Air Quality Impacts Analysis (AQIA)
for
Epitome Energy, LLC

Located in Grand Forks, ND 58203
Lat. 47.99296 Long. -97.1149

Permit No.: ACP-18210 v1.0
Report Date: March 18, 2024

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North Dakota Department of Environmental Quality
Division of Air Quality

Report By:

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Contents

1 Executive Summary

Epitome Energy, LCC (Epitome) conducted air dispersion modeling for a proposed facility near Grand Forks, ND. The modeling efforts were conducted to demonstrate compliance with both state and federal Ambient Air Quality Standards (AAQS) and Prevention of Significant Deterioration (PSD) increment consumption regulations.

Based on the data provided in the Permit to Construct (PTC) application submitted on June 16, 2023, and the Department's independent review and modeling analysis, it is expected that the proposed facility (Project) will comply with the applicable AAQS and PSD Increments. The Department results of the modeled impacts for the AAQS and PSD increment consumption are outlined in Table 1 and Table 2, respectively.

Table 1- Ambient Air Quality Standards (AAQS) Results Summary[1]

POLLUTANT	AVERAGING TIME	MODELED IMPACT ($\mu g/m^3$)	BACKGROUND ($\mu g/m^3$)	TOTAL IMPACT ($\mu g/m^3$)	NDAAQS ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	PASSED (Y/N)
PM_{10}	24-HR	8.13	30	38.13	150	150	Y
$PM_{2.5}$	Annual	1.21	4.75	5.96	-	9[2]	Y
	24-HR	5.42	13.7	19.13	-	35	Y

Table 2 - PSD Class II Increment Results Summary[3]

POLLUTANT	AVERAGING TIME	MODELED IMPACT ($\mu g/m^3$)	CLASS II INCREMENT ($\mu g/m^3$)	% INCREMENT CONSUMED	PASSED (Y/N)
PM_{10}	Annual	1.35	17	8%	Y
	24-HR	9.33	30	31%	Y
$PM_{2.5}$	Annual	1.32	4	33%	Y
	24-HR	8.82	9	98%	Y

[1] See Table 154 for AAQS averaging times.
[2] 89 FR 16202 (Effective May 6, 2024)
[3] See Table 16 for PSD Increment averaging times.

2 Introduction

On June 16, 2023, the North Dakota Department of Environmental Quality, Division of Air Quality (Department) received an application for a Permit to Construct from Epitome for the construction of a new soybean processing facility in Grand Forks, North Dakota. The application included a modeling analysis to confirm compliance with the North Dakota Ambient Air Quality Standards (NDAAQS), the National Ambient Air Quality Standards (NAAQS), and PSD increment standards. Modeling efforts were carried out for PM_{10} and $PM_{2.5}$. This Air Quality Impacts Analysis (AQIA) summarizes the Department's findings based on a thorough review and independent modeling analysis of the Project.

3 Project Background

Epitome is proposing a new soybean processing plant located approximately six miles northwest of Grand Forks, North Dakota in Grand Forks County. The facility is designed to have a processing capacity of 120,000 bushels per day (3,600 tons per day).

Initial construction of the Project will ensue to the PSD baseline date for Region No. 172 (Table 3). Therefore, all the emission units proposed as a part of the Project will consume PSD increment.

Table 3 - PSD Minor Source Baseline Dates[4]

POLLUTANT	PSD BASELINE DATE Region No. 172 (all counties except Cass County)	PSD BASELINE DATE Region No. 130 (Cass County)	SOURCE INCLUDED IN BASELINE (Y/N)
CO	No PSD Class II Increment	No PSD Class II Increment	N/A
NO_2	October 31, 1989	September 13, 2007	N
SO_2	December 19, 1977	November 30, 1979	N
PM_{10}	January 13, 1978	November 30, 1979	N
$PM_{2.5}$	August 23, 2012	April 28, 2022	N
Lead (Pb)	No PSD Class II Increment	No PSD Class II Increment	N/A

4 Model Requirements

Epitome qualifies as a major source according to the PSD rules[5,6] and consequently falls under the purview of PSD review requirements. Per the Department Memo[7] dated October 6, 2014, sources that are subject

[4] May 13, 2022, *Department Memo, North Dakota Prevention of Significant Deterioration (PSD) Minor Source Baseline Dates*. Available at: https://deq.nd.gov/publications/AQ/policy/Modeling/2022MEMO_PSD_BASELINE_DATES.pdf (Last visited October 24, 2023)

[5] *NDAC 33.1-15-15*. Available at: https://www.ndlegis.gov/information/acdata/pdf/33.1-15-15.pdf (Last visited October 24, 2023)

[6] *40 CFR §52.21*. Available at: https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-52/subpart-A/section-52.21 (Last visited October 24, 2023)

[7] *Criteria Pollutant Modeling Requirements for a Permit to Construct.* Available at:

to the PSD rules require dispersion modeling for criteria pollutants prior to the issuance of a PTC if the projected emissions exceed PSD significant emission rates (SERs) (Table 4).

Furthermore, any new source subject to PSD review that is situated within 250 kilometers (km) of a Class I area is required to include a Class I increment analysis. Table 5 provides a list of the Class I areas in closest proximity to Epitome. Epitome is located approximately 298 km from the nearest Class I area; therefore, a Class I increment analysis is not required. All other areas within North Dakota are designated Class II areas and Class II increment analysis applies.

Table 4 - Significant Emission Rates (SERs) in Tons per Year[6]

POLLUTANT	SER (TPY)	FINAL PROJECT EMISSIONS (TPY)	MODELING REQUIRED (Y/N)
PM_{10}	15	75.54	Y
$PM_{2.5}$	10	68.49	Y
SO_2	40	1.09	N
NO_x	40	31.69	N
CO	100	68.00	N

Table 5 - Class I Areas Near Source

CLASS I AREA	DISTANCE FROM PROJECT (km)	MODELING REQUIRED (Y/N)
Voyageurs National Park (MN)	298	N
Lostwood Wilderness Area (ND)	399	N
Boundary Waters Canoe Area (MN)	427	N
Theodore Roosevelt National Park-North Unit (ND)	460	N
Theodore Roosevelt National Park-South Unit (ND)	481	N
Theodore Roosevelt National Park-Elkhorn Ranch Unit (ND)	495	N
Medicine Lake Wilderness Area (MT)	542	N

https://deq.nd.gov/publications/AQ/policy/Modeling/Criteria_Modeling_Memo.pdf (Last visited October 24, 2023)

Epitome is subject to the requirements of NDAC 33.1-15-02[8] and Ambient Air Quality Standards. Cumulative modeling was conducted to demonstrate compliance with applicable state and federal standards.

5 Model Input Values

5.1 Model Version

The U.S. Environmental Protection Agency (EPA) has developed the *Guideline on Air Quality Models*[9] (40 CFR 51 Appendix W) wherein they list preferred models for pre-construction permitting reviews. At the time of the application submittal, Appendix W (2017) was the most current revision in use.

EPA's preferred model is AERMOD, which Epitome and the Department used for the analysis and review, in accordance with Appendix W.

Table 6 - Model Versions

MODEL	VERSION	MODEL	VERSION
AERMOD	22112	BPIP-PRIME	4274
AERMET	22112	AERMINUTE	15272
AERMAP	18081	AERSURFACE	20060

5.2 Meteorological Data (MET)

In the modeling process, both surface and upper-air meteorological (met) data are pre-processed through AERMET. This pre-processing generates the boundary layer parameters required by AERMOD to estimate plume dispersion. AERMET processes hourly meteorological data to determine plume transport and dispersion downwind from a source.

Per Appendix W (2017) 8.4.2.e, the choice of meteorological data should be based on ensuring a sufficiently conservative and representative result, considering hourly and seasonal variations in meteorological conditions throughout the year, which directly influence plume movement due to atmospheric conditions. The options for selecting meteorological data include:

1. One year of site-specific data: This involves using data collected onsite from a monitoring station.
2. Five years of representative National Weather Service (NWS) data: This data source typically provides long-term, historical weather information.
3. At least 3 years of prognostic meteorological data: This type of data involves using predictive meteorological models to estimate future conditions.

The specific MET stations used for input in AERMET for this analysis are listed in Table 7. AERMET processes hourly surface observations, including parameters such as wind speed and direction, ambient

[8] Available at: https://www.ndlegis.gov/information/acdata/pdf/33.1-15-02.pdf (Last visited October 24, 2023)
[9] Available at: https://www.epa.gov/sites/default/files/2020-09/documents/appw_17.pdf (Last visited October 24, 2023)

temperature, sky cover (opacity), and local air pressure (optionally). It combines these observations with the pre-processed AERSURFACE output values (Table 8) to compile the necessary surface met inputs for AERMOD.

Table 7 - MET Data Used

MET DATA	LOCATION	STATION NO.	YEARS	DISTANCE FROM SOURCE* (km)	SOURCE OF DATA
Surface Air	Grand Forks, ND	14916	2018-2022	8.06	NDDEQ
Upper Air	International Falls, MN	14918	2018-2022	282.22	NDDEQ

* Approximate distances using ArcGIS Earth's measuring tool.

5.3 Surface Inputs

AERMET relies on certain key values, including surface roughness length, albedo, and Bowen ratio when pre-processing met data for use in AERMOD.

AERSURFACE allows users to generate these values based on inputs related to seasonal variation in the vegetative landscape (e.g., landcover). The Input values recommended by the Department for AERSURFACE are outlined in the document titled *"Recommended AERSURFACE Inputs North Dakota* (March 2017)".[10] For the current proposed project input values for seasonal categories and surface moisture were generated using historic (2018 – 2022) meteorological data acquired from the ground monitoring station located at Grand Forks International Airport, ND. In accordance with "EPA User's Guide for AERSURFACE Tool" [11], the Continuous snow cover months were estimated by assessing the months that experienced snow cover for more than 50 percent of the days (Table 9Table 9). In addition, surface moisture conditions were estimated for each year by comparing the total annual precipitation to historic (1988 -2017) 30 and 70-percentile precipitation observations (Table 10).

Table 8 - AERSURFACE Input Values

PARAMETER	VALUE USED
Radius of study area used for surface roughness:	1.0 km
Define the surface roughness length for multiple sectors?	Yes
Number of sectors:	12
Temporal resolution of surface characteristics	Monthly

[10] Available at: https://deq.nd.gov/publications/AQ/policy/Modeling/AERSURFACE_InputsND.pdf (Last visited October 24, 2023)

[11] Available at: https://gaftp.epa.gov/Air/aqmg/SCRAM/models/related/aersurface/aersurface_ug_v20060.pdf (Last visited October 24, 2023)

Continuous snow cover for at least one month?	Yes
Reassign the months to different seasons?	Yes
Specify months for each season:	Yes
Is this site at an airport?	Yes
Is the site in an arid region?	No
Surface moisture condition at the site:	Dry, Wet, or Average

Table 9: Snow cover 2018 – 2022

Year	Snow Cover (%)					
	October	November	December	January	February	March
2018	10%	73%	100%	100%	100%	100%
2019	10%	13%	100%	100%	100%	100%
2020	3%	0%	35%	100%	100%	100%
2021	0%	50%	97%	100%	82%	3%
2022	0%	67%	97%	100%	100%	71%

Table 10: Surface moisture 2018 -2022

YEAR	ANNUAL PRECIPITATION (in.)	DRY, WET, or AVERAGE
2018	21.13	A
2019	28.11	W
2020	19.35	A
2021	19.13	A
2022	23.32	W

* 30th Percentile - 18.17"; 70th Percentile - 22.77"

5.4 Receptor Grid

Receptors serve as the designated locations where the air quality model calculates ground-level pollutant concentrations. These receptors are strategically placed within a receptor grid, and their distribution is determined by factors such as terrain characteristics and pollutant emission rates. While the exact configuration may vary, it typically forms a rectangular pattern radiating outward from the emission source. The goal is to ensure that the receptor grid effectively captures the dispersion and distribution of pollutants in the vicinity of the facility.

For further specifics on the receptor grid, including intervals and locations used (Table 11).

