INITIAL PSD AIR DISPERSION MODELING PROTOCOL

Ingleside Blue Ammonia
Ingleside, San Patricio County, Texas

OCTOBER 2023

Prepared for:

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1.0 INTRODUCTION

This air quality analysis (AQA) Modeling Protocol describes the methodology that will be used to evaluate whether emissions from the proposed project will comply with applicable air quality standards. This Modeling Protocol is in support of the following initial permit application:

Applicant:	**Ingleside Clean Ammonia Partners, LLC**
Facility:	**Ingleside Blue Ammonia Plant**
Permit Application Number:	**To be assigned**
Regulated Entity Number:	**To be assigned**
Nearest City and County:	**Ingleside, San Patricio County**
Applicant's Modeler:	**Arijit Pakrasi, PhD, PE** **Edge Engineering and Science, LLC** **apakrasi@edge-es.com** **(832) 772-3009**

1.1 Project Overview

Ingleside Clean Ammonia Partners, LLC (ICAP) plans to build the Ingleside Blue Ammonia (IBA) plant (the Plant) located at 1450 Lexington Blvd in Ingleside, San Patricio County, Texas. San Patricio County is currently designated as attainment for all criteria pollutants and averaging times.[1] The IBA plant will be a blue ammonia production and storage operation, which will be comprised of two production trains with shared utilities, storage, and support systems. Although intended to operate as a blue ammonia producer (with carbon capture and sequestration (CCS)), ICAP is requesting a permit authorizing limited operation without CCS. More specifically, the application requests provisional operations without CCS for a period of up to 180 days after startup of each ammonia production train to account for availability of and alignment with emerging CCS infrastructure. The application also requests up to 90 days each year (accumulated in hours) to account for reliance on off-site/third-party CCS systems which may have periodic downtime.

Ammonia produced at the Plant will be transferred offsite through closed-loop loading via the adjacent for-hire marine terminal. Producing blue ammonia is a low-carbon alternative to traditional ammonia manufacturing methods. Blue ammonia utilizes carbon dioxide (CO_2) capture, permanent sequestration, and storage technologies. With this application, ICAP is requesting that the Texas Commission on Environmental Quality (TCEQ) assign a new Customer Number (CN) and Regulated Entity Number (RN) for this company and site through the submittal of applicable Core Data Form information during the required

[1] Attainment data obtained from https://www.tceq.texas.gov/airquality/sip/cc/cc-status, accessed on June 8, 2023.

online transmittal of this application in the State of Texas Environmental Electronic Reporting System (STEERS).

The blue ammonia production plant will receive materials via pipeline and store ammonia in refrigerated storage tanks prior to loading into marine vessels. Process equipment consists of cooling towers, heaters, a boiler, flares, vertical fixed roof (VFR) and horizontal fixed roof (HFR) storage tanks, emergency generators, emergency engines, and equipment leak fugitives.

The AQA is being conducted in support of the initial PSD application for the IBA plant. Total emissions from all facilities included in the application are included in the analysis.

This AQA includes all site-wide sources that emit pollutants under PSD review to demonstrate there are no adverse effects on public health or welfare from this project. A plot plan showing the location of these sources is provided in Appendix A of this document. Details regarding the AQA process are described throughout this document.

1.2 Type of Permit Review

The Plant is located in Ingleside, San Patricio County, Texas. San Patricio County is currently designated as attainment for all criteria pollutants. The Plant is a major source with respect to PSD.

This modeling protocol describes the methodology of the AQA to be submitted by ICAP as part of the PSD review for the initial NSR permit application.

1.3 Pollutants Evaluated in AQA

This project will require PSD review for the following pollutants:

+ Carbon monoxide (CO),
+ Nitrogen dioxide (NO_2), and
+ Particulate matter smaller than 2.5 microns in diameter ($PM_{2.5}$).

Note that PSD review is also triggered for greenhouse gases (GHGs) and ozone (along with its precursor, volatile organic compounds [VOCs]), but these pollutants do not require air dispersion modeling as part of the PSD evaluation. A discussion of compliance with the ozone NAAQS is included in Section 6.1.6.

The modeling analyses will evaluate projected offsite concentrations of these pollutants against applicable NAAQS and PSD Increments as listed in Table 1-1.

Table 1-1: Pollutants Evaluated in AQA

Pollutant	Averaging Time	Significant Impact Level (SIL)	Significant Monitoring Concentration (SMC)	Primary NAAQS	Secondary NAAQS	Class II Increment
		$\mu g/m^3$				
CO	1-Hour	2,000	-	40,000	-	-
	8-Hour	500	575	10,000	-	-
NO_2	1-Hour	7.5	-	188	-	-
	Annual	1	14	100	100	25
Ozone	8-Hour	1.96 (1 ppb)	-	137 (70 ppb)	137 (70 ppb)	-
$PM_{2.5}$	24-Hour	1.2	-	35	35	9
	Annual	0.2	-	12	15	4

2.0 PLOT PLAN AND AREA MAP

The Plant is located in Ingleside, San Patricio County Texas. The area map illustrating the location of the Plant and Plot Plans indicating the Plant boundary, fenceline, model IDs, and buildings are provided in Appendix A. There are no Class I areas located within 100 kilometers of the site.

Coordinates of emission sources shown in the plot plans are included in Table 4-3 of this document. Information for buildings and other downwash structures is included in Table 5-1 and Table 5-2 of this document.

3.0 AIR QUALITY MONITORING DATA

For those pollutants predicted to have project-specific impacts greater than an applicable Significant Impact Level (SIL), a cumulative impact analysis will be conducted. That cumulative impact analysis will include ambient background monitoring data to account for the contribution of off-site emission sources that are not explicitly included in the modeling. The sum of modeled impact and background monitoring concentrations will be compared with respective NAAQS to demonstrate compliance.

