AIR DISPERSION MODELING PROTOCOL

Proposed Steel Mill

CMC Steel US, LLC / Martinsburg, WV

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1. INTRODUCTION

CMC Steel US, LLC is proposing the construction of a new steel mill (the Project) in Martinsburg, West Virginia. The proposed Project will produce long steel products such as rebar and rebar spools. Operations at the proposed Project fall under the Standard Industrial Classification (SIC) Code 3312 and CMC intends to operate the proposed Project 24 hours per day, 7 days per week.

Estimated potential emissions are anticipated to exceed the Prevention of Significant Deterioration (PSD) major source threshold for carbon monoxide (CO). Other project-related emissions are anticipated to exceed the PSD significant emission rate (SER) thresholds for the following:

- Particulate matter (PM);
- Particulate matter with an aerodynamic diameter of 10 microns (PM_{10});
- Particulate matter with an aerodynamic diameter of 2.5 microns ($PM_{2.5}$);
- Nitrogen oxides (NO_x);
- Volatile organic carbon (VOC);
- Sulfur dioxide (SO_2);
- Fluorides (F); and
- Greenhouse gases (GHG) in terms of carbon dioxide equivalents (CO_2e).[1]

The West Virginia Department of Environmental Protection (WVDEP) has codified the federal PSD permitting requirements in Title 45 of the West Virginia Code of State Rules (45 CSR) Section 14 and has full authority to implement this program through its United States Environmental Protection Agency (EPA) State Implementation Plan.

The area immediately surrounding the proposed Project is designated as attainment for all applicable National Ambient Air Quality Standards (NAAQS) and is designated as Class II as it relates to its PSD area classification. The PSD permitting requirements therefore require a Class II air quality analysis for PM_{10}, $PM_{2.5}$, CO, SO_2, NO_2, and Fluorides.[2] Additionally, air quality analyses are required for secondary $PM_{2.5}$ and ozone when emissions of precursor pollutants exceed the applicable PSD SERs. Finally, four (4) Class I areas, including Shenandoah National Park, Dolly Sods Wilderness, Otter Creek Wilderness, and James River Face Wilderness are located within 300 kilometers (km) of the proposed Project. Therefore, a Class I analysis will be considered to assess the potential impact of the proposed Project on these Class I areas.

This modeling protocol outlines the proposed methodologies that will be used to conduct the air dispersion modeling analyses required under PSD permitting consistent with 45 CSR 14-10. Air dispersion modeling is relied upon to demonstrate that the proposed Project will not:

1. Cause or significantly contribute to a violation of any applicable NAAQS;
2. Cause or significantly contribute to a violation of incremental standards; or
3. Cause any other adverse impacts to the surrounding area (i.e., impacts on soil and vegetation, visibility degradation, etc.).

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[1] For this project, CO_2e denotes carbon dioxide equivalents and is calculated as the sum of the four well-mixed GHGs (CO_2, CH_4, N_2O, and SF_6) with applicable global warming potentials per 40 CFR 98 applied.

[2] Note that the proposed lead (Pb) emissions increase is less than the 0.6 tpy PSD Significant Emission Rate (SER). Therefore, the proposed Project is not subject to PSD or dispersion modeling for Pb emissions.

This modeling protocol is prepared in accordance with Appendix W of the *Guideline on Air Quality Models (Revised)* [3]. CMC will document the model approaches selected for the PSD analysis in a final modeling report and provide supporting data via File Transfer Protocol (FTP) transfer, which will include imported terrain elevations, building downwash, meteorological data, and model output files.

1.1 Project Overview

The proposed Project will manufacture steel products from scrap metal. New equipment to be authorized for construction/operation at the new steel mill will include an electric arc furnace (EAF), a ladle metallurgy station (LMS), a continuous caster, and the following ancillary emission sources:

- Handling and storage of scrap;
- Manual torch cutting of scrap material completed outdoors;
- Handling and storage of raw materials used in the EAF and LMS;
- Handling and storage of baghouse dust
- Handling, processing, and storage of slag;
- Refractory replacement and refractory curing and drying using fuel-fired dryers;
- Handling and storage of raw materials used to rebuild and repair refractory;
- Spent refractory handling and storage;
- Ladle and tundish preheating using fuel-fired preheaters;
- Mill scale handling and storage
- Cooling towers;
- Emergency generators;
- Diesel fuel storage; and
- Traffic on facility roads.

A detailed description of all proposed equipment will be provided in the construction permit application.

1.2 Facility Location

The location of the proposed Project is in Martinsburg, Berkeley County, WV which is designated by the EPA as "unclassifiable" and/or "attainment" for the NAAQS for ozone, CO, SO_2, PM_{10}, $PM_{2.5}$, and NO_2.[4] The proposed location is the previously operated Dupont Falling Waters Explosives Plant, which had several ammunition bunkers. CMC has completed a review of these bunkers. The bunkers are currently empty with no ammunition or other content. The structures of the bunkers have deteriorated over time with some falling apart or partially demolished. As part of the proposed Project CMC plans to safely remove these structures in the construction area. These demolition activities are not part of the PSD review process and will not be included in the air quality dispersion modeling evaluations.

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[3] EPA, 40 CFR Part 51, Appendix W, January 17, 2017.

[4] 40 CFR §81.349.

To complete the air quality impacts demonstration, CMC is proposing to conduct air quality analysis for these pollutants. Air quality impact standards are not established for PM, VOC, and GHGs. Furthermore, the proposed lead (Pb) emissions increase is less than the 0.6 tpy PSD SER. Therefore, modeling of proposed PM, VOC, GHGs, and Pb emissions is not required.

The land surrounding the proposed Project is divided into areas that are classified in one of the following categories:

- Class I areas; and
- Class II/unclassified areas.

Each classification is considered differently in the modeling analysis. The classifications are described in more detail in the following sections.

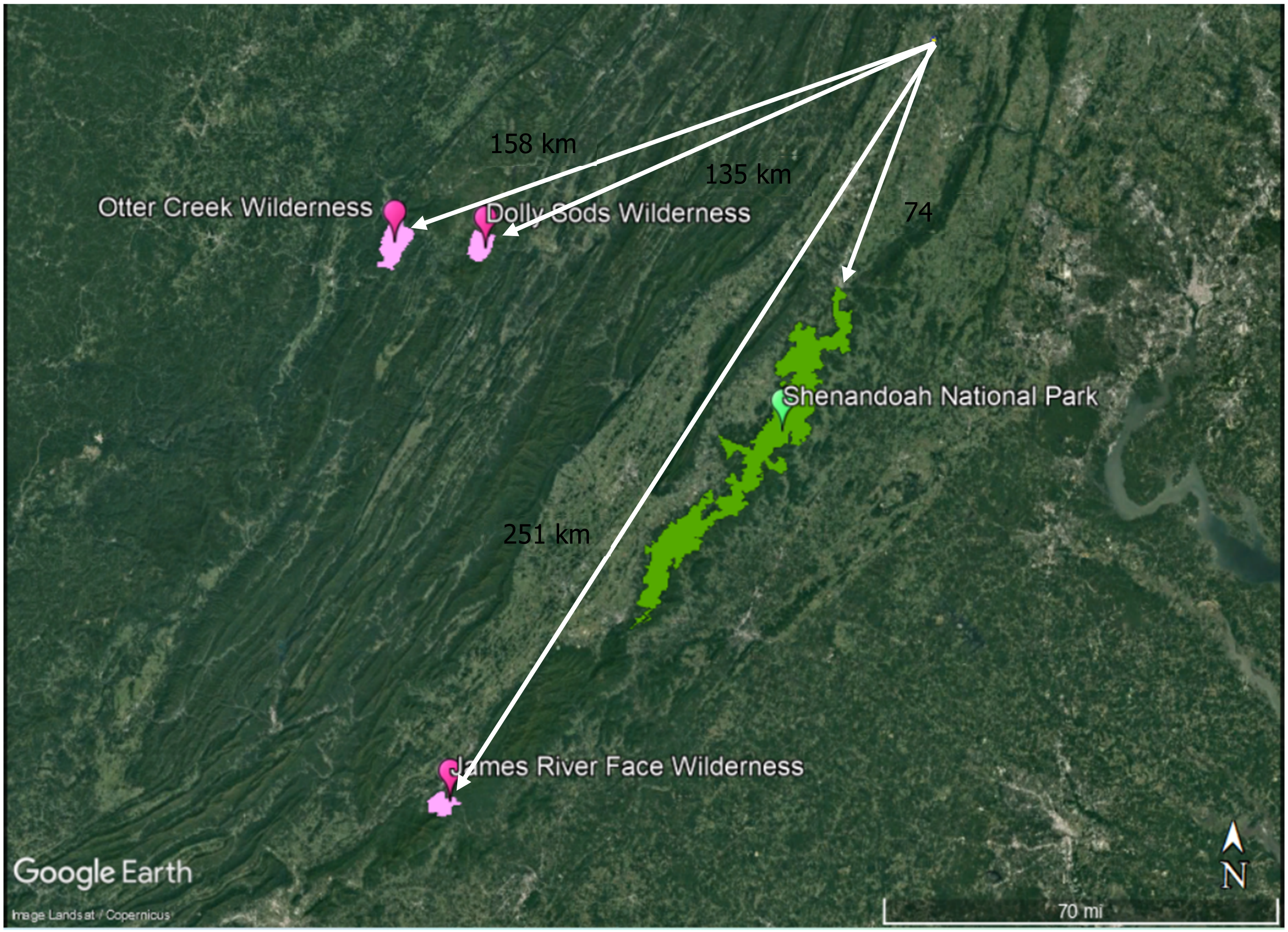
1.2.1 Class I Areas

Class I areas are defined by the EPA as those areas of the nation that are of special natural, scenic, recreational, or historic interest to the public. Class I areas are designated by the Clean Air Act and have a separate set of standards from Class II/unclassified areas. Class I areas are managed by Federal Land Managers (FLMs). The project is located in a Class II/unclassified area. There are four (4) Class I areas within 300 km of the proposed Project location. A list of the Class I areas within 300 km, the approximate distance of each area from the proposed Project, and the responsible FLM for each area is contained in Table 1-1. Figure 1-1 depicts the four Class I areas and their distances from the proposed Project. Because the distance from the project to the Class I areas exceeds 50 km, CMC proposes to utilize screening methodologies to demonstrate the proposed Project will not result in adverse impacts at Class I areas.

Table 1-1. Class I Areas within 300 km of the Project

Class I Area	Distance to Facility (km)	Federal Land Manager
Shenandoah National Park	74	National Park Service (NPS)
Dolly Sods Wilderness	135	U.S. Forest Service (USFS)
Otter Creek Wilderness	158	U.S. Forest Service (USFS)
James River Face Wilderness	251	U.S. Forest Service (USFS)

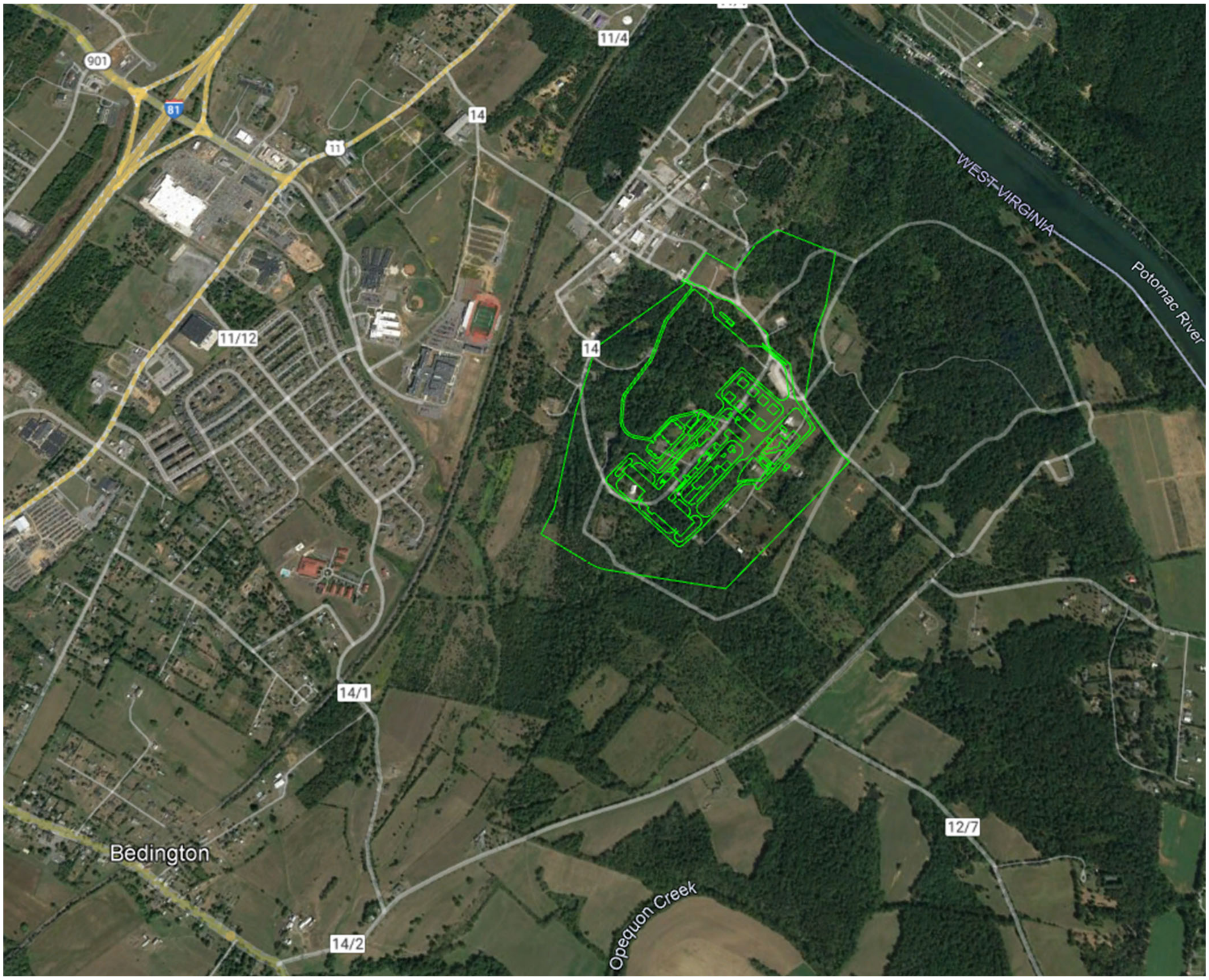
Figure 1-1. Class I Areas within 300 km of the Proposed Project



1.2.2 Class II Areas

Class II/unclassified areas are all other areas that are not classified as Class I. Figure 1-2 provides a general map of the proposed Project location, showing public roads, and general boundaries of towns and other nearby municipalities. Note that all existing and new railroad tracks leading to the proposed Project are for the exclusive use of CMC and not part of a network associate with the public or other organizations. Additionally, Figure 1-2 depicts the proposed property line with respect to the surrounding topography and predominant geographic features (such as highways, streams, railroads, etc.). The area immediately surrounding the proposed Project and within the general ambient air quality airshed in which nearfield modeling is conducted (within 50 km) are designated as Class II areas. Appendix A contains a geographic information system (GIS) Shapefile of the layout contained in Figure 1-2.

Figure 1-2. Proposed Project Area Map



2. CLASS II DISPERSION MODELING REQUIREMENTS

Because sources and emissions in the proposed Project are subject to the ambient air quality assessment requirements of the PSD program, modeling is required to meet specific permitting objectives of 45 CSR 14. Modeling will be used to demonstrate that proposed Project emissions of PM_{10}, $PM_{2.5}$, NO_2, CO, and SO_2 will not:

- Cause or significantly contribute to a violation of any applicable NAAQS,
- Cause or significantly contribute to ambient concentrations that are greater than allowable PSD Increments,
- Cause any other additional adverse impacts to the surrounding area (i.e., impairment to visibility, soils and vegetation and air quality impacts from general commercial, residential, industrial, and other growth associated with the proposed Project).

To facilitate this analysis (and allow it to be commensurate with the requirements to which the WVDEP adheres), dispersion modeling methodologies will be consistent with the EPA's Appendix W of Title 40 of the Code of Federal Regulations Part 51 (40 CFR 51) and EPA procedures specified in the Guideline on Air Quality Models (Guideline).[5] The purpose of this protocol is to provide an overview of the proposed techniques and model selections used for determining appropriate off-property impacts and include a detailed review of the modeling objectives required to demonstrate compliance to each element of the PSD air quality analysis.

The Class I area modeling analysis is expected to demonstrate that more detailed regional scale modeling will not be needed and that only screening modeling will be considered. Class I area screening techniques will be implemented to include the use of the Q/D analysis for the Air Quality Related Value (AQRV) demonstration, and an AERMOD analysis with receptors positioned at the extent of the nearfield analysis (50 km) for the Class I PSD Increment demonstration. In the event more robust Class I modeling is required, a detailed Class I modeling approach will be submitted for approval.

For the Class II analysis, the various stages of modeling to be performed dependent on compliance demonstration at each modeling step. To allow the WVDEP to evaluate the various levels of proposed modeling methodologies, this protocol outlines each stage of modeling in the sequence as if each would be used. The modeling steps will include the following sequence, if required:

- Step 1 - Determine if ambient air quality impacts of the proposed new sources are greater than or less than the Significant Impact Levels (SIL) per pollutant and per averaging time basis. Table 2-1 summarizes the applicable SILs and other criteria pollutant thresholds for CO, SO_2, NO_2, PM_{10}, and $PM_{2.5}$.

- Step 2 - Perform NAAQS dispersion modeling if air modeling impacts are greater than the SILs (in Step 1) to estimate the NAAQS impacts of the new project sources and regional inventory sources on a combined basis. The screening distance for assessing nearby regional inventory sources will be based on the distances to the proposed project's maximum concentrations and the expected decrease in concentrations as a function of distance (what EPA terms the gradient of impact). Background concentrations from nearby representative ambient monitors will also be added to the total impacts of all sources.

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[5] 40 CFR 51, Appendix W, *Guideline on Air Quality Models*, and 45 CSR 14-10.

- Step 3 - Perform PSD increment modeling if air modeling impacts are greater than the SILs (in Step 1) to estimate the PSD increment impacts of the new project sources as well as any regional inventory sources. The screening distance for assessing regional PSD increment consuming or expanding sources will also be based on the distances to the proposed Project's maximum impact concentrations and the expected area with the highest concentration gradient from the proposed Project's modeled sources.

- Step 4 – Prepare an "additional impacts" analysis. This analysis will utilize the results of the Significance Analysis modeling in Step 1 to compare ambient impacts to the secondary NAAQS. Incremental air quality impacts due to growth in the local infrastructure that may result from added employees and attendant industries will be qualitatively evaluated.

- Step 5 – Address the ozone and secondary $PM_{2.5}$ ambient impact analysis requirements by conducting a quantitative assessment of potential ozone impacts from the proposed Project. The quantitative assessment will rely on the approach outlined in EPA's Guidance for Ozone and Fine Particulate Matter Permit Modeling, dated July 29, 2022 and associated Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool, dated April 2019.

The remainder of this protocol provides the tools and methods that will be employed to conduct the Class II dispersion modeling along with a short overview of the Class I screening methodology.

Table 2-1. Significant Impact Levels, NAAQS, PSD Class II Increments, and Significant Monitoring Concentrations for Applicable Criteria Air Pollutants

Pollutant	Averaging Period	PSD SIL ($\mu g/m^3$)	Primary NAAQS ($\mu g/m^3$)	Secondary NAAQS ($\mu g/m^3$)	Class IIPSD Increment[1] ($\mu g/m^3$)	Significant Monitoring Concentration ($\mu g/m^3$)
CO	1-hour	2,000	40,000 (35 ppm)[2]	--	--	--
	8-hour	500	10,000 (9 ppm)[2]	--	--	575
SO2	1-hour	7.8	196 (75 ppb)	--	--	--
	3-hour	25	--	1,300 (500 ppb)	512	--
	24-hour	5	--	--	91	13
	Annual	1	--	--	20	--
NO2	1-hour	7.5[3]	188 (100 ppb)[4]	--	--	--
	Annual	1	100 (53 ppb)[5]	100 (53 ppb)	25	14
PM10	24-hour	5	150[6]	150	30	10
	Annual	1	--	--	17[7]	--
PM2.5	24-hour	1.2[8]	35[9]	35	9	0[10]
	Annual	0.2[8]	12[11]	15[11]	4	--
F	24-hour	--	--	--	--	0.25[12]

Table Footnotes:

1. All short-term PSD Increments are not to be exceeded more than once per year.
2. Only a primary standard, not to be exceeded more than once per year.
3. No 1-hour NO_2 SIL has been promulgated by EPA. An interim SIL of 7.5 $\mu g/m^3$ (4 ppb) was selected based on theEPA Office of Air Quality Planning and Standards Memorandum from Ms. Anna Marie Wood to Regional Air Division Directors titled *General Guidance for Implementing the 1-hour NO_2 National Ambient Air Quality Standardin Prevention of Significant Deterioration Permits, Including an Interim 1-hour NO_2 Significant Impact Level* (June 28, 2010).[6]
4. Only a primary standard, the 3-year average of the 98th percentile of the daily maximum 1-hour averageconcentrations.
5. Annual arithmetic average.
6. Not to be exceeded more than three times in 3 consecutive years.
7. The EPA revoked the annual PM_{10} NAAQS in 2006, but the annual PM_{10} Class II PSD Increment remains in effect.
8. EPA allows states to use alternate SILs if properly justified but does not allow a value higher than 0.3 ug/m3 (Annual) or 1.2 ug/m3 (24-hour). For more information see the "Guidance for Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program" memo from Peter Tsirigotis on April 17, 2018.
9. The 3-year average of the 98th percentile 24-hour average concentrations.
10. On January 22, 2013, the U.S. DC Court of Appeals vacated the $PM_{2.5}$ SMC of 4 µg/m3.
11. EPA published a final rule (78 FR 3086), with an effective date of March 18, 2013, that reduced the primary annual $PM_{2.5}$ NAAQS from 15 $\mu g/m^3$ to 12 $\mu g/m^3$ and retained the secondary annual $PM_{2.5}$ NAAQS at 15 $\mu g/m^3$. Both the primary and secondary standards are expressed as the 3-year average of the annual arithmetic averageconcentration.
12. CMC will consider a SMC of 0.25 $\mu g/m^3$, 24-hour average, for fluorides.

[6] https://www.epa.gov/sites/default/files/2015-07/documents/appwno2.pdf

2.1 Dispersion Model Selection

A number of guidelines are available to facilitate and provide detail on the methodologies required for conducting a dispersion modeling evaluation for the proposed Project. In general, the air dispersion modeling analyses to be conducted will be in accordance with applicable EPA guidance, as follows:

- EPA's Guideline on Air Quality Models, 40 CFR Part 51, Appendix W (Published, January 17, 2017), which West Virginia cites by reference in Section 10 of 45 CSR 14.[7]
- EPA 's AERMOD Implementation Guide (April 2021)[8]
- EPA's User's Guide for the AMS/EPA Regulatory Model – AERMOD (April 2021)[9]
- EPA's New Source Review Workshop Manual (Draft, October 1990)[10]

Given these guidance documents and typical modeling practices, CMC will utilize the EPA-recommended American Meteorological Society / Environmental Protection Agency Regulatory Model (AERMOD) in its most recent Version 22112 released June 2022. AERMOD is a refined, steady-state (both emissions and meteorology over a one hour time step), multiple source dispersion model and was promulgated by EPA in December 2005 as the preferred model to use for industrial sources in this type of air quality analysis.[11] AERMOD will be used to model each stack, horizontal vent, and any other type of source at the proposed Project. CMC will utilize AERMOD using the regulatory default options in all cases.

2.2 Source Characterization

The following sections provide the details associated with characterizing the emission sources into various model source representations. Point source characterization will be used to simulate emissions that are emitted from a stack. Modeled stack heights will be based on structural heights. Modeled stack diameters will be based on equipment specifications. Exit stack velocities and temperatures will be based on operating mechanisms.

Area source characterization will be used to simulate emissions that initially disperse in two dimensions with little or no plume rise, such as low-level emissions from a storage pile. Parameters used to characterize area sources are location, geometry, and release height. The dimensions for area source characterization will be determined based on the geographical location where representative emissions have the potential to occur. The geometry of an area source will be characterized as a rectangle, irregularly shaped polygon, or circle. Release heights for area source characterization will be based on the height in which emissions emit to atmosphere.

A volume source characterization may be used to simulate emissions that initially disperse in three dimensions with little or no plume rise (e.g., fugitive emissions from conveyor belts and roads). Parameters used to

[7] 40 CFR 51, Appendix W, Guideline on Air Quality Models.

[8] EPA, *AERMOD Implementation Guide*, April 2021, available at https://www3.epa.gov/ttn/scram/models/aermod/aermod_implementation_guide.pdf

[9] *User's Guide for the AMS/EPA Regulatory Model (AERMOD)*, EPA-454/B-21-001, EPA, OAQPS, Research Triangle Park, NC, April 2021.

[10] EPA, *New Source Review Workshop Manual*, Draft October 1990, available athttp://www.epa.gov/ttn/nsr/gen/wkshpman.pdf

[11] 40 CFR 51, Appendix W–*Guideline on Air Quality Models*, Appendix A.1– AMS/EPA Regulatory Model (AERMOD).

characterize volume sources are location, height of release, and initial horizontal and vertical dimensions. The dimensions for volume source characterization will be determined based on the geographical location where representative emissions have the potential to occur. The height of release will be the center of the volume source above ground.

Additionally, certain sources will be modeled as buoyant line and line sources (i.e., using the LINE and BUOYLINE feature of AERMOD) with appropriate parameters.

2.2.1 Point Sources

The following sources will be modeled as point sources with the appropriate stack parameters (i.e., stack height, diameter, exit velocity, and exit temperature):

- Meltshop Baghouse (Model ID BH1)
- Fluxing Agent Storage Silo No. 1 (Model ID FLXSLO11)
- Fluxing Agent Storage Silo No. 2 (Model ID FLXSLO12)
- Carbon Storage Silo No. 1 (Model ID CARBSLO1)
- EAF Baghouse Dust Silo (Model ID DUSTSLO1)
- Non-Contact Cooling Tower 1 - Cell 1 (Model ID CTNC11a)
- Non-Contact Cooling Tower 1 - Cell 2 (Model ID CTNC11b)
- Non-Contact Cooling Tower 2 - Cell 1 (Model ID CTNC12a)
- Non-Contact Cooling Tower 2 - Cell 2 (Model ID CTNC12b)
- Contact Cooling Tower - Cell 1 (Model ID CTC1a)
- Contact Cooling Tower - Cell 2 (Model ID CTC1b)
- Emergency Generator 1 (Model ID EGEN1)
- Emergency Fire Water Pump 1 (Model ID EFWP1)
- Cutting Torches (Model ID TORCH1)[12]

The cooling towers will exhaust at ambient temperature and thus were modeled at 0 Kelvin, which flags the model to use the ambient temperature from the meteorological data as the exit temperature.

The fan for the Meltshop Baghouse (Model ID BH1) will utilize a multi-speed or variable speed drive unit. The fan is expected to operate at a flow rate ranging from 788,000 acfm during EAF "tapping" (i.e., when molten steel is tapped from the EAF to the lade) to 409,000 acfm during EAF "melting" (i.e., when the scrap/charge in the EAF is being melted). The particulate matter emissions from the baghouse are based on the flow rate (baghouse particulate matter emissions are based on grains/dscf) and the particulate matter emission rates will decrease as the flow rate decreases. The emissions of all other pollutants are constant and not affected by baghouse flow rate. Because $PM_{10}/PM_{2.5}$ air dispersion modeling impacts can be affected by flow rate/exhaust velocity, the modeling evaluation will be completed utilizing the baghouse flow rate/exhaust velocity and emission rate that yields the highest $PM_{10}/PM_{2.5}$ impacts, as summarized in Table 2-2. Note that for purposes of NSR and PSD applicability determination in the air permit application, the highest flow rate is utilized to maximize particulate emission rates.

[12] Cutting torches are utilized outdoors and generate significant heat and thermal momentrum which is best represeted as a point source.

Table 2-2. Worst Case Baghouse Flow Rate for Modeling Purposes

EAF Operation	Tapping	Melting	Units
Exhaust Flow Rate	788,000	409,000	ACFM
	679,000	314,000	SCFM
	671,192	310,389	DSCFM
Proposed Total $PM_{10}/PM_{2.5}$ Emission Rate	0.0052	0.0052	gr/dscf
	29.92	13.83	lb/hr
Normalized Model Emission Rate	1	0.36	g/sec
Exhaust Diameter	5.2	5.2	m
Release Height	50	50	m
Exhaust Velocity	17.5	9.1	m/sec
Exhaust Temperature	176	240	deg F
Meteorological Data Set	2017-2021 KMRB + KMRB Land Use	2017-2021 KMRB + KMRB Land Use	
Model Results			
Results for 1-hour averaging period	3.22	1.68	$\mu g/m^3$
Results for 3-hour averaging period	1.71	0.82	
Results for 8-hour averaging period	0.86	0.63	
Results for 24-hour averaging period	0.43	0.29	
Results for Annual averaging period	0.03	0.02	

Based on the results in Table 2-2, the modeling evaluation will be completed using the flow rate associated with the Tapping operations (i.e., 788,000 acfm) as this flowrate generates the highest $PM_{10}/PM_{2.5}$ impacts.

2.2.2 Area Sources

The following sources will be modeled as area sources with the appropriate parameters:

- ECS Scrap Building Storage Pile A (Model ID W51A)
- ECS Scrap Building Storage Pile B (Model ID W51B)
- ECS Scrap Building Storage Pile C (Model ID W51C)
- ECS Scrap Building Overage Scrap Pile (Model ID W51D)
- Outside Rail Scrap 5k Pile A (Model ID W51E)
- Outside Rail Scrap 5k Pile B (Model ID W51F)
- Outside Rail Scrap 5k Pile C (Model ID W51G)
- Outside Rail Scrap 5k Pile D (Model ID W51H)
- Outside Truck Scrap 5k Pile A (Model ID W51K)
- Outside Truck Scrap 5k Pile B (Model ID W51L)
- Outside Truck Scrap 5k Pile C (Model ID W51M)
- Outside Truck Scrap 5k Pile D (Model ID W51N)
- Alloy Aggregate Storage Pile (Model ID W61)
- SPP Slag Storage Pile (Model ID W71A)
- SPP Piles (Model ID W71B)
- Residual Scrap Storage Pile in Scrap Yard (Model ID W81)
- Mill Scale Pile (Model ID W111)

For storage piles, source parameters will be determined as follows:

- X and Y length is based on storage pile area;
- Release height = average pile height / 2;
- Initial vertical dimension = the average pile height / 4.3.

Pursuant to AP-42 Section 13.2.5, *Industrial Wind Erosion*, emissions from a storage pile are expected when threshold wind speeds exceed 5 m/s at 15 cm above the surface or 10 m/s at 7 m above the surface. AERMOD includes six different categories reflecting six ranges for wind speeds. The user is able to enter a "variable emission rate factor" for each of the six wind speed categories that weights the emissions for hours with wind speeds in the different categories. Because wind speeds below 5.14 m/s are not high enough to entrain particulates, storage pile emissions will be to zero for wind speeds below 5.14 m/s, consistent with AP-42 Section 13.2.5.