Table 11 - Receptor Grid Spacing

DISTANCE OUT FROM SOURCE	DISTANCE BETWEEN RECEPTORS
Fence line	25 meters
0 to 1000 meters (0 to 1.0 km)	50 meters
1,001 to 2,000 (1 to 2 km)	100 meters
2,001 to 5,000 meters (2 to 5 km)	250 meters
5,001 to 10,000 meters (5 to 10 km)	500 meters
TOTAL NUMBER OF RECEPTORS	5,535
Terrain Data	NED 2017, 1/3 arcsecond (10-meter)

The receptor points are placed at ground level, and their elevation is determined using the United States Geological Survey (USGS) National Elevation Dataset (NED) terrain and land-use data. The Universal Transverse Mercator (UTM) map projection with the North American Datum of 1983 (NAD83) is used for both the source input locations and the receptor grid location. To ensure accurate placement at ground level, the USGS NED 2017 data at a 1/3 arcsecond (10-meter) resolution is processed through the AERMAP pre-processor. This pre-processor adjusts the receptor points' elevations based on terrain data, aligning them with the actual topography of the area.

Receptor points located within the plant boundary are not modeled, as they do not represent ambient air.[12] Ambient air is defined as air situated outside of a boundary (e.g., a fence), which restricts general public access to a facility or source. This exclusion ensures that the modeling analysis focuses on assessing the impact of emissions on the air quality in areas accessible to the public.

5.5 Background

Epitome used fixed background concentrations when predicting the total ambient effect on AAQ. These fixed background concentrations are not included as inputs in the modeling process, and as a result, they are not included in the values output for concentrations (i.e. not included in MODELED IMPACT, but added in after under the TOTAL IMPACT in Table 1 and Table 15). Fixed background concentrations shown in Table 12 are considered reasonably representative of the entire state, and while they are conservative, they play a significant role in ensuring a comprehensive and conservative assessment of the total ambient effect on AAQS due to emissions from the facility.

Table 12 - Fixed Background Concentrations[13]

POLLUTANT	AVERAGING TIME	BACKGROUND ($\mu g/m^3$)

[12] *§40 CFR 50.1(e).* Available at: https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-50/section-50.1 (Last visited October 24, 2023)

[13] Available at: https://deq.nd.gov/publications/AQ/policy/Modeling/ND_Air_Dispersion_Modeling_Guide.pdf

PM_{10}	24-HR	30
$PM_{2.5}$	Annual	4.75
	24-HR	13.7

5.5.1 Nearby Sources

Per Appendix W, the Department reviewed records pertaining to sources that could potentially share a significant concentration gradient with the proposed Epitome facility. Five point sources were identified. The sources were: Wood Products, Inc. - Grand Forks Plant; Fuchs North America d.b.a. Baltimore Spice, Inc.; J.R. Simplot Company - Grand Forks Facility; North Dakota Mill and Red River Biorefinery. Red River Biorefinery has not operated since Spring of 2022. A letter was sent to the facility on November 7, 2023[14], to inform them that they would need to start the permit process over before being able to begin operations. As a result, this facility was not included in the analysis as a nearby source.

Epitome submitted Radius of Impact (ROI) plots to the Department demonstrating the absence of any overlap between the plume dispersion of Epitome and the neighboring facilities. The Department conducted an independent analysis and verified the results. The modeled parameters and corresponding plots affirming the results are in Appendix A. No sources shared a significant concentration gradient with Epitome and were therefore not included in a cumulative analysis.

5.6 Emission Source Modeling Parameters

AERMOD requires specific source data to model air pollutant dispersion accurately. This data includes:

1. Type and location of each emission point
2. Base elevation of each stack
3. Emission height and rate
4. Gas exit velocity and temperature
5. Other stack/emission parameters depending upon source type

To ensure the accuracy of model input values, a comparison was made between the emission rates and stack parameters provided in the application and the corresponding information for each emission unit.

The modeling parameters for point sources are shown in Table 13 and Table 14. Volume source parameters are detailed in Table 13.

Table 13 - Point Source Parameters lists the model input parameters for location (UTM X-Y coordinates), elevation, height (i.e. release height), exit temperature, exit velocity, stack exit diameter, and stack exit orientation.

[14] ACP-17851 v1.0. Air Quality Permit modeling exceedances – Letter to Plant Manager, Red River Biorefinery. Available at: https://ceris.deq.nd.gov/ext/nsite/map/results/detail/-8933768693451038206/documents (Last visited March 6, 2024)

Table 14 – Point Source Emission Rates lists the emission rates for the Point Sources.

Error! Reference source not found. lists the Volume Source parameter and emission rate.

Table 13 - Point Source Parameters

EMISSION POINT	EMISSION POINT DESCRIPTION	UTM X (m)	UTM Y (m)	ELEV. (m)	HEIGHT (m)	TEMP (°F)	FLOW (acfm)	VELOCITY (m/s)	EXIT DIA. (m)	Orient. (vert/horiz)	Notes
EP100	Bean Receiving	640,601.6	5,317,299.2	252.86	46.94	70	54,280	20.22	1.27	Vertical	
EP101	Bean Storage Bin A	640,632.2	5,317,297.0	252.81	39.01	70	2,000	12.94	0.31	Vertical	
EP102	Bean Storage Bin B	640,684.7	5,317,299.3	252.69	39.01	70	2,000	12.94	0.31	Vertical	
EP103	Bean Storage Bin C	640,737.3	5,317,301.1	252.69	39.01	70	2,000	12.94	0.31	Vertical	
EP104	Bean Storage Bin D	640,789.9	5,317,303.0	252.90	39.01	70	2,000	12.94	0.31	Vertical	
EP105	Scalper	640,595.0	5,317,293.3	252.91	46.94	70	1,000	17.86	0.18	Vertical	
EP106	Meal/Hull	640,607.2	5,317,132.8	253.12	50.29	110	33,100	19.27	1.02	Vertical	
EP107	Preparation Building	640,628.1	5,317,138.5	253.07	56.39	144	163,500	23.79	2.03	Vertical	
EP109	Extraction DTDC Cyclones	640,715.9	5,317,117.5	252.74	56.39	120	80,100	23.79	1.42	Vertical	
EP111	Meal Storage	640,583.2	5,317,290.9	252.94	37.34	70	2,700	17.46	0.31	Vertical	
EP112	Hull Pellet Bin #1	640,555.9	5,317,267.1	252.87	29.12	110	2,015	10.06	0.35	Horizontal	Only 1 of the 4 Hull Pellet Bins will operate at any one time. Worst case is represented by Bin #1
EP113	Hull Pellet Bin #2	640,563.9	5,317,267.7	252.85	29.12	110	2,015	10.06	0.35	Horizontal	
EP114	Hull Pellet Bin #3	640,572.4	,317,267.9	252.89	29.12	110	2,015	10.06	0.35	Horizontal	
EP115	Hull Pellet Bin #4	640,581.2	5,317,268.2	252.94	29.12	110	2,015	10.06	0.35	Horizontal	
EP116	Hull Filter	640,593.5	5,317,275.0	252.90	27.56	110	2,800	18.11	0.31	Vertical	
EP117	Meal/Hull Pellet Loadout	640,595.9	5,317,299.0	252.88	46.94	110	13,000	17.91	0.66	Horizontal	
EP118	Steam Boiler A	640,692.2	5,317,236.4	252.67	25.86	416	18,379	12.82	1.17	Vertical	
EP119	Steam Boiler B	640,692.1	5,317,244.6	252.63	25.86	416	18,379	12.82	1.17	Vertical	
EP127	Hull/Pellet Loadout Storage Bin	640,607.6	5,317,333.9	252.76	24.84	70	2,750	25.61	0.25	Horizontal	

EMISSION POINT	EMISSION POINT DESCRIPTION	UTM X (m)	UTM Y (m)	ELEV. (m)	HEIGHT (m)	TEMP (°F)	FLOW (acfm)	VELOCITY (m/s)	EXIT DIA. (m)	Orient. (vert/horiz)	Notes
FS2A	Cooling Tower A	640,691.0	5,317,192.6	252.80	8.66	110	238,000	11.31	3.56	Vertical	Cooling Towers combined as FS2 in permit
FS2B	Cooling Tower B	640,691.0	5,317,188.9	252.80	8.66	110	238,000	11.31	3.56	Vertical	
FS2C	Cooling Tower C	640,691.1	5,317,184.4	252.80	8.66	110	238,000	11.31	3.56	Vertical	

Table 14 – Point Source Emission Rates

EMISSION POINT	EMISSION POINT DESCRIPTION	PM_{10} (g/s)	$PM_{2.5}$ (g/s)
EP100	Bean Receiving	1.76E-01	1.47E-01
EP101	Bean Storage Bin A	8.64E-03	8.64E-03
EP102	Bean Storage Bin B	8.64E-03	8.64E-03
EP103	Bean Storage Bin C	8.64E-03	8.64E-03
EP104	Bean Storage Bin D	8.64E-03	8.64E-03
EP105	Scalper	3.24E-03	2.70E-03
EP106	Meal/Hull	1.48E-01	1.35E-01
EP107	Preparation Building	4.57E-01	3.81E-01
EP109	Extraction DTDC Cyclones	1.01E+00	1.01E+00
EP111	Meal Storage	8.75E-03	7.29E-03
EP112	Hull Pellet Bin #1	8.64E-03	8.64E-03
EP113	Hull Pellet Bin #2	-	-
EP114	Hull Pellet Bin #3	-	-
EP115	Hull Pellet Bin #4	-	-

EMISSION POINT	EMISSION POINT DESCRIPTION	PM_{10} (g/s)	$PM_{2.5}$ (g/s)
EP116	Hull Filter	8.42E-03	7.02E-03
EP117	Meal/Hull Pellet Loadout	3.86E-03	3.21E-02
EP118	Steam Boiler A	8.64E-02	8.64E-02
EP119	Steam Boiler B	8.64E-02	8.64E-02
EP127	Hull/Pellet Loadout Storage Bin	1.19E-02	1.19E-02
FS2A	Cooling Tower A	6.80E-04	2.51E-06
FS2B	Cooling Tower B	6.80E-04	2.51E-06
FS2C	Cooling Tower C	6.80E-04	2.51E-06

6 Model Execution and Results

6.1 Ambient Air Quality Standards (AAQS) and PSD Increment Analysis

State[15] and federal[16] AAQS and the Class II PSD Increment analyses were modeled per the parameters listed in Section 5.6. The model analysis results are shown in Table 15 and Table 16.

Table 15 – AAQS Results Summary

POLLUTANT	AVERAGING TIME	MODELED IMPACT (µg/m^3)	BACKGROUND (µg/m^3)	TOTAL IMPACT (µg/m^3)	NDAAQS (µg/m^3)	NAAQS (µg/m^3)	PASSED (Y/N)
PM_{10}	24-HR[A]	8.13	30	38.13	150	150	Y
$PM_{2.5}$	Annual[B]	1.21	4.75[D]	5.96	-	9	Y
	24-HR[C]	5.42	13.71[E]	19.13	-	35	Y

[A] Modeled concentration is the highest-sixth-highest 24-hour average across five years of meteorological data.

[B] Modeled concentration is the annual average concentration of five modeled years of meteorological data.

[C] Modeled concentration is the 98th percentile (eighth-high) of the annual distribution of maximum 24-hour concentrations averaged across five years of meteorological data.

[D] Includes MERP adjustment of 0.00035 µg/m^3 to account for secondary formation.

[E] Includes MERP adjustment of 0.006 µg/m^3 to account for secondary formation.

Table 16 – PSD Class II Increment Results Summary

POLLUTANT	AVERAGING TIME	MODELED IMPACT (µg/m^3)	CLASS II INCREMENT (µg/m^3)	INCREMENT CONSUMED (%)	PASSED (Y/N)
PM_{10}	Annual[A]	1.35	17	8	N
	24-HR[B] (2021)	9.33	30	31	N
$PM_{2.5}$	Annual[A]	1.32	4	33	N
	24-HR[B] (2021)	8.82	9	98	N

[A] Modeled concentration is the highest annual average concentration of five modeled years of meteorological data.