Modeled CO concentrations evaluated pursuant this protocol are below the SILs for CO. Therefore, cumulative modeling requiring the inclusion of background concentrations should be required only for NO_2 and $PM_{2.5}$. The following sections discuss the proposed background data used for those pollutants that require cumulative modeling. Note that these data may be refined as dictated by the results of the modeling analysis. The monitoring data discussed below were obtained from the EPA Air Quality System (AQS) Data Mart system (https://www.epa.gov/outdoor-air-quality-data).

3.1 NO_2

There are no NO_2 monitors in San Patricio County or in any of the adjacent counties. So, a monitor in Beaumont, Jefferson County, TX is proposed to be used as a conservative representation of the background concentration at the project site. The monitor is located at 1086 Vermont Avenue and the station ID is AQS ID 48-245-0009. An analysis of the monitor vs the project site was completed. A summary of this analysis is shown below in Table 3-1. This analysis shows the emissions within 10km, the County-wide emissions, and the population of the county for both the project site and monitor location. The monitor location and a 10km radius can be seen in Appendix B. Based on the results shown, the use of this monitor is justified as being a conservative representation of the background NO_2 concentration near the project site.

Table 3-1: NO_2 Background Monitor Justification Analysis

	Distance to Project Site (km):	10 Kilometer NO_2 Emissions Comparison	County NO_2 Emissions Comparison	2021 County Population Comparison
Project:	--	2,583 tpy	2,951 tpy	69,699
Monitor:	133	3,183 tpy	10,198 tpy	253,704

Emission data is based on 2019-2021 Emission Inventory data available from the TCEQ.
https://www.tceq.texas.gov/airquality/point-source-ei/psei.html

3.2 $PM_{2.5}$

There are no $PM_{2.5}$ monitors in San Patricio County; however, there are two $PM_{2.5}$ monitors close to the Plant: Dona Park and Huisache, both across Corpus Christi Bay in Nueces County (26 km and 23 km to the west of the Plant, respectively). The Huisache monitor is bordered by industry to the east, north, and south, while the Dona Park monitor is not immediately adjacent to the same amount of industry (although there are major industrial facilities within 1 km). Therefore, Dona Park is proposed to be used as a conservative representation of the background concentration at the project site. The monitor is located at 5707 Up River Road, Corpus Christi, Texas and the station ID is AQS ID 48-355-0034. An analysis of the monitor vs the project site was completed. A summary of this analysis is shown below in Table 3-2. This analysis shows the emissions within 10 km, the County-wide emissions, and the population of the county for both the project site and monitor location. The monitor location and a 10 km radius can be seen in Appendix B. Based on the results shown, the use of this monitor is justified as being a conservative representation of the background $PM_{2.5}$ concentration near the project site.

Table 3-2: $PM_{2.5}$ Background Monitor Justification Analysis

	Distance to Project Site (km):	10 Kilometer $PM_{2.5}$ Emissions Comparison	County $PM_{2.5}$ Emissions Comparison	2021 County Population Comparison
Project:	--	156.35 tpy	254 tpy	69,699
Monitor:	26	905.33 tpy	1,130 tpy	353,079

Emission data is based on 2019-2021 Emission Inventory data available from the TCEQ.
https://www.tceq.texas.gov/airquality/point-source-ei/psei.html

3.3 Background Monitor Concentrations Summary

Table 3-3 shows the proposed background concentrations for NO_2 and $PM_{2.5}$. For the 1-hour average NO_2 background concentration, the most recent 3-year average (2020-2022) of the annual 98th percentile daily maximum 1-hour concentration is proposed for the NAAQS compliance demonstration. For the annual average NO_2 NAAQS compliance demonstration, the annual monitoring concentration from the most recent complete year of the annual averaging time is proposed. For the 24-hour average $PM_{2.5}$ background concentration, the average of the 98th percentile of the daily concentrations over the most recent three years (2020-2022) is proposed for the NAAQS compliance demonstration. For the annual average $PM_{2.5}$ NAAQS compliance demonstration the annual monitoring concentration from the most recent complete year of the annual averaging time is proposed.

Table 3-3: Background Monitor Data Summary

Compound	Monitor Address	AQS ID	Year	Averaging Period	Value Rank	Concentration	Short-term Average Background Concentration	Annual Average Background Concentration
						μg/m³	μg/m³	μg/m³
NO_2	1086 Vermont Avenue	48-245-0009	2020	1-hr	98th Percentile of Max Daily	55.1	58.2	
			2021			55.3		
			2022			64.1		
			2022	Annual	Mean	11.7		11.7
$PM_{2.5}$	5707 Up River Road	48-355-0034	2020	24-hr	98th Percentile	28.8	25.4	
			2021			20.7		
			2022			26.7		
			2022	Annual	Mean	8.8		8.8

4.0 MODELING EMISSIONS INVENTORY

Details on emission source parameters, emission rates, off-property sources, and worst-case scenario determination are described throughout this section.

Table 4-1 below shows the emission sources to be evaluated along with the basis for emission rates that will be used. These values are subject to change based on permitting review and will be finalized in the final Modeling Report.

