Annual Emissions

Pollutant	Combustion Turbine and Duct Burner (tons/year)	Other Sources[3] (tons/year)	Startup and Shut down (tons/year)	Total Facility Wide Annual Emissions (tons/year)
NO_x	238	2.69	41.8	283
VOCs	46.8	0.40	504.4	552
CO	143	2.33	595.1	740
PM_{10}	162	0.44	12.2	175
SO_2	35.1	0.09	NA	35.2
H2SO4	29.6	0	NA	29.6
GHG	3,568,513	6332.22	NA	3,574,845

[3] Includes cooling tower, fire water pump and emergency generator. Fire water pump and emergency generator limited to 100 hrs/yr of operation.

3.3 PSD AND NSR APPLICABILITY DETERMINATION

The potential annual emission rates associated with the proposed Longview Unit 2 Project are used to determine the applicability of PSD and non-attainment New Source Review (NSR) requirements. PSD applicability is determined by comparing the potential emission rate from the project for each criteria pollutant that is in attainment with the National Ambient Air Quality Standards (NAAQS) to the respective significant emission threshold levels. The Longview Unit 2 Project will be located in Monongalia County, West Virginia that is designated as "in attainment" or "unclassifiable" for all regulated air pollutants so nonattainment NSR review does not apply.

The Project triggers PSD applicable since it is a new source at a listed 100 TPY source under 40 CFR 52.21 and the project's potential to emit of at least one criteria pollutant is greater the PSD significant emission levels presented in Table 3-5. As seen from this table the proposed project is subject to federal PSD requirements for NO_x, CO, particulates (PM/PM_{10} and $PM_{2.5}$), H_2SO_4 and GHG.

Table 3-5
Comparison of Project Maximum Emissions to PSD Significance Levels

Pollutant	Annual Emissions (tons/year)	PSD Significance Level (tons/year)	PSD Pollutant
NO_x	282	40	Yes
VOCs	552	40	Yes
CO	740	100	Yes
$PM/PM_{10}/PM_{2.5}$	175	25/15/10	Yes
SO_2	35	40	No
H_2SO_4	30	7	Yes
Ozone Precursor (NO_x)	282	40	Yes
Ozone Precursor (VOC)	552	40	Yes
$PM_{2.5}$ Precursor Pollutant (NO_x)	282	40	Yes
$PM_{2.5}$ Precursor Pollutant (SO_2)	35	40	No
Lead	0.00045	0.6	No
Fluorides	0	1	No
Vinyl Chloride	0	1	No
Total Reduced Sulfur	0	10	No
Sulfur Compounds	0	10	No
GHG (CO2e)	3,574,845	100,000	Yes

4. AIR QUALITY MODEL SELECTION AND INPUT DATA

The air quality dispersion models to be used in the air quality modeling analysis of the Longview Unit 2 Project will be both screening and refined U.S. EPA air dispersion models. The procedures used in conducting the modeling analysis will follow the requirements outlined in 40 CFR Part 51 Appendix W "Guideline on Air Quality Models" (U.S. EPA 2017), guidance provided by West Virginia DAQ, and other state and federal regulatory agency documents.

4.1 AIR QUALITY MODEL SELECTION

4.1.1 Screening Air Quality Models

A screening level air quality model will be used to obtain conservative modeled estimates of the air quality impact of the proposed project based on simplified assumptions of the model inputs (e.g., preset, worst-case meteorological conditions). The screening air quality model to be used is the AERSCREEN model (Version 16216). AERSCREEN is the EPA's recommended screening model for simple and complex terrain for single sources including point sources, area sources, horizontal stacks, capped stacks, and flares. AERSCREEN runs AERMOD (a refined air quality model) in a screening mode using a matrix of meteorological conditions.

4.1.2 Refined Air Quality Model

If the screening model indicates that the increase in concentration attributable to the proposed project could cause or contribute to a violation of any NAAQS or PSD increment, then the second level of more sophisticated (Refined) models will be used. The refined air quality modeling analysis will use the AERMOD (**AER**MIC **MOD**el) air dispersion model as the refined air quality model. A description of this model is provided in the following subsections.

4.1.3 AERMOD Model Selection

The **A**MS/**E**PA **R**egulatory **MOD**el (AERMOD, 18081) air dispersion model will be used to perform the air quality modeling analysis. The AERMOD air dispersion model is an approved U.S. EPA air dispersion model for performing refined, multi-source air quality modeling studies. The AERMOD air dispersion model contains sophisticated dispersion algorithms. A description of the AERMOD model is provided below.

The American Meteorological Society (AMS) and the U.S. Environmental Protection Agency (EPA) formed the **A**MS/**E**PA **R**egulatory **M**odel **I**mprovement **C**ommittee (AERMIC) in 1991. The goal of the committee was to introduce planetary boundary layer (PBL) concepts into a new air dispersion model. The use of PBL concepts in AERMOD represents a more sophisticated approach to predicting plume dispersion than the approach used by the ISCST3 model. The PBL concepts include using dispersion parameters (sigma y and sigma z) that are based on either measured or estimated turbulent intensities, accounting for non-homogenous conditions throughout the PBL, improving the treatment of plume rise, and enhancing the way concentrations at complex terrain receptors (i.e. terrain receptors with elevations above stack top elevation) are predicted by incorporating the concept of a critical dividing streamline.

AERMOD uses an abbreviated approach to the three-dimensional terrain feature representation and critical dividing streamline approach that is used by the Complex Terrain Dispersion Model Plus Algorithms for Unstable Situations (CTDMPLUS). The AERMOD approach determines the fraction of the plume that is below the critical dividing streamline height (Φ from 0.0 to 1.0) and then uses that number as a scaling factor. The scaling factor, Φ, is multiplied by the concentration that represents the plume flowing around the terrain feature and then 1- Φ is multiplied by the concentration that represents the plume flowing over the terrain feature. The AERMOD concentration is the sum of the two, scaled concentrations. AERMOD differs from CTDMPLUS in its treatment of flow around a terrain feature by not considering the lateral splitting of the plume that occurs as the plume flows around a terrain feature. In its present form, AERMOD uses the Schulman-Scire and Huber-Synder downwash algorithms that are contained in ISCST3.

The AERMOD modeling system consists of two pre-processors and the dispersion model. AERMET (Version 19191) is the meteorological pre-processor and AERMAP (Version 18081) is the terrain pre-processor that characterizes the terrain and generates receptor elevations. The AERMET pre-processor, which is very similar to the CTDMPLUS meteorological pre-processor (METPRO), produces a file containing an hourly, vertical profile of the atmosphere and a file that includes surface and micrometeorological data. The AERMAP pre-processor is designed to develop receptor grid height information based on United States Geological Survey (USGS) digital elevation model (DEM) data. The development of the receptor grid includes assigning receptor elevations to the receptor locations and also assigning a hill height scale to each receptor. Receptor elevations are determined by finding the four closest DEM elevation points to the receptor location and averaging the elevations to represent the receptor. Hill height scales for all receptors are determined by examining the height and proximity of all DEM points within the modeled domain area to each receptor location. The domain used in AERMAP included the area covered by the Cartesian receptors plus an additional 5,000-meter buffer in the x and y-directions. Surface elevations for all receptors will be obtained from USGS 1:24,000 Level II DEM data when available and Level I when not available.

Other components of this system include AERSURFACE, a surface characteristics preprocessor, and BPIPPRIME (BPIPPRM), a multi-building dimensions program incorporating the GEP technical procedures for PRIME applications.

The AERMOD air dispersion model has various options to simulate a variety of dispersion conditions for emissions from a stack or non-stack source. The U.S. EPA has recommended various default options to be used in dispersion modeling for regulatory purposes. These recommended regulatory default options will be used in the air quality impact analysis as follows:

- Stack-tip downwash.
- Model Accounts for Elevated Terrain Effects.
- Calms Processing Routine Used.
- No Exponential Decay for Rural Mode.
- Upper bound value for “super squat” buildings.
- Missing meteorological data processing used.

4.2 LANDUSE

The land use classification for the area was based on a quantitative review of land use patterns surrounding the proposed project site. The 2011 National Land Cover Dataset (NLCD) was used. Current satellite imagery was inspected and compared to the 2011 NLCS land use data and 2011 satellite imagery (from Google Earth) to determine the representativeness of the 2011 land use data. It was determined that the land use for 2011 is representative of the current conditions. The land use analysis followed the procedures recommended by the U.S. EPA (U.S. EPA 2000) and the typing scheme developed by Auer (Auer 1978). The Auer technique established four primary land use types: industrial, commercial, residential, and agricultural. Industrial, commercial, and compact residential areas are classified as urban, while agricultural and common residential areas are considered rural. For air quality modeling purposes, an area is defined as urban if more than 50 percent of the surface within 3 kilometers of the source falls under an urban land use type. Otherwise, the area is determined to be rural.

Although Morgantown, WV is in close proximity to the proposed site and represents a portion of the area that is classified as urban, a review of the gridded digital land use data and the 7.5 USGS topographic maps indicates that 98% of the area within the 3-kilometer radius is classified as rural for air quality modeling purposes (Urban classifications were assumed to be category 22 (high intensity residential) and category 23 (commercial/industrial/transportation)). Based on the rural land use designation, AERMOD will be used in the default (rural) mode to predict the ambient air concentrations associated with emissions from the proposed project.

4.3 RECEPTOR GRID

The AERMOD air quality modeling study will use a Cartesian receptor grid network including fence line receptors. A description of the receptor grids network is provided in the following subsections.

4.3.1 AERMOD Receptor Grid

The receptor network for the AERMOD analysis will minimally cover a square region 20-km on a side, centered on the proposed project site. All receptors will be referenced to the UTM coordinate system (Zone 17), using the North American Datum of 1927 (NAD 27). A rectangular Cartesian coordinate receptor grid will be used as the main receptor grid. The main receptor grid will be centered on the CT stacks and have the following grid spacing:

- 100 meters out to ± 1 kilometer;
- 250 meters out to ± 2 kilometers;
- 500 meters out to ± 5 kilometers;
- 1,000 meters out to ± 10 kilometers.
- 2,000 meters out to ± 20 kilometers

In addition to the rectangular Cartesian coordinate receptor grid, a set of fenceline receptors will be prepared. The fence line receptors will be placed every 50 meters around the site fenced portion of the property.

Concentration contours maps will be developed to determine the refined modeling grid requirements including extending the modeling domain and/or refining the resolution grid spacing. A more refined spaced receptor grid will be developed and used in area of maximum predicted concentrations and the receptor grid will be extended if maximum predicted concentrations occur near the edge of the receptor grid.

Terrain elevations will be assigned to all receptors included in the air dispersion modeling analysis. The terrain elevations for the main receptor grid will be developed using the AERMAP terrain preprocessor.

The AERMAP pre-processor is designed to develop receptor grid height information based on United States Geological Survey (USGS) digital elevation model (DEM) data. The development of the receptor grid includes assigning receptor elevations to the receptor locations and also assigning a hill height scale to each receptor. Receptor elevations are determined by finding the four closest DEM elevation points to the receptor location and averaging the elevations to represent the receptor. Hill height scales for all receptors are determined by examining the height and proximity of all DEM points within the modeled domain area to each receptor location. The domain used in AERMAP included the area covered by the Cartesian receptors plus an additional 5,000-meter buffer in the x and y-direction. Terrain elevations for all receptors were obtained from the USGS 1:24,000 Level II DEM data.

The Cartesian receptor grid will be further refined based on the initial modeling results. Contour plots of the predicted concentrations will be developed for each pollutant and averaging time. The contour plots will be used to determine if refinements to the modeling domain and/or grid resolution are necessary. If maximum or high concentrations are predicted in a coarse section of the grid then that area of the grid will be remodeled with a 50 meter spacing to determine maximum modeled concentrations.

4.4 METEOROLOGICAL DATA

The meteorological data for the AERMOD air dispersion model with include both surface and upper air data from National Weather Service (NWS) observation stations. Section 6 of this document addresses the representativeness and adequacy of the surface meteorological database. A description of the procedures that will be used to process the meteorological data is presented in the following subsections.

4.4.1 AERMOD Meteorological Data

The meteorological database for the AERMOD air dispersion model will consist of five years of surface meteorological data collected at the Morgantown Municipal Airport from 2014-2018. A wind rose for the Morgantown Airport is presented in Figure 4-1. The Morgantown meteorological data was previously used for the Longview Power Project (Unit 1) and a demonstration of the representativeness of the Morgantown Airport meteorological data for the Longview Unit project is presented in Section 6.

The Morgantown surface meteorological data will be processed using the procedures described in the U.S. EPA AERMET meteorological processor. The AERMET preprocessor produces a file containing an hourly, vertical profile of the atmosphere and a file that includes surface and micrometeorological data.

The AERMET analysis will include the use of both the AERMINUTE and AERSURFACE preprocessors. The AERMINUTE (Version 15272) meteorological data processor will be used to

produce wind speed and direction data based on archived 1-minute and 5- minute ASOS data for Morgantown Airport, for input into AERMET Stage 2. A 0.5 m/s wind speed threshold will be applied to the 1-minute ASOS derived wind speeds in AERMET.

The AERMET preprocessor also requires several micrometeorological variables for the project site area. The variables included surface roughness, Bowen ratio, and albedo. The values that were used in AERMET were determined using the AERSURFACE pre-processor. AERSURFACE used 12 equal sectors by season.

The 2011 NLCD land use was used to develop the surface characteristics of the Morgantown.

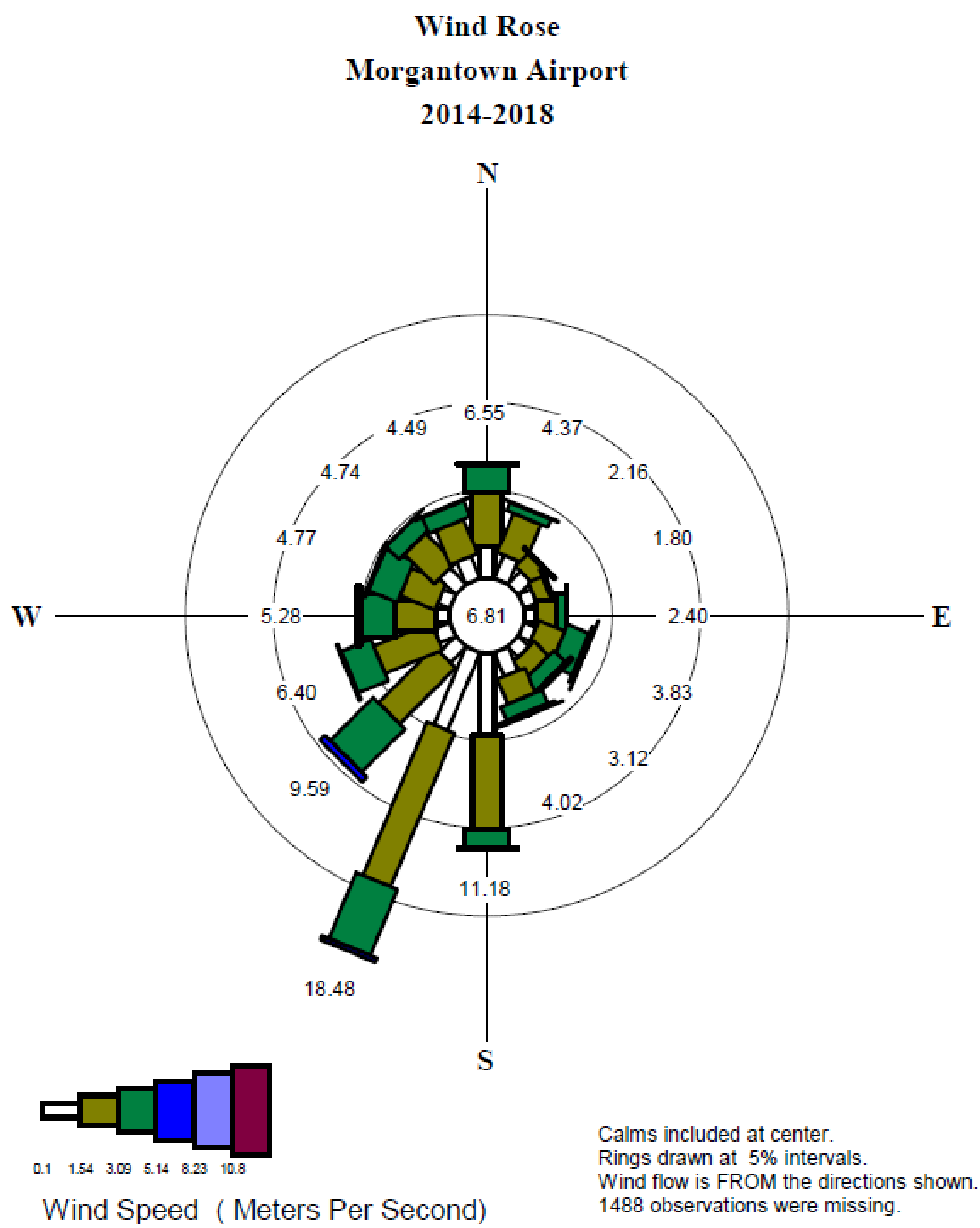

Figure 6-4
Wind Rose for Morgantown Airport (2014-2018)

Municipal Airport site and the project site. Current satellite imagery was inspected and compared to the 2011 NLCS land use data and 2011 satellite imagery (from Google Earth) to determine the representativeness of the 2011 land use data. It was determined that the land use for 2011 is representative of the current conditions.

A comparison of the surface characteristics of the Morgantown Municipal Airport site and the project site is presented in Table 4-1. As seen from this table the land use surrounding the airport is consistent with the land use at the project site, therefore the land use at the airport was used with AERSURFACE to develop the AERMET data for AERMOD model input.

Using the procedures described in AERMET, the surface meteorological data will be combined with concurrent twice-daily rawinsonde data obtained from the NWS observation station in Pittsburgh, Pennsylvania. All NWS upper air and surface meteorological data will be obtained from the National Climatic Data Center (NCDC).

4.5 GOOD ENGINEERING PRACTICE STACK HEIGHT ANALYSIS

Following U.S. EPA guidance contained in the “Guideline for Determination of Good Engineering Practice (GEP) Stack Height (Revised)” (U.S. EPA 1985), a GEP analysis will be performed to evaluate the potential for building downwash on the stacks. The following procedures will be used to analyze the stacks for downwash effects. The stacks and influencing buildings will be located on a plant map and the coordinates will be manually digitized. The stack height and relevant building dimensions will be evaluated using the U.S. EPA Building Profile Input Program Prime (BPIPPRM, Date 04274). BPIPPRM determines, in each of the 36 wind directions (10° sectors), which building may produce the greatest downwash effects for a stack. The direction-specific dimensions produced by BPIPPRM will be included in the AERMOD air quality modeling studies. Table 4-2 summarizes the building dimensions and structures that influence each stack. The BPIPPRM analysis indicated that the GEP height for all stacks is 250 ft., based on the preliminary height of the HRSG Drum Building. The CT stacks are within 500 ft. (the area of influence) of HRSG Drum Building which produced the controlling GEP heights for all sources. The CT stack height is 180 ft., which are not GEP height and therefore do not avoid building downwash effects. Therefore, direction-specific building downwash dimensions will be included in the AERMOD dispersion modeling analyses.

Table 4-1
Comparison of the Surface Characteristics of the Project Site and Meteorological Data Collection Site (Morgantown Airport)

		Morgantown Airport			Project Site					Morgantown Airport			Project Site		
Season	Sector	Albedo	Bowen Ratio	Zo	Albedo	Bowen Ratio	Zo	Season	Sector	Albedo	Bowen Ratio	Zo	Albedo	Bowen Ratio	Zo
1	1	0.17	0.86	0.254	0.17	0.85	0.063	3	1	0.16	0.46	0.65	0.16	0.37	0.3
1	2	0.17	0.86	0.308	0.17	0.85	0.034	3	2	0.16	0.46	0.64	0.16	0.37	0.211
1	3	0.17	0.86	0.151	0.17	0.85	0.035	3	3	0.16	0.46	0.301	0.16	0.37	0.214
1	4	0.17	0.86	0.148	0.17	0.85	0.041	3	4	0.16	0.46	0.323	0.16	0.37	0.183
1	5	0.17	0.86	0.14	0.17	0.85	0.12	3	5	0.16	0.46	0.329	0.16	0.37	0.293
1	6	0.17	0.86	0.128	0.17	0.85	0.035	3	6	0.16	0.46	0.289	0.16	0.37	0.16
1	7	0.17	0.86	0.08	0.17	0.85	0.019	3	7	0.16	0.46	0.145	0.16	0.37	0.108
1	8	0.17	0.86	0.07	0.17	0.85	0.05	3	8	0.16	0.46	0.159	0.16	0.37	0.175
1	9	0.17	0.86	0.159	0.17	0.85	0.071	3	9	0.16	0.46	0.227	0.16	0.37	0.256
1	10	0.17	0.86	0.092	0.17	0.85	0.123	3	10	0.16	0.46	0.143	0.16	0.37	0.401
1	11	0.17	0.86	0.093	0.17	0.85	0.05	3	11	0.16	0.46	0.131	0.16	0.37	0.238
1	12	0.17	0.86	0.052	0.17	0.85	0.039	3	12	0.16	0.46	0.111	0.16	0.37	0.22
2	1	0.15	0.58	0.406	0.15	0.54	0.099	4	1	0.16	0.86	0.634	0.16	0.85	0.3
2	2	0.15	0.58	0.471	0.15	0.54	0.051	4	2	0.16	0.86	0.614	0.16	0.85	0.211
2	3	0.15	0.58	0.228	0.15	0.54	0.053	4	3	0.16	0.86	0.271	0.16	0.85	0.214
2	4	0.15	0.58	0.226	0.15	0.54	0.061	4	4	0.16	0.86	0.299	0.16	0.85	0.179
2	5	0.15	0.58	0.221	0.15	0.54	0.164	4	5	0.16	0.86	0.306	0.16	0.85	0.288
2	6	0.15	0.58	0.204	0.15	0.54	0.079	4	6	0.16	0.86	0.267	0.16	0.85	0.157
2	7	0.15	0.58	0.106	0.15	0.54	0.055	4	7	0.16	0.86	0.129	0.16	0.85	0.108
2	8	0.15	0.58	0.093	0.15	0.54	0.078	4	8	0.16	0.86	0.146	0.16	0.85	0.174
2	9	0.15	0.58	0.199	0.15	0.54	0.112	4	9	0.16	0.86	0.211	0.16	0.85	0.256
2	10	0.15	0.58	0.115	0.15	0.54	0.19	4	10	0.16	0.86	0.127	0.16	0.85	0.401
2	11	0.15	0.58	0.115	0.15	0.54	0.075	4	11	0.16	0.86	0.115	0.16	0.85	0.238
2	12	0.15	0.58	0.072	0.15	0.54	0.066	4	12	0.16	0.86	0.096	0.16	0.85	0.219

Table 4-2
Building Dimensions for GEP Height Analysis

Building/Structure	Height (ft.)	Maximum Projected Width (ft.)	Formula GEP height (ft.)	Radius of Influence (ft.)	Controlling Structure for Source(s)
Steam Turbine Building	96	444	240	480	No
HRSG Drum Platform North	100	276	250	500	Yes
HRSG Drum Platform South	100	276	250	500	Yes

4.6 MODELED EMISSION RATES

All loads and operating scenarios for normal operating and startup/shutdown conditions identified in Section 3 will be initially modeled. The loads and/or operating scenario which produce the highest short-term ground level air quality concentrations will be identified and those hourly emissions will be used for all further refined modeling including short-term and long-term averaging periods including SIL, cumulative multi-source and visibility analysis. The emissions expected for the startup and shutdown conditions will be model but only used if they produce higher short-term impact than the normal operating conditions. The predicted concentration from the startup and shutdown conditions will not be used for any long-term average concentrations. The proposed project is considered a base load power plant.