2.2.3 Volume Sources

2.2.3.1 Volume Sources – Drop Points

The following drop points have been modeled as volume sources with the appropriate parameters:

- Inside ECS Building Drop Points, Scrap (Model ID TR51A)
- Outside ECS Building Drop Points, Scrap, Storage Area (Model ID TR51B)
- Outside Rail Bins Drop Point, Scrap (Model ID TR51C)
- Outside Truck Bins Drop Point, Scrap (Model ID TR51E)
- Inside ECS Building Drop Points, Fluxing Agent (Model ID TR71)
- Outside Drop Points, Alloy Aggregate (Model ID TR81)
- Inside Drop Points, Spent Refractory and Other Waste (Model ID TR91A)
- Outside Drop Points, Spent Refractory and Other Waste (Model ID TR91B)
- Outside SPP Pile Drop Points, Slag (Model ID TR11A)
- SPP Material Transfers, Crusher, and Screen (Model ID TR11B)
- Outside Drop Points, Residual Scrap Pile (Model ID TR131)
- Outside Drop Points, Mill Scale Pile (Model ID TR141)
- Ball Drop Crushing (Model ID CR1)
- Trailer Parking Area (Model ID TRAILER1 through TRAILER5)

Source parameters will be determined as follows. Note that the following equations apply to square sources and any rectangular shaped volume sources will be divided into squares before applying the equations.

- Release height = center of volume above ground
- Initial lateral dimensions (σ_{yo}) for single volume source = length of side / 4.3
- Initial vertical dimensions (σ_{zo}) for elevated source not on or adjacent to a building = average drop height / 4.3

2.2.3.2 Volume Sources – Roads

The roads will be modeled as a series of adjacent volume sources. Source parameters will be determined following the eight steps.

- Step 1: Adjusted width of road = actual road width (6 meters) + 6 meters
- Step 2: Number of volume source N = road length / adjusted road width
- Step 3: Height of volume = 1.7 x average vehicle height

- Step 4: Initial horizontal sigma (σ_{yo}) = adjusted road width / 2.15
- Step 5: Initial vertical sigma (σ_{zo}) = volume height / 2.15
- Step 6: Release height = volume height / 2
- Step 7: Emission rate per volume source = total emission rate / number of volume source
- Step 8: Determine UTM coordinate for release point
- Step 9: Determine source elevation using AERMAP

As part of allocating the calculated emissions for the various trucks traveling on the plant roads to the appropriate locations, the roads will be divided up into segments. Each road segment represents a stretch of road that can be traveled on for delivering/transferring various material. There will be some road segments that will be traveled on by vehicles delivering/transferring multiple materials. Emissions will be spread across these segments based on the number of volume sources needed to cover a specific road segment and the total emissions for the vehicles traveling on the segments.

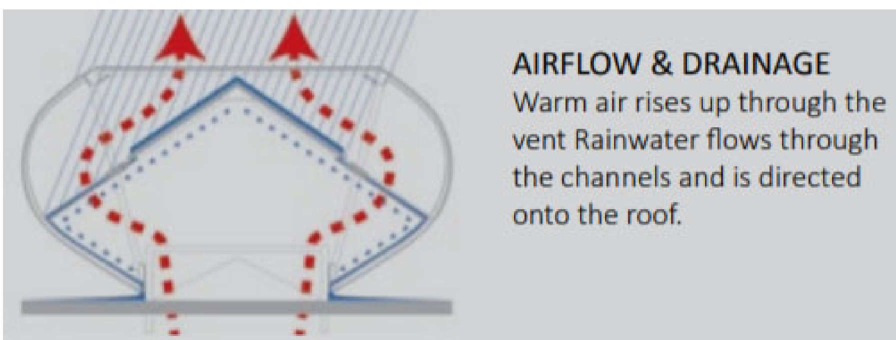
2.2.4 Building Vent Sources

The following sources will be modeled as buoyant line (i.e., BUOYLINE) sources with the appropriate parameters. The roof line over these sources will be designed to allow exhaust air to escape while preventing rainwater from entering the building, as shows in Figure 2-1.

- Caster Vent (Model ID CV1);
- Rolling Mill Vent (Model ID RMV1); and
- Cooling Bed Vents (Model ID CBV1.)

Note that EPA did not implement the deposition algorithms within AERMOD for the BUOYLINE source representation. When the deposition algorithms are executed for the BUOYLINE sources, AERMOD generates error E251 stating that deposition (DPOS, DDEP, WDEP) is incompatible with these sources. Therefore, if any deposition modeling analyses are to be executed a series of point sources for the vent sources noted above will be utilized instead.

Figure 2-1. Roofline at the Caster Vent, Rolling Mill Vent, and Cooling Bed Vent



The Spooler Vent (Model ID SPV1) is also designed to allow exhaust air to escape while preventing rainwater from entering the building, similar to the sources above. However, the Spooler Vent (Model ID SPV1) is perpendicular to the three sources noted above. As shown in Figure 2-2, the AERMOD code does not accept buoyant line source geometries that are perpendicular to each other (note that several source order changes were deployed to address the fatal error but it could not be resolved). Therefore, the Spooler Vent (Model ID SPV1) will be represented as a LINE source with the appropriate parameters, which is conservative as any plume rise due to momentum or buoyancy is neglected in line sources.

Figure 2-2. AERMOD Perpendicular BUOYLINE Error Message

```
   ******** FATAL ERROR MESSAGES ********
SO E389      32   BL_ROTATE1: Rotated buoyant line sources not in correct order:        SPV1
SO E388       5        SRCQA: Input buoyant line sources not in correct order:      BUOYLINE
```

2.3 Considerations for NO_2 Modeling

In the "Models for Nitrogen Dioxide" section of the Guideline (Section 4.2.3.4), the EPA recommends a tiered screening approach for estimating NO_2 impacts from point sources in the PSD modeling analyses. Use of the tiered approach to NO_2 modeling for the 1-hour and annual NO_2 standards will be considered. The approach used in each of the three tiers is described briefly below.

1) Under the initial Tier 1 screening level, all NO_X emitted is modeled as NO_2 which assumes total conversion of NO to NO_2.
2) For the Tier 2 screening level, the EPA recommends multiplying the Tier 1 results by the Ambient Ratio Method 2 (ARM2), which provides estimates of representative equilibrium ratios of NO_2/NO_X based on ambient levels of NO_2 and NO_X derived from national data from the EPA's Air Quality System (AQS). The ARM2 function, which is a default option within the latest version of AERMOD, will be used to complete this multiplication. The default minimum ambient NO_2/NO_X ratio of 0.5 and maximum ambient ratio of 0.9 will be used for this methodology.
3) Because the impact of an individual NO_X source on ambient NO_2 depends on the chemical environment into which the source's plume is emitted, modeling techniques that account for this atmospheric chemistry such as the Ozone Limiting Method (OLM) or the Plume Volume Molar Ratio Method (PVMRM) can be considered under the most accurate and refined Tier 3 approach identified by the EPA. Additional model inputs required for the use of OLM or PVMRM could include source-specific in-stack NO_2/NOX ratios, ambient equilibrium NO_2/NO_X ratios, and background ozone concentrations.

CMC proposes to utilize a Tier 2 NO_2 modeling approach using the regulatory-approved EPA default settings. CMC reserves the right to modify this methodology at a future date and will submit a revised modeling protocol for WVDEP approval prior to final modeling should a Tier 3 approach be required.

The proposed emergency generators are only expected to operate during unplanned emergency events as well as monthly planned generator maintenance checks and readiness testing. Potential emissions from the emergency generators are estimated based on the limit of 100 hours/year for maintenance checks and readiness testing pursuant to the requirements of 40 CFR Part 60, Subpart IIII. Emergency, maintenance checks, and readiness testing events are not continuous and do not occur frequently enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations. Therefore, based on EPA guidance[13], the emissions of NOx from the emergency generators are considered intermittent with respect to the 1-hr NO_2 NAAQS. Emergency generators are also provided as an example of an intermittent emissions unit in EPA guidance[14] and 1-hour NO_2 modeling will use annualized emission rates for the emergency generators.

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[13] EPA memorandum "Additional Clarification Regarding Application of Appendix W Modeling Gudiance for the 1-hour NO_2 National Ambient Air Quality Standard", dated March 1, 2011.

[14] EPA memorandum "Additional Clarification Regarding Application of Appendix W Modeling Gudiance for the 1-hour NO_2 National Ambient Air Quality Standard", dated March 1, 2011.

2.4 Rural/Urban Model Selection

For any dispersion modeling exercise, the "urban" or "rural" determination of the area surrounding the subject source is considered in determining the applicable atmospheric boundary layer characteristics that affect a model's calculation of ambient concentrations.

The first method discussed in Section 5.1 of the AERMOD Implementation Guide (also referring therein to Section 7.2.3c of the Guideline on Air Quality Models, Appendix W) is called the "land use" technique as it examines the various land use within 3 km of a source and quantifies the percentage of area in various land use categories. If greater than 50% of the land use in the prescribed area is considered urban, then the urban option should be used in AERMOD. However, EPA cautions against the use of the "land use" technique for sources close to a body of water because the water body may result in a predominately rural land use classification despite being located in an urban area. If necessary, the second recommended urban/rural classification method in Appendix W Section 7.2.1.1.b is the Population Density Procedure. This technique evaluates the total population density within 3-kilometers of a source. If the population density is greater than 750 people per square kilometer, then EPA recommends the use of urban dispersion coefficients.

As shown in Figure 1-2, the proposed Project is located in an area with wooded grassland and agricultural as the dominant land cover. CMC has selected the land-use type method based on the work of August Auer. The Auer land-use approach considers four primary land-use types:

- Industrial (I);
- Commercial (C);
- Residential (R); and
- Agricultural (A).

The current approved EPA AERSURFACE version 20060 model was executed with 2016 land use data. The 2016 land use types are identified in Table 2-3.

Table 2-3. Land Use Types and Corresponding Dispersion Classification

Type	Description	Class
0	Missing, Out-of-Bounds, or Unde	Rural
11	Open Water	Rural
12	Perennial Ice/Snow	Rural
21	Developed, Open Space	Rural
22	Developed, Low Intensity	Urban
23	Developed, Medium Intensity	Urban
24	Developed, High Intensity	Urban
31	Barren Land (Rock/Sand/Clay)	Rural
32	Unconsolidated Shore	Rural
41	Deciduous Forest	Rural
42	Evergreen Forest	Rural
43	Mixed Forest	Rural
51	Dwarf Scrub	Rural
52	Shrub/Scrub	Rural
71	Grasslands/Herbaceous	Rural
72	Sedge/Herbaceous	Rural
73	Lichens	Rural
74	Moss	Rural

Type	Description	Class
81	Pasture/Hay	Rural
82	Cultivated Crops	Rural
90	Woody Wetlands	Rural
91	Palustrine Forested Wetland	Rural
92	Palustrine Scrub/Shrub Wetland	Rural
93	Estuarine Forested Wetland	Rural
94	Estuarine Scrub/Shrub Wetland	Rural
95	Emergent Herbaceous Wetland	Rural
96	Palustrine Emergent Wetland	Rural
97	Estuarine Emergent Wetland	Rural
98	Palustrine Aquatic Bed	Rural
99	Estuarine Aquatic Bed	Rural

CMC conducted a land cover analysis using EPA AERSURFACE within a 3-km radius from the proposed site. AERSURFACE provides a tally of the number of land cover grid cells for the 30 land cover categories that are present in the area of interest. Table 2-4 summarizes the results from the AERSURFACE model for the number of different land cover categories encountered during the surface roughness analysis. In addition, in Table 2-4, a classification of "rural" or "urban" was assigned to the 30 land cover categories based on Table 2-3. As shown, over 87% of land within 3 km from CMC is considered "rural". Therefore, CMC utilized the default, rural dispersion coefficient.

Table 2-4. Land Cover Analysis

Category No.	Category Description	Class	Counts	% of Total
0	Missing, Out-of-Bounds, or Unde	Undefined	0	0.0%
11	Open Water	Rural	1,366	4.3%
12	Perennial Ice/Snow	Rural	0	0.0%
21	Developed, Open Space	Rural	2,599	8.3%
22	Developed, Low Intensity	Urban	2,673	8.5%
23	Developed, Medium Intensity	Urban	1,030	3.9%
24	Developed, High Intensity	Urban	287	0.9%
31	Barren Land (Rock/Sand/Clay)	Rural	4	0.0%
32	Unconsolidated Shore	Rural	0	0.0%
41	Deciduous Forest	Rural	3,049	9.7%
42	Evergreen Forest	Rural	178	0.6%
43	Mixed Forest	Rural	5,992	19.1%
51	Dwarf Scrub	Rural	0	0.0%
52	Shrub/Scrub	Rural	28	0.1%
71	Grasslands/Herbaceous	Rural	35	0.1%
72	Sedge/Herbaceous	Rural	0	0.0%
73	Lichens	Rural	0	0.0%
74	Moss	Rural	0	0.0%
81	Pasture/Hay	Rural	11,531	36.7%
82	Cultivated Crops	Rural	1,994	6.3%
90	Woody Wetlands	Rural	498	1.6%
91	Palustrine Forested Wetland	Rural	0	0.0%
92	Palustrine Scrub/Shrub Wetland	Rural	0	0.0%
93	Estuarine Forested Wetland	Rural	0	0.0%
94	Estuarine Scrub/Shrub Wetland	Rural	0	0.0%

Category No.	Category Description	Class	Counts	% of Total
95	Emergent Herbaceous Wetland	Rural	160	0.5%
96	Palustrine Emergent Wetland	Rural	0	0.0%
97	Estuarine Emergent Wetland	Rural	0	0.0%
98	Palustrine Aquatic Bed	Rural	0	0.0%
99	Estuarine Aquatic Bed	Rural	0	0.0%
Total - Counts			**31,424**	**-**
Percentage - Rural			**-**	***87.3%***
Percentage - Urban			**-**	***12.7%***

2.5 Building Downwash

The Guideline requires the evaluation of the potential for physical structures to affect the dispersion of emissions from stack sources. The exhaust from stacks that are located within specified distances of buildings may be subject to "aerodynamic building downwash" under certain meteorological conditions. This determination is made by comparing actual stack height to the Good Engineering Practice (GEP) stack height. The modeled emission units will be evaluated in terms of their proximity to nearby structures.

In accordance with recent AERMOD updates, an emission point is assumed to be subject to the effects of downwash at all release heights even if the stack height is above the EPA formula height, which is defined by the following formula:

$H = H_s + 1.5L$, where:

Where

H = GEP stack height,
Hs = structure height, and
L = lesser dimension of the structure (height or maximum projected width).

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

Direction-specific equivalent building dimensions used as input to the AERMOD model to simulate the impacts of downwash will be calculated using the EPA-sanctioned Building Profile Input Program (BPIP-PRIME), version 04274 and used in the AERMOD Model.[15] BPIP-PRIME is designed to incorporate the concepts and procedures expressed in the GEP Technical Support document, the Building Downwash Guidance document, and other related documents and has been adapted to incorporate the PRIME downwash algorithms.[16]

A GEP analysis of all modeled point sources in relation to each building will be performed to determine which building has the greatest influence on the dispersion of each stack's emissions. The GEP height for each stack calculated using the dominant structure's height and maximum projected width will also be determined.

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[15] Earth Tech, Inc., Addendum to the ISC3 User's Guide, The PRIME Plume Rise and Building Downwash Model, November 1997, http://www.epa.gov/scram001/7thconf/iscprime/useguide.pdf

[16] U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Guidelines for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations) (Revised), Research Triangle Park, North Carolina, EPA 450/4-80-023R, June 1985.

According to the EPA dispersion modeling guidance, stacks with actual heights greater than either 65 meters or the calculated GEP height, whichever is greater, generally cannot take credit for their full stack height in a PSD modeling analysis. At this time, all modeled source stacks are less than 65 meters tall and therefore meet the requirements of GEP and credit for the entire actual height of each stack is used in this modeling analysis.

2.6 Terrain Elevations

Terrain elevations will be considered in the modeling analysis. The elevations of receptors, buildings, and sources will refine the modeling impacts between the sources at one elevation and receptor locations at various other elevations at the fence line and beyond. This will be accomplished using a hybrid site-specific and AERMAP approach. Actual elevation contour data for all locations within the proposed Project boundary were developed. These contours were used to generate raster elevation data for the Project, including fenceline elevations, and this raster data was used to interpolate elevation data for fenceline receptors and on-site sources and buildings. Appendix B contains the on-site contour data, converted on-site raster elevation data, and elevation interpolation outputs. The AERMOD terrain preprocessor called AERMAP (latest version 18081) was used to determine the base elevation for off-site receptors only and effective hill height scales for fenceline and off-site receptors. The effective hill height scale determines the magnitude of each source plume-elevated terrain feature interaction and is based on elevation node data from surrounding terrain data. AERMOD uses both of these receptor-related values to calculate the effect of terrain on each plume. Terrain elevations for off-site receptors and other regional source base elevations (if required in the NAAQS modeling analysis) input to the model were read and interpolated from 1/3 arc second (approximately 10-meter resolution) National Elevation Dataset (NED) data obtained from the U.S. Geological Survey (USGS).[17] The NED data extends well beyond the extent of the modeled receptor grids to properly calculate the receptor elevations and hill-height scales.

2.7 Meteorological Data

For completing the evaluations using AERMOD, meteorological data must be preprocessed into a format that AERMOD can use. This will be accomplished using the AERMET processor (Version 22112) along with nearby sets of National Weather Service (NWS) data from surface and upper air stations.

Because the meteorology generated by AERMET relies on the land surface in the vicinity of the NWS surface site, land cover/land use data (National Land Cover Data, NLCD) was determined from that available from the United States Geological Survey through the MRLC Consortium viewer platform. The AERSURFACE program (Version 20060) was used to generate the three critical parameters used in AERMET, namely, albedo, Bowen Ratio (ratio of sensible heat to latent heat), and the surface roughness parameter. AERMET and AERSURFACE program inputs and outputs are summarized in Appendix C and are based on the following:

- The following AERSURFACE program default seasons[18]:
  - Late autumn after frost and harvest, or winter with no snow (Dec, Jan, Feb).
  - Transitional spring with partial green coverage or short annuals (Mar, Apr, May).
  - Midsummer with lush vegetation (Jun, Jul, Aug).
  - Autumn with unharvested cropland (Sep, Oct, Nov)

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[17] U.S. Geological Survey, USGS 3D Elevation Program (3DEP), accessed April 6, 2021 at https://apps.nationalmap.gov/downloader/#/

[18] Per User's Guide for AERSURFACE Tool, EPA-454/B-20-008, February 2020.

- Local precipitation data since 1991 including a review of the lower 30th percentile, upper 70th percentile, and total rainfall.
- The land use at the proposed Project after completion of construction (note that Appendix C contains both the pre and post construction analyses for comparison).

Values for those land use parameters were tabulated for both the meteorological data sites considered and proposed Project site to confirm that the NWS stations within close proximity are reasonably representative of the proposed Project. There are two nearby meteorological data stations within close proximity to the proposed Project:

- Martinsburg – Eastern West Virginia (KMRB) located 18 km to the southwest; and
- Hagerstown – Richard Henson (KHGR) located 22 km to the northeast.

Figure 2-3 and Figure 2-4 present aerial images of the immediate area surrounding the airport NWS stations and Figure 2-5 depicts the aerial image of the proposed Project location.

Figure 2-3. Aerial Image of Martinsburg – Eastern West Virginia Regional Airport (KMRB)

Figure 2-4. Aerial Image of Hagerstown – Richard Henson Airport (KHGR)

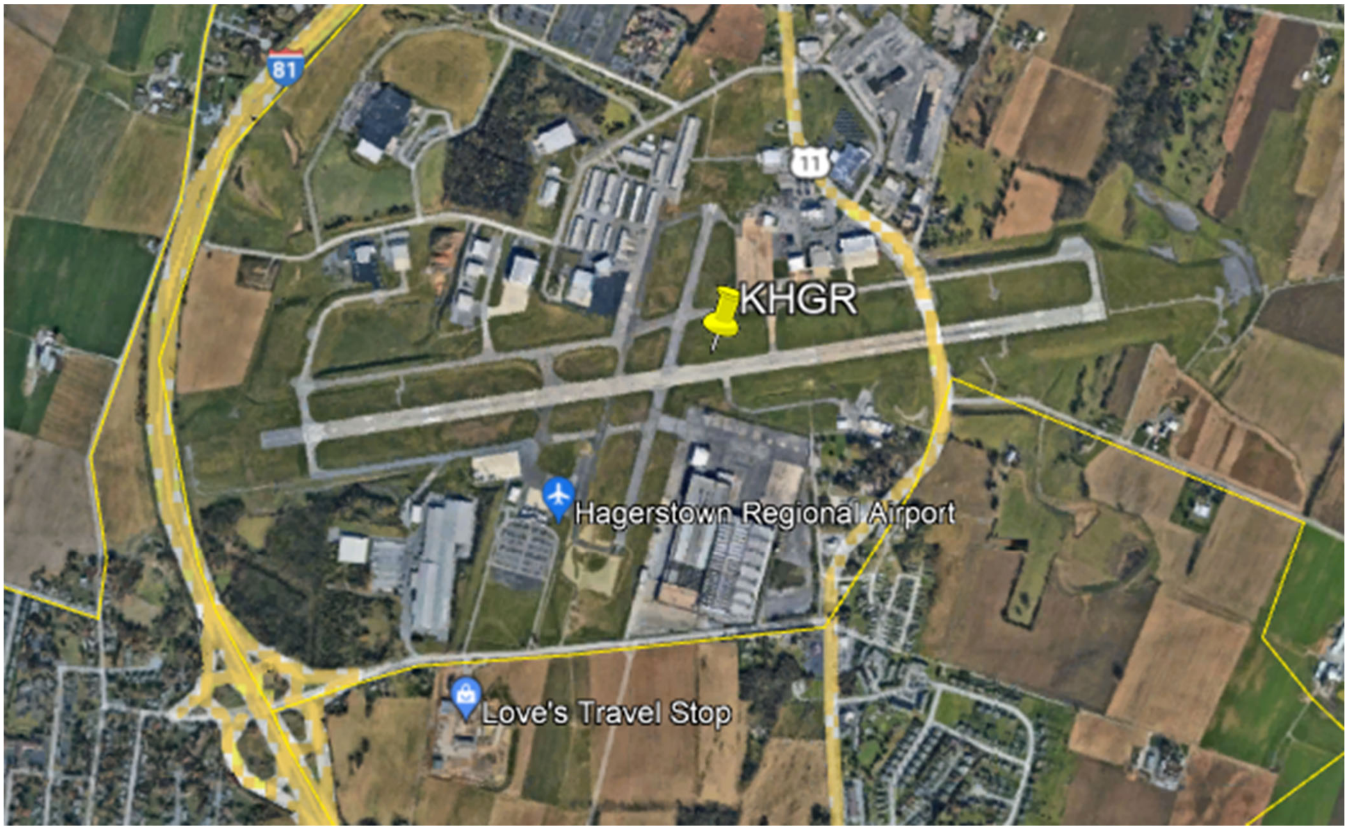
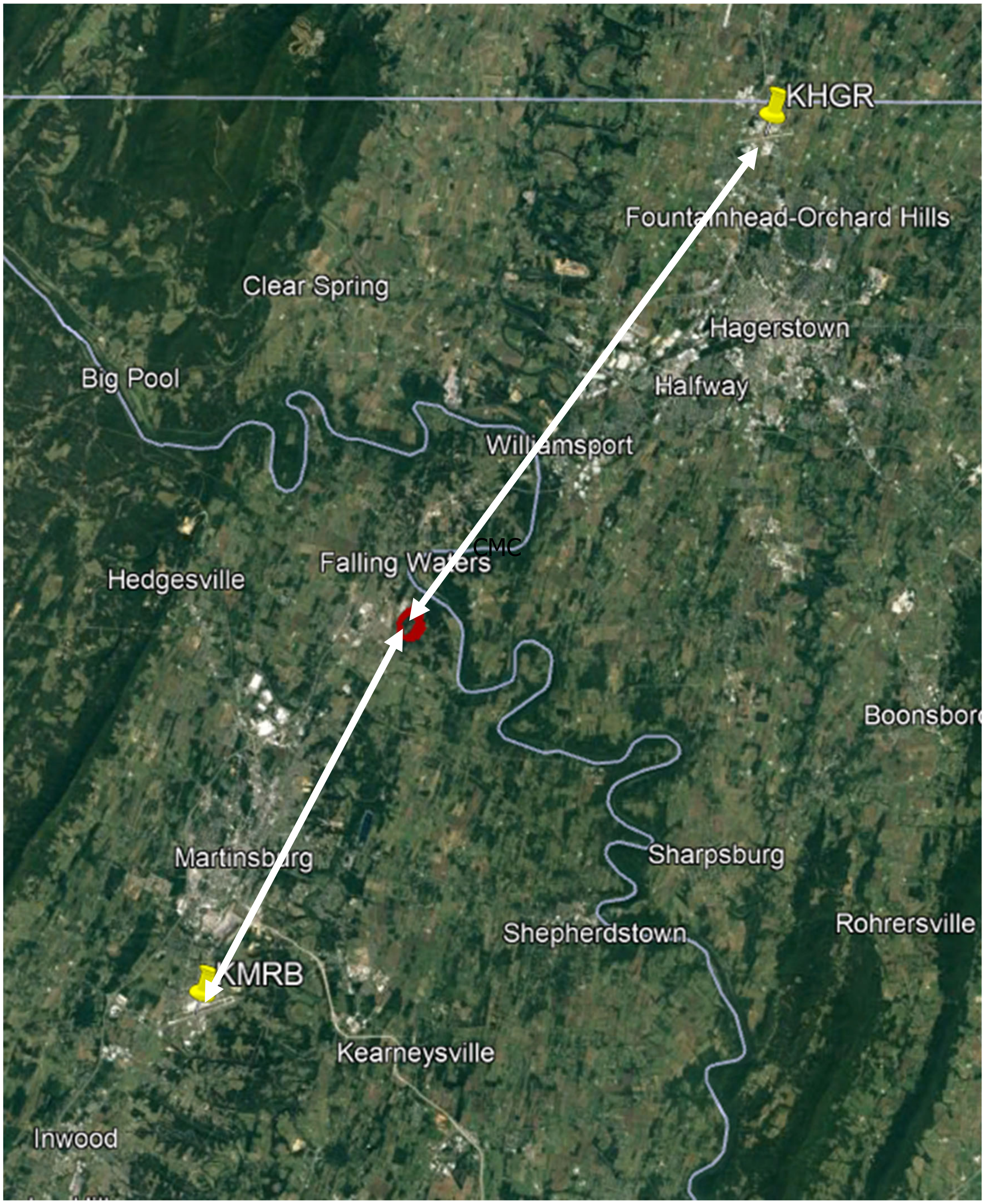


Figure 2-5. Aerial Image of Proposed Project Location



The tables below present a comparison of the albedo, Bowen ratio, and surface roughness for Martinsburg (KMRB) and the proposed Project location. The albedo and Bowen ratio are comparable at both sites. However, there are some sectors where the surface roughness varies between the two locations. The tables below present a comparison of the albedo, Bowen ratio, and surface roughness for Hagerstown (KHGR) and the proposed Project location. Overall, the land use characteristics at Martinsburg (KMRB) and proposed Project are more comparable than those associated with Hagerstown (KHGR).

Table 2-5. Comparison of Land Use Characteristics for Martinsburg (KMRB) – Dry

Sector (degrees)	Season	Martinsburg			Proposed Project Site			Project/Martinsburg		
		Albedo	Bowen Ratio	Surface Roughness (m)	Albedo	Bowen Ratio	Surface Roughness	Albedo (% diff)	Bowen Ratio (% diff)	Surface Roughness (% diff)
0-30	Winter	0.17	2.06	0.023	0.17	1.75	0.25	0%	16%	166%
30-60		0.17	2.06	0.031	0.17	1.75	0.295	0%	16%	162%
60-90		0.17	2.06	0.028	0.17	1.75	0.217	0%	16%	154%
90-120		0.17	2.06	0.081	0.17	1.75	0.095	0%	16%	16%
120-150		0.17	2.06	0.034	0.17	1.75	0.056	0%	16%	49%
150-180		0.17	2.06	0.067	0.17	1.75	0.168	0%	16%	86%
180-210		0.17	2.06	0.04	0.17	1.75	0.388	0%	16%	163%
210-240		0.17	2.06	0.038	0.17	1.75	0.137	0%	16%	113%
240-270		0.17	2.06	0.021	0.17	1.75	0.161	0%	16%	154%
270-300		0.17	2.06	0.034	0.17	1.75	0.132	0%	16%	118%
300-330		0.17	2.06	0.026	0.17	1.75	0.181	0%	16%	150%
330-360		0.17	2.06	0.026	0.17	1.75	0.173	0%	16%	148%
0-30	Spring	0.15	1.31	0.027	0.14	1.1	0.363	7%	17%	172%
30-60		0.15	1.31	0.036	0.14	1.1	0.398	7%	17%	167%
60-90		0.15	1.31	0.031	0.14	1.1	0.321	7%	17%	165%
90-120		0.15	1.31	0.123	0.14	1.1	0.136	7%	17%	10%
120-150		0.15	1.31	0.051	0.14	1.1	0.08	7%	17%	44%
150-180		0.15	1.31	0.105	0.14	1.1	0.228	7%	17%	74%
180-210		0.15	1.31	0.058	0.14	1.1	0.532	7%	17%	161%
210-240		0.15	1.31	0.052	0.14	1.1	0.193	7%	17%	115%
240-270		0.15	1.31	0.025	0.14	1.1	0.239	7%	17%	162%
270-300		0.15	1.31	0.039	0.14	1.1	0.19	7%	17%	132%
300-330		0.15	1.31	0.031	0.14	1.1	0.257	7%	17%	157%
330-360		0.15	1.31	0.03	0.14	1.1	0.232	7%	17%	154%
0-30	Summer	0.17	1.2	0.035	0.17	1.05	0.604	0%	13%	178%
30-60		0.17	1.2	0.047	0.17	1.05	0.6	0%	13%	171%
60-90		0.17	1.2	0.041	0.17	1.05	0.526	0%	13%	171%
90-120		0.17	1.2	0.31	0.17	1.05	0.339	0%	13%	9%
120-150		0.17	1.2	0.181	0.17	1.05	0.25	0%	13%	32%
150-180		0.17	1.2	0.282	0.17	1.05	0.458	0%	13%	48%
180-210		0.17	1.2	0.19	0.17	1.05	0.83	0%	13%	125%
210-240		0.17	1.2	0.109	0.17	1.05	0.446	0%	13%	121%
240-270		0.17	1.2	0.031	0.17	1.05	0.491	0%	13%	176%
270-300		0.17	1.2	0.044	0.17	1.05	0.332	0%	13%	153%
300-330		0.17	1.2	0.036	0.17	1.05	0.414	0%	13%	168%
330-360		0.17	1.2	0.037	0.17	1.05	0.356	0%	13%	162%
0-30	Autumn	0.17	2.06	0.031	0.17	1.75	0.591	0%	16%	180%

Sector (degrees)	Season	Martinsburg			Proposed Project Site			Project/Martinsburg		
		Albedo	Bowen Ratio	Surface Roughness (m)	Albedo	Bowen Ratio	Surface Roughness	Albedo (% diff)	Bowen Ratio (% diff)	Surface Roughness (% diff)
30-60		0.17	2.06	0.044	0.17	1.75	0.584	0%	16%	172%
60-90		0.17	2.06	0.039	0.17	1.75	0.509	0%	16%	172%
90-120		0.17	2.06	0.303	0.17	1.75	0.333	0%	16%	9%
120-150		0.17	2.06	0.177	0.17	1.75	0.247	0%	16%	33%
150-180		0.17	2.06	0.276	0.17	1.75	0.45	0%	16%	48%
180-210		0.17	2.06	0.185	0.17	1.75	0.826	0%	16%	127%
210-240		0.17	2.06	0.098	0.17	1.75	0.445	0%	16%	128%
240-270		0.17	2.06	0.027	0.17	1.75	0.485	0%	16%	179%
270-300		0.17	2.06	0.039	0.17	1.75	0.315	0%	16%	156%
300-330		0.17	2.06	0.032	0.17	1.75	0.396	0%	16%	170%
330-360		0.17	2.06	0.034	0.17	1.75	0.336	0%	16%	163%
Average		0.17	1.66	0.077	0.16	1.41	0.346	2%	16%	127%