Table 4-1: Emission Sources and Basis for Emission Rates

EPN	Model ID	Basis for Short Term Modeling Emission Rate	Basis for Long Term Modeling Emission Rate
CTWR1	CTWR1_1	Max hourly rate from cooling tower, divided by 16 (number of cells in cooling tower)	Annual average rate from cooling tower, divided by 16 (number of cells in cooling tower)
	CTWR1_2		
	CTWR1_3		
	CTWR1_4		
	CTWR1_5		
	CTWR1_6		
	CTWR1_7		
	CTWR1_8		
	CTWR1_9		
	CTWR1_10		
	CTWR1_11		
	CTWR1_12		
	CTWR1_13		
	CTWR1_14		
	CTWR1_15		
	CTWR1_16		
CTWR2	CTWR2_1	Max hourly rate from cooling tower, divided by 16 (number of cells in cooling tower)	Annual average rate from cooling tower, divided by 16 (number of cells in cooling tower)
	CTWR2_2		
	CTWR2_3		
	CTWR2_4		
	CTWR2_5		
	CTWR2_6		
	CTWR2_7		
	CTWR2_8		
	CTWR2_9		

Table 4-1: Emission Sources and Basis for Emission Rates

EPN	Model ID	Basis for Short Term Modeling Emission Rate	Basis for Long Term Modeling Emission Rate
CTWR2 (cont'd)	CTWR2_10	Max hourly rate from cooling tower, divided by 16 (number of cells in cooling tower)	Annual average rate from cooling tower, divided by 16 (number of cells in cooling tower)
	CTWR2_11		
	CTWR2_12		
	CTWR2_13		
	CTWR2_14		
	CTWR2_15		
	CTWR2_16		
BLR-AUX1	BLRAX1SU	Max hourly rate from source during startup	Annual average rate from annual startup emissions
	BLRAX1RT	Turndown rate (20% of max) for routine ops	Annual average rate from annual routine emissions
H-201	H_201_SU	Max hourly rate from H-201 during startup	Annual average rate from annual startup emissions
	H_201_RT	Max hourly rate from H-201 for routine ops	Annual average rate from annual routine emissions
	H_202_SU	Max hourly rate from H-202 during startup	Annual average rate from annual startup emissions
	H_202_RT	Max hourly rate from H-202 for routine ops	Annual average rate from annual routine emissions
H-203	H_203_SU	Max hourly rate from H-203 during startup	Annual average rate from annual startup emissions
	H_203_RT	Max hourly rate from H-203 for routine ops	Annual average rate from annual routine emissions
	H_204_SU	Max hourly rate from H-204 during startup	Annual average rate from annual startup emissions
	H_204_RT	Max hourly rate from H-204 for routine ops	Annual average rate from annual routine emissions
H-590	H_590_SU	Max hourly rate from startup heater	Annual average rate from startup heater
H-591	H_591_SU	Max hourly rate from startup heater	Annual average rate from startup heater
FW-PUMP1	FW_PUMP1	Max hourly rate from source	Annual average rate from source
FW-PUMP2	FW_PUMP2	Max hourly rate from source	Annual average rate from source
FW-PUMP3	FW_PUMP3	Max hourly rate from source	Annual average rate from source
EG-1	EG_1_AB	Max hourly rate from source	Annual average rate from source
EG-2	EG_2_AB	Max hourly rate from source	Annual average rate from source
FL-1	FL_1_PLT	Max hourly rate from pilot emissions	Annual average rate from pilot emissions

Table 4-1: Emission Sources and Basis for Emission Rates

EPN	Model ID	Basis for Short Term Modeling Emission Rate	Basis for Long Term Modeling Emission Rate
FL-1 (Cont'd)	FL_1_SU1	Max hourly rate from startup stage 1	Annual average rate from startup stage 1 annual emissions
	FL_1_SU2	Max hourly rate from startup stage 2	Annual average rate from startup stage 2 annual emissions
	FL_1_SU3	Max hourly rate from startup stage 3	Annual average rate from startup stage 3 annual emissions
	FL_1_SU4	Max hourly rate from startup stage 4	Annual average rate from startup stage 4 annual emissions
	FL_1_SD1	Max hourly rate from shutdown	Annual average rate from shutdown emissions
FL-2	FL_2_PLT	Max hourly rate from pilot emissions	Annual average rate from pilot emissions
	FL_2_SU1	Max hourly rate from startup stage 1	Annual average rate from startup stage 1 annual emissions
	FL_2_SD1	Max hourly rate from shutdown	Annual average rate from shutdown emissions
FL-3	FL_3_PLT	Max hourly rate from pilot emissions	Annual average rate from pilot emissions
	FL_3_SU1	Max hourly rate from startup stage 1	Annual average rate from startup stage 1 annual emissions
	FL_3_SD1	Max hourly rate from shutdown	Annual average rate from shutdown emissions
FL-4	FL_4_PLT	Max hourly rate from pilot emissions	Annual average rate from pilot emissions
	FL_4_SU1	Max hourly rate from startup stage 1	Annual average rate from startup stage 1 annual emissions
	FL_4_SU2	Max hourly rate from startup stage 2	Annual average rate from startup stage 2 annual emissions
	FL_4_SU3	Max hourly rate from startup stage 3	Annual average rate from startup stage 3 annual emissions
	FL_4_SU4	Max hourly rate from startup stage 4	Annual average rate from startup stage 4 annual emissions
	FL_4_SD1	Max hourly rate from shutdown	Annual average rate from shutdown emissions
FL-5	FL_5_PLT	Max hourly rate from pilot emissions	Annual average rate from pilot emissions
	FL_5_SU1	Max hourly rate from startup stage 1	Annual average rate from startup stage 1 annual emissions
	FL_5_SD1	Max hourly rate from shutdown	Annual average rate from shutdown emissions

4.1 Source Parameter Justification

The sources being evaluated as part of the PSD modeling will be represented as Point sources in the modeling. A summary of modeled stack parameters is included in Table 4-3.

4.2 Off-Property Sources

A modeling retrieval request form was submitted through a public information request with the TCEQ to obtain the information needed to support full NAAQS modeling for NAAQS pollutants with projected impacts over the de minimis level. TCEQ provided the off-site inventory data needed for the AQA. The request included both NAAQS inventory and PSD increment inventory of the off-site sources to be explicitly modeled in the AQA.