It is expected that operating conditions No. 27 (Average Day,100% CTG Load, Duct Firing, Evap ON, Air Temperature/Relative Humidity: 63.0/70.1) will produce the highest short- and long-term predicted concentrations since this operating scenario has the highest hourly emission rates.

5. AIR QUALITY IMPACTS ANALYSIS

The air quality modeling analysis will be used to determine the predicted ambient air concentrations resulting from emissions from the Longview Unit 2 Project. Air quality modeling analyses will be performed to determine the significant impact area (SIA), the amount of PSD increment consumption, and the level of compliance with the National Ambient Air Quality Standards (NAAQS) and other air quality related values (AQRVs).

5.1 SIGNIFICANCE ANALYSIS

The air quality impact analysis will initially evaluate emissions of CO, PM/PM_{10}/$PM_{2.5}$, SO_2, and NO_x from the project. The results of this air quality modeling analysis will be compared to the ambient air significance levels shown in Table 5-1.

The EPA has historically cautioned states that the use of a SIL may not be appropriate when a substantial portion of any NAAQS or PSD increment is known to be consumed. Therefore, justification of the use of SILs is recommended in support of the PSD review record. To provide justification with respect to use of SILs in the significance and NAAQS analyses, the differences between the NAAQS and background concentrations determined to be representative of the Project impact area for applicable compound and averaging periods were compared to the applicable) values. As shown in Table 5-2, the differences between the NAAQS and background concentrations are much higher than the corresponding SILs. Therefore, it is sufficient for WVDEP to conclude that an air quality modeled impact less than the SIL for each of the applicable compounds will not cause or contribute to a modeled violation of the NAAQS.

If the proposed Longview Power Unit 2 produces no significant impacts (i.e., at or below the ambient air significance levels), then no further analysis is required to demonstrate compliance with the NAAQS or PSD increment consumption in Class II areas. No further analysis is required because the project, by definition, does not significantly contribute to any possible violations of the NAAQS or consume a significant portion of the available increment.

If the highest modeled concentrations are above the ambient air significance levels, then a Significant Impact Area (SIA) will be defined. The SIA will be defined by a circle with a radius

Table 5-1
Significance Impact Levels ($\mu g/m^3$)

Pollutant	Averaging Time	Class II	Class I EPA	Class I FLM
Sulfur Dioxide	Annual	1	0.1	0.03
	24-hour	5	0.2	0.07
	3-hour	25	1	0.48
	1-hour	7.8		
PM_{10}	Annual	1		
	24-hour	5	0.3	0.27
$PM_{2.5}$	Annual	0.3 0.2 proposed	0.06	
	24-hour	1.2	0.07	
Nitrogen Dioxide	Annual	1	0.1	0.03
	1-hr	7.5		
Carbon Monoxide	8-hour	500		
	1-hour	2,000		

Table 5-2
Comparison of NAAQS, Representative Background Concentrations, and SILs

Pollutant and Averaging Period	Background	Background	NAAQS	NAAQS	SIL	Difference	Greater than SIL?
SO_2	**(ppb)**	**(μg/m^3)**	**(ppb)**	**(μg/m^3)**	**(μg/m^3)**	**(μg/m^3)**	
3-hour	20.6	53.8	75	195.8	5	142	YES
1-hour	35	91.4	500	1,305	1	1214	YES
NO_2							
Annual	6.21	11.7	53	99.6	1	88.0	YES
1-hour	45	84.6	100	188	7.5	103	YES
$PM_{2.5}$							
Annual		7.4		12	0.2	4.6	YES
24-hour		23.4		35	1.2	11.6	YES
PM_{10}							
24-hour		135		150	5	15	YES
CO							
8-hour	0.7	798	35	39,900	2,000	39,102	YES
1-hour	0.8	912	9	10,260	5,00	9,348	YES

extending from the reference origin of the proposed plant site out to the greatest radius where a receptor has a maximum concentration equal to the significance levels. The SIA with the largest radial distance among the various pollutants and averaging periods will be used for all further modeling as described in Section 5.2. The further analysis will be performed to determine compliance with the NAAQS and Class I and II PSD increments shown in Tables 5-3 and 5-4, respectively.

5.2 CLASS II AREA- MULTI-SOURCE IMPACT ANALYSIS

A discussion of the Class II area air quality impact analysis is presented in the following sections.

5.2.1 NAAQS Analysis

If the initial significance analysis indicates that the proposed project has significant impacts, then a multi-source impact analysis will be conducted. The multi-source impact analysis will include all sources at the Longview Unit 2 that emit the pollutants that have been determined to result in a modeled concentration above the significance levels. In addition, other sources of the PSD significant pollutants that are located within 25 km of proposed project. The emission inventory for the other local sources will be developed in consultation with the Pennsylvania DEP and West Virginia DAQ.

The multi-source inventory will be converted to maximum allowable emissions and then screened to remove small insignificant sources or fugitive emission sources that are located at significant distances from the Longview Unit project. Other sources will be modeled with AERSCREEN to determine their SIA. Those sources whose SIA does not overlap the SIA of the Longview Unit 2 Project will be eliminated from the multi-source emission inventory.

An analysis of the location of minor sources and background air quality selected for the NAAQS analysis will be performed to determine if the minor sources should be included in the multi-source modeling analysis or whether the existing background air quality data is conservatively high enough to represent the impact of the minor sources.

The NAAQS analyses will be based on the maximum concentration for the form of the NAAQS (i.e., highest second highest, annual maximum, 99^{th} percentile or 98^{th} percentile etc).

A NO to NO_2 conversion factor will be applied to all predicted NO_x concentrations. The NO to NO_2 conversion factor recognizes that most of the NO_x emitted from combustion sources is in the form of NO, which is then eventually converted to NO_2. The NO to NO_2 conversion method described in Ambient

Table 5-3
National Ambient Air Quality Standards

Pollutant		Primary/Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)		primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead (Pb)		primary and secondary	Rolling 3 month average	0.15 µg/m3(1)	Not to be exceeded
Nitrogen Dioxide (NO2)		primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	1 year	53 ppb (2)	Annual Mean
Ozone (O3)		primary and secondary	8 hours	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution (PM)	$PM_{2.5}$	primary	1 year	12.0 $\mu g/m^3$	annual mean, averaged over 3 years
		secondary	1 year	15.0 $\mu g/m^3$	annual mean, averaged over 3 years
		primary and secondary	24 hours	35 $\mu g/m^3$	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24 hours	150 $\mu g/m^3$	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO2)		primary	1 hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

(1) In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m3 as a calendar quarter average) also remain in effect.
(2) The level of the annual NO2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.
(3) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.
(4) The previous SO2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2)any area for which implementation plans providing for attainment of the current (2010) standard have not been submitted and approved and which is designated nonattainment under the previous SO2 standards or is not meeting the requirements of a SIP call under the previous SO2 standards (40 CFR 50.4(3)), A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the require NAAQS.

Table 5-4
Class I and II Areas
PSD Increments (µg/m^3)

Pollutant	Averaging Period	Class I	Class II
SO_2	Annual	2	20
	24-hour	5	91
	3-hour	25	512
PM_{10}	Annual	4	17
	24-hr	8	30
$PM_{2.5}$	Annual	1	4
	24-hour	2	9
NO_2	Annual	2.5	25

Ratio Method 2 (ARM2, Appendix W, 2017) will be used.

The NAAQS compliance assessment will include the Longview Unit 2 Project emissions, the offsite facilities including Longview Unit 1 and representative background concentrations.

5.2.2 PSD Increment Analysis

The PSD increment analysis will include all PSD increment consuming sources identified by both the WV DAQ and Pennsylvania DEP that are located within 50 Km of the SIA for the respective pollutant. It is anticipated that the final multi-source emission inventory will be developed in conjunction with WV DAQ and will be approved prior to conducting the refined multi-source air quality modeling analysis.

The final multi-source inventory will be used to assess PSD increment consumption. The PSD increment consumption assessment will include only PSD sources identified in the inventory. The PSD increment analyses will be based on the maximum concentration for the form of the NAAQS (i.e., highest second highest, annual maximum, 99^{th} percentile or 98^{th} percentile etc).

Air quality increment consumption is tracked by tabulating the actual emissions changes at a stationary source, area source or mobile source since the minor source baseline date and changes in actual emissions at major stationary sources after the major source baseline date. To determine the air quality increment consumed in a region the net actual emissions changes are modeled to obtain an air quality increment consumption concentrations. The changes in emissions from existing sources and increases from proposed new sources since the baseline date are modeled together to determine the incremental change in air quality levels. These incremental changes in air quality levels are compared to the PSD increment.

The PSD major source baseline dates for NO_2, PM_{10}, and SO_2 have been triggered by the Morgantown Energy Associates (MEA) project. This facility is located within the same air quality control region of that the Longview Unit 2 Project is located. The major source baseline year for NO_2, PM_{10}, and SO_2 is 1989.

5.2.3 Visibility Analysis

A screening level visibility assessment using VISCREEN (Version: 13190) will be performed. The model calculates the change in the color difference index (ΔE) and contrast between the plume and the viewing background. If the hourly estimates of ΔE is less than to 2.0, or the absolute value of the contrast values (|C|) is less than 0.05, then no further visibility analysis will be performed.

5.2.4 Secondary Aerosol Formation

Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and PM2.5 under the PSD Permitting Program will be used to demonstrate the effects of the proposed project on ozone and secondary formation of $PM_{2.5}$

5.3 BACKGROUND AMBIENT AIR DATA

Background ambient air quality values are required as part of the NAAQS analysis. The background values should be representative of the background pollutant concentration levels that could be expected to occur in the vicinity of the Longview Unit 2 Project. Therefore, ambient air data from a West Virginia DAQ monitoring station in Morgantown, WV, Ohio EPA monitoring station in Shadyside, OH and Pennsylvania DEP monitoring station in Charleroi, PA were reviewed in order to select representative background pollutant concentration data. A summary of the air quality data from monitoring stations in Morgantown, WV, Shadyside, OH and Charleroi, PA are presented in Table 5-5. The maximum measured concentrations from these monitoring stations over the previous 3 years (2016-2018) will be used to establish the existing ambient air quality levels for NAAQS compliance evaluation. If necessary a directional specific background concentration will be developed by eliminating those periods from the background measurements when an existing source (included in the multi-source inventory) is impacting the monitor. The procedure described in 40 CFR 51 Appendix W Section 8.3.3 may be used but only after consultation with WV DEP will a directional specific background concentration analysis be utilized.

A demonstration of the representativeness of these monitoring stations for the Longview Unit 2 Project is presented in Section 6.

Table 5-5
Proposed Background
Ambient Air Data for NAAQS Analysis

Pollutant and Averaging Period	2016	2017	2018	Site Location
SO_2 (ppb)				
3-hour	10.6	6	20.6	Morgantown Airport US 119 & Airport Blvd. (AQS Site ID 54-061-0003)
1-hour	23	9	35	
NO_2 (ppb)				
Annual	6.21	5.35	5.29	220 Meddings Road Charleroi, PA (AQS Site ID 42-125-0005)
1-hour	44	43	45	
$PM_{2.5}$ (µg/m3)				
Annual	7.40	7.3	7.2	Morgantown Airport US 119 & Airport Blvd. (AQS Site ID 54-061-0003)
24-hour	20.6	23.4	18.9	
PM_{10} (µg/m3)				
24-hour	135	61	73	2 Ball Park Rd Shadyside, OH (AQS Site ID 39-013-0006)
CO (ppm)				
8-hour	0.7	0.5	0.6	2 Ball Park Rd Shadyside, OH (AQS Site ID 39-013-0006)
1-hour	0.8	0.8	0.8	

5.4 CLASS I AREA ASSESSMENT

An assessment of potential project impacts on increment consumption, visibility and other air quality related values (AQRVs) in Class I areas is a requirement for PSD projects. Air quality impacts at Class I areas must be assessed under PSD regulations if they are within 100 km of the PSD source, or if the PSD source is judged to have a potential effect at Class I areas at distances beyond 100 km.

There are four (4) Class I areas within 250 km of the proposed site of the Longview Unit 2 Project. These areas are the Dolly Sods, Otter Creek and James River Face National Wilderness Areas and the Shenandoah National Park. The Dolly Sods, Otter Creek, James River Face and Shenandoah areas are approximately 91 km southeast, 78 km south-southeast, 237 south-southeast, and 173 km southeast respectively, of the proposed project site. The locations of the Class I areas relative to the proposed plant site are shown in Figure 5-1.

The procedure to assess the impact of the proposed project emission on the Class I areas are described in the following sections.

5.4.1 Increment Analysis

A Class I increment screening level assessment following the procedure described in Section 4.2 of Appendix W will be performed. Preliminary modeling using the preferred near field refined air quality model (AEMOD) will be used to determine the significant impact area (distance). If the SIA is less than the distance to any of the Class I areas then no further analysis will be performed for the Class I increment. If the SIA extends to any of the Class I areas then AERMOD will be used to perform the Class I increment analysis.

5.4.2 Visibility and Air Quality Related Values

The initial screening method described in Section 3.2 of the FLAG (2010) document will be used to evaluate the impacts of the proposed Longview Unit 2 Project on the Class I areas. The FLAG member agencies that administer Federal Class I areas (U.S. Forest Service (USFS) the National Park Service (NPS) and U.S. Fish and Wildlife Service (FWS)) will consider a source locating greater than 50 km from a Class I area to have negligible impacts with respect to Class I AQRVs if its total SO_2, NO_x, PM_{10}, and H_2SO_4 annual emissions (in tons per year, based on 24-hour

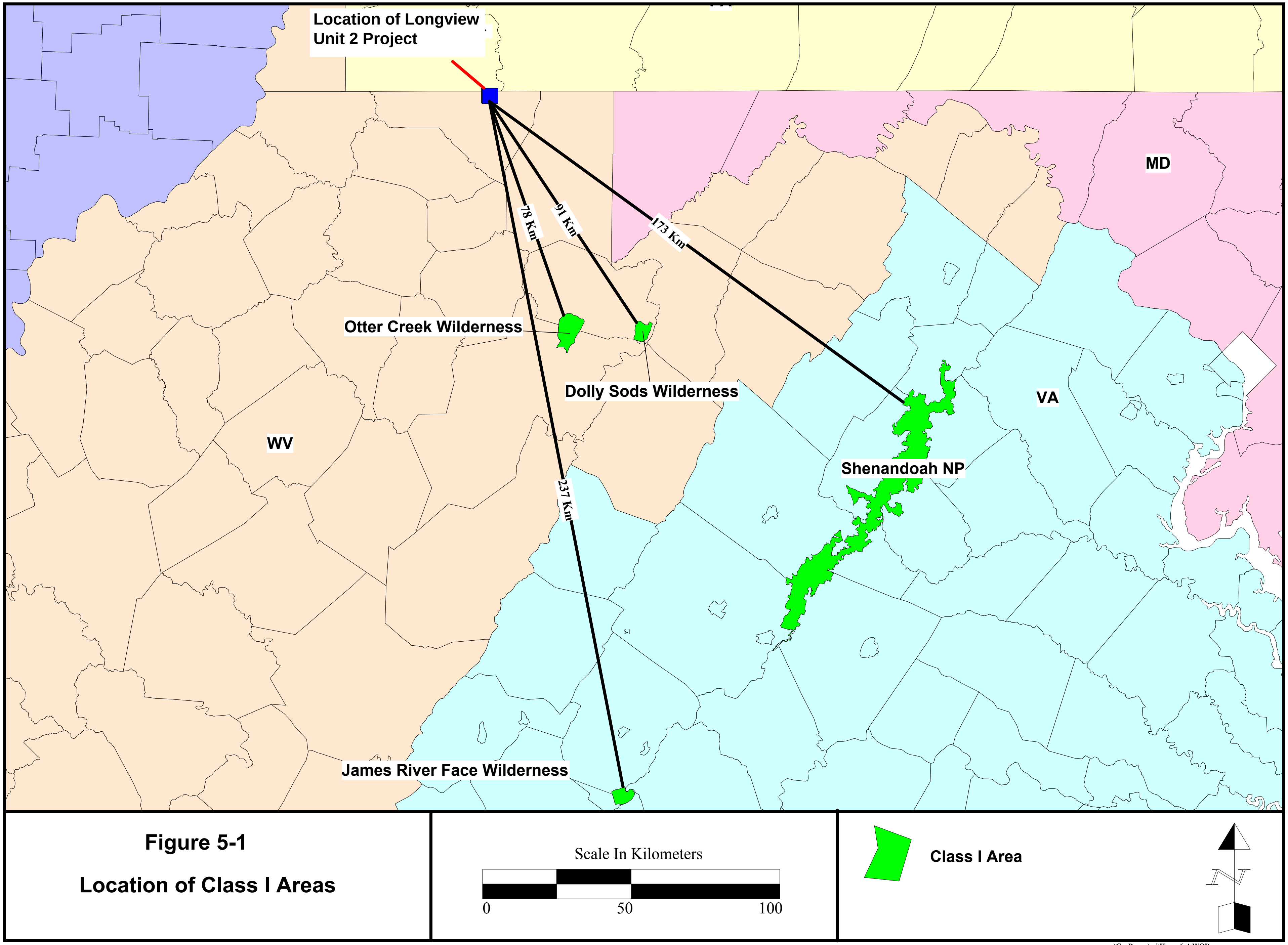

Figure 5-1

Location of Class I Areas

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maximum allowable emissions), divided by the distance (in km) from the Class I area (Q/D) is 10 or less. The Agencies would not request any further Class I AQRV impact analyses from such sources. The Q/D calculation for the proposed project is shown in Table 5-6. As seen from this table the Q/D calculation is less than for all four Class I Areas, therefore, no further Class I AQVR impact analysis is required.

5.5 OTHER AIR QUALITY RELATED VALUES ANALYSIS

PSD regulations also require an analysis of the effects of the proposed project on AQRVs in areas surrounding the project. These AQRVs include effects of other growth (residential, commercial, or industrial) associated with the project and possible impacts on sensitive flora, fauna, and soils. Growth-related AQRVs, such as influxes of additional population or increases in vehicular traffic, will not be significantly affected by the proposed project. The electricity produced by the project will be transmitted over a multi-state power grid and will not directly enable or support any additional local commercial, industrial, or residential development. The labor force required to operate the facility will be small and will be drawn from the local communities. Because there are no anticipated effects on growth, no detailed analysis for growth-related AQRVs will be required. The AQRV analysis for sensitive ecological communities will be made based on consultations with West Virginia DEP regarding any sensitive species or ecosystems that may exist within a 10-kilometer radius of the project.

Table 5-6
Q/D Calculations for Class I Areas

Total Project Emissions	**Q (tpy)**		
SO_2, NO_x, PM_{10}, and H_2SO_4	522		
Class I Area	**D (km)**	**Q/D**	**Q/D < 10?**
Shenandoah National Park	173	3.02	Yes
Dolly Sods	91	5.74	Yes
Otter Creek	78	6.70	Yes
James River Face	237	2.20	Yes

6. METEOROLOGICAL AND AMBIENT AIR QUALITY MONITORING EXEMPTION REQUEST

This section presents the results of an evaluation of the suitability of meteorological data collected at Morgantown, WV (surface observations) and Pittsburgh, PA (upper air observations) and air quality data from Morgantown, WV, Shadyside, OH and Charleroi, PA for the air quality modeling analysis of the proposed Longview Unit 2 Project. This evaluation used U.S. EPA approved criteria to demonstrate the adequacy and representativeness of the selected meteorological and air quality databases for the Longview Unit 2 Project.

6.1 METEOROLOGICAL MONITORING DATA

6.1.1 Approach

The meteorological data evaluation criteria contained in the U.S. EPA Guideline on Air Quality Models (40 CFR Part 51, App. W, Section 8.4.1.b) were used to assess the representativeness of the Morgantown, WV meteorological data for the Longview Unit 2 Project area. This document states: "*The meteorological data used as input to a dispersion model should be selected on the basis of spatial and climatological (temporal) representativeness as well as the ability of the individual parameters selected to characterize the transport and dispersion conditions in the area of concern*."

This document establishes the following parameters for selecting and evaluating meteorological data for air quality modeling:

- The proximity of the meteorological monitoring site to the project area under consideration.
- The complexity of the terrain.
- The exposure of the meteorological monitoring site and parameters monitored.
- The period of time during which data are collected.

Each of the parameters was used to evaluate the Morgantown, WV meteorological data. The results are provided in the following subsections.

6.1.2 Proximity of Meteorological Monitoring Site

The Morgantown Airport is located only 4.2 miles (6.4 km) southeast of the proposed Longview Unit 2 Project site and is the closest meteorological monitoring site collecting the parameters required for air quality modeling analysis. This proximity makes the Morgantown Airport the preferred source of meteorological data for evaluating the transport and dispersion of the Longview Unit 2 Project emissions. The locations of the Morgantown Airport and the proposed Longview Unit 2 Project site are shown in Figure 6-1.

6.1.3 Complexity of Terrain

The complexity of terrain surrounding a site is based upon the relationship of the terrain elevation to stack top and final plume height. U.S. EPA defines three categories of terrain for air quality modeling purposes:

- Simple terrain as terrain below stack top elevation.
- Complex terrain as any terrain that exceeds final plume height elevation.
- Intermediate terrain as any terrain between stack top and final plume height.

For air quality modeling analysis in simple terrain regions, meteorological data from the closest National Weather Service (NWS) station is usually satisfactory while for complex terrain and intermediate terrain locations onsite meteorological data may be required. Elevations of the terrain features surrounding the proposed Longview Unit 2 Project site and the expected final plume height for the CT stacks are discussed below.