Table 2-6. Comparison of Land Use Characteristics for Martinsburg (KMRB) – Average

Sector (degrees)	Season	Martinsburg			Proposed Project Site			Project/Martinsburg		
		Albedo	Bowen Ratio	Surface Roughness (m)	Albedo	Bowen Ratio	Surface Roughness	Albedo (% diff)	Bowen Ratio (% diff)	Surface Roughness (% diff)
0-30	Winter	0.17	0.84	0.023	0.17	0.73	0.25	0%	14%	166%
30-60		0.17	0.84	0.031	0.17	0.73	0.295	0%	14%	162%
60-90		0.17	0.84	0.028	0.17	0.73	0.217	0%	14%	154%
90-120		0.17	0.84	0.081	0.17	0.73	0.095	0%	14%	16%
120-150		0.17	0.84	0.034	0.17	0.73	0.056	0%	14%	49%
150-180		0.17	0.84	0.067	0.17	0.73	0.168	0%	14%	86%
180-210		0.17	0.84	0.04	0.17	0.73	0.388	0%	14%	163%
210-240		0.17	0.84	0.038	0.17	0.73	0.137	0%	14%	113%
240-270		0.17	0.84	0.021	0.17	0.73	0.161	0%	14%	154%
270-300		0.17	0.84	0.034	0.17	0.73	0.132	0%	14%	118%
300-330		0.17	0.84	0.026	0.17	0.73	0.181	0%	14%	150%
330-360		0.17	0.84	0.026	0.17	0.73	0.173	0%	14%	148%
0-30	Spring	0.15	0.48	0.027	0.14	0.41	0.363	7%	16%	172%
30-60		0.15	0.48	0.036	0.14	0.41	0.398	7%	16%	167%
60-90		0.15	0.48	0.031	0.14	0.41	0.321	7%	16%	165%
90-120		0.15	0.48	0.123	0.14	0.41	0.136	7%	16%	10%
120-150		0.15	0.48	0.051	0.14	0.41	0.08	7%	16%	44%
150-180		0.15	0.48	0.105	0.14	0.41	0.228	7%	16%	74%
180-210		0.15	0.48	0.058	0.14	0.41	0.532	7%	16%	161%
210-240		0.15	0.48	0.052	0.14	0.41	0.193	7%	16%	115%
240-270		0.15	0.48	0.025	0.14	0.41	0.239	7%	16%	162%
270-300		0.15	0.48	0.039	0.14	0.41	0.19	7%	16%	132%
300-330		0.15	0.48	0.031	0.14	0.41	0.257	7%	16%	157%
330-360		0.15	0.48	0.03	0.14	0.41	0.232	7%	16%	154%
0-30	Summer	0.17	0.47	0.035	0.17	0.42	0.604	0%	11%	178%
30-60		0.17	0.47	0.047	0.17	0.42	0.6	0%	11%	171%
60-90		0.17	0.47	0.041	0.17	0.42	0.526	0%	11%	171%
90-120		0.17	0.47	0.31	0.17	0.42	0.339	0%	11%	9%
120-150		0.17	0.47	0.181	0.17	0.42	0.25	0%	11%	32%
150-180		0.17	0.47	0.282	0.17	0.42	0.458	0%	11%	48%
180-210		0.17	0.47	0.19	0.17	0.42	0.83	0%	11%	125%
210-240		0.17	0.47	0.109	0.17	0.42	0.446	0%	11%	121%
240-270		0.17	0.47	0.031	0.17	0.42	0.491	0%	11%	176%
270-300		0.17	0.47	0.044	0.17	0.42	0.332	0%	11%	153%
300-330		0.17	0.47	0.036	0.17	0.42	0.414	0%	11%	168%
330-360		0.17	0.47	0.037	0.17	0.42	0.356	0%	11%	162%
0-30	Autumn	0.17	0.84	0.031	0.17	0.73	0.591	0%	14%	180%

Sector (degrees)	Season	Martinsburg			Proposed Project Site			Project/Martinsburg		
		Albedo	Bowen Ratio	Surface Roughness (m)	Albedo	Bowen Ratio	Surface Roughness	Albedo (% diff)	Bowen Ratio (% diff)	Surface Roughness (% diff)
30-60		0.17	0.84	0.044	0.17	0.73	0.584	0%	14%	172%
60-90		0.17	0.84	0.039	0.17	0.73	0.509	0%	14%	172%
90-120		0.17	0.84	0.303	0.17	0.73	0.333	0%	14%	9%
120-150		0.17	0.84	0.177	0.17	0.73	0.247	0%	14%	33%
150-180		0.17	0.84	0.276	0.17	0.73	0.45	0%	14%	48%
180-210		0.17	0.84	0.185	0.17	0.73	0.826	0%	14%	127%
210-240		0.17	0.84	0.098	0.17	0.73	0.445	0%	14%	128%
240-270		0.17	0.84	0.027	0.17	0.73	0.485	0%	14%	179%
270-300		0.17	0.84	0.039	0.17	0.73	0.315	0%	14%	156%
300-330		0.17	0.84	0.032	0.17	0.73	0.396	0%	14%	170%
330-360		0.17	0.84	0.034	0.17	0.73	0.336	0%	14%	163%
Average		0.17	0.66	0.077	0.16	0.57	0.346	2%	14%	127%

Table 2-7. Comparison of Land Use Characteristics for Martinsburg (KMRB) – Wet

Sector (degrees)	Season	Martinsburg			Proposed Project Site			Project/Martinsburg		
		Albedo	Bowen Ratio	Surface Roughness (m)	Albedo	Bowen Ratio	Surface Roughness	Albedo (% diff)	Bowen Ratio (% diff)	Surface Roughness (% diff)
0-30	Winter	0.17	0.43	0.023	0.17	0.38	0.25	0%	12%	166%
30-60		0.17	0.43	0.031	0.17	0.38	0.295	0%	12%	162%
60-90		0.17	0.43	0.028	0.17	0.38	0.217	0%	12%	154%
90-120		0.17	0.43	0.081	0.17	0.38	0.095	0%	12%	16%
120-150		0.17	0.43	0.034	0.17	0.38	0.056	0%	12%	49%
150-180		0.17	0.43	0.067	0.17	0.38	0.168	0%	12%	86%
180-210		0.17	0.43	0.04	0.17	0.38	0.388	0%	12%	163%
210-240		0.17	0.43	0.038	0.17	0.38	0.137	0%	12%	113%
240-270		0.17	0.43	0.021	0.17	0.38	0.161	0%	12%	154%
270-300		0.17	0.43	0.034	0.17	0.38	0.132	0%	12%	118%
300-330		0.17	0.43	0.026	0.17	0.38	0.181	0%	12%	150%
330-360		0.17	0.43	0.026	0.17	0.38	0.173	0%	12%	148%
0-30	Spring	0.15	0.28	0.027	0.14	0.24	0.363	7%	15%	172%
30-60		0.15	0.28	0.036	0.14	0.24	0.398	7%	15%	167%
60-90		0.15	0.28	0.031	0.14	0.24	0.321	7%	15%	165%
90-120		0.15	0.28	0.123	0.14	0.24	0.136	7%	15%	10%
120-150		0.15	0.28	0.051	0.14	0.24	0.08	7%	15%	44%
150-180		0.15	0.28	0.105	0.14	0.24	0.228	7%	15%	74%
180-210		0.15	0.28	0.058	0.14	0.24	0.532	7%	15%	161%
210-240		0.15	0.28	0.052	0.14	0.24	0.193	7%	15%	115%
240-270		0.15	0.28	0.025	0.14	0.24	0.239	7%	15%	162%
270-300		0.15	0.28	0.039	0.14	0.24	0.19	7%	15%	132%
300-330		0.15	0.28	0.031	0.14	0.24	0.257	7%	15%	157%
330-360		0.15	0.28	0.03	0.14	0.24	0.232	7%	15%	154%
0-30	Summer	0.17	0.3	0.035	0.17	0.27	0.604	0%	11%	178%
30-60		0.17	0.3	0.047	0.17	0.27	0.6	0%	11%	171%
60-90		0.17	0.3	0.041	0.17	0.27	0.526	0%	11%	171%
90-120		0.17	0.3	0.31	0.17	0.27	0.339	0%	11%	9%
120-150		0.17	0.3	0.181	0.17	0.27	0.25	0%	11%	32%
150-180		0.17	0.3	0.282	0.17	0.27	0.458	0%	11%	48%
180-210		0.17	0.3	0.19	0.17	0.27	0.83	0%	11%	125%
210-240		0.17	0.3	0.109	0.17	0.27	0.446	0%	11%	121%
240-270		0.17	0.3	0.031	0.17	0.27	0.491	0%	11%	176%
270-300		0.17	0.3	0.044	0.17	0.27	0.332	0%	11%	153%
300-330		0.17	0.3	0.036	0.17	0.27	0.414	0%	11%	168%
330-360		0.17	0.3	0.037	0.17	0.27	0.356	0%	11%	162%
0-30	Autumn	0.17	0.43	0.031	0.17	0.38	0.591	0%	12%	180%

Sector (degrees)	Season	Martinsburg			Proposed Project Site			Project/Martinsburg		
		Albedo	Bowen Ratio	Surface Roughness (m)	Albedo	Bowen Ratio	Surface Roughness	Albedo (% diff)	Bowen Ratio (% diff)	Surface Roughness (% diff)
30-60		0.17	0.43	0.044	0.17	0.38	0.584	0%	12%	172%
60-90		0.17	0.43	0.039	0.17	0.38	0.509	0%	12%	172%
90-120		0.17	0.43	0.303	0.17	0.38	0.333	0%	12%	9%
120-150		0.17	0.43	0.177	0.17	0.38	0.247	0%	12%	33%
150-180		0.17	0.43	0.276	0.17	0.38	0.45	0%	12%	48%
180-210		0.17	0.43	0.185	0.17	0.38	0.826	0%	12%	127%
210-240		0.17	0.43	0.098	0.17	0.38	0.445	0%	12%	128%
240-270		0.17	0.43	0.027	0.17	0.38	0.485	0%	12%	179%
270-300		0.17	0.43	0.039	0.17	0.38	0.315	0%	12%	156%
300-330		0.17	0.43	0.032	0.17	0.38	0.396	0%	12%	170%
330-360		0.17	0.43	0.034	0.17	0.38	0.336	0%	12%	163%
Average		0.17	0.36	0.077	0.16	0.32	0.346	2%	13%	127%

Table 2-8. Comparison of Land Use Characteristics for Hagerstown (KHGR) – Dry

Sector (degrees)	Season	Hagerstown			Proposed Project Site			Project/Hagerstown		
		Albedo	Bowen Ratio	Surface Roughness (m)	Albedo	Bowen Ratio	Surface Roughness	Albedo (% diff)	Bowen Ratio (% diff)	Surface Roughness (% diff)
0-30	Winter	0.18	2.05	0.024	0.17	1.75	0.25	6%	16%	165%
30-60		0.18	2.05	0.023	0.17	1.75	0.295	6%	16%	171%
60-90		0.18	2.05	0.024	0.17	1.75	0.217	6%	16%	160%
90-120		0.18	2.05	0.031	0.17	1.75	0.095	6%	16%	102%
120-150		0.18	2.05	0.03	0.17	1.75	0.056	6%	16%	60%
150-180		0.18	2.05	0.021	0.17	1.75	0.168	6%	16%	156%
180-210		0.18	2.05	0.052	0.17	1.75	0.388	6%	16%	153%
210-240		0.18	2.05	0.097	0.17	1.75	0.137	6%	16%	34%
240-270		0.18	2.05	0.085	0.17	1.75	0.161	6%	16%	62%
270-300		0.18	2.05	0.019	0.17	1.75	0.132	6%	16%	150%
300-330		0.18	2.05	0.018	0.17	1.75	0.181	6%	16%	164%
330-360		0.18	2.05	0.044	0.17	1.75	0.173	6%	16%	119%
0-30	Spring	0.15	1.19	0.031	0.14	1.1	0.363	7%	8%	169%
30-60		0.15	1.19	0.029	0.14	1.1	0.398	7%	8%	173%
60-90		0.15	1.19	0.03	0.14	1.1	0.321	7%	8%	166%
90-120		0.15	1.19	0.036	0.14	1.1	0.136	7%	8%	116%
120-150		0.15	1.19	0.035	0.14	1.1	0.08	7%	8%	78%
150-180		0.15	1.19	0.024	0.14	1.1	0.228	7%	8%	162%
180-210		0.15	1.19	0.067	0.14	1.1	0.532	7%	8%	155%
210-240		0.15	1.19	0.119	0.14	1.1	0.193	7%	8%	47%
240-270		0.15	1.19	0.108	0.14	1.1	0.239	7%	8%	76%
270-300		0.15	1.19	0.025	0.14	1.1	0.19	7%	8%	153%
300-330		0.15	1.19	0.023	0.14	1.1	0.257	7%	8%	167%
330-360		0.15	1.19	0.056	0.14	1.1	0.232	7%	8%	122%
0-30	Summer	0.18	1.5	0.036	0.17	1.05	0.604	6%	35%	178%
30-60		0.18	1.5	0.034	0.17	1.05	0.6	6%	35%	179%
60-90		0.18	1.5	0.036	0.17	1.05	0.526	6%	35%	174%
90-120		0.18	1.5	0.042	0.17	1.05	0.339	6%	35%	156%
120-150		0.18	1.5	0.041	0.17	1.05	0.25	6%	35%	144%
150-180		0.18	1.5	0.032	0.17	1.05	0.458	6%	35%	174%
180-210		0.18	1.5	0.161	0.17	1.05	0.83	6%	35%	135%
210-240		0.18	1.5	0.172	0.17	1.05	0.446	6%	35%	89%
240-270		0.18	1.5	0.14	0.17	1.05	0.491	6%	35%	111%
270-300		0.18	1.5	0.03	0.17	1.05	0.332	6%	35%	167%
300-330		0.18	1.5	0.029	0.17	1.05	0.414	6%	35%	174%
330-360		0.18	1.5	0.066	0.17	1.05	0.356	6%	35%	137%
0-30	Autumn	0.18	2.05	0.031	0.17	1.75	0.591	6%	16%	180%

Sector (degrees)	Season	Hagerstown			Proposed Project Site			Project/Hagerstown		
		Albedo	Bowen Ratio	Surface Roughness (m)	Albedo	Bowen Ratio	Surface Roughness	Albedo (% diff)	Bowen Ratio (% diff)	Surface Roughness (% diff)
30-60		0.18	2.05	0.029	0.17	1.75	0.584	6%	16%	181%
60-90		0.18	2.05	0.031	0.17	1.75	0.509	6%	16%	177%
90-120		0.18	2.05	0.037	0.17	1.75	0.333	6%	16%	160%
120-150		0.18	2.05	0.038	0.17	1.75	0.247	6%	16%	147%
150-180		0.18	2.05	0.029	0.17	1.75	0.45	6%	16%	176%
180-210		0.18	2.05	0.15	0.17	1.75	0.826	6%	16%	139%
210-240		0.18	2.05	0.156	0.17	1.75	0.445	6%	16%	96%
240-270		0.18	2.05	0.123	0.17	1.75	0.485	6%	16%	119%
270-300		0.18	2.05	0.025	0.17	1.75	0.315	6%	16%	171%
300-330		0.18	2.05	0.024	0.17	1.75	0.396	6%	16%	177%
330-360		0.18	2.05	0.058	0.17	1.75	0.336	6%	16%	141%
Average		0.17	1.70	0.054	0.16	1.41	0.346	6%	18%	146%

Table 2-9. Comparison of Land Use Characteristics for Hagerstown (KHGR) – Average

Sector (degrees)	Season	Hagerstown			Proposed Project Site			Project/Hagerstown		
		Albedo	Bowen Ratio	Surface Roughness (m)	Albedo	Bowen Ratio	Surface Roughness	Albedo (% diff)	Bowen Ratio (% diff)	Surface Roughness (% diff)
0-30	Winter	0.18	0.76	0.024	0.17	0.73	0.25	6%	4%	165%
30-60		0.18	0.76	0.023	0.17	0.73	0.295	6%	4%	171%
60-90		0.18	0.76	0.024	0.17	0.73	0.217	6%	4%	160%
90-120		0.18	0.76	0.031	0.17	0.73	0.095	6%	4%	102%
120-150		0.18	0.76	0.03	0.17	0.73	0.056	6%	4%	60%
150-180		0.18	0.76	0.021	0.17	0.73	0.168	6%	4%	156%
180-210		0.18	0.76	0.052	0.17	0.73	0.388	6%	4%	153%
210-240		0.18	0.76	0.097	0.17	0.73	0.137	6%	4%	34%
240-270		0.18	0.76	0.085	0.17	0.73	0.161	6%	4%	62%
270-300		0.18	0.76	0.019	0.17	0.73	0.132	6%	4%	150%
300-330		0.18	0.76	0.018	0.17	0.73	0.181	6%	4%	164%
330-360		0.18	0.76	0.044	0.17	0.73	0.173	6%	4%	119%
0-30	Spring	0.15	0.39	0.031	0.14	0.41	0.363	7%	5%	169%
30-60		0.15	0.39	0.029	0.14	0.41	0.398	7%	5%	173%
60-90		0.15	0.39	0.03	0.14	0.41	0.321	7%	5%	166%
90-120		0.15	0.39	0.036	0.14	0.41	0.136	7%	5%	116%
120-150		0.15	0.39	0.035	0.14	0.41	0.08	7%	5%	78%
150-180		0.15	0.39	0.024	0.14	0.41	0.228	7%	5%	162%
180-210		0.15	0.39	0.067	0.14	0.41	0.532	7%	5%	155%
210-240		0.15	0.39	0.119	0.14	0.41	0.193	7%	5%	47%
240-270		0.15	0.39	0.108	0.14	0.41	0.239	7%	5%	76%
270-300		0.15	0.39	0.025	0.14	0.41	0.19	7%	5%	153%
300-330		0.15	0.39	0.023	0.14	0.41	0.257	7%	5%	167%
330-360		0.15	0.39	0.056	0.14	0.41	0.232	7%	5%	122%
0-30	Summer	0.18	0.54	0.036	0.17	0.42	0.604	6%	25%	178%
30-60		0.18	0.54	0.034	0.17	0.42	0.6	6%	25%	179%
60-90		0.18	0.54	0.036	0.17	0.42	0.526	6%	25%	174%
90-120		0.18	0.54	0.042	0.17	0.42	0.339	6%	25%	156%
120-150		0.18	0.54	0.041	0.17	0.42	0.25	6%	25%	144%
150-180		0.18	0.54	0.032	0.17	0.42	0.458	6%	25%	174%
180-210		0.18	0.54	0.161	0.17	0.42	0.83	6%	25%	135%
210-240		0.18	0.54	0.172	0.17	0.42	0.446	6%	25%	89%
240-270		0.18	0.54	0.14	0.17	0.42	0.491	6%	25%	111%
270-300		0.18	0.54	0.03	0.17	0.42	0.332	6%	25%	167%
300-330		0.18	0.54	0.029	0.17	0.42	0.414	6%	25%	174%
330-360		0.18	0.54	0.066	0.17	0.42	0.356	6%	25%	137%
0-30	Autumn	0.18	0.76	0.031	0.17	0.73	0.591	6%	4%	180%

Sector (degrees)	Season	Hagerstown			Proposed Project Site			Project/Hagerstown		
		Albedo	Bowen Ratio	Surface Roughness (m)	Albedo	Bowen Ratio	Surface Roughness	Albedo (% diff)	Bowen Ratio (% diff)	Surface Roughness (% diff)
30-60		0.18	0.76	0.029	0.17	0.73	0.584	6%	4%	181%
60-90		0.18	0.76	0.031	0.17	0.73	0.509	6%	4%	177%
90-120		0.18	0.76	0.037	0.17	0.73	0.333	6%	4%	160%
120-150		0.18	0.76	0.038	0.17	0.73	0.247	6%	4%	147%
150-180		0.18	0.76	0.029	0.17	0.73	0.45	6%	4%	176%
180-210		0.18	0.76	0.15	0.17	0.73	0.826	6%	4%	139%
210-240		0.18	0.76	0.156	0.17	0.73	0.445	6%	4%	96%
240-270		0.18	0.76	0.123	0.17	0.73	0.485	6%	4%	119%
270-300		0.18	0.76	0.025	0.17	0.73	0.315	6%	4%	171%
300-330		0.18	0.76	0.024	0.17	0.73	0.396	6%	4%	177%
330-360		0.18	0.76	0.058	0.17	0.73	0.336	6%	4%	141%
Average		0.17	0.61	0.054	0.16	0.57	0.346	6%	7%	146%

Table 2-10. Comparison of Land Use Characteristics for Hagerstown (KHGR) – Wet

Sector (degrees)	Season	Hagerstown Albedo	Hagerstown Bowen Ratio	Hagerstown Surface Roughness (m)	Proposed Project Site Albedo	Proposed Project Site Bowen Ratio	Proposed Project Site Surface Roughness	Project/Hagerstown Albedo (% diff)	Project/Hagerstown Bowen Ratio (% diff)	Project/Hagerstown Surface Roughness (% diff)
0-30	Winter	0.18	0.43	0.024	0.17	0.38	0.25	6%	12%	165%
30-60		0.18	0.43	0.023	0.17	0.38	0.295	6%	12%	171%
60-90		0.18	0.43	0.024	0.17	0.38	0.217	6%	12%	160%
90-120		0.18	0.43	0.031	0.17	0.38	0.095	6%	12%	102%
120-150		0.18	0.43	0.03	0.17	0.38	0.056	6%	12%	60%
150-180		0.18	0.43	0.021	0.17	0.38	0.168	6%	12%	156%
180-210		0.18	0.43	0.052	0.17	0.38	0.388	6%	12%	153%
210-240		0.18	0.43	0.097	0.17	0.38	0.137	6%	12%	34%
240-270		0.18	0.43	0.085	0.17	0.38	0.161	6%	12%	62%
270-300		0.18	0.43	0.019	0.17	0.38	0.132	6%	12%	150%
300-330		0.18	0.43	0.018	0.17	0.38	0.181	6%	12%	164%
330-360		0.18	0.43	0.044	0.17	0.38	0.173	6%	12%	119%
0-30	Spring	0.15	0.26	0.031	0.14	0.24	0.363	7%	8%	169%
30-60		0.15	0.26	0.029	0.14	0.24	0.398	7%	8%	173%
60-90		0.15	0.26	0.03	0.14	0.24	0.321	7%	8%	166%
90-120		0.15	0.26	0.036	0.14	0.24	0.136	7%	8%	116%
120-150		0.15	0.26	0.035	0.14	0.24	0.08	7%	8%	78%
150-180		0.15	0.26	0.024	0.14	0.24	0.228	7%	8%	162%
180-210		0.15	0.26	0.067	0.14	0.24	0.532	7%	8%	155%
210-240		0.15	0.26	0.119	0.14	0.24	0.193	7%	8%	47%
240-270		0.15	0.26	0.108	0.14	0.24	0.239	7%	8%	76%
270-300		0.15	0.26	0.025	0.14	0.24	0.19	7%	8%	153%
300-330		0.15	0.26	0.023	0.14	0.24	0.257	7%	8%	167%
330-360		0.15	0.26	0.056	0.14	0.24	0.232	7%	8%	122%
0-30	Summer	0.18	0.34	0.036	0.17	0.27	0.604	6%	23%	178%
30-60		0.18	0.34	0.034	0.17	0.27	0.6	6%	23%	179%
60-90		0.18	0.34	0.036	0.17	0.27	0.526	6%	23%	174%
90-120		0.18	0.34	0.042	0.17	0.27	0.339	6%	23%	156%
120-150		0.18	0.34	0.041	0.17	0.27	0.25	6%	23%	144%
150-180		0.18	0.34	0.032	0.17	0.27	0.458	6%	23%	174%
180-210		0.18	0.34	0.161	0.17	0.27	0.83	6%	23%	135%
210-240		0.18	0.34	0.172	0.17	0.27	0.446	6%	23%	89%
240-270		0.18	0.34	0.14	0.17	0.27	0.491	6%	23%	111%
270-300		0.18	0.34	0.03	0.17	0.27	0.332	6%	23%	167%
300-330		0.18	0.34	0.029	0.17	0.27	0.414	6%	23%	174%
330-360		0.18	0.34	0.066	0.17	0.27	0.356	6%	23%	137%
0-30	Autumn	0.18	0.43	0.031	0.17	0.38	0.591	6%	12%	180%

Sector (degrees)	Season	Hagerstown			Proposed Project Site			Project/Hagerstown		
		Albedo	Bowen Ratio	Surface Roughness (m)	Albedo	Bowen Ratio	Surface Roughness	Albedo (% diff)	Bowen Ratio (% diff)	Surface Roughness (% diff)
30-60		0.18	0.43	0.029	0.17	0.38	0.584	6%	12%	181%
60-90		0.18	0.43	0.031	0.17	0.38	0.509	6%	12%	177%
90-120		0.18	0.43	0.037	0.17	0.38	0.333	6%	12%	160%
120-150		0.18	0.43	0.038	0.17	0.38	0.247	6%	12%	147%
150-180		0.18	0.43	0.029	0.17	0.38	0.45	6%	12%	176%
180-210		0.18	0.43	0.15	0.17	0.38	0.826	6%	12%	139%
210-240		0.18	0.43	0.156	0.17	0.38	0.445	6%	12%	96%
240-270		0.18	0.43	0.123	0.17	0.38	0.485	6%	12%	119%
270-300		0.18	0.43	0.025	0.17	0.38	0.315	6%	12%	171%
300-330		0.18	0.43	0.024	0.17	0.38	0.396	6%	12%	177%
330-360		0.18	0.43	0.058	0.17	0.38	0.336	6%	12%	141%
Average		0.17	0.37	0.054	0.16	0.32	0.346	6%	14%	146%

A site-specific sensitivity analysis, in accordance with the AERMOD Implementation Guide (EPA-454/B-22-008, June 2022), of land use characteristics between the proposed Project location, the Hagerstown (KHGR) station, and the Martinsburg (KMRB) station was also completed based on the following four meteorological data sets.

- KHGR 2017-2021 data (discussed below) + CMC Land Use (which incorporates land use parameters for the proposed Project post construction). Note that this data set is for sensitivity evaluation purposes only and does not represent physical reality.
- KHGR 2017-2021 data (discussed below) + KHGR Land Use (which incorporates land use parameters for the airport location).
- KMRB 2017-2021 data (discussed below) + CMC Land Use (which incorporates land use parameters for the proposed Project post construction). Note that this data set is for sensitivity evaluation purposes only and does not represent physical reality.
- KMRB 2017-2021 data (discussed below) + KMRB Land Use (which incorporates land use parameters for the airport location).

Representative emission sources from the proposed Project for both short term and long-term averaging periods were modeled at an emission rate of 1 gram/second using the four meteorological data sets. The following representative sources were evaluated as part of the analysis, as summarized in Table 2-11. Note that Buoyant Line and Line sources are not considered in this evaluation because their proposed emissions are very small (in the range of 0.01 lb/hr and 0.01 tpy) and not expected to impact the overall model results.

- The proposed baghouse stack, which is the primary emission point of the proposed project.
- The area source associate with the Outside Rail Scrap 5k Pile D (Model ID W51H), which is expected to yield the highest off-site impacts due to its close proximity to the fenceline.
- The volume source associate with the Paved Road 1 (Model ID PR1_1), which is expected to yield the highest off-site impacts due to its close proximity to the fenceline.

Table 2-11. Meteorological Data Sensitivity Analysis Representative Sources

Meteorological Data Set	Averaging Period	Point	Area	Volume
		BH1	W51H	PR1_1
Model Results (ug/m³)				
2017-2021 KHGR + CMC Land Use	1-hour	2.28	3,354.78	7,498
	3-hour	1.41	1,864.90	5,916
	8-hour	1.29	1,087.49	5,467
	24-hour	0.81	498.11	2,405
	Annual	0.05	48.58	595
2017-2021 KHGR + KHGR Land Use	1-hour	3.41	3,942.71	7,948
	3-hour	1.44	2,145.96	6,605
	8-hour	0.86	1,149.52	5,531
	24-hour	0.38	533.75	2,597
	Annual	0.03	49.65	515
2017-2021 KMRB + CMC Land Use	1-hour	2.26	3,383.50	7,558
	3-hour	1.43	2,842.12	6,420
	8-hour	1.19	1,265.78	5,137
	24-hour	0.70	567.09	2,974
	Annual	0.04	71.00	823
2017-2021 KMRB + KMRB Land Use	1-hour	3.21	4,807.16	7,980
	3-hour	1.70	3,437.55	7,439
	8-hour	0.84	1,614.38	5,417
	24-hour	0.43	660.37	3,259
	Annual	0.03	84.20	754
Concentration Difference for Land Use Evaluation (%)				
(2017-2021 KHGR + KHGR Land Use) vs. (2017-2021 KHGR + CMC Land Use)	1-hour	49%	18%	6%
	3-hour	2%	15%	12%
	8-hour	33%	6%	1%
	24-hour	53%	7%	8%
	Annual	32%	2%	13%
(2017-2021 KMRB + KMRB Land Use) vs. (2017-2021 KMRB + CMC Land Use)	1-hour	42%	42%	6%
	3-hour	19%	21%	16%
	8-hour	29%	28%	5%
	24-hour	39%	16%	10%
	Annual	24%	19%	8%
Station with Least Difference	1-hour	KMRB	KHGR	KMRB
	3-hour	KHGR	KHGR	KHGR
	8-hour	KMRB	KHGR	KHGR
	24-hour	KMRB	KHGR	KHGR
	Annual	KMRB	KHGR	KMRB

The following observations can be derived from the results in Table 2-11:

- The model impacts based on KMRB and KHGR meteorological data with the two land use characteristics vary between 1% and 53%.

- KMRB is the station with the least difference in impacts relative to the proposed Project (i.e., most similar from a land use perspective) for:
  - Model ID BH1 (i.e., the baghouse), which is the largest emission source at the proposed Project.
  - The 1-hour averaging period which is generally the most stringent of the averaging periods for the various standards.

Based on the above considerations, Martinsburg (KMRB) is selected as the most representative meteorological station for the proposed project. The most recent, readily available full five years of meteorological data for Martinsburg is 2017-2021. Meteorological data from these representative years will be used in the air quality modeling analysis. AERMET will be used to process the model ready dataset. The proposed Project site will utilize upper air data from Sterling - Washington Dulles (KIAD, WBAN #93734). Those upper air data will be obtained from the National Oceanic and Atmospheric Administration NOAA/ESRL Radiosonde Database.

A minimum threshold wind speed of 0.5 m/s (the lowest wind speed that will be allowed in the generated meteorological data set) will be implemented in AERMET, as suggested in Section 4.6.2.2 of the latest AERMET User's Guide, all hours with wind speeds below this value will be treated as "calm" in AERMOD.