[B] Modeled concentration is the highest-second-high concentration of five modeled years of meteorological data.

[15] *NDAC 33.1-15-02*. Available at: https://www.ndlegis.gov/information/acdata/pdf/33.1-15-02.pdf?20150602082326 (Last visited October 24, 2023)

[16] *§40 CFR 50.* Available at: https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-50?toc=1 (Last visited October 24, 2023)

6.1.1 $PM_{2.5}$ Secondary Formation

The secondary formation of $PM_{2.5}$ from emissions of precursor pollutants NO_x and SO_2 was accounted for following the April 30, 2019, EPA guidance memo.[17] There were no exceptional circumstances related to complex terrain in the vicinity of the facility. A hypothetical representative source from Stutsman County, ND was selected from the EPA's database of modeled sources.[18] A conservative approach was taken, and the worst-case project impact was chosen regardless of hypothetical stack heights. These values were incorporated into the background values (Table 15). For a more in-depth examination of the MERPs calculations, refer to Appendix E of the permit application.

Table 17 - $PM_{2.5}$ MERPs Summary

Averaging Period	Precursor	Calculated Impact (µg/m3)	Cumulative Impact (µg/m3)
24-Hour	NO_x	0.0047	0.006
	SO_2	0.0013	
Annual	NO_x	0.0003	0.00035
	SO_2	0.00003	

6.1.2 O_3 Secondary Formation

The secondary formation of O_3 resulting from emissions of precursor pollutants NO_x and VOC was taken into consideration in line with the EPA guidance memo dated April 30, 2019. Similar to the $PM_{2.5}$ analysis, there were no exceptional circumstances related to complex terrain in the vicinity of the facility. A hypothetical source from Stutsman County, North Dakota, was selected from the EPA's database of modeled sources. The worst-case project impact was chosen regardless of hypothetical stack heights. The final project impacts were determined through a comparison of the calculated MERPs to design concentration monitoring data. For a more in-depth examination of MERPs calculations, refer to Appendix E of the permit application.

Table 18 - O_3 MERPs Summary

Averaging Period	Precursor	Calculated Impact (ppb)	Cumulative Impact (ppb)
24-Hour	NO_x	0.058	0.255
	VOC	0.196	

[17] *Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program.* Available at: https://www.epa.gov/sites/default/files/2020-09/documents/epa-454_r-19-003.pdf (Last visited October 24, 2023)

[18] Available at: https://www.epa.gov/scram/merps-view-qlik (Last visited October 24, 2023)

Table 19 shows a summary of the 4th-high 8-hour O_3 monitoring data for all sites across North Dakota.[19] The highest 3-year average O_3 concentration recorded for any county in North Dakota is 0.0587 ppm. Adding the calculated O_3 MERPs of 0.000255 ppm (0.255 ppb) to the monitoring data results in a total O_3 concentration of 0.0589 ppm. The total O_3 concentration remains below the design concentration of 0.07 ppm for O_3, demonstrating compliance with the NAAQS.

Table 19 - O_3 Monitoring Data Summary

County	2020 (ppm)	2021 (ppm)	2022 (ppm)	3-Year Average (ppm)
Billings	0.053	0.069	0.053	0.058
Burke	0.053	0.061	0.053	0.056
Burleigh	0.051	0.060	0.046	0.052
Cass	0.056	0.063	0.055	0.058
Dunn	0.054	0.068	0.053	0.058
McKenzie	0.051	0.064	0.054	0.056
Mercer	0.052	0.065	0.054	0.057
Oliver	0.055	0.065	0.056	0.059
Ward	0.051	0.057	0.053	0.054

7 Summary & Conclusions

Upon the Department's review and independent analysis of the modeling submitted by Epitome, the following is concluded:

Epitome followed all applicable State and Federal guidance in their modeling protocol.

Epitome's dispersion modeling was conducted to demonstrate that emissions from the Project are expected to comply with state and federal Ambient Air Quality Standards (AAQS). Emissions associated with operating the facility with the proposed emission units and limits are not expected to cause or contribute to a violation of the NAAQS and NDAAQS as listed in NDAC 33.1-15-02-04. Results of the modeled impacts for the AAQS are displayed in Table 1 and Table 15.

Epitome modeling was conducted to demonstrate that emissions from the Project are expected to comply with federal PSD Class II Increments. Emissions associated with operating the facility with the proposed emission units and limits are not expected to cause or contribute to a violation of the PSD Increments as incorporated by reference in NDAC 33.1-15-15. Results of the modeled impacts for the PSD Increments are displayed in Table 2 and Table 16.

[19] *Outdoor Air Quality Data - Monitor Value Report.* Available at: https://www.epa.gov/outdoor-air-quality-data/monitor-values-report (Last visited October 24, 2023)

8 Plots

Model Set-Up

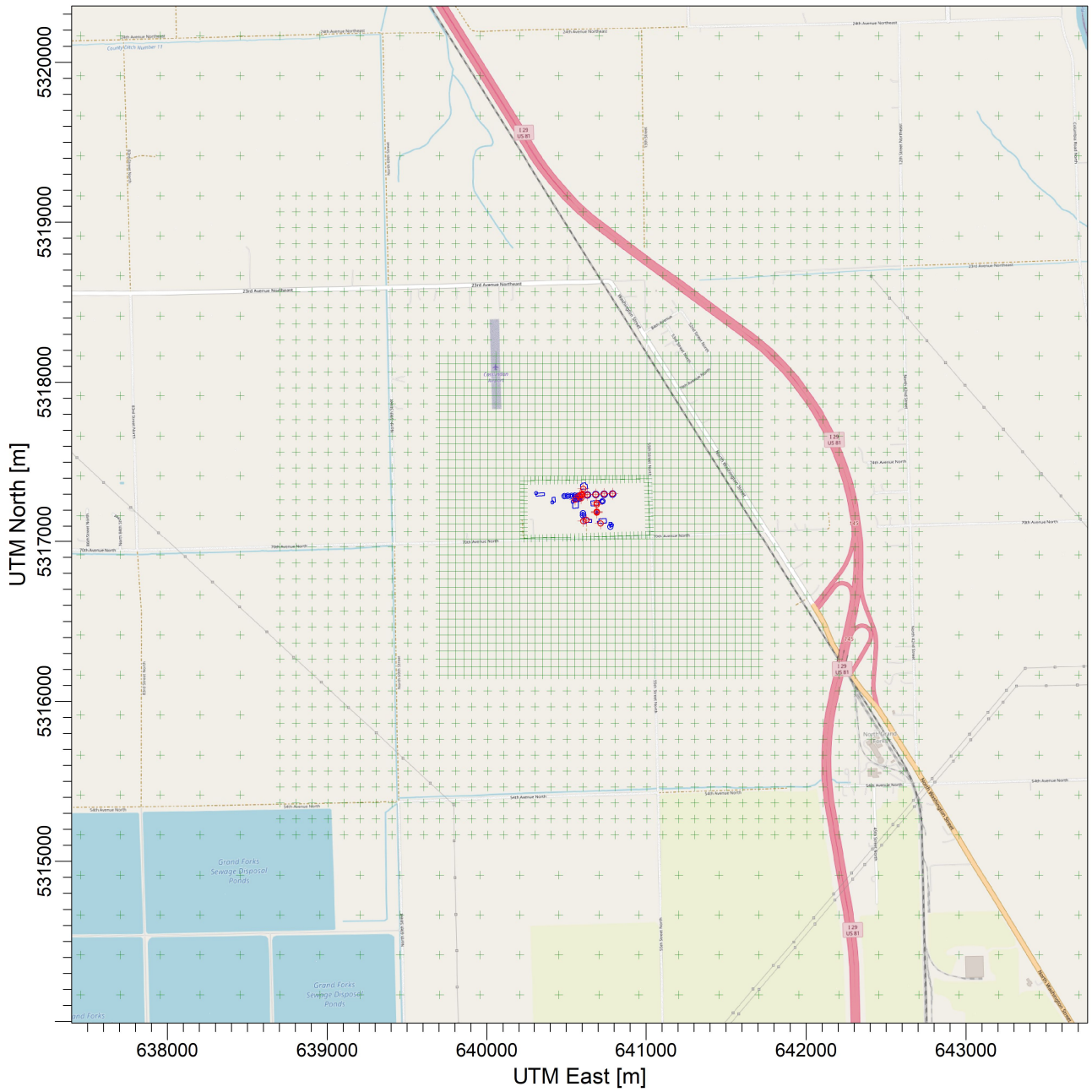
AAQS Analysis

PSD Increment Analysis

Appendix A

PROJECT TITLE:

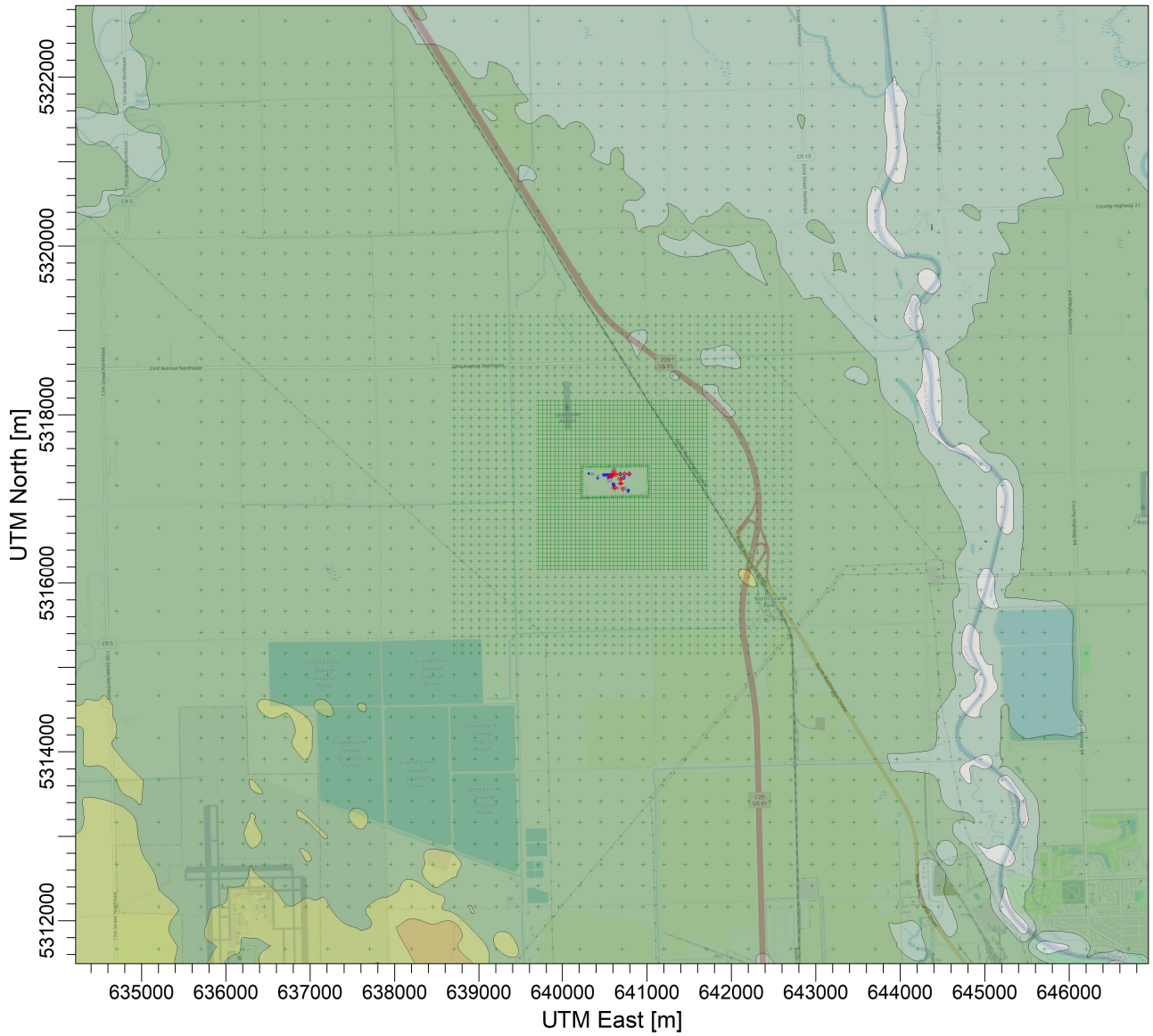
Epitome Energy
Plot 1 - Site

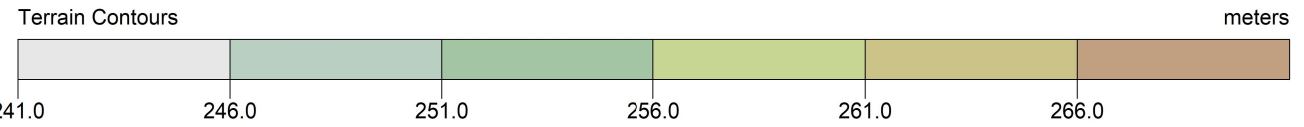


SOURCES: **19**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
RECEPTORS: **5535**	MODELER: **Sankalp Kumar**	NORTH Dakota Be Legendary. | Environmental Quality
	SCALE: 1:40,000 0 1 km	
	DATE: **11/30/2023**	PROJECT NO.: **ACP-18210 v1.0**