The topography of the local area surrounding the Longview Unit 2 Project site is shown in Figure 6-2 which was adapted from the United States Geologic Survey (USGS) digital elevation data

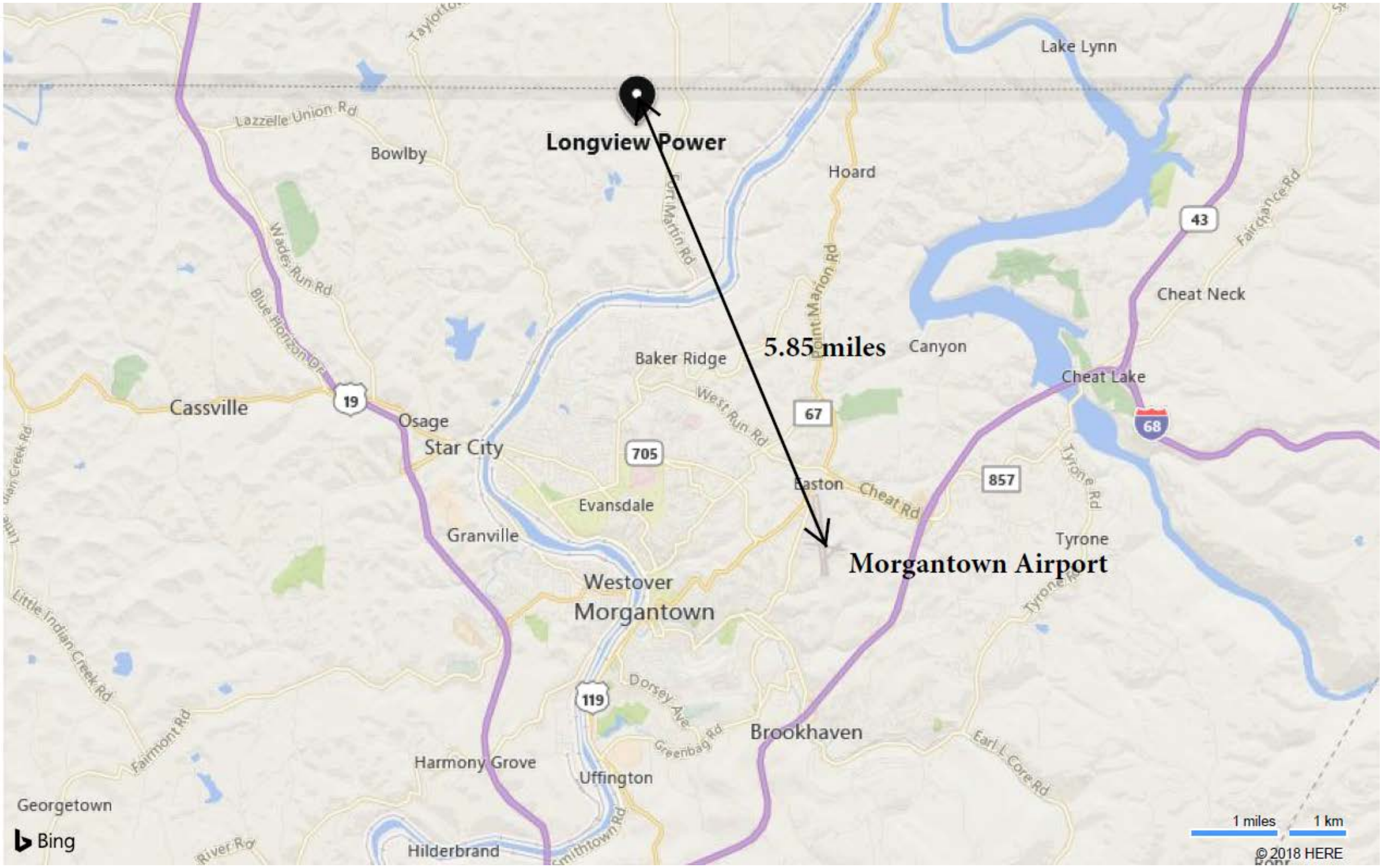

Figure 6 1
Location of the Longview Unit 2 Project
and Morgantown Airport

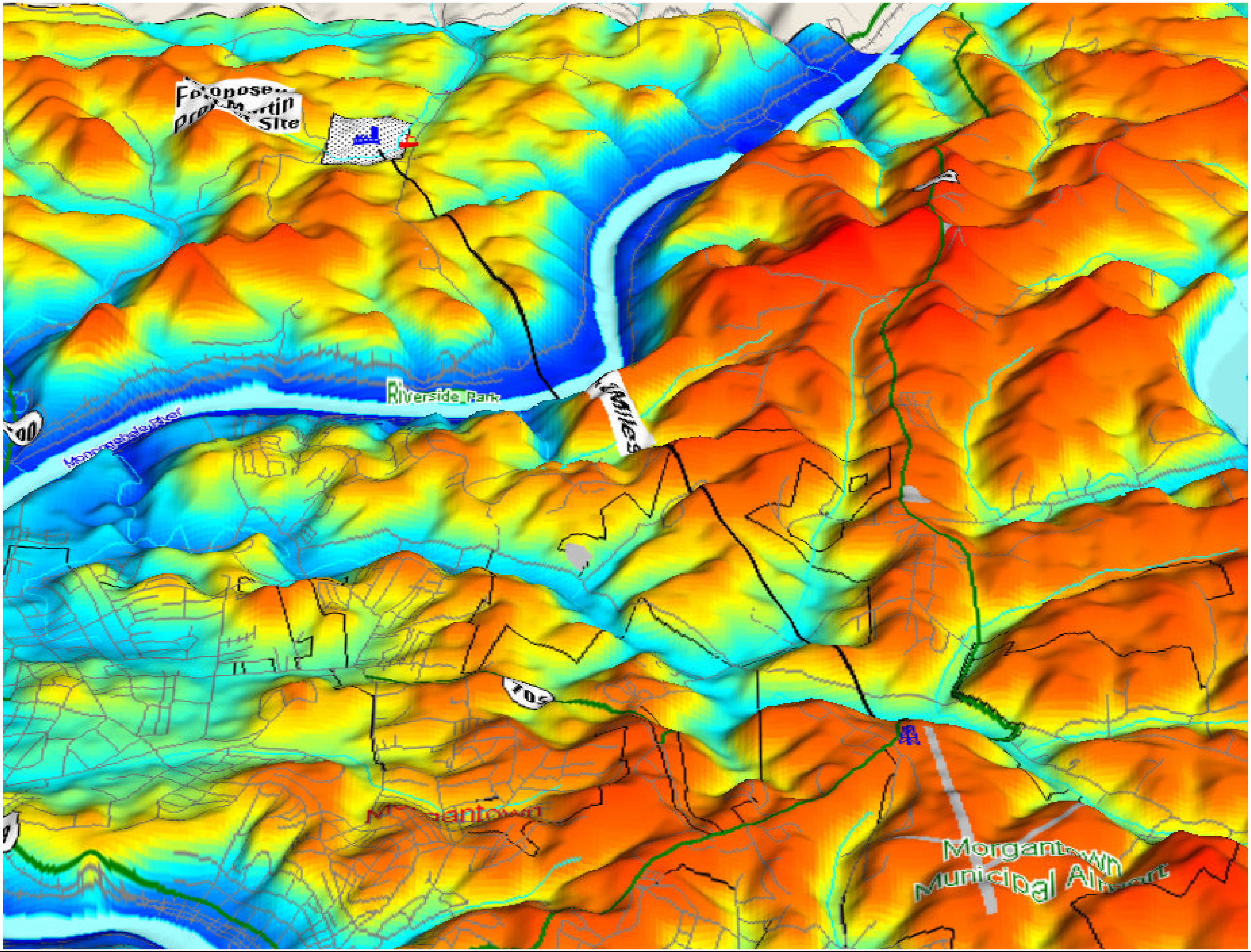

Figure 6-2 Topographic Map of the Fort Martin, WV Area

(DEM) for the Morgantown, WV area. The location of the project is also indicated in this figure.

The dominant feature of the Fort Martin area is the rapid increase in elevation away from the Monongahela River. The river elevation is approximately 820 ft. above mean sea level (amsl) (250 m amsl). Terrain of approximately 1,100 ft. amsl occurs within 700 feet (210 m) of the river. Moving further away from the river isolated terrain peaks of 1,300 ft. amsl (400 m amsl) occur within 5,000 ft. (1.5 km) of the Monongahela River. The highest terrain within 15 km of the project site is 2,464 ft. amsl (751 m amsl).

The elevation of the project site is approximately 1,150 ft. amsl (350 m amsl) and the elevation of the Morgantown Airport is 1,215 amsl (370 m amsl). Both of these locations exhibit some of the highest terrain in the project area. The height of the CT stack for the proposed Longview Unit 2 Project is 180 ft. above grade (54.9 m above grade). This places the stack top elevation at 1,330 ft. amsl (405 m amsl). The minimum expected plume elevation for the CT stack is 2,267 ft. amsl (691 m amsl) based on the stack exit parameters. The stack top elevation and the minimum plume elevation exceed all terrain elevations within 7 and 15 km, respectively of the project site. Thus, emissions from the CT stacks enter the atmosphere well above the surrounding terrain and the terrain immediately surrounding the stack is considered simple terrain by U.S. EPA definition.

Figure 6-3 presents the locations within 15 km of the Longview Unit 2 Project site where the terrain exceeds the minimum plume height. As indicated in Figure 6-3, the major feature between the Morgantown Airport and the Longview Unit 2 Project site is the Monongahela River valley. Also, the area between the airport and the Longview Unit 2 Project is considered simple terrain for air quality modeling purposes, based on the expected minimum plume height and height of the CT stack.

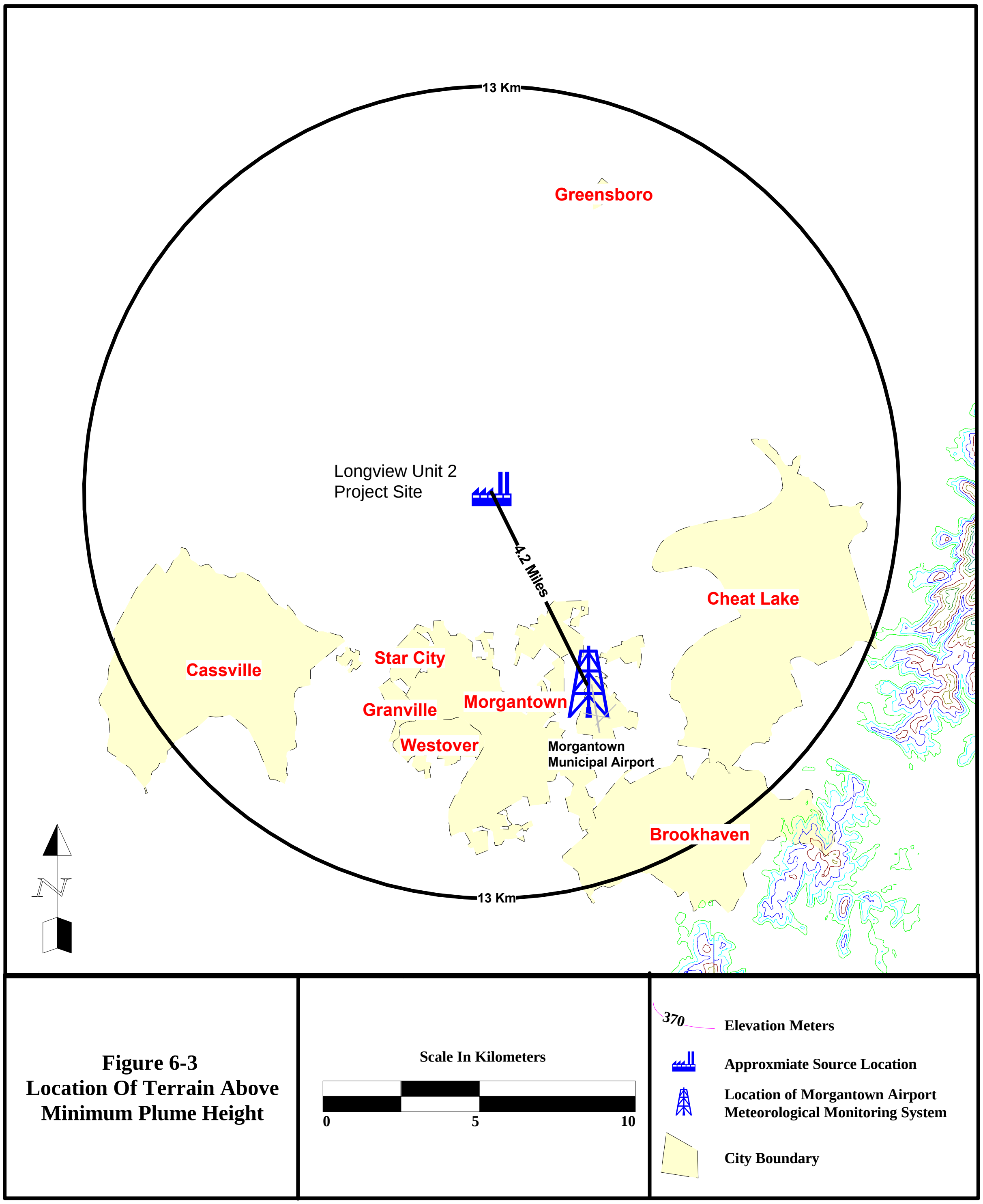

Figure 6-3
Location Of Terrain Above Minimum Plume Height

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6.1.4 Exposure/Monitoring Parameters

The meteorological measurements from the Morgantown Airport are made at approximately 6 meters above ground. This level is sufficient to represent the pollutant transport between the Project's CT stacks and the receptors of interest since there are no significant terrain features between the two sites.

The meteorological observations from the Morgantown Airport include hourly measurements sufficient to support the U.S. EPA AERMOD air quality model. These measurements include:

- Wind speed.
- Wind direction.
- Ambient temperature.
- Cloud cover.

6.1.5 Time Period

Five years of meteorological data are available from Morgantown Airport, which is sufficient to ensure that worst-case meteorological data are represented in the air quality modeling analysis of the Longview Unit 2 Project emissions. The most recent five-year data period with acceptable data recovery rates (i.e. greater than 95%) is 2014-2018 This data period is sufficient to support air quality modeling since it complies with the following U.S. EPA recommendations for meteorological data:

- A five (5) year data period.
- Collected at a National Weather Service (NWS) station.
- Consecutive years of data from the most recent, readily available period.

A wind rose for the five year period (2014-2018) for Morgantown Airport is presented in Figure 6-4. As seen from this figure, the prevailing winds are from the southwest, which occur

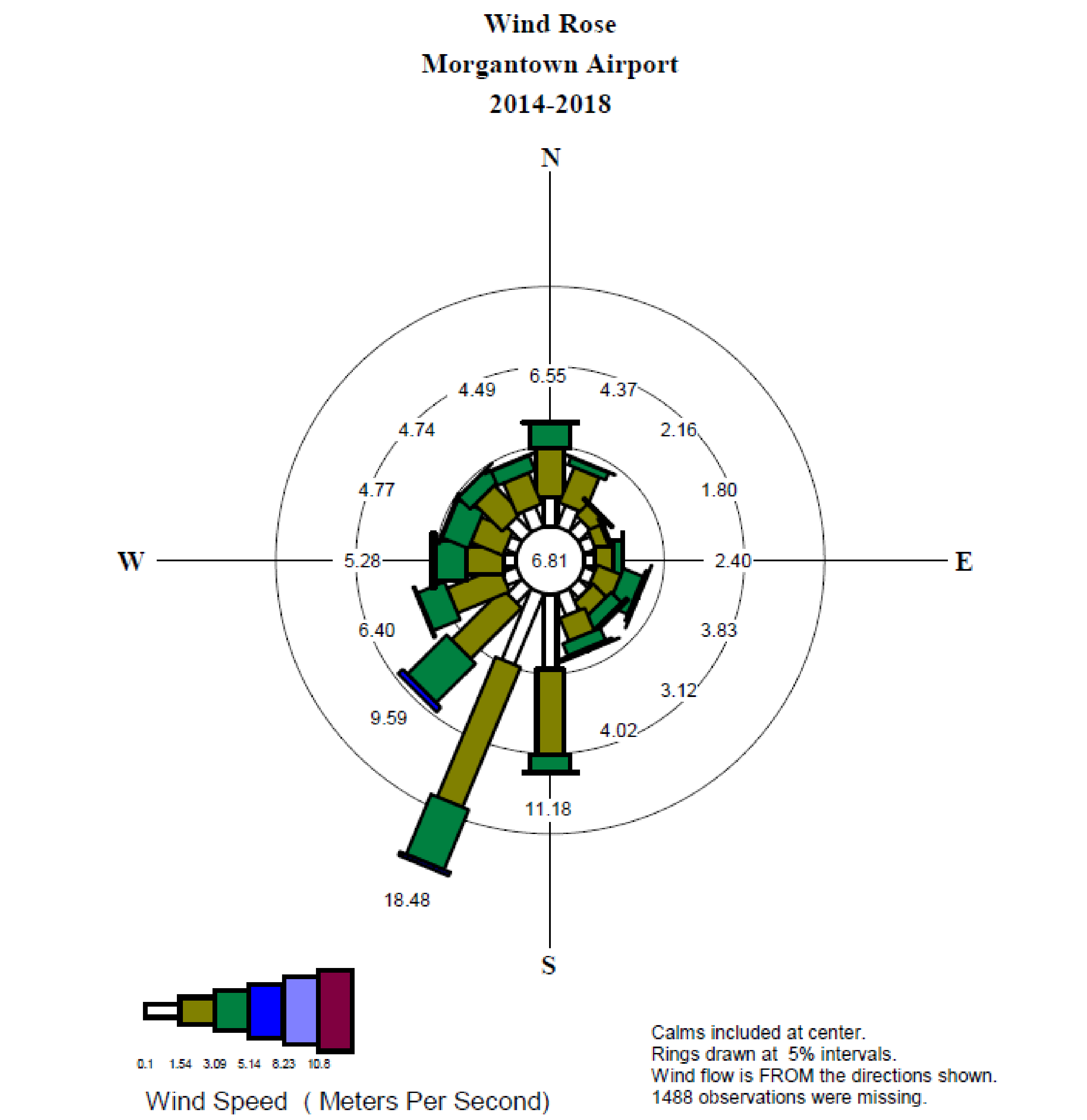

Figure 6-4
Wind Rose for Morgantown Airport (2014-2018)

approximately 14% of the time during the 5 year period, 2014-2018. Winds from the south quadrant (west southwest, south, and south-southwest) occur approximately 35% of the time. This wind pattern is typical of the synoptic scale flow for the Mid-Atlantic region of the United States. There is no evidence in the wind rose of the influence of any of the local terrain features in the Morgantown area.

6.1.6 Upper Air Monitoring Station

In addition to surface meteorological data from the Morgantown Airport, the air quality modeling of the Longview Unit 2 Project will require an upper air meteorological database. Upper air data are collected at a limited number of stations across the continental United States. The closest and most representative upper air station for the Longview Unit 2 Project is the Pittsburgh, NWS station. The data from this upper air station are routinely used for air quality modeling analyses in Northern West Virginia and are considered the most representative station available since it measures the same synoptic scale meteorological conditions at the Project site.

6.2 AMBIENT AIR QUALITY MONITORING DATA

The air quality data evaluation criteria contained in the U.S. EPA Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD) (U.S. EPA, 1987) were used to assess the representativeness of the existing WV DEP air quality monitoring data for the Project site.

This document establishes the following parameters for selecting and evaluating existing air data for air quality modeling:

- Air quality monitoring location.
- Data quality.
- Currentness of Data.

Each of the parameters was used to evaluate the existing air quality data from the WV DEP monitoring stations in Morgantown, WV. The results are provided in the following subsections.

6.2.1 Monitor Locations

This document establishes that the existing monitoring data should be representative of the following:

- The location of maximum concentration increase from the proposed source or modification.
- The location(s) of the maximum air pollutant concentration from existing sources.
- The location(s) of the maximum air pollutant concentration from both existing and proposed new source combined.

For a proposed source in an area of multi-source emissions and basically flat terrain (terrain below stack top) then the use of existing data from a nearby monitoring site may be used if:

- The existing monitoring is within 10 km of the points of proposed emissions

The previously subsections demonstrated that the Project area is considered flat terrain based on the proposed stack height and a base elevation of the Longview Unit 2 Project. Therefore, the air quality data from the existing monitoring station within 10 km can be used for the Longview Unit 2 Project. The locations of the existing monitoring station are presented in Figure 6-5. As seen from this figure, the existing monitors in Morgantown are all within 10 km of the proposed Longview Unit 2 Project. Therefore, the existing WV DEP monitors can be used to establish the existing air quality levels for the NAAQS compliance assessment of the air quality modeling analysis.

Since the DAQ monitoring station in Morgantown, WV does not measure PM_{10}, NO_x or CO levels, the air quality data from the Shadyside, OH and Charleroi, PA will also be used.

6.2.2 Data Quality

The existing monitoring data should be of similar quality as required by the PSD monitoring guidance (U.S. EPA, 1987). The monitoring stations in Morgantown, WV, Shadyside, OH and Charleroi, PA are all part of the State and Local Ambient Monitoring System (SLAMS) and meet all data quality requirements of the PSD monitoring guidance.