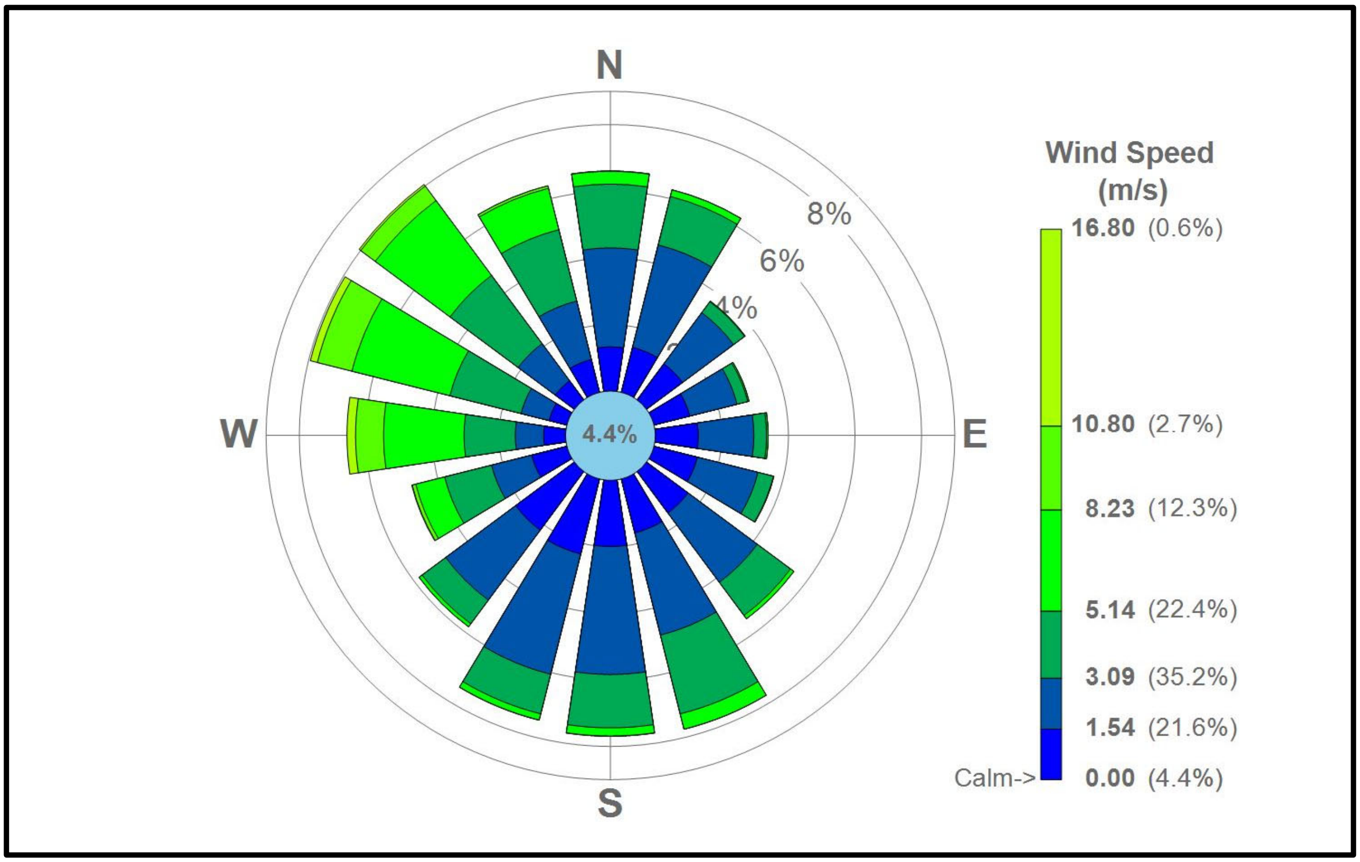
Raw hourly surface meteorological was obtained from the U.S. National Climactic Data Center (NCDC) for the Martinsburg (KMRB) station in the standard ISHD format for 2017-2021. Per EPA guidance, a meteorological database "must be 90 percent complete (before substitution) in order to be acceptable for use in regulatory dispersion modeling" and "The 90 percent requirement applies on a quarterly basis such that 4 consecutive quarters with 90 percent recovery are required for an acceptable one-year data base." As summarized in Table 2-6, ISHD data for the Martinsburg (KMRB) station meets the 90 percent data completeness requirement for all quarters from 2017 to 2021. Figure 2-6 depicts the distribution of wind speed and direction for the Martinsburg (KMRB) station for this same timeframe.

Table 2-12. Martinsburg (KMRB) Meteorological Data Completeness for 2017-2021

Year	Parameter	Quarter 1	Quarter 2	Quarter 3	Quarter 4
2021	Station Pressure	100.0%	100.0%	100.0%	100.0%
	Wind Direction	99.8%	98.3%	97.2%	99.5%
	Wind Speed	100.0%	99.9%	97.3%	100.0%
	Temperature	100.0%	100.0%	99.5%	100.0%
	Total Opaque Sky	100.0%	100.0%	100.0%	100.0%
	Relative Humidity	100.0%	100.0%	99.5%	98.8%
	SFC File (includes upper air)	99.8%	98.3%	97.2%	98.8%
2020	Station Pressure	100.0%	100.0%	100.0%	100.0%
	Wind Direction	99.8%	98.9%	97.6%	99.5%
	Wind Speed	100.0%	99.6%	99.4%	99.7%
	Temperature	100.0%	100.0%	99.5%	100.0%
	Total Opaque Sky	100.0%	100.0%	99.5%	99.8%
	Relative Humidity	99.9%	99.9%	99.5%	99.8%
	SFC File (includes upper air)	99.8%	98.9%	97.6%	99.5%
2019	Station Pressure	100.0%	100.0%	100.0%	100.0%
	Wind Direction	98.4%	99.1%	95.8%	99.7%
	Wind Speed	100.0%	100.0%	98.3%	100.0%
	Temperature	100.0%	100.0%	95.3%	100.0%
	Total Opaque Sky	100.0%	100.0%	100.0%	100.0%
	Relative Humidity	100.0%	100.0%	94.8%	100.0%

	SFC File (includes upper air)	98.4%	99.1%	94.8%	99.7%
2018	Station Pressure	100.0%	100.0%	100.0%	100.0%
	Wind Direction	99.8%	99.5%	99.8%	99.9%
	Wind Speed	100.0%	99.9%	100.0%	100.0%
	Temperature	100.0%	100.0%	100.0%	99.7%
	Total Opaque Sky	100.0%	100.0%	100.0%	100.0%
	Relative Humidity	100.0%	100.0%	100.0%	99.4%
	SFC File (includes upper air)	99.8%	99.5%	99.8%	99.4%
2017	Station Pressure	100.0%	100.0%	100.0%	100.0%
	Wind Direction	99.4%	100.0%	100.0%	99.5%
	Wind Speed	99.6%	100.0%	100.0%	100.0%
	Temperature	99.6%	100.0%	100.0%	100.0%
	Total Opaque Sky	100.0%	100.0%	100.0%	100.0%
	Relative Humidity	99.6%	100.0%	100.0%	100.0%
	SFC File (includes upper air)	99.4%	100.0%	100.0%	99.5%

Figure 2-6. 2017-2021 Wind Rose for Martinsburg (KMRB)



2.8 Coordinate System

The location of emission sources, structures, and receptors will be represented in the Universal Transverse Mercator (UTM) coordinate system. The UTM grid divides the world into coordinates that are measured in north meters (measured from the equator) and east meters (measured from the central 500 km meridian of each UTM zone, where the world is divided into 36 north- south zones). The datum for the modeling analysis is based on North American Datum 1983 (NAD 83). UTM coordinates for this analysis reside within UTM Zones 17 and 18 which will serve as the reference point for all data as well as all regional receptors and sources.

2.9 Receptor Grids

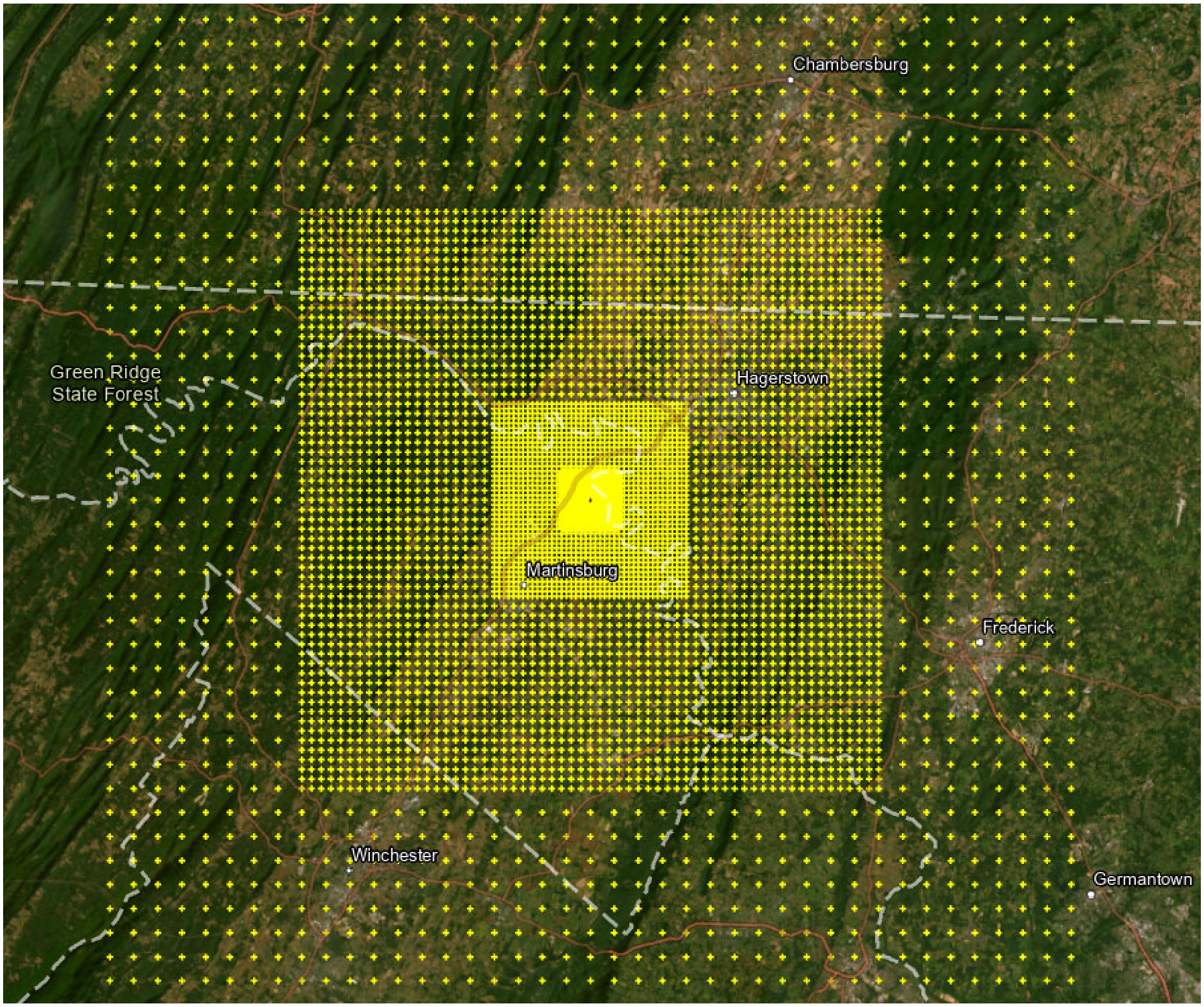
For the Class II air dispersion modeling analyses, ground-level concentrations will be calculated from the fence line to 50 km using a series of nested receptor grids. These receptors will be used in the Significance analysis, PSD increment modeling, and within the overall NAAQS modeling. The following nested grids will be used to determine the extent of significance:

- **Fence Line Grid**: "Fence line" grid consisting of evenly-spaced receptors 50 meters apart placed along the main property boundary of the proposed Project,
- **Fine Cartesian Grid**: A "fine" grid containing 100-meter spaced receptors extending approximately 3 km from the center of the property and beyond the fence line,
- **Medium Cartesian Grid**: A "medium" grid containing 500-meter spaced receptors extending from 3 km to 10 km from the center of the proposed Project, exclusive of receptors on the fine grid,
- **Coarse Cartesian Grid**: A "coarse grid" containing 1,000-meter spaced receptors extending from 10 km to 30 km from the center of the proposed Project, exclusive of receptors on the fine and medium grids, and
- **Very Coarse Cartesian Grid**: A "very coarse grid" containing 2,500-meter spaced receptors extending from 30 km to 50 km from the center of the proposed Project, exclusive of receptors on the fine, medium, and coarse grids.

This configuration and extent will capture the area of maximum modeled concentrations. If maximum modeled concentrations are located in an area with less than 100-meter receptor density, then the receptor density will be increased accordingly. Similarly, if maximum impacts are identified near the extents of the receptor grid, then the receptor grid will be expanded to ensure the maximum modeled concentrations are appropriately captured.

The full NAAQS and PSD increment analyses will be conducted using only receptor locations at which impacts calculated for the proposed Project sources exceed the SIL for the respective pollutant and averaging time. As compliance with the PSD increment analysis and NAAQS is only required in areas regulated as "ambient air," in developing the receptor grid for the modeling analysis, CMC will exclude all company owned property to which general public access is restricted because it is fenced or access is otherwise restricted, and thus, will not be considered "ambient air." Figure 2-7 depicts the receptor grid for the proposed Project.

Figure 2-7. Proposed Project Receptor Grid



2.10 Regional Source Inventory

Dispersion modeling for the significance analysis will be conducted for all new sources using hourly or annual potential emission rates, where applicable, based on the averaging period of the underlying NAAQS or PSD Increment standard. As per PSD modeling requirements, for any off-site air concentration impact calculated that is greater than the SIL for a given pollutant, the radius of the significant impact area (SIA) will be determined based on the extent to where the farthest receptor is located at which the SIL is exceeded. Thus, the SIA will encompass a circle centered on the proposed Project with a radius extending out to either:

1. The farthest location where the emissions of a pollutant causes a significant ambient [i.e., modeled impact above the SIL on a high-first-high (H1H) basis], or

2. A maximum distance of 50 km, whichever is less.[19]

Under EPA's previous guidance in Section IV.C.1 of the draft New Source Review Manual[20] applicable to "deterministic" NAAQS, all sources within the SIA or 50 km, whichever is less, would be evaluated for possible inclusion in the regional inventory. For the proposed Project, the states and agencies that may provide regional sources for inclusion in the evaluation are as follows.

- Maryland, through Maryland Department of the Environment (MDE);
- Pennsylvania, through Pennsylvania Department of Environmental Protection (PADEP);
- Virginia, through Virginia Department of Environmental Quality (VADEQ); and
- West Virginia, through West Virginia Department of Environmental Protection (WVDEP).

Sources in the raw inventories provided by state agencies would first be screened to remove sources located outside of 50 km. The remaining sources within 50 km will be screened using the "20D" procedure to identify small and distant sources that could be excluded from the NAAQS analysis because they were not anticipated to impact receptors in the SIA.[21]. Under the "20D" screening procedure, sources will be excluded from the inventories for the short- and long-term averaging periods if the entire facility's emissions (tpy) are less than 20 times the distance (km) from the proposed Project. In addition, the locations of the regional sources will be plotted to determine if any sources eliminated by the "20D" rule were in close enough proximity to one another that they could be considered a "cluster." The combined Q/d value for each identified cluster will be calculated. If the aggregate Q/d for a cluster exceeds 20, the sources within the cluster excluded from the inventory on the basis of their individual facility Q/d value will be further evaluated for possible inclusion in the NAAQS/PSD Increment analyses.

For short-term probabilistic NAAQS like the 1-hour NO_2 standard, this procedure often produces an inordinately large number of regional inventory sources due to larger SIA distances caused by peak hourly impacts during certain low frequency meteorological events. Recognizing the limitations of the NSR Manual procedure developed at a time when no probabilistic 1-hour NAAQS were in effect, EPA now recommends a different regional inventory screening procedure focusing primarily on the concentration gradient of the source and professional judgement by the dispersion modeler. As indicated in Appendix W, EPA states that "the number of nearby sources to be explicitly modeled in the air quality analysis is expected to be few except in unusual situations [and] in most cases, the few nearby sources will be located within the first 10 to 20 km from the source(s) under consideration." CMC will consult with WVDEP prior to removing sources from the proposed off-site inventory.

As noted in the details below, WVDEP, MDE, PADEP, and VADEQ are only able to provide actual emissions information for the sources in these states and do not track changes to allowable emissions for these sources. Pursuant to 40 CFR Part 51, Appendix W, Table 8-2, an applicant is allowed to consider actual emission levels for nearby sources for the most recent two years. Based on the considerations above, the following is a summary of the regional source inventory proposed for each state:

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[19] This is the maximum extent of the applicability of the AERMOD Model as per the *Guideline on Air Quality Models.*

[20] EPA, *New Source Review Workshop Manual*, Draft October 1990, available athttp://www.epa.gov/ttn/nsr/gen/wkshpman.pdf

[21] 57 FR 8079, March 6, 1992.

- Maryland
  - Agency contact
    - Alison Ray
    - Natural Resources Planner & PIA Liaison
    - Air & Radiation Administration
    - Maryland Department of the Environment
    - 1800 Washington Boulevard
    - Baltimore, Maryland 21230
    - alison.ray@maryland.gov
    - 410-537-3142
  - MDE provided spreadsheets that contain actual 2020 and 2019 emissions (for CO, NOx, PM, PM_{10}, $PM_{2.5}$, and SO_2) as well as some stack parameter data for Title V and some non-Title V sources.
  - Two sets of spreadsheets were provided:
    - One for actual pollutant emissions greater than 5 tpy; and
    - One for actual pollutant emissions less than 5 tpy.
  - Only the spreadsheets for actual pollutant emissions greater than 5 tpy were evaluated as emissions less than 5 tpy are not expected to affect impacts in the proposed Project area.
  - The list of counties in the spreadsheets was screened to only include counties with lands that fall with 50 km of the Proposed project (i.e., Allegany, Frederick, and Washington).
  - The distance from the proposed Project to each regional inventory source was determined and any regional inventory sources outside 50 km were eliminated.
  - The resulting regional inventory sources are as follows, which are also depicted in Figure 2-8.
    - AstraZeneca PLP
    - C. William Hetzer, Inc.
    - Craig Paving, Inc
    - Fort Detrick United States Army
    - Frederick Asphalt Co., L.C.
    - Frederick National Laboratory for Cancer Research
    - Holcim (US), Inc.
    - Mack Trucks, Inc
    - Maryland Correctional Institution
    - Maryland Paper
    - Miller Asphalt
    - NIBC Fort Detrick
    - Pleasants Construction, Inc.
    - Redland Brick, Inc. - Cushwa Plant
    - Reich's Ford Road Landfill
    - Rust-Oleum Corporation
    - S.W. Barrick and Sons, Inc. - Barrick Quarry
    - TAMKO Building Products LLC
  - The three main source clusters are
    - Woodsboro Cluster, located approximately 49 km from the proposed Project, consisting of:
      - S.W. Barrick and Sons, Inc. - Barrick Quarry
      - Miller Asphalt
    - Frederick Cluster, located approximately 43 km from the proposed Project, consisting of:
      - Frederick National Laboratory for Cancer Research
      - Fort Detrick United States Army
      - AstraZeneca PLP
      - Frederick Asphalt Co., L.C.

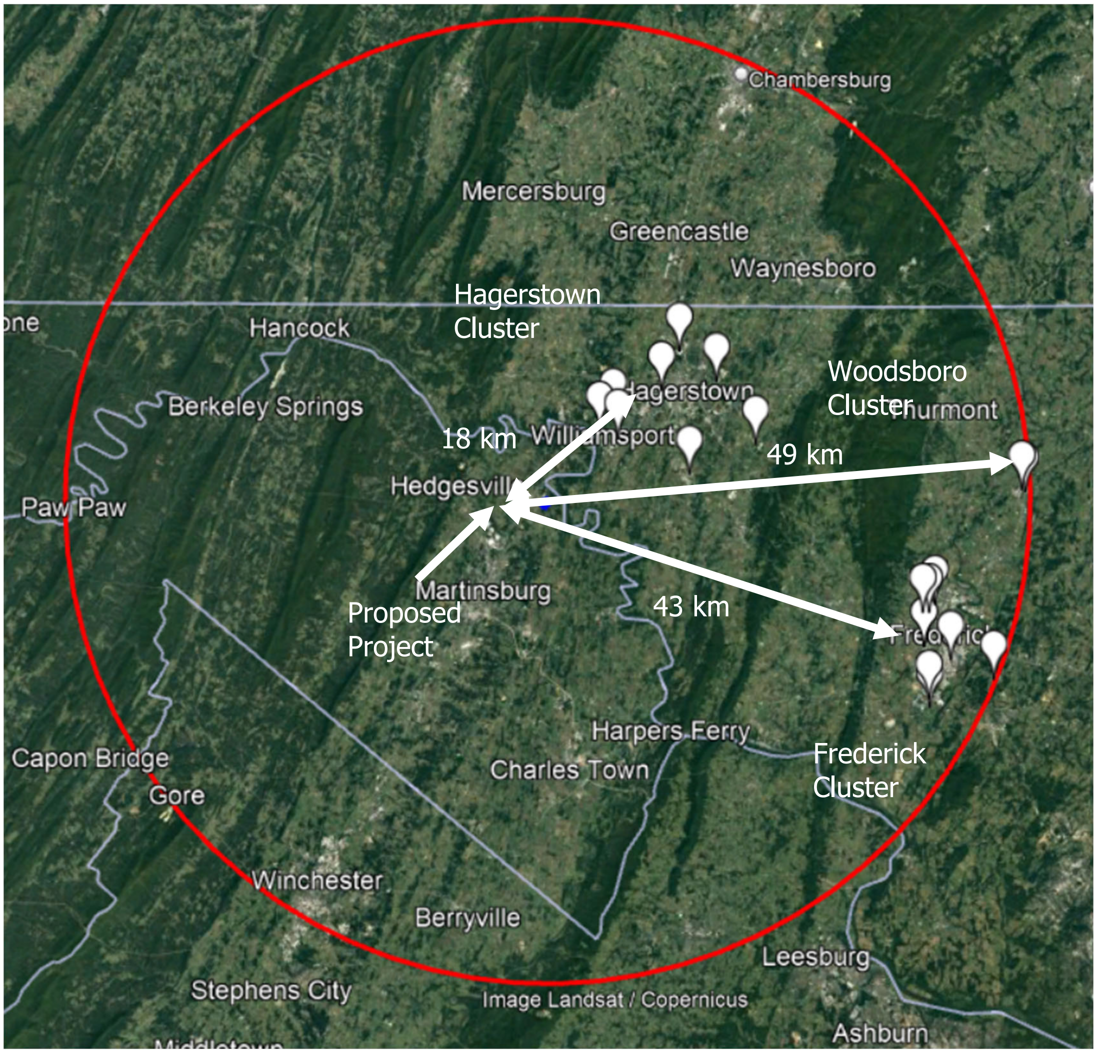
    - Pleasants Construction, Inc.
    - NIBC Fort Detrick
    - Reich's Ford Road Landfill
    - TAMKO Building Products LLC
  - Hagerstown Cluster, located approximately 18 km from the proposed Project, consisting of:
    - Maryland Paper
    - Mack Trucks, Inc
    - Holcim (US), Inc.
    - Craig Paving, Inc
    - C. William Hetzer, Inc.
    - Maryland Correctional Institution
    - Redland Brick, Inc. - Cushwa Plant
    - Rust-Oleum Corporation
- The 2020/2019 average emissions from each cluster are summarized in Table 2-13.
- The Q/d ratio was then determined for each cluster source and only those with a Q/d above 20 were considered.
- Based on the results in Table 2-13, only the Hagerstown cluster needs to be considered further.

Table 2-13. Maryland Regional Inventory Cluster Average 2019/2020 Emissions

Cluster	2019/2020 Average, Q [1] (tons)	Distance from Project, d (km)	Q/d	Q/d < 20?
Frederick	258	43	6.00	Yes
Woodsboro	45	49	0.92	Yes
Hagerstown	1,166	18	64.8	No

[1] Q is the sum of emissions of NOx, CO, Filterable PM_{10}, Filterable $PM_{2.5}$, Condensable PM, and SO_2.

Figure 2-8. Maryland Regional Inventory Sources Locations



Red circle depicts 50 km surrounding the proposed Project. White pins are regional inventory sources within 50 km of the proposed Project.

- The 2020/2019 average emissions from each source within the Hagerstown cluster are summarized in Table 2-14.
- The Q/d ratio was then determined for each source and only those with a Q/d above 20 were considered.
- Based on the results in Table 2-14, only the Holcim (US), Inc. emissions will be considered in the regional inventory. Other sources in the Hagerstown cluster are eliminated from consideration due to minimal emissions and not expected to impact the airshed surrounding the proposed Project.
- The source parameters and emission rates for Holcim (US), Inc. are obtained from the April 2021 Low Carbon Engineered Fuels Project Permit to Construct application, which is the most recent permit action and dispersion modeling for the site, as summarized in Table 2-15.

Table 2-14. Maryland Regional Inventory Hagerstown Cluster Average 2019/2020 Emissions

Facility	2019/2020 Average, Q [1] (tons)	Distance from Project, d (km)	Q/d	Q/d < 20?
C. William Hetzer, Inc. - Beaver Creek West	18	23	0.81	Yes
Craig Paving, Inc	16	17	0.98	Yes
Holcim (US), Inc.	1,012	22	46.46	No
Mack Trucks, Inc	29	21	1.38	Yes
Maryland Correctional Institution	25	14	1.75	Yes
Maryland Paper	16	11	1.44	Yes
Redland Brick, Inc. - Cushwa Plant	42	9	4.43	Yes
Rust-Oleum Corporation	8	10	0.83	Yes

[1] Q is the sum of emissions of NOx, CO, Filterable PM_{10}, Filterable $PM_{2.5}$, Condensable PM, and SO_2.

Table 2-15. Holcim (US), Inc. Source Parameters and Emission Rates

Emission Unit Description	Model Emission Unit ID	Source Type	UTM Zone	UTM East	UTM North	Elevation	Stack/ Release Height	Exhaust Temperature	Exit Velocity	Stack Diameter	Area	Initial Lateral Dimension	Initial Vertical Dimension	NO_2		SO_2		PM_{10}		$PM_{2.5}$	
				(m)	(m)	(m)	(m)	(F)	(m/s)	(m)	(m^2)	(m)	(m)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
KILN STACK	KILN	Point	18	269,974	4,392,581	159	96	214	23.6	3.2	-	-	-	175	765	150	655	25	109	24	106
Crushing operations and dust collectors 211-BF1 and 311-BF1	CRUSH	Area	18	270,160	4,393,752	155	1	-	-	-	541,836	-	0	-	-	-	-	3.28	14.4	3.19	13.96
Clinker burning operations and dust collector 4A1-BF1	BURN	Area	18	269,966	4,392,588	155	1	-	-	-	2,471	-	0	-	-	-	-	0.15	0.6	0.14	0.62
Coal handling operations, dust collector L91-BF1	COAL	Area	18	270,106	4,392,692	155	1	-	-	-	6,489	-	0	-	-	-	-	0.93	4.1	0.90	3.96
GAF, iron ore, sand, and gypsum stockpiles	MATPILE	Area	18	269,876	4,392,735	155	1	-	-	-	1,627	-	0	-	-	-	-	0.016	0.072	0.016	0.070
Outside stone storage and enclosed stone storage piles	STPILE	Area	18	270,095	4,392,794	155	1	-	-	-	15,051	-	0	-	-	-	-	0.020	0.088	0.020	0.086
Emergency coal pile	EMCOAL	Area	18	269,952	4,392,820	155	1	-	-	-	3,485	-	0	-	-	-	-	0.0094	0.041	0.0091	0.040
Coal storage and dust collectors V14-BF1 and L91-BF2	COALSTOR	Area	18	270,113	4,392,689	155	1	-	-	-	308	-	0	-	-	-	-	0.20	0.87	0.19	0.85
CKD storage pile	CKDPILE	Area	18	270,495	4,392,962	155	1	-	-	-	24,320	-	0	-	-	-	-	1.34	5.9	1.30	5.69
Quarry haul roads	QUARRY	Area	18	270,155	4,393,758	155	1	-	-	-	510,992	-	0	-	-	-	-	3.67	16.1	3.57	15.66
Low carbon engineered fuels material handling and dust collectors V81-BF01, V81-CF01, V81-CF02, and V81-CF03	ENGFUEL	Area	18	269,900	4,392,583	155	1	-	-	-	1,871	-	0	-	-	-	-	2.86	12.5	2.78	12.17
Raw grinding operations, reject pile, and dust collectors 311-BF4, 311-BF5, 331-BF1, 331-BF2, 331-BF3, 331-BF4, 361-BF1, 361-BF9, and 391-BF2	RAW	Volume	18	270,093	4,392,615	155	16.34	-	-	-	-	10.47	15.2	-	-	-	-	4.72	20.7	4.59	20.11
Kiln feed blending operations and dust collectors 391-BF1, blending silo DC,431-BF1, 431-BF4, and P72-BF1	FEED	Volume	18	270,091	4,392,583	155	8.3	-	-	-	-	5	7.72	-	-	-	-	1.66	7.3	1.61	7.06
Clinker cooling operations and dust collectors 491-BF7 and 491-BF8	COOL	Volume	18	270,091	4,392,583	155	8.3	-	-	-	-	5	7.72	-	-	-	-	0.88	3.9	0.86	3.75
Clinker handling operations and dust collectors 491-BF1, 491-BF2, 491-BF4, 491-BF6, 511-BF1, 511-BF2, and 511-BF4	CLHAND	Volume	18	269,940	4,392,658	155	8.45	-	-	-	-	7.21	7.86	-	-	-	-	6.45	28.3	6.28	27.50
Finish grinding operations and dust collectors 511-BF3, 561-BF1, 561-BF2, finish mill de-dusting, 592-BF1, 592-BF2, and 592-BF3	FINISH	Volume	18	270,093	4,392,615	155	16.34	-	-	-	-	10.47	15.2	-	-	-	-	11.65	51.0	11.33	49.63
Bulk silos and dust collectors 591-BF1, 591-BF3, 621-BF1, and 621-BF2	BULK	Volume	18	269,632	4,392,463	155	23.75	-	-	-	-	6.28	22.09	-	-	-	-	1.51	6.6	1.47	6.43

- Pennsylvania
  - Agency contact
    - Daniel Roble
    - Air Quality Program Specialist
    - Bureau of Air Quality
    - Pennsylvania Department of Environmental Protection
    - 400 Market Street
    - Harrisburg, Pennsylvania 17105
    - droble@pa.gov
    - 717-705-7689
  - Information was requested from PADEP for counties with lands that fall within 50 km of the proposed Project (i.e., Adams, Bedford, Franklin, and Fulton).
  - PADEP provided text files that contain actual 2020 and 2021 emissions (for CO, NOx, PM_{10}, $PM_{2.5}$, and SO_2) for each facility in these counties.
  - The distance from the proposed Project to each regional inventory source was determined and any regional inventory sources outside 50 km were eliminated.
  - The resulting regional inventory sources are as follows, which are also depicted in Figure 2-9:
    - Mellott Company
    - TB Woods Inc
    - Chambersburg Boro/Falling Spring
    - Spectrum Ind. Coatings Inc
    - US Dod/Raven Rock
    - Chambersburg Boro/Orchard Park
    - Martins Famous Pastry Shop
    - New Enterprise Stone and Lime Inc
    - Specialty Granules Inc
    - JLG Ind
    - JLG Equip SVC Inc
    - Texas Eastern Trans LP
    - Eastern Gas Trans and Storage
    - Chambersburg Energy LLC
    - Johnson Controls Inc
    - Novae Corporation
    - Fayetteville Contr Inc
    - Strait Steel Inc
    - Grove US Inc
    - Ingenco Wholesale Power LLC
    - Waste Mgmt Dspl SVC
    - Columbia Gas Trans Corporation
  - These facilities fall within the following five main source clusters:
    - Chambersburg Cluster, located approximately 45 km from the proposed Project, consisting of:
      - TB Woods Inc
      - Chambersburg Boro/Falling Spring Power Plant
      - Chambersburg Boro/Orchard Park Generating Station
      - Martins Famous Pastry Shop
      - New Enterprise Stone and Lime Inc
      - Texas Eastern Trans LP
      - Eastern Gas Trans and Storage

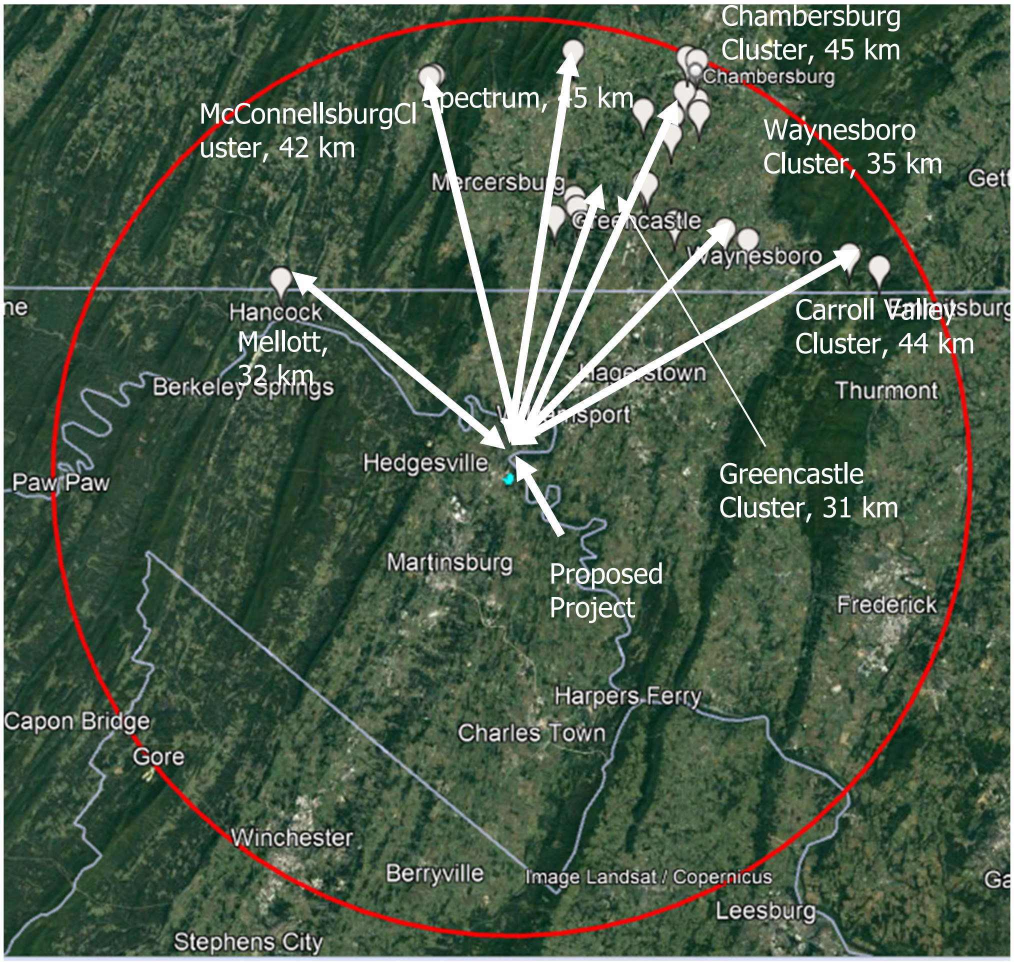
        - Chambersburg Energy LLC
    - Greencastle Cluster, located approximately 31 km from the proposed Project, consisting of:
        - Fayetteville Contr Inc
        - Strait Steel Inc
        - Grove US Inc
        - Ingenco Wholesale Power LLC
        - Waste Mgmt Dspl SVC
        - Columbia Gas Trans Corporation
    - Waynesboro Cluster, located approximately 35 km from the proposed Project, consisting of:
        - Johnson Controls Inc
        - Novae Corporation
    - Carroll Valley Cluster, located approximately 44 km from the proposed Project, consisting of:
        - US DOD/Raven Rock
        - Specialty Granules Inc
    - Mcconnellsburg Cluster, located approximately 42 km from the proposed Project, consisting of:
        - JLG Ind
        - JLG Equip SVC Inc
- In addition to these clusters, the following sites are being evaluated on their own:
    - Mellott Company, located approximately 32 km from the proposed Project
    - Spectrum Ind. Coatings Inc, located approximately 45 km from the proposed Project
- The 2020/2021 average emissions from each cluster are summarized in Table 2-16.
- The Q/d ratio was then determined for each cluster source and only those with a Q/d above 20 would be considered further.
- Based on the results in Table 2-16, no clusters will be considered further for any pollutants.