PROJECT TITLE:

Epitome Energy
Plot 2 - Terrain Contours





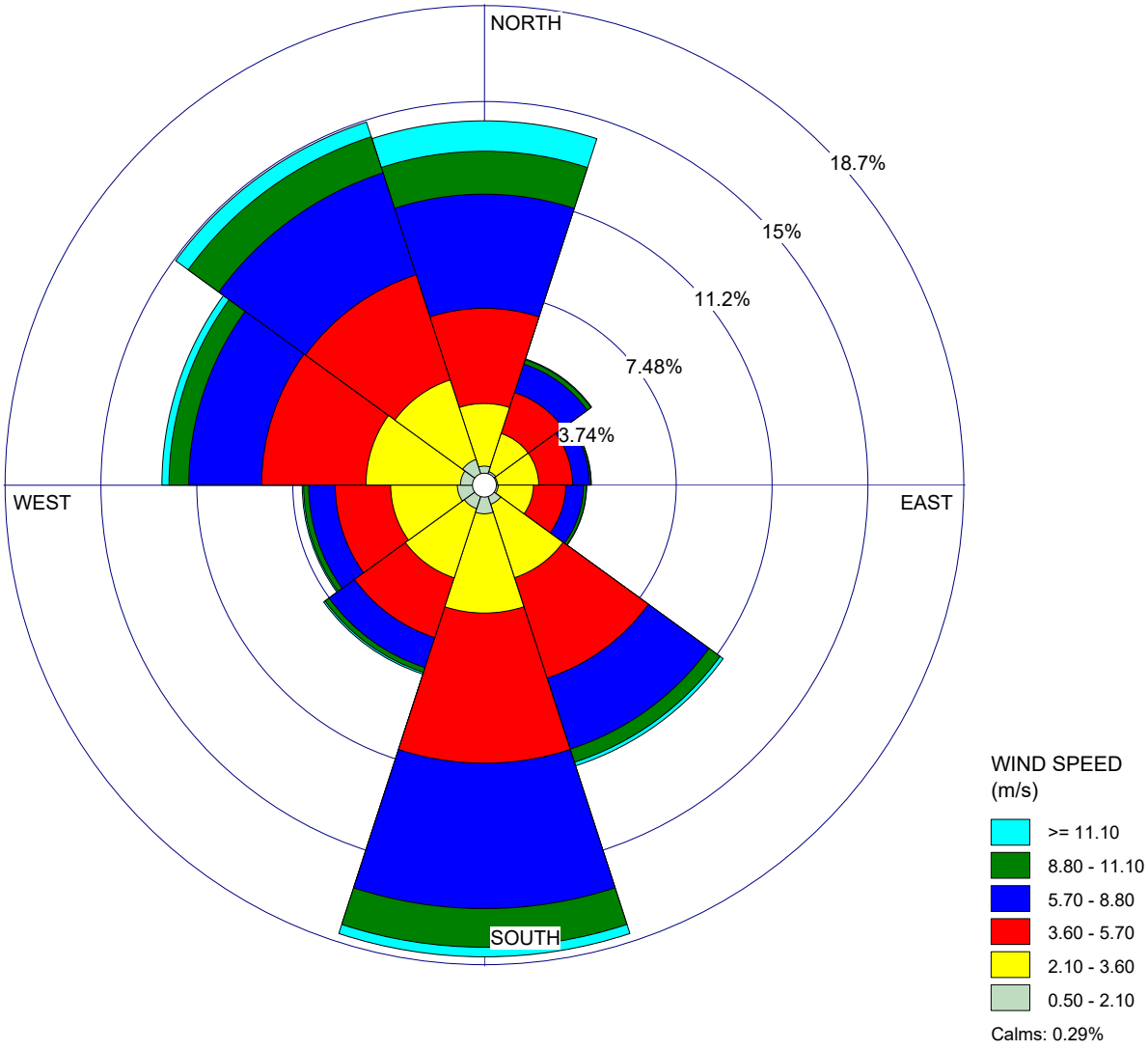
	SOURCES: **19**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **5535**	MODELER: **Sankalp Kumar**	NORTH Dakota Be Legendary.™ | Environmental Quality
		SCALE: 1:80,000 0 3 km	
		DATE: **11/30/2023**	PROJECT NO.: **ACP-18210 v1.0**

WIND ROSE PLOT:

Epitome Energy
Plot 3 - Windrose

DISPLAY:

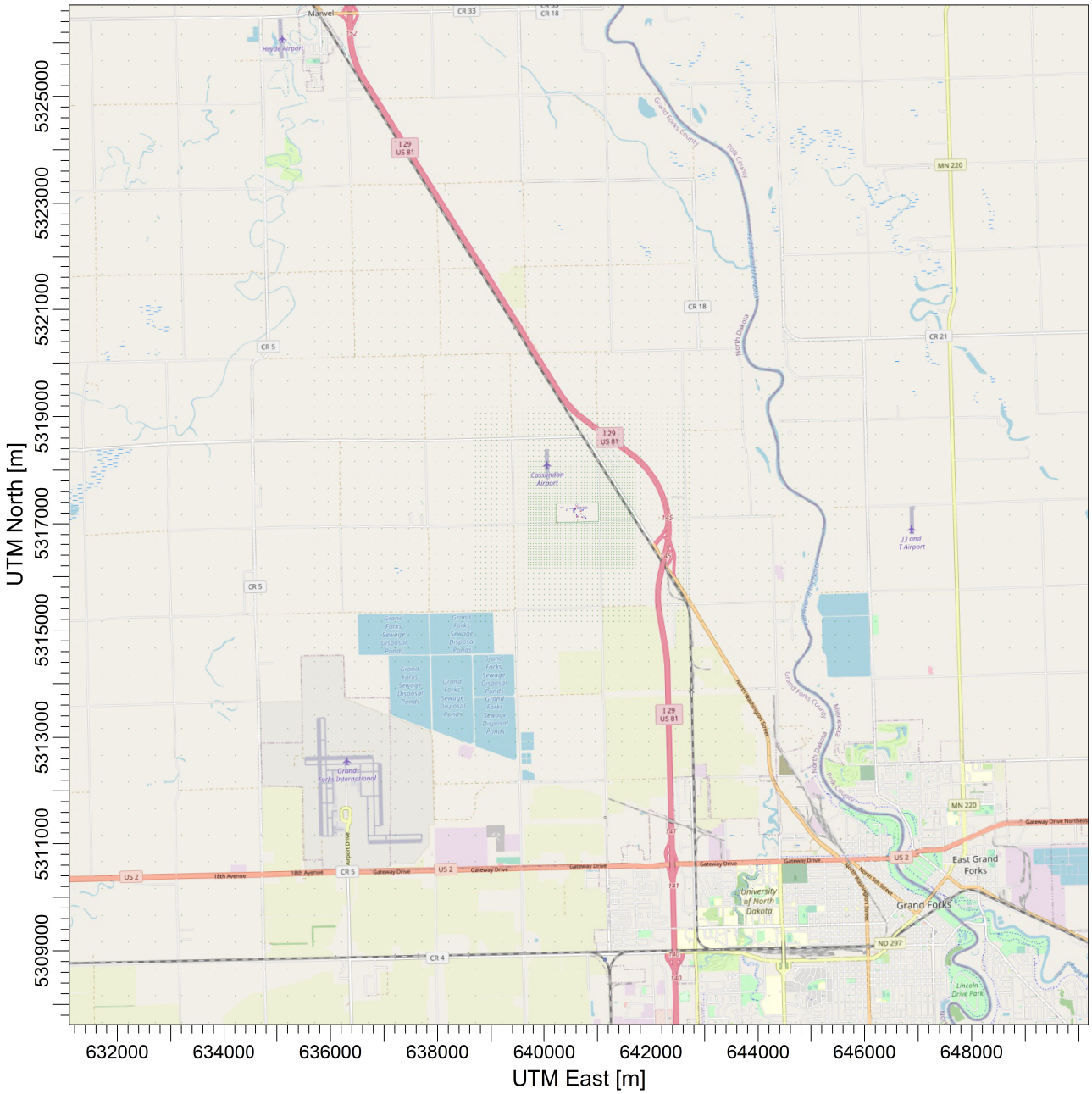
Wind Speed
Direction (blowing from)



COMMENTS: Grand Forks, ND Station No. 14916	DATA PERIOD: **Start Date: 1/1/2018 - 00:00** **End Date: 12/31/2022 - 23:59**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
		MODELER: **Sankalp Kumar**	NORTH Dakota Be Legendary.™ | Environmental Quality
	CALM WINDS: **0.29%**	TOTAL COUNT: **43751 hrs.**	
	AVG. WIND SPEED: **5.05 m/s**	DATE: **11/30/2023**	PROJECT NO.: **ACP-18210 v1.0**

PROJECT TITLE:

Epitome Energy
Plot 4 - Receptor Grid

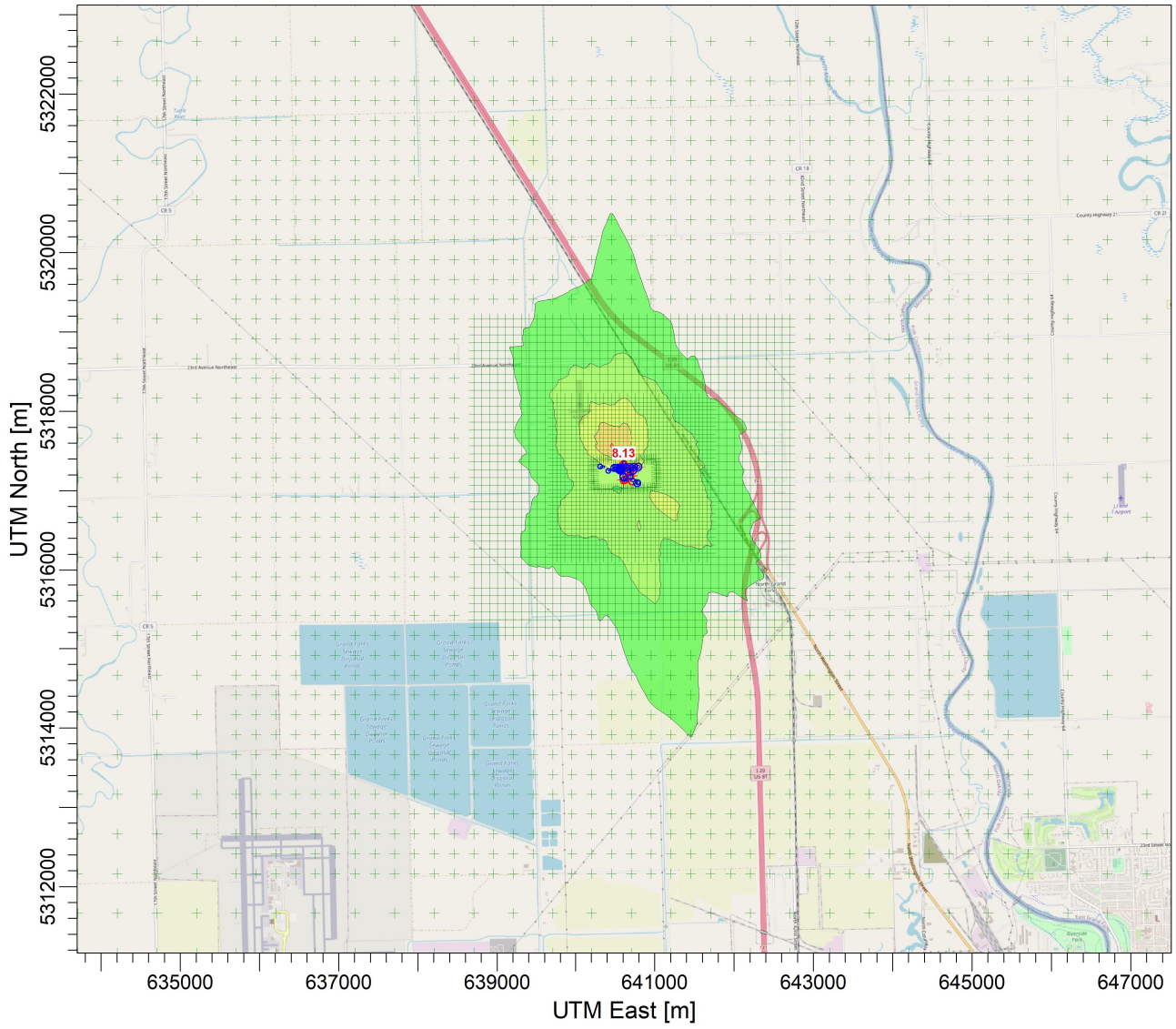


	SOURCES: **19**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **5535**	MODELER: **Sankalp Kumar**	
		SCALE: 1:120,000 0 4 km	NORTH Dakota Be Legendary. | Environmental Quality
		DATE: **11/30/2023**	PROJECT NO.: **ACP-18210 v1.0**

AERMOD View - Lakes Environmental Software

PROJECT TITLE:

Epitome Energy
Plot 5 - PM10 24-HR AAQS



PLOT FILE OF HIGH 6TH HIGH 24-HR VALUES FOR SOURCE GROUP: ALL ug/m^3

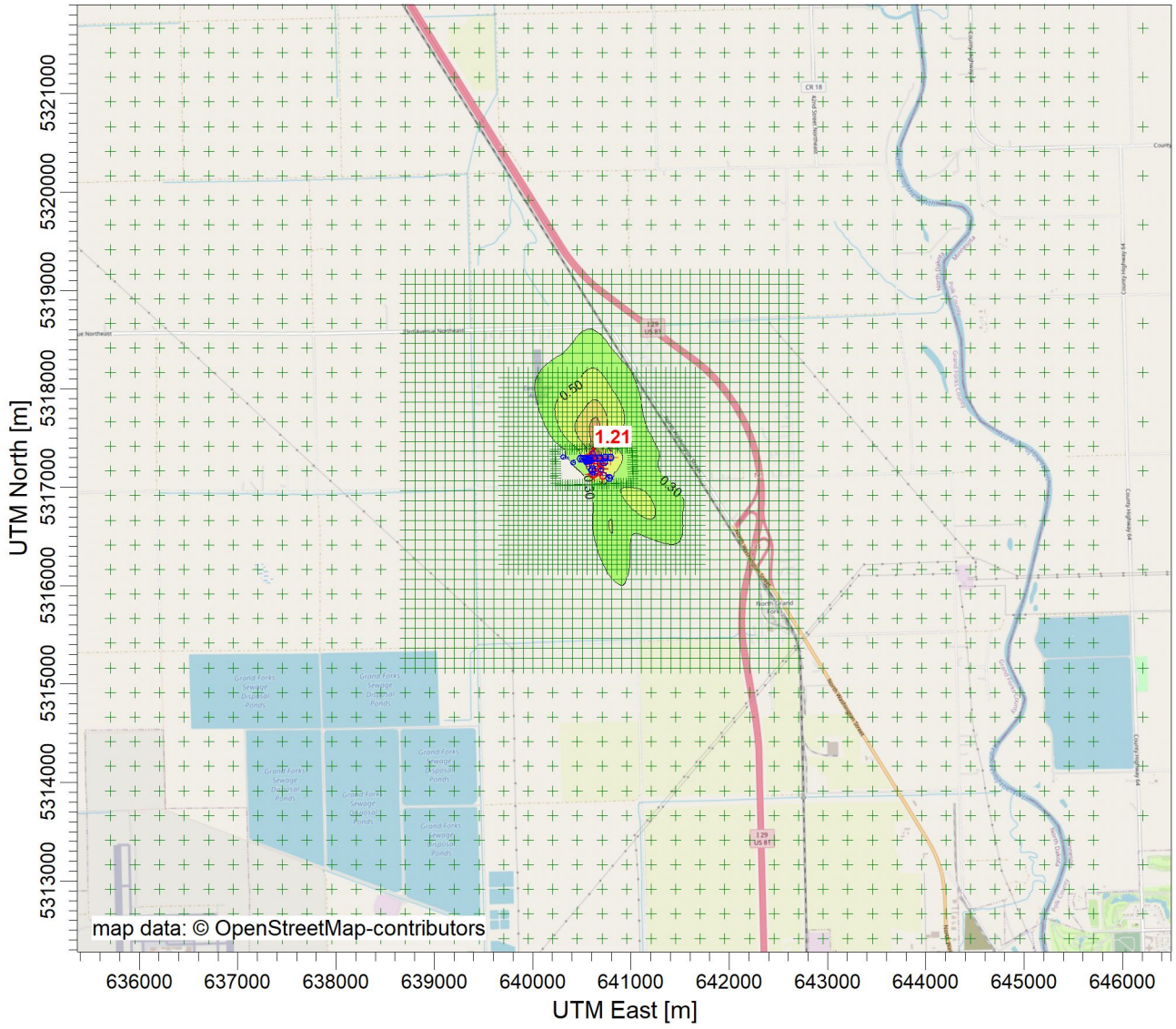
Max: 8.13 [ug/m^3] at (640455.00, 5317565.00)

1.00 2.00 4.00 6.00 8.00 8.13

COMMENTS: Background is 30 µg/m3. Total Impact is 38.13 µg/m3. AAQS is 150 µg/m3.	SOURCES: **19**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **5535**	MODELER: **Sankalp Kumar**	NORTH Dakota Be Legendary. | Environmental Quality
	OUTPUT TYPE: **Concentration**	SCALE: 1:86,884 0 3 km	
	MAX: **8.13 ug/m^3**	DATE: **11/29/2023**	PROJECT NO.: **ACP-18210 v1.0**

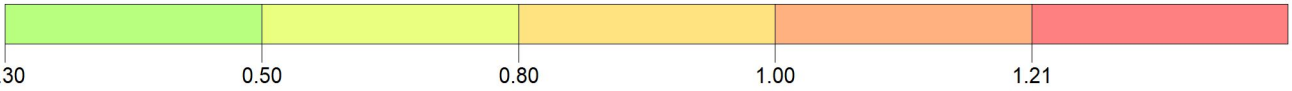
PROJECT TITLE:

Epitome Energy
Plot 6 - PM2.5 Annual AAQS



PLOT FILE OF ANNUAL VALUES AVERAGED ACROSS 5 YEARS FOR SOURCE GROUP: ALL ug/m^3

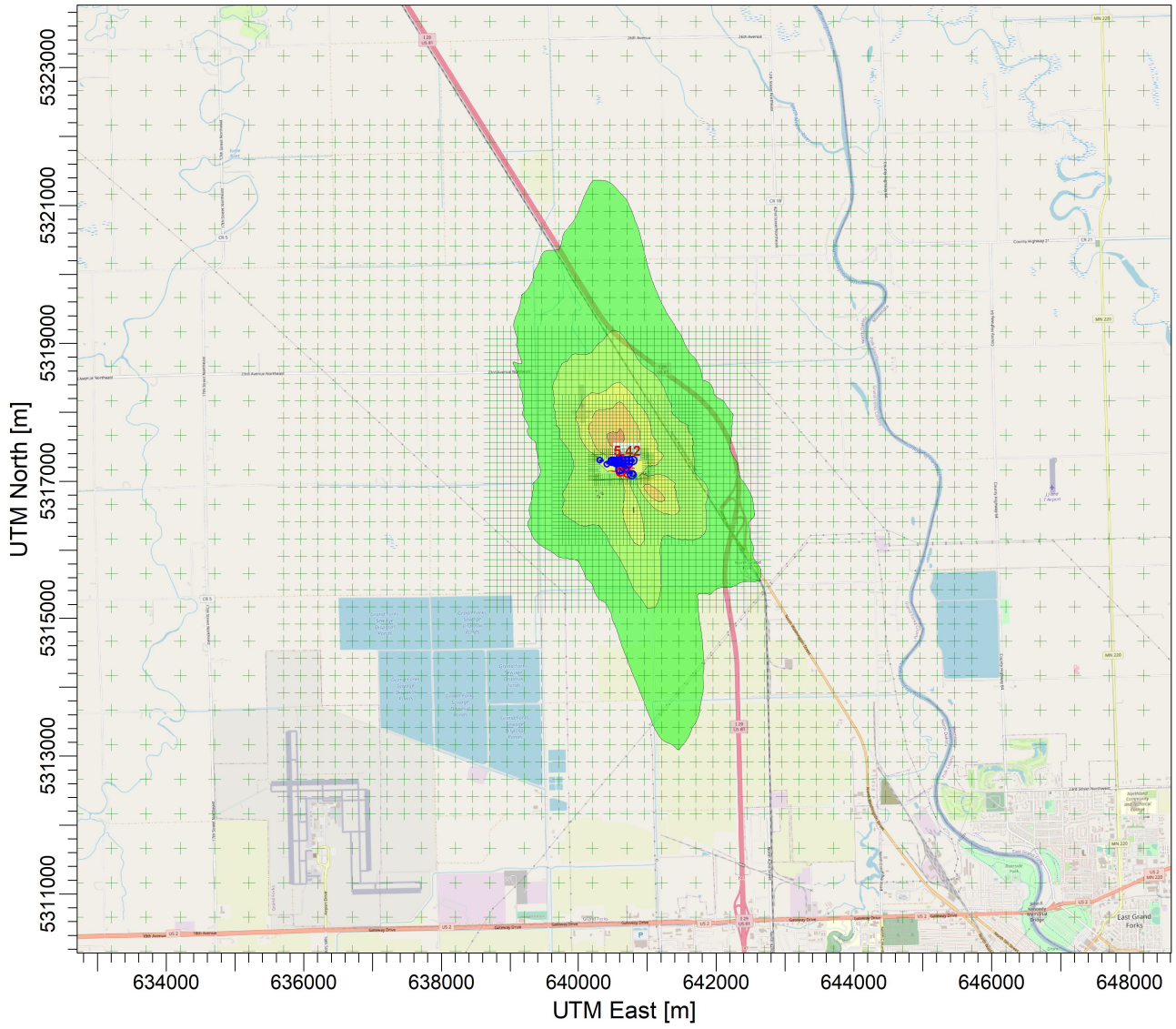
Max: 1.21 [ug/m^3] at (640620.80, 5317390.74)



COMMENTS: Background is 4.75 µg/m3. Total Impact is 5.96 µg/m3. AAQS is 9 µg/m3.	SOURCES: **19**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **5535**	MODELER: **Sankalp Kumar**	NORTH Dakota Be Legendary. | Environmental Quality
	OUTPUT TYPE: **Concentration**	SCALE: 1:70,000 0 2 km	
	MAX: **1.21 ug/m^3**	DATE: **11/30/2023**	PROJECT NO.: **ACP-18210 v1.0**