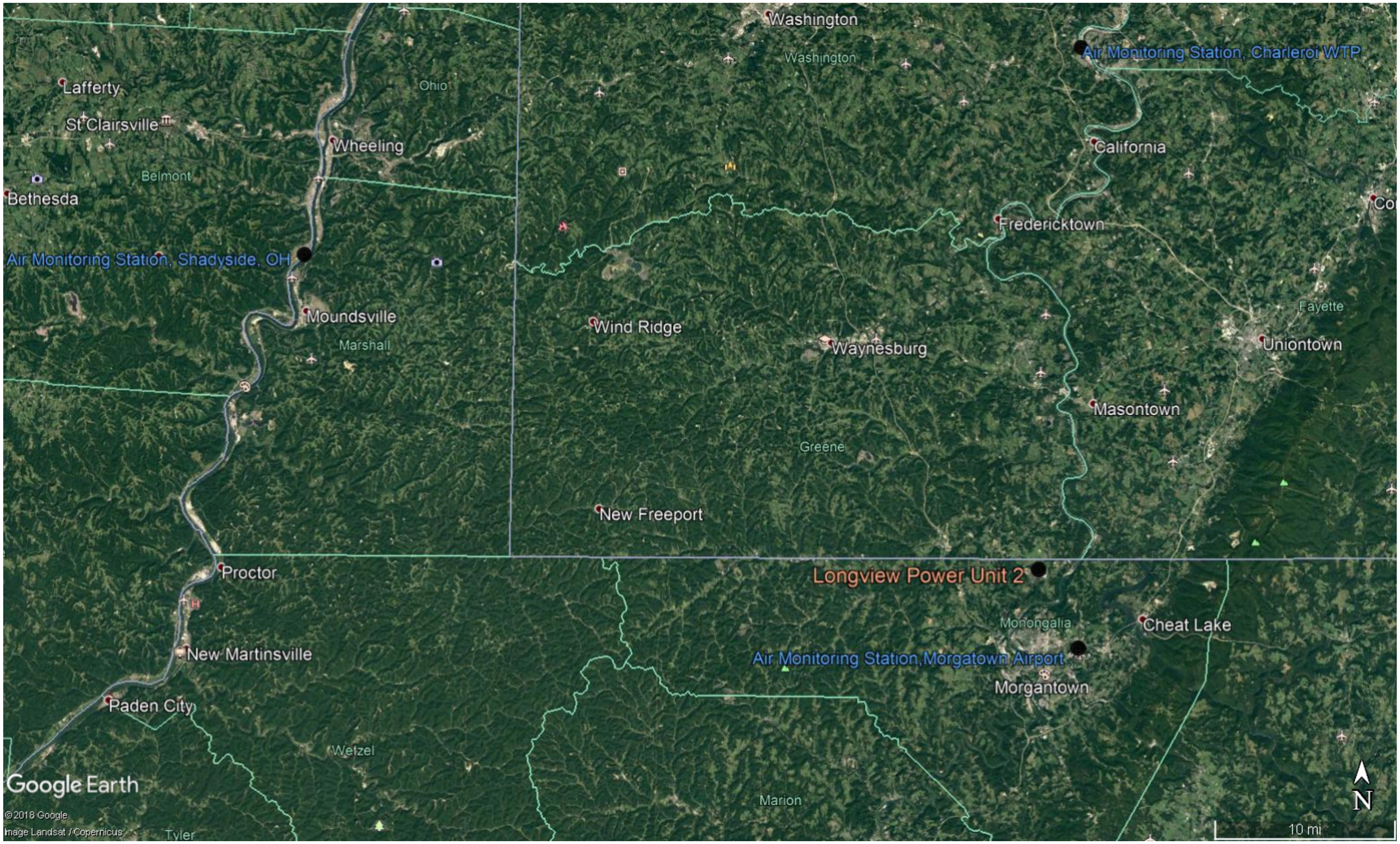

Figure 6-5
Location of Existing Air Quality Monitoring Stations

6.2.3 Currentness of Data

The air quality monitoring data should be current in order to represent the existing air quality levels. Generally, the air quality data must be collected within 3 years of the air quality permit application. The existing air quality data from the monitoring stations in Morgantown, WV, Shadyside, OH and Charleroi, PA are current since they are continuously operated by the state agencies. The most 3-year period available is 2016-2018

6.3 CONCLUSIONS

Based on the results of the evaluation presented in subsections 6.1 and 6.2 the air quality data from Morgantown, WV, Shadyside, OH and Charleroi ,PA and the meteorological data from Morgantown, WV, and Pittsburgh, PA are representative and adequate for the air quality modeling analysis of the Longview Unit 2 Project. This conclusion is reached based on the following considerations:

6.3.1 Meteorological Data

1. The Morgantown Airport is only 4.2 miles (6.4 km) southwest of the Longview Unit 2 Project Site.
2. The regional terrain is generally simple, non-complex terrain for air quality modeling purposes based on the elevation of the project site, the CT stack height and the expected minimum plume height of the CT stacks.
3. There are no intervening terrain between the project site and the Morgantown Airport to make the Morgantown meteorological data nonrepresentative of conditions at the Longview Unit 2 Project site
4. The exposure of the Morgantown Airport meteorological sensors is sufficient to represent the pollutant transport between the Longview Unit 2 Project site and the receptors of interest.
5. The time period of the Morgantown Airport data (5-year database) is sufficient to ensure that worst-case meteorological data are represented in the air quality modeling of the project emissions.
6. The meteorological measurements from the Morgantown Airport and Pittsburgh NWS station satisfy the data requirements of the U.S. EPA AERMOD air quality dispersion model.

7. The upper air station at Pittsburgh NWS station measures the same synoptic scale conditions as those experienced at the Project site.

6.3.2 Air Quality Data

1. The exiting WV DEP air quality monitor in Morgantown, WV is within 10 km of the proposed Longview Unit 2 Project and is of sufficient data quality and is current data.

7. MODELING RESULTS

The air quality modeling results will be summarized and described in a section of the PSD application. At a minimum the modeling results a discussion of the modeling procedures followed and include:

- Summary tables containing the pollutants, averaging periods, highest (and fourth, eighth, etc. highest, if appropriate) modeled concentration, background concentration, total concentration, and applicable ambient quality standards
- Summary table of the PSD increment analysis showing the increment consumed and the PSD increment (both Class I and Class II)
- Summary table of the Class I other AQRV analysis and threshold values.
- Summary table of the visibility impact (Class I and II)
- Concentration contour maps showing the extent of the air quality impacts.

Submitted with the PSD application will be all modeling input/output files (e.g., AERSCREEN, AERMOD, AERMET, AERMAP, AERSURFACE, BPIP-PRIME) and all files needed to construct and replicate the modeling analysis.

8. REFERENCES

U.S. EPA 1985 – “Guidelines for Determination of Good Engineering Practice Stack Height (Technical Support Document for Stack Height Regulations) Revised” EPA-450:4-80-023R, June 1985.

U.S. EPA 1987 – “Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD) May 1987.

U.S. EPA 1993 – “User's Guide to the Building Profile Input Program”, October 1993.

U.S. EPA 2018 – “Users Guide for the AERMOD Terrain Preprocessor (AERMAP) Revised – Draft” April 2018.

U.S. EPA 2017 – 40 CFR Part 51 Appendix W “Guideline on Air Quality Models (Revised)”, January 17, 2017

U.S. FS 2010 – “Federal Land Managers’ Air Quality Related Values Workgroup (FLAG) Phase I Report” 2010.

Andrews, Edward S

From:	McClung, Jon D
Sent:	Tuesday, March 12, 2019 11:36 AM
To:	Louis M. Militana
Cc:	Joseph Douglass; 'Brian Hoyt'; Andrews, Edward S; Kessler, Joseph R; Pursley, Steven R
Subject:	RE: Air Quality Modeling Protocol and Monitoring Exemption Request/Longview Power Unit 2 Project
Attachments:	West Virginia Division of Air QualityComments on Air Quality.pdf

Lou,

Attached are WV DAQ's comments on the protocol. Please contact me to go over any questions you may have.

Regards,
Jon.

____

Jonathan D. McClung, P.E.
West Virginia DEP
Division of Air Quality
601 57th Street SE
Charleston WV 25304
(304) 926-0499 ext. 1689
Jon.D.McClung@wv.gov

From: Louis M. Militana <lmilitana@aaqsinc.com>
Sent: Saturday, February 16, 2019 1:26 PM
To: McClung, Jon D <Jon.D.McClung@wv.gov>
Cc: Joseph Douglass <JDouglass@longviewpower.net>; 'Brian Hoyt' <bhoyt@longviewpower.net>; lmilitana@aaqsinc.com
Subject: Air Quality Modeling Protocol and Monitoring Exemption Request/Longview Power Unit 2 Project

Jon

Enclosed is the Air Quality Modeling Protocol and Monitoring Exemption Request for the air permit application for the proposed Longview Power Unit 2 Project.

After reviewing the protocol if you have any questions please contact me at (484) 224 6218 ext. 101 or by email at lmilitana@aaqsinc.com.

Louis M. Militana, QEP
Partner/Principal Consultant
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lmilitana@aaqsinc.com
Ambient Air Quality Services, Inc.

West Virginia Division of Air Quality
Comments on Air Quality Modeling Protocol and Monitoring Exemption Request for the Longview Power Unit 2 Project
Protocol Dated February 15, 2019

1. The final version of the modeling protocol needs to be signed by a responsible official for Longview Power.
2. For all loads, operating scenarios, startup/shutdown processes, etc., the protocol needs to specifically state which and how each will be modeled. Scenarios and/or equipment that is proposed by the applicant to be considered an intermittent emissions scenario needs to be identified as such and justified. Whether the proposed units are considered base load or peaking needs to be described and considered as any part of an intermittent emissions related discussion. Also, how and which loads/scenarios will be modeled in SIL analysis, cumulative analysis, visibility analysis, etc. needs to be described.
3. The AERMAP buffer of 500m and 1,000m beyond the receptor domain is probably not sufficient to accurately render the hill height scale if significantly higher terrain is beyond the buffer. The applicant should go 5km beyond the domain in both the x and y direction but specifically to the east where the terrain rises significantly past Cheat Lake (~900 ft) and heads up into the Allegheny Mountains (~2300 ft).
4. The applicant should include the Q/D calculations in the protocol. The calculations should be based on FLAG guidance to estimate the worst-case Q as based on 24-hour emissions scaled up to 365 days/yr.
5. The applicant should perform a Class I increment screening level assessment per Section 4.2 of Appendix W.
6. A Class II screening level visibility assessment needs to be proposed and performed by the applicant.
7. The proposed receptor grid is to be considered a starting point in determining the maximum impacts from the proposed emission sources. For each pollutant and averaging time, the applicant needs to construct and analyze contour plots of the predicted concentrations. The analysis of the resulting contour plots needs to determine if refinements to the modeling domain and/or grid resolution is necessary. For example, if concentration gradients are increasing near the edge of the modeling domain, the domain should be extended. If maximum or high concentrations are predicted in a coarse section of the grid then that area of the grid should be remodeled with a finer resolution to determine maximum modeled concentrations. The language in the modeling protocol should be modified to include these concepts. The receptor grid should initially extend, in all directions, at least 20 km from the proposed project.
8. The land-use/land-cover data used to develop the meteorological data set needs to be proposed and justified. For example, if 1992 NLCD data is proposed, a demonstration that the 1992 land-use/land-cover is representative of current conditions is necessary. A comparison between 1992 conditions and current conditions via satellite imagery would likely be useful.

9. As part of the demonstration of representativeness of meteorological data collection site to the proposed project site, a quantitative and qualitative comparison of albedo, bowen ratio, and surface roughness length should be included in the protocol.
10. The applicant needs to provide a proposal to demonstrate the affects of the project on ozone and secondary formation of $PM_{2.5}$. Guidance exists that may be applied to estimate modeled emission rates of precursors (MERPs) to assess a project's emissions of precursor pollutants as they relate to ozone and secondary formation of $PM_{2.5}$. Note too that SO_2 should be included as a precursor to secondary formation of PM2.5 even though it is below the (primary) significant emission rate PSD threshold for NSR. Secondary formation of $PM_{2.5}$ should be also be considered in the significant impact analysis.
11. The applicant should modify Table 3-3 to include ozone and include precursor pollutants and thresholds for ozone and secondary formation of $PM_{2.5}$.
12. A table should be added that summarizes the applicable pollutant air quality standards, averaging periods, Class II increments, and SILs.
13. In Table 5-1, the statistical form of the averaging period should be added to the table for each pollutant. For example, for 1-hour NO_2, the statistical form of the NAAQS is the 98^{th} percentile of the daily maximum, averaged over three years.
14. Page 5-3 states that concentrations from monitoring stations over the previous 3 years (2016-2018) will be used to establish the existing ambient air quality levels for NAAQS compliance evaluation. However, Table 5-1 lists only a single year for each pollutant and averaging period to be used for background data. The applicant should update the table to be consistent.
15. A discussion of whether AERMINUTE is appropriate for use and whether it will be used should be included.
16. Since the project is subject to PSD review for NO_2, Section 5.1 should include the interim SIL for 1-hr NO_2 of 4 ppb (7.5 $\mu g/m^3$) that WV DEP adopted on January 28, 2014. SILs should also be included for $PM_{2.5}$. The use of any SILs should be justified by ensuring that the difference between the NAAQS and the representative background concentration is greater than the SIL.
17. For NO to NO2 conversion, the Tier 2 uniform National Default Ratio of 0.75 (Appendix W, 2005) proposed by the applicant has been replaced by the Ambient Ratio Method 2 (ARM2, Appendix W, 2017).
18. Although identifying sources farther from the project source will be informative, the cumulative source NAAQS analyses should focus on considering sources within approximately 25km. Consultation with WV DEP to identify the appropriate source inventory is necessary and those sources whose SIA does not overlap the SIA of the Longview Unit 2 Project should not be automatically eliminated from the multi-source emission inventory.
19. Please label Figure 2-3, Plot Plan.
20. The protocol proposes surface meteorological data from the Morgantown Municipal Airport from 2013 to 2017. The most recent five years of data should be used. It appears that 2018 data is available from the Morgantown Municipal Airport.
21. Figure 4-1 notes that calms are excluded from the wind rose. The percentage of calms should be noted on the figure.

22. A description of the analysis for determining land use surrounding the source (i.e., urban vs. rural) should be included. For any land use data, a demonstration that the time-frame (i.e. 1992) of the land-use/land-cover is representative of current conditions is necessary.

23. The most recent version of BPIPPRM should be used, version dated 04274.

24. As part of the Good Engineering Practice Stack Height Analysis, Section 4.4, a labeled diagram of all existing and proposed structures at the facility should be included.

25. The applicant needs to consult with WV DEP prior to implementing a directional specific background concentration methodology as described in Section 5.3.

26. A discussion of the modeling results that will be provided by the applicant should be included in the protocol. Modeling Results: the modeling results should be provided as follows:
a) summarized and presented in tabular format that includes pollutants, averaging periods, highest (and fourth, eighth, etc. highest, if appropriate) modeled concentration, background concentration, total concentration, and applicable ambient standards.
b) include graphics (e.g., contour maps) that show the extent of the air quality impacts.

27. Modeling Files: submittal of all modeling input/output files (e.g., AERSCREEN, AERMOD, AERMET, AERMAP, AERSURFACE, BPIP-PRIME) and all files needed to construct and replicate the modeling analysis.

28. Section 5.3 of the protocol proposes to use NO_2 and CO background concentration data from a monitoring station in Shadyside, OH in the cumulative NAAQS analysis. Section 6.2.1 of the protocol indicates that NO_2 and CO data from a monitoring station in Greene County, PA will be used. Please identify which monitoring station will be used for the modeling analysis. Include monitor ID numbers.

Andrews, Edward S

From:	McClung, Jon D
Sent:	Tuesday, February 19, 2019 7:13 AM
To:	Andrews, Edward S; Kessler, Joseph R; Pursley, Steven R; Yuchniuk, Lee
Subject:	FW: Air Quality Modeling Protocol and Monitoring Exemption Request/Longview Power Unit 2 Project
Attachments:	Longview Unit 2 Modeling Protocol Final R2.pdf

Ed, Joe, Steve,

Please review the particular area(s) that you have been working on for past projects and prepare questions/comments.

Lee,

Please review the entire protocol and prepare questions/comments.

Thanks,
Jon.

From: Louis M. Militana <lmilitana@aaqsinc.com>
Sent: Saturday, February 16, 2019 1:26 PM
To: McClung, Jon D <Jon.D.McClung@wv.gov>
Cc: Joseph Douglass <JDouglass@longviewpower.net>; 'Brian Hoyt' <bhoyt@longviewpower.net>; lmilitana@aaqsinc.com
Subject: Air Quality Modeling Protocol and Monitoring Exemption Request/Longview Power Unit 2 Project

Jon

Enclosed is the Air Quality Modeling Protocol and Monitoring Exemption Request for the air permit application for the proposed Longview Power Unit 2 Project.

After reviewing the protocol if you have any questions please contact me at (484) 224 6218 ext. 101 or by email at lmilitana@aaqsinc.com.

Louis M. Militana, QEP
Partner/Principal Consultant
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AAQS
Ambient Air Quality Services, Inc.

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Ambient Air Quality Services, Inc.

February 15, 2019

Jon McClung
WVDEP
Division of Air Quality
601 57th St.
Charleston, WV 25304

RE: Air Quality Modeling Protocol and Monitoring Exemption Request for the Longview Power Unit 2 Project

Dear Mr. McClung:

Enclosed is the Air Quality Modeling Protocol and Monitoring Exemption Request for the air permit application for the proposed Longview Power Unit 2 Project.

After reviewing the protocol if you have any questions please contact me at (484) 224 6218 ext 101 or by email at lmilitana@aaqsinc.com.

Very truly yours,
AAQS Inc.

Louis M. Militana, QEP
Partner/Principal Consultant

FINAL

AIR QUALITY MODELING PROTOCOL AND MONITORING EXEMPTION REQUEST FOR THE LONGVIEW UNIT 2 PROJECT

Submitted to:
West Virginia Department of Environmental Protection
Division of Air Quality
601 57th Street, SE,
Charleston, WV 25304

Prepared by:
Ambient Air Quality Services, Inc.
107 Hidden Fox Dr.
Suite 101A
Lincoln University, PA 19352

February 15, 2019

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1. INTRODUCTION

1.1 BACKGROUND

Longview Power, LLC (Longview Power) currently owns and operates the Longview Power Plant in Maidsville, WV which is a modern advanced supercritical 700 mw coal-fired Unit 1 facility. Longview Power is proposing to develop a two-phase expansion which includes a which 1,200 megawatt (MW) Combined Cycle Gas fired Turbine (CCGT) Unit 2 facility and a photovoltaic renewable energy Unit 3 that will be up to 50 MW in size. The CCGT facility is referred to as the Longview Unit 2 Project (Project).

The Unit 2 Project is proposed to be a nominally rated 1,200 MW natural gas-fired only (no oil backup), combined-cycle gas turbine (CCGT) located immediately adjacent to the North of the current Unit 1 location. The facility will be designed to achieve a peak electrical output of approximately 1,200 MW. Electricity generated by the Project will be supplied to the PJM power grid and connect to the grid via the existing interconnection used by the Longview Power Plant.

The major components of the proposed project include:

- One combined cycle power train consisting of two state-of-the-art natural gas-fueled advanced class combustion turbines, two heat recovery steam generators (with duct burners), and one steam turbine.
- Diesel fuel-fired firewater pump.
- Diesel fuel-fired emergency generator.
- Wet mechanical draft cooling tower.
- Aqueous ammonia tanks for the selective catalytic reduction pollution control system.

No auxiliary boiler is planned for the project. Any start-up steam requirement will be supplied by the Longview Power auxiliary boiler.

The proposed project will be subject to West Virginia Department of Environmental Protection (WVDEP), Division of Air Quality (DAQ) regulations 45CSR13 and 45CSR14 (known as Part 13 and 14 regulations) and Federal Prevention of Significant Deterioration (PSD).

1.2 PURPOSE

Under the West Virginia Department of Environmental Protection (WVDEP), Division of Air Quality (DAQ) regulations, the proposed the Project will be subject Part 13 and 14 regulations, which require a permit-to-construct for any major/minor stationary source. Since the adjacent Longview Power facility is defined as a 100 ton-per-year (TPY) major source under 40 CFR Part 52.21(2)(i) (i.e., federal PSD regulations) one or more regulated air pollutant emissions from the Project which exceed applicable significant emission threshold levels will require an air quality modeling impact analysis. An ambient impact analysis is also a required component of the DAQ air permit application. The ambient impact analysis utilizes the results of air quality modeling to demonstrate that the project will not cause or contribute to an air quality level which exceeds a state or Federal Ambient Air Quality Standard, a PSD increment and/or Class I Area air quality related value (AQRV).

Prior to conducting any air modeling analysis to support the air permit application, an air quality modeling protocol must be prepared and submitted to the DAQ for review and approval. This document outlines the proposed approach or protocol to be followed in conducting an air quality modeling analysis for Class I and II areas in order to demonstrate compliance with the applicable National Ambient Air Quality Standards (NAAQS), PSD increments and visibility/deposition impacts. The technical approach that is proposed follows accepted U.S. EPA guidance and previous experience. This document also contains a meteorological and ambient air quality monitoring exemption request.

1.3 DOCUMENT ORGANIZATION

Section 2 of the protocol provides a description of the project site and the project components. Section 3 contains the emissions inventory for the proposed emission units. Section 4 describes the air quality model selection and input data, including the selected air dispersion model, land use and topography, receptor grid, meteorological data and "good engineering practice" (GEP) stack height analysis. Section 5 discusses the approach for the summarization and presentation of the air quality modeling results, including the Class I and II area assessment. The air quality/meteorological monitoring exemption request is in Section 6 of the document. Section 7 presents the references referred to in this protocol.

Information provided at this time is based on the preliminary design of the Project. As new or revised information is developed after submission of this document that may significantly affect the proposed design of the facility and its potential impact on air quality, the appropriate portion(s) of the document will be revised and resubmitted to the DAQ.

2. PROJECT LOCATION AND DESCRIPTION

This section of the air quality modeling protocol describes the proposed project location and the proposed project.

2.1 PROJECT LOCATION

The proposed Project will be located on the Longview Power site in Maidsville, Monongalia County, West Virginia. The site is situated approximately 2,500 feet south of the Pennsylvania border, 3,000 feet west of the Monongahela River, and one mile north of Morgantown, West Virginia. The location of the Longview Power site is shown in Figure 2-1.

The geographic coordinates for the approximate center of the proposed project site are:

- Latitude: 39.7124 and Longitude: -79.9608
- UTM Easting: 589,077.73 and Northing: 4,396353.40
- UTM Zone: 17

(UTM = Universal Traverse Mercator)

The area in which the project will be located is in attainment of all of the National Ambient Air Quality Standards (NAAQS) pollutants.

The dominant land features of the Project area are the Monongahela River and the rapid increase in elevation away from the river. The river elevation is approximately 820 ft. above mean sea level (amsl) (250 m amsl). Terrain of approximately 1,100 ft. amsl occurs within 700 feet (210 m) of the river. Moving further away from the river isolated terrain peaks of 1,300 ft. amsl (400 m amsl) occur within 5,000 ft. (1.5 km) of the Monongahela River. The highest terrain within 15 km of the project site is 2,464 ft. amsl (751 m amsl).