Table 2-16. Pennsylvania Regional Inventory Cluster Average 2020/2021 Emissions

Cluster	2020/2021 Average, Q[1] (tons)	Distance from Project, d (km)	Q/d	Q/d < 20?
Chambersburg	339	45	7.53	Yes
Greencastle	224	31	7.24	Yes
Waynesboro	1	35	0.03	Yes
Carroll Valley	139	44	3.15	Yes
McConnellsburg	12	42	0.28	Yes
Spectrum	0	45	0.00	Yes
Mellott	0	32	0.00	Yes

[1] Q is the sum of emissions of NOx, CO, PM_{10}, $PM_{2.5}$, and SO_2.

Figure 2-9. Pennsylvania Regional Inventory Sources Locations

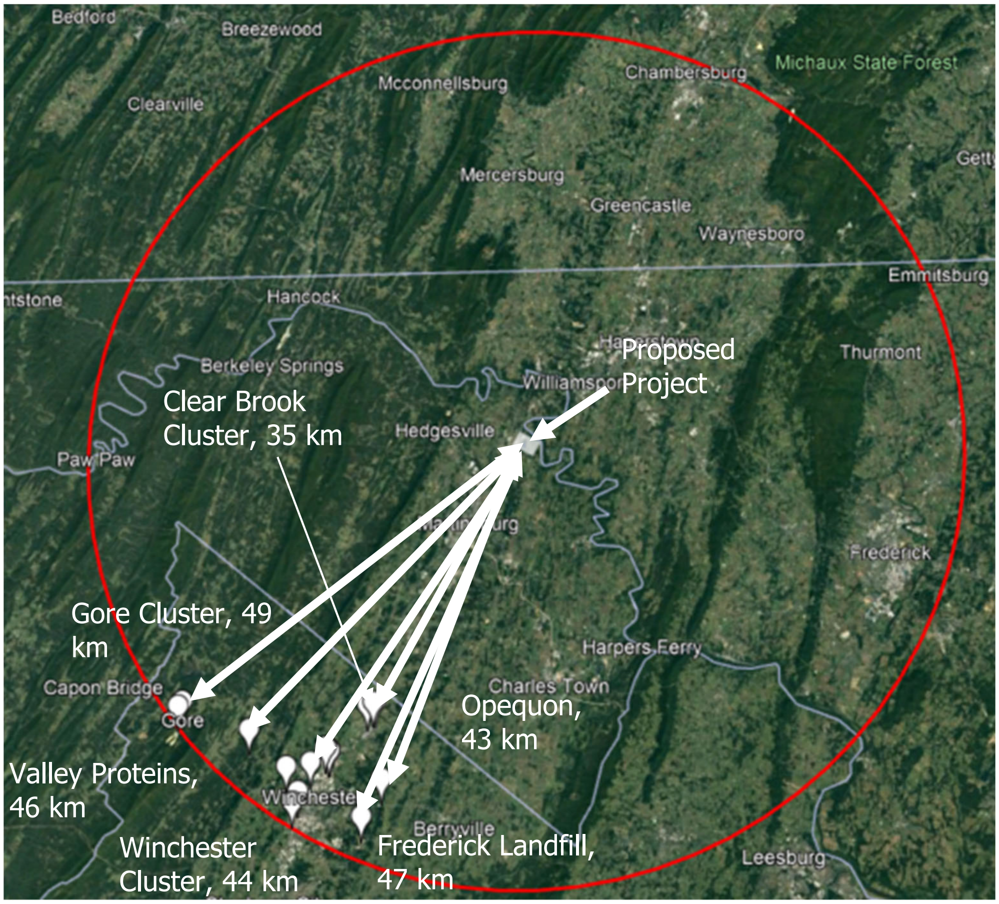


Red circle depicts 50 km surrounding the proposed Project. White pins are regional inventory sources within 50 km of the proposed Project.

- Virginia
  - Agency contact
    - Robert Lute
    - Air Quality Modeler
    - Virginia Department of Environmental Quality
    - 1111 East Main Street
    - P.O. Box 1105
    - Richmond, Virginia 23218
    - Phone: (804) 718-9970 NEW
    - robert.lute@deq.virginia.gov
  - Information was requested from VADEQ for counties with lands that fall within 50 km of the proposed Project (i.e., Clarke, Frederick, Loudoun, and Winchester City).
  - VADEQ provided workbooks which contain actual 2020 and 2021 emissions (for CO, NO_2, PM_{10}, $PM_{2.5}$, and SO_2) for sources in these counties.
  - The distance from the proposed project to each regional inventory source was determined and any regional inventory sources outside of 50 km were eliminated.

- Only regional inventory sources with pollutant emissions greater than 5 tpy were evaluated as emissions less than 5 tpy are not expected to affect impacts in the proposed Project area.
- The resulting regional inventory sources are as follows, which are also depicted in Figure 2-10.
  - 8th Ave Food & Provisions
  - CED Enterprises Inc
  - Covia Holdings Corporation
  - Frederick County Regional Landfill
  - Kraft Heinz Company LLC – Winchester
  - Miller Milling Co
  - National Fruit Product Co Inc
  - O-N Minerals (Chemstone) Company - Winchester Aggregate Plant
  - O-N Minerals (Chemstone) Company - Winchester Lime Plant
  - Opequon Water Reclamation Facility
  - O'Sullivan Films Inc
  - Stuart M Perry Incorporated-Asphalt
  - Valley Proteins, Inc.
  - Winchester Medical Center (VHS)
  - W-L Construction & Paving Inc – Clearbrook
- These facilities fall within the following three main source clusters:
  - Clear Brook Cluster, located approximately 35 km from the proposed Project, consisting of:
    - O-N Minerals (Chemstone) Company - Winchester Aggregate Plant
    - O-N Minerals (Chemstone) Company - Winchester Lime Plant
    - W-L Construction & Paving Inc – Clearbrook
  - Gore Cluster, located approximately 49 km from the proposed Project, consisting of:
    - CED Enterprises Inc
    - Covia Holdings Corporation
  - Winchester Cluster, located approximately 44 km from the proposed Project, consisting of:
    - 8th Ave Food & Provisions
    - Kraft Heinz Company LLC – Winchester
    - Miller Milling Co
    - National Fruit Product Co Inc
    - O'Sullivan Films Inc
    - Stuart M Perry Incorporated-Asphalt
    - Winchester Medical Center (VHS)
- In addition to these clusters, the following sites are being evaluated on their own:
  - Valley Proteins, Inc., located approximately 46 km from the proposed Project
  - Opequon Water Reclamation Facility, located approximately 43 km from the proposed Project
  - Frederick County Regional Landfill, located approximately 47 km from the proposed Project

Figure 2-10. Virginia Regional Inventory Sources Locations



- The 2020/2021 average emissions from each cluster are summarized in Table 2-17.
- The Q/d ratio was then determined for each cluster source and only those with a Q/d above 20 were considered.
- Based on the results in Table 2-17, no clusters will be considered further for any pollutants.

Table 2-17. Virginia Regional Inventory Cluster Average 2020/2021 Emissions

Cluster	2020/2021 Average, Q (tons)	Distance from Project, d (km)	Q/d	Q/d < 20?
Clear Brook	136	35	3.88	Yes
Gore	75	49	1.52	Yes
Winchester	150	44	3.42	Yes
Valley Proteins	10	46	0.23	Yes
Opequon	43	43	1.00	Yes
Frederick Landfill	110	47	2.33	Yes

[1] Q is the sum of emissions of NO_x, CO, PM_{10}, $PM_{2.5}$, and SO_2.

- West Virginia
  - Agency contact
    - David J. Porter, PE
    - Engineer
    - WVDEP Division of Air Quality
    - 601 57th Street
    - Charleston, WV 25304
    - voice: 304-414-1291
    - email: David.J.Porter@wv.gov
  - Information was requested from WVDEP for counties with lands that fall within 50 km of the proposed Project (i.e., Berkeley, Jefferson, Hampshire, and Morgan).
  - WVDEP provided a workbook that contains actual 2020 and 2021 emissions (for CO, NOx, PM_{10}, $PM_{2.5}$, and SO_2) for Major sources in these counties.
  - WVDEP noted that no such facilities exist in Hampshire county.
  - The distance from the proposed Project to each regional inventory source was determined and any regional inventory sources outside 50 km were eliminated.
  - The resulting regional inventory sources are as follows, which are also depicted in Figure 2-11:
    - MAAX U.S. CORP
    - QUAD/GRAPHICS, INC
    - Knauf Insulation, Inc. - INWOOD, WV
    - ROXUL USA INC. - RAN[22]
    - ARGOS USA - MARTINSBURG
    - CONTINENTAL BRICK - MARTINSBURG FACILITY
    - LCS Services, Inc. - NORTH MOUNTAIN SANITARY LANDFILL
    - OX PAPERBOARD, LLC - HALLTOWN MILL
    - U.S. SILICA COMPANY - BERKELEY SPRINGS PLANT
  - These facilities fall within the following three main source clusters:
    - Berkeley Cluster, located approximately 6.5 km from the proposed Project, consisting of:
      - MAAX U.S. CORP
      - QUAD/GRAPHICS, INC
    - Kearneysville Cluster, located approximately 16 km from the proposed Project, consisting of:
      - Knauf Insulation, Inc. - INWOOD, WV
      - ROXUL USA INC. - RAN
    - Martinsburg Cluster, located approximately 13 km from the proposed Project, consisting of:
      - ARGOS USA - MARTINSBURG
      - CONTINENTAL BRICK - MARTINSBURG FACILITY
  - In addition to these clusters, the following sites are being evaluated on their own:
    - LCS Services, Inc. - NORTH MOUNTAIN SANITARY LANDFILL, located approximately 9.2 km from the proposed Project
    - OX PAPERBOARD, LLC - HALLTOWN MILL, located approximately 26 km from the proposed Project
    - U.S. SILICA COMPANY - BERKELEY SPRINGS PLANT, located approximately 30 km from the proposed Project

[22] Note that Roxul commenced operation on June 21, 2021. Therefore, Roxul's 2021 actual emissions are doubled to estimate full year 2021 emissions. This value is then utilized in the 20D evaluation.

- The 2020/2021 average emissions from each cluster are summarized in Table 2-18.
- The Q/d ratio was then determined for each cluster source and only those with a Q/d above 20 would be considered further.
- Based on the results in Table 2-18, only the Kearneysville and Martinsburg clusters needs to be considered further.
- The 2020/2021 average emissions from each source within the Kearneysville and Martinsburg cluster are summarized in Table 2-19.
- The Q/d ratio was then determined for each source and only those with a Q/d above 20 were considered. Based on the results in Table 2-19 only the Argos USA and Knauf Insulation – Inwood emissions will be considered in the regional inventory. Other sources in the Kearneysville ad Martinsburg clusters are eliminated from consideration due to minimal emissions and not expected to impact the airshed surrounding the proposed Project.
- The source parameters and emission rates for Argos USA (previously ESSROC Cement)[23] and Knauf Insulation – Inwood are obtained from December 2017 Prevention of Significant Deterioration Application - Appendix C Air Quality Assessment, for Roxul USA, Inc. as summarized in Table 2-20 and Table 2-21.[24]

Table 2-18. West Virginia Regional Inventory Cluster Average 2020/2021 Emissions

Cluster	2020/2021 Average, Q [1] (tons)	Distance from Project, d (km)	Q/d	Q/d < 20?
Berkeley	29	6.5	4.45	Yes
Kearneysville	534	16	33.40	No
Martinsburg	2,762	13	212.46	No
LCS Services	100	9	10.86	Yes
OX Paperboard	20	26	0.78	Yes
US Silica	55	30	1.85	Yes

[1] Q is the sum of emissions of NOx, CO, Filterable PM, Filterable PM_{10}, Filterable $PM_{2.5}$, Condensable PM, and SO_2.

Table 2-19. West Virginia Regional Inventory Kearneysville & Martinsburg Clusters Average 2020/2021 Emissions

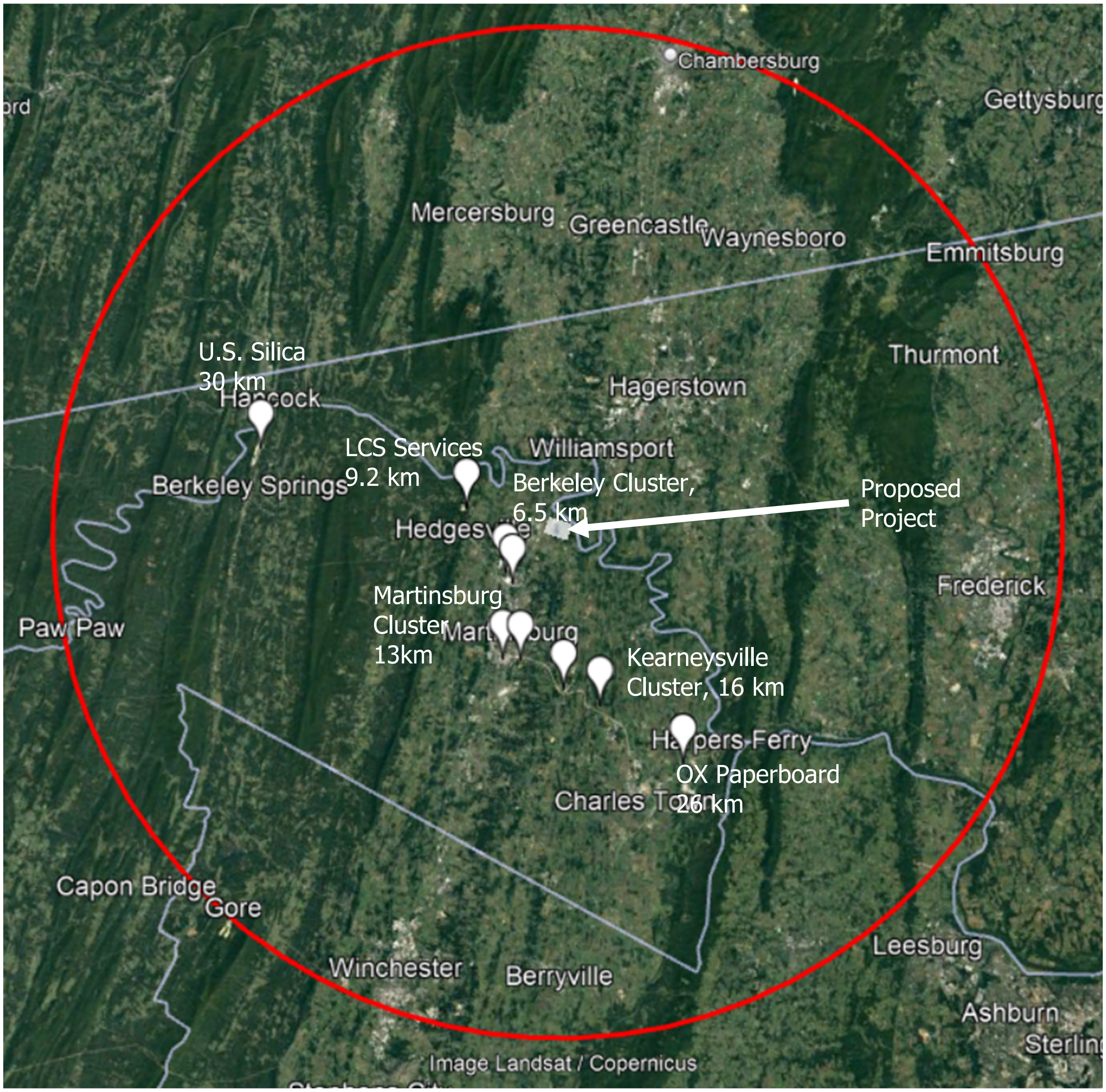
Cluster	2020/2021 Average, Q [1] (tons)	Distance from Project, d (km)	Q/d	Q/d < 20?
ARGOS USA - MARTINSBURG	2,686	14	194	No
CONTINENTAL BRICK - MARTINSBURG FACILITY	77	13	5.7	Yes
Knauf Insulation, Inc. - INWOOD, WV	435	19	22.9	No
ROXUL USA INC. - RAN	99	18	5.6	Yes

[1] Q is the sum of emissions of NOx, CO, Filterable PM, Filterable PM_{10}, Filterable $PM_{2.5}$, Condensable PM, and SO_2.

[23] Argos USA LLC completed the acquisition of Essroc Cement in 2016: https://www.heidelbergmaterials.com/en/pr-18-08-2016

[24] December 2016 Class II Air Quality Modeling Report for Knauf Insulation, Inc. can be obtained from the following link: Microsoft Word - 2016-1213_FINAL_Knauf_Inwood_PSD Modeling Report.docx (wv.gov).

Figure 2-11. West Virginia Regional Inventory Sources Locations



Red circle depicts 50 km surrounding the proposed Project. White pins are regional inventory sources within 50 km of the proposed Project.

If a modeled exceedance is observed on property of a nearby source, the "Mitsubishi Method" may be employed to demonstrate compliance at those on-property receptor locations.[25] Specifically, CMC and the nearby sources will be modeled to obtain total concentrations at all receptor locations. Where a receptor is located on a nearby source's non-ambient air property, the contribution from that specific nearby source may be subtracted from the total concentrations.

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[25] U.S. EPA Memorandum from Robert D. Bauman (Chief SO2/Particulate Matter Programs Branch) to Gerald Fontenot (ChiefAir Programs Branch, Region VI), *Ambient Air,* October 17, 1989

Table 2-20. Argos USA Source Parameters and Emission Rates

Emission Unit Description	Model Emission Unit ID	Source Type	UTM Zone	Zone UTM East (m)	Zone UTM North (m)	Elevation (m)	Stack Height (m)	Stack Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)	NO_2 Emission Rate (g/s)		SO_2 Emission Rate (g/s)		PM_{10} Emission Rate (g/s)		$PM_{2.5}$ Emission Rate (g/s)		Increment Consuming?		
											Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	NO_2	PM_{10}	$PM_{2.5}$
BOILER	ESS00B	Point	18	243,700	4,369,200	154.04	4.88	477.59	1.04	0.36	4.21E-02	-	2.5E-04	-	2.877E-03	-	3.0E-03	3.0E-03	No	No	No
EMERGENCY GENERATOR	ESS00E	Point	18	243,700	4,369,200	154.04	1.83	422.04	2.87	0.20	-	-	-	-	5.466E-03	-	5.0E-03	5.0E-03	-	No	No
PH/PC KILN SYSTEM	ESS1	Point	18	243,882	4,369,246	154.04	133.20	358.15	22.92	5.19	219.87	-	266.02	-	7.383E+00	-	7.38	6.48	Yes	No	No
BYPASS DUST TANK D/C	ESS10	Point	18	243,700	4,369,200	154.04	28.65	293.15	35.66	0.20	-	-	-	-	2.000E-01	-	9.0E-03	8.0E-03	-	No	No
FM REJECT BIN	ESS100	Point	18	243,700	4,369,200	154.04	6.71	373.15	12.92	0.15	-	-	-	-	2.520E-02	-	3.0E-03	3.0E-03	-	No	Yes
BYPASS DUST LOADOUT D/C	ESS11	Point	18	243,700	4,369,200	154.04	6.10	293.15	76.14	0.15	-	-	-	-	2.400E-01	-	1.1E-02	9.0E-03	-	No	No
NEW PRIMARY CRUSHER	ESS12	Point	18	243,700	4,369,200	154.04	19.81	293.15	12.86	1.39	-	-	-	-	1.630E+00	-	7.2E-02	6.3E-02	-	No	No
CRUSHING SYSTEM TT	ESS13	Point	18	243,700	4,369,200	154.04	11.28	293.15	31.70	0.30	-	-	-	-	3.780E-03	-	4.0E-03	3.0E-03	-	No	No
PREMIX CONVEYING	ESS14	Point	18	243,700	4,369,200	154.04	23.16	293.15	22.89	0.41	-	-	-	-	5.300E-01	-	2.4E-02	2.1E-02	-	No	No
PREMIX STORAGE FEEDING	ESS15	Point	18	243,700	4,369,200	154.04	7.01	293.15	4.79	0.52	-	-	-	-	1.800E-01	-	8.0E-03	7.0E-03	-	No	No
PREMIX STORAGE DISCHARGE	ESS16	Point	18	243,700	4,369,200	154.04	7.01	293.15	4.79	0.52	-	-	-	-	1.800E-01	-	8.0E-03	7.0E-03	-	No	No
ADDITIVE DELIVERY SYSTEM	ESS17	Point	18	243,700	4,369,200	154.04	14.33	293.15	11.89	1.22	-	-	-	-	2.450E+00	-	1.1E-01	9.5E-02	-	No	No
ADDITIVE FEEDING SYSTEM	ESS18	Point	18	243,700	4,369,200	154.04	49.68	293.15	5.49	0.90	-	-	-	-	6.200E-01	-	2.8E-02	2.4E-02	-	No	No
LIMESTONE BIN	ESS19	Point	18	243,700	4,369,200	154.04	36.58	293.15	4.79	0.52	-	-	-	-	1.800E-01	-	8.0E-03	7.0E-03	-	No	No
FINISH MILL 1&2 AIR HEATR	ESS2	Point	18	243,673	4,369,384	154.04	47.24	368.15	18.81	1.75	3.53E-01	-	1.27	-	6.300E-02	-	6.3E-02	5.8E-02	Yes	No	No
RAW MATERIAL BINS	ESS20	Point	18	243,700	4,369,200	154.04	36.27	293.15	4.72	0.73	-	-	-	-	3.500E-01	-	1.5E-02	1.4E-02	-	No	No
SHALE BIN 2	ESS21	Point	18	243,700	4,369,200	154.04	44.81	293.15	4.48	0.65	-	-	-	-	2.600E-01	-	1.1E-02	1.0E-02	-	No	No
RAW MILL FEED BELT	ESS22	Point	18	243,700	4,369,200	154.04	7.92	293.15	1.83	0.83	-	-	-	-	1.800E-01	-	8.0E-03	7.0E-03	-	No	No
RAW MILL HIGH ZONE	ESS23	Point	18	243,700	4,369,200	154.04	15.54	293.15	19.02	0.53	-	-	-	-	6.600E-01	-	2.9E-02	2.6E-02	-	No	No
RAW MILL LOW ZONE	ESS24	Point	18	243,700	4,369,200	154.04	39.32	293.15	21.31	0.46	-	-	-	-	2.770E-02	-	2.8E-02	2.4E-02	-	No	No
RAW MEAL AIR SLIDE	ESS25	Point	18	243,700	4,369,200	154.04	13.72	363.15	9.05	0.63	-	-	-	-	5.300E-01	-	2.4E-02	2.1E-02	-	No	No
HOMO SILO FEEDING	ESS26	Point	18	243,700	4,369,200	154.04	92.96	363.15	15.21	0.51	-	-	-	-	4.400E-01	-	2.0E-02	1.7E-02	-	No	No
HOMO SILO DISCHARGE	ESS27	Point	18	243,700	4,369,200	154.04	18.59	363.15	15.09	0.46	-	-	-	-	3.500E-01	-	1.5E-02	1.4E-02	-	No	No
TOP OF HOMO SILO	ESS28	Point	18	243,700	4,369,200	154.04	78.94	363.15	20.57	0.28	-	-	-	-	1.900E-01	-	2.4E-02	2.4E-02	-	No	No
KILN FEEDING ELEVATOR	ESS29	Point	18	243,700	4,369,200	154.04	115.21	363.15	21.03	0.43	-	-	-	-	4.400E-01	-	2.0E-02	1.7E-02	-	No	No
RAIL TRANSLOADER	ESS3	Point	18	243,459	4,369,277	154.04	3.90	293.15	0.00	0.40	3.11E-01	-	2.0E-02	-	2.268E-02	-	2.3E-02	9.0E-03	Yes	No	Yes
KILN FEED BELT 1	ESS30	Point	18	243,700	4,369,200	154.04	115.21	363.15	36.52	0.51	-	-	-	-	1.060E+00	-	4.7E-02	4.1E-02	-	No	No
KILN FEED BELT 2	ESS31	Point	18	243,700	4,369,200	154.04	114.91	363.15	16.98	0.30	-	-	-	-	1.800E-01	-	8.0E-03	7.0E-03	-	No	No
CEMENT FRINGE BIN	ESS32	Point	18	243,700	4,369,200	154.04	33.53	352.04	10.97	0.71	-	-	-	-	7.400E-01	-	3.3E-02	2.9E-02	-	No	No
LIME STORAGE	ESS33	Point	18	243,700	4,369,200	154.04	33.22	293.15	25.88	0.15	-	-	-	-	1.220E+00	-	5.4E-02	4.8E-02	-	No	No
BIG CLINKER SILO FEEDING	ESS34	Point	18	243,700	4,369,200	154.04	22.86	403.15	29.08	0.45	-	-	-	-	4.400E-01	-	2.0E-02	1.7E-02	-	No	No
BIG CLINKER SILO	ESS35	Point	18	243,700	4,369,200	154.04	39.32	403.15	27.31	0.28	-	-	-	-	2.280E-01	-	2.9E-02	2.9E-02	-	No	No
SMALL CLINKER SILO FEED	ESS36	Point	18	243,700	4,369,200	154.04	54.56	403.15	13.62	0.44	-	-	-	-	2.600E-01	-	1.1E-02	1.0E-02	-	No	No
SMALL CLINKER SILO DISCH	ESS37	Point	18	243,700	4,369,200	154.04	54.56	293.15	16.92	0.27	-	-	-	-	2.000E-02	-	1.0E-03	1.0E-03	-	No	No
BIG CLINKER SILO DISCHARE	ESS38	Point	18	243,700	4,369,200	154.04	22.86	293.15	17.31	0.27	-	-	-	-	2.000E-02	-	1.0E-03	1.0E-03	-	No	No
UB1 TO FM FEED HOPPERS	ESS39	Point	18	243,700	4,369,200	154.04	3.05	293.15	17.31	0.27	-	-	-	-	2.000E-02	-	1.0E-03	1.0E-03	-	No	No
PRIMARY CRUSHER D/C	ESS4	Point	18	243,700	4,369,200	154.04	13.11	293.15	23.74	0.40	-	-	-	-	5.000E-01	-	2.3E-02	1.9E-02	-	No	No
LB1 TO FM FEED HOPPERS	ESS40	Point	18	243,700	4,369,200	154.04	3.05	293.15	17.31	0.27	-	-	-	-	2.000E-02	-	1.0E-03	1.0E-03	-	No	No
UB2 TO FM FEED HOPPERS	ESS41	Point	18	243,700	4,369,200	154.04	3.05	293.15	17.31	0.27	-	-	-	-	2.000E-02	-	1.0E-03	1.0E-03	-	No	No
FINISH MILL 1 & 2 HOPPERS	ESS42	Point	18	243,700	4,369,200	154.04	38.71	293.15	11.19	0.53	-	-	-	-	4.400E-01	-	2.0E-02	1.7E-02	-	No	No

