Air Quality Impacts Analysis (AQIA)
for
American Crystal Sugar Company
Drayton Sugar Beet Processing Facility

8152 Old Highway 44
Drayton, ND 58225

Permit No.: ACP-18197 v1.0
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North Dakota Department of Environmental Quality
Division of Air Quality

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1 Executive Summary

The American Crystal Sugar Company – Drayton Sugar Beet Processing Facility (ACS-Drayton) conducted air dispersion modeling for a proposed expansion project and for as-built updates to permit ACP-17815 (formerly PTC 17001). The modeling efforts were conducted to demonstrate that the facility remains in compliance with both state and federal Ambient Air Quality Standards (AAQS) as well as Prevention of Significant Deterioration (PSD) increment consumption regulations.

Based on the data provided in the Permit to Construct (PTC) applications and the Department's independent review and modeling analysis, it is expected that the proposed expansion project and as-built updates will continue to 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 ($\mu g/m^3$)	NAAQS/NDAAQS ($\mu g/m^3$)	PASSED (Y/N)
PM_{10}	24-HR	111.7	30	141.7	150	Y
$PM_{2.5}$	Annual	4.13	4.81	8.94	12	Y
	24-HR	18.6	15.9	34.5	35	Y
SO_2	Annual	5.28	3	8.28	80	Y
	24-HR	69.5	9	78.5	365	Y
	3-HR	206.6	11	217.6	1,300	Y
	1-HR	151.1	13	164.1	196	Y
NO_2	Annual	6.51	5	11.51	100	Y
	1-HR	124.2	35	159.2	188	Y
CO	8-HR	1,915	1,149	3,064	10,000	Y
	1-HR	4,735	1,149	5,884	40,000	Y

[1] See Table 21 for AAQS averaging times.

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

POLLUTANT	AVERAGING TIME	MODELED IMPACT ($\mu g/m^3$)	CLASS II INCREMENT ($\mu g/m^3$)	% INCREMENT CONSUMED	PASSED (Y/N)
PM_{10}	Annual	-0.004	17	0%	Y
	24-HR	25.1	30	84%	Y
$PM_{2.5}$	Annual	0.54	4	14%	Y
	24-HR	3.99	9	44%	Y
SO_2	Annual	-0.01	20	0%	Y
	24-HR	0.48	91	1%	Y
	3-HR	2.80	512	1%	Y
NO_2	Annual	3.22	25	13%	Y

2 Introduction

On August 18, 2022, the North Dakota Department of Environmental Quality, Division of Air Quality (Department) received an application for an amendment to a Permit to Construct from ACS-Drayton for as-built updates to ACP-17815. As part of the application, an updated modeling analysis was included to confirm compliance with the North Dakota Ambient Air Quality Standards (NDAAQS), the National Ambient Air Quality Standards (NAAQS) and PSD increment standards. The as-built changes resulted in decreased emissions for all pollutants, except for $PM_{2.5}$. Modeling efforts were carried out for PM_{10}, $PM_{2.5}$, SO_2 and NO_2. ACS-Drayton's updated analysis demonstrated continued compliance with applicable state and federal air quality standards.

On December 28, 2022, the Department received another application for a Permit to Construct from ACS-Drayton for a proposed expansion of the facility. The proposed expansion consisted of replacing a pulp dryer and the addition of a new package boiler to support increased sugar beet processing. As part of the application, a cumulative modeling analysis was included to confirm continued compliance with the NDAAQS, NAAQS and PSD increment standards. The cumulative analysis demonstrated compliance with the applicable state and federal air quality standards.

Both applications are being processed concurrently as part of a single analysis. This Air Quality Impacts Analysis (AQIA) serves to summarize the Department's findings based on a comprehensive review and independent modeling analysis of the ACS-Drayton proposed expansion and as-built updates (Project).

3 Project Background

ACS-Drayton is a sugar beet processing plant located approximately two miles north of Drayton, North Dakota in Pembina County. The facility specializes in the production of granulated beet sugar and low-

[2] See Table 22 for PSD Increment averaging times.

grade beet molasses and has been in operation since 1965. The facility currently holds Title V Permit to Operate AOP-28454 v5.0 (formerly T5X73015).

It is pertinent to mention that this facility was in operation before the PSD major source baseline dates for the North Dakota intrastate air quality control region no. 172, as indicated in Table 3. Consequently, emission units existing at the time were encompassed within the PSD baseline.

Table 3 - PSD Minor Source Baseline Dates[3]

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	Y
SO_2	December 19, 1977	November 30, 1979	Y
PM_{10}	January 13, 1978	November 30, 1979	Y
$PM_{2.5}$	August 23, 2012	April 28, 2022	Y
Lead (Pb)	No PSD Class II Increment	No PSD Class II Increment	N/A

4 Model Requirements

ACS-Drayton is classified as a major stationary source under the PSD regulations[4,5]. The Project triggers the major modification requirements under PSD and is subject to the PSD review requirements. Per the Department Memo[6] dated October 6, 2014, sources that are subject to the PSD rules require dispersion modeling for criteria pollutants prior to the issuance of a PTC if the projected changes in emissions exceed PSD significant emission rates (SERs) (Table 4).

Furthermore, any new source or major modification 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 ACS-Drayton. ACS-Drayton is located approximately 296 km from the nearest Class I area, so a Class I increment analysis was not required. All other areas within North Dakota are designated Class II areas and Class II increment analysis applies.

[3] 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)

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

[5] *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)

[6] *Criteria Pollutant Modeling Requirements for a Permit to Construct.* Available at: https://deq.nd.gov/publications/AQ/policy/Modeling/Criteria_Modeling_Memo.pdf (Last visited October 24, 2023)

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

POLLUTANT	SER	FINAL PROJECT EMISSION INCREASE (TPY)	MODELING REQUIRED (Y/N)
PM_{10}	15	323	Y
$PM_{2.5}$	10	276	Y

Table 5 - Class I Areas Near Source

CLASS I AREA	DISTANCE FROM PROJECT (km)	MODELING REQUIRED (Y/N)
Theodore Roosevelt National Park-North Unit (ND)	465	N
Theodore Roosevelt National Park-South Unit (ND)	497	N
Theodore Roosevelt National Park-Elkhorn Ranch Unit (ND)	505	N
Lostwood Wilderness Area (ND)	388	N
Medicine Lake Wilderness Area (MT)	529	N
Voyageurs National Park (MN)	296	N
Boundary Waters Canoe Area (MN)	354	N

ACS-Drayton is subject to the requirements of NDAC 33.1-15-02[7] 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*[8] (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 ACS-Drayton and the Department used for this analysis and review, in accordance with Appendix W.

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

Table 6 - Model Versions

MODEL	VERSION	MODEL	VERSION
AERMOD	22112	BPIP-PRIME	4274
AERMAP	18081		

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 temperature, sky cover (opacity), and local air pressure (optionally). It combines these observations with the pre-processed AERSURFACE output values, as detailed in Table 8, to compile the necessary surface met inputs for AERMOD. It's important to note that for the current analysis previously approved meteorological data was utilized.

Table 7 - MET Data Used

MET DATA	LOCATION	STATION NO.	YEARS	DISTANCE FROM SOURCE [A]	SOURCE OF DATA
Surface Air	Grand Forks, ND	14916	2009-2013	73 km South	NDDEQ
Upper Air	International Falls, MN	14918	2009-2013	278 km East	NDDEQ

[A] Approximate distances using Google 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). To facilitate this process, the Department has compiled a set of recommended inputs specifically designed for various regions within the state. These recommendations are outlined in the document titled *"Recommended AERSURFACE Inputs North Dakota* (March 2017)".[9]

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
Continuous snow cover for at least one month?	Yes
Reassign the months to different seasons?	Yes
Specify months for each season:	Yes
Late autumn after frost and harvest, or winter with no snow	Oct, Nov, Mar
Winter with continuous snow cover	Dec, Jan, Feb
Transitional spring	Apr, May
Midsummer with lush vegetation	Jun, Jul, Aug
Autumn with unharvested cropland	Sep
Is this site at an airport?	Yes
Is the site in an arid region?	No
Surface moisture condition at the site:	Average

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, refer to Table 9.

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

Table 9 - 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	11,423
Terrain Data	NED 2017, 1/3 arcsecond (10-meter)

The receptor points are placed at ground level, and their elevation is determined using 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.[10] 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

ACS-Drayton used fixed background concentrations when predicting the total ambient effect on the AAQS. These fixed background concentrations were 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 21). Fixed background concentrations shown in Table 10 are considered reasonably representative of the entire state, and while they are conservative in nature, 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.

[10] *§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)

Table 10 - Fixed Background Concentrations[11]

POLLUTANT	AVERAGING TIME	BACKGROUND ($\mu g/m^3$)
PM_{10}	24-HR	30
$PM_{2.5}$	Annual	4.75
	24-HR	13.7
SO_2	Annual	3
	24-HR	9
	3-HR	11
	1-HR	13
NO_2	Annual	5
	1-HR	35
CO	8-HR	1,149
	1-HR	1,149

5.6 Emission Source Modeling Parameters

AERMOD requires specific source data to accurately model air pollutant dispersion. 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 11, Table 14, Table 17, Table 19 and Table 20. For area sources, the parameters are shown in Table 12, Table 15 and Table 18. Volume source parameters are detailed in Table 16. Specifically, Table 11 includes the modeling parameters for the facility resulting from the Project, with the corresponding emission rates shown in Table 13.

ACS-Drayton has several unpaved haul roads as PM (particulate matter) volume sources in accordance with the EPA guidance memo[12] dated March 2, 2012. Detailed parameters for these sources are provided

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

[12] *Haul Road Workgroup Final Report Submission to EPA-OAQPS.* Available at: https://www.epa.gov/sites/default/files/2020-10/documents/haul_road_workgroup-final_report_package-20120302.pdf (Last visited October 24, 2023)

at the end of the document. This comprehensive approach ensures that all relevant sources of emissions are appropriately considered in the modeling analysis.

The modeling parameters and emission rates for various pollutants are provided in the following tables, each associated with a specific PSD baseline date:

1. PM_{10} Baseline Parameters (Jan. 13, 1978): Presented in Table 14. The parameters and emission rates for PM_{10} as of the PSD baseline date are detailed here.
2. Area and Volume Source Parameters (PM_{10} Baseline): These are found in Table 15 and Table 16, respectively. These tables include area and volume source parameters associated with the PM_{10} baseline.
3. $PM_{2.5}$ Baseline Parameters (Aug. 23, 2012): Presented in Table 17. The parameters and emission rates for $PM_{2.5}$ as of the PSD baseline date (Aug. 23, 2012) are provided here.
4. Area Source Parameters ($PM_{2.5}$ Baseline): Detailed in Table 18. This table includes area source parameters associated with the $PM_{2.5}$ baseline.
5. NO_x Baseline Parameters (Oct. 31, 1989): Presented in Table 19. The parameters and emission rates for NO_x as of the PSD baseline date (Oct. 31, 1989) are listed here.
6. SO_2 Baseline Parameters (Dec. 19, 1977): Detailed in Table 20. The parameters and emission rates for SO_2 as of the PSD baseline date (Dec. 19, 1977) are provided here.

The emission rates in Table 14 through Table 20 were modeled with negative emission rates to account for the sources that were already included in the PSD baseline. A conservative approach was taken, and the annual increment rates were based off two-year average baseline emission rates for the period immediately preceding the baseline trigger date, and the 24-hour increment rates were based on average production data or available source test data for the period immediately preceding the baseline trigger date for each pollutant. Stack parameters were also modeled as they existed prior to the trigger dates to account for changes in dispersion characteristics that may impact increment consumption.

In the submitted analysis, two nearby sources were identified: Alchem, Ltd. LLP's Grafton Ethanol Plant and the Life Skills & Transition Center-Heating Plant. However, Alchem, Ltd. LLP's Grafton Ethanol Plant has been non-operational and shut down since 2010. Similarly, the coal-burning boiler located at the Life Skills & Transition Center-Heating Plant was decommissioned and removed in 2016. Neither of these sources were included in this analysis.

Table 11 - 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.

Table 12 - Area Source Parameters and Emission Rates lists the model input parameters and emission rates for the Area Sources.

Table 13 - Point Source Emission Rates lists the point source emission rates for PM_{10}, $PM_{2.5}$, NO_x, SO_2, and CO.

Table 14 - PM10 Baseline Increment Point Source Modeling Parameters and Emission Rates lists the model input parameters and emission rates for the PM_{10} baseline point sources.

Table 15 - PM10 Baseline Increment Area Source Modeling Parameters and Emission Rates lists the model input parameters and emission rates for the PM_{10} baseline area sources.

Table 16 - PM10 Baseline Increment Volume Source Modeling Parameters and Emission Rates lists the model input parameters and emission rates for the PM_{10} volume sources.

Table 17 - PM2.5 Baseline Increment Point Source Modeling Parameters and Emission Rates lists the model input parameters and emission rates for the $PM_{2.5}$ baseline point sources.

Table 18 - PM2.5 Baseline Increment Area Source Modeling Parameters and Emission Rates lists the model input parameters and emission rates for the $PM_{2.5}$ baseline area sources.

Table 19 - NOx Baseline Increment Point Source Modeling Parameters and Emission Rates lists the model input parameters and emission rates for the NO_x baseline point sources.

Table 20- SO2 Baseline Increment Point Source Modeling Parameters and Emission Rates lists the model input parameters and emission rates for the SO_2 baseline point sources.

Table 11 - Point Source Parameters

EMISSION POINT	EMISSION POINT DESCRIPTION	UTM X (m)	UTM Y (m)	ELEV. (m)	HEIGHT (m)	TEMP (K)	VELOCITY (m/s)	EXIT DIA. (m)	Orient. (vert/horiz)
EP1	B&W Boiler	634,538.2	5,383,772.1	243.8	45.72	559.3	22.5	2.35	Vertical
EP1a	Coal Handling Equip.	634,518.7	5,383,766.2	243.8	25.91	294.3	0.001	0.001	Horizontal
EP4	Pulp Dryer No. 1	634,464.9	5,383,839.7	243.8	54.86	384.8	33	1.52	Vertical
EP30	New Pulp Pellet Mills & Cooler	634,495.0	5,383,941.4	243.8	7.01	294.3	36.2	0.76	Vertical
EP9	Dry Pulp Belt Conveyor	634,518.0	5,383,849.8	243.8	6.71	310.9	0.001	0.001	Horizontal
EP10	Dry Pulp Reclaim System	634,473.3	5,383,946.8	243.8	7.31	310.9	0.001	0.001	Horizontal
EP28	Sugar Dryer	634,478.4	5,383,733.8	243.8	27.43	329.2	15.4	1.22	Vertical
EP14a	MAC2 Flow Headhouse	634,494.1	5,383,726.9	243.8	26.22	302.6	0.001	0.001	Horizontal
EP14b	Old Hummer Room Pulsaire	634,488.6	5,383,726.9	243.8	22.25	302.6	0.001	0.001	Horizontal
EP15	Pulp Pellet Bin No. 1	634,426.9	5,383,932.8	243.8	18.9	294.3	0.001	0.001	Horizontal
EP19a	Bulk Loading Pulsaire	634,436.9	5,383,673.3	243.8	4.72	294.3	0.001	0.001	Horizontal
EP20	Main Sugar Warehouse Pulsaire	634,469.5	5,383,641.9	243.8	12.19	294.3	0.001	0.01	Horizontal
EP23	Pulp Dryer Coal Hopper	634,497.6	5,383,847.8	243.8	23.16	294.3	0.001	0.001	Horizontal
EP24	Flume Lime Slaker	634,519.2	5,383,801.5	243.8	6.1	294.3	0.001	0.001	Horizontal
EP27a	Kiln Balance Vent	634,565.9	5,383,761.9	243.8	53.34	317	16.2	0.41	Vertical

EMISSION POINT	EMISSION POINT DESCRIPTION	UTM X (m)	UTM Y (m)	ELEV. (m)	HEIGHT (m)	TEMP (K)	VELOCITY (m/s)	EXIT DIA. (m)	Orient. (vert/horiz)
EP27b	Kiln Carbonation Vent	634,512.6	5,383,797.1	243.8	33.53	358.1	6.3	0.91	Vertical
EP29	New Lime Slaker	634,574.4	5,383,753.0	243.8	24.38	337.6	2.75	0.81	Vertical
EP31	Pulp Pellet Loadout	634,444.4	5,383,949.7	243.8	7.62	294.3	10.11	0.24	Vertical
EP32	New Package Boiler	634,524.1	5,383,784.2	243.8	36.58	449.8	33.54	1.37	Vertical
EP33	New Pulp Dryer No. 2	634,468.5	5,383,839.7	243.8	54.86	398.7	21.38	1.68	Vertical

Table 12 - Area Source Parameters and Emission Rates

EMISSION POINT	EMISSION POINT DESCRIPTION	UTM X (m)	UTM Y (m)	ELEV. (m)	REL. HT. (m)	E. LENGTH (m)	N. LENGTH (m)	ANGLE (°)	INIT. VERT. (m)	Orient.	PM_{10} (lb/hr)	PM_{10} (g/s)	$PM_{2.5}$ (lb/hr)	$PM_{2.5}$ (g/s)
Fug 2[A]	Coal Handling Emissions	634,518.2	5,383,428.4	243.8	3.05	18.5	115	-2	1.52	Fugitive	0.64	0.08	0.09	0.01
Fug 3[A]	Lime Rock Handling Emissions	634,582.6	5,383,680.6	243.8	1.83	45	60	-2	0.91	Fugitive	0.1	0.01	4.3E-05	5.4E-06
Fug 4[A]	Spent Lime Wind Erosion	635,097.1	5,384,717.2	243.8	1.83	70	125	-2	0.91	Fugitive	0.25	0.03	0.04	0.01

[A] Included in PSD Baseline. Not included in PSD Increment analysis.