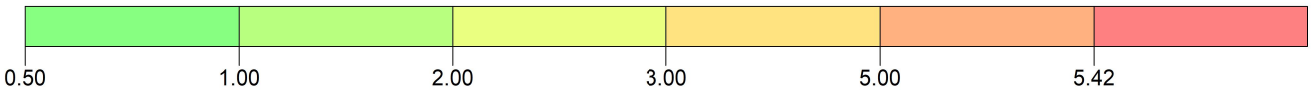
PROJECT TITLE:

Epitome Energy
Plot 7 - PM2.5 24-HR AAQS



PLOT FILE OF 8TH-HIGHEST MAX DAILY 24-HR VALUES AVERAGED OVER 5 YEARS FOR SOURCE GROUP: ALL ug/m^3

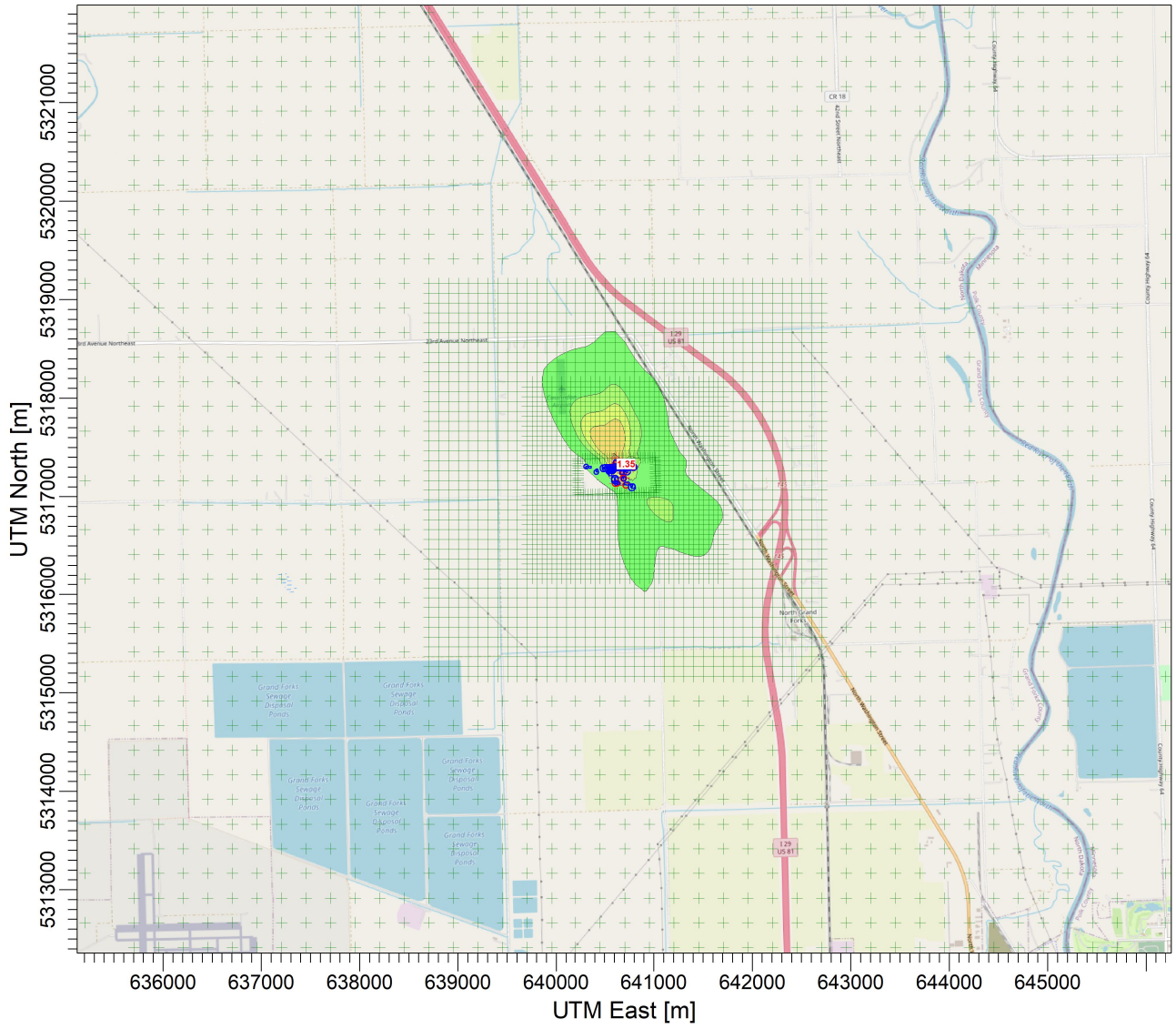
Max: 5.42 [ug/m^3] at (640505.00, 5317565.00)



COMMENTS: Background is 13.71 µg/m3. Total Impact is 19.13 µg/m3. AAQS is 35 µg/m3.	SOURCES: **19**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **5535**	MODELER: **Sankalp Kumar**	NORTH Dakota Be Legendary. | Environmental Quality
	OUTPUT TYPE: **Concentration**	SCALE: 1:100,000 0 3 km	
	MAX: **5.42 ug/m^3**	DATE: **11/29/2023**	PROJECT NO.: **ACP-18210 v1.0**

PROJECT TITLE:

Epitome Energy
Plot 8 - PSD Increment PM10 Annual



POST/PLOT FILE OF ANNUAL VALUES FOR YEAR 1 FOR SOURCE GROUP: ALL ug/m^3

Max: 1.35 [ug/m^3] at (640620.80, 5317390.74)

0.30 0.60 0.80 1.00 1.20 1.35

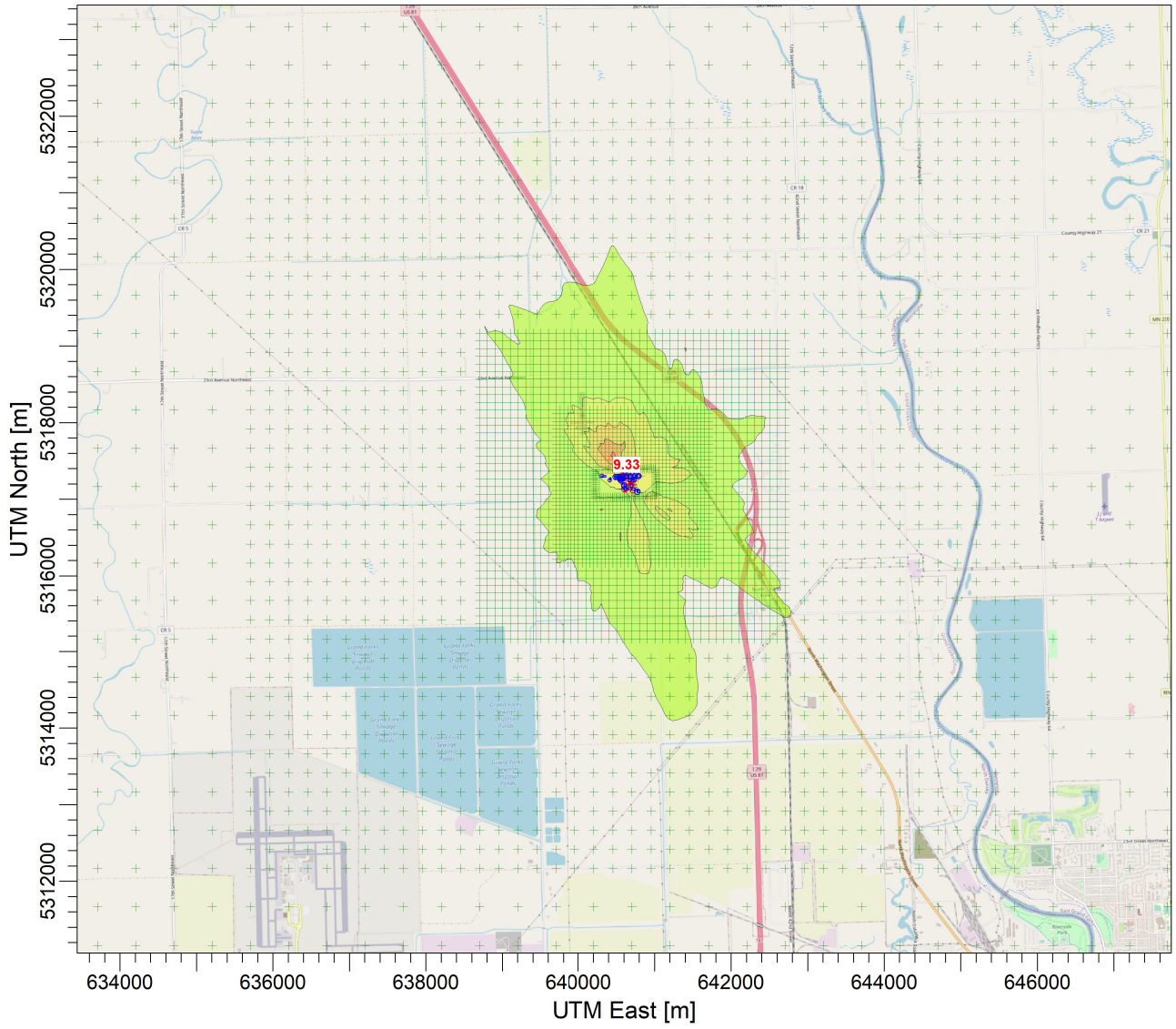
COMMENTS: Highest met year: 2020 Class II standard is 17 µg/m3	SOURCES: **19**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **5535**	MODELER: **Sankalp Kumar**	
	OUTPUT TYPE: **Concentration**	SCALE: 1:70,000 0 2 km	
	MAX: **1.35 ug/m^3**	DATE: **11/30/2023**	PROJECT NO.: **ACP-18210 v1.0**

NORTH Dakota Be Legendary.™ | Environmental Quality

PROJECT TITLE:

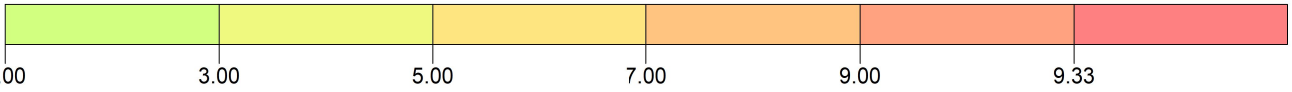
Epitome Energy

Plot 9 - PSD Increment PM10 24-HR



PLOT FILE OF HIGH 2ND HIGH 24-HR VALUES FOR SOURCE GROUP: ALL ug/m^3

Max: 9.33 [ug/m^3] at (640455.00, 5317565.00)