FINISH MILL 3 HOPPER	ESS43	Point	18	243,700	4,369,200	154.04	30.18	293.15	10.24	0.56	-	-	-	-	4.400E-01	-	2.0E-02	1.7E-02	-	No	No
NORMAL CLINKER BIN	ESS44	Point	18	243,700	4,369,200	154.04	17.68	383.15	27.31	0.28	-	-	-	-	8.150E-01	-	1.0E-01	1.0E-01	-	No	Yes
LA CLINKER BIN TO FM2 BT	ESS45	Point	18	243,700	4,369,200	154.04	20.73	293.15	10.18	0.43	-	-	-	-	2.600E-01	-	1.1E-02	1.0E-02	-	No	No
CLINKER BIN TO FM1 BELT	ESS46	Point	18	243,700	4,369,200	154.04	20.73	293.15	10.18	0.43	-	-	-	-	2.600E-01	-	1.1E-02	1.0E-02	-	No	No
CLINKER BIN TO FM2 BELT	ESS47	Point	18	243,700	4,369,200	154.04	4.57	293.15	2.99	0.65	-	-	-	-	1.800E-01	-	8.0E-03	7.0E-03	-	No	No
FINISH MILL 2 FEEDING	ESS48	Point	18	243,700	4,369,200	154.04	9.14	293.15	10.18	0.43	-	-	-	-	2.600E-01	-	1.1E-02	1.0E-02	-	No	No
FINISH MILL 1 FEEDING	ESS49	Point	18	243,700	4,369,200	154.04	8.84	293.15	10.18	0.43	-	-	-	-	2.600E-01	-	1.1E-02	1.0E-02	-	No	No
SECONDARY CRUSHER D/C	ESS5	Point	18	243,700	4,369,200	154.04	3.35	293.15	20.06	1.17	-	-	-	-	3.630E+00	-	1.6E-01	1.4E-01	-	No	No
FM1 CONVEYOR	ESS50	Point	18	243,700	4,369,200	154.04	37.19	293.15	4.48	0.65	-	-	-	-	2.600E-01	-	1.1E-02	1.0E-02	-	No	No
FINISH MILL 1 HIGH ZONE	ESS51	Point	18	243,700	4,369,200	154.04	38.71	293.15	5.49	0.90	-	-	-	-	6.200E-01	-	2.8E-02	2.4E-02	-	No	No
FINISH MILL 1 LOW ZONE	ESS52	Point	18	243,700	4,369,200	154.04	12.19	373.15	5.94	0.74	-	-	-	-	3.500E-01	-	1.5E-02	1.4E-02	-	No	No
FINISH MILL 1	ESS53	Point	18	243,700	4,369,200	154.04	47.24	368.15	18.81	1.75	-	-	-	-	6.360E+00	-	2.8E-01	2.5E-01	-	No	No
FINISH MILL 1 DISCHARGE	ESS54	Point	18	243,700	4,369,200	154.04	21.95	403.15	4.45	0.63	-	-	-	-	1.800E-01	-	8.0E-03	7.0E-03	-	No	No
FM2 CONVEYOR	ESS55	Point	18	243,700	4,369,200	154.04	37.49	293.15	4.48	0.65	-	-	-	-	2.600E-01	-	1.1E-02	1.0E-02	-	No	No
FINISH MILL 2 HIGH ZONE	ESS56	Point	18	243,700	4,369,200	154.04	39.01	293.15	5.49	0.90	-	-	-	-	6.200E-01	-	2.8E-02	2.4E-02	-	No	No
FINISH MILL 2 LOW ZONE	ESS57	Point	18	243,700	4,369,200	154.04	12.19	373.15	5.94	0.74	-	-	-	-	3.500E-01	-	1.5E-02	1.4E-02	-	No	No
FINISH MILL 2	ESS58	Point	18	243,700	4,369,200	154.04	47.55	368.15	18.81	1.75	-	-	-	-	6.360E+00	-	2.8E-01	2.5E-01	-	No	No
FINISH MILL 2 DISCHARGE	ESS59	Point	18	243,700	4,369,200	154.04	22.25	403.15	4.45	0.63	-	-	-	-	1.800E-01	-	8.0E-03	7.0E-03	-	No	No
BUILDING 30 NORBLO	ESS6	Point	18	243,700	4,369,200	154.04	17.37	293.15	19.90	0.57	-	-	-	-	3.320E+00	-	1.5E-01	1.3E-01	-	No	No
FINISH MILL 1 AIRSLIDES	ESS60	Point	18	243,700	4,369,200	154.04	7.62	373.15	20.03	0.40	-	-	-	-	3.500E-01	-	1.5E-02	1.4E-02	-	No	No
FINISH MILL 2 AIRSLIDES	ESS61	Point	18	243,700	4,369,200	154.04	7.62	373.15	20.03	0.40	-	-	-	-	3.500E-01	-	1.5E-02	1.4E-02	-	No	No
FM 1 TO CEMENT SILOS	ESS62	Point	18	243,700	4,369,200	154.04	65.23	373.15	15.73	0.39	-	-	-	-	2.600E-01	-	1.1E-02	1.0E-02	-	No	No
FM 2 TO CEMENT SILOS	ESS63	Point	18	243,700	4,369,200	154.04	64.92	373.15	15.73	0.39	-	-	-	-	2.600E-01	-	1.1E-02	1.0E-02	-	No	No
CEMENT SILO A1 & A2	ESS64	Point	18	243,700	4,369,200	154.04	64.92	373.15	16.70	0.48	-	-	-	-	4.200E-01	-	1.9E-02	1.6E-02	-	No	No
CEMENT SILO B1 & B2	ESS65	Point	18	243,700	4,369,200	154.04	64.92	373.15	16.70	0.48	-	-	-	-	4.200E-01	-	1.9E-02	1.6E-02	-	No	No
CEMENT SILO C1 & C2	ESS66	Point	18	243,700	4,369,200	154.04	64.92	373.15	17.47	0.48	-	-	-	-	4.400E-01	-	2.0E-02	1.7E-02	-	No	No
BULK LANE LOADOUT 1	ESS67	Point	18	243,700	4,369,200	154.04	13.11	373.15	26.15	0.30	-	-	-	-	2.300E-01	-	1.0E-02	9.0E-03	-	No	No
BULK LANE LOADOUT 2	ESS68	Point	18	243,700	4,369,200	154.04	13.41	373.15	29.35	0.27	-	-	-	-	2.300E-01	-	1.0E-02	9.0E-03	-	No	No
BULK LANE LOADOUT 3	ESS69	Point	18	243,700	4,369,200	154.04	13.72	373.15	25.79	0.29	-	-	-	-	2.300E-01	-	1.0E-02	9.0E-03	-	No	No
FINISH MILL 3 SEPARATOR	ESS7	Point	18	243,700	4,369,200	154.04	25.91	353.15	21.00	1.46	-	-	-	-	1.027E+01	-	4.6E-01	4.0E-01	-	No	No
BULK LANE LOADOUT 4	ESS70	Point	18	243,700	4,369,200	154.04	14.02	373.15	26.15	0.30	-	-	-	-	2.300E-01	-	1.0E-02	9.0E-03	-	No	No
CEMENT ANALYZER	ESS71	Point	18	243,700	4,369,200	154.04	9.75	293.15	11.25	0.28	-	-	-	-	1.200E-01	-	5.0E-03	5.0E-03	-	No	No
AIRSLIDE AT MULTICELL SIL	ESS72	Point	18	243,700	4,369,200	154.04	16.46	373.15	40.66	0.21	-	-	-	-	2.080E-01	-	2.6E-02	2.6E-02	-	No	No
MIDDLE BANK SILOS 1	ESS73	Point	18	243,700	4,369,200	154.04	33.22	366.48	14.97	0.48	-	-	-	-	5.000E-01	-	2.3E-02	2.0E-02	-	No	No
MIDDLE BANK SILOS 2	ESS74	Point	18	243,700	4,369,200	154.04	33.22	366.48	14.97	0.48	-	-	-	-	5.000E-01	-	2.3E-02	2.0E-02	-	No	No
MIDDLE BANK SILOS 3	ESS75	Point	18	243,700	4,369,200	154.04	33.22	366.48	14.97	0.48	-	-	-	-	5.000E-01	-	2.3E-02	2.0E-02	-	No	No
MIDDLE BANK SILOS 4	ESS76	Point	18	243,700	4,369,200	154.04	32.61	366.48	14.97	0.48	-	-	-	-	5.000E-01	-	2.3E-02	2.0E-02	-	No	No
MIDDLE BANK SILOS 5	ESS77	Point	18	243,700	4,369,200	154.04	32.92	366.48	14.97	0.48	-	-	-	-	5.000E-01	-	2.3E-02	2.0E-02	-	No	No
MIDDLE BANK BIN VENT 1	ESS78	Point	18	243,700	4,369,200	154.04	3.66	355.37	18.38	0.25	-	-	-	-	8.000E-02	-	4.0E-03	3.0E-03	-	No	No
MIDDLE BANK BIN VENT 2	ESS79	Point	18	243,700	4,369,200	154.04	3.66	355.37	18.38	0.25	-	-	-	-	8.000E-02	-	4.0E-03	3.0E-03	-	No	No
N.E. PACKER D/C	ESS8	Point	18	243,700	4,369,200	154.04	15.54	310.93	13.93	0.57	-	-	-	-	1.210E+00	-	1.5E-01	1.5E-01	-	No	No
MIDDLE BANK BIN VENT 3	ESS80	Point	18	243,700	4,369,200	154.04	3.66	355.37	22.77	0.25	-	-	-	-	8.000E-02	-	4.0E-03	3.0E-03	-	No	No
MIDDLE BANK BIN VENT 4	ESS81	Point	18	243,700	4,369,200	154.04	3.96	355.37	22.77	0.25	-	-	-	-	8.000E-02	-	4.0E-03	3.0E-03	-	No	No
BULK RAIL LOADOUT 1	ESS82	Point	18	243,700	4,369,200	154.04	15.54	408.15	28.62	0.28	-	-	-	-	1.000E-01	-	4.0E-03	4.0E-03	-	No	No
BULK RAIL LOADOUT 2	ESS83	Point	18	243,700	4,369,200	154.04	15.54	408.15	28.62	0.28	-	-	-	-	1.000E-01	-	4.0E-03	4.0E-03	-	No	No
TRUCK LOADOUT SILO 1	ESS84	Point	18	243,700	4,369,200	154.04	24.38	322.04	20.63	0.33	-	-	-	-	2.000E-01	-	9.0E-03	8.0E-03	-	No	Yes
TRUCK LOADOUT SILO 2	ESS85	Point	18	243,700	4,369,200	154.04	24.38	322.04	9.30	0.72	-	-	-	-	2.000E-01	-	9.0E-03	8.0E-03	-	No	Yes

TRUCK LOADOUT SILO 3	ESS86	Point	18	243,700	4,369,200	154.04	24.38	322.04	15.54	0.33	-	-	-	-	2.000E-01	-	9.0E-03	8.0E-03	-	No	Yes
TRUCK LOADOUT SILO 4	ESS87	Point	18	243,700	4,369,200	154.04	24.38	322.04	15.54	0.33	-	-	-	-	2.000E-01	-	9.0E-03	8.0E-03	-	No	Yes
TRUCK LOADOUT SILO 5	ESS88	Point	18	243,700	4,369,200	154.04	24.38	353.71	16.03	0.33	-	-	-	-	2.000E-01	-	9.0E-03	8.0E-03	-	No	Yes
BULK LOADOUT 5 - TRUCK	ESS89	Point	18	243,700	4,369,200	154.04	12.19	310.93	14.20	0.28	-	-	-	-	1.700E-01	-	8.0E-03	7.0E-03	-	No	Yes
FLYASH TANK D/C	ESS9	Point	18	243,700	4,369,200	154.04	4.27	293.15	35.66	0.20	-	-	-	-	2.000E-01	-	9.0E-03	8.0E-03	-	No	No
BULK LOADOUT 6 - TRUCK	ESS90	Point	18	243,700	4,369,200	154.04	12.19	310.93	14.20	0.28	-	-	-	-	1.700E-01	-	8.0E-03	7.0E-03	-	No	Yes
EAST BANK SILOS 1	ESS91	Point	18	243,700	4,369,200	154.04	33.53	366.48	18.75	0.39	-	-	-	-	4.000E-01	-	1.8E-02	1.6E-02	-	No	No
EAST BANK SILOS 2	ESS92	Point	18	243,700	4,369,200	154.04	33.53	366.48	18.75	0.39	-	-	-	-	4.000E-01	-	1.8E-02	1.6E-02	-	No	No
EAST BANK SILOS 3	ESS93	Point	18	243,700	4,369,200	154.04	33.22	366.48	18.75	0.39	-	-	-	-	4.000E-01	-	1.8E-02	1.6E-02	-	No	No
PACKHOUSE	ESS94	Point	18	243,700	4,369,200	154.04	13.41	294.26	18.53	0.66	-	-	-	-	1.170E+00	-	5.2E-02	4.6E-02	-	No	No
WEST BANK SILO #71	ESS95	Point	18	243,700	4,369,200	154.04	33.83	293.15	6.46	0.30	-	-	-	-	6.310E-01	-	8.0E-02	8.0E-02	-	No	No
WEST BANK SILO #72	ESS96	Point	18	243,700	4,369,200	154.04	33.83	293.15	6.46	0.30	-	-	-	-	6.310E-01	-	8.0E-02	8.0E-02	-	No	No
WEST BANK SILO #82	ESS97	Point	18	243,700	4,369,200	154.04	33.83	293.15	6.46	0.30	-	-	-	-	6.310E-01	-	8.0E-02	8.0E-02	-	No	No
WEST BANK SILO #83	ESS98	Point	18	243,700	4,369,200	154.04	33.83	293.15	6.46	0.30	-	-	-	-	2.750E-01	-	3.5E-02	3.5E-02	-	No	No
DRY FLYASH BIN	ESS99	Point	18	243,700	4,369,200	154.04	23.77	293.15	20.57	0.28	-	-	-	-	6.200E-01	-	2.8E-02	2.4E-02	-	No	No
CRUSHER 440HP	ESS101	Point	18	243,700	4,369,200	154.04	1.83	293.15	0.00	0.61	6.38E-01	-	2.2E-01	-	-	-	-	-	No	-	-

Table 2-21. Knauf Insulation – Inwood Source Parameters and Emission Rates

Emission Unit Description	Model Emission Unit ID	Source Type	Stack Orientation	UTM Zone	UTM East (m)	UTM North (m)	Elevation (m)	Stack Height (m)	Stack Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)	Initial Lateral Dimension (m)	Initial Vertical Dimension (m)	NO_2 Emission Rate (g/s)	SO_2 Emission Rate (g/s)	PM_{10} Emission Rate (g/s)[1]	$PM_{2.5}$ Emission Rate (g/s)
LINE 2 Facing & Packaging, Raw Material Handling Forming, Melting & Refining Baghouse Stack	EP23	Point	Vertical	18	239,657	4,365,698	179	60.66	333.15	20.65	2.90	-	-	2.7	6.77E-01	3.01E+00	3.01E+00
LINE 2 Curing & Cooling Stack	EP24	Point	Vertical	18	239,703	4,365,722	179	36.58	449.82	20.07	1.45	-	-	4.96E-01	2.14E-02	9.24E-01	9.24E-01
LINE 1 Melting & Refining Baghouse Stack	EP12	Point	Vertical	18	239,586	4,365,746	179	18.38	316.48	17.82	0.71	-	-	1.70E-02	-	7.70E-02	7.70E-02
LINE 1 Forming & Collection Stack	EP13	Point	Vertical	18	239,587	4,365,780	179	60.66	344.26	20.86	2.13	-	-	1.81E-01	5.75E-04	1.97E+00	1.97E+00
LINE 1 Curing & Cooling Stack	EP14	Point	Vertical	18	239,601	4,365,787	179	36.58	385.93	21.13	1.32	-	-	2.13	-	3.06E-01	3.06E-01
ESDG12 Emergency Generator	EP16	Point	Vertical	18	239,631	4,365,693	179	7.32	845.93	22.02	0.30	-	-	-	-	4.00E-03	4.00E-03
ESDG13 Emergency Generator	EP17	Point	Vertical	18	239,621	4,365,699	179	7.32	739.65	21.56	0.30	-	-	-	-	1.00E-03	1.00E-03
ESFW11 Emergency Fire Pump	EP18	Point	Vertical	18	239,836	4,365,622	179	3.05	583.15	9.22	0.30	-	-	-	-	4.00E-03	4.00E-03
Day Bin 1	EP11A	Point	Horizontal	18	239,685	4,365,713	179	25.46	294.26	1.00E-03	0.10	-	-	-	-	1.00E-03	1.00E-03
Day Bin 2	EP11B	Point	Horizontal	18	239,688	4,365,710	179	25.46	294.26	1.00E-03	0.10	-	-	-	-	1.00E-03	1.00E-03
New Emergency Generator	NEWGEN	Point	Vertical	18	239,624	4,365,676	179	4.27	807.76	50.00	0.10	-	-	-	-	2.30E-02	2.30E-02
Cooling Tower 1	CT1	Point	Vertical	18	239,691	4,365,683	179	8.84	302.59	19.76	1.83	-	-	-	-	0.00E+00	0.00E+00
Cooling Tower 2	CT2	Point	Vertical	18	239,691	4,365,683	179	8.84	302.59	19.76	1.83	-	-	-	-	0.00E+00	0.00E+00
Cooling Tower 3	CT3	Point	Vertical	18	239,691	4,365,683	179	8.84	302.59	19.76	1.83	-	-	-	-	0.00E+00	0.00E+00
Cooling Tower 4	CT4	Point	Vertical	18	239,696	4,365,677	179	7.92	302.59	15.16	2.44	-	-	-	-	0.00E+00	0.00E+00
Cooling Tower 5	CT5	Point	Vertical	18	239,696	4,365,677	179	7.92	302.59	15.16	2.44	-	-	-	-	0.00E+00	0.00E+00
Heater	HTR	Point	Vertical	18	239,678	4,365,685	179	2.44	338.71	0.00	0.91	-	-	2.12E-01	1.26E-03	6.00E-03	6.00E-03
Finished Product Paved Haul Road	FP11	Volume	-	18	239,659	4,365,771	178	1.0	-	-	-	59.60	0.47	-	-	2.10E-02	2.10E-02
Finished Product Paved Haul Road	FP16	Volume	-	18	239,659	4,365,771	178	1.0	-	-	-	59.60	0.47	-	-	2.30E-02	2.30E-02
Finished Product Paved Haul Road	FP19	Volume	-	18	239,659	4,365,771	178	1.0	-	-	-	59.60	0.47	-	-	1.40E-02	1.40E-02
Road	Road	Volume	-	18	239,659	4,365,771	178	1.0	-	-	-	59.60	0.47	-	-	5.00E-03	5.00E-03

[1] PM_{10} emissions excluded from the December 2017 ROXUL dispersion modeling. Therefore, PM_{10} emissions were assumed to be equivalent to $PM_{2.5}$ emissions.

2.11 Background Concentrations

A "representative" background concentration is required for each modeled pollutant and averaging period to complete the cumulative impact NAAQS modeling analysis. In general, background concentrations are intended to account for source impacts not explicitly included in the modeling analysis. These sources include the following:

- Natural sources;
- Nearby, non-modeled sources; and
- Unidentified sources of air pollution (e.g., long-range transport).

Typically, background concentrations are obtained from air quality data measured at a representative monitoring station. Section 8.3.2 of 40 CFR Part 51, Appendix W discusses the requirements for obtaining "representative" background concentrations for single isolated sources. Because background concentrations are influenced by surrounding man-made emissions (i.e., industrial impacts), the selection of the "representative" background concentrations for the project was performed as follows:

- Step 1 – Evaluate monitor distance from proposed Project.
- Step 2 – Evaluate data completeness at monitor.
- Step 3 – Consider monitor scale in identifying representative monitor (e.g. regional, neighborhood, etc.).
- Step 4 – Evaluate large emission sources around the monitor.
- Step 5 – Identify closest monitors to facility with the most complete data set which also have a representative monitor scale.
- Step 6 – Compare and contrast chosen monitors to identify most representative monitor.

Section 8.2 of Appendix W of 40 CFR Part 50 discusses requirements for obtaining representative background concentrations. Specifically, "*air quality data should be used to establish background concentrations in the vicinity of the source(s) under consideration*." Additionally, per EPA guidance, in determining whether background data is representative, one must consider the quality of the data collected, and the age of the data collected. Taking these considerations into account, CMC proposes to use the most recent three years of background data in which the background data is more than 75% complete[26] for each site. A summary of the monitor sites and data used for best representative background purposes is contained in Table 2-22. Details of the background analysis are contained in Appendix D.

The level of conservatism will be evaluated for the monitored background concentrations of those pollutants that are subject to patterns (seasonal/diurnal). CMC intends to utilize refined background concentrations in accordance with EPA guidance for any background concentrations that appear to be overly conservative. Season and hour of day variations in concentrations are typically meant to be used for 1-hour NO_2 and SO_2

[26] Data completeness per 40 CFR Part 50: Appendix K Section 2.3(a) and (b), Appendix N Section 3.0(c), Appendix P Section 2.3(b), Appendix R Section 4(c)(i), Appendix S Section 3.1(b) and 3.2(b), Appendix T Section 3(b)

and concentrations values that vary by season are intended for use for 24-hr $PM_{2.5}$. If required, the varying concentration values will be calculated based on recommendations in current EPA guidance.[27,28]

[27] https://www.epa.gov/sites/default/files/2015-07/documents/appwno2_2.pdf

[28] https://www.epa.gov/system/files/documents/2021-09/revised_draft_guidance_for_o3_pm25_permit_modeling.pdf

Table 2-22. Representative Background Concentrations

Pollutant	Averaging Period	Monitoring Station	AQS Site ID	County	State	Approx. Distance from Facility (km)	Measurement Scale	Sampling Rate	Monitor Type	Background Concentration (ug/m^3)	NAAQS (ug/m^3)	% of NAAQS
NO_2	1-hour	Arendtsville	42-001-0001	Adams	PA	65	Regional (50 - 100s km)	1-hour	SLAMS	23	188	12%
	Annual	Arendtsville	42-001-0001	Adams	PA	65	Regional (50 - 100s km)	1-hour	SLAMS	4	100	4%
$PM_{2.5}$	24-hour	Martinsburg Ball Field	54-003-0003	Berkeley	WV	13	Urban (4 - 50 km)	24-hour, every 3rd day	SLAMS	23	35	64%
	Annual	Martinsburg Ball Field	54-003-0003	Berkeley	WV	13	Urban (4 - 50 km)	24-hour, every 3rd day	SLAMS	8	12	70%
CO	1-hour	Piney Run	24-023-0002	Garrett	MD	98	Regional (50 - 100s km)	1-hour	SLAMS	414	40,000	1%
	8-hour	Piney Run	24-023-0002	Garrett	MD	98	Regional (50 - 100s km)	1-hour	SLAMS	344	10,000	3%
SO_2	1-hour	Piney Run	24-023-0002	Garrett	MD	98	Regional (50 - 100s km)	1-hour	SLAMS	8	196	4%
	3-hour	Piney Run	24-023-0002	Garrett	MD	98	Regional (50 - 100s km)	1-hour	SLAMS	9	1,300	1%
PM_{10}	24-hr	Winchester Courts Building (Inactive)	51-840-0002	Winchester City	VA	45	Neighborhood (500 m - 4 km)	24-hour, every 6th day	Inactive	25	150	17%

1 All monitor data was obtained from EPA Outdoor Air Quality Data (https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors)

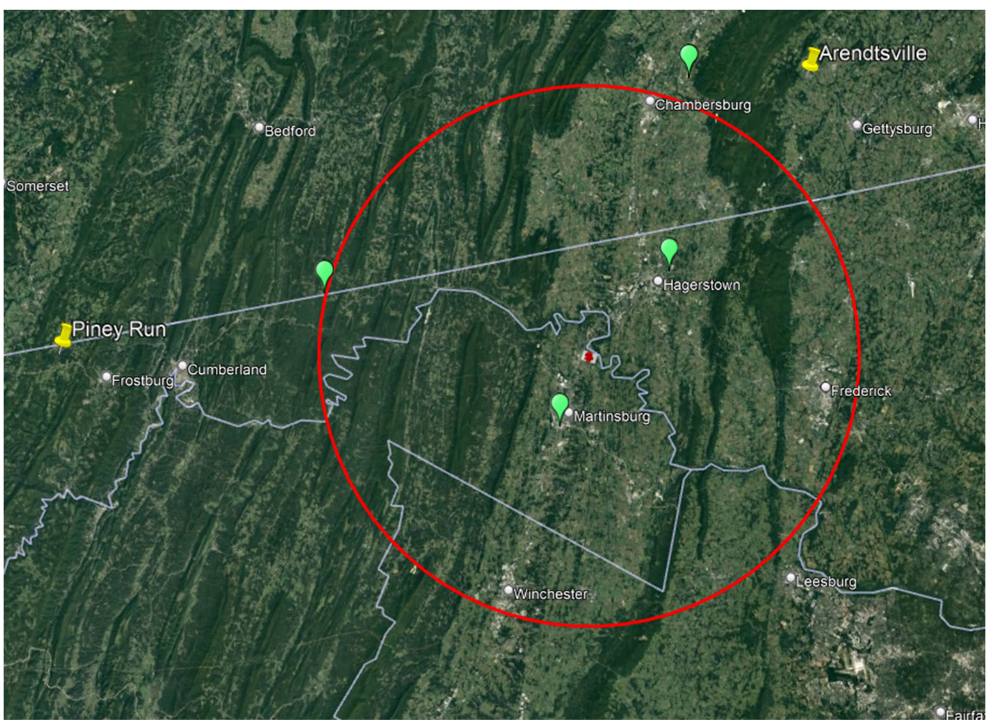
2.11.2 Carbon Monoxide

As depicted in Figure 2-12, there are a total of two (2) monitoring stations for CO and approximately four (4) sources with emissions greater than 100 CO tons based on the raw inventories provided by the state agencies. The two (2) monitoring stations evaluated for representative background monitor for CO are:

- Arendtsville (AQS ID 42-001-0001) – currently active, approximate distance to proposed Project = 65 km
- Piney Run (AQS ID 24-023-0002) – currently active, approximate distance to proposed Project = 98 km

Overall, both monitors are not within close proximity to any large emission sources (greater than 100 CO tons based on the raw inventories provided by the state agencies). The Arendtsville monitor did not have a complete data set in 2021 (data recovery less than 60%) whereas the Piney Run monitor had complete data sets (above 75%) for each year over the past 4 years. Based on the high magnitude of the 1-hour and 8-hour SIL for CO, CMC does not anticipate triggering a full NAAQS analysis for CO. However, if required, CMC has selected the Piney Run monitoring station as a representative monitor for CO based on the higher reliability of the monitor (i.e., higher data recovery in 2021). The measurement scale for the Arendtsville and Piney Run monitors are both "regional scale" (50 km to 100s km). Both Arendtsville and Piney Run have a monitor type of State and Local Air Monitoring Stations (SLAMS) that is an EPA-approved monitoring type.

Figure 2-12. CO Background: Location of Monitors & Large Sources



Red circle depicts 50 km surrounding the proposed Project. Monitors are yellows pins. Green pins are large emission with emissions greater than 100 tons based on the raw inventories provided by the state agencies.

2.11.3 Particulate Matter

There are a total of two (2) monitoring stations that were evaluated for PM_{10} and three (3) monitoring stations for $PM_{2.5}$. Other monitors were excluded from review either because of incomplete data, distance, located in urban areas, or measurement scale being not reflective of background needed for this assessment.[29] The two monitoring stations evaluated for PM_{10} are:

- Rest (AQS ID 51-069-0010) – currently active, approximate distance to proposed Project = 33 km
- Winchester Courts Building (AQS ID 51-840-0002) – currently inactive, approximate distance to proposed Project = 45 km

The three monitoring stations evaluated for $PM_{2.5}$ are:

- Hagerstown (AQS ID 24-043-0009) – currently active, approximate distance to proposed Project = 15 km
- Martinsburg Ball Field (AQS ID 54-003-0003) – currently active, approximate distance to proposed Project = 13 km
- Rest (AQS ID 51-069-0010) – currently active, approximate distance to proposed Project = 33 km

2.11.3.1 PM_{10}

As depicted in Figure 2-13, there are a total of two (2) monitoring stations for PM_{10} and approximately 4 sources with emissions greater than 100 PM_{10} tons based on the raw inventories provided by the state agencies. The Winchester Courts Building monitoring station had data prior to 2021, however the Rest monitoring station has more recent data from 2021. Therefore, the Rest monitoring station does not have a historic data trend while the Winchester Courts Building monitoring station does. Because it is not possible to develop an average concentration from the Rest station per regulatory requirements, the ambient PM_{10} concentrations at the Winchester Courts Building monitoring station are selected as representative of the proposed Project. The measurement scale of the Winchester Courts Building monitor is Neighborhood scale (500 m to 4 km). The Winchester Courts Building monitor type of State and Local Air Monitoring Stations (SLAMS) that is an EPA-approved monitoring type.

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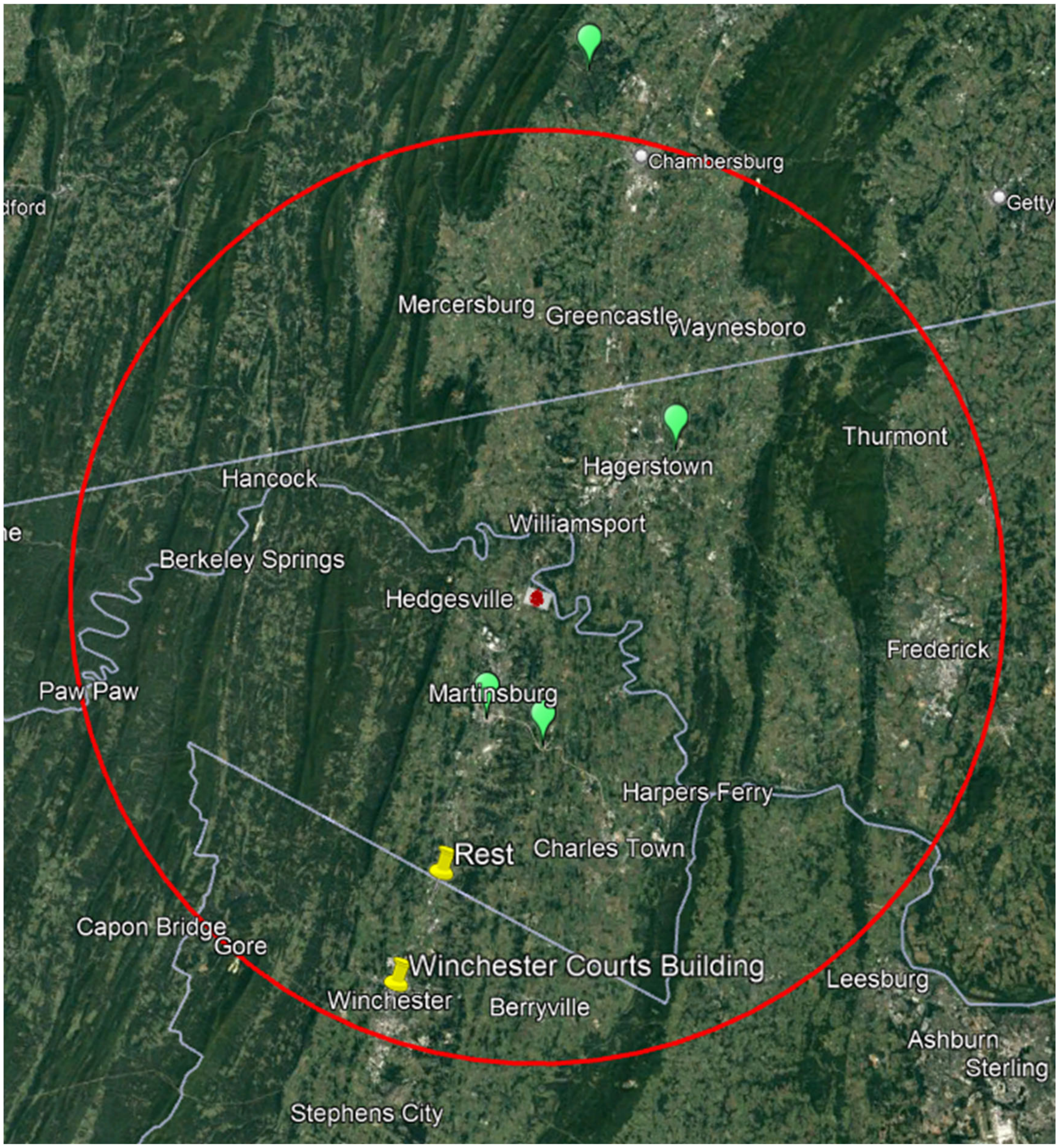
[29] Excluded inactive PM_{10} monitors include the following: Martinsburg Ball Field (last collected data in 2004), clearbrook (last collected data in 2008), General Electric Plant (last collected data in 2006), and other surroudning monitors that last collected data in 1995/1995.