Table 13 - Point Source Emission Rates

EMISSION POINT	EMISSION POINT DESCRIPTION	PM_{10} (g/s)	$PM_{2.5}$ (g/s)	NO_x (g/s)	SO_2 (g/s)	CO (g/s)
EP1	B&W Boiler	3.75	3.18	25.01	45.98	6.56
EP1a	Coal Handling Equip.	0.04	0.01	-	-	-
EP4	Pulp Dryer No. 1	11.19	10.28	6.84	5.87	57.33
EP30	New Pulp Pellet Mills & Cooler	0.19	0.04	-	-	-
EP9	Dry Pulp Belt Conveyor	0.04	0.01	-	-	-
EP10	Dry Pulp Reclaim System	0.08	0.01	-	-	-
EP28	Sugar Dryer	0.28	0.06	-	-	-
EP14a	MAC2 Flow Headhouse	0.43	0.10	-	-	-
EP14b	Old Hummer Room Pulsaire	0.41	0.09	-	-	-
EP15	Pulp Pellet Bin No. 1	0.05	0.01	-	-	-
EP19a	Bulk Loading Pulsaire	0.01	0.004	-	-	-
EP20	Main Sugar Warehouse Pulsaire	0.06	0.01	-	-	-
EP23	Pulp Dryer Coal Hopper	0.11	0.03	-	-	-
EP24	Flume Lime Slaker	0.01	0.001	-	-	-
EP27a	Kiln Balance Vent	1.38	0.84	1.01	0.42	19.68
EP27b	Kiln Carbonation Vent	-	-	2.36	0.05	45.92
EP29	New Lime Slaker	0.42	0.16	-	-	-
EP31	Pulp Pellet Loadout	0.01	0.001	-	-	-
EP32	New Package Boiler	0.34	0.34	0.91	0.03	1.67
EP33	New Pulp Dryer No. 2	7.43	4.62	5.9	7.60	57.74

Table 14 - PM_{10} Baseline Increment Point Source Modeling Parameters and Emission Rates

EMISSION POINT	EMISSION POINT DESCRIPTION	UTM X (m)	UTM Y (m)	ELEV. (m)	HEIGHT (m)	TEMP (K)	VELOCITY (m/s)	EXIT DIA. (m)	Orient. (vert/horiz)	24-Hour		Annual	
										PM_{10} (lb/hr)	PM_{10} (g/s)	PM_{10} (lb/hr)	PM_{10} (g/s)
PEP1	B&W Boiler	634,538.2	5,383,772.1	243.8	36.57	490.2	18.6	2.36	Vertical	-37.52	-4.73	-26.34	-3.32
PEP1A	Coal Handling Equip.	634,518.7	5,383,766.2	243.8	25.91	294.3	0.001	0.001	Horizontal	-0.29	-0.04	-0.16	-0.02
PEP2	Startup Boiler	634,504.0	5,383,770.4	243.8	30.5	566.1	14.1	0.91	Vertical	-1.62	-0.20	0.00	0.00
PEP3A	Pulp Dryer No. 2 Stack 1	634,488.9	5,383,845.1	243.8	24.69	373.3	5.87	1.22	Vertical	-18.70	-2.36	-10.14	-1.28
PEP3B	Pulp Dryer No. 2 Stack 2	634,485.4	5,383,845.0	243.8	24.69	373.3	5.87	1.22	Vertical	-18.70	-2.36	-10.14	-1.28
PEP3C	Pulp Dryer No. 2 Stack 3	634,481.7	5,383,844.8	243.8	24.69	373.3	5.87	1.22	Vertical	-18.70	-2.36	-10.14	-1.28
PEP3D	Pulp Dryer No. 2 Stack 4	634,478.2	5,383,844.8	243.8	24.69	373.3	5.87	1.22	Vertical	-18.7	-2.36	-10.14	-1.28
PEP4A	Pulp Dryer No. 1 Stack 1	634,489.0	5,383,841.9	243.8	24.69	380.4	7.95	1.22	Vertical	-25.39	-3.20	-13.76	-1.73
PEP4B	Pulp Dryer No. 1 Stack 2	634,485.5	5,383,841.7	243.8	24.69	380.4	7.95	1.22	Vertical	-25.39	-3.20	-13.76	-1.73
PEP4C	Pulp Dryer No. 1 Stack 3	634,481.8	5,383,841.5	243.8	24.69	380.4	7.95	1.22	Vertical	-25.39	-3.20	-13.76	-1.73
PEP4D	Pulp Dryer No. 1 Stack 4	634,478.2	5,383,841.5	243.8	24.69	380.4	7.95	1.22	Vertical	-25.39	-3.20	-13.76	-1.73
PEP4E	Pulp Dryer No. 1 Stack 5	634,474.7	5,383,841.5	243.8	24.69	380.4	7.95	1.22	Vertical	-25.39	-3.20	-13.76	-1.73
PEP5	Lime Mixing Tank	634,519.2	5,383,802.3	243.8	9.45	399.8	0.001	0.001	Horizontal	-0.65	-0.08	-0.54	-0.07
PEP6	Pellet Mill No. 1	634,476.4	5,383,941.2	243.8	23.77	310.9	4.45	1.22	Vertical	-3.7	-0.47	-2.01	-0.25
PEP7	Pellet Mill No. 2	634,476.1	5,383,943.9	243.8	23.77	310.9	4.45	1.22	Vertical	-3.7	-0.47	-2.01	-0.25

EMISSION POINT	EMISSION POINT DESCRIPTION	UTM X (m)	UTM Y (m)	ELEV. (m)	HEIGHT (m)	TEMP (K)	VELOCITY (m/s)	EXIT DIA. (m)	Orient. (vert/horiz)	24-Hour		Annual	
										PM_{10} (lb/hr)	PM_{10} (g/s)	PM_{10} (lb/hr)	PM_{10} (g/s)
PEP8	Pellet Mill No. 3	634,481.4	5,383,943.8	243.8	23.77	310.9	4.45	1.22	Vertical	-3.7	-0.47	-2.01	-0.25
PEP9	Dry Pulp Belt Conveyor	634,518.0	5,383,849.8	243.8	20.42	310.9	0.001	0.001	Horizontal	-0.60	-0.08	-0.33	-0.04
PEP10	Dry Pulp Reclaim System	634,473.3	5,383,946.8	243.8	7.31	310.9	0.001	0.001	Horizontal	-0.60	-0.08	-0.33	-0.04
PEP11	Dry Pulp Bucket Elevator	634,518.6	5,383,844.1	243.8	17.37	310.9	0.001	0.001	Horizontal	-0.60	-0.08	-0.33	-0.04
PEP12	Sugar Dryer	634,478.4	5,383,733.8	243.8	27.43	312	0.001	0.001	Horizontal	-1.58	-0.20	-0.85	-0.11
PEP13	Belgian Lime Kiln	634,514.1	5,383,784.2	243.8	38.71	376.5	21.0	0.30	Vertical	-2.97	-0.37	-1.61	-0.20
PEP14	Weibull Bin	634,441.5	5,383,675.5	243.8	6.10	302.6	0.001	0.001	Horizontal	-3.40	-0.43	-1.84	-0.23
PEP15	Pulp Pellet Bin No. 1, 2, 3	634,440.2	5,383,949.1	243.8	18.9	294.3	0.001	0.001	Horizontal	-0.37	-0.05	-0.20	-0.03
PEP18	Sugar Warehouse	634,474.2	5,383,675.5	243.8	10.1	294.3	17.9	0.5	Vertical	-0.11	-0.014	-0.06	-0.008

Table 15 - PM_{10} Baseline Increment Area Source Modeling Parameters and Emission Rates

EMISSION POINT	EMISSION POINT DESCRIPTION	UTM X (m)	UTM Y (m)	ELEV. (m)	REL. HT. (m)	E. LENGTH (m)	N. LENGTH (m)	ANGLE (°)	INIT. VERT. (m)	Orient.	24-Hour		Annual	
											PM_{10} (lb/hr)	PM_{10} (g/s)	PM_{10} (lb/hr)	PM_{10} (g/s)
PFUG1	Pellet Loadout Emissions	634,446.8	5,383,938.7	243.8	3.66	5.0	20.0	-2.0	1.86	Fugitive	-0.45	-0.06	-0.24	-0.03

Table 16 - PM_{10} Baseline Increment Volume Source Modeling Parameters and Emission Rates

EMISSION POINT	EMISSION POINT DESCRIPTION	UTM X (m)	UTM Y (m)	ELEV. (m)	REL. HT. (m)	SIGMA Y (m)	SIGMA Z (m)	24-Hour		Annual	
								PM_{10} (lb/hr)	PM_{10} (g/s)	PM_{10} (lb/hr)	PM_{10} (g/s)
PEP19	Sugar Loadout	634,436.9	5,383,673.3	243.8	4.72	0.23	2.20	-0.11	-0.01	-0.06	-0.01
PEP20	Sugar Screening	634,458.6	5,383,667.2	243.8	18.29	0.23	8.51	-0.45	-0.06	-0.24	-0.03

Table 17 - $PM_{2.5}$ Baseline Increment Point Source Modeling Parameters and Emission Rates

EMISSION POINT	EMISSION POINT DESCRIPTION	UTM X (m)	UTM Y (m)	ELEV. (m)	HEIGHT (m)	TEMP (K)	VELOCITY (m/s)	EXIT DIA. (m)	Orient. (vert/horiz)	24-Hour		Annual	
										$PM_{2.5}$ (lb/hr)	$PM_{2.5}$ (g/s)	$PM_{2.5}$ (lb/hr)	$PM_{2.5}$ (g/s)
PEP1	B&W Boiler	634,538.2	5,383,772.1	243.8	36.57	490.2	18.6	2.36	Vertical	-20.92	-2.64	-15.31	-1.93
PEP1A	Coal Handling Equip.	634,518.7	5,383,766.2	243.8	25.91	294.3	0.001	0.001	Horizontal	-0.07	-0.01	-0.05	-0.01
PEP2	Startup Boiler	634,504.0	5,383,770.4	243.8	30.50	566.1	14.1	0.91	Vertical	-1.18	-0.15	-0.01	-0.001
PEP3	Pulp Dryer No. 2	634,468.5	5,383,839.7	243.8	51.82	398.7	20.19	1.22	Vertical	-25.39	-3.20	-18.33	-2.31
PEP4	Pulp Dryer No. 1	634,464.9	5,383,839.7	243.8	51.82	388.7	22.0	1.52	Vertical	-37.03	-4.67	-26.73	-3.37
PEP5	Lime Mixing Tank and Kiln Cooler	634,519.2	5,383,802.3	243.8	9.45	399.8	0.001	0.001	Horizontal	-1.33	-0.17	-0.95	-0.12
PEP6	Pellet Mill No. 1	634,476.4	5,383,941.2	243.8	23.77	310.9	3.21	1.22	Vertical	-0.57	-0.07	-0.41	-0.05
PEP7	Pellet Mill No. 2	634,476.1	5,383,943.9	243.8	23.77	310.9	2.00	1.22	Vertical	-0.57	-0.07	-0.41	-0.05
PEP8	Pellet Mill No. 3	634,481.4	5,383,943.8	243.8	23.77	310.9	2.38	1.22	Vertical	-0.57	-0.07	-0.41	-0.05
PEP9	Dry Pulp Belt Conveyor	634,518.0	5,383,849.8	243.8	17.37	310.9	0.001	0.001	Horizontal	-0.14	-0.02	-0.1	-0.01

EMISSION POINT	EMISSION POINT DESCRIPTION	UTM X (m)	UTM Y (m)	ELEV. (m)	HEIGHT (m)	TEMP (K)	VELOCITY (m/s)	EXIT DIA. (m)	Orient. (vert/horiz)	24-Hour		Annual	
										$PM_{2.5}$ (lb/hr)	$PM_{2.5}$ (g/s)	$PM_{2.5}$ (lb/hr)	$PM_{2.5}$ (g/s)
PEP10	Dry Pulp Reclaim System	634,473.3	5,383,946.8	243.8	7.31	310.9	0.001	0.001	Horizontal	-0.14	-0.02	-0.10	-0.01
PEP11	Dry Pulp Bucket Elevator	634,518.6	5,383,844.1	243.8	17.37	310.9	0.001	0.001	Horizontal	-0.14	-0.02	-0.10	-0.01
PEP12	Sugar Dryer	634,478.4	5,383,733.8	243.8	27.43	312.0	0.001	0.001	Horizontal	-0.41	-0.05	-0.30	-0.04
PEP13	Belgian Lime Kiln	634,514.1	5,383,784.2	243.8	38.71	376.5	20.97	0.30	Vertical	-0.31	-0.04	-0.22	-0.03
PEP14A	MAC2 Flow Headhouse	634,494.1	5,383,726.9	243.8	26.22	302.6	0.001	0.001	Horizontal	-0.79	-0.10	-0.79	-0.10
PEP15	Pulp Pellet Bin No. 1	634,440.2	5,383,949.1	243.8	18.90	294.3	0.001	0.001	Horizontal	-0.06	-0.01	-0.06	-0.01
PEP14B	Old Hummer Room Pulsaire	634,488.6	5,383,726.9	243.8	22.25	302.6	0.001	0.001	Horizontal	-0.77	-0.10	-0.77	-0.10
PEP19A	Bulk Loading Pulsaire	634,436.9	5,383,673.3	243.8	4.72	294.3	0.001	0.001	Horizontal	-0.03	-0.004	-0.03	-0.004
PEP20	Main Sugar Warehouse Pulsaire	634,469.5	5,383,641.9	243.8	12.19	294.3	0.001	0.001	Horizontal	-0.10	-0.01	-0.10	-0.01
PEP22	Pulp Pellet Mill & Cooler	634,478.8	5,383,945.3	243.8	24.99	294.3	28.7	0.46	Vertical	-0.04	-0.01	-0.03	-0.004
PEP23	Pulp Dryer Coal Hopper	634,497.6	5,383,847.8	243.8	23.16	294.3	0.001	0.001	Horizontal	-0.21	-0.03	-0.15	-0.02
PEP25	Lime Slaker	634,519.4	5,383,800.4	243.8	15.24	294.3	0.001	0.001	Horizontal	-0.28	-0.04	-0.20	-0.03

Table 18 - $PM_{2.5}$ Baseline Increment Area Source Modeling Parameters and Emission Rates

EMISSION POINT	EMISSION POINT DESCRIPTION	UTM X (m)	UTM Y (m)	ELEV. (m)	REL. HT. (m)	E. LENGTH (m)	N. LENGTH (m)	ANGLE (°)	INIT. VERT. (m)	Orient.	24-Hour		Annual	
											$PM_{2.5}$ (lb/hr)	$PM_{2.5}$ (g/s)	$PM_{2.5}$ (lb/hr)	$PM_{2.5}$ (g/s)
PFUG1	Pellet Loadout Emissions	634,446.8	5,383,938.7	243.8	3.66	5.0	20.0	-2.0	1.86	Fugitive	-0.014	-0.002	-0.01	-0.001

Table 19 - NO_x Baseline Increment Point Source Modeling Parameters and Emission Rates

EMISSION POINT	EMISSION POINT DESCRIPTION	UTM X (m)	UTM Y (m)	ELEV. (m)	HEIGHT (m)	TEMP (K)	VELOCITY (m/s)	EXIT DIA. (m)	Orient. (vert/horiz)	NO_x (lb/hr)	NO_x (g/s)
PEP1	B & W Boiler	634,538.2	5,383,772.1	243.8	36.57	490.2	18.6	2.36	Vertical	-85.50	-10.77
PEP3A	Pulp Dryer No. 2 Stack 1	634,488.9	5,383,845.1	243.8	24.69	373.3	5.87	1.22	Vertical	-1.58	-0.20
PEP3B	Pulp Dryer No. 2 Stack 2	634,485.4	5,383,845.0	243.8	24.69	373.3	5.87	1.22	Vertical	-1.58	-0.20
PEP3C	Pulp Dryer No. 2 Stack 3	634,481.7	5,383,844.8	243.8	24.69	373.3	5.87	1.22	Vertical	-1.58	-0.20
PEP3D	Pulp Dryer No. 2 Stack 4	634,478.2	5,383,844.8	243.8	24.69	373.3	5.87	1.22	Vertical	-1.58	-0.20
PEP4A	Pulp Dryer No. 1 Stack 1	634,489.0	5,383,841.9	243.8	24.69	380.4	7.95	1.22	Vertical	-1.50	-0.19
PEP4B	Pulp Dryer No. 1 Stack 2	634,485.5	5,383,841.7	243.8	24.69	380.4	7.95	1.22	Vertical	-1.50	-0.19
PEP4C	Pulp Dryer No. 1 Stack 3	634,481.8	5,383,841.5	243.8	24.69	380.4	7.95	1.22	Vertical	-1.50	-0.19
PEP4D	Pulp Dryer No. 1 Stack 4	634,478.2	5,383,841.5	243.8	24.69	380.4	7.95	1.22	Vertical	-1.50	-0.19
PEP4E	Pulp Dryer No. 1 Stack 5	634,474.7	5,383,841.5	243.8	24.69	380.4	7.95	1.22	Vertical	-1.50	-0.19
PEP13	Belgian Lime Kiln	634,514.1	5,383,784.2	243.8	38.71	376.5	21	0.3	Vertical	-4.60	-0.58

Table 20- SO_2 Baseline Increment Point Source Modeling Parameters and Emission Rates

EMISSION POINT	EMISSION POINT DESCRIPTION	UTM X (m)	UTM Y (m)	ELEV. (m)	HEIGHT (m)	TEMP (K)	VELOCITY (m/s)	EXIT DIA. (m)	Orient. (vert/horiz)	SO_2 (lb/hr)	SO_2 (g/s)
PEP1	B & W Boiler	634,538.2	5,383,772.1	243.8	36.57	490.2	18.6	2.36	Vertical	-358.7	-45.20
PEP3A	Pulp Dryer No. 2 Stack 1	634,488.9	5,383,845.1	243.8	24.69	373.3	5.87	1.22	Vertical	-5.45	-0.69
PEP3B	Pulp Dryer No. 2 Stack 2	634,485.4	5,383,845.0	243.8	24.69	373.3	5.87	1.22	Vertical	-5.45	-0.69
PEP3C	Pulp Dryer No. 2 Stack 3	634,481.7	5,383,844.8	243.8	24.69	373.3	5.87	1.22	Vertical	-5.45	-0.69
PEP3D	Pulp Dryer No. 2 Stack 4	634,478.2	5,383,844.8	243.8	24.69	373.3	5.87	1.22	Vertical	-5.45	-0.69
PEP4A	Pulp Dryer No. 1 Stack 1	634,489.0	5,383,841.9	243.8	24.69	380.4	7.95	1.22	Vertical	-5.44	-0.69
PEP4B	Pulp Dryer No. 1 Stack 2	634,485.5	5,383,841.7	243.8	24.69	380.4	7.95	1.22	Vertical	-5.44	-0.69
PEP4C	Pulp Dryer No. 1 Stack 3	634,481.8	5,383,841.5	243.8	24.69	380.4	7.95	1.22	Vertical	-5.44	-0.69
PEP4D	Pulp Dryer No. 1 Stack 4	634,478.2	5,383,841.5	243.8	24.69	380.4	7.95	1.22	Vertical	-5.44	-0.69
PEP4E	Pulp Dryer No. 1 Stack 5	634,474.7	5,383,841.5	243.8	24.69	380.4	7.95	1.22	Vertical	-5.44	-0.69
PEP13	Belgian Lime Kiln	634,514.1	5,383,784.2	243.8	38.71	376.5	21.6	0.30	Vertical	-14.50	-1.83

6 Model Execution and Results

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

State[13] and federal[14] 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 21 and Table 22.