The data received from TCEQ was reviewed for data gaps and inconsistencies. Appendix C includes the raw off-property source data received from TCEQ. The proposed details of filling the missing data and revising inconsistent data, and the final version of the off-property source parameters to be included in the cumulative modeling analysis are detailed, below. The following steps are proposed to correct data gaps and inconsistencies.

1. Off property intermittent sources of NO_X will be excluded from consideration per the United States Environmental Protection Agency (US EPA) memorandum dated March 1, 2011.[2] These sources will not operate continuously or frequent enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations.

2. Using the UTM coordinates provided and a central site location, the distance between the Plant and each off-site source will be calculated.

3. The TCEQ Records Online database[3] will be reviewed for information for sources within 20 km. If available, the updated information will be used in the AQA. If information is unavailable through this review, stack parameters for a similar source will be used. If a similar source is not identified, the emission rate for the source will be added to another source at that site. At a distance of 20 km from the project site, this methodology will not have any material impact on the results of the AQA.

4. For off property sources 20-50 km from the site without data on stack parameters, conservative values will be used. These will be: (i) stack diameter of 1 ft; (ii) stack height of 10 ft; (iii) stack gas exit temperature same as ambient temperature; and (iv) stack velocity of 10 feet per second (fps) or 0.001 meters per second (m/s) based on the source type.

[2] Tyler Fox to Regional Air Division Directors, March 1, 2011, United States Environmental Protection Agency, Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard (https://www.epa.gov/sites/default/files/2015-07/documents/r2concure.pdf).

[3] TCEQ Records Online: https://records.tceq.texas.gov/cs/idcplg?IdcService=TCEQ_SEARCH

4.3 Scaling Factors

No scaling factors will be evaluated in the AQA for this project because the proposed emission rates will be used for all emission sources and there are no restrictions on operating hours proposed for the emission sources.

4.4 Intermittent Emissions

Several activities' emissions from sources of NO_2 occur for brief durations (i.e., less than 500 hours) per year. These activities and sources include:

- Auxiliary boiler startup;
- Startup of the steam-superheaters and fired process heaters;
- Startup heaters;
- Fire water pump testing;
- Emergency generator testing; and
- Flare startup stages and shutdown.

Based on the duration and frequency of each of the listed activities and sources, EPA has concluded that the emissions from these intermittently operating sources will be infrequent enough to not contribute significantly to the annual distribution of daily maximum 1-hour concentration for NO_2.[2] Therefore, these emission sources have been considered as intermittent sources for 1-hour NO_2 NAAQS compliance demonstration. Table 4-2 includes a list of each model ID and annual hours of operation for intermittent sources.

Table 4-2: Intermittent Activities and Sources

Model ID	Activity	Annual Duration (hrs/yr)
BLRAX1SU	Auxiliary boiler startup	96
H_201_SU	Train 1 fired process heater startup	48
H_202_SU	Train 1 steam superheater startup	48
H_203_SU	Train 2 fired process heater startup	48
H_204_SU	Train 2 steam superheater startup	48
H_590_SU	Train 1 startup heater	48
H_591_SU	Train 2 startup heater	48
FW_PUMP1	Fire water pump engine testing	100
FW_PUMP2	Fire water pump engine testing	100
FW_PUMP3	Fire water pump engine testing	100
EG_1_AB	Emergency generator testing	100
EG_2_AB	Emergency generator testing	100
FL_1_SU1	Train 1 Ammonia Plant Front End Flare startup stage 1	6
FL_1_SU2	Train 1 Ammonia Plant Front End Flare startup stage 2	4
FL_1_SU3	Train 1 Ammonia Plant Front End Flare startup stage 3	5
FL_1_SU4	Train 1 Ammonia Plant Front End Flare startup stage 4	6
FL_1_SD1	Train 1 Ammonia Plant Front End Flare shutdown	8
FL_2_SU1	Train 1 Ammonia Plant Back End Flare startup	8
FL_2_SD1	Train 1 Ammonia Plant Back End Flare shutdown	8
FL_3_SU1	Ammonia Storage Flare startup	4
FL_3_SD1	Ammonia Storage Flare shutdown	350
FL_4_SU1	Train 2 Ammonia Plant Front End Flare startup stage 1	6
FL_4_SU2	Train 2 Ammonia Plant Front End Flare startup stage 2	4
FL_4_SU3	Train 2 Ammonia Plant Front End Flare startup stage 3	5
FL_4_SU4	Train 2 Ammonia Plant Front End Flare startup stage 4	6
FL_4_SD1	Train 2 Ammonia Plant Front End Flare shutdown	8
FL_5_SU1	Train 2 Ammonia Plant Back End Flare startup	8
FL_5_SD1	Train 2 Ammonia Plant Back End Flare shutdown	8

4.5 Maximum Case Sources and Scenarios

At the IBA plant, not all emission sources will be operating simultaneously. To represent this situation in the AQA, several operating scenarios will be evaluated to confirm the worst-case operation is considered in the modeling. The operating scenarios will include sources in routine operation, with varying startup or shutdown emissions occurring depending on the scenario. A breakdown of the operating scenarios is provided in table format in Appendix D.