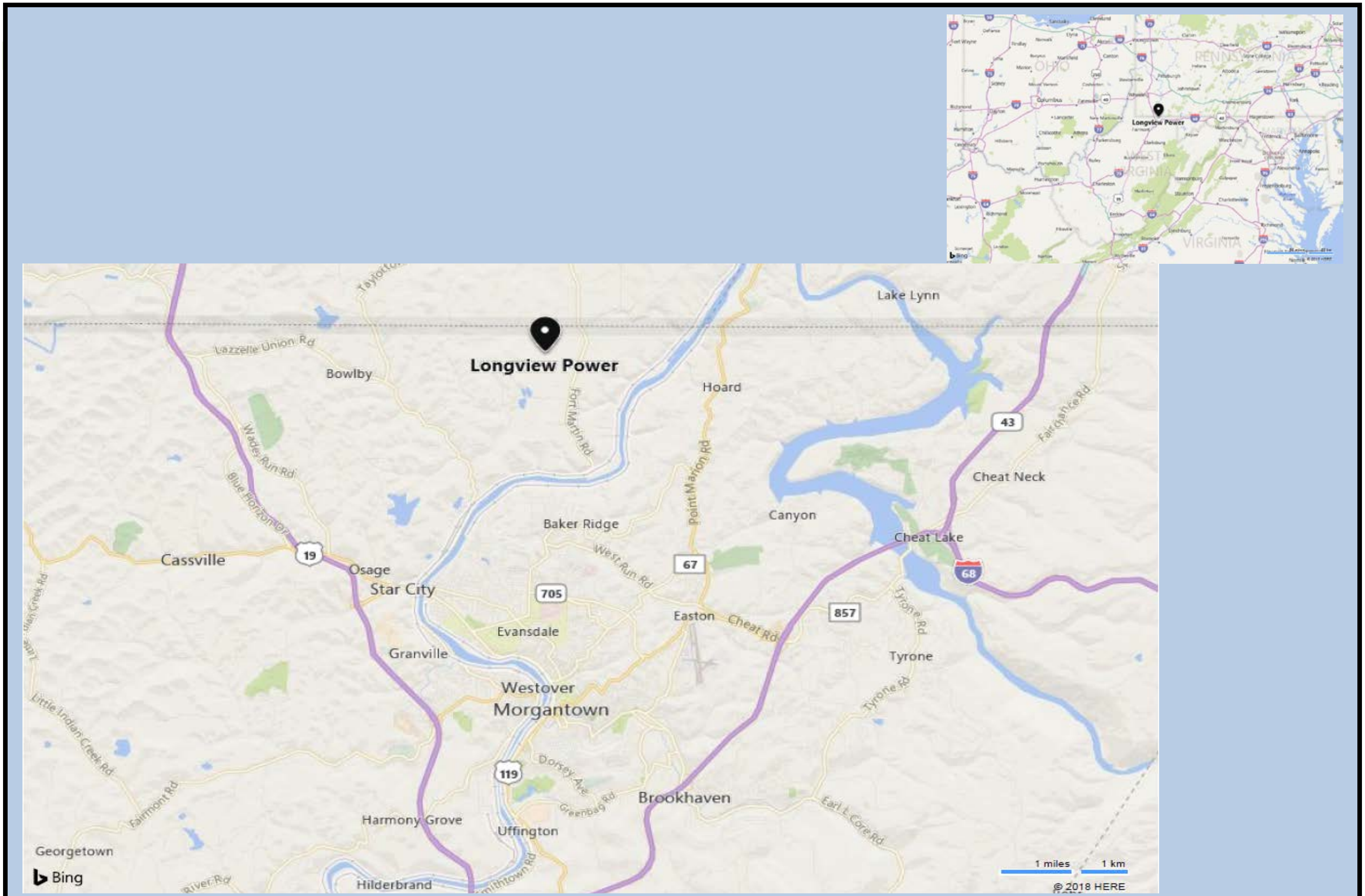

Figure 2-1
Location of Proposed Longview Power Unit 2 Project

2.2 PROJECT DESCRIPTION

The Longview Power Unit 2 Project is proposed to be a nominally rated 1,200 MW natural gas-fired only (no oil backup), combined-cycle power plant located immediately adjacent to the north of the existing Longview Power Unit 1. The Project will be designed to achieve a peak electrical output during the summer season of approximately 1,200 MW. Electricity generated by Unit 2 will be supplied to the PJM power grid and connect to the grid via the existing interconnection used by the Longview Power Unit 1.

The major components of the proposed power plant include: One combined cycle power train consisting of two combustion turbines, two heat recovery steam generators (HRSG) with duct burners, one steam turbine, one diesel fuel-fired firewater pump, one diesel fired emergency generator and one mechanical draft cooling tower.

To enhance the plant's overall efficiency and increase the amount of electricity generated by the Project, the hot exhaust gases from each combustion turbine will be routed to a downstream Heat Recovery Steam Generator. The HRSGs contains a series of heat exchangers designed to recover the heat from the turbine's exhaust gas and produce steam. The Project includes the installation of duct burners to produce additional steam in the HRSGs for additional power output from the steam turbine generator. The duct burners will only fire natural gas. No oil backup is planned for the Project.

Cooled exhaust gas passing through the HRSGs will be vented to the Selective Catalytic Reduction (SCR) and Oxidation Catalyst control system used to control NO_x and CO emissions. Selective Catalytic Reduction involves the injection of aqueous ammonia (NH_3) at a concentration of approximately 19% by weight into the combustion turbine exhaust gas streams. The ammonia reacts with NO_x in the exhaust gas stream in the presence of a catalyst, reducing it to elemental nitrogen (N_2) and water vapor (H_2O). The aqueous ammonia will be stored on-site in dual 60,000 gallon (approximate) storage tanks.

Steam generated in the HRSGs will be routed to a steam driven turbine that will increase the output of the electric generator. This generator will produce additional electricity that will be sold

on the grid. Electricity generated by the combustion turbines and the single steam driven turbine driving the electric generator represents the Project's total electrical output.

The Project will use a condenser and a 14 cell wet mechanical draft cooling tower for steam turbine generator steam condensation and waste heat rejection.

Figure 2-2 provides a General Arrangement Drawing and Figure 2-3 presents a plot plan of the plant. More detailed descriptions of the Project components are in the following subsections.

2.2.1 Combustion Turbines

The combustion turbines (CT) produce shaft power to drive an electric generator. Natural gas and combustion air are combusted producing a high velocity discharge which rotates a turbine shaft. The exhaust gases exiting the combustion turbines are routed to an HRSG to recover heat and generate steam. The combustion turbines will be General Electric (GE) 7HA.02 or equivalent, each with a nominal electric generation capacity of approximately 400 MW and a maximum rated heat capacity of 3,970 MMBtu/hr. [Higher Heating Value (HHV)] at cold day ambient temperature of -5 °F. The combustion turbines will be fired with natural gas only and will be equipped with Dry Low NO_x burners.

2.2.2 Heat Recovery Steam Generators/Steam Turbine

Exhaust gas from the combustion turbine is routed to the HRSG through insulated ductwork, where it passes through the water and steam HRSG heat exchanging sections. The gas is then discharged to the atmosphere through the integral HRSG exhaust stack with a silencer. Heat is transferred by primary convection from the hot CT exhaust gas to the feed water and steam systems. The feed water and steam will flow inside the vertically oriented finned tubes, and the gas flow will be directed horizontally across the tube rows.

For maximum flexibility, the bottoming cycle portion of a combined cycle is "oversized" to allow for higher output of the steam turbine than what could otherwise be achieved using the exhaust energy produced by the CT alone. The exhaust gases leaving the CT contain enough

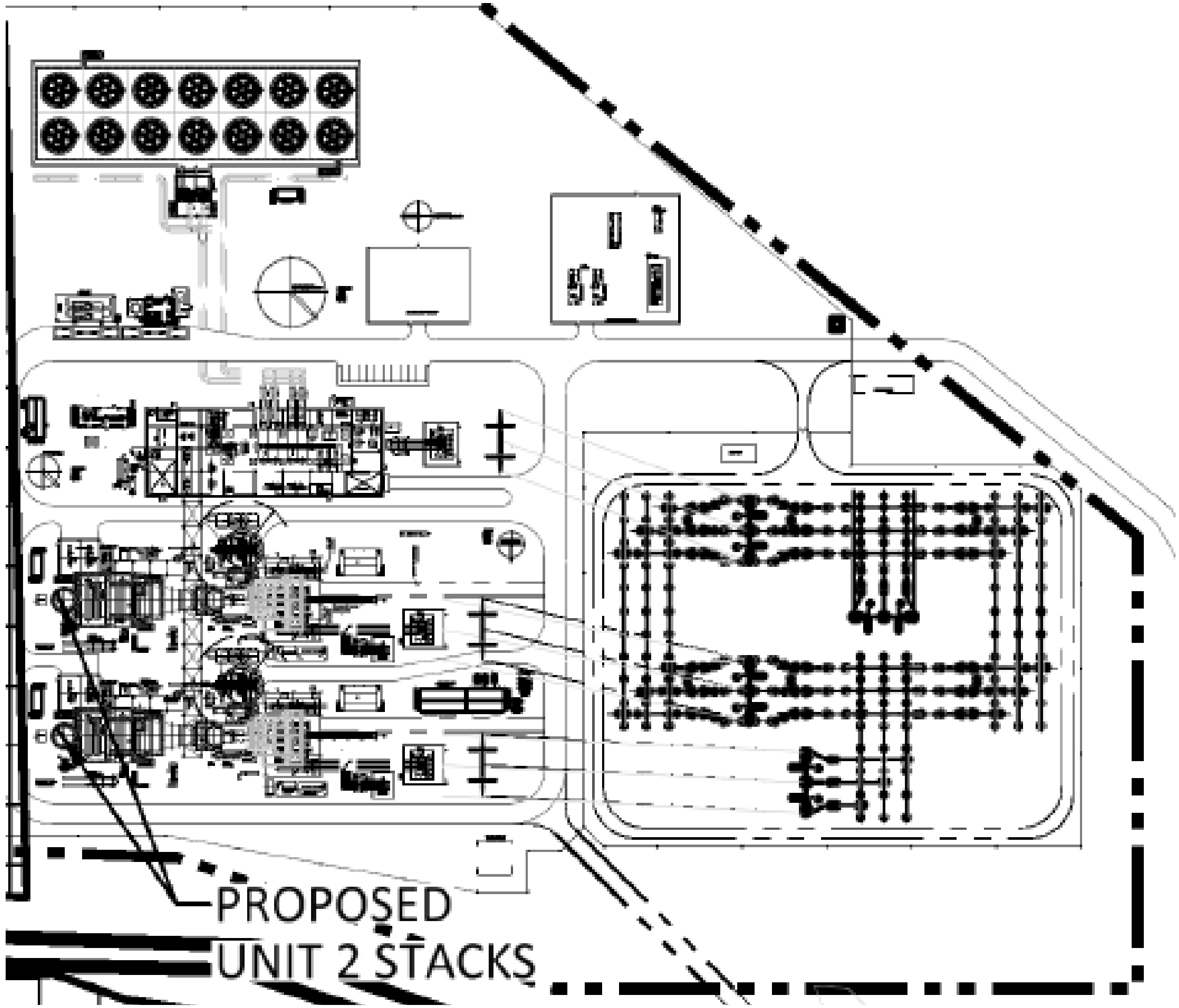

Figure 2 2
General Arrangement Drawing

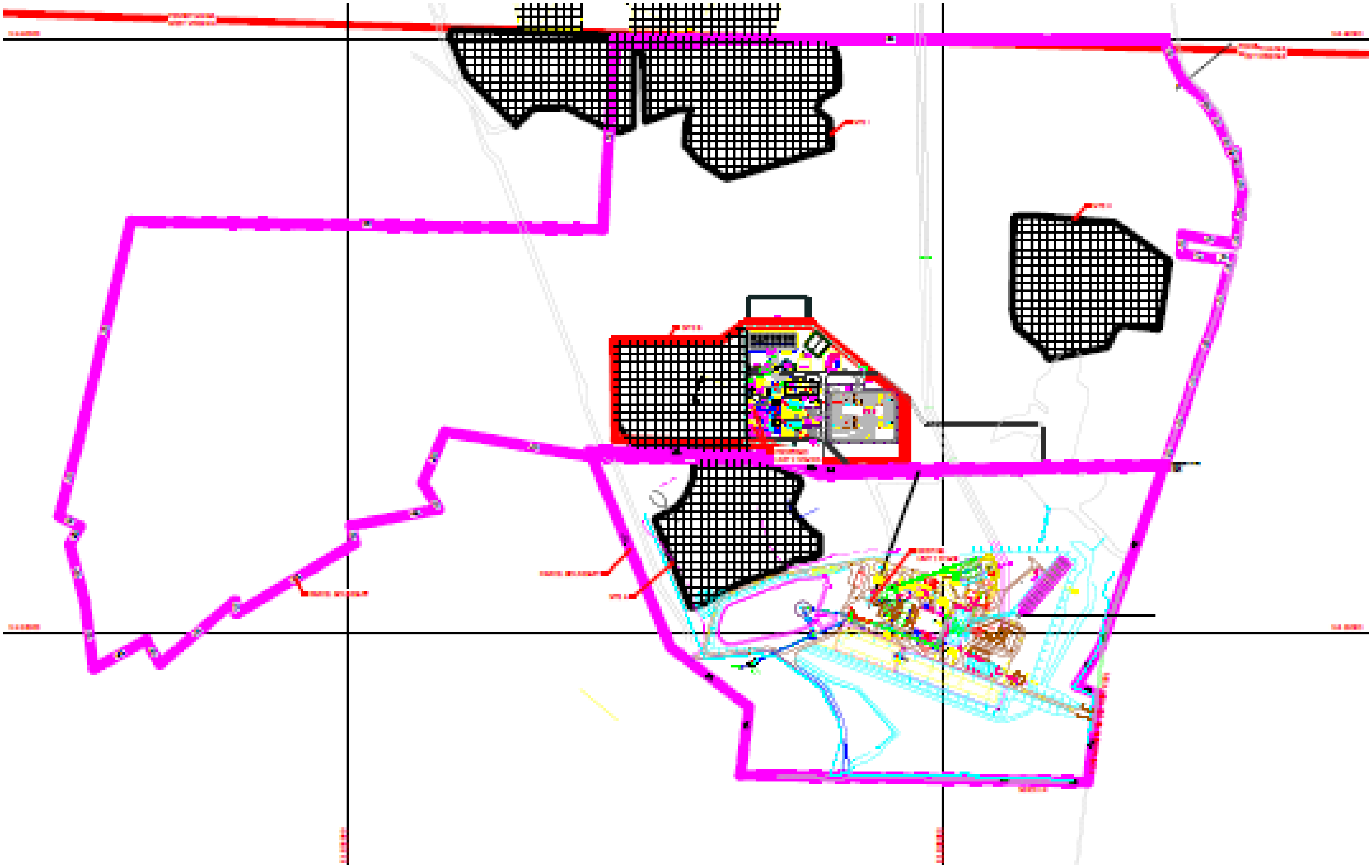

Figure 2-3
Plot Plan

oxygen to support additional combustion of fuels. Additional heat is added to the bottoming cycle using Low NOx duct burners with a maximum rated heat capacity of 250 MMBtu/hr-HHV per HRSG. This additional heat produces additional steam, which is passed through the ST flow path for additional electrical output (approximately 60 MW). The supplemental HRSG duct firing system consists of the duct burners, duct burner management system, duct burner fuel metering and regulation skid, and fuel supply.

The HRSG will be equipped with a selective catalytic reduction (SCR) system to limit NO_x emissions, and a catalytic Oxidation (CO) system to limit carbon monoxide and volatile organic compound emissions. The duct burners will not operate independently of the combustion turbine.

No auxiliary boiler will be constructed for the Project. Instead, via an interconnect with existing Unit 1, steam will be provided via the existing Unit 1 Auxiliary Boiler and also allow for bi-directional steam flow between Units 1 and 2.

2.2.3 Steam Turbine/Generator

The steam turbine/generator will utilize the steam developed in the HRSG to generate electricity. The steam turbine generator will receive steam from the HRSG and will discharge the low-pressure exhaust steam to the condenser. The steam turbines have a maximum rating of 430 MW each (maximum).

2.2.4 Mechanical Draft Cooling Tower

The ST exhausts directly into the condenser, where the steam is condensed by the circulating water passing through the condenser tubes. Condensate formed in the condenser is collected in the hot well. Recoverable steam and condensate from cycle drains and other reclaimable steam are also routed to the condenser hot well. The steam surface condenser relies on the circulating water system to provide cooling water for heat exchange. The circulating water system rejects the waste heat to atmosphere via a wet mechanical draft cooling tower by sensible heat transfer (increasing the temperature of the air passing across the tower) and latent heat transfer (evaporating a portion of the circulating water into the air passing across the tower). The cooling tower is designed to reject heat returned from the steam surface condenser and the plant auxiliary cooling water system. The now cooled circulating water is collected in the cooling tower basin, and pumped back to the condenser water boxes, repeating the process. A circulating water chemical feed system will be included.

During the cooling process, small water droplets, known as cooling tower drift, escape to the atmosphere through the cooling tower exhaust. To minimize this effect, the cooling tower will be equipped with drift eliminators. The drift eliminators provide multiple directional changes of airflow which helps prevent the escape of water droplets.

2.2.5 Diesel fired firewater pump

A 240 hp, 179 kW standby firewater pump will be used to supply water during emergency conditions. The fire water pump will use ultra-low sulfur diesel (ULSD) fuel, with a sulfur content no greater than 0.0015% by weight. The fire water pump will also be periodically operated for short periods per manufacturer's maintenance instructions to ensure operational readiness in the event of an emergency. The fire water pump is expected to operate less than 100 hours per year.

2.2.6 Diesel fired emergency generator

An emergency generator will be used for emergency backup electric power. The fuel for the emergency generator will be ULSD with a sulfur content no greater than 0.0015% by weight. The emergency generator will be periodically operated for short periods per manufacturer's maintenance instructions to ensure operational readiness in the event of an emergency. The emergency generator is expected to operate less than 100 hours per year.

2.2.7 Fuel Gas Heaters/Gas Compressor

Two (2) fuel gas heaters will be used to preheat the gaseous fuel received by the plant. Preheating the fuel prior to combustion in the CTs increases their efficiency, safeguards the fuel pipelines from icing, and protects the CTs from fuel condensates.

The fuel supply for the Unit 2 CCGT will be provided via a 6.2 mile 20" pipeline interconnecting onto both the Columbia 1804 and 10240 interstate pipelines located near Greensboro, PA. At this interconnection, there will be a metering station allowing connection with the dual supply lines that are integral to the Columbia pipeline. Gas compression equipment will be added to this line and will have those facilities located on the Unit 2 site.

2.3 OPERATING SCENARIOS

The typical range of operating scenarios for the Project is shown in Table 2-1 and includes three load conditions (50%, 75%, and 100%) with the duct burner and/or evaporative cooler either operating or not operating and various start-up and shut-down conditions. Each of the operating scenarios has unique exhaust gas conditions and pollutant emission rates. The typical operating scenario is for the combustion turbine to operate at or near 100% of the design capacity and highest hourly emission rates are associated with winter day, 100% load, with duct firing.

Start-up conditions for the combustion turbines represent periods from initial firing until the system reaches steady state operations.

Start-up modes include:

- cold starts (restarts made more than 72 hours of shutdown).
- warm starts (between 8 and 72 hours of shutdown).
- hot starts (less than 8 hours of shutdown).

Shutdown conditions represent periods where system output is lowered below steady state conditions until the cessation of fuel firing. Shutdown commences when the turbine loads reach less than 50% load with the intent to stop operations. The proposed emission limits for the combustion turbines should not apply during periods of start-up (cold, warm or hot) and shutdown. The annual emissions for the entire facility, which are discussed in Section 3, include 260 start-ups (208 hot startups, 40 warm startups, and 12 cold startups) and 260 shut-down.

Table 2-1
Summary of Potential Operating Scenarios for Selected Design Conditions

	Case Description	CTG Load	Ambient DBT/RH	Inlet Cooling	Duct Firing	Blowdown	Fuel Type	Configuration
1	Summer Day,100% CTG Load, Duct Firing, Evap ON	100	92.0/45.7	On	On	0%	NG	2x1
2	Summer Day,100% CTG Load, Evap ON	100	92.0/45.7	On	Off	0%	NG	2x1
3	Summer Day,100% CTG Load, Duct Firing	100	92.0/45.7	Off	On	0%	NG	2x1
4	Summer Day,100% CTG Load	100	92.0/45.7	Off	Off	0%	NG	2x1
5	Summer Day,75% CTG Load	75	92.0/45.7	Off	Off	0%	NG	2x1
6	Summer Day,50% CTG Load	50	92.0/45.7	Off	Off	0%	NG	2x1
7	Summer Day, MECL CTG Load	MECL	92.0/45.7	Off	Off	0%	NG	2x1
8	Average Day,100% CTG Load, Duct Firing, Evap ON	100	63.0/70.1	On	On	0%	NG	2x1
9	Average Day,100% CTG Load, Evap ON	100	63.0/70.1	On	Off	0%	NG	2x1
10	Average Day,100% CTG Load, Duct Firing	100	63.0/70.2	Off	On	0%	NG	2x1
11	Average Day,100% CTG Load	100	63.0/70.2	Off	Off	0%	NG	2x1
12	Average Day,75% CTG Load	75	63.0/70.2	Off	Off	0%	NG	2x1
13	Average Day,50% CTG Load	50	63.0/70.2	Off	Off	0%	NG	2x1
14	Average Day, MECL CTG Load	MECL	63.0/70.2	Off	Off	0%	NG	2x1
15	Winter Day,100% CTG Load, Duct Firing	100	-5.0/90.0	Off	On	0%	NG	2x1
16	Winter Day,100% CTG Load	100	-5.0/90.0	Off	Off	0%	NG	2x1
17	Winter Day,75% CTG Load	75	-5.0/90.0	Off	Off	0%	NG	2x1
18	Winter Day,50% CTG Load	50	-5.0/90.0	Off	Off	0%	NG	2x1
19	Winter Day, MECL CTG Load	MECL	-5.0/90.0	Off	Off	0%	NG	2x1
20	Summer Day,100% CTG Load, Duct Firing, Evap ON	100	92.0/45.7	On	On	0%	NG	1x1
21	Summer Day,100% CTG ON	100	92.0/45.7	On	Off	0%	NG	1x1
22	Summer Day,100% CTG Load, Duct Firing	100	92.0/45.7	Off	On	0%	NG	1x1
23	Summer Day,100% CTG Load	100	92.0/45.7	Off	Off	0%	NG	1x1
24	Summer Day,75% CTG Load	75	92.0/45.7	Off	Off	0%	NG	1x1
25	Summer Day,50% CTG Load	50	92.0/45.7	Off	Off	0%	NG	1x1
26	Summer Day, MECL CTG Load	MECL	92.0/45.7	Off	Off	0%	NG	1x1
27	Average Day,100% CTG Load, Duct Firing, Evap ON	100	63.0/70.1	On	On	0%	NG	1x1
28	Average Day,100% CTG Load, Evap ON	100	63.0/70.1	On	Off	0%	NG	1x1
29	Average Day,100% CTG Load, Duct Firing	100	63.0/70.2	Off	On	0%	NG	1x1
30	Average Day,100% CTG Load	100	63.0/70.2	Off	Off	0%	NG	1x1
31	Average Day,75% CTG Load	75	63.0/70.2	Off	Off	0%	NG	1x1
32	Average Day,50% CTG Load	50	63.0/70.2	Off	Off	0%	NG	1x1
33	Average Day, MECL CTG Load	MECL	63.0/70.2	Off	Off	0%	NG	1x1
34	Winter Day,100% CTG Load, Duct Firing	100	-5.0/90.0	Off	On	0%	NG	1x1
35	Winter Day,100% CTG Load	100	-5.0/90.0	Off	Off	0%	NG	1x1
36	Winter Day,75% CTG Load	75	-5.0/90.0	Off	Off	0%	NG	1x1
37	Winter Day,50% CTG Load	50	-5.0/90.0	Off	Off	0%	NG	1x1
38	Winter Day, MECL CTG Load	MECL	-5.0/90.0	Off	Off	0%	NG	1x1

Notes: 1. The Duct Firing cases shall be designed to provide approximately a 15% increase over the STG unfired output.
2. CTG - Combustion Turbine Generator, DBT - Dry-Bulb Temperature (deg F), RH - Relative Humidity, NG - Natural Gas, Listed steam conditions: M (kpph), P (psia), T (deg F), MECL - Minimum Emissions Compliance Load

3. EMISSIONS INVENTORY

3.1 PROPOSED PROJECT EMISSION RATES

The emission units associated with the proposed Longview Unit 2 Project include the combustion turbines, HRSG duct burners, emergency generator, fire pump, gas preheaters and gas compressor equipment. All units will be natural gas-fired except the fire water pump and emergency generator, which are diesel fuel fired. The following subsections provide brief summaries of the pertinent emissions data for each emission unit.