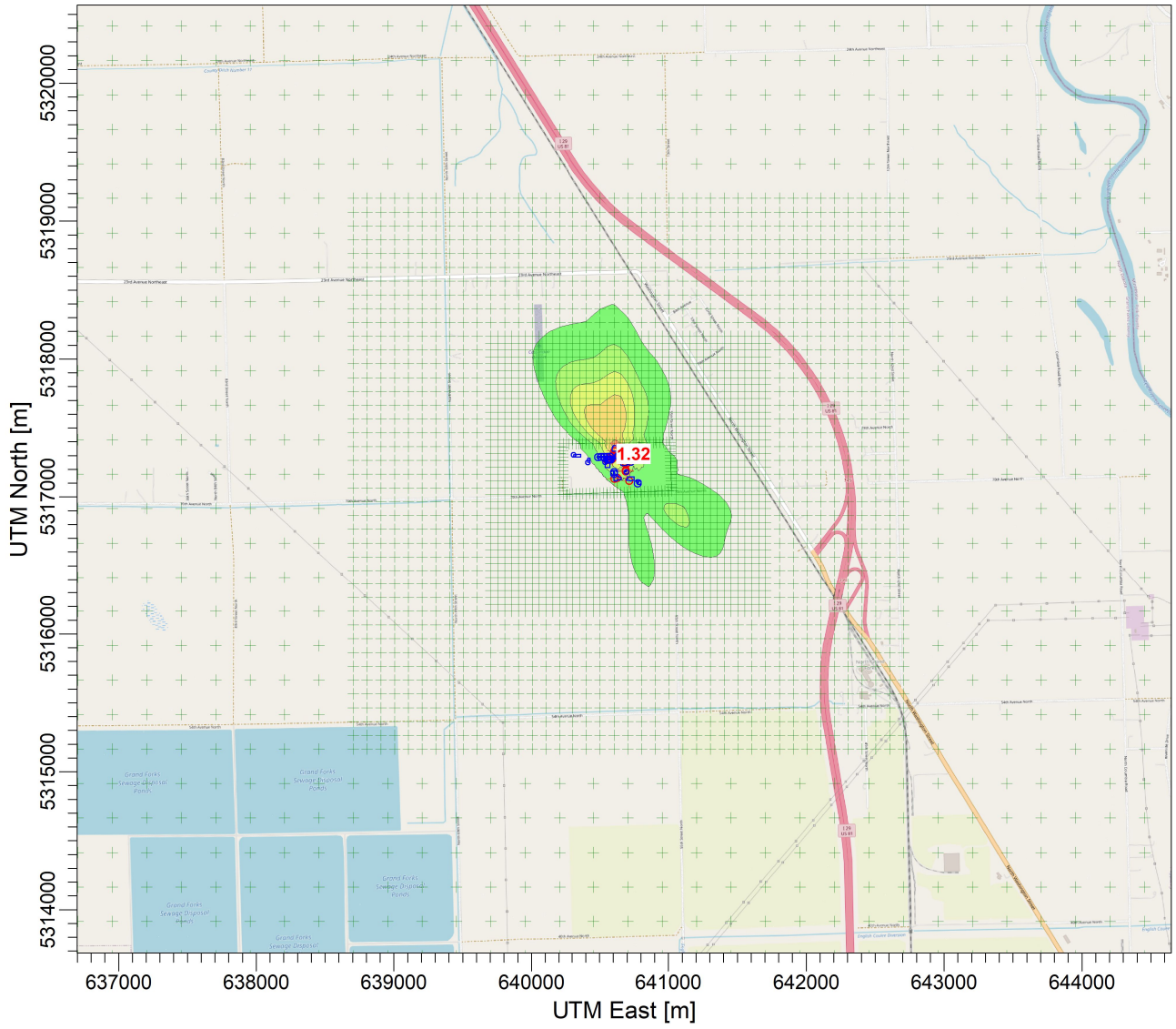


COMMENTS: Highest met year: 2021 Class II standard is 30 µg/m3	SOURCES: **22**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **5535**	MODELER: **Sankalp Kumar**	NORTH Dakota Be Legendary. | Environmental Quality
	OUTPUT TYPE: **Concentration**	SCALE: 1:100,000 0 3 km	
	MAX: **9.33 ug/m^3**	DATE: **11/30/2023**	PROJECT NO.: **ACP-18210 v1.0**

PROJECT TITLE:

Epitome Energy

Plot 10 - PSD Increment PM2.5 Annual



POST/PLOT FILE OF ANNUAL VALUES FOR YEAR 1 FOR SOURCE GROUP: ALL ug/m^3

Max: 1.32 [ug/m^3] at (640620.80, 5317390.74)

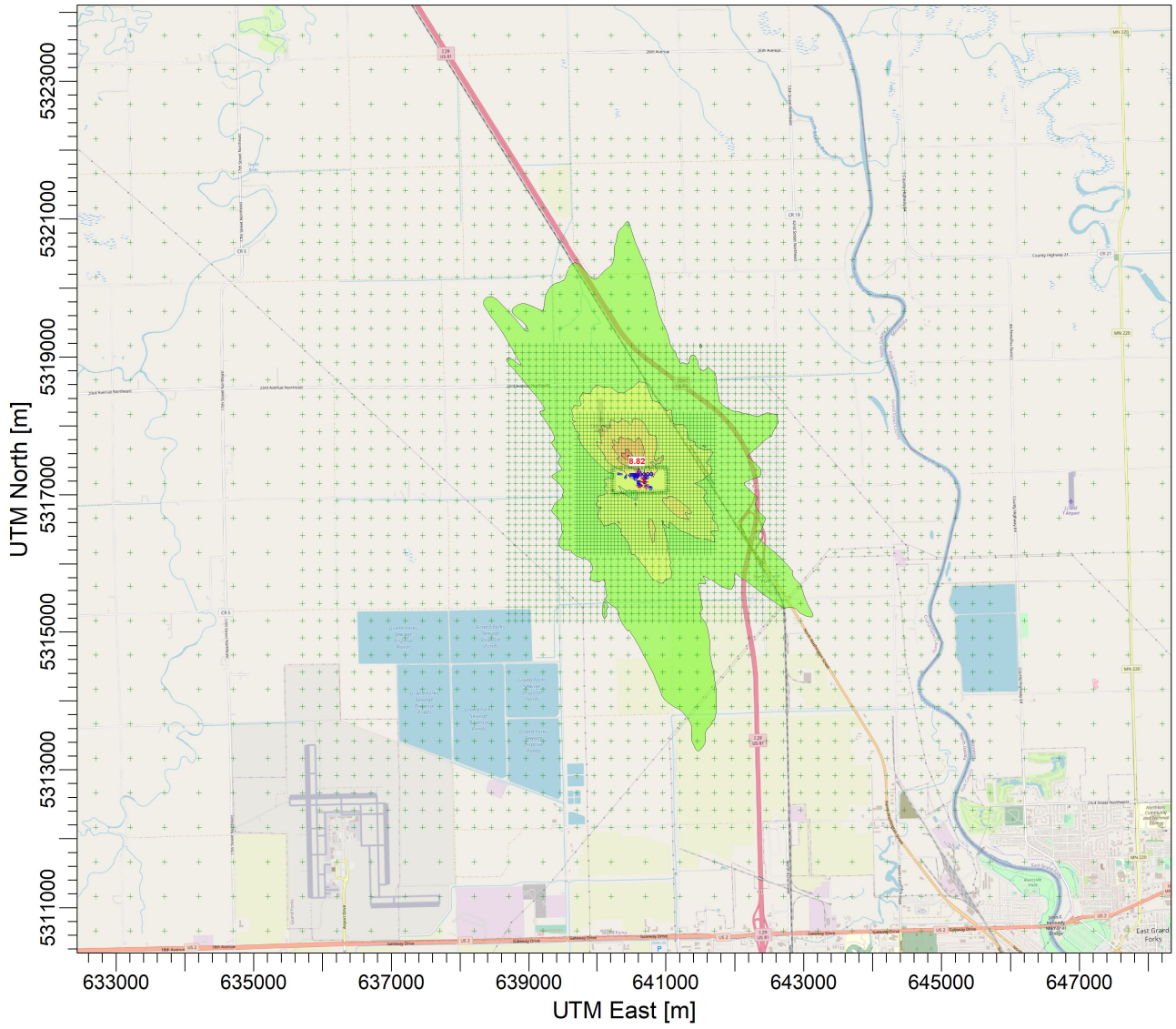
0.40 0.60 0.80 1.00 1.20 1.32

COMMENTS: Highest met year: 2020 Class II standard is 4 µg/m3	SOURCES: **19**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **5535**	MODELER: **Sankalp Kumar**	NORTH Dakota Be Legendary. | Environmental Quality
	OUTPUT TYPE: **Concentration**	SCALE: 1:50,000 0 1 km	
	MAX: **1.32 ug/m^3**	DATE: **11/30/2023**	PROJECT NO.: **ACP-18210 v1.0**

PROJECT TITLE:

Epitome Energy

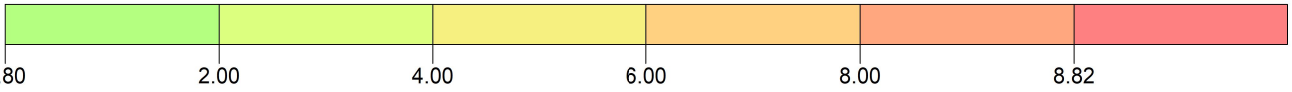
Plot 11 - PSD Increment PM2.5 24-HR



PLOT FILE OF HIGH 2ND HIGH 24-HR VALUES FOR SOURCE GROUP: ALL

ug/m^3

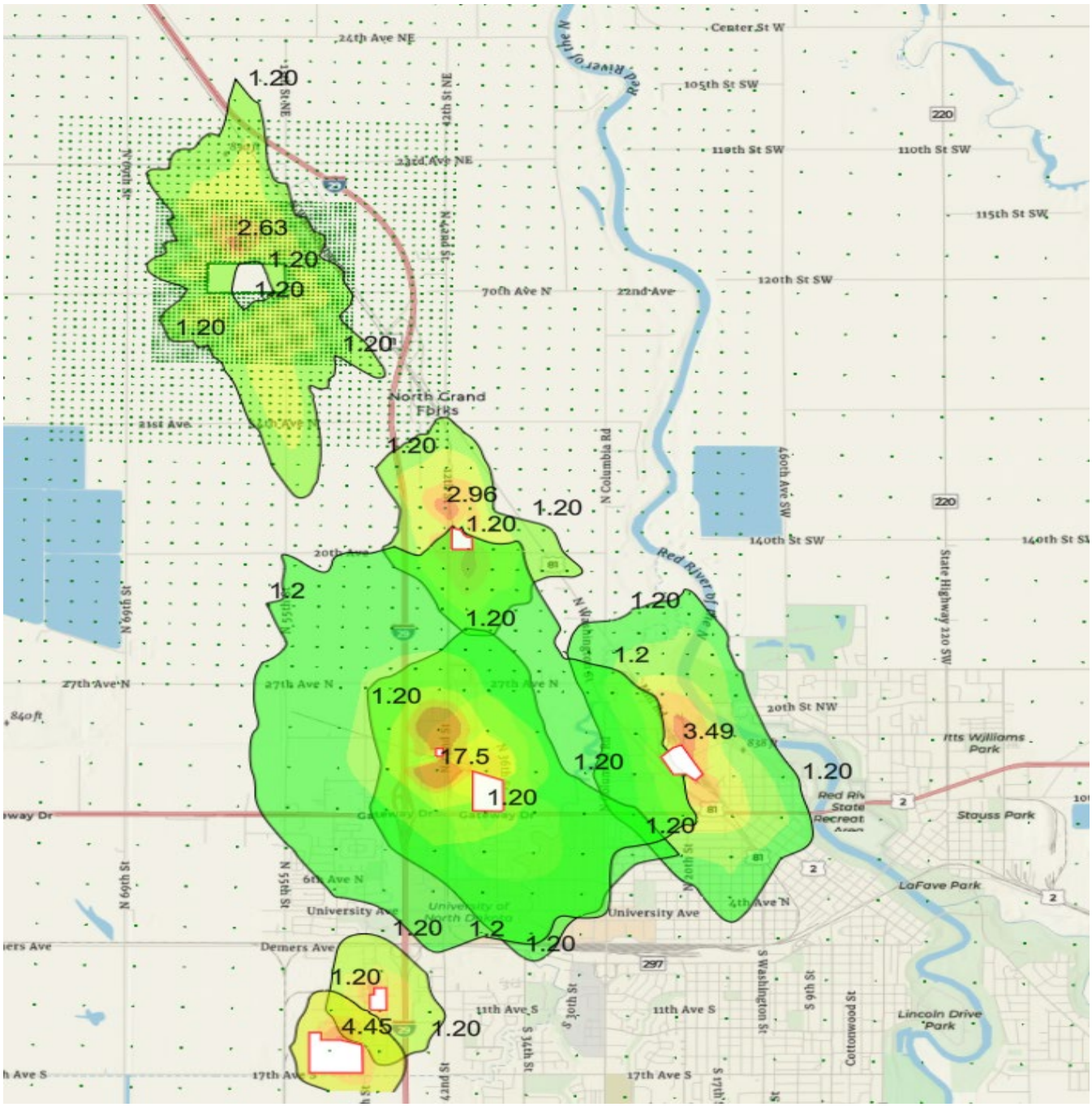
Max: 8.82 [ug/m^3] at (640455.00, 5317565.00)