Table 4-3: Modeled Point Source Parameters

EPN	Model ID	Source Description	Easting: X [m]	Northing: Y [m]	Base Elevation [m]	Height [m]	Exit Temperature [K]	Exit Velocity [m/s]	Diameter [m]
CTWR1	CTWR1_1	Cooling Tower 1	677164.19	3080124.73	5.47	16.00	0.00	9.107	10.00
	CTWR1_2	Cooling Tower 1	677179.52	3080119.46	5.09	16.00	0.00	9.107	10.00
	CTWR1_3	Cooling Tower 1	677158.87	3080110.01	5.48	16.00	0.00	9.107	10.00
	CTWR1_4	Cooling Tower 1	677173.84	3080104.83	5.33	16.00	0.00	9.107	10.00
	CTWR1_5	Cooling Tower 1	677153.30	3080095.35	5.72	16.00	0.00	9.107	10.00
	CTWR1_6	Cooling Tower 1	677168.65	3080089.92	5.57	16.00	0.00	9.107	10.00
	CTWR1_7	Cooling Tower 1	677148.02	3080080.03	5.74	16.00	0.00	9.107	10.00
	CTWR1_8	Cooling Tower 1	677163.48	3080074.90	5.17	16.00	0.00	9.107	10.00
	CTWR1_9	Cooling Tower 1	677142.54	3080065.50	5.73	16.00	0.00	9.107	10.00
	CTWR1_10	Cooling Tower 1	677157.53	3080060.22	5.82	16.00	0.00	9.107	10.00
	CTWR1_11	Cooling Tower 1	677137.04	3080050.57	5.78	16.00	0.00	9.107	10.00
	CTWR1_12	Cooling Tower 1	677152.19	3080045.23	6.13	16.00	0.00	9.107	10.00
	CTWR1_13	Cooling Tower 1	677131.53	3080035.81	6.19	16.00	0.00	9.107	10.00
	CTWR1_14	Cooling Tower 1	677146.92	3080030.38	6.15	16.00	0.00	9.107	10.00
	CTWR1_15	Cooling Tower 1	677126.35	3080021.03	5.96	16.00	0.00	9.107	10.00
	CTWR1_16	Cooling Tower 1	677141.17	3080015.67	6.22	16.00	0.00	9.107	10.00
CTWR2	CTWR2_1	Cooling Tower 2	677207.04	3080243.08	4.65	16.00	0.00	9.107	10.00
	CTWR2_2	Cooling Tower 2	677222.37	3080237.81	4.68	16.00	0.00	9.107	10.00
	CTWR2_3	Cooling Tower 2	677201.72	3080228.36	4.68	16.00	0.00	9.107	10.00
	CTWR2_4	Cooling Tower 2	677216.69	3080223.18	4.62	16.00	0.00	9.107	10.00

Table 4-3: Modeled Point Source Parameters

EPN	Model ID	Source Description	Easting: X [m]	Northing: Y [m]	Base Elevation [m]	Height [m]	Exit Temperature [K]	Exit Velocity [m/s]	Diameter [m]
CTWR2 (Cont'd)	CTWR2_5	Cooling Tower 2	677196.15	3080213.70	4.67	16.00	0.00	9.107	10.00
	CTWR2_6	Cooling Tower 2	677211.50	3080208.27	4.52	16.00	0.00	9.107	10.00
	CTWR2_7	Cooling Tower 2	677190.87	3080198.38	4.58	16.00	0.00	9.107	10.00
	CTWR2_8	Cooling Tower 2	677206.33	3080193.25	4.61	16.00	0.00	9.107	10.00
	CTWR2_9	Cooling Tower 2	677185.39	3080183.85	4.74	16.00	0.00	9.107	10.00
	CTWR2_10	Cooling Tower 2	677200.38	3080178.57	4.81	16.00	0.00	9.107	10.00
	CTWR2_11	Cooling Tower 2	677179.89	3080168.92	5.24	16.00	0.00	9.107	10.00
	CTWR2_12	Cooling Tower 2	677195.04	3080163.58	5.27	16.00	0.00	9.107	10.00
	CTWR2_13	Cooling Tower 2	677174.38	3080154.16	5.67	16.00	0.00	9.107	10.00
	CTWR2_14	Cooling Tower 2	677189.77	3080148.73	5.47	16.00	0.00	9.107	10.00
	CTWR2_15	Cooling Tower 2	677169.20	3080139.38	5.6	16.00	0.00	9.107	10.00
	CTWR2_16	Cooling Tower 2	677184.02	3080134.02	5.51	16.00	0.00	9.107	10.00
BLR-AUX1	BLRAX1SU	Boiler - Startup	677308.77	3080193.33	4.64	35.05	472.04	1.225	1.98
	BLRAX1RT	Boiler - Routine	677308.77	3080193.33	4.64	35.05	472.04	1.225	1.98
H-201	H_201_SU	Heater 201 - Startup	677268.50	3079898.17	5.86	35.05	440.37	2.583	3.66
	H_201_RT	Heater 201 - Routine	677268.50	3079898.17	5.86	35.05	440.37	2.583	3.66
	H_202_SU	Heater 202 - Startup	677268.50	3079898.17	5.86	35.05	440.37	2.583	3.66
	H_202_RT	Heater 202 - Routine	677268.50	3079898.17	5.86	35.05	440.37	2.583	3.66