Figure 2-13. PM_{10} Background: Location of Monitors & Large Sources

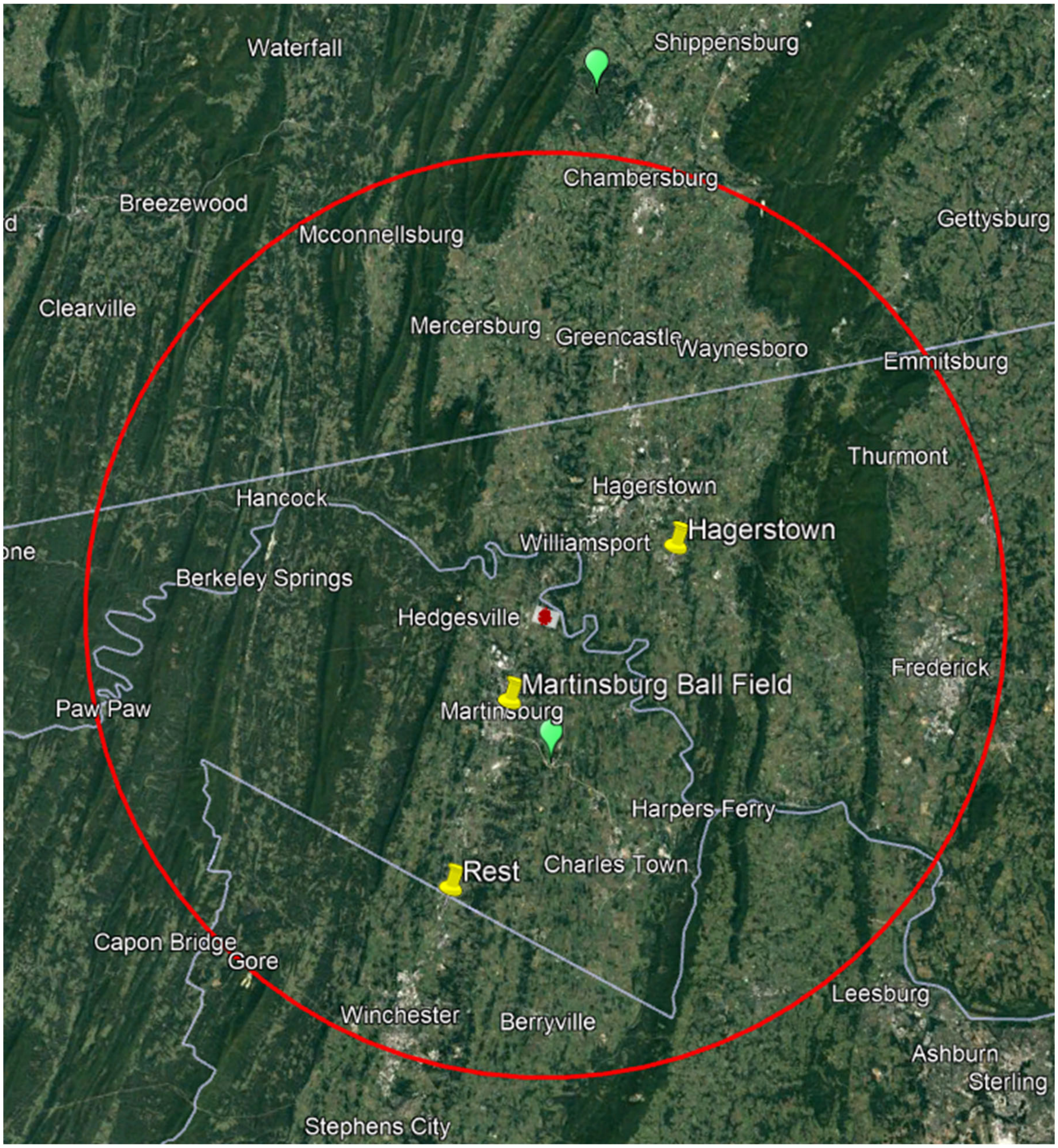


Red circle depicts 50 km surrounding the proposed Project. Monitors are yellows pins. Green pins are large emission with emissions greater than 100 tons based on the raw inventories provided by the state agencies

2.11.3.2 $PM_{2.5}$

As depicted in Figure 2-14, there are a total of three (3) monitoring stations for $PM_{2.5}$ and approximately two (2) sources with emissions greater than 100 $PM_{2.5}$ tons based on the raw inventories provided by the state agencies. All three monitoring stations have a measurement scale of "urban scale" (4 km to 50 km) that covers to the extent of the proposed Project. Additionally, all three monitors have a monitor type of State and Local Air Monitoring Stations (SLAMS) that is an EPA-approved monitoring type. Overall, ambient $PM_{2.5}$ concentrations at the Martinsburg Ball Field monitoring station are higher than the other two monitors. Furthermore, the Rest monitor did not have a complete data set in 2021 (data recovery at approximately 12%). Based of the higher reliability of the Martinsburg Ball Field 2021 data, the proximity to the proposed Project, higher ambient concentrations, and influence of large emission sources, CMC has selected Martinsburg Ball Field as a $PM_{2.5}$ representative monitor.

Figure 2-14. $PM_{2.5}$ Background: Location of Monitors & Large Sources



Red circle depicts 50 km surrounding the proposed Project. Monitors are yellows pins. Green pins are large emission with emissions greater than 100 tons based on the raw inventories provided by the state agencies.

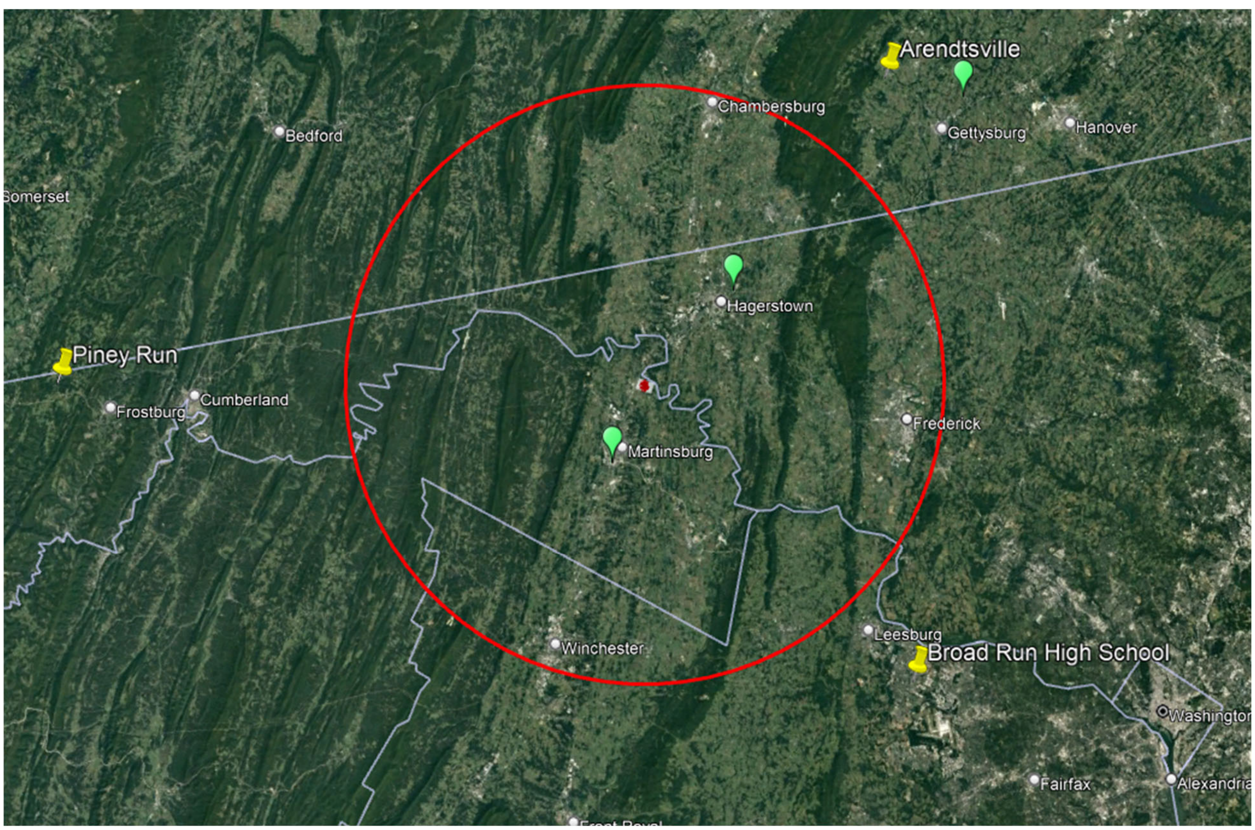
2.11.4 Nitrogen Dioxide

As depicted in Figure 2-15, there are a total of three (3) monitoring stations for NO_2 and approximately 3 sources with emissions greater than 100 NOx tons based on the raw inventories provided by the state agencies. Other monitors were excluded from review either because of incomplete data, distance, located in urban areas, or measurement scale being not reflective of background needed for this assessment. The three monitoring stations evaluated for NO_2 are:

- Arendtsville (AQS ID 42-001-0001) – currently active, approximate distance to proposed Project = 65 km
- Broad Run High School (AQS ID 51-107-1005) – currently active, approximate distance to proposed Project = 66 km
- Piney Run (AQS ID 24-023-0002) – currently active, approximate distance to proposed Project = 98 km

Arendtsville and Piney Run monitoring stations have a measurement scale of "regional scale" (50 km to 100 km) that covers to the extent of the proposed Project but the Broad Run High School has a measurement scale of "neighborhood" (500 m to 4 km). However, a review of the more appropriate "regional scale" monitors indicates that the Piney Run monitor did not have a complete data set in 2019 (data recovery less than 50%). Based on these considerations, CMC has selected the Arendtsville monitor as a NO_2 representative monitor due to its higher measurement scale and higher reliability (the data recovery for all years considered are above 75%). All three monitors have a monitor type of State and Local Air Monitoring Stations (SLAMS) that is an EPA approved monitoring type.

Figure 2-15. NO_2 Background: Location of Monitors & Large Sources



Red circle depicts 50 km surrounding the proposed Project. Monitors are yellows pins. Green pins are large emission with emissions greater than 100 tons based on the raw inventories provided by the state agencies.

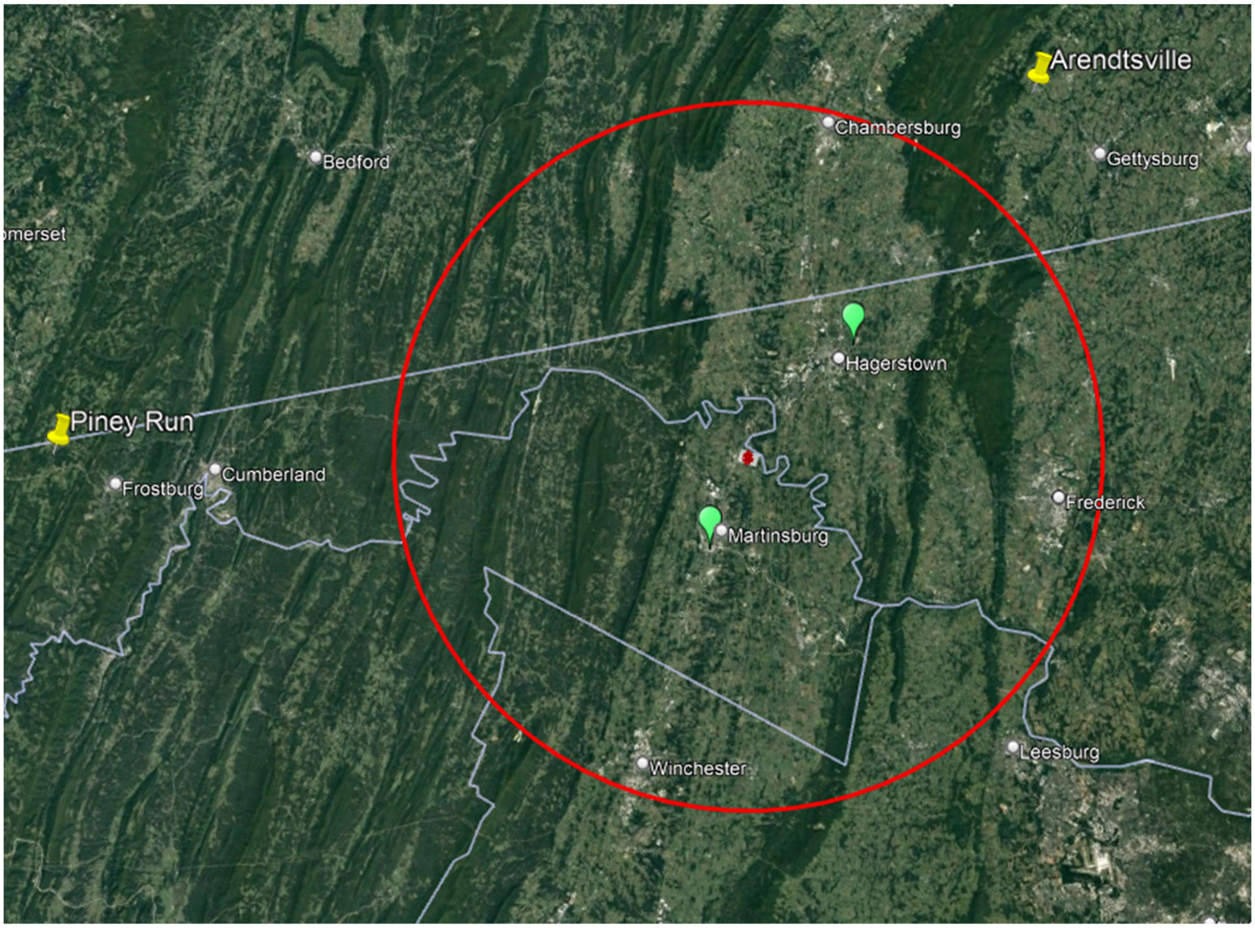
2.11.5 Sulfur Dioxide

As depicted in Figure 2-16, there are a total of two (2) monitoring stations for SO_2 and approximately 2 sources with emissions greater than 100 SO_2 tons of based on the raw inventories provided by the state agencies. Other monitors were excluded from review either because of incomplete data, distance, located in urban areas, or measurement scale being not reflective of background needed for this assessment. The two monitoring stations evaluated for SO_2 are:

- Arendtsville (AQS ID 42-001-0001) – currently active, approximate distance to proposed Project = 65 km
- Piney Run (AQS ID 24-023-0002) – currently active, approximate distance to proposed Project = 98 km

Overall, both monitors are not within close proximity to any large emission sources (greater than 100 SO_2 tons based on the raw inventories provided by the state agencies). However, ambient ambient concentrations at the Piney Run monitor are higher than those at the Arendtsville monitors. Therefore, CMC has selected the Piney Run monitoring station as a representative monitor for SO_2 background concentrations due to completeness of the available dataset and higher ambient concentrations. The measurement scale for the Arendtsville and Piney Run monitors are both "regional scale" (50 km to 100 km). The Arendtsville and Piney Run monitor both have a monitor type of State and Local Air Monitoring Stations (SLAMS) that is an EPA-approved monitoring type.

Figure 2-16. SO_2 Background: Location of Monitors & Large Sources



Red circle depicts 50 km surrounding the proposed Project. Monitors are yellows pins. Green pins are large emission with emissions greater than 100 tons based on the raw inventories provided by the state agencies.

2.12 Pre-Construction Monitoring Requirements

The maximum impacts attributable to the emissions increases from a project must be assessed against the Significant Monitoring Concentrations (SMC) to determine whether pre-construction monitoring should be considered. In general, it is expected that the analysis may exceed the SMC for PM_{10} and $PM_{2.5}$ only. CMC will coordinate with WVDEP if the SMCs for additional pollutants are exceeded as part of the dispersion modeling evaluation.

A pre-construction air quality analysis using continuous monitoring data can be required for pollutants subject to PSD review per 40 CFR §52.21(m). The SMCs are provided in 40 CFR §52.21(i)(5)(i) and are listed in Table 2-1. If either the predicted modeled impact from the proposed Project or the existing ambient concentration is less than the SMC, the permitting agency has the discretionary authority to exempt an applicant from pre-construction ambient monitoring.

When not exempt, an applicant may provide existing data representative of ambient air quality in the affected area or, if such data are not available, collect background air quality data. However, this requirement can be waived if representative background data have been collected and are available. To satisfy the PSD pre-construction monitoring requirements, CMC proposes that existing monitoring data provide reasonable estimates of the background pollutant concentrations for the pollutants considered. The representativeness of existing monitoring data is outlined further in Section 2.11.

As described in Section 2.11, the monitoring data from the Winchester Courts Building (AQS ID 51-840-0002) monitor for PM_{10} and the monitoring data from the Martinsburg Ball Field (AQS ID 54-003-0003) monitor for $PM_{2.5}$ will be utilized for background concentrations. The EPA guidance document addressing pre-construction monitoring, "Ambient Monitoring Guidelines for Prevention of Significant Deterioration", discusses the following criteria to assess whether data from a monitor are representative:

- Monitor Location: The existing monitoring data should be representative of maximum concentration locations.
- Data Quality: The monitoring data should be of similar quality as would be obtained if the applicant monitored according to the PSD requirements.
- Currentness of Data: The air quality monitoring data should be current.

The Winchester Courts Building and Martinsburg Ball Field monitors are located 45 and 13 km, respectively, from the proposed Project. Both monitors are within close proximity to the proposed Project. Furthermore, industrial emissions in a given area could have an influence on the pollutant concentrations in the area. The Winchester Courts Building monitor is located near the following (2) sources with emissions greater than 100 tons of PM_{10} based on raw inventories provided by the state agencies. Similarly, the Martinsburg Ball Field monitor is located within 7 km of ARGOS USA.

- ARGOS USA: located within 32 km of the Winchester Courts Building monitor.
- Knauf Insulation, Inc.: located within 32 km of the Winchester Courts Building monitor.

Both monitors are in similar environments compared to the proposed Project. Both monitors are in areas with similar attributable natural sources such as nearby fields and farmlands. The land use and population surrounding the monitors is also similar to the proposed Project, with the Winchester Courts Building monitor located in Frederick County with a 2021 population of 93,717 and the Martinsburg monitor located in Berkeley County with a population of 126,069 (the proposed Project is also located in Berkeley County).[30] Therefore, the monitors are representative of the location of the proposed Project. Both monitors have a monitor type of State and Local Air Monitoring Stations (SLAMS) that is an EPA-approved monitoring type, therefore these monitors are subject to the quality assurance requirements found in 40 CFR Part 58 Appendix A. Based on the considerations above, CMC concludes that pre-construction monitoring will not be required for the proposed Project.

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[30] Population information from County Population Totals: 2020-2021 (https://www.census.gov/data/tables/time-series/demo/popest/2020s-counties-total.html)

3. CLASS I AIR DISPERSION MODELING ANALYSIS

There are four Class I areas within 300 km of the proposed Project, Otter Creek Wilderness, Dolly Sods Wilderness, Shenandoah National Park, and James River Face Wilderness. The closest Class I area is Shenandoah National Park, approximately 74 km from the proposed Project location. Class I areas are federally protected areas for which more stringent air quality standards apply to protect unique natural, cultural, recreational, and/or historic values. The FLMs of these Class I areas have the authority to protect AQRV and to consider, in consultation with the permitting authority, whether a proposed major emitting facility will have an adverse impact on such values. AQRVs for which PSD modeling is typically conducted include visibility and surface deposition of sulfur and nitrogen.

Based on preliminary estimates of project emission increases for pollutants that would be considered in the AQRV analysis, the ratio (Q/D) of the project emission changes to the distance of the nearest Class I area, is summarized in Table 3-1. The emissions increases are based on the maximum hourly potential emission rates extrapolated to an annual basis assuming continuous operation, and thus, are consistent with FLM guidance for establishing the Q/D ratio based on the maximum daily emission rate extrapolated to an annual basis rather than the annual potential emission rates which may consider inherent constraints on annual production or fuel usage. The FLM's AQRV Work Group (FLAG) guidance states that a Q/D value of ten (10) or less indicates that AQRV analyses will generally not be required.[31] Therefore, it is unlikely the proposed Project would lead to adverse impacts at any of the Class I areas listed in Table 3-1. Based on these initial calculations, CMC concludes that the FLMs for all Class I areas within 300 km of the proposed Project will not require an AQRV analysis for this project.

Table 3-1. Class I Q/D Analysis

Class I Area	Distance to Proposed Project (km)	FLAG 2010 Q/D
Shenandoah National Park	74	7.65
Dolly Sods Wilderness	135	4.19
Otter Creek Wilderness	158	3.59
James River Face Wilderness	251	2.26

In addition to the AQRVs, the analysis is required to assess PSD Increment consumption at the affected Class I areas. CMC proposes to perform this evaluation using a screening methodology that is commonly applied. This methodology relies on the same Significance analysis model input parameters applied for the Class II area assessments. Modeling in AERMOD will be performed by placing an arc of receptors at a distance of 50 km in the direction each Class I area within 300 km, to demonstrate that impacts are below the Class I SILs. A "polar grid" containing one ring with 360 receptors spaced approximately 873 meters and extending 50 km from the center of the proposed Project will be used for the Class I air dispersion analyses. Shenandoah National Park is the closest Class I area, as such, the receptors will be modeled at three different elevations representing the maximum, minimum and average elevations for Shenandoah National Park. The park rises

[31] National Park Service, U.S. Department of the Interior, Federal Land Mangers' Air Quality Related Values Work Group (FLAG), Phase I Report–Revised (2010), National Resource Report NPS/NRPC/NRR_2010/232, October 2010.

from 550 feet at its lowest elevation to over 4,049 feet at its highest.[32] Therefore, a hill-height scale equal to the highest elevation (4,049 feet) will be utilized for the three different sets of rings at the varying elevations.

This Class I increment screening procedure was originally proposed by EPA Region 4 and has been used in several recent PSD applications to fulfill the Class I increment modeling requirements. The Class I SILs for the pollutants expected to exceed their respective SERs and for which there is a SIL are presented in Table 3-2. CMC assumes the $PM_{2.5}$ Class I Area SIL contained in EPA's "Guidance on Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program" (April 2018) will be accepted for this PSD air quality analysis.

Table 3-2. Class I PSD SILs

Pollutant	Averaging Period	Class I SIL ($\mu g/m^3$)
NO_2	1-Hour	NA
	Annual	0.10
PM_{10}	24-Hour	0.32
	Annual	0.16
$PM_{2.5}$	24-Hour	0.27
	Annual	0.05
SO_2	1-Hour	NA
	3-hour	1.00
	24-HourAnnual	0.20
		0.10

If the impacts within the 50 km arc in the direction of Class I areas exceed the SIL for a particular pollutant/averaging period, CMC will coordinate with WVDEP on the needed technical evaluations. Overall, CMC expects modeled concentrations to fall well below the applicable Class SILs, and thus no further refined modeling is expected to be required and a separate Class I modeling protocol for long range transport modeling will not be necessary.

[32] Shenandoah National Park: https://www.virginia.org/things-to-do/outdoors/national-parks/shenandoah-national-park/#:~:text=The%20park%20contains%20a%20wide,at%20its%20highest%20atop%20Hawksbill.

4. ADDITIONAL IMPACT ANALYSIS

The PSD additional impacts analysis depends on existing air quality, the quantity of proposed emissions, and the sensitivity of local soils and vegetation in the Project's impact area. The additional impacts analysis is conducted for the constituents subject to PSD review for the project and is presented in the following sections:

- Growth analysis;
- Soils and vegetation analysis; and
- Visibility impairment analysis.

4.1 Growth Analysis

The elements of the growth analysis include a projection of the associated industrial, commercial, and residential growth that will occur in the area of impact due to the proposed Project, including the potential impact on ambient air due to this growth. The proposed Project is not expected to cause a significant shift of population or an increase in industrial, commercial, and residential growth in the area. Since no significant associated commercial, industrial, or residential growth is expected as a result of the proposed Project, negligible growth-related ambient air impacts are expected.

4.2 Soil and Vegetation Analysis

Pursuant to the requirements in 40 CFR §52.21(o) the analysis of the impact that would occur to soils and vegetation of significant commercial or recreational value as a result of the project is discussed below. The EPA developed the secondary NAAQS in order to protect certain air quality-related values (i.e., soil and vegetation) that were not sufficiently protected by the primary NAAQS. The secondary NAAQS represent ambient air concentrations below which most types of soil and vegetation are unaffected by criteria pollutants.[33] However, this may not be true for particularly sensitive soils or plant species.[34]

In the 2006 case In re: Indeck-Elwood, LLC (PSD Appeal No. 03-04)[35], the Environmental Appeals Board (EAB) referenced the PSD "other impacts analysis" procedures in the 1990 Draft New Source Review Workshop Manual (1990 NSR Manual). The 1990 NSR Manual states that an analysis of soil and vegetation air pollution impacts "should be based on an inventory of the soil and vegetation types found in the impact area."[36] For purposes of this project, an impact area of 50 km (i.e., the extent of the AERMOD modeling system) will be used for the vegetation analysis. For the soil analysis, an impact area of 100,000 acres (i.e., the extent of the U.S. Department of Agriculture Web Soil Survey [WSS] system) will be utilized. Furthermore, this analysis will

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[33] EPA, Office of Air Quality Planning and Standards, New Source Review Workshop Manual, Research Triangle Park, NC, October 1990.

[34] EPA, Office of Air Quality Planning and Standards, Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts, EPA-454/R-98-019, December 1998.

[35] In re: Indeck-Elwood, LLC; PSD Appeal No. 03-04, decided September 27, 2006.

[36] EPA, Office of Air Quality Planning and Standards, New Source Review Workshop Manual, Research Triangle Park, NC, October 1990.

utilize the EPA's criteria for evaluating impacts on soils and vegetation in *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals*.[37]

4.3 Visibility Analysis

To provide a demonstration that local visibility impairment will not result from the proposed Project, CMC will utilize the EPA VISCREEN model following the guidelines published in the Workbook for Plume Visual Impact Screening and Analysis to assess potential plume impairment.[38] The primary variables that affect whether a plume is visible or not at a certain location are:

(1) Quantity of emissions;
(2) Types of emissions;
(3) Relative location of source and observer; and
(4) Background visibility range.

The VISCREEN model is designed to determine whether a plume from a facility may be visible from a given vantage point. CMC will complete the visibility assessment at the following parks as depicted in Figure 4-1. Pursuant to discussions with WVDEP[39], the closest visitor centers at the Chesapeake & Ohio (C&O) Canal[40] will also be considered, as summarized below, and depicted in Figure 4-1.

- ► Parks
  - Fort Frederick State Park;
  - Antietam National Battlefield; and
  - Harpers Ferry National Historical Park.
- ► Chesapeake & Ohio (C&O) Canal
  - Williamsport Visitor Center; and
  - Ferry Hill Visitor Center.

Level-1 screening techniques are expected to adequately demonstrate plume impairment values below screening thresholds. Regardless, Level-2 and subsequently Level-3 (i.e., PLUVUE II) screening techniques will be applied if necessary. Per EPA guidance[41] the stability class can be adjusted to one level less stable when a tall feature is between the proposed Project and parks. For example, as depicted in Figure 4-2, a significant geographic feature exists between the proposed Project and the Williamsport Visitor Center which is expected to affect the dispersion between both locations requiring an adjustment to the stability class of

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[37] EPA, Office of Air Quality Planning and Standards, A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals, EPA 450/2-81-078, December 12, 1980.

[38] EPA, Workbook for Plume Visual Impact Screening and Analysis, EPA-450/4-88-015, 1998.

[39] Per telephone communication between Eddie Al-Rayes, Trinity Consultants, and Joe Kessler, WVDEP, on February 1, 2023 and Jon McClung, WVDEP, on March 3, 2023.

[40] A map of the Chesapeake & Ohio (C&O) Canal can be obtained from the following link: https://www.nps.gov/choh/planyourvisit/upload/CHOHmap-full-140922-v7-accessible.pdf.

[41] Page 49 "Accounting for Complex Terrain" of EPA, "Workbook for Plume Visual Impact Screening and Analysis (Revised)," EPA-454/R-92-023, October 1992.

the analyses for the Williamsport Visitor Center. If a PLUVUE II analysis is necessary, CMC will submit a different protocol to address that specific analysis.