Table 21 – AAQS Results Summary

POLLUTANT	AVERAGING TIME	MODELED IMPACT (µg/m³)	BACKGROUND (µg/m³)	TOTAL IMPACT (µg/m³)	NDAAQS (µg/m³)	NAAQS (µg/m³)	PASSED (Y/N)
PM_{10}	24-HR[A]	111.7	30	141.7	150	150	Y
$PM_{2.5}$	Annual[B]	4.13	4.81[G]	8.94	12	12	Y
	24-HR[C]	18.6	15.9[H]	34.5	35	35	Y
SO_2	Annual[B]	5.28	3	8.28	80	80	Y
	24-HR[D]	69.5	9	78.5	365	365	Y
	3-HR[D]	206.6	11	217.6	1,300	1,300	Y
	1-HR[E]	151.1	13	164.1	196	196	Y
NO_2	Annual[B]	6.51	5	11.51	100	100	Y
	1-HR[F]	124.2	35	159.2	188	188	Y
CO	8-HR[D]	1,915	1,149	3,064	10,000	10,000	Y
	1-HR[D]	4,735	1,149	5,884	40,000	40,000	Y

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

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

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

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

[E] Modeled concentration is the 99th percentile (fourth-high) of the annual distribution of daily maximum 1-hr concentrations averaged across five years of met data.

[F] Modeled concentration is the 98th percentile (eighth-high) of the annual distribution of daily maximum 1-hr concentrations averaged across five years of met data.

[G] Includes MERP adjustment of 0.06 µg/m³ to account for secondary formation. See Section 6.1.1.

[H] Includes MERP adjustment of 2.16 µg/m³ to account for secondary formation. See Section 6.1.1.

[13] *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)

[14] *§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)

Table 22 – PSD Class II Increment Results Summary

POLLUTANT	AVERAGING TIME	MODELED IMPACT ($\mu g/m^3$)	CLASS II INCREMENT ($\mu g/m^3$)	INCREMENT CONSUMED	PASSED (Y/N)
PM_{10}	Annual[A]	-0.004	17	0%	Y
	24-HR[B]	25.1	30	84%	Y
$PM_{2.5}$	Annual[A]	0.54	4	14%	Y
	24-HR[B]	3.99	9	44%	Y
SO_2	Annual[A]	-0.01	20	0%	Y
	24-HR[B]	0.48	91	1%	Y
	3-HR[B]	2.80	512	1%	Y
NO_2	Annual[A]	3.22	25	13%	Y

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

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

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.[15] 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.[16] 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 presented in Table 21. For a more in-depth examination of the MERPs calculations, refer to Appendix E of the permit application.

Table 23 - $PM_{2.5}$ MERPs Summary

Averaging Period	Precursor	Calculated Impact (µg/m3)	Cumulative Impact (µg/m3)
24-Hour	NO_x	0.12	2.16
	SO_2	2.04	
Annual	NO_x	0.008	0.06
	SO_2	0.052	

[15] *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)

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

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, ND 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 24 - O_3 MERPs Summary

Averaging Period	Precursor	Calculated Impact (ppb)	Cumulative Impact (ppb)
8-Hour	NO_x	1.52	1.75
	VOC	0.23	

Table 25 shows a summary of the 4th-high 8-hour O_3 monitoring data for all sites across North Dakota.[17] The highest 3-year average (2019-2021) O_3 concentration recorded for any county in North Dakota was 0.062 ppm. Adding the calculated O_3 MERPs of 0.00175 ppm (1.75 ppb) to the monitoring data results in a total O_3 concentration of 0.06375 ppm. The total O_3 concentration remains below the design concentration of 0.07 ppm for O_3, demonstrating compliance with the NAAQS.

Table 25 - O_3 Monitoring Data Summary

County	2019 (ppm)	2020 (ppm)	2021 (ppm)	3-Year Average (ppm)
Billings	0.058	0.053	0.069	0.06
Burke	0.056	0.053	0.061	0.057
Cass	0.062	0.056	0.063	0.06
Dunn	0.063	0.054	0.068	0.062
McKenzie	0.06	0.051	0.064	0.058
Mercer	0.059	0.052	0.065	0.059
Oliver	0.061	0.055	0.065	0.06
Ward	0.063	0.051	0.057	0.057

[17] *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)

6.1.3 1-HR NO_2 Modeling Methodology (Tier II)

The determination of 1-hour NO_2 impacts was conducted using the EPA-approved Tier II modeling methodology known as ARM2. Default in-stack NO_2/NO_x ratios of 0.5 minimum and 0.9 maximum were used.

7 Summary & Conclusions

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

ACS-Drayton followed all applicable State and Federal guidance in their modeling protocol.

ACS-Drayton 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 21.

ACS-Drayton 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 22.

8 Plots

Model Set-Up

AAQS Analysis

PSD Increment Analysis

PROJECT TITLE:

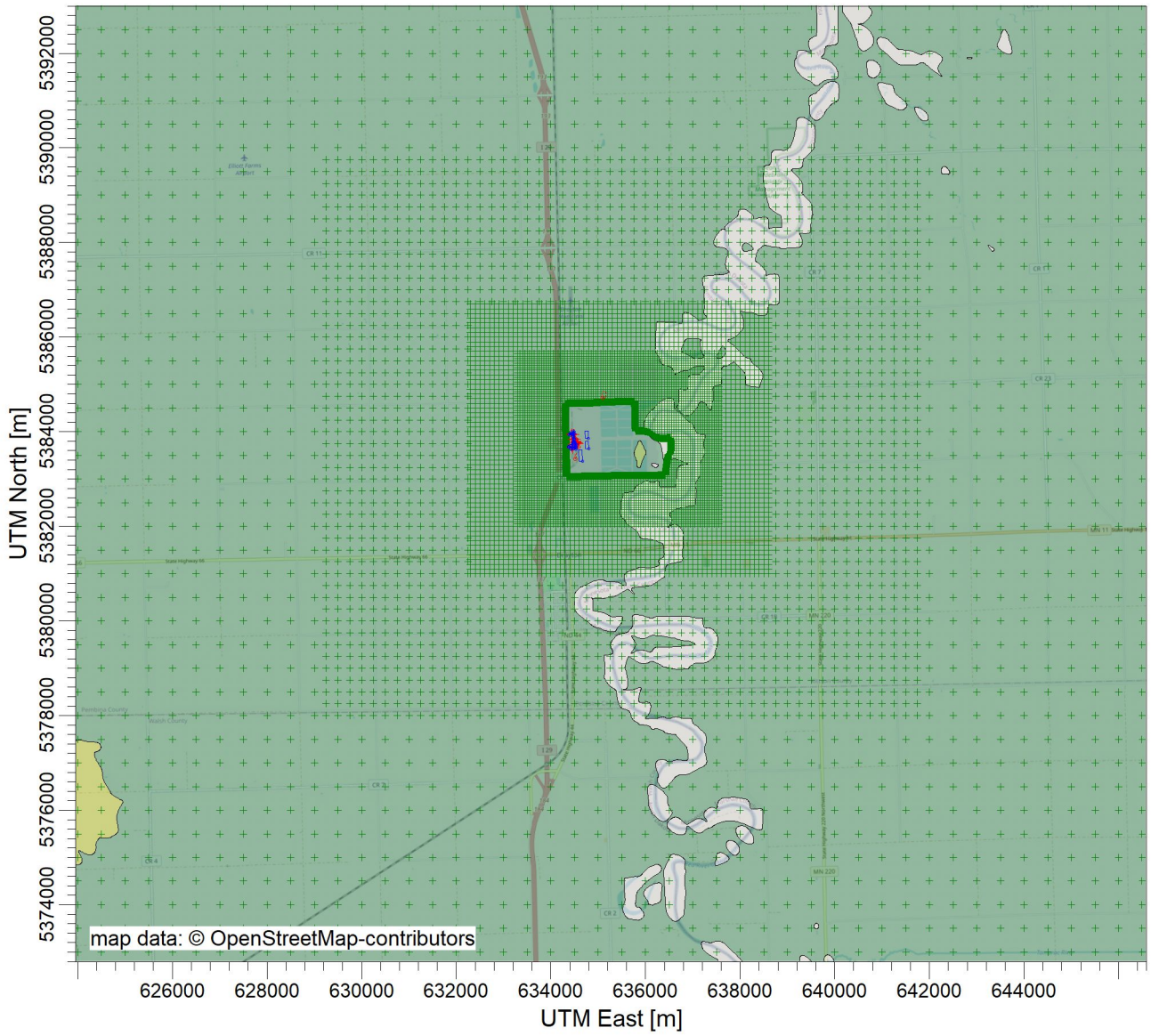
American Crystal Sugar - Drayton
Plot 1 - Site

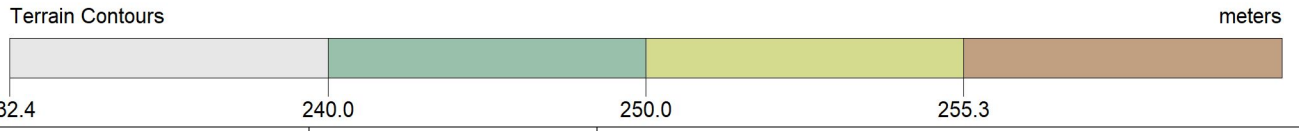
COMMENTS:	SOURCES: **22**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **11423**	MODELER: **Rhannon Thorton**	NORTH Dakota Be Legendary. | Environmental Quality
		SCALE: 1:41,236 0 1 km	
		DATE: **10/25/2023**	PROJECT NO.: **ACP-18197 v1.0**

AERMOD View - Lakes Environmental Software

PROJECT TITLE:

American Crystal Sugar - Drayton
Plot 2 - Terrain Contours





COMMENTS: Terrain/Elevation	SOURCES: **22**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **11423**	MODELER: **Rhannon Thorton**	
		SCALE: 1:142,354 0 5 km	
		DATE: **10/25/2023**	PROJECT NO.: **ACP-18197 v1.0**

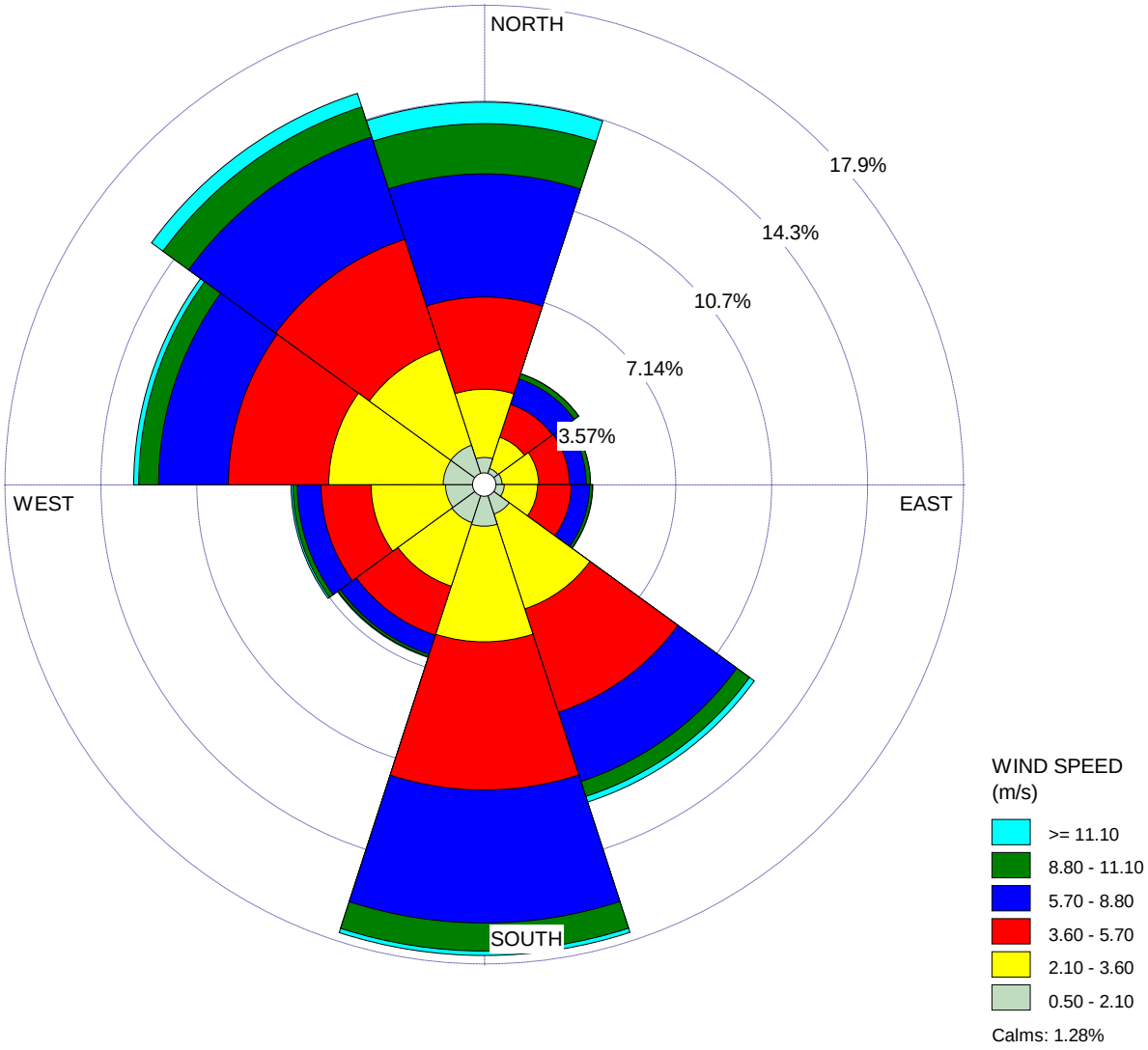
NORTH Dakota Be Legendary.™ | Environmental Quality

WIND ROSE PLOT:

American Crystal Sugar - Drayton
Plot 3 - Windrose

DISPLAY:

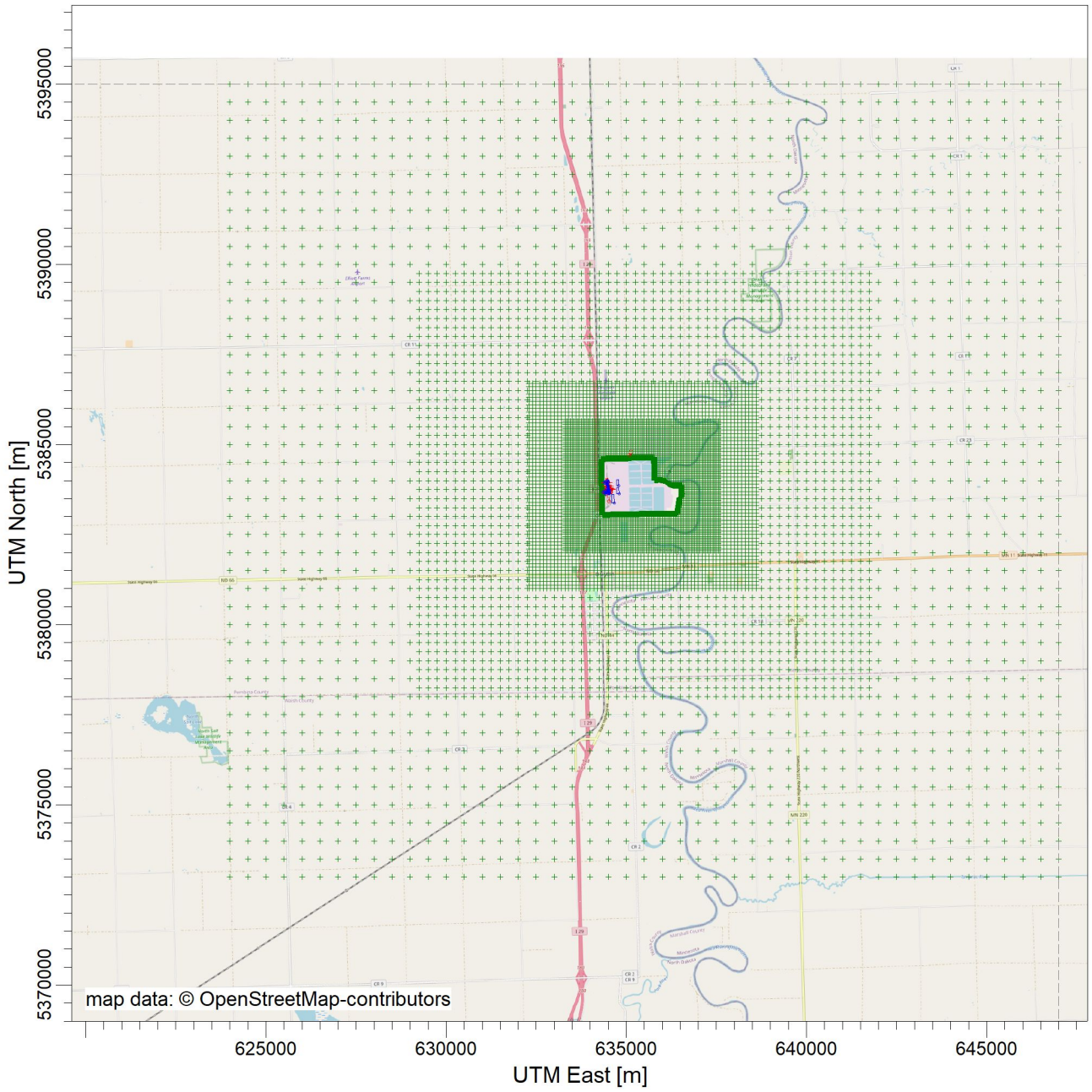
Wind Speed
Direction (blowing from)