Table 4-3: Modeled Point Source Parameters

EPN	Model ID	Source Description	Easting: X [m]	Northing: Y [m]	Base Elevation [m]	Height [m]	Exit Temperature [K]	Exit Velocity [m/s]	Diameter [m]
H-203	H_203_SU	Heater 203 - Startup	677353.41	3080148.65	5.27	35.05	440.37	2.583	3.66
	H_203_RT	Heater 203 - Routine	677353.41	3080148.65	5.27	35.05	440.37	2.583	3.66
	H_204_SU	Heater 204 - Startup	677353.41	3080148.65	5.27	35.05	440.37	2.583	3.66
	H_204_RT	Heater 204 - Routine	677353.41	3080148.65	5.27	35.05	440.37	2.583	3.66
H-590	H_590_SU	SU Heater 1 - Startup	677309.24	3080005.25	5.29	33.53	1144.26	8.003	2.13
H-591	H_591_SU	SU Heater 2 - Startup	677395.17	3080253.47	5.24	33.53	1144.26	8.003	2.13
FW-PUMP1	FW_PUMP1	FW Pump	677235.98	3080229.35	4.69	0.91	922.04	0.483	0.91
FW-PUMP2	FW_PUMP2	FW Pump	677303.17	3080090.53	5.74	0.91	922.04	0.483	0.91
FW-PUMP3	FW_PUMP3	FW Pump	677286.45	3080232.33	5.27	0.91	922.04	0.483	0.91
EG-1	EG_1_AB	Emergency Generator	677112.56	3079957.62	5.84	1.98	922.04	75.108	0.25
EG-2	EG_2_AB	Emergency Generator	677110.92	3079953.04	6.28	1.98	922.04	75.108	0.25
FL-1	FL_1_PLT	Flare 1 Pilot	677453.04	3079784.42	5.11	76.20	1273.00	20.000	0.33
	FL_1_SU1	Flare 1 SU 1	677453.04	3079784.42	5.11	76.20	1273.00	20.000	13.78
	FL_1_SU2	Flare 1 SU 2	677453.04	3079784.42	5.11	76.20	1273.00	20.000	13.70
	FL_1_SU3	Flare 1 SU 3	677453.04	3079784.42	5.11	76.20	1273.00	20.000	15.11
	FL_1_SU4	Flare 1 SU 4	677453.04	3079784.42	5.11	76.20	1273.00	20.000	20.53
	FL_1_SD1	Flare 1 SD 1	677453.04	3079784.42	5.11	76.20	1273.00	20.000	16.38
FL-2	FL_2_PLT	Flare 2 Pilot	677450.86	3079777.95	4.84	76.20	1273.00	20.000	0.33
	FL_2_SU1	Flare 2 SU 1	677450.86	3079777.95	4.84	76.20	1273.00	20.000	0.48
	FL_2_SD1	Flare 2 SD 1	677450.86	3079777.95	4.84	76.20	1273.00	20.000	3.57

Table 4-3: Modeled Point Source Parameters

EPN	Model ID	Source Description	Easting: X [m]	Northing: Y [m]	Base Elevation [m]	Height [m]	Exit Temperature [K]	Exit Velocity [m/s]	Diameter [m]
FL-3	FL_3_PLT	Flare 3 Pilot	676895.56	3078952.24	5.98	46.02	1273.00	20.000	0.28
	FL_3_SU1	Flare 3 SU 1	676895.56	3078952.24	5.98	46.02	1273.00	20.000	2.35
	FL_3_SD1	Flare 3 SD 1	676895.56	3078952.24	5.98	46.02	1273.00	20.000	2.35
FL-4	FL_4_PLT	Flare 4 Pilot	677589.73	3080185.31	4.72	76.20	1273.00	20.000	0.33
	FL_4_SU1	Flare 4 SU 1	677589.73	3080185.31	4.72	76.20	1273.00	20.000	13.78
	FL_4_SU2	Flare 4 SU 2	677589.73	3080185.31	4.72	76.20	1273.00	20.000	13.70
	FL_4_SU3	Flare 4 SU 3	677589.73	3080185.31	4.72	76.20	1273.00	20.000	15.11
	FL_4_SU4	Flare 4 SU 4	677589.73	3080185.31	4.72	76.20	1273.00	20.000	20.53
	FL_4_SD1	Flare 4 SD 1	677589.73	3080185.31	4.72	76.20	1273.00	20.000	16.38
FL-5	FL_5_PLT	Flare 5 Pilot	677587.21	3080179.03	4.73	76.20	1273.00	20.000	0.33
	FL_5_SU1	Flare 5 SU 1	677587.21	3080179.03	4.73	76.20	1273.00	20.000	0.48
	FL_5_SD1	Flare 5 SD 1	677587.21	3080179.03	4.73	76.20	1273.00	20.000	3.57

5.0 MODEL SELECTIONS AND MODELING TECHNIQUES

The modeling methodology will follow the procedures outlined in the following guidelines:

- TCEQ Air Quality Modeling Guidelines (APDG 6232v4, Nov 2019); and
- US EPA's Guideline on Air Quality Models 40 CFR 51 Appendix W.

Site-specific and project-specific revisions to these methodologies will be made when appropriate and justified in the AQA report.

5.1 Dispersion Model Selection

The American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Committee (AERMIC) modeling program (AERMOD, version 21112) will be used to predict off-site impacts for the AQA. AERMOD is currently the preferred dispersion model recommended by the EPA and TCEQ for complex source configurations and emission units subject to downwash. The modeling will be conducted with the latest version of BEEST (version 12.09).

The following preprocessors will be used in the modeling:

- AERSURFACE version 20060
- Building Profile Input Program (BPIP) version 04274
- AERMAP version 18081

5.2 Modeling Procedures

5.2.1 Regulatory Options

All default options in AERMOD will be used in this AQA. These include:

- Use the elevated terrain algorithms requiring input of terrain height data;
- Use stack-tip downwash (except for building downwash cases);
- Use the calms processing routines; and
- Use the missing data processing routines.

AERMOD will be applied to calculate concentrations using the regulatory defaults in addition to the options and data discussed in this section.

5.2.2 Selection of Dispersion Option

The AERMOD rural dispersion option will be used in the AQA. Appendix E shows the land-use of the area within 3 km radius from the site is greater than 85% rural and therefore justifies this dispersion option.

5.2.3 Averaging Periods

Pollutant concentrations predicted by AERMOD will be averaged over short-term and annual averaging periods as required by the applicable ambient air quality standard averaging period(s) for each modeled pollutant. The pollutants and averaging times to be reviewed as part of this AQA are listed in Table 1-1 in Section 1.0 of this modeling protocol.