Figure 4-1. Location of Parks for Visibility Assessment

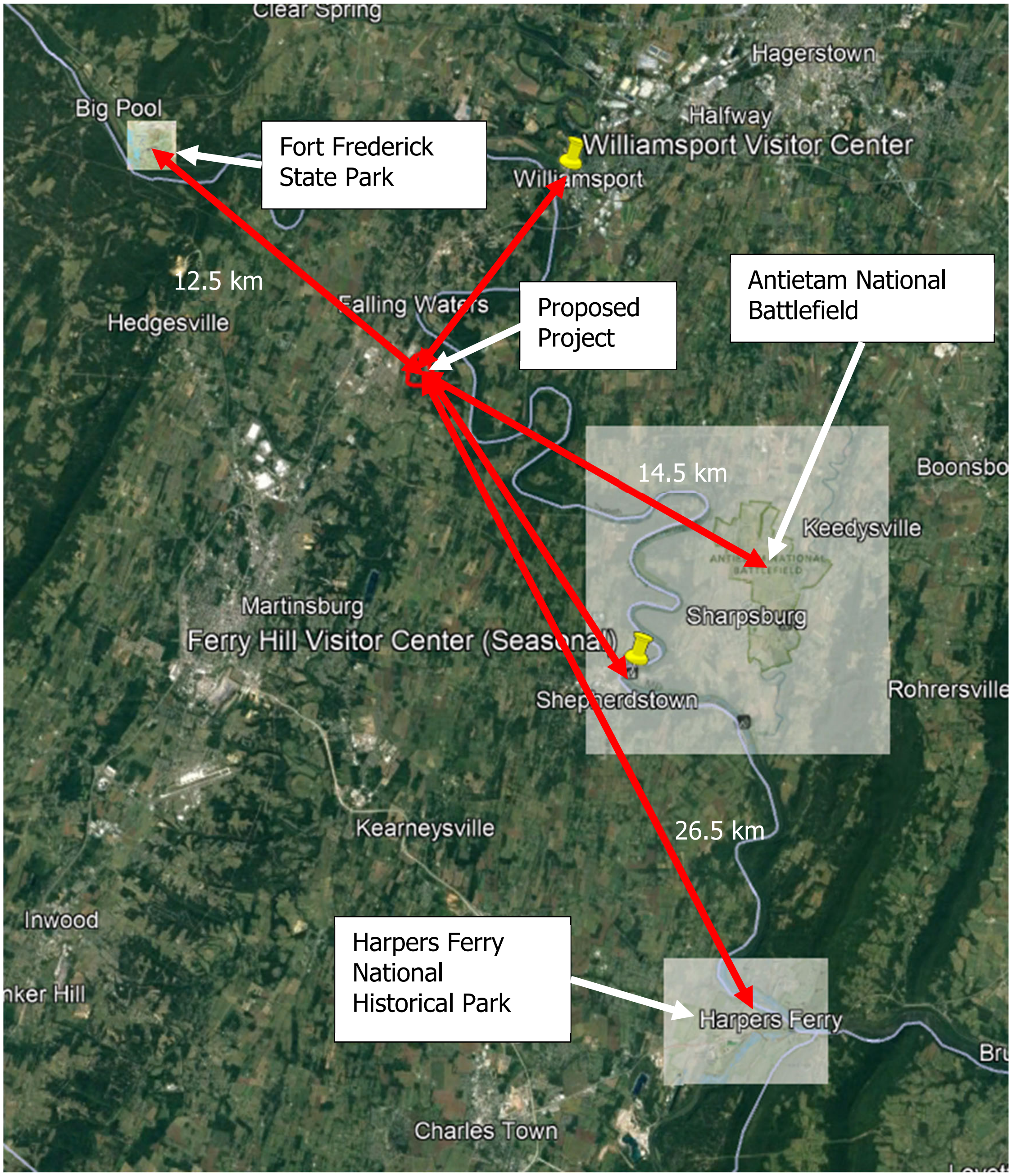
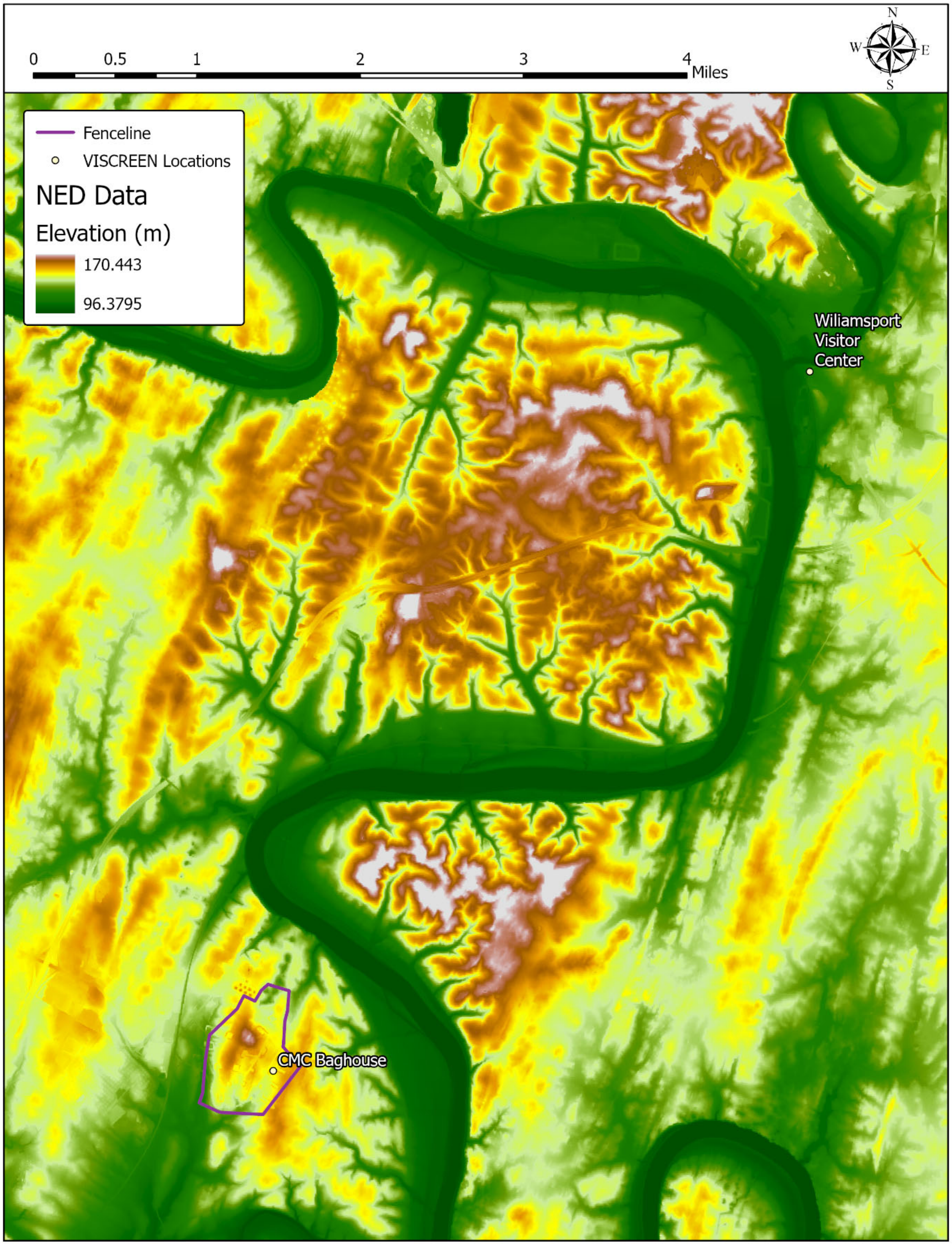


Figure 4-2. Elevation Change Between Proposed Project and Williamsport Visitor Center



5. SECONDARY POLLUTION FORMATION

Secondary pollutant formation is also required to be addressed in the PSD review process. When precursor emissions for ozone (VOC and NO_X) and/or $PM_{2.5}$ (SO_2 and NO_X) trigger PSD review, ozone and secondary $PM_{2.5}$ ambient impacts must be reviewed. Elevated ground-level ozone concentrations are the result of photochemical reactions among various chemical species. These reactions are more likely to occur under certain ambient conditions (e.g., high ground-level temperatures, light winds, and sunny conditions). The chemical species that contribute to ozone formation, referred to as ozone precursors, include NO_X and VOC emissions from both anthropogenic (e.g., mobile and stationary sources) and natural sources (e.g., vegetation).

Based on the recently released EPA July 2022 guidance[42], the proposed Project increases above the PSD SERs trigger a secondary $PM_{2.5}$ and/or ozone air impact analysis. The EPA July 2022 guidance is relevant for the PSD program and focuses on assessing the ambient impacts of precursors of Ozone/$PM_{2.5}$ for purposes of that program. MERPs can be viewed as a Tier 1 demonstration tool under the PSD permitting program that provides a straightforward and representative way to relate maximum source impacts with a critical air quality threshold (e.g., a significant impact level or SIL).[43] Specifically, the MERP framework may be used to describe an emission rate of an individual precursor (such as NO_2 or SO_2 for $PM_{2.5}$) that is expected to result in a change in the level of ambient secondary $PM_{2.5}$/ozone that would be less than a specific air quality threshold that a permitting authority adopts and chooses to use in determining whether a projected impact causes or contributes to a violation of the NAAQS, such as the $PM_{2.5}$ SIL recommended by the EPA.[44] In short, MERPs are intended to be used with SILs as analytical tools for PSD air quality analyses, and if necessary, a cumulative impacts analysis including background air quality.

The first step is to define the applicable MERP site to be used in the assessment. There are three hypothetical model sources in presented in the EPA MERPS ViewQlik website that are nearest to the proposed Project, which are summarized in Table 5-2. The EPA April 2019 guidance[45] states that the representativeness of a hypothetical source is based on *the chemical and physical environment (e.g., meteorology, background pollutant concentrations, and regional/local emissions).* Hypothetical Source 8 (FIPS 42001) is assumed to be representative of the proposed Project based on the following:

- **Proximity** – Source 8 is the closest hypothetical source to the proposed Project, approximately 84 km away.
- **Terrain & Land Use** – Source 8 has the lowest nearby urban percentage which is representative of the Project.
- **Climate** – Due to distance between the Project and source 8 as well as the common geographical landscape, the climate characteristics from the temperature and humidity at the Project is more identical to Source 8 than compared to the other two MERPs sources.

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[42] Guidance for Ozone and Fine Particulate Matter Permit Modeling, dated July 29, 2022 https://www.epa.gov/system/files/documents/2022-08/2022%20Guidance%20O3%20and%20Fine%20PM%20Modeling.pdf

[43] Ibid.

[44] Ibid.

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

- **Regional Sources of Pollutants** – Source 8 and the proposed Project share similar nearby large emission sources.
- **Highest Impacts** – Based on the summary in Table 5-1, Source 8 generated the highest maximum concentrations in the EPA models for the smallest MERP values and is, therefore, the most conservative for purposes of estimating proposed Project impacts.
- **Background Pollutant Concentrations** – For the reasons listed above, the ambient concentrations are relatively similar to the proposed Project.

Table 5-1. Summary of EPA MERPs & Maximum Concentrations

State	County	Source	Metric	Precursor	MERP	Maximum Concentration	
						Value	Units
PA	Chester	3	8-hr Ozone	NOx	526	0.95	ppb
PA	Adams	8			299	1.67	ppb
PA	Chester	3		VOC	4,095	0.12	ppb
MD	Baltimore	14			3,212	0.16	ppb
PA	Adams	8			3,159	0.16	ppb
PA	Chester	3	Annual $PM_{2.5}$	NOx	14,604	0.007	ug/m3
	Adams	8			10,142	0.010	ug/m3
	Chester	3		SO2	14,724	0.007	ug/m3
	Adams	8			10,885	0.009	ug/m3
PA	Chester	3	Daily $PM_{2.5}$	NOx	7,010	0.09	ug/m3
	Adams	8			5,977	0.10	ug/m3
	Chester	3		SO2	2,263	0.27	ug/m3
	Adams	8			1,643	0.37	ug/m3

The EPA MERPS ViewQlik website provides data for a variety of model combinations, including a source height of 10 m vs. 90 m, and emission rates of 500 tons, 1,000 tons, and 3,000 tons. The stack heights at the proposed Project will range in heights from 1 to 50 50 m; therefore, a stack height of 10 m at Source 8 was conservatively chosen to be representative for the proposed Project. Emissions of NO_x and SO_2 are both well under 500 tpy; therefore, an emission rate of 500 tons is representative for secondary $PM_{2.5}$ assessment. Emissions of NO_x and VOC are both well under 500 tpy; therefore, an emission rate of 500 tons is representative for ozone assessment.

Table 5-2. Nearest EPA MERP Facilities & Proposed Project

Reference	FIPS	County	State	Source	Latitude	Longitude	Distant to Project (km)	Max Nearby Terrain (m)	Max Nearby Urban (%)
EPA MERP Guidance	42001	Adams	PA	8	40.009	-77.111	84	364	26.9
	42510	Baltimore	MD	14	39.302	-76.674	108	95	58.2
	42029	Chester	PA	3	39.940	-75.822	177	188	32.2
Project	-	Berkeley	WV	-	39.536	-77.886	-	480	3.0

The MERP values from Source 8 are obtained from EPA's MERPS View Qlik application.[46] The NO_x and SO_2 daily and annual MERP values with 500 tons of emissions with 10 m source height are contained in Table 5-3 and NO_x and VOC MERP values are contained in Table 5-4.

Table 5-3. MERP Values for Secondary $PM_{2.5}$ assessment

FIPS	Source	County	Precursor	$PM_{2.5}$ 24-Hour [1, 2]	$PM_{2.5}$ Annual [1,2]
42001	8	Adams	NO_x	5,977	10,142
			SO_2	1,643	10,885

[1] Based on 500 tons emissions and 10 m stack height
[2] Values obtained from EPA MERPS ViewQlik website in July 2022 (https://www.epa.gov/scram/merps-view-qlik)

Table 5-4. MERP Values for Ozone assessment

FIPS	Source	County	Precursor	8 Hour Ozone
42001	8	Adams	NO_x	299
			VOC	3,159

[1] Based on 500 tons emissions and 10 m stack height
[2] Values obtained from EPA MERPS ViewQlik website in July 2022 (https://www.epa.gov/scram/merps-view-qlik)

5.1 Secondary $PM_{2.5}$ Assessment

Precursor pollutants for $PM_{2.5}$ (i.e., NO_x, and SO_2) can undergo photochemical reactions with gases in the atmosphere, resulting in the formation of secondary $PM_{2.5}$ downwind of an emission source, which can add to concentrations resulting from direct (or primary) emissions of $PM_{2.5}$. Two of the largest constituents of secondary $PM_{2.5}$ in the U.S. are sulphates (SO_4^{2-}) and nitrates (NO_3^-), both of which are formed from their respective precursor pollutants (i.e., SO_2 for SO_4^{2-}, NO_x for NO_3^-).

Pursuant to the EPA July 2022 guidance[47], a proposed Project with an increase of NO_x and/or SO_2 emissions in excess of 40 tpy triggers a secondary $PM_{2.5}$ air impact analysis.

The combined primary and secondary impacts of $PM_{2.5}$ for the source impact analysis will be assessed using the highest (AERMOD) modeled primary $PM_{2.5}$ concentration (HMC), the Class II SIL, precursor emissions, and the default MERPs as follows:

$$\text{Secondary PM}_{2.5}\text{ Impact} = \left(\frac{\text{Highest primary PM2.5 modeled concentration}}{\text{SIL}} + \frac{\text{NO}_x\text{ Emissions}}{\text{NO}_x\text{ MERP}} + \frac{\text{SO}_2\text{ Emissions}}{\text{SO}_2\text{ MERP}}\right) < 1$$

If the sum of the ratios in the equation below is less than 1, then the combined $PM_{2.5}$ impacts are below the $PM_{2.5}$ SIL. If the ratio for each averaging period is greater than 1, a cumulative impact analysis will be performed. To estimate the total concentration of $PM_{2.5}$, $PM_{2.5}$ SILs 24-hour and annual values (i.e., 1.2 $\mu g/m^3$

[46] https://www.epa.gov/scram/merps-view-qlik, accessed July 2022.

[47] https://www.epa.gov/scram/merps-view-qlik, accessed July 2022.

and 0.2 μg/m^3) calculated above for secondary $PM_{2.5}$ impact will be added to $PM_{2.5}$ model results (i.e., primary $PM_{2.5}$ impacts) for comparison to the applicable standards. This will be performed for the NAAQS and PSD Increment evaluations. CMC will utilize the following methodologies:

$$\text{Secondary PM}_{2.5}\text{ Impact on NAAQS} = \left(\text{PM}_{2.5}\text{ Modeled concentration} + \text{Background PM}_{2.5}\text{ concentration} + \left(\frac{\text{NO}_x\text{ Emissions}}{\text{NO}_x\text{ MERP}} + \frac{\text{SO}_2\text{ Emissions}}{\text{SO}_2\text{ MERP}}\right) * \text{SIL}\right) < NAAQS$$

$$\text{Secondary PM}_{2.5}\text{ Impact on PSD Increment} = \left(\text{PM}_{2.5}\text{ Modeled concentration} + \left(\frac{\text{NO}_x\text{ Emissions}}{\text{NO}_x\text{ MERP}} + \frac{\text{SO}_2\text{ Emissions}}{\text{SO}_2\text{ MERP}}\right) * \text{SIL}\right) < \text{PSD Increment}$$

5.2 Ozone Impact Analysis

Similarly, pursuant to the EPA July 2022 guidance[48], a proposed Project with an increase of NO_x and/or VOC emissions in excess of 40 tpy triggers an ozone air impact analysis. The ozone impacts for the assessment will be calculated as the sum of the ratio of precursor emissions to the MERPs. If the sum of the ratios is less than 1, then the ozone impacts are below the ozone SIL and no cumulative analysis is necessary. Similar to the secondary $PM_{2.5}$ assessment, CMC will utilize Source 8 in Adams County, PA as the representative MERP source. The ratio of the post-project PTE[49] to the MERP value will be evaluated using below equation.

$$\text{Secondary Ozone Impact} = \left(\frac{\text{NO}_x\text{ Emissions}}{\text{NO}_x\text{ MERP}} + \frac{\text{VOC Emissions}}{\text{VOC MERP}}\right) < 1$$

In the final modeling report, CMC will determine whether the proposed Project will contribute to an increase in ozone above 1 ppb SIL Level and whether a cumulative analysis is required.

[48] Guidance for Ozone and Fine Particulate Matter Permit Modeling, dated July 29, 2022
https://www.epa.gov/system/files/documents/2022-08/2022%20Guidance%20O3%20and%20Fine%20PM%20Modeling.pdf

[49] Post-project PTE is used conservatively.

6. AIR QUALITY MODEL RESULTS

The results of the modeling evaluations will be provided as follows:

- Summarized and presented in tabular format that includes the following:
  - Pollutants;
  - Averaging periods;
  - Highest (and second, sixth, etc. highest, as appropriate) modeled concentration;
  - Background concentration;
  - Total concentration;
  - Applicable ambient standard; and
  - Secondary formation, as appropriate.
- Include graphics (e.g., concentration contour maps) that show the extent of the air quality impacts and utilize a base map that is readily understandable by the general public. Each contour map will identify the proposed Project location relative to these air quality impacts;
- Provide all model control input and output files and all supporting information/files to allow replication of model results.

APPENDIX A. GIS SHAPEFILE OF PROPOSED PROJECT LAYOUT

The GIS Shapefile will be delivered electronically to WVDAQ.

APPENDIX B. ON-SITE ELEVATION FILES

The following files will be delivered electronically to WVDAQ due to the size of the files.

- CMC on-site contour data;
- Converted on-site raster elevation data; and
- Elevation interpolation outputs.

APPENDIX C. AERSURFACE & AERMET PROGRAM FILES & FIGURES

The AERMET and AERSURFACE files utilized to develop the meteorological data sets considered will be delivered electronically to WVDAQ. The figures below depict the project area landcover pre and post construction.

Figure C-1. Project Area Landcover Pre-Construction

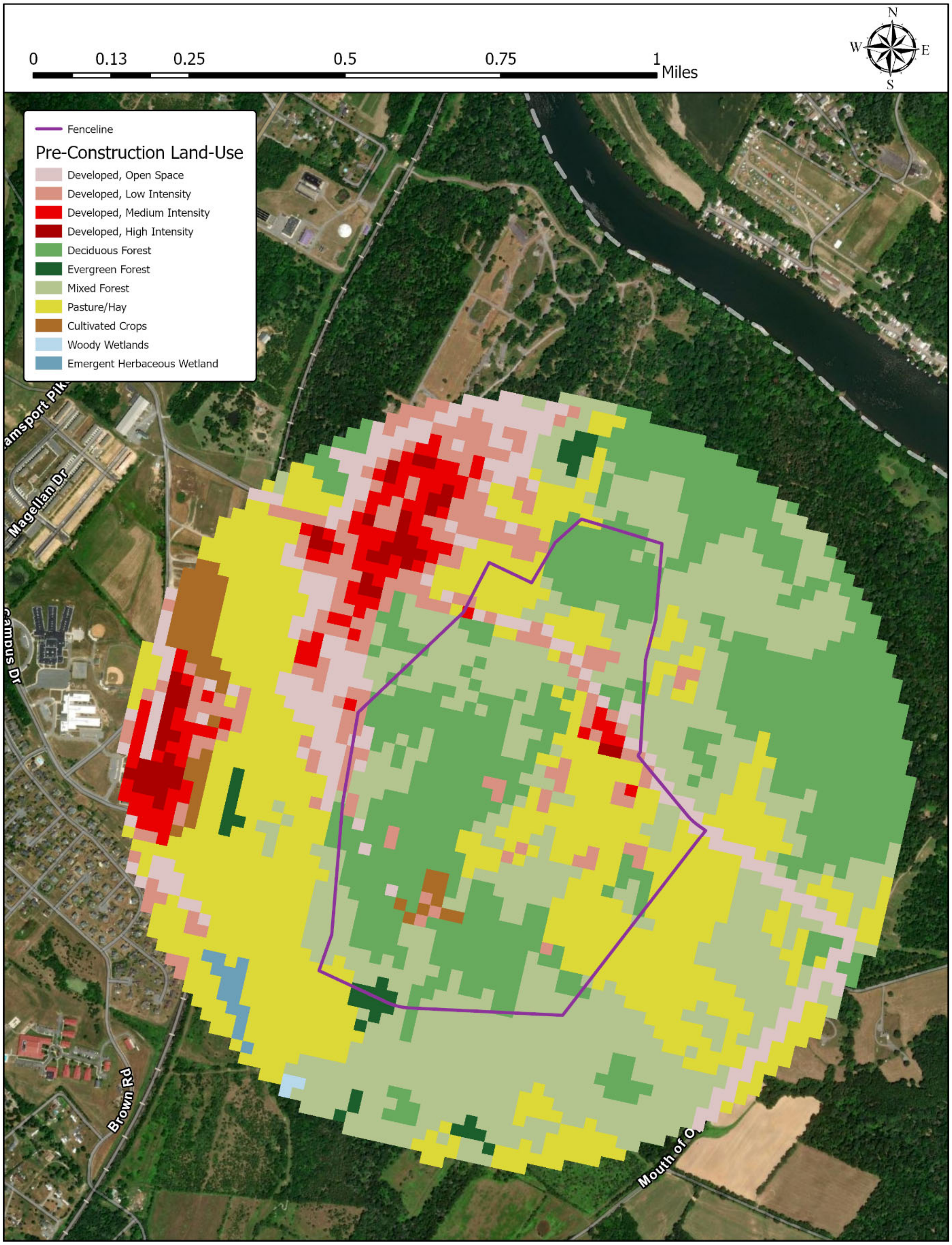
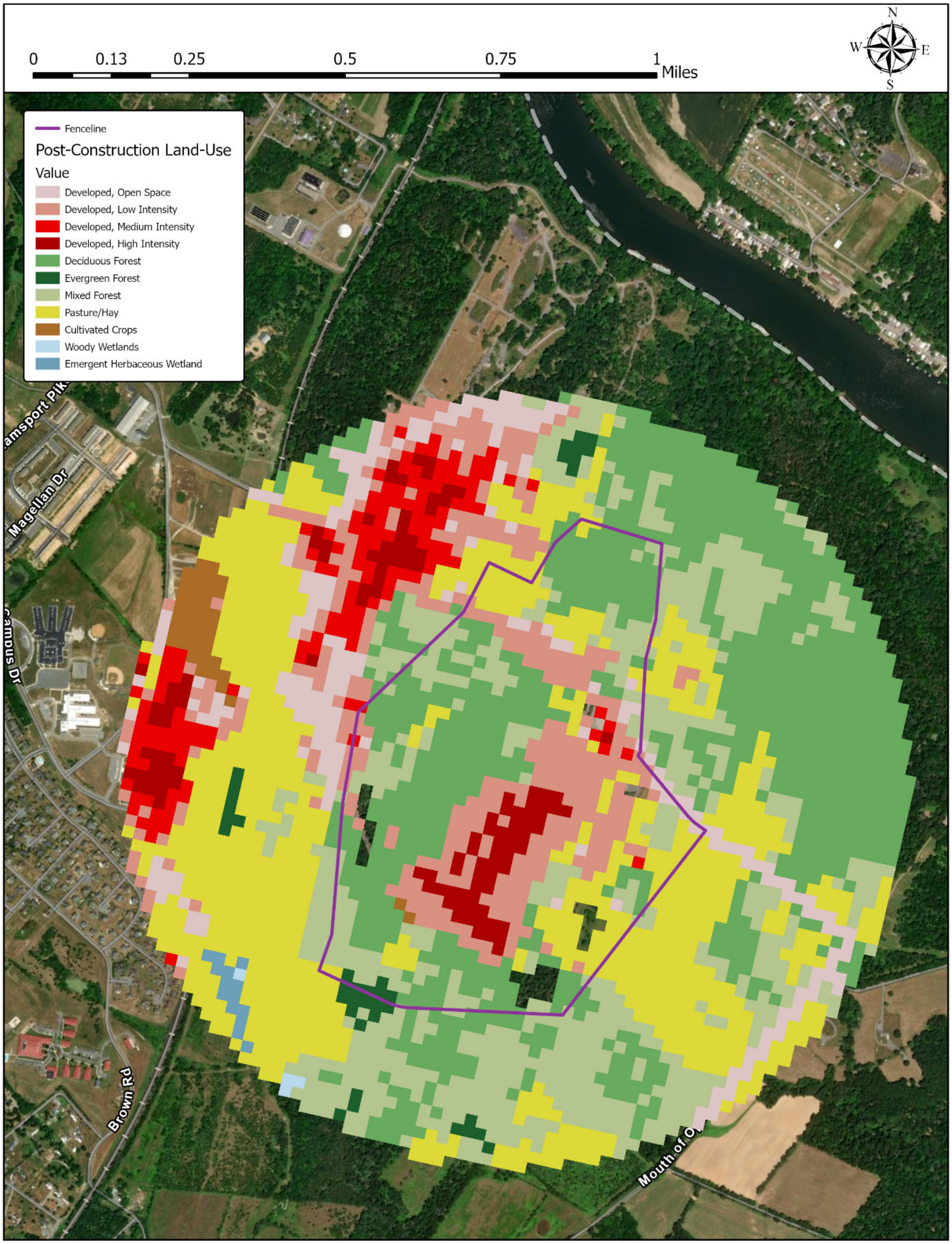


Figure C-2. Project Area Landcover Post-Construction



APPENDIX D. BACKGROUND CONCENTRATION EVALUATION

										Number of Observations [a]				Data Completeness				Background Concentration									NAAQS		
Pollutant	Averaging Period	Monitoring Station [a]	AQS Site ID	County	State	Approx. Distance from Facility (km)	Measurement Scale	Sampling Rate	Monitor Type	2018	2019	2020	2021	2018	2019	2020	2021	Observations Type	2018	2019	2020	2021	Average Value	Max Value	Units	Metric	Value	Units	Notes
NO_2	1-hour	Arendtsville	42-001-0001	Adams	PA	65	Regional (50 - 100s km)	1-hour	SLAMS	-	7,290	8,103	7,128	-	83%	92%	81%	98th Percentile	-	12	12	13	12.33	-	ppb	98th percentile averaged over three years.	100	ppb	
		Piney Run	24-023-0002	Garrett	MD	98	Regional (50 - 100s km)	1-hour	SLAMS	No Data	4,086	8,611	8,649	No Data	47%	98%	99%	98th Percentile	No Data	10.3	9.2	7.8	9.10	-	ppb				Started in 2019
		Broad Run High School	51-107-1005	Loudoun	VA	66	Neighborhood (500 m – 4 km)	1-hour	SLAMS	-	7,706	8,510	8,554	-	88%	97%	98%	98th Percentile	-	37.5	30.7	31.3	33.17	-	ppb				
	Annual	Arendtsville	42-001-0001	Adams	PA	65	Regional (50 - 100s km)	1-hour	SLAMS	-	7,290	8,103	7,128	-	83%	92%	81%	Annual Mean	-	1.58	1.86	2.11	-	2.11	ppb	Maximum annual average from three years.	53	ppb	
		Piney Run	24-023-0002	Garrett	MD	98	Regional (50 - 100s km)	1-hour	SLAMS	No Data	4,086	8,611	8,649	No Data	47%	98%	99%	Annual Mean	No Data	2.68	1.76	1.89	-	2.68	ppb				Started in 2019
		Broad Run High School	51-107-1005	Loudoun	VA	66	Neighborhood (500 m – 4 km)	1-hour	SLAMS	-	7,706	8,510	8,554	-	88%	97%	98%	Annual Mean	-	6.58	5.17	5.31	-	6.58	ppb				
$PM_{2.5}$	24-hour	Hagerstown	24-043-0009	Washington	MD	15	Urban (4 - 50 km)	1-hour, every day	SLAMS	-	355	352	350	-	97%	96%	96%	98th Percentile	-	23.8	17.9	19.5	20.40	-	ug/m^3	98th percentile averaged over three years	35	ug/m3	
		Martinsburg Ball Field	54-003-0003	Berkeley	WV	13	Urban (4 - 50 km)	24-hour, every 3rd day	SLAMS	-	115	118	116	-	95%	97%	95%	98th Percentile	-	25.1	23.1	19.5	22.57	-	ug/m^3				
		Rest	51-069-0010	Frederick	VA	33	Urban (4 - 50 km)	1-hour, every day	SLAMS	115	121	44	323	94%	100%	12%	88%	98th Percentile	22.6	22.8	18.4	21.2	22.20	-	ug/m^3				
	Annual	Hagerstown	24-043-0009	Washington	MD	15	Urban (4 - 50 km)	1-hour, every day	SLAMS	-	355	352	350	-	97%	96%	96%	Annual Mean	-	6.95	6.59	8.02	7.19	-	ug/m^3	Annual average, averaged over three years	12	ug/m3	
		Martinsburg Ball Field	54-003-0003	Berkeley	WV	13	Urban (4 - 50 km)	24-hour, every 3rd day	SLAMS	-	115	118	116	-	95%	97%	95%	Annual Mean	-	8.83	7.48	8.77	8.36	-	ug/m^3				
		Rest	51-069-0010	Frederick	VA	33	Urban (4 - 50 km)	1-hour, every day	SLAMS	115	121	44	323	94%	100%	12%	88%	Annual Mean	4.44	7.62	8.73	9.17	7.07	-	ug/m^3				
CO	1-hour	Arendtsville	42-001-0001	Adams	PA	65	Regional (50 - 100s km)	1-hour	SLAMS	8,332	8,119	8,388	5,051	95%	93%	95%	58%	Second Max	0.50	0.50	0.60	0.50	-	0.60	ppm	Maximum second maximum value over three years	35	ppm	
		Piney Run	24-023-0002	Garrett	MD	98	Regional (50 - 100s km)	1-hour	SLAMS	7,924	7,375	8,618	8,518	90%	84%	98%	97%	Second Max	0.39	0.36	0.32	0.35	-	0.36	ppm				
	8-hour	Arendtsville	42-001-0001	Adams	PA	65	Regional (50 - 100s km)	1-hour	SLAMS	8,681	8,457	8,750	5,005	99%	97%	100%	57%	Second Max	0.40	0.40	0.50	0.40	-	0.50	ppm	Maximum second maximum value over years.	9	ppm	
		Piney Run	24-023-0002	Garrett	MD	98	Regional (50 - 100s km)	1-hour	SLAMS	7,958	7,406	8,669	8,557	91%	85%	99%	98%	Second Max	0.20	0.20	0.20	0.30	-	0.30	ppm				
SO_2	1-hour	Arendtsville	42-001-0001	Adams	PA	65	Regional (50 - 100s km)	1-hour	SLAMS	-	8,130	8,325	7,335	-	93%	95%	84%	99th Percentile	-	4	2	2	2.67	-	ppb	Average of 99th percentile over three years.	75	ppm	
		Piney Run	24-023-0002	Garrett	MD	98	Regional (50 - 100s km)	1-hour	SLAMS	-	7,165	8,351	8,174	-	82%	95%	93%	99th Percentile	-	3.8	2.3	3.1	3.07	-	ppb				
	3-hour	Arendtsville	42-001-0001	Adams	PA	65	Regional (50 - 100s km)	1-hour	SLAMS	-	2,459	2,522	2,304	-	84%	86%	79%	Second Max	-	3.3	2	3	-	3.30	ppb	Max of second maximum value over three years.	0.5	ppm	
		Piney Run	24-023-0002	Garrett	MD	98	Regional (50 - 100s km)	1-hour	SLAMS	-	2,337	2,628	2,577	-	80%	90%	88%	Second Max	-	2.8	3.6	2.3	-	3.60	ppb				
PM_{10}	24-hour	Rest	51-069-0010	Frederick	VA	33	Urban (4 - 50 km)	1-hour, every day	SLAMS	No Data	No Data	No Data	323	No Data	No Data	No Data	88%	Second Max	No Data	No Data	No Data	46	-	46	ug/m^3	Max of second maximum over three years.	150	ug/m3	Started in 2021
		Winchester Courts Building (Inactive)	51-840-0002	Winchester City	VA	45	Neighborhood (500 m - 4 km)	24-hour, every 6th day	Inactive	60	57	58	No Data	98%	93%	95%	No Data	Second Max	20	25	18	No Data	-	25	ug/m^3				Stopped in 2020