3.1.1 Combustion Turbines

3.1.1.1 Normal Operating Condition

The combustion turbine will be a General Electric Frame GE 7HA.02 gas turbine (or equivalent) with supplemental HRSG duct firing with inlet air-cooling and will combust natural gas only. The combustion turbine will have a rated heat input of 3,561.2 MMBtu/hr (approximate) while operating at an average ambient temperature of 62° F. The heat input capacity of the combustion turbine increases at lower ambient temperatures and decreases at higher ambient temperatures.

The combustion turbine will be equipped with dry low NO_x combustor technology to minimize the formation of NO_x. Pollutant emission rates from the combustion turbine are obtained directly from the performance data provided by General Electric. The maximum projected emission rates are equal to the highest emission rate over a range of operating conditions (load and ambient air temperature). The temperature and load conditions analyzed are 50%, 75% and 100% load and minimum, average and maximum design temperatures of -5, 63 and 92 ºF, respectively.

A summary of the maximum hourly and annual emission rates for the normal operating conditions of the combustion turbine is provided in Table 3-1.

Table 3-1
Potential Maximum Hourly Emission Rate from one Combustion Turbine/HRSG Set

	Case Description	CTG Load	Ambient DBT/RH	Inlet Cooling	Duct Firing	Blowdown	Fuel Type	Configuration	NO2	CO	VOC	SO2[a]	PM
1	Summer Day,100% CTG Load, Duct ON	100	92.0/45.7	On	On	0%	NG	2x1	28	16.8	5.5	4.13	19.1
2	Summer Day,100% CTG ON	100	92.0/45.7	On	Off	0%	NG	2x1	26.5	16.1	4.6	3.88	13.2
3	Summer Day,100% CTG Load, Duct Firing	100	92.0/45.7	Off	On	0%	NG	2x1	27.1	16.3	5.4	3.99	18.7
4	Summer Day,100% CTG Load	100	92.0/45.7	Off	Off	0%	NG	2x1	25.5	15.5	4.4	3.74	12.9
5	Summer Day,75% CTG Load	75	92.0/45.7	Off	Off	0%	NG	2x1	20.3	12.4	3.6	2.99	10.4
6	Summer Day,50% CTG Load	50	92.0/45.7	Off	Off	0%	NG	2x1	15.7	10.4	7.1	2.32	8.5
7	Summer Day, MECL CTG Load	MECL	92.0/45.7	Off	Off	0%	NG	2x1	15.7	10.4	7.1	2.32	8.5
8	Average Day,100% CTG Load, Duct Firing, Evap ON	100	63.0/70.1	On	On	0%	NG	2x1	28.4	17	5.6	4.18	19.2
9	Average Day,100% CTG Load, Evap ON	100	63.0/70.1	On	Off	0%	NG	2x1	26.8	16.3	4.7	3.93	13.4
10	Average Day,100% CTG Load, Duct Firing	100	63.0/70.2	Off	On	0%	NG	2x1	28.2	17	5.5	4.16	19.2
11	Average Day,100% CTG Load	100	63.0/70.2	Off	Off	0%	NG	2x1	26.6	16.2	4.6	3.91	13.4
12	Average Day,75% CTG Load	75	63.0/70.2	Off	Off	0%	NG	2x1	21.2	12.9	3.7	3.12	10.9
13	Average Day,50% CTG Load	50	63.0/70.2	Off	Off	0%	NG	2x1	16.4	9.8	3.7	2.41	8.7
14	Average Day, MECL CTG Load	MECL	63.0/70.2	Off	Off	0%	NG	2x1	16.4	9.8	3.7	2.41	8.7
15	Winter Day,100% CTG Load, Duct Firing	100	-5.0/90.0	Off	On	0%	NG	2x1	29.1	17.4	5.6	4.28	19.6
16	Winter Day,100% CTG Load	100	-5.0/90.0	Off	Off	0%	NG	2x1	27.5	16.7	4.9	4.03	13.7
17	Winter Day,75% CTG Load	75	-5.0/90.0	Off	Off	0%	NG	2x1	24.5	14.9	4.3	3.59	12.4
18	Winter Day,50% CTG Load	50	-5.0/90.0	Off	Off	0%	NG	2x1	18.2	16	10.5	2.7	9.7
19	Winter Day, MECL CTG Load	MECL	-5.0/90.0	Off	Off	0%	NG	2x1	18.2	16	10.5	2.7	9.7
20	Summer Day,100% CTG Load, Duct ON	100	92.0/45.7	On	On	0%	NG	1x1	28	16.8	5.5	4.13	19.1
21	Summer Day,100% CTG ON	100	92.0/45.7	On	Off	0%	NG	1x1	26.5	16.1	4.6	3.88	13.2
22	Summer Day,100% CTG Load, Duct Firing	100	92.0/45.7	Off	On	0%	NG	1x1	27.1	16.3	5.4	3.99	18.7
23	Summer Day,100% CTG Load	100	92.0/45.7	Off	Off	0%	NG	1x1	25.5	15.5	4.4	3.74	12.9
24	Summer Day,75% CTG Load	75	92.0/45.7	Off	Off	0%	NG	1x1	20.3	12.4	3.6	2.99	10.4
25	Summer Day,50% CTG Load	50	92.0/45.7	Off	Off	0%	NG	1x1	15.7	10.4	7.1	2.32	8.5
26	Summer Day, MECL CTG Load	MECL	92.0/45.7	Off	Off	0%	NG	1x1	15.7	10.4	7.1	2.32	8.5
27	**Average Day,100% CTG Load, Duct Firing, Evap ON**	**100**	**63.0/70.1**	**On**	**On**	**0%**	**NG**	**1x1**	**28.4**	**17**	**5.6**	**4.18**	**19.2**
28	Average Day,100% CTG Load, Evap ON	100	63.0/70.1	On	Off	0%	NG	1x1	26.8	16.3	4.7	3.93	13.4
29	Average Day,100% CTG Load, Duct Firing	100	63.0/70.2	Off	On	0%	NG	1x1	28.2	17	5.5	4.16	19.2
30	Average Day,100% CTG Load	100	63.0/70.2	Off	Off	0%	NG	1x1	26.6	16.2	4.6	3.91	13.4
31	Average Day,75% CTG Load	75	63.0/70.2	Off	Off	0%	NG	1x1	21.2	12.9	3.7	3.12	10.9
32	Average Day,50% CTG Load	50	63.0/70.2	Off	Off	0%	NG	1x1	16.4	9.8	3.7	2.41	8.7
33	Average Day, MECL CTG Load	MECL	63.0/70.2	Off	Off	0%	NG	1x1	16.4	9.8	3.7	2.41	8.7
34	Winter Day,100% CTG Load, Duct Firing	100	-5.0/90.0	Off	On	0%	NG	1x1	29.1	17.4	5.6	4.28	19.6
35	Winter Day,100% CTG Load	100	-5.0/90.0	Off	Off	0%	NG	1x1	27.5	16.7	4.9	4.03	13.7
36	Winter Day,75% CTG Load	75	-5.0/90.0	Off	Off	0%	NG	1x1	24.5	14.9	4.3	3.59	12.4
37	Winter Day,50% CTG Load	50	-5.0/90.0	Off	Off	0%	NG	1x1	18.2	16	10.5	2.7	9.7
38	Winter Day, MECL CTG Load	MECL	-5.0/90.0	Off	Off	0%	NG	1x1	18.2	16	10.5	2.7	9.7

[a] Sulfur content of 0.4 grains/100 scf of natural gas

3.1.1.2 Start-Up and Shutdown Conditions

Emissions during start-up and shutdowns of the combustion turbines will be estimated for the air permit application using vendor supplied information and the expected number of cold, warm and hot start-ups which would occur each year. The emissions from start-ups and shutdown have not been performed for the air quality modeling protocol.

3.1.2 Heat Recovery Steam Generator Duct Burners

The Heat Recovery Steam Generator (HRSG) duct burner will have a design heat input capacity of 227 MMBtu/hr (HHV) (approximate) and will combust natural gas. The HRSG will primarily operate in the recovery or “unfired” mode (i.e., no duct burner) utilizing heat from the proposed combustion turbine exhaust gases to generate steam. The HRSG and duct burner cannot operate independently from the proposed combustion turbine. The exhaust gases from the combustion turbines and duct burners will be discharged to the atmosphere downstream of the HRSG through a 180-ft stack.

The duct burner will be of a “low-NO_x” design in order to control emissions of nitrogen oxides. Maximum hourly emissions from the duct burner are estimated based on operation at full capacity and on emission factors from performance data sheets for the units as supplied by the manufacturer. Annual emissions are based on 8,500 hours per year of normal operation which assumes 260 hours of startup/shutdown for the balance of the year.

A summary of the maximum hourly and annual combustion turbine and duct burner emission rates (assuming natural gas firing) is provided in Table 3-1.

3.1.3 Other Combustion/Process Sources

The other minor combustion and/or process sources of the Project include:

- Firewater pump
- Emergency generator
- Gas preheaters
- Gas Compressor equipment

The fire water pump and emergency generator will be ULSD fuel fired. The fire water pump has a rating of 240 HP and the emergency generator is rated at 1,000 kW. The fire water pumps and emergency generators will be limited to 100 hrs./year of operation, respectively.

The estimated emissions for the fire water pump, emergency generator, and preheaters will be included in the final air permit application but for the purposes of the air quality modeling protocol have not been included.

3.1.4 Facility-Wide Maximum Potential Annual Emission Rates

A summary of the potential annual emission rates for the entire Longview Unit 2 Project (combustion turbines and duct burners) is provided in Table 3-2. The potential annual emissions presented are for two CTs and Operating Case No 27 in Table 3-1 which is an average day, 100% CTG load, duct firing, and evaporation on.

3.2 HAZARDOUS AIR POLLUTANT EMISSIONS

A summary of the potential annual hazardous air pollutant (HAP) emissions from the combustion turbines and duct burners will be provided with the air permit application but have not been included in the air quality modeling protocol.

The emissions for formaldehyde will be developed using USEPA emission for hazardous air pollutants from natural gas-fired stationary gas turbines and duct burners (Hazardous Air Pollutant (HAP) Emission Control Technology for New Stationary Combustion Turbines, Sims Roy, Docket A-95-51, August 21, 2001, Table 3) and then assuming 90% removal for formaldehyde by the catalytic oxidation system. These removal rates are based on information provided by the vendor of the catalytic oxidation system.

It is not expected that the emissions from the Longview Unit 2 Project will exceed 10 tons per year for any single HAP or 25 tons per year for HAPs in aggregate. Therefore, the proposed project is not expected to be a major source of HAP emissions and will not be subject to case by case Maximum Achievable Control Technology (MACT).

Table 3-2
Maximum Potential Annual Emissions
Operating Case No. 27

Pollutant	Total Project Annual Emissions (tons/year)
NO_x	249
VOCs	49
CO	149
PM/PM_{10} /$PM_{2.5}$	168
SO_2	37
H_2SO_4	31

3.3 PSD AND NSR APPLICABILITY DETERMINATION

The potential annual emission rates associated with the proposed Longview Unit 2 Project are used to determine the applicability of PSD and non-attainment New Source Review (NSR) requirements. PSD applicability is determined by comparing the potential emission rate from the project for each criteria pollutant that is in attainment with the National Ambient Air Quality Standards (NAAQS) to the respective significant emission threshold levels. The Longview Unit 2 Project will be located in Monongalia County, West Virginia that is designated as "in attainment" or "unclassifiable" for all regulated air pollutants so nonattainment NSR review does not apply.

The Project triggers PSD applicable since it is a new source at a listed 100 TPY source under 40 CFR 52.21 and the project's potential to emit of at least one criteria pollutant is greater the PSD significant emission levels presented in Table 3-3. As seen from this table the proposed project is subject to federal PSD requirements for NO_x, CO, particulates (PM/PM_{10} and $PM_{2.5}$) and H_2SO_4.

Table 3-3
Comparison of Project Maximum Emissions to PSD Significance Levels

Pollutant	Annual Emissions (tons/year)	PSD Significance Level (tons/year)	PSD Pollutant
NO_x	249	40	Yes
VOCs	49	40	Yes
CO	149	100	Yes
$PM/PM_{10}/PM_{2.5}$	168	25/15/10	Yes
SO_2	37	40	No
H_2SO_4	31	7	Yes

4. AIR QUALITY MODEL SELECTION AND INPUT DATA

The air quality dispersion model to be used in the air quality modeling analysis of the Longview Unit 2 Project will be a U.S. EPA air dispersion model. The air quality modeling analysis will include refined air dispersion models used in a refined and screening mode. The procedures used in conducting the modeling analysis will follow the requirements outlined in 40 CFR Part 51 Appendix W “Guideline on Air Quality Models” (U.S. EPA 2017), guidance provided by West Virginia DAQ, and other state and federal regulatory agency documents.

4.1 AIR DISPERSION MODEL SELECTION

The air quality modeling analysis will use an air dispersion model to predict ambient air impacts from the proposed project. The AERMOD (**AER**MIC **MOD**el) air dispersion model system will be used for the screening and refined analysis to establish the receptor distances, for identification of worst-case operating scenarios and building wake cavity zone analysis. Description of this model is provided in the following subsections.

4.1.1 AERMOD Model Selection

The **A**MS/**E**PA **R**egulatory **MOD**el (AERMOD, 18081) air dispersion model will be used to perform the air quality modeling analysis. The AERMOD air dispersion model is an approved U.S. EPA air dispersion model for performing refined, multi-source air quality modeling studies. The AERMOD air dispersion model contains sophisticated dispersion algorithms. A description of the AERMOD model is provided below.

The American Meteorological Society (AMS) and the U.S. Environmental Protection Agency (EPA) formed the **A**MS/**E**PA **R**egulatory **M**odel **I**mprovement **C**ommittee (AERMIC) in 1991. The goal of the committee was to introduce planetary boundary layer (PBL) concepts into a new air dispersion model. The use of PBL concepts in AERMOD represents a more sophisticated approach to predicting plume dispersion than the approach used by the ISCST3 model. The PBL concepts include using dispersion parameters (sigma y and sigma z) that are based on either measured or estimated turbulent intensities, accounting for non-homogenous conditions throughout the PBL, improving the treatment of plume rise, and enhancing the way concentrations at complex terrain receptors (i.e. terrain receptors with elevations above stack top elevation) are predicted by incorporating the concept of a critical dividing streamline.

AERMOD uses an abbreviated approach to the three-dimensional terrain feature representation and critical dividing streamline approach that is used by the Complex Terrain Dispersion Model Plus Algorithms for Unstable Situations (CTDMPLUS). The AERMOD approach determines the fraction of the plume that is below the critical dividing streamline height (Φ from 0.0 to 1.0) and then uses that number as a scaling factor. The scaling factor, Φ, is multiplied by the concentration that represents the plume flowing around the terrain feature and then 1- Φ is multiplied by the concentration that represents the plume flowing over the terrain feature. The AERMOD concentration is the sum of the two, scaled concentrations. AERMOD differs from CTDMPLUS in its treatment of flow around a terrain feature by not considering the lateral splitting of the plume that occurs as the plume flows around a terrain feature. In its present form, AERMOD uses the Schulman-Scire and Huber-Synder downwash algorithms that are contained in ISCST3.

The AERMOD modeling system consists of two pre-processors and the dispersion model. AERMET (Version 18081) is the meteorological pre-processor and AERMAP (Version 18081) is the terrain pre-processor that characterizes the terrain and generates receptor elevations. The AERMET pre-processor, which is very similar to the CTDMPLUS meteorological pre-processor (METPRO), produces a file containing an hourly, vertical profile of the atmosphere and a file that includes surface and micrometeorological data. The AERMAP pre-processor is designed to develop receptor grid height information based on United States Geological Survey (USGS) digital elevation model (DEM) data. The development of the receptor grid includes assigning receptor elevations to the receptor locations and also assigning a hill height scale to each receptor. Receptor elevations are determined by finding the four closest DEM elevation points to the receptor location and averaging the elevations to represent the receptor. Hill height scales for all receptors are determined by examining the height and proximity of all DEM points within the modeled domain area to each receptor location. The domain used in AERMAP included the area covered by the Cartesian receptors plus an additional 500-meter buffer in the x-direction and a 1,000-meter buffer in the y-direction. Surface elevations for all receptors will be obtained from USGS 1:24,000 Level II DEM data when available and Level I when not available.

Other components of this system include AERSURFACE, a surface characteristics preprocessor, and BPIPPRIME, a multi-building dimensions program incorporating the GEP technical procedures for PRIME applications.

The AERMOD air dispersion model has various options to simulate a variety of dispersion conditions for emissions from a stack or non-stack source. The U.S. EPA has recommended various default options to be used in dispersion modeling for regulatory purposes. These recommended regulatory default options will be used in the air quality impact analysis as follows:

- Stack-tip downwash.
- Model Accounts for Elevated Terrain Effects.
- Calms Processing Routine Used.
- No Exponential Decay for Rural Mode.
- Upper bound value for "super squat" buildings.
- Missing meteorological data processing used.

4.2 RECEPTOR GRID

The AERMOD air quality modeling study will use a Cartesian receptor grid network including fence line receptors. A description of the receptor grids network is provided in the following subsections.

4.2.1 AERMOD Receptor Grid

The receptor network for the AERMOD analysis will minimally cover a square region 20-km on a side, centered on the proposed project site. All receptors will be referenced to the UTM coordinate system (Zone 17), using the North American Datum of 1927 (NAD 27). A rectangular Cartesian coordinate receptor grid will be used as the main receptor grid. The main receptor grid will be centered on the CT stacks and have the following grid spacing:

- 100 meters out to ± 1 kilometer;
- 250 meters out to ± 2 kilometers;
- 500 meters out to ± 5 kilometers;
- 1,000 meters out to ± 10 kilometers.
- 2,000 meters out to ± 20 kilometers

In addition to the rectangular Cartesian coordinate receptor grid, a set of fenceline receptors will be prepared. The fence line receptors will be placed every 50 meters around the site fenced portion of the property. Terrain elevations will be assigned to all receptors included in the air dispersion modeling analysis. The terrain elevations for the main receptor grid will be developed using the AERMAP terrain preprocessor.

The AERMAP pre-processor is designed to develop receptor grid height information based on United States Geological Survey (USGS) digital elevation model (DEM) data. The development of the receptor grid includes assigning receptor elevations to the receptor locations and also assigning a hill height scale to each receptor. Receptor elevations are determined by finding the four closest DEM elevation points to the receptor location and averaging the elevations to represent the receptor. Hill height scales for all receptors are determined by examining the height and proximity of all DEM points within the modeled domain area to each receptor location. The domain used in AERMAP included the area covered by the Cartesian receptors plus an additional 500-meter buffer in the x-direction and a 1,000-meter buffer in the y-direction. Terrain elevations for all receptors were obtained from the USGS 1:24,000 Level II DEM data.

4.3 METEOROLOGICAL DATA

The meteorological data for the AERMOD air dispersion model with include both surface and upper air data from National Weather Service (NWS) observation stations. Section 6 of this document addresses the representativeness and adequacy of the surface meteorological database. A description of the procedures that will be used to process the meteorological data is presented in the following subsections.

4.3.1 AERMOD Meteorological Data

The meteorological database for the AERMOD air dispersion model will consist of five years of surface meteorological data collected at the Morgantown Municipal Airport from 2013-2017. A wind rose for the Morgantown Airport is presented in Figure 4-1. The Morgantown meteorological data was previously used for the Longview Power Project (Unit 1) and a demonstration of the representativeness of the Morgantown Airport meteorological data for the Longview Unit project is presented in Section 6.

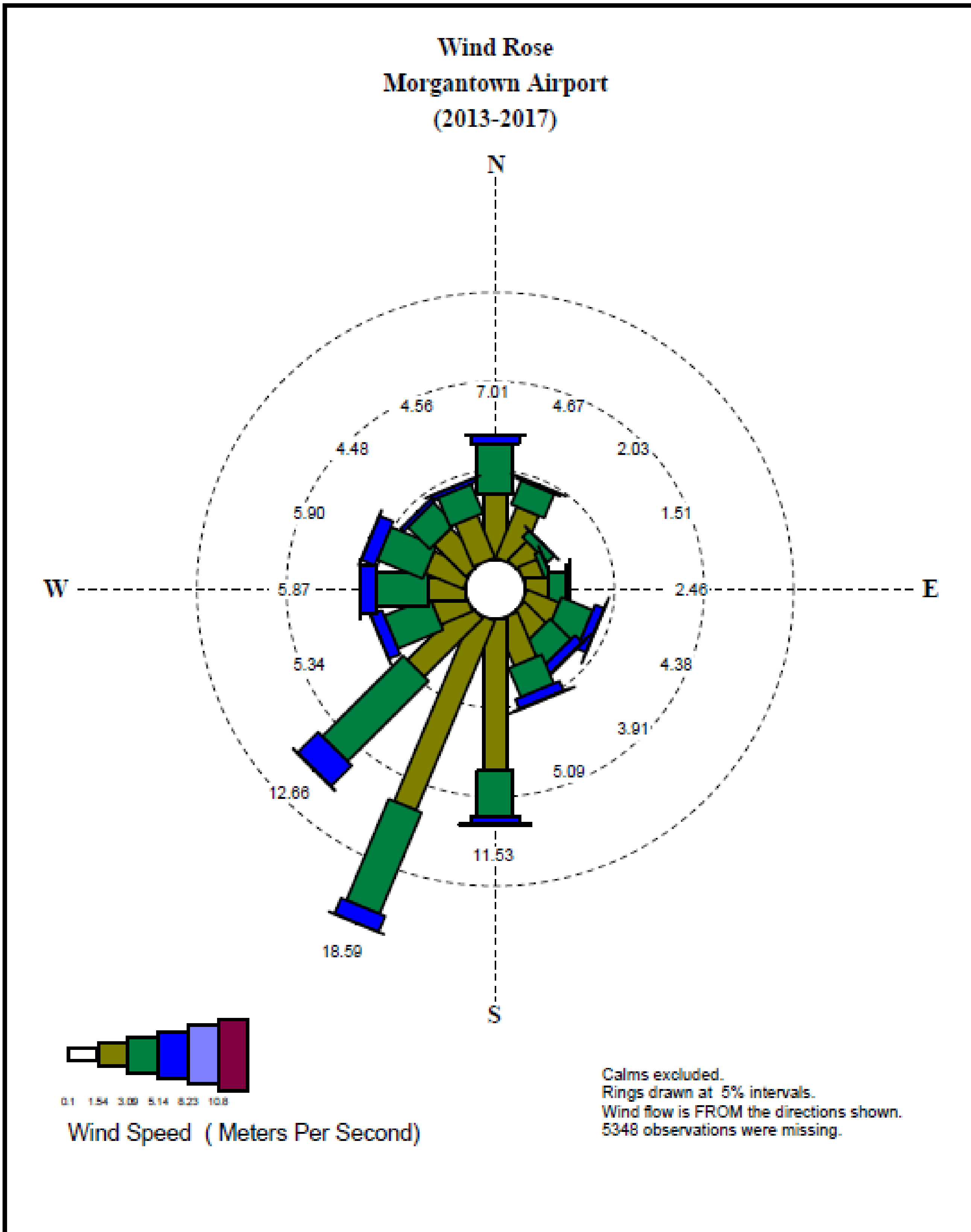

Figure 4-1
Wind Rose for Morgantown Airport (2013-2017)

The Morgantown surface meteorological data will be processed using the procedures described in the U.S. EPA AERMET meteorological processor. The AERMET preprocessor produces a file containing an hourly, vertical profile of the atmosphere and a file that includes surface and micrometeorological data.