5.2.4 NO to NO_2 Conversion

Per 40 CFR 51, Appendix W, Section 4.2.3.4, a multi-tiered screening approach can be used to obtain account for atmospheric conversion of nitric oxides to nitrogen dioxide in the atmosphere, for estimating both hourly and annual average impacts of NO_2. The modeling will initially use Tier 1 and based on the results of this screening of conservative assumptions, Tier 2 or Tier 3 may be applied.

Tier 1: Assume a total conversion of NO to NO_2.

Tier 2: Multiply the Tier 1 results by the ambient ratio method 2 (ARM2), which provides estimates of representative equilibrium ratios of NO_2/NO_X value based ambient levels of NO_2 and NO_X derived from national data from the EPA's AQS. The national default for ARM2 includes a minimum ambient NO_2/NO_X ratio of 0.5 and a maximum ambient ratio of 0.9. If necessary, alternative default minimum NO_2/NO_X values may be established based on the source's in-stack emissions ratio, with alternative minimum values reflecting the source's in-stack NO_2/NO_X ratios. If such alternative in-stack ratios are used, justification will be provided in the Modeling Report.

Tier 3: Estimate NO_X concentrations and then estimate the conversion of primary NO emission to NO_2 based on the ambient levels of ozone and the plume characteristics using either the Ozone Limiting Method (OLM) or the Plume Volume Molar Ratio Method (PVMRM) option. Both the OLM/PVMRM options account for NO_2 formation based on the ambient levels of ozone. Any of the following two alternative options may be used in the OLM/PVMRM for the ambient ozone concentration: (i) hourly ozone concentration for the same period as the meteorological data; or (ii) average ozone concentration by season and hour of day from a set of latest available 5-year period of ambient ozone data. The hourly background ozone concentration will be obtained from the nearest monitoring station in Corpus Christi, TX (Station ID: 48-355-0025), approximately 25 km from the project site. Any missing hourly data will be filled in using appropriate US EPA procedures.

5.2.5 Building Wake Effects (Downwash)

The EPA's Building Profile Input Program (BPIP) downwash algorithms will be used to determine the parameters for accounting aerodynamic downwash from buildings and structures on modeled emission sources. Based on a review of the Plant's plot plan and a visual survey of the Project location and immediate surrounding areas, there are 13 buildings/structures and 73 storage tanks which could potentially cause aerodynamic downwash to the modeled emission sources. These buildings/structures will be included in the AQA. Information on the downwash structures to be included, including height, size, and UTM location information, is listed in Table 5-1 for buildings/structures. They are also represented in the attached Plot Plan in Appendix A of this submittal.

Table 5-1: Buildings and Structure Downwash Information (UTM Coordinates)

Downwash Type	Modeled Building ID	No. of Tiers	Max. Ht. (m)	X1	Y1	X2	Y2	X3	Y3	X4	Y4	X5	Y5
				[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]
Building	BLDG128	1	6.10	677060	3079411	677067	3079411	677067	3079413	677084	3079413	677084	3079414
				X6	Y6	X7	Y7	X8	Y8	X9	Y9	X10	Y10
				677093	3079414	677093	3079406	677090	3079406	677090	3079378	677091	3079378
				X11	Y11	X12	Y12	X13	Y13	X14	Y14		
				677091	3079371	677090	3079370	677060	3079370	677060	3079411		
Downwash Type	Modeled Building ID	No. of Tiers	Max. Ht. (m)	X1	Y1	X2	Y2	X3	Y3	X4	Y4	X5	Y5
				[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]
Building	BLDG213	1	9.14	677176	3079401	677187	3079397	677186	3079394	677199	3079389	677194	3079378
				X6	Y6	X7	Y7	X8	Y8	X9	Y9	X10	Y10
				677200	3079376	677194	3079359	677173	3079367	677172	3079363	677160	3079367
				X11	Y11	X12	Y12	X13	Y13				
				677171	3079394	677173	3079393	677176	3079401				
Downwash Type	Modeled Building ID	No. of Tiers	Max. Ht. (m)	X1	Y1	X2	Y2	X3	Y3	X4	Y4	X5	Y5
				[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]
Building	BLDG217	1	6.10	677166	3079291	677247	3079259	677236	3079231	677155	3079262	677166	3079291

Table 5-1: Buildings and Structure Downwash Information (UTM Coordinates)

Downwash Type	Modeled Building ID	No. of Tiers	Max. Ht. (m)	X1	Y1	X2	Y2	X3	Y3	X4	Y4	X5	Y5
				[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]
Building	BLDG229	1	4.88	677200	3079223	677218	3079216	677201	3079174	677184	3079181	677200	3079223
Downwash Type	**Modeled Building ID**	**No. of Tiers**	**Max. Ht. (m)**	**X1**	**Y1**	**X2**	**Y2**	**X3**	**Y3**	**X4**	**Y4**	**X5**	**Y5**
				[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]
Building	BLDG300	1	13.11	676702	3079138	676778	3079109	676777	3079106	676785	3079103	676775	3079076
				X6	**Y6**	**X7**	**Y7**	**X8**	**Y8**	**X9**	**Y9**		
				676684	3079112	676694	3079138	676701	3079135	676702	3079138		
Downwash Type	**Modeled Building ID**	**No. of Tiers**	**Max. Ht. (m)**	**X1**	**Y1**	**X2**	**Y2**	**X3**	**Y3**	**X4**	**Y4**	**X5**	**Y5**
				[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]
Structure	VCU4STK	1	13.70	676954	3079139	676953	3079140	676952	3079141	676951	3079140	676951	3079139
				X6	**Y6**	**X7**	**Y7**	**X8**	**Y8**	**X9**	**Y9**		
				676951	3079138	676952	3079138	676953	3079138	676954	3079139		
Downwash Type	**Modeled Building ID**	**No. of Tiers**	**Max. Ht. (m)**	**X1**	**Y1**	**X2**	**Y2**	**X3**	**Y3**	**X4**	**Y4**	**X5**	**Y5**
				[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]
Building	BLD_60	1	12.19	676523	3078932	676514	3078928	676510	3078920	676514	3078911	676523	3078907
				X6	**Y6**	**X7**	**Y7**	**X8**	**Y8**				
				676532	3078911	676535	3078920	676532	3078928				