COMMENTS: Grand Forks, ND Station No. 14916 Years: 2009-2014	DATA PERIOD: **Start Date: 1/1/2009 - 00:00** **End Date: 12/31/2013 - 23:59**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
		MODELER: **Rhannon Thorton**	NORTH Dakota Be Legendary.™ | Environmental Quality
	CALM WINDS: **1.28%**	TOTAL COUNT: **43816 hrs.**	
	AVG. WIND SPEED: **4.72 m/s**	DATE: **10/25/2023**	PROJECT NO.: **ACP-18197 v1.0**

PROJECT TITLE:

American Crystal Sugar - Drayton
Plot 4 - Receptor Grid

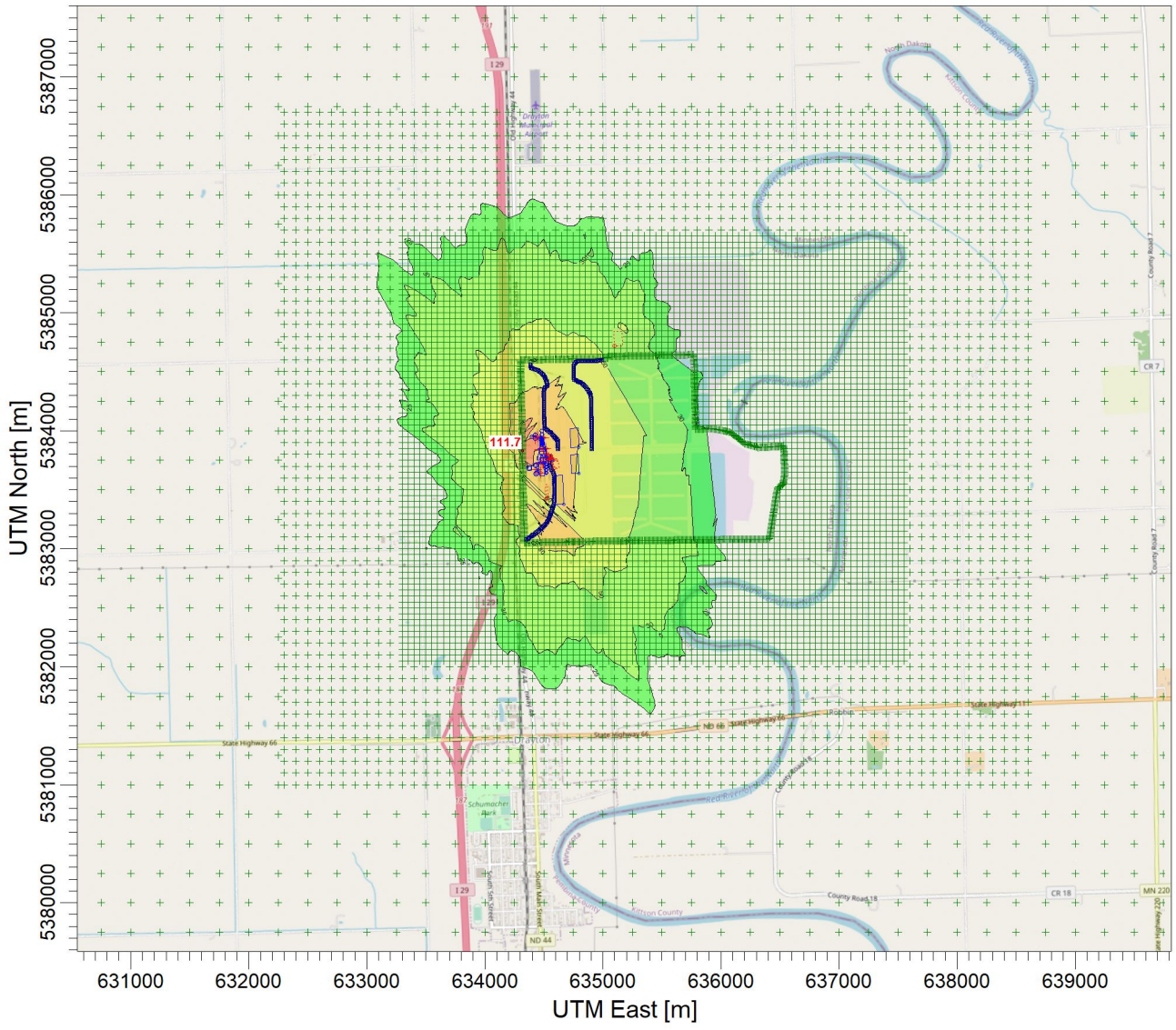


COMMENTS:	SOURCES: **22**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **11423**	MODELER: **Rhannon Thorton**	
		SCALE: 1:177,351 — 0 — 5 km	
		DATE: **10/25/2023**	PROJECT NO.: **ACP-18197 v1.0**

NORTH Dakota Be Legendary.™ | Environmental Quality

PROJECT TITLE:

American Crystal Sugar - Drayton
Plot 5 - PM10 24-HR AAQS



PLOT FILE OF HIGH 6TH HIGH 24-HR VALUES FOR SOURCE GROUP: ALL

ug/m^3

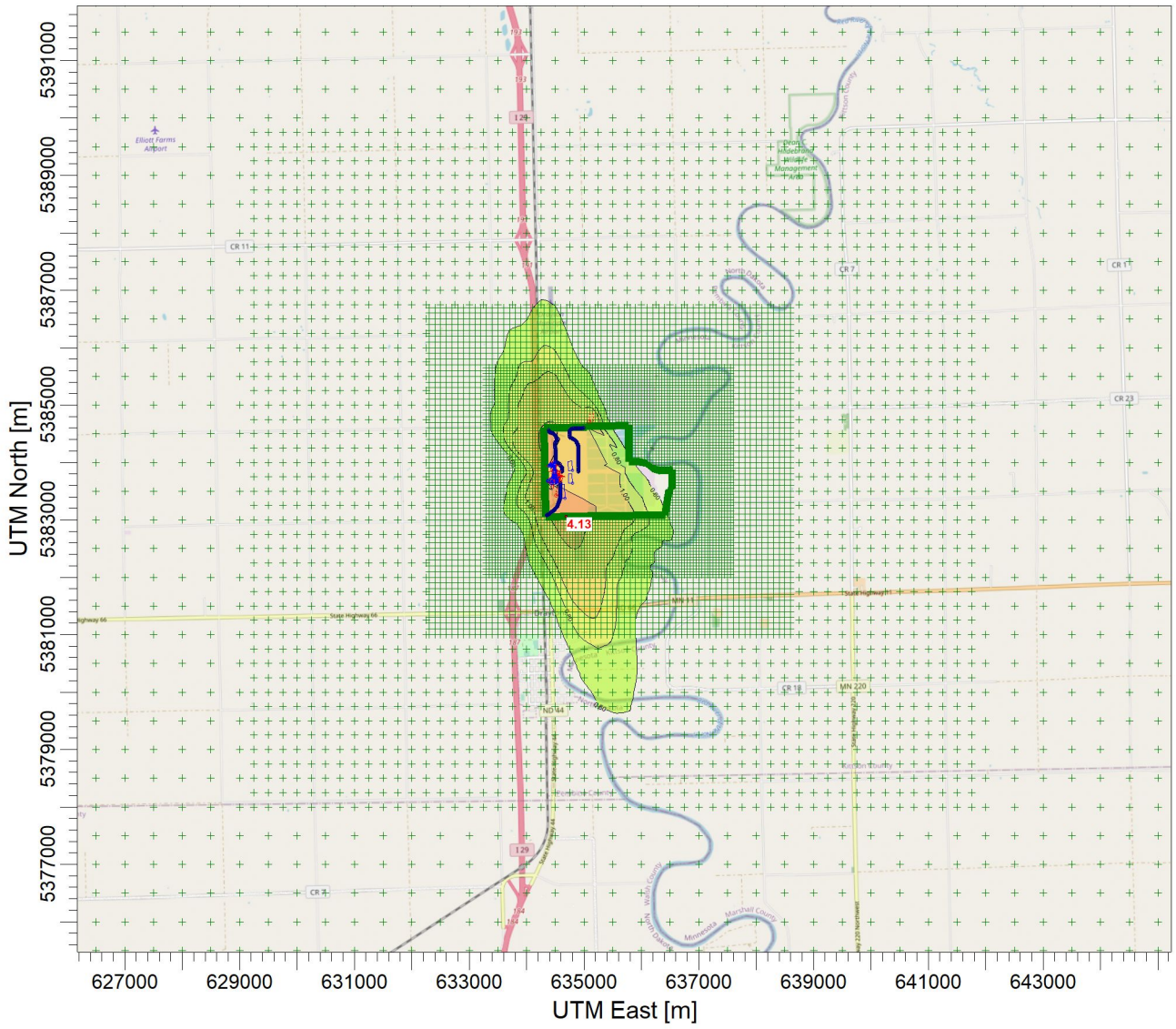
Max: 112 [ug/m^3] at (634318.00, 5383829.70)

25 30 50 80 100 112

COMMENTS: Background is 30 µg/m3. Total Impact is 141.7 µg/m3. AAQS is 150 µg/m3.	SOURCES: **205**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **11423**	MODELER: **Rhannon Thorton**	NORTH Dakota Be Legendary. | Environmental Quality
	OUTPUT TYPE: **Concentration**	SCALE: 1:58,297 0 2 km	
	MAX: **112 ug/m^3**	DATE: **10/19/2023**	PROJECT NO.: **ACP-18197 v1.0**

PROJECT TITLE:

American Crystal Sugar - Drayton
Plot 6 - PM2.5 Annual AAQS



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

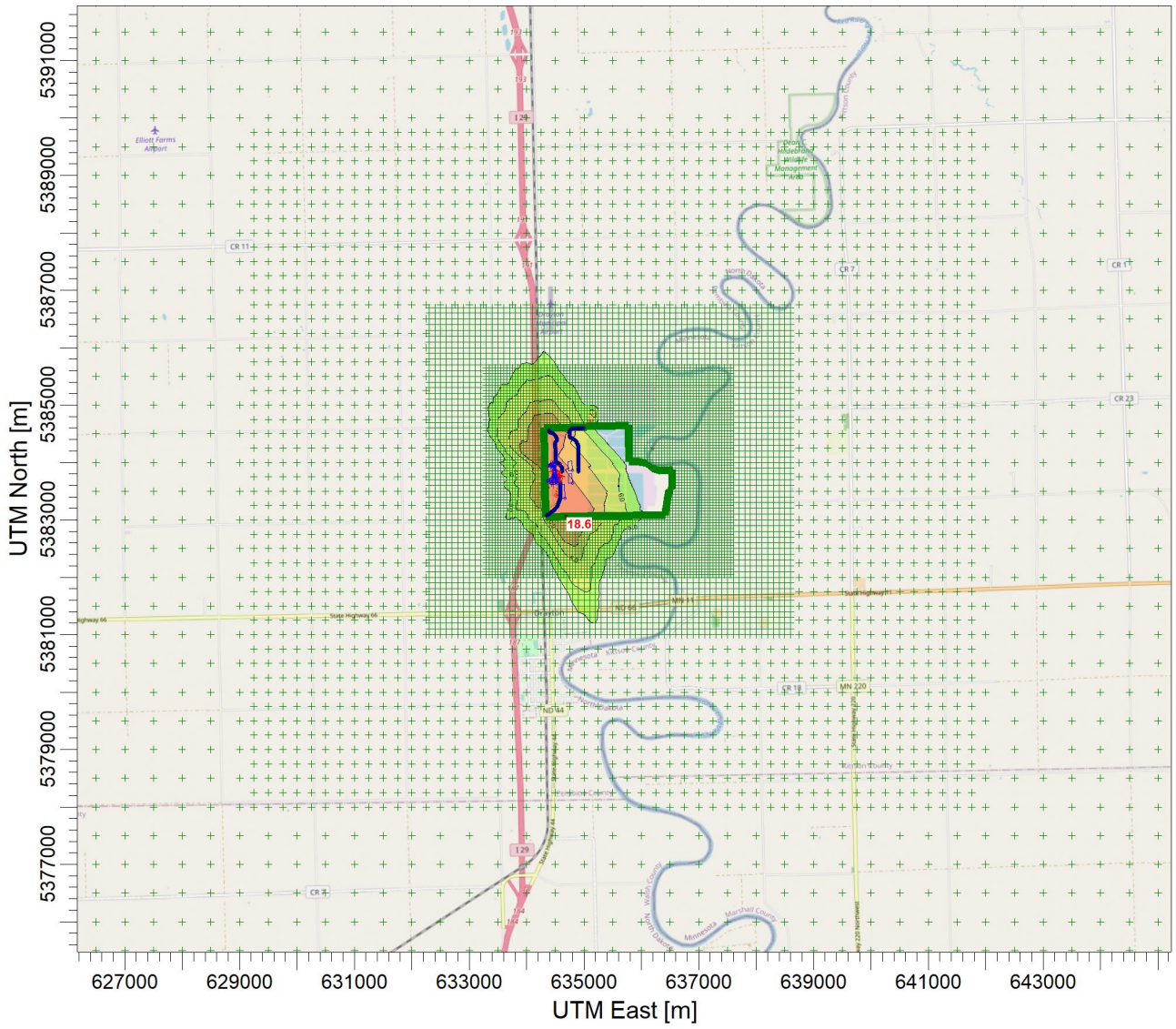
Max: 4.13 [ug/m^3] at (634686.10, 5383058.50)

0.60 0.80 1.00 2.00 4.00 4.13

COMMENTS: Background is 4.81 µg/m3. Highest met year : 2013 Total Impact is 8.94 µg/m3. AAQS is 12 µg/m3.	SOURCES: **205**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **11423**	MODELER: **Rhannon Thorton**	NORTH Dakota Be Legendary. | Environmental Quality
	OUTPUT TYPE: **Concentration**	SCALE: 1:119,901 0 4 km	
	MAX: **4.13 ug/m^3**	DATE: **10/19/2023**	PROJECT NO.: **ACP-18197 v1.0**

PROJECT TITLE:

American Crystal Sugar - Drayton
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

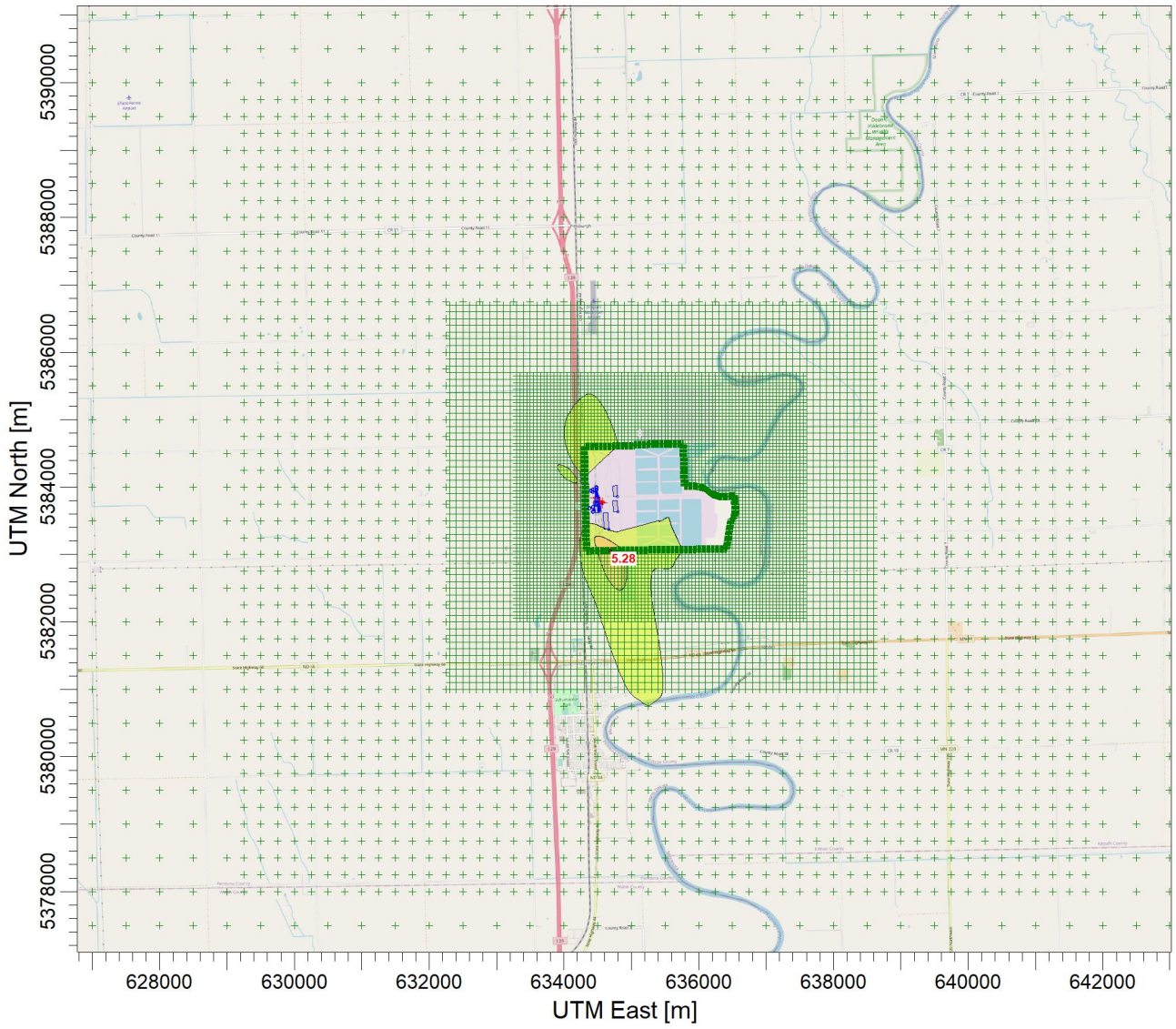
Max: 18.6 [ug/m^3] at (634686.10, 5383058.50)