The AERMET preprocessor also requires several micrometeorological variables for the project site area. The variables included surface roughness, Bowen ratio, and albedo. The values that were used in AERMET were determined using the AERSURFACE pre-processor. AERSURFACE was run using 12 equal sectors by season.

Using the procedures described in AERMET, the surface meteorological data will be combined with concurrent twice-daily rawinsonde data obtained from the NWS observation station in Pittsburgh, Pennsylvania. All NWS upper air and surface meteorological data will be obtained from the National Climatic Data Center (NCDC).

4.4 GOOD ENGINEERING PRACTICE STACK HEIGHT ANALYSIS

Following U.S. EPA guidance contained in the "Guideline for Determination of Good Engineering Practice (GEP) Stack Height (Revised)" (U.S. EPA 1985), a GEP analysis will be performed to evaluate the potential for building downwash on the stacks. The following procedures will be used to analyze the stacks for downwash effects. The stacks and influencing buildings will be located on a plant map and the coordinates will be manually digitized. The stack height and relevant building dimensions will be evaluated using the U.S. EPA Building Profile Input Program (BPIP, Date 95086). BPIP determines, in each of the 36 wind directions (10° sectors), which building may produce the greatest downwash effects for a stack. The direction-specific dimensions produced by BPIP will be included in the AERMOD air quality modeling studies.

Table 4-1 summarizes the building dimensions and structures that influence each stack. The BPIP analysis indicated that the GEP height for all stacks is 250 ft., based on the preliminary height of the HRSG Drum Building. The CT stacks are within 500 ft. (the area of influence) of HRSG Drum Building which produced the controlling GEP heights for all sources. The CT stack height is 180 ft., which are not GEP height and therefore do not to avoid building downwash

Table 4-1
Building Dimensions for GEP Height Analysis

Building/Structure	Height (ft.)	Maximum Projected Width (ft.)	Formula GEP height (ft.)	Radius of Influence (ft.)	Controlling Structure for Source(s)
Steam Turbine Building	96	444	240	480	No
HRSG Drum Platform North	100	276	250	500	Yes
HRSG Drum Platform South	100	276	250	500	Yes

effects. Therefore, direction-specific building downwash dimensions will be included in the AERMOD dispersion modeling analyses.

5. AIR QUALITY IMPACTS ANALYSIS

The air quality modeling analysis will be used to determine the predicted ambient air concentrations resulting from emissions from the Longview Unit 2 Project. Air quality modeling analyses will be performed to determine the significant impact area (SIA), the amount of PSD increment consumption, and the level of compliance with the National Ambient Air Quality Standards (NAAQS) and other air quality related values (AQRVs).

5.1 SIGNIFICANCE ANALYSIS

The air quality impact analysis will initially evaluate emissions of CO, PM/PM_{10}/$PM_{2.5}$, SO_2, and NO_x from the project. The results of this air quality modeling analysis will be compared to the PSD significance levels of:

- 1 $\mu g/m^3$ for annual average PM_{10}, SO_2, and NO_x,
- 5 $\mu g/m^3$ for 24-hour average PM_{10}, and SO_2
- 500 $\mu g/m^3$ for 8-hour average CO
- 25 $\mu g/m^3$ for 3-hour average SO_2
- 2,000 $\mu g/m^3$ for 1-hour CO

If the proposed Longview Power Unit 2 produces no significant impacts (i.e., at or below the ambient air significance levels), then no further analysis is required to demonstrate compliance with the NAAQS or PSD increment consumption in Class II areas. No further analysis is required because the project, by definition, does not significantly contribute to any possible violations of the NAAQS or consume a significant portion of the available increment.

If the highest modeled concentrations are above the ambient air significance levels, then a Significant Impact Area (SIA) will be defined. The SIA will be defined by a circle with a radius extending from the reference origin of the proposed plant site out to the greatest radius where a receptor has a maximum concentration equal to the significance levels. The SIA with the largest radial distance among the various pollutants and averaging periods will be used for all further modeling as described in Section 5.2.

5.2 MULTI-SOURCE IMPACT ANALYSIS

If the initial significance analysis indicates that the proposed project has significant impacts, then a multi-source impact analysis will be conducted. The multi-source impact analysis will include all sources at the Longview Unit 2 that emit the pollutants that have been determined to result in a modeled concentration above the significance levels. In addition, other sources of the PSD significant pollutants that are located within 50 km of the SIA will also be modeled. The emission inventory for the other local sources will be developed in consultation with the Pennsylvania DEP and West Virginia DAQ, based on a map of the area within 50 km of the SIA. The multi-source inventory will be converted to maximum allowable emissions and then screened to remove small insignificant sources or fugitive emission sources that are located at significant distances from the Longview Unit project. Other sources will be modeled with AERSCREEN to determine their SIA. Those sources whose SIA does not overlap the SIA of the Longview Unit 2 Project will be eliminated from the multi-source emission inventory.

The PSD increment analysis will include all PSD increment consuming sources identified by both the WV DAQ and Pennsylvania DEP that are located within 50 Km of the SIA for the respective pollutant. It is anticipated that the final multi-source emission inventory will be developed in conjunction with WV DAQ and will be approved prior to conducting the refined multi-source air quality modeling analysis.

The final multi-source inventory will be used to assess NAAQS compliance and PSD increment consumption. The NAAQS compliance assessment will include the Longview Unit 2 Project emissions, the offsite facilities including Longview Unit 1 and representative background concentrations. The PSD increment consumption assessment will include only PSD sources identified in the inventory. Both the NAAQS and PSD increment analyses will be based on the highest annual and highest, second highest short-term predicted concentrations.

A NO to NO_2 conversion factor will be applied to all predicted NO_x concentrations. The NO to NO_2 conversion factor recognizes that most of the NO_x emitted from combustion sources is in the form of NO, which is then eventually converted to NO_2. The NO to NO_2 conversion rate is dependent on several variables including residence time, ozone levels, and solar intensity. A 0.75 default factor is recommended by U.S. EPA (U.S. EPA 2000).

Air quality increment consumption is tracked by tabulating the actual emissions changes at a stationary source, area source or mobile source since the minor source baseline date and changes in actual emissions at major stationary sources after the major source baseline date. To determine the air quality increment consumed in a region the net actual emissions changes are modeled to obtain an air quality increment consumption concentrations. The changes in emissions from existing sources and increases from proposed new sources since the baseline date are modeled together to determine the incremental change in air quality levels. These incremental changes in air quality levels are compared to the PSD increment.

The PSD major source baseline dates for NO_2, PM_{10}, and SO_2 have been triggered by the Morgantown Energy Associates (MEA) project. This facility is located within the same air quality control region of that the Longview Unit 2 Project is located. The major source baseline year for NO_2, PM_{10}, and SO_2 is 1989.

5.3 BACKGROUND AMBIENT AIR DATA

Background ambient air quality values are required as part of the NAAQS analysis. The background values should be representative of the background pollutant concentration levels that could be expected to occur in the vicinity of the Longview Unit 2 Project. Therefore, ambient air data from a West Virginia DAQ monitoring station in Morgantown, WV and Ohio EPA monitoring station in Shadyside, OH were reviewed in order to select representative background pollutant concentration data. A summary of the air quality data from monitoring stations in Morgantown, WV, and Shadyside, OH are presented in Table 5-1. The maximum measured concentrations from these monitoring stations over the previous 3 years (2016-2018) will be used to establish the existing ambient air quality levels for NAAQS compliance evaluation. If necessary a directional specific background concentration will be developed by eliminating those periods from the background measurements when an existing source (included in the multi-source inventory) is impacting the monitor. The procedure described in 40 CFR 51 Appendix W Section 8.3.3 will be used. A demonstration of the representativeness of these monitoring stations for the Longview Unit 2 Project is presented in Section 6.

Table 5-1
Proposed Background
Ambient Air Data for NAAQS Analysis

Pollutant and Averaging Period	Highest Concentration	Year	Site Location
SO_2			
3-hour	20.6 ppb	2018	Morgantown Airport US 119 & Airport Blvd.
1-hour	35 ppb	2018	
NO_2			
Annual	7.43 ppb	2018	2 Ball Park Rd Shadyside, OH
1-hour	68 ppb		
PM_{10}/PM2.5			
Annual	7.40 µg/m^3	2016	Morgantown Airport US 119 & Airport Blvd.
24-hour	23.4 µg/m^3	2017	
CO			
8-hour	0.6 ppm	2018	2 Ball Park Rd Shadyside, OH
1-hour	0.8 ppm	2018	

5.4 CLASS I AREA ASSESSMENT

An assessment of potential project impacts on visibility and other air quality related values (AQRVs) in Class I areas is a requirement for PSD projects. Air quality impacts at Class I areas must be assessed under PSD regulations if they are within 100 km of the PSD source, or if the PSD source is judged to have a potential effect at Class I areas at distances beyond 100 km.

There are four (4) Class I areas within 250 km of the proposed site of the Longview Unit 2 Project. These areas are the Dolly Sods, Otter Creek and James River Face National Wilderness Areas and the Shenandoah National Park. The Dolly Sods, Otter Creek, James River Face and Shenandoah areas are approximately 91 km southeast, 78 km south-southeast, 237 south-southeast, and 173 km southeast respectively, of the proposed project site. The locations of the Class I areas relative to the proposed plant site are shown in Figure 5-1.

The initial screening method described in Section 3.2 of the FLAG (2010) document will be used to evaluate the impacts of the proposed Longview Unit 2 Project on the Class I areas. The FLAG member agencies that administer Federal Class I areas (U.S. Forest Service (USFS) the National Park Service (NPS) and U.S. Fish and Wildlife Service (FWS) (Agencies) will consider a source locating greater than 50 km from a Class I area to have negligible impacts with respect to Class I AQRVs if its total SO_2, NO_x, PM_{10}, and H_2SO_4 annual emissions (in tons per year, based on 24-hour maximum allowable emissions), divided by the distance (in km) from the Class I area (Q/D) is 10 or less. The Agencies would not request any further Class I AQRV impact analyses from such sources.

5.5 OTHER AIR QUALITY RELATED VALUES ANALYSIS

PSD regulations also require an analysis of the effects of the proposed project on AQRVs in areas surrounding the project. These AQRVs include effects of other growth (residential, commercial, or industrial) associated with the project and possible impacts on sensitive flora, fauna, and soils.

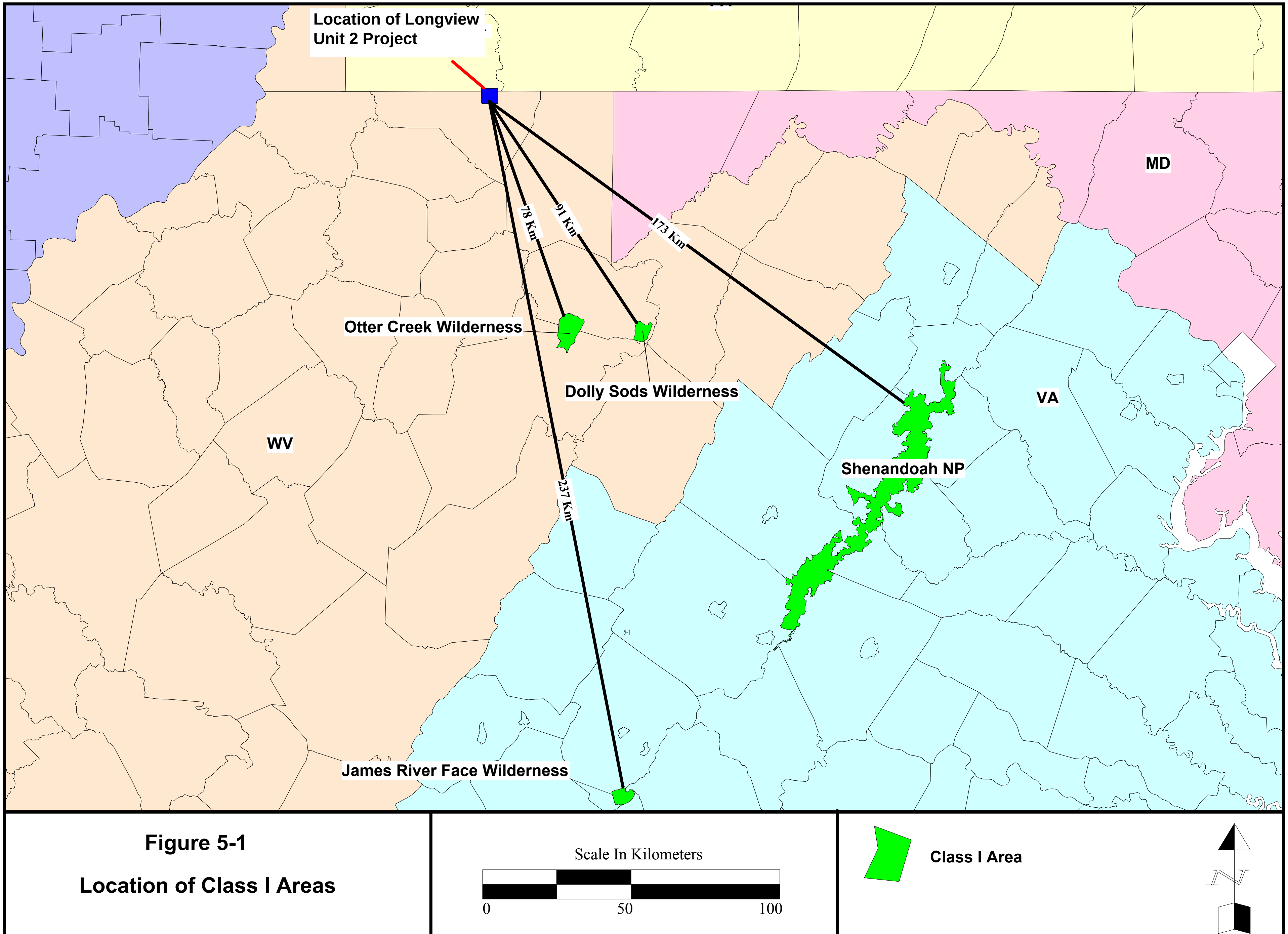

Figure 5-1

Location of Class I Areas

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Growth-related AQRVs, such as influxes of additional population or increases in vehicular traffic, will not be significantly affected by the proposed project. The electricity produced by the project will be transmitted over a multi-state power grid and will not directly enable or support any additional local commercial, industrial, or residential development. The labor force required to operate the facility will be small and will be drawn from the local communities. Because there are no anticipated effects on growth, no detailed analysis for growth-related AQRVs will be required. The AQRV analysis for sensitive ecological communities will be made based on consultations with West Virginia DEP regarding any sensitive species or ecosystems that may exist within a 10-kilometer radius of the project.

6. METEOROLOGICAL AND AMBIENT AIR QUALITY MONITORING EXEMPTION REQUEST

This section presents the results of an evaluation of the suitability of meteorological data collected at Morgantown, WV (surface observations) and Pittsburgh, PA (upper air observations) and air quality data from Morgantown, WV and Greene County, PA for the air quality modeling analysis of the proposed Longview Unit 2 Project. This evaluation used U.S. EPA approved criteria to demonstrate the adequacy and representativeness of the selected meteorological and air quality databases for the Longview Unit 2 Project.

6.1 METEOROLOGICAL MONITORING DATA

6.1.1 Approach

The meteorological data evaluation criteria contained in the U.S. EPA Guideline on Air Quality Models (40 CFR Part 51, App. W, Section 8.4.1.b) were used to assess the representativeness of the Morgantown, WV meteorological data for the Longview Unit 2 Project area. This document states: "*The meteorological data used as input to a dispersion model should be selected on the basis of spatial and climatological (temporal) representativeness as well as the ability of the individual parameters selected to characterize the transport and dispersion conditions in the area of concern*."

This document establishes the following parameters for selecting and evaluating meteorological data for air quality modeling:

- The proximity of the meteorological monitoring site to the project area under consideration.
- The complexity of the terrain.
- The exposure of the meteorological monitoring site and parameters monitored.
- The period of time during which data are collected.

Each of the parameters was used to evaluate the Morgantown, WV meteorological data. The results are provided in the following subsections.

6.1.2 Proximity of Meteorological Monitoring Site

The Morgantown Airport is located only 4.2 miles (6.4 km) southeast of the proposed Longview Unit 2 Project site and is the closest meteorological monitoring site collecting the parameters required for air quality modeling analysis. This proximity makes the Morgantown Airport the preferred source of meteorological data for evaluating the transport and dispersion of the Longview Unit 2 Project emissions. The locations of the Morgantown Airport and the proposed Longview Unit 2 Project site are shown in Figure 6-1.

6.1.3 Complexity of Terrain

The complexity of terrain surrounding a site is based upon the relationship of the terrain elevation to stack top and final plume height. U.S. EPA defines three categories of terrain for air quality modeling purposes:

- Simple terrain as terrain below stack top elevation.
- Complex terrain as any terrain that exceeds final plume height elevation.
- Intermediate terrain as any terrain between stack top and final plume height.

For air quality modeling analysis in simple terrain regions, meteorological data from the closest National Weather Service (NWS) station is usually satisfactory while for complex terrain and intermediate terrain locations onsite meteorological data may be required. Elevations of the terrain features surrounding the proposed Longview Unit 2 Project site and the expected final plume height for the CT stacks are discussed below.

The topography of the local area surrounding the Longview Unit 2 Project site is shown in Figure 6-2 which was adapted from the United States Geologic Survey (USGS) digital elevation data