COMMENTS: Highest met year: 2021 Class II standard is 9 µg/m3	SOURCES: **19**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **5535**	MODELER: **Sankalp Kumar**	NORTH Dakota Be Legendary.™ | Environmental Quality
	OUTPUT TYPE: **Concentration**	SCALE: 1:100,000 0 3 km	
	MAX: **8.82 ug/m^3**	DATE: **11/30/2023**	PROJECT NO.: **ACP-18210 v1.0**

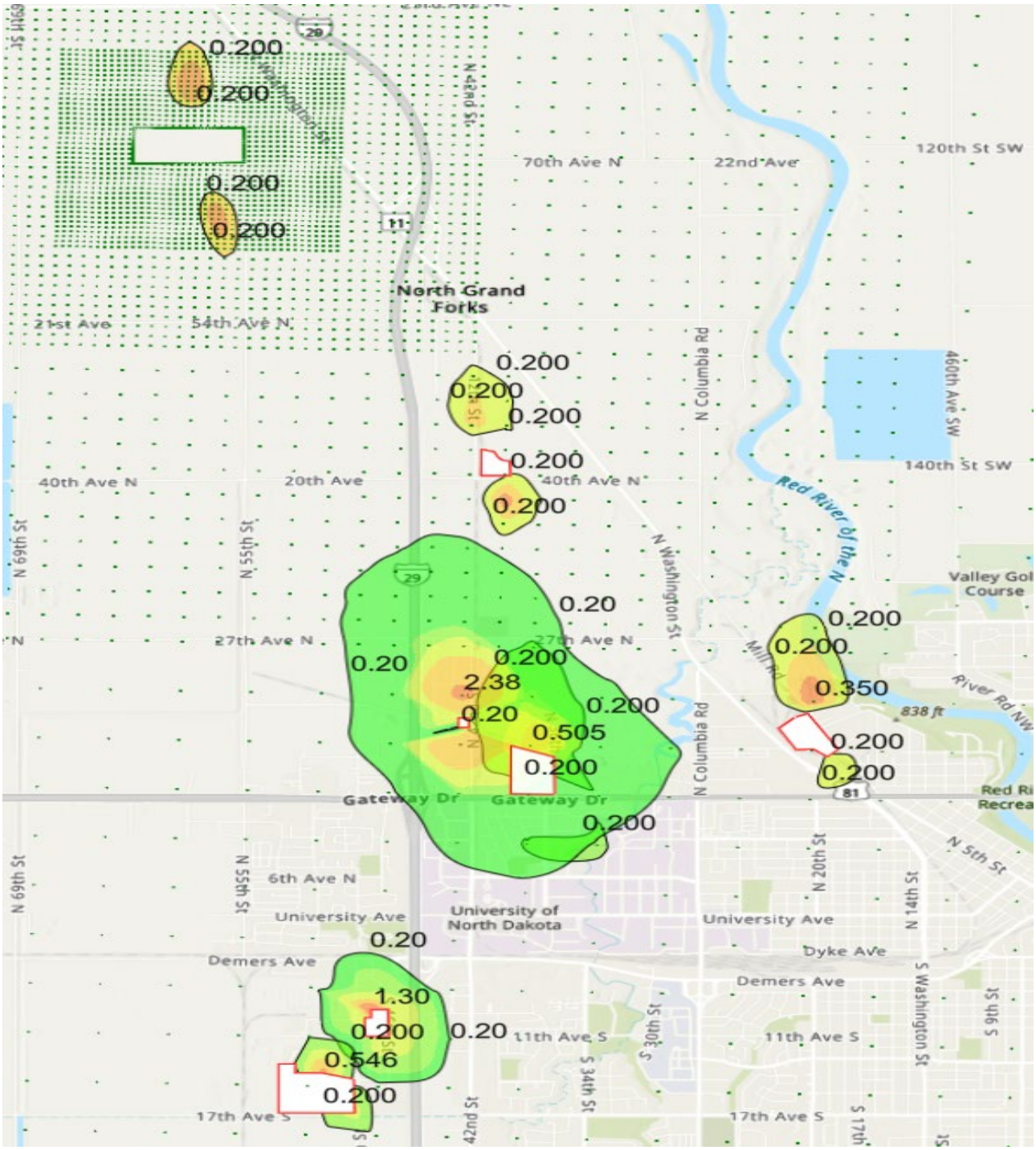
Appendix A: Radius of Impact plots (Epitome with Nearby Sources)

1. **$PM_{2.5}$ 24-hour**



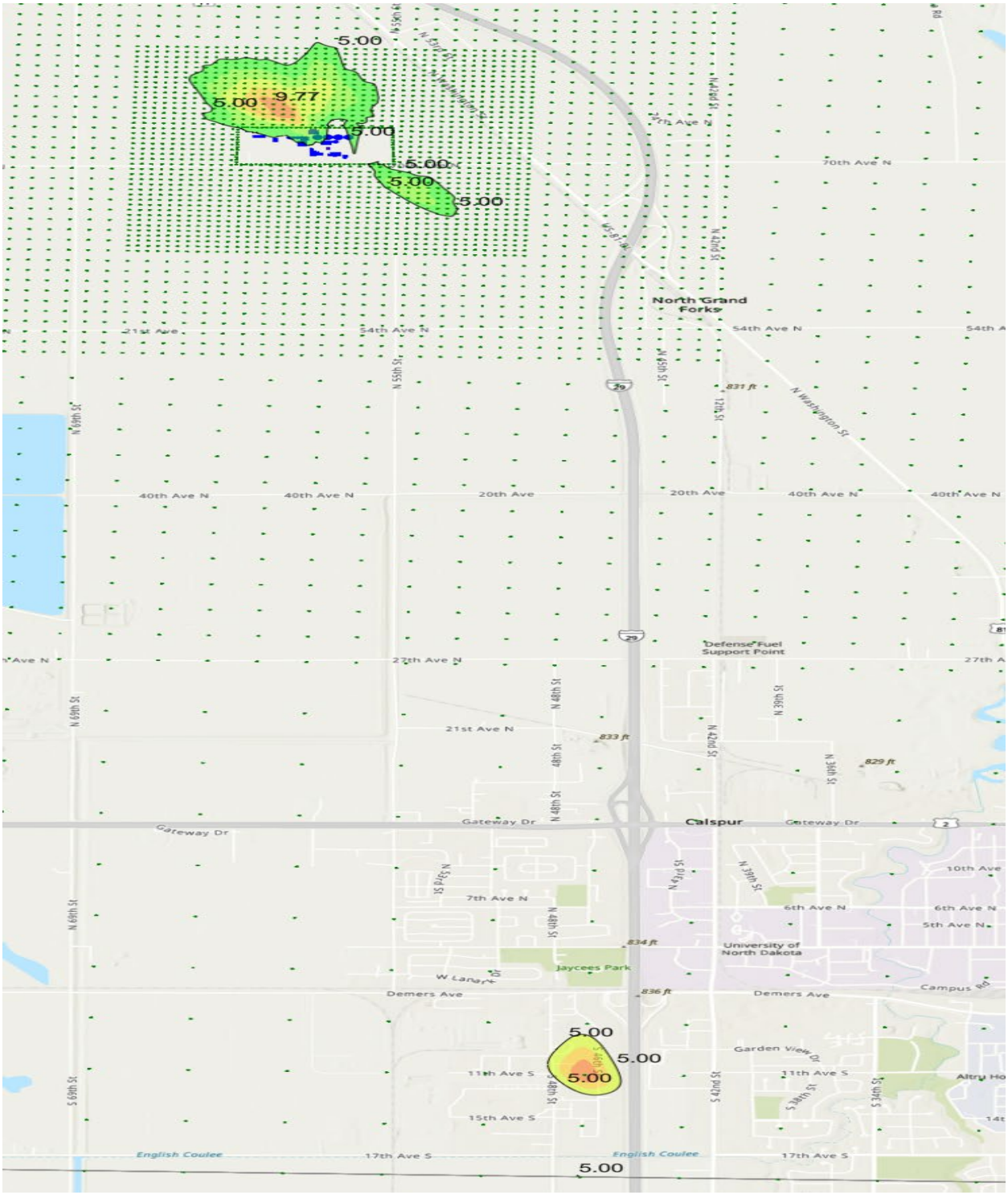
*Epitome Energy – top left

2. $PM_{2.5}$ Annual



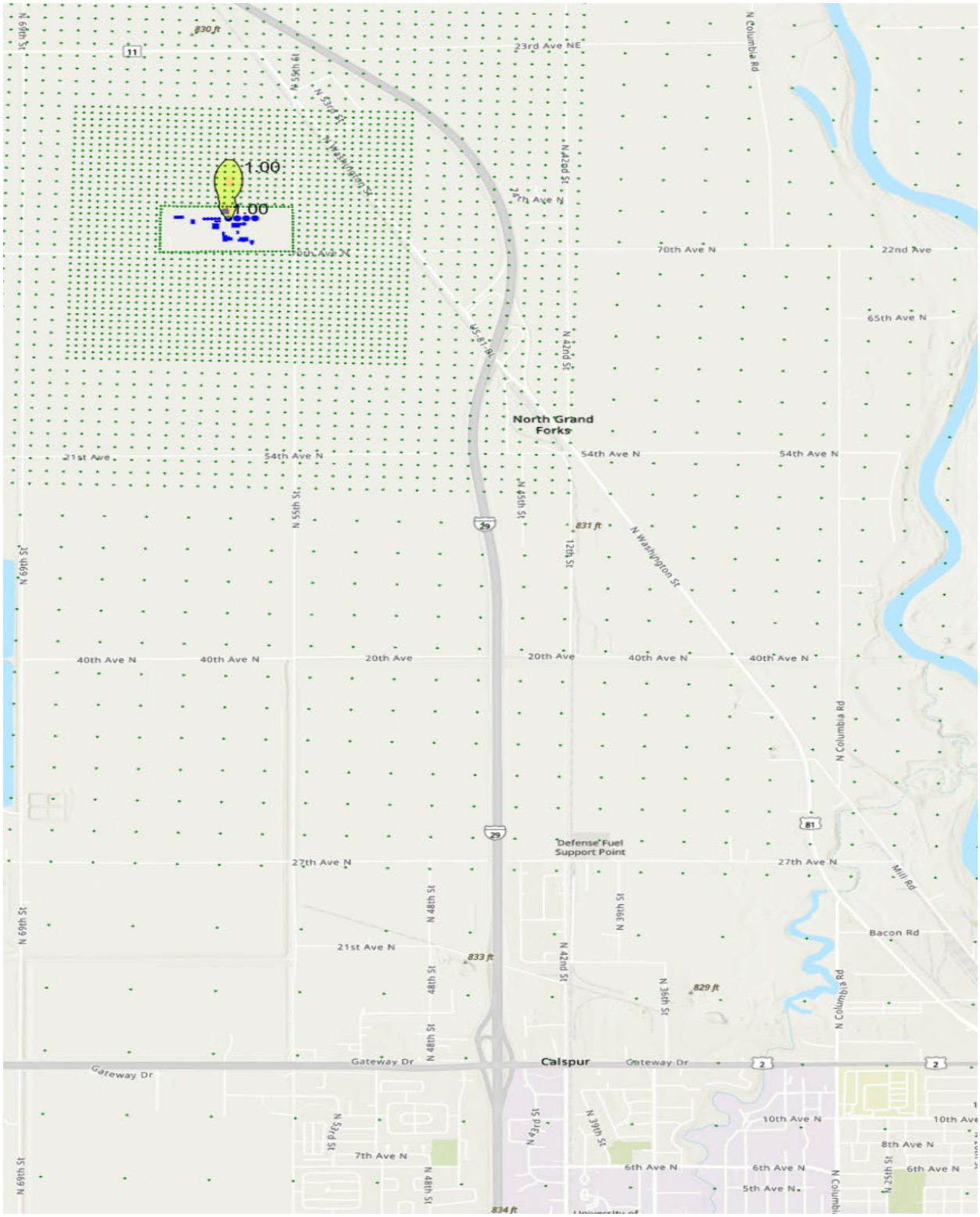
*Epitome Energy – top left

3. PM_{10} 24-hour



*Epitome Energy – top left

4. PM_{10} Annual



*Epitome Energy – top left