5.0 6.0 8.0 10.0 18.6

COMMENTS: Background is 15.9 µg/m3. Total Impact is 34.5 µg/m3. AAQS is 35 µg/m3.	SOURCES: **205**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **11423**	MODELER: **Rhannon Thorton**	NORTH Dakota Be Legendary. | Environmental Quality
	OUTPUT TYPE: **Concentration**	SCALE: 1:119,901 0 4 km	
	MAX: **18.6 ug/m^3**	DATE: **10/19/2023**	PROJECT NO.: **ACP-18197 v1.0**

PROJECT TITLE:

American Crystal Sugar - Drayton
Plot 8 - SO2 Annual AAQS



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

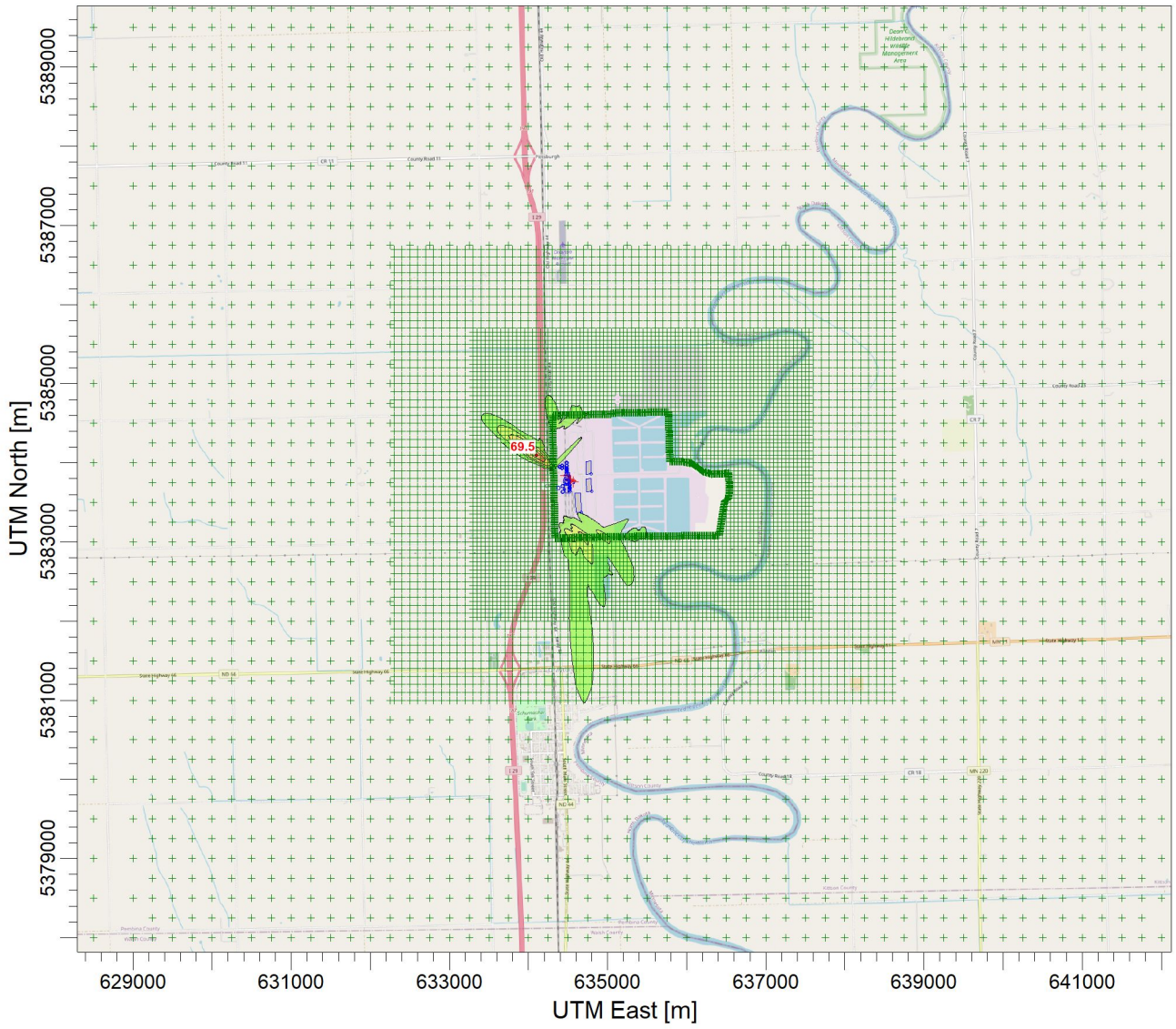
Max: 5.28 [ug/m^3] at (634686.10, 5383058.50)

1.50 3.00 5.00 5.28

COMMENTS: Background is 3 µg/m3. Highest met year: 2013 Total Impact is 8.28 µg/m3. AAQS is 80 µg/m3.	SOURCES: **6**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **11423**	MODELER: **Rhannon Thorton**	NORTH Dakota Be Legendary. | Environmental Quality
	OUTPUT TYPE: **Concentration**	SCALE: 1:102,132 0 4 km	
	MAX: **5.28 ug/m^3**	DATE: **1/8/2024**	PROJECT NO.: **ACP-18197 v1.0**

PROJECT TITLE:

American Crystal Sugar - Drayton
Plot 9 - SO2 24-HR AAQS



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

ug/m^3

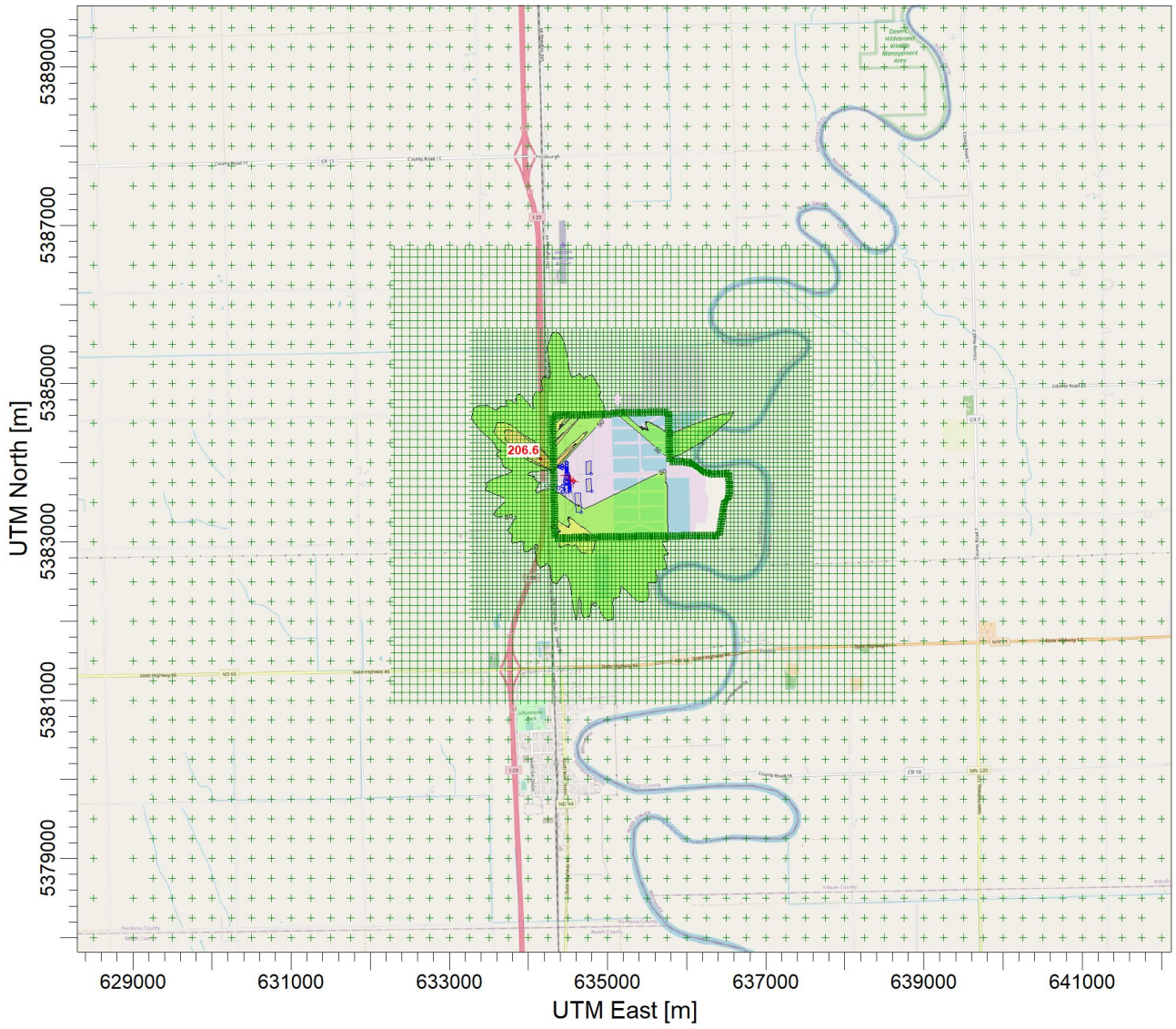
Max: 69.5 [ug/m^3] at (634100.00, 5384100.00)

25.0 35.0 45.0 60.0 69.5

COMMENTS: Background is 9 µg/m3. Highest met year : 2010 Total Impact is 78.5 µg/m3. AAQS is 365 µg/m3.	SOURCES: **6**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **11423**	MODELER: **Rhannon Thorton**	NORTH Dakota Be Legendary. | Environmental Quality
	OUTPUT TYPE: **Concentration**	SCALE: 1:86,992 0 3 km	
	MAX: **69.5 ug/m^3**	DATE: **10/19/2023**	PROJECT NO.: **ACP-18197 v1.0**

PROJECT TITLE:

American Crystal Sugar - Drayton
Plot 10 - SO2 3-HR AAQS



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

Max: 207 [ug/m^3] at (634150.00, 5384050.00)

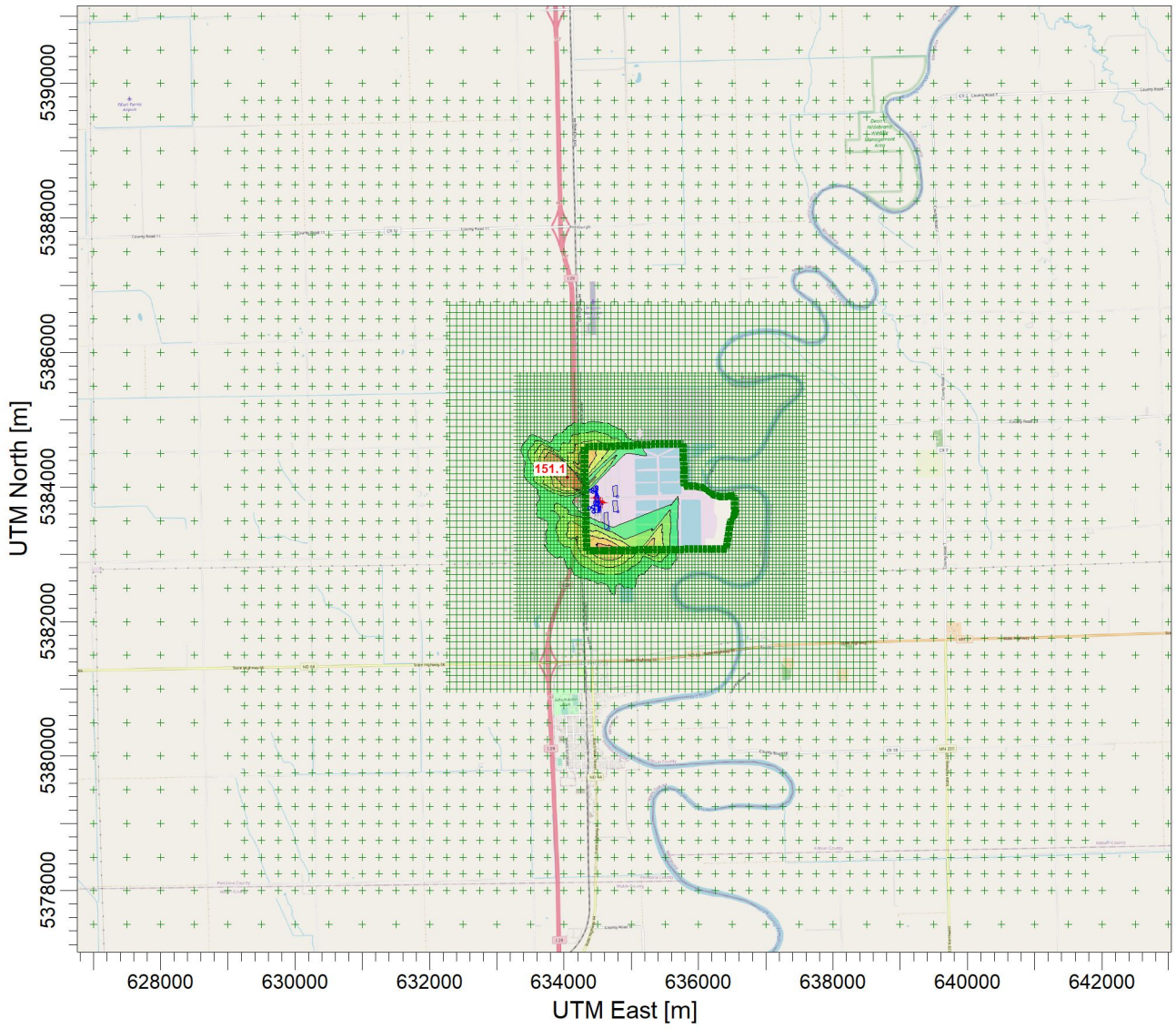
50 80 100 200 207

COMMENTS: Background is 11 µg/m3. Highest met year : 2010 Total Impact is 217.6 µg/m3. AAQS is 1300 µg/m3.	SOURCES: **6**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **11423**	MODELER: **Rhannon Thorton**	NORTH Dakota Be Legendary. | Environmental Quality
	OUTPUT TYPE: **Concentration**	SCALE: 1:86,994 0 3 km	
	MAX: **207 ug/m^3**	DATE: **10/19/2023**	PROJECT NO.: **ACP-18197 v1.0**

AERMOD View - Lakes Environmental Software

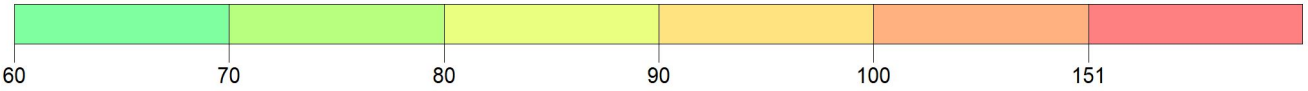
PROJECT TITLE:

American Crystal Sugar - Drayton
Plot 11 - SO2 1-HR AAQS



PLOT FILE OF 4TH-HIGHEST MAX DAILY 1-HR VALUES AVERAGED OVER 5 YEARS FOR SOURCE GROUP: ALL ug/m^3

Max: 151 [ug/m^3] at (634050.00, 5384150.00)