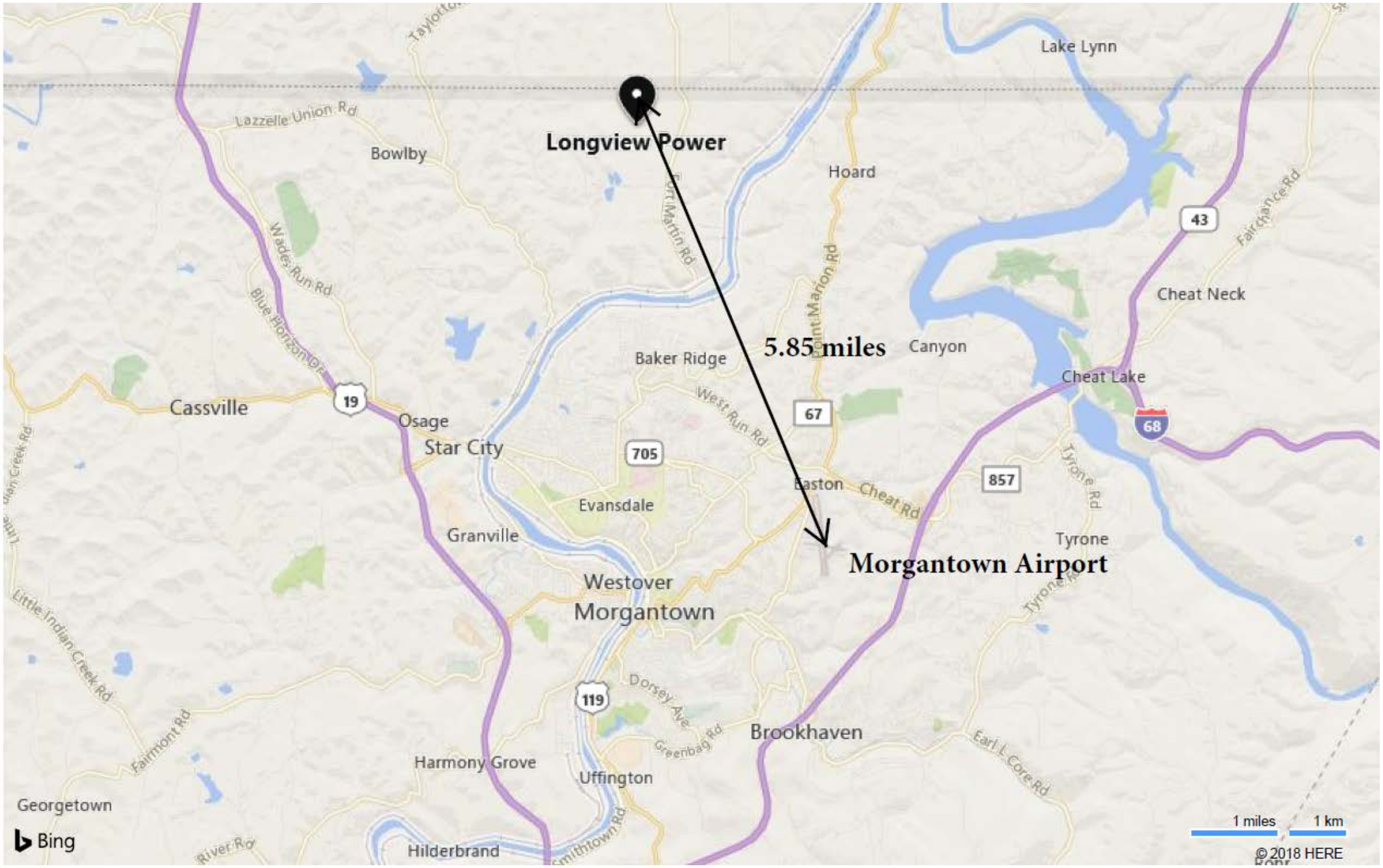

Figure 6 1
Location of the Longview Unit 2 Project
and Morgantown Airport

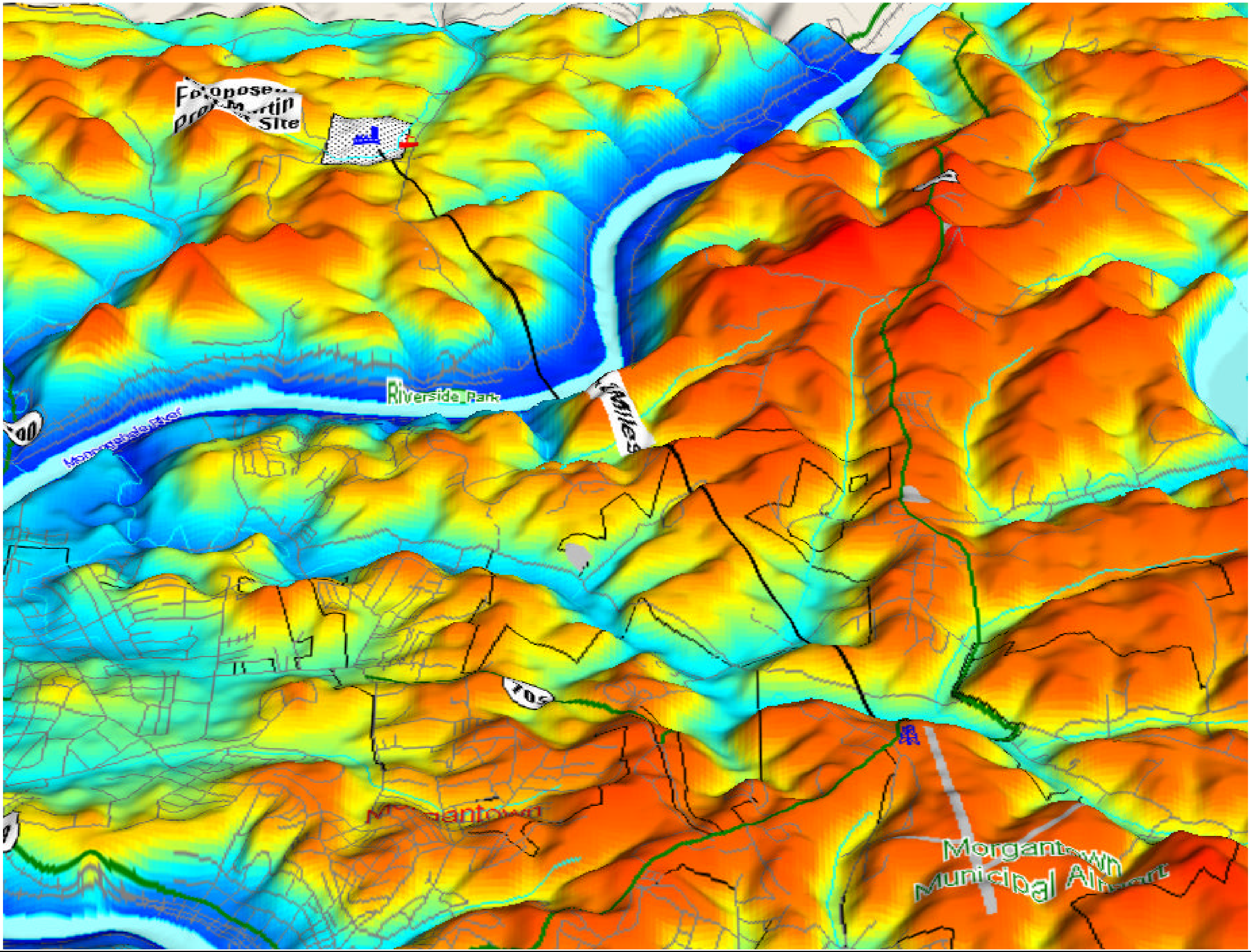

Figure 6-2 Topographic Map of the Fort Martin, WV Area

(DEM) for the Morgantown, WV area. The location of the project is also indicated in this figure. The dominant feature of the Fort Martin area is the rapid increase in elevation away from the Monongahela River. The river elevation is approximately 820 ft. above mean sea level (amsl) (250 m amsl). Terrain of approximately 1,100 ft. amsl occurs within 700 feet (210 m) of the river. Moving further away from the river isolated terrain peaks of 1,300 ft. amsl (400 m amsl) occur within 5,000 ft. (1.5 km) of the Monongahela River. The highest terrain within 15 km of the project site is 2,464 ft. amsl (751 m amsl).

The elevation of the project site is approximately 1,150 ft. amsl (350 m amsl) and the elevation of the Morgantown Airport is 1,215 amsl (370 m amsl). Both of these locations exhibit some of the highest terrain in the project area. The height of the CT stack for the proposed Longview Unit 2 Project is 180 ft. above grade (54.9 m above grade). This places the stack top elevation at 1,330 ft. amsl (405 m amsl). The minimum expected plume elevation for the CT stack is 2,267 ft. amsl (691 m amsl) based on the stack exit parameters. The stack top elevation and the minimum plume elevation exceed all terrain elevations within 7 and 15 km, respectively of the project site. Thus, emissions from the CT stacks enter the atmosphere well above the surrounding terrain and the terrain immediately surrounding the stack is considered simple terrain by U.S. EPA definition.

Figure 6-3 presents the locations within 15 km of the Longview Unit 2 Project site where the terrain exceeds the minimum plume height. As indicated in Figure 6-3, the major feature between the Morgantown Airport and the Longview Unit 2 Project site is the Monongahela River valley. Also, the area between the airport and the Longview Unit 2 Project is considered simple terrain for air quality modeling purposes, based on the expected minimum plume height and height of the CT stack.

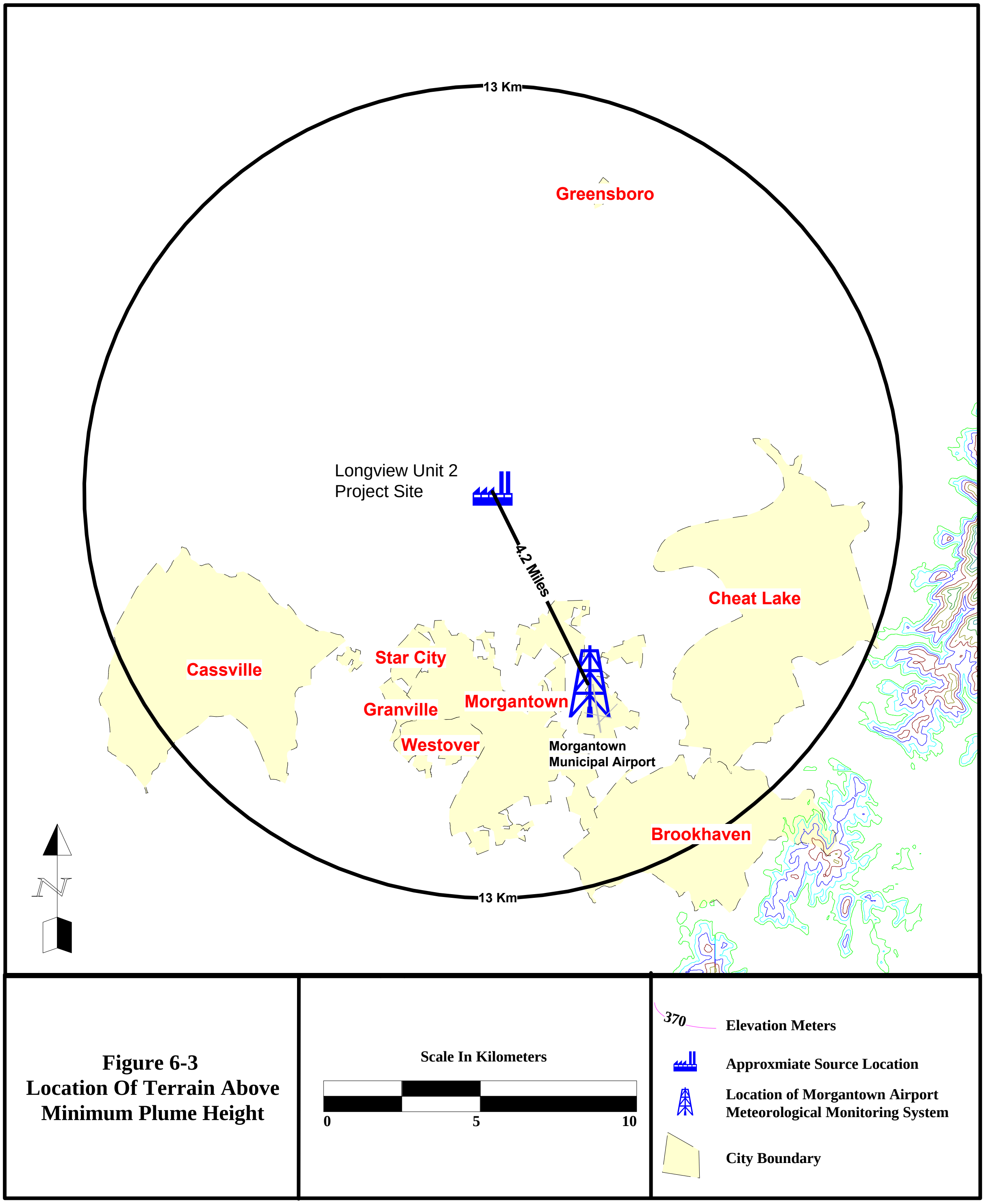

Figure 6-3
Location Of Terrain Above Minimum Plume Height

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6.1.4 Exposure/Monitoring Parameters

The meteorological measurements from the Morgantown Airport are made at approximately 6 meters above ground. This level is sufficient to represent the pollutant transport between the Project's CT stacks and the receptors of interest since there are no significant terrain features between the two sites.

The meteorological observations from the Morgantown Airport include hourly measurements sufficient to support the U.S. EPA AERMOD air quality model. These measurements include:

- Wind speed.
- Wind direction.
- Ambient temperature.
- Cloud cover.

6.1.5 Time Period

Five years of meteorological data are available from Morgantown Airport, which is sufficient to ensure that worst-case meteorological data are represented in the air quality modeling analysis of the Longview Unit 2 Project emissions. The most recent five-year data period with acceptable data recovery rates (i.e. greater than 95%) is 2013-2017 This data period is sufficient to support air quality modeling since it complies with the following U.S. EPA recommendations for meteorological data:

- A five (5) year data period.
- Collected at a National Weather Service (NWS) station.
- Consecutive years of data from the most recent, readily available period.

A wind rose for the five year period (2013-2017) for Morgantown Airport is presented in Figure 6-4. As seen from this figure, the prevailing winds are from the southwest, which occur

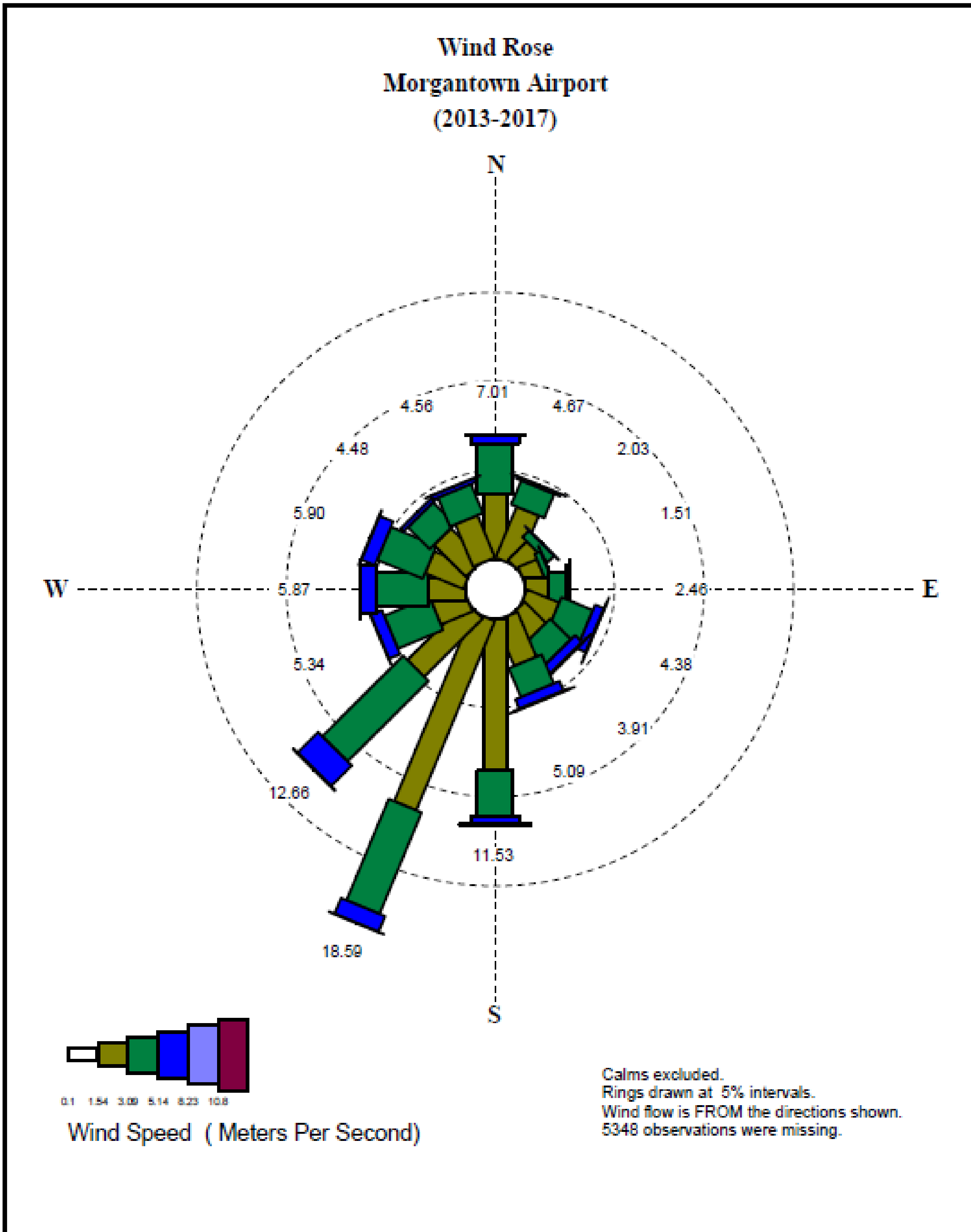

Figure 6-4
Wind Rose for Morgantown Airport (2013-2017)

approximately 14% of the time during the 5 year period, 2013-2017. Winds from the south quadrant (west southwest, south, and south-southwest) occur approximately 35% of the time. This wind pattern is typical of the synoptic scale flow for the Mid-Atlantic region of the United States. There is no evidence in the wind rose of the influence of any of the local terrain features in the Morgantown area.

6.1.6 Upper Air Monitoring Station

In addition to surface meteorological data from the Morgantown Airport, the air quality modeling of the Longview Unit 2 Project will require an upper air meteorological database. Upper air data are collected at a limited number of stations across the continental United States. The closest and most representative upper air station for the Longview Unit 2 Project is the Pittsburgh, NWS station. The data from this upper air station are routinely used for air quality modeling analyses in Northern West Virginia and are considered the most representative station available since it measures the same synoptic scale meteorological conditions at the Project site.

6.2 AMBIENT AIR QUALITY MONITORING DATA

The air quality data evaluation criteria contained in the U.S. EPA Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD) (U.S. EPA, 1987) were used to assess the representativeness of the existing WV DEP air quality monitoring data for the Project site.

This document establishes the following parameters for selecting and evaluating existing air data for air quality modeling:

- Air quality monitoring location.
- Data quality.
- Currentness of Data.

Each of the parameters was used to evaluate the existing air quality data from the WV DEP monitoring stations in Morgantown, WV. The results are provided in the following subsections.

6.2.1 Monitor Locations

This document establishes that the existing monitoring data should be representative of the following:

- The location of maximum concentration increase from the proposed source or modification.
- The location(s) of the maximum air pollutant concentration from existing sources.
- The location(s) of the maximum air pollutant concentration from both existing and proposed new source combined.

For a proposed source in an area of multi-source emissions and basically flat terrain (terrain below stack top) then the use of existing data from a nearby monitoring site may be used if:

- The existing monitoring is within 10 km of the points of proposed emissions

The previously subsections demonstrated that the Project area is considered flat terrain based on the proposed stack height and a base elevation of the Longview Unit 2 Project. Therefore, the air quality data from the existing monitoring station within 10 km can be used for the Longview Unit 2 Project. The locations of the existing monitoring station are presented in Figure 6-5. As seen from this figure, the existing monitors in Morgantown are all within 10 km of the proposed Longview Unit 2 Project. Therefore, the existing WV DEP monitors can be used to establish the existing air quality levels for the NAAQS compliance assessment of the air quality modeling analysis.

Since the DAQ monitoring station in Morgantown, WV does not measure NO_x or CO levels, the air quality data from the PA DEP monitoring station in Greene County, PA will be used.

6.2.2 Data Quality

The existing monitoring data should be of similar quality as required by the PSD monitoring guidance (U.S. EPA, 1987). The monitoring stations in Morgantown are operated by WV DAQ as part of the State and Local Ambient Monitoring System (SLAMS) and meet all data quality requirements of the PSD monitoring guidance.

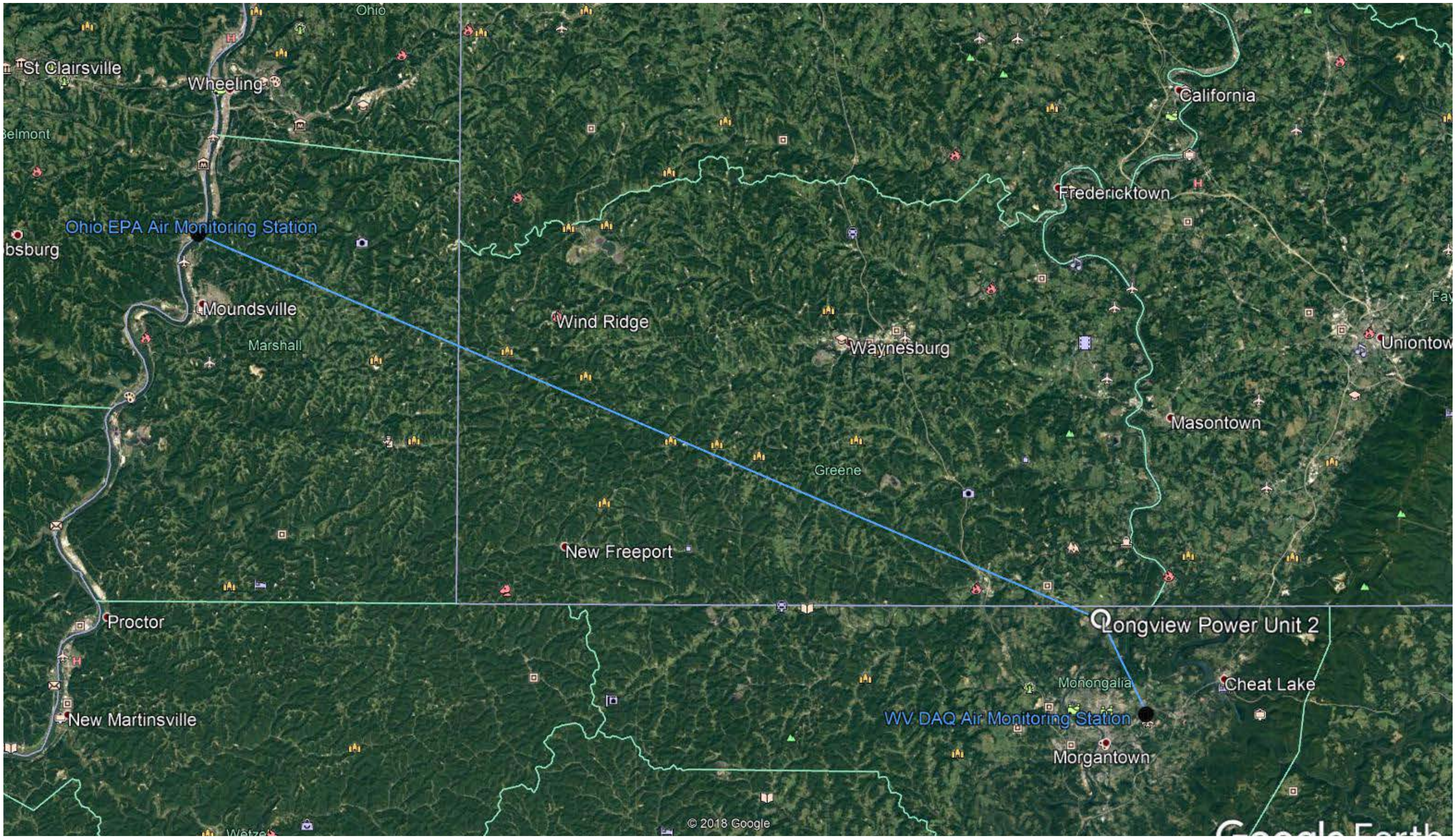

Figure 6-5
Location of Existing Air Quality Monitoring Stations

6.2.3 Currentness of Data

The air quality monitoring data should be current in order to represent the existing air quality levels. Generally, the air quality data must be collected within 3 years of the air quality permit application. The existing air quality data from the WV DAQ monitoring stations in Morgantown are current since they are continuously operated by DEP. The most 3-year period available is 2016-2018

6.3 CONCLUSIONS

Based on the results of the evaluation presented in subsections 6.1 and 6.2 the air quality data from Morgantown, WV and the meteorological data from Morgantown, WV, and Pittsburgh, PA are representative and adequate for the air quality modeling analysis of the Longview Unit 2 Project. This conclusion is reached based on the following considerations:

6.3.1 Meteorological Data

1. The Morgantown Airport is only 4.2 miles (6.4 km) southwest of the Longview Unit 2 Project Site.
2. The regional terrain is generally simple, non-complex terrain for air quality modeling purposes based on the elevation of the project site, the CT stack height and the expected minimum plume height of the CT stacks.
3. There are no intervening terrain between the project site and the Morgantown Airport to make the Morgantown meteorological data nonrepresentative of conditions at the Longview Unit 2 Project site
4. The exposure of the Morgantown Airport meteorological sensors is sufficient to represent the pollutant transport between the Longview Unit 2 Project site and the receptors of interest.
5. The time period of the Morgantown Airport data (5-year database) is sufficient to ensure that worst-case meteorological data are represented in the air quality modeling of the project emissions.
6. The meteorological measurements from the Morgantown Airport and Pittsburgh NWS station satisfy the data requirements of the U.S. EPA AERMOD air quality dispersion model.
7. The upper air station at Pittsburgh NWS station measures the same synoptic scale conditions as those experienced at the Project site.

6.3.2 Air Quality Data

1. The exiting WV DEP air quality monitors in Morgantown, WV are within 10 km of the proposed Longview Unit 2 Project and are of sufficient data quality and are current data.

7. REFERENCES

U.S. EPA 1985 – “Guidelines for Determination of Good Engineering Practice Stack Height (Technical Support Document for Stack Height Regulations) Revised” EPA-450:4-80-023R, June 1985.

U.S. EPA 1987 – “Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD) May 1987.

U.S. EPA 1993 – “User's Guide to the Building Profile Input Program”, October 1993.

U.S. EPA 2018 – “Users Guide for the AERMOD Terrain Preprocessor (AERMAP) Revised – Draft” April 2018.

U.S. EPA 2017 – 40 CFR Part 51 Appendix W “Guideline on Air Quality Models (Revised)”, January 17, 2017

U.S. FS 2010 – “Federal Land Managers’ Air Quality Related Values Workgroup (FLAG) Phase I Report” 2010.