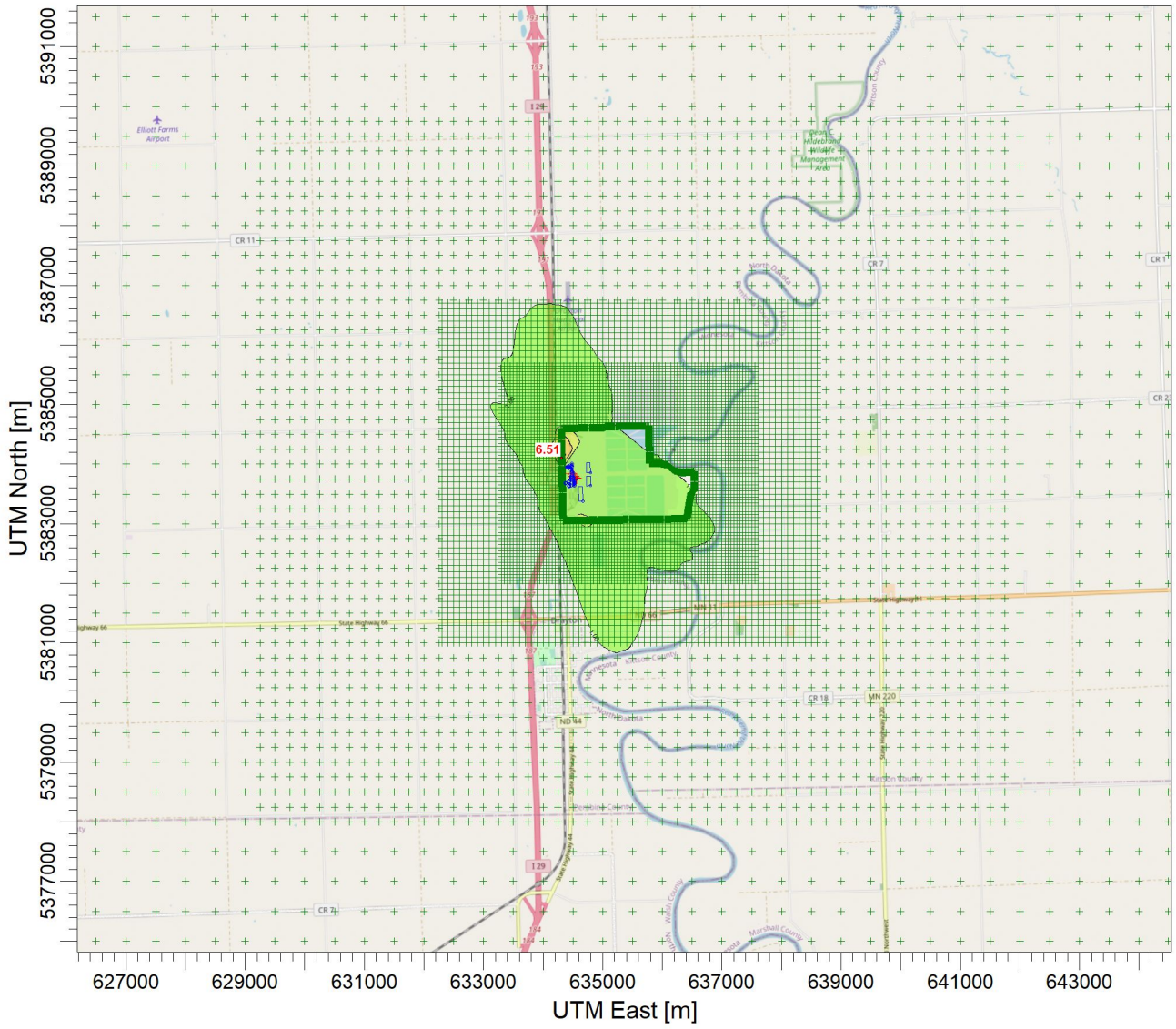


COMMENTS: Background is 13 µg/m3. Total Impact is 164.1 µg/m3. AAQS is 196 µg/m3.	SOURCES: **6**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **11423**	MODELER: **Rhannon Thorton**	NORTH Dakota Be Legendary. | Environmental Quality
	OUTPUT TYPE: **Concentration**	SCALE: 1:102,349 0 — 4 km	
	MAX: **151 ug/m^3**	DATE: **1/8/2024**	PROJECT NO.: **ACP-18197 v1.0**

AERMOD View - Lakes Environmental Software

PROJECT TITLE:

American Crystal Sugar - Drayton
Plot 12 - NO2 Annual AAQS



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

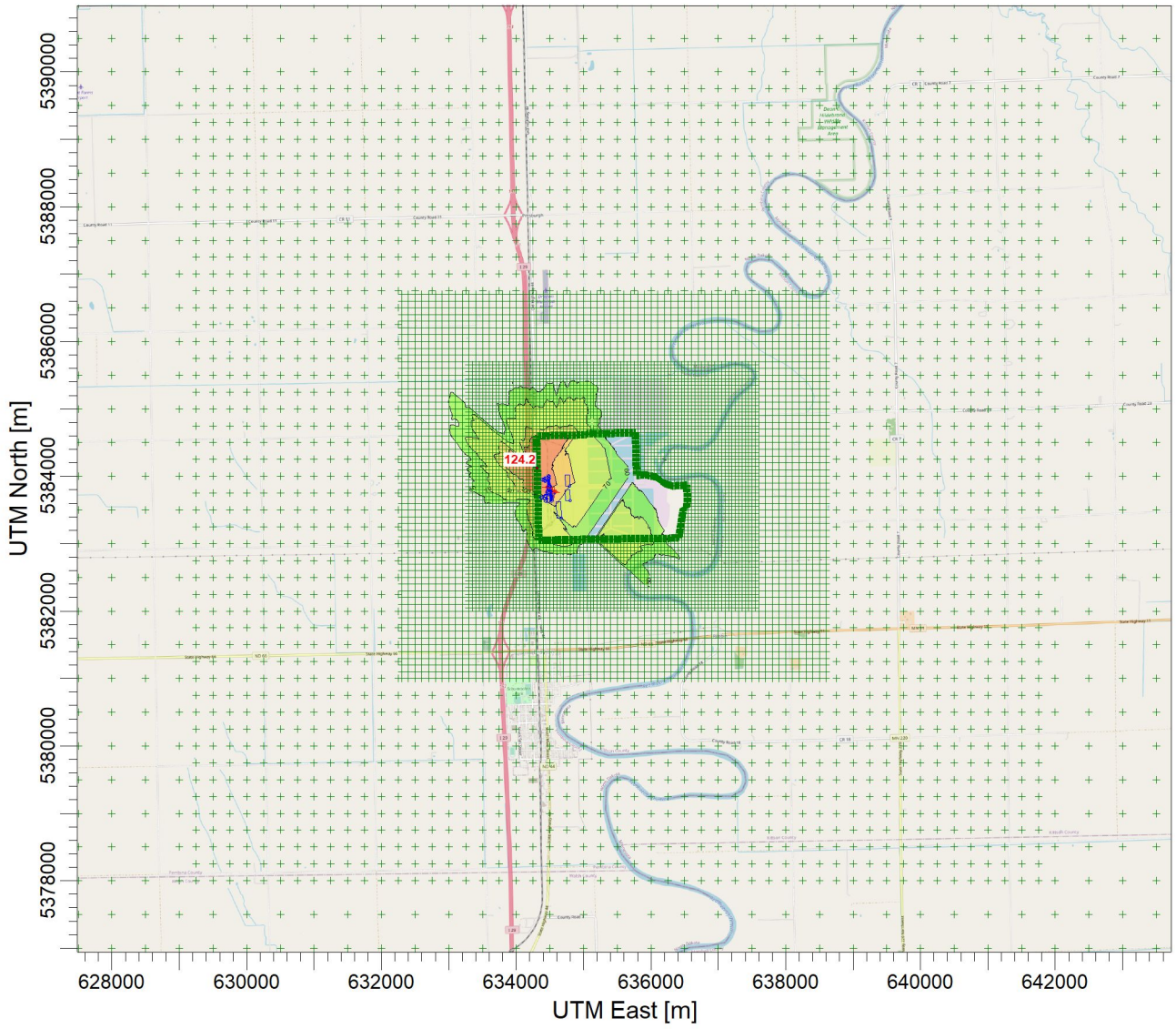
Max: 6.51 [ug/m^3] at (634312.50, 5384099.60)

1.00 4.00 5.00 6.00 6.51

COMMENTS: Background is 5 µg/m3. Highest met year : 2012 Total Impact is 11.51 µg/m3. AAQS is 100 µg/m3.	SOURCES: **6**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **11423**	MODELER: **Rhannon Thorton**	NORTH Dakota Be Legendary. | Environmental Quality
	OUTPUT TYPE: **Concentration**	SCALE: 1:115,469 0 4 km	
	MAX: **6.51 ug/m^3**	DATE: **10/19/2023**	PROJECT NO.: **ACP-18197 v1.0**

PROJECT TITLE:

American Crystal Sugar - Drayton
Plot 13 - NO2 1-HR AAQS



PLOT FILE OF 8TH-HIGHEST MAX DAILY 1-HR VALUES AVERAGED OVER 5 YEARS FOR SOURCE GROUP: ALL ug/m^3

Max: 124 [ug/m^3] at (634312.10, 5384119.50)

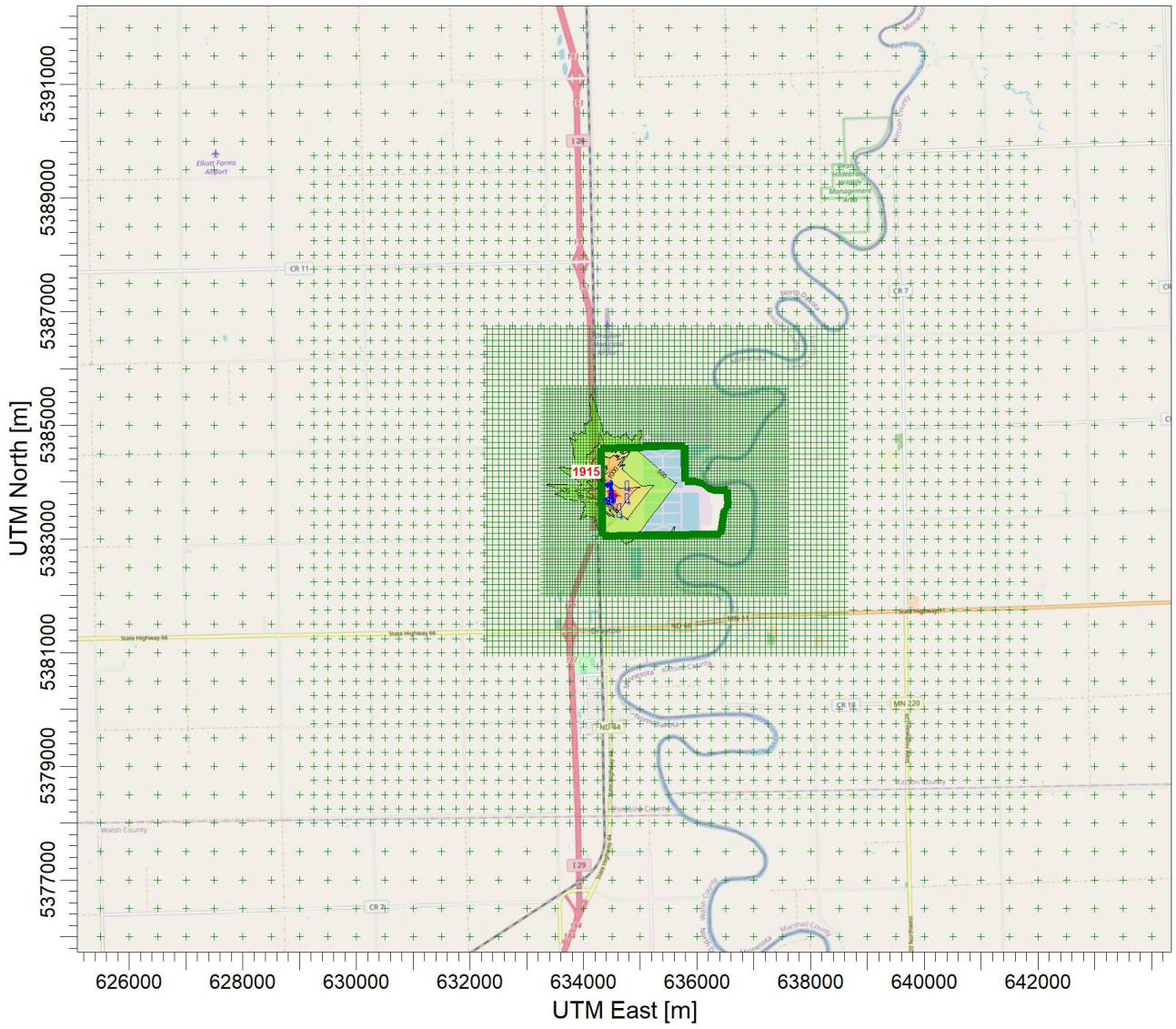
60 70 90 100 124

COMMENTS: Background is 35 µg/m3. Total Impact is 159.2 µg/m3. AAQS is 188 µg/m3.	SOURCES: **6**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **11423**	MODELER: **Rhannon Thorton**	NORTH Dakota Be Legendary. | Environmental Quality
	OUTPUT TYPE: **Concentration**	SCALE: 1:102,133 0 4 km	
	MAX: **124 ug/m^3**	DATE: **10/19/2023**	PROJECT NO.: **ACP-18197 v1.0**

AERMOD View - Lakes Environmental Software

PROJECT TITLE:

American Crystal Sugar - Drayton
Plot 14 - CO 8-HR AAQS



PLOT FILE OF HIGH 2ND HIGH 8-HR VALUES FOR SOURCE GROUP: ALL ug/m^3

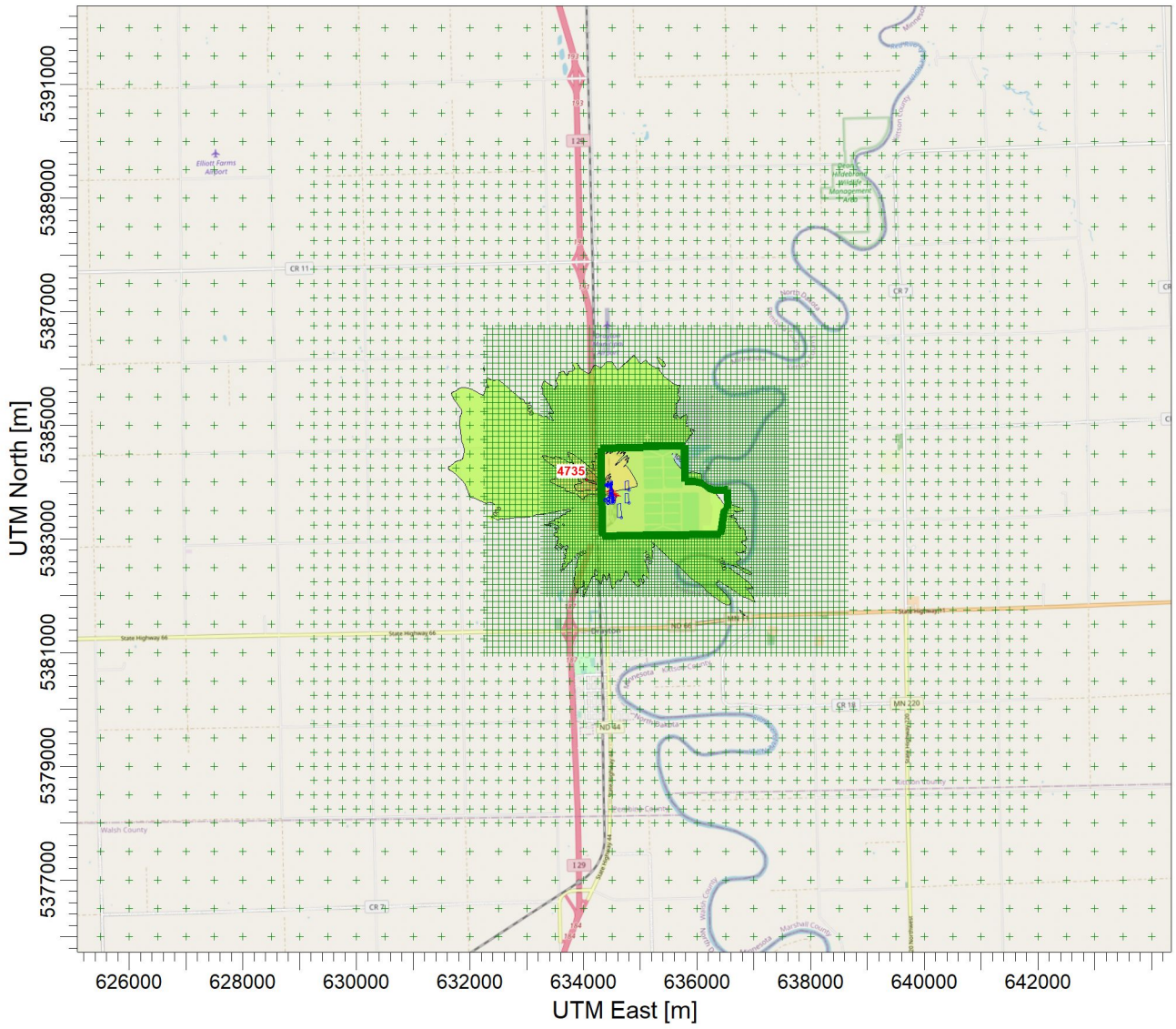
Max: 1915 [ug/m^3] at (634313.70, 5384039.60)

500 800 1000 1500 1915

COMMENTS: Background is 1,149 µg/m3. Highest met year : 2009 Total Impact is 3,064 µg/m3. AAQS is 10,000 µg/m3.	SOURCES: **6**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **11423**	MODELER: **Rhannon Thorton**	NORTH Dakota Be Legendary. | Environmental Quality
	OUTPUT TYPE: **Concentration**	SCALE: 1:121,158 0 4 km	
	MAX: **1915 ug/m^3**	DATE: **10/19/2023**	PROJECT NO.: **ACP-18197 v1.0**

PROJECT TITLE:

American Crystal Sugar - Drayton
Plot 15 - CO 1-HR AAQS



PLOT FILE OF HIGH 2ND HIGH 1-HR VALUES FOR SOURCE GROUP: ALL ug/m^3

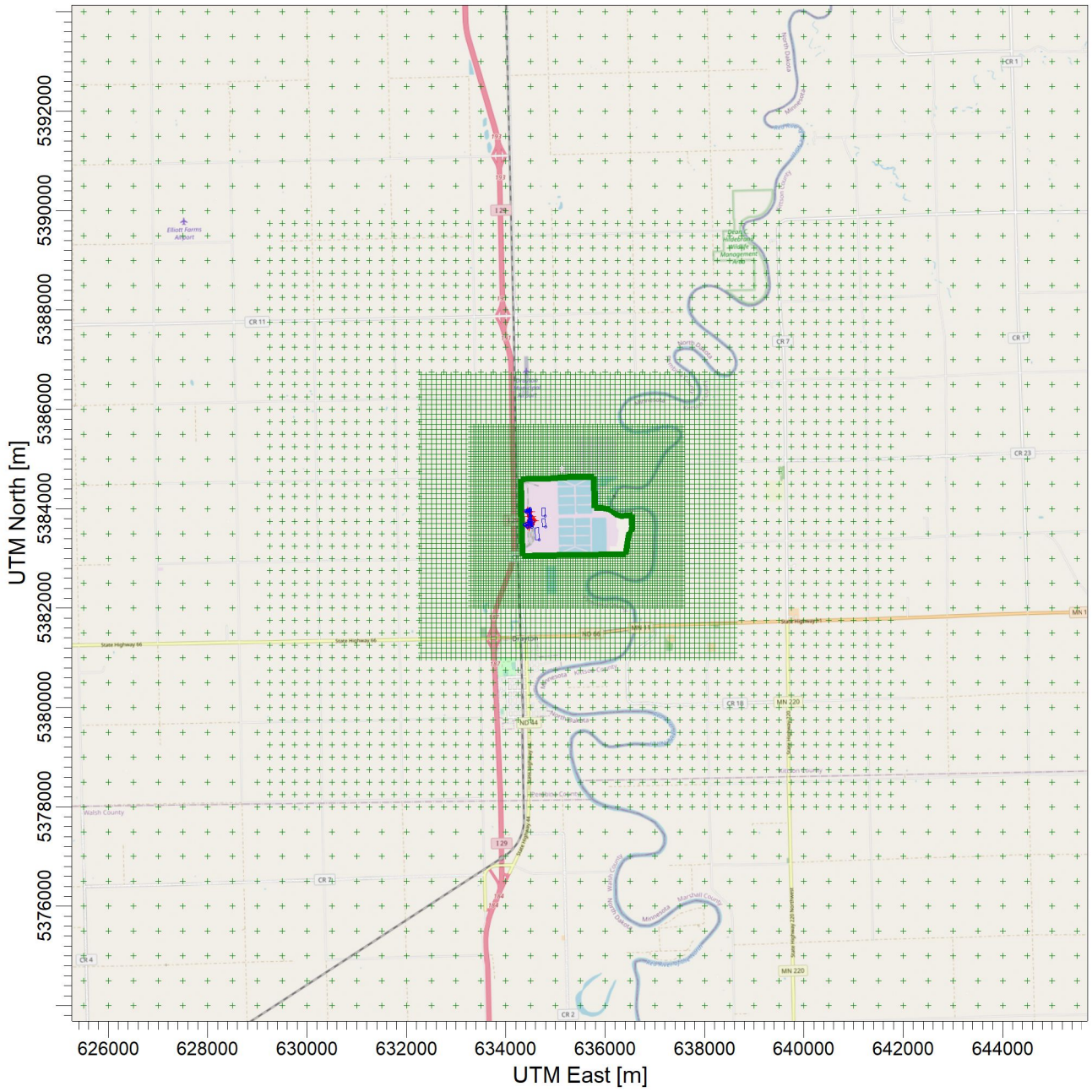
Max: 4735 [ug/m^3] at (634050.00, 5384050.00)

1000 2500 3500 4500 4735

COMMENTS: Background is 1,149 µg/m3. Highest met year : 2010 Total Impact is 5,884 µg/m3. AAQS is 40,000 µg/m3.	SOURCES: **6**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **11423**	MODELER: **Rhannon Thorton**	NORTH Dakota Be Legendary. | Environmental Quality
	OUTPUT TYPE: **Concentration**	SCALE: 1:121,158 0 4 km	
	MAX: **4735 ug/m^3**	DATE: **10/19/2023**	PROJECT NO.: **ACP-18197 v1.0**

PROJECT TITLE:

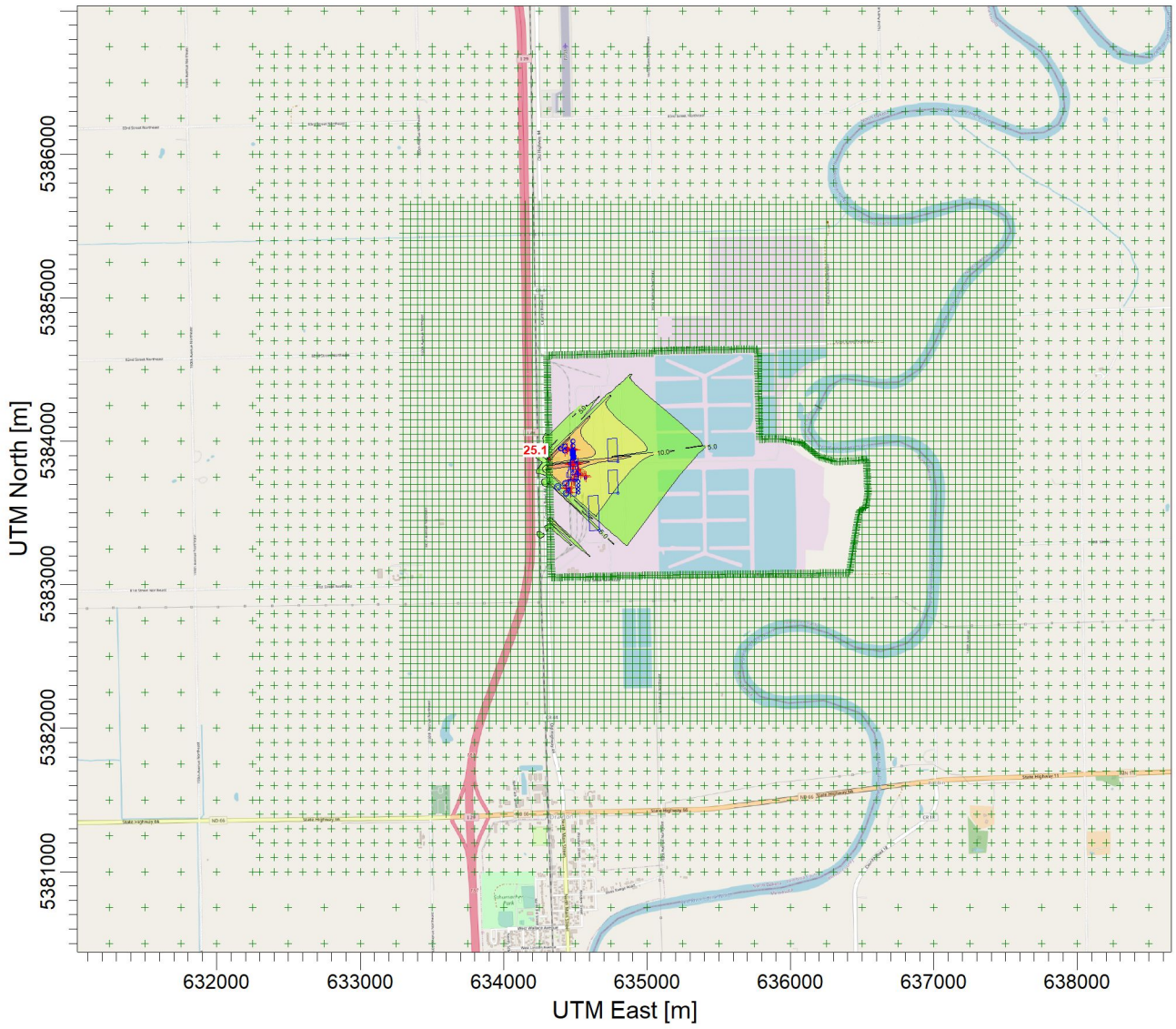
American Crystal Sugar - Drayton
Plot 16 - PSD Increment PM10 Annual



COMMENTS: Highest met year : 2013 Class II standard is 17 µg/m3.	SOURCES: **46**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **11423**	MODELER: **Rhannon Thorton**	
	OUTPUT TYPE: **Concentration**	SCALE: 1:128,628 0 5 km	
	MAX: **-0.004 ug/m^3**	DATE: **10/19/2023**	PROJECT NO.: **ACP-18197 v1.0**

PROJECT TITLE:

American Crystal Sugar - Drayton
Plot 17 - PSD Increment PM10 24-HR



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

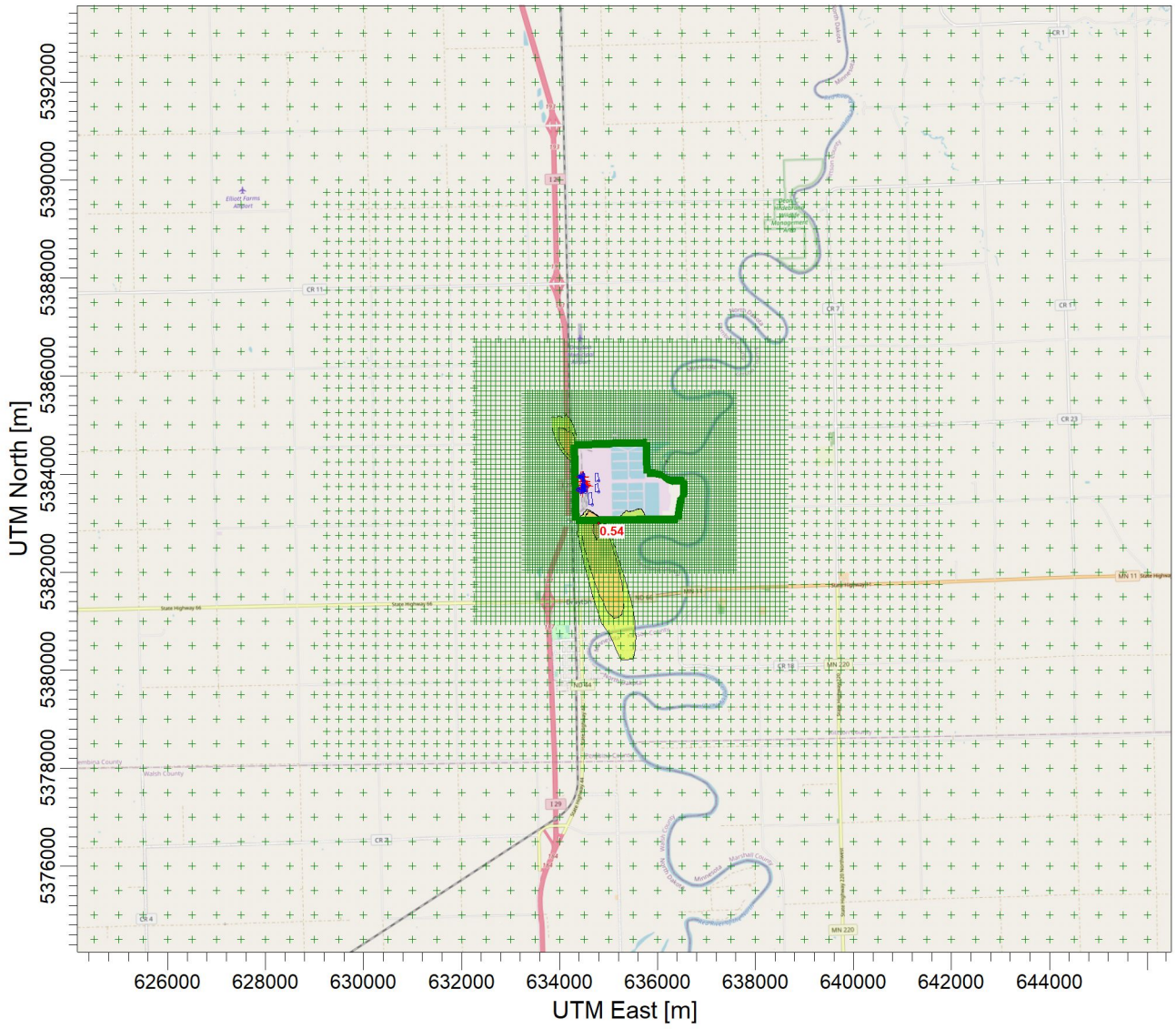
Max: 25.1 [ug/m^3] at (634317.00, 5383879.70)

5.0 10.0 15.0 20.0 25.1

COMMENTS: Highest met year : 2010 Class II standard is 30 µg/m3.	SOURCES: **46**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **11423**	MODELER: **Rhannon Thorton**	NORTH Dakota Be Legendary. | Environmental Quality
	OUTPUT TYPE: **Concentration**	SCALE: 1:47,984 0 1 km	
	MAX: **25.1 ug/m^3**	DATE: **10/19/2023**	PROJECT NO.: **ACP-18197 v1.0**

PROJECT TITLE:

American Crystal Sugar - Drayton
Plot 18 - PSD Increment PM2.5 Annual



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

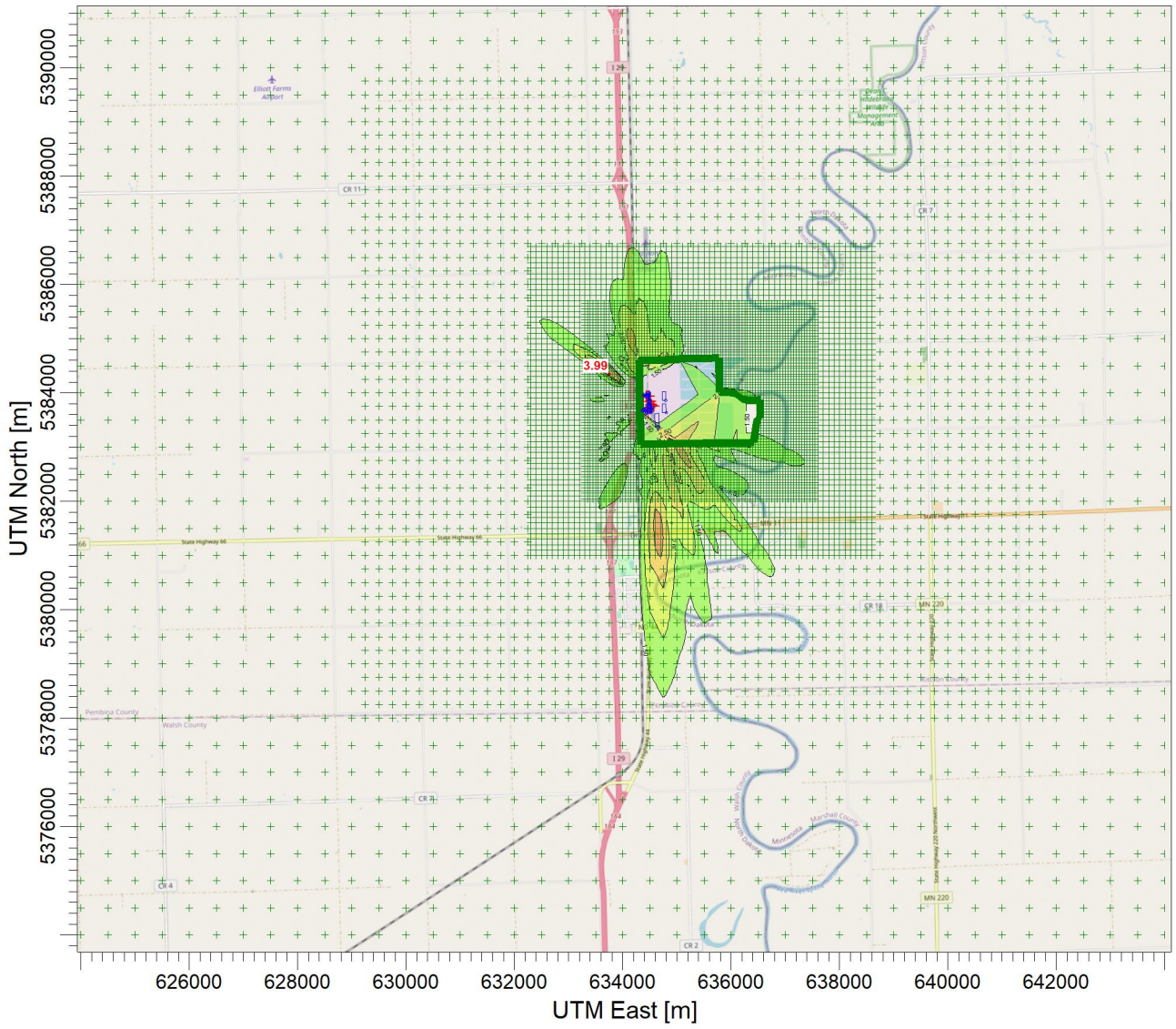
Max: 0.544 [ug/m^3] at (634800.00, 5383000.00)

0.250 0.300 0.500 0.544

COMMENTS: Highest met year : 2013 Class II standard is 4 µg/m3.	SOURCES: **42**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **11423**	MODELER: **Rhannon Thorton**	NORTH Dakota Be Legendary. | Environmental Quality
	OUTPUT TYPE: **Concentration**	SCALE: 1:140,460 0 5 km	
	MAX: **0.544 ug/m^3**	DATE: **10/19/2023**	PROJECT NO.: **ACP-18197 v1.0**

PROJECT TITLE:

American Crystal Sugar - Drayton
Plot 19 - PSD Increment PM2.5 24-HR



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

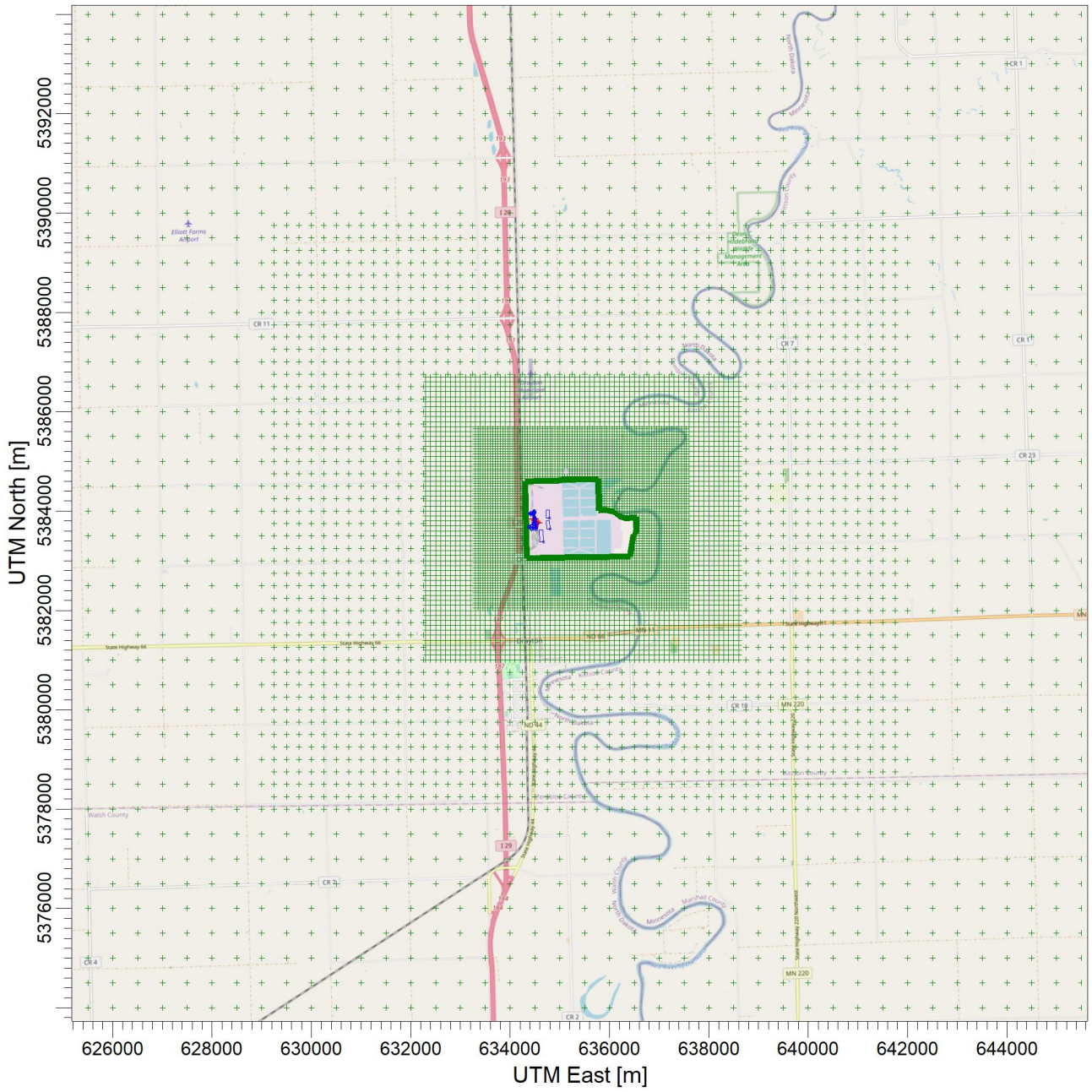
Max: 3.99 [ug/m^3] at (633750.00, 5384350.00)

1.50 2.00 2.50 3.00 3.99

COMMENTS: Highest met year : 2010 Class II standard is 9 µg/m3.	SOURCES: **42**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **11423**	MODELER: **Rhannon Thorton**	NORTH Dakota Be Legendary. | Environmental Quality
	OUTPUT TYPE: **Concentration**	SCALE: 1:126,992 0 5 km	
	MAX: **3.99 ug/m^3**	DATE: **10/19/2023**	PROJECT NO.: **ACP-18197 v1.0**

PROJECT TITLE:

American Crystal Sugar - Drayton
Plot 20 - PSD Increment SO2 Annual

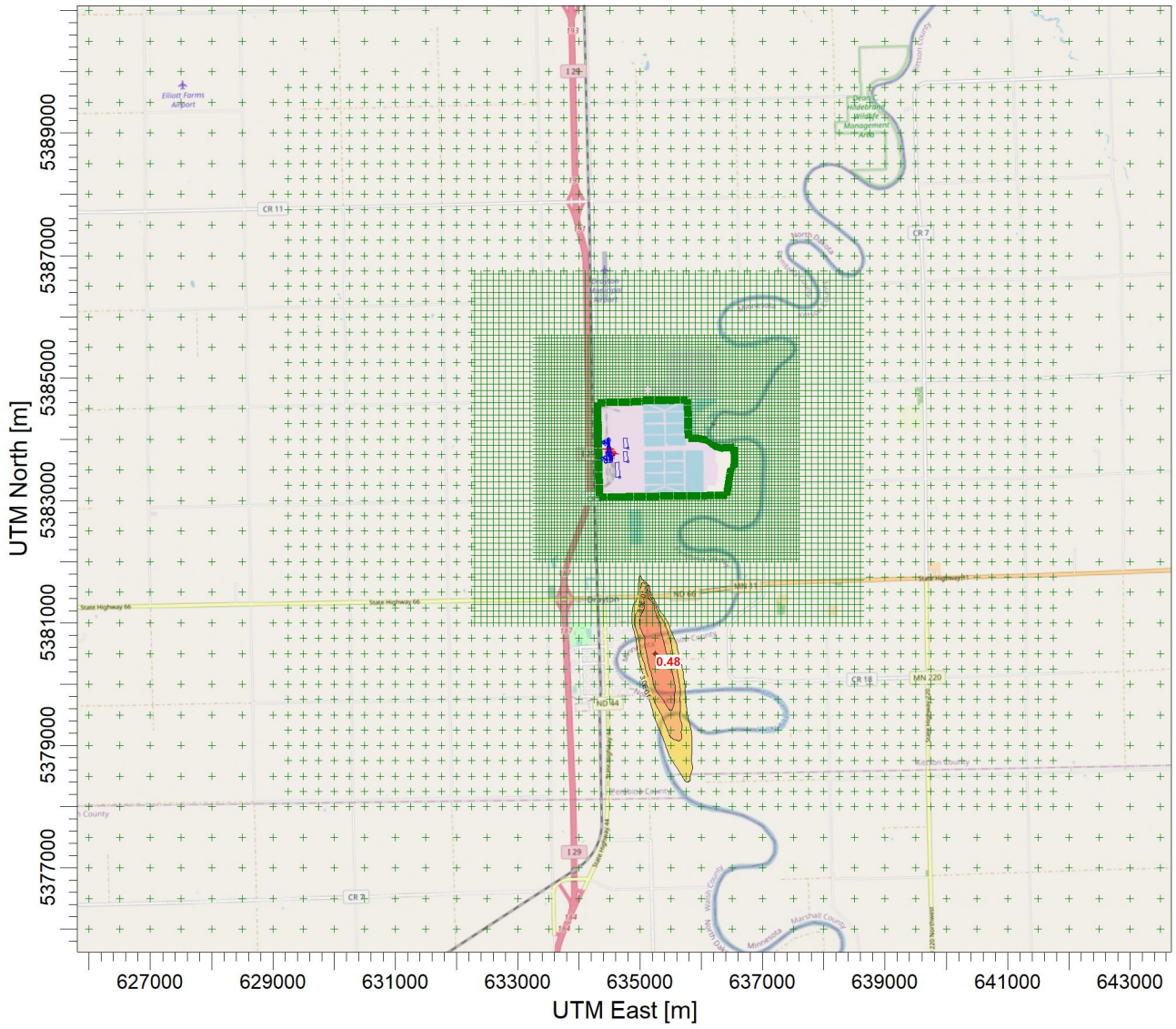


COMMENTS: Highest met year : 2011 Class II standard is 20 µg/m3.	SOURCES: **17**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **11423**	MODELER: **Rhannon Thorton**	
	OUTPUT TYPE: **Concentration**	SCALE: 1:128,628 0 5 km	
	MAX: **-0.010 ug/m^3**	DATE: **10/19/2023**	PROJECT NO.: **ACP-18197 v1.0**

AERMOD View - Lakes Environmental Software

PROJECT TITLE:

American Crystal Sugar - Drayton
Plot 21 - PSD Increment SO2 24-HR



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

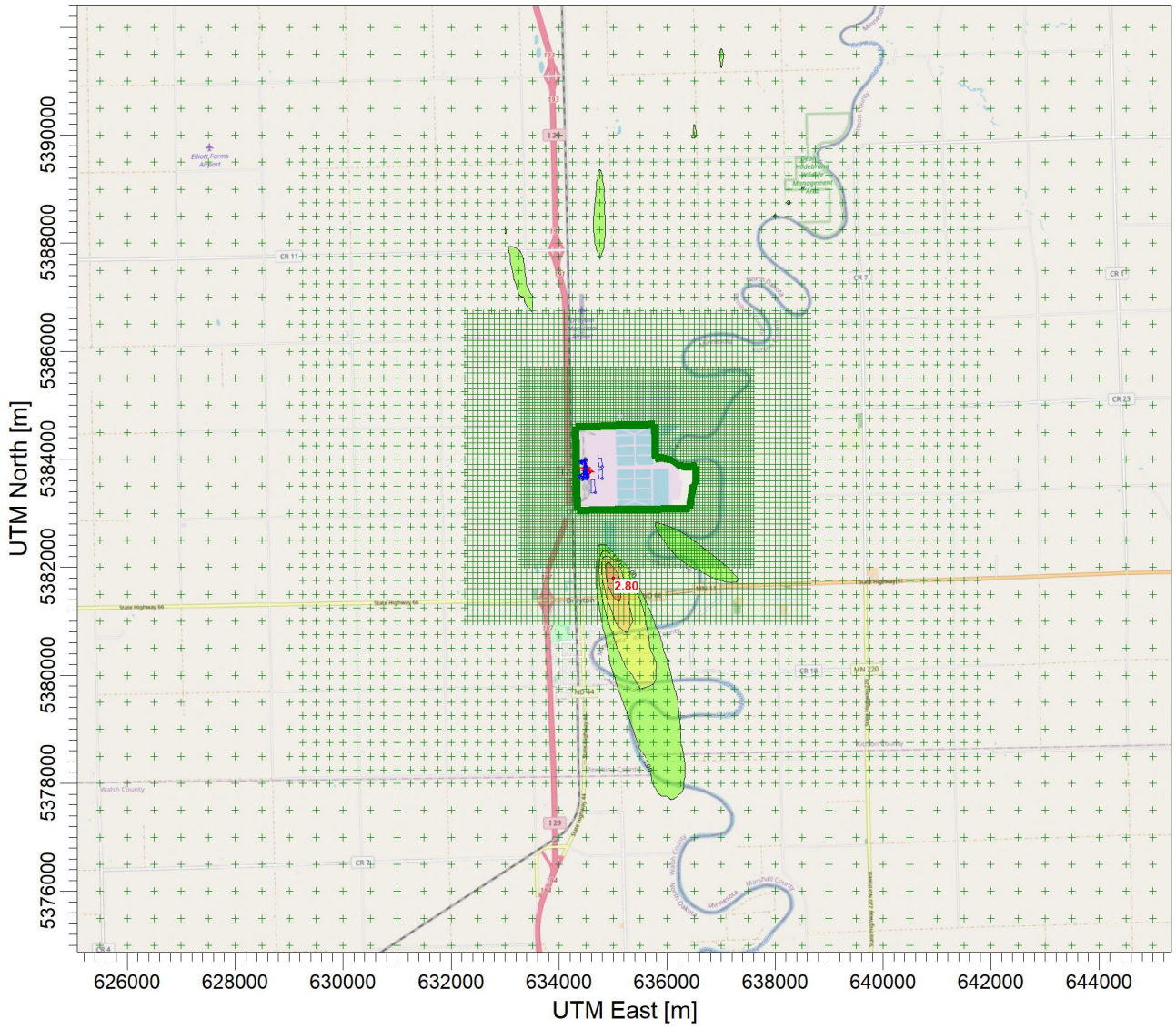
Max: 4.8E-01 [ug/m^3] at (635250.00, 5380500.00)

3.0E-01 3.5E-01 4.0E-01 4.8E-01

COMMENTS: Highest met year : 2011 Class II standard is 91 µg/m3.	SOURCES: **17**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **11423**	MODELER: **Rhannon Thorton**	NORTH Dakota Be Legendary. | Environmental Quality
	OUTPUT TYPE: **Concentration**	SCALE: 1:112,399 0 4 km	
	MAX: **4.8E-01 ug/m^3**	DATE: **10/19/2023**	PROJECT NO.: **ACP-18197 v1.0**

PROJECT TITLE:

American Crystal Sugar - Drayton
Plot 22 - PSD Increment SO2 3-HR



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

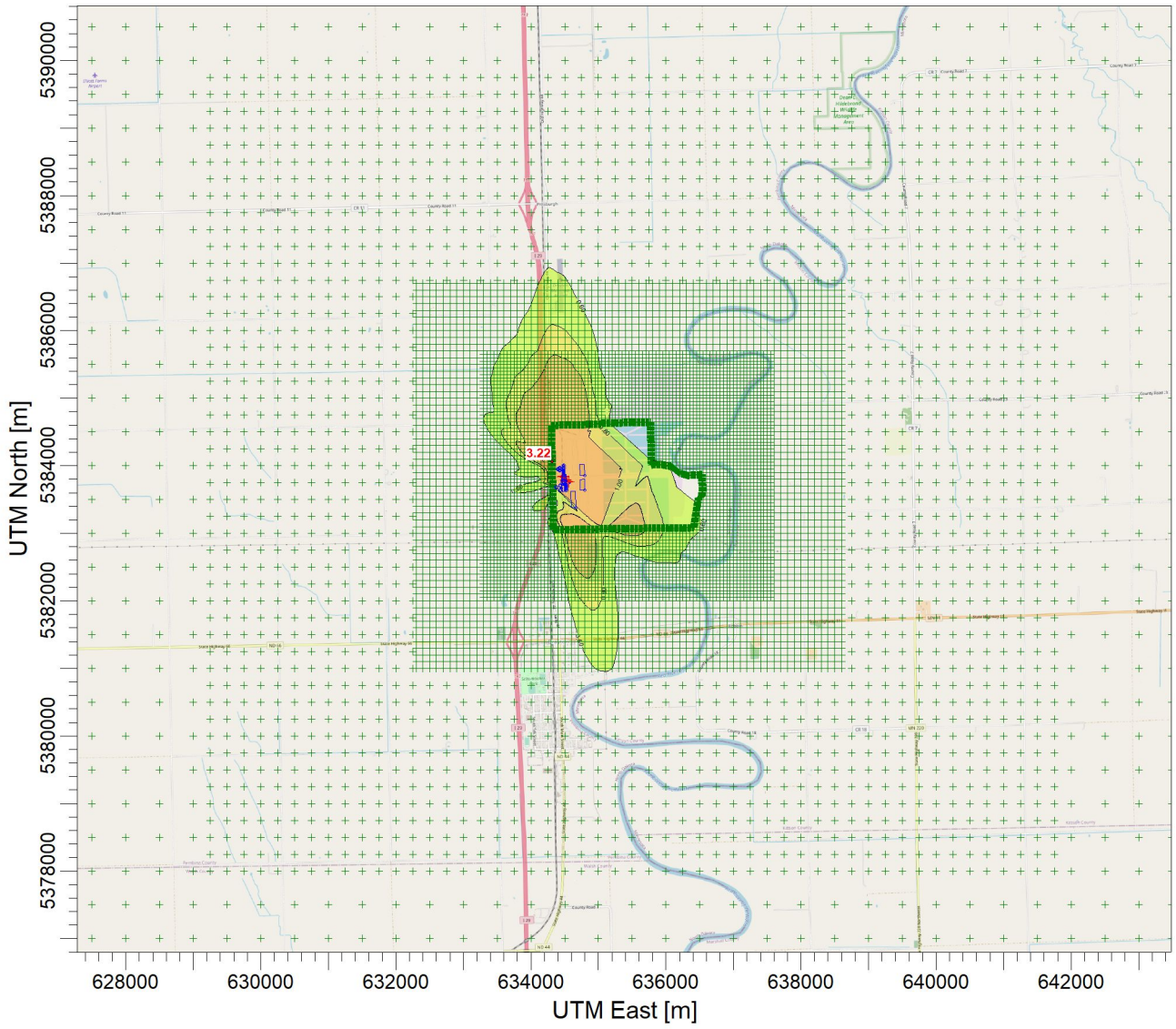
Max: 2.80 [ug/m^3] at (635000.00, 5381800.00)

1.00 1.50 2.00 2.50 2.80

COMMENTS: Highest met year : 2011 Class II standard is 512 µg/m3.	SOURCES: **17**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **11423**	MODELER: **Rhannon Thorton**	NORTH Dakota Be Legendary. | Environmental Quality
	OUTPUT TYPE: **Concentration**	SCALE: 1:127,454 0 5 km	
	MAX: **2.80 ug/m^3**	DATE: **10/19/2023**	PROJECT NO.: **ACP-18197 v1.0**

PROJECT TITLE:

American Crystal Sugar - Drayton
Plot 23 - PSD Increment NO2 Annual



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

Max: 3.22 [ug/m^3] at (634313.30, 5384059.60)

0.60 0.80 1.00 3.00 3.22

COMMENTS: Highest met year : 2010 Class II standard is 25 µg/m3.	SOURCES: **17**	COMPANY NAME: **North Dakota Department of Environmental Quality**	
	RECEPTORS: **11423**	MODELER: **Rhannon Thorton**	
	OUTPUT TYPE: **Concentration**	SCALE: 1:101,915 0 4 km	
	MAX: **3.22 ug/m^3**	DATE: **10/19/2023**	PROJECT NO.: **ACP-18197 v1.0**