Table 5-1: Buildings and Structure Downwash Information (UTM Coordinates)

Downwash Type	Modeled Building ID	No. of Tiers	Max. Ht. (m)	X1	Y1	X2	Y2	X3	Y3	X4	Y4		
				[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]		
Building	BLD_61	1	16	677115	3080017	677201	3080254	677234	3080242	677148	3080005		
Downwash Type	**Modeled Building ID**	**No. of Tiers**	**Max. Ht. (m)**	**X1**	**Y1**	**X2**	**Y2**	**X3**	**Y3**	**X4**	**Y4**		
				[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]		
Building	CENTCTRL	1	3.048	677342	3080286	677277	3080307	677265	3080273	677332	3080251		
Downwash Type	**Modeled Building ID**	**No. of Tiers**	**Max. Ht. (m)**	**X1**	**Y1**	**X2**	**Y2**	**X3**	**Y3**	**X4**	**Y4**		
				[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]		
Building	SUBSTATN	1	3.048	677050	3078923	677019	3078846	677039	3078837	677069	3078916		
Downwash Type	**Modeled Building ID**	**No. of Tiers**	**Max. Ht. (m)**	**X1**	**Y1**	**X2**	**Y2**	**X3**	**Y3**	**X4**	**Y4**		
				[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]		
Building	COMP_N	1	6.096	677575	3080181	677448	3080229	677432	3080188	677561	3080140		
Downwash Type	**Modeled Building ID**	**No. of Tiers**	**Max. Ht. (m)**	**X1**	**Y1**	**X2**	**Y2**	**X3**	**Y3**	**X4**	**Y4**		
				[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]		
Building	COMP_S	1	6.096	677475	3079890	677488	3079929	677362	3079976	677347	3079937		
Downwash Type	**Modeled Building ID**	**No. of Tiers**	**Max. Ht. (m)**	**X1**	**Y1**	**X2**	**Y2**	**X3**	**Y3**	**X4**	**Y4**		
				[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]		
Building	ELECSUB	1	4.8768	677246	3079940	677239	3079918	677172	3079941	677180	3079963		

Table 5-2: Tank Downwash Information

Downwash Type	Modeled Building ID	Tank Diameter (m)	Number of Tiers	Maximum Height (m)
Tank	T-101	64.00	1	18.29
Tank	T-102	64.00	1	18.29
Tank	T-103	64.00	1	24.38
Tank	T-104	64.00	1	18.29
Tank	T-105	64.00	1	18.29
Tank	T-106	64.00	1	24.38
Tank	T-107	64.00	1	18.29
Tank	T-108	64.00	1	18.29
Tank	T-109	64.00	1	24.38
Tank	T-110	64.00	1	24.38
Tank	T-111	64.00	1	24.38
Tank	T-112	64.00	1	24.38
Tank	T-113	64.00	1	24.38
Tank	T-114	64.00	1	24.38
Tank	T-115	64.00	1	24.38
Tank	T-116	64.00	1	24.38
Tank	T-117	64.00	1	24.38
Tank	T-118	64.00	1	24.38
Tank	T-119	64.00	1	24.38
Tank	T-120	64.00	1	24.38
Tank	T-121	64.00	1	24.38
Tank	T-122	57.91	1	24.38
Tank	T-123	57.91	1	24.38
Tank	T-124	64.00	1	24.38
Tank	T-125	64.00	1	24.38

Downwash Type	Modeled Building ID	Tank Diameter (m)	Number of Tiers	Maximum Height (m)
Tank	T-126	42.67	1	24.38
Tank	T-127	64.00	1	24.38
Tank	T-128	64.00	1	24.38
Tank	T-129	64.00	1	24.38
Tank	T-130	64.00	1	24.38
Tank	T-131	64.00	1	24.38
Tank	T-132	64.00	1	24.38
Tank	T-133	64.00	1	24.38
Tank	T-134	64.00	1	24.38
Tank	T-135	64.00	1	24.38
Tank	T-136	64.00	1	24.38
Tank	T-137	64.00	1	24.38
Tank	T-138	64.00	1	24.38
Tank	T-139	64.00	1	24.38
Tank	T-140	64.00	1	24.38
Tank	T-141	64.00	1	24.38
Tank	T-142	64.00	1	24.38
Tank	T-143	64.00	1	24.38
Tank	T-144	64.00	1	24.38
Tank	T-201	4.72	1	9.75
Tank	T-202	4.72	1	9.75
Tank	EMERTK1	14.02	1	9.75
Tank	EMERTK2	14.02	1	9.75
Tank	BT201	30.48	1	18.29
Tank	BT202	30.48	1	18.29

Table 5-2: Tank Downwash Information

Downwash Type	Modeled Building ID	Tank Diameter (m)	Number of Tiers	Maximum Height (m)
Tank	BT203	30.48	1	18.29
Tank	TANK1	49.99	1	40.84
Tank	TANK2	49.99	1	40.84
Tank	TANK3	49.99	1	40.84
Tank	TANK4	49.99	1	40.84
Tank	TK28067	40.69	1	14.63
Tank	TK28068	39.83	1	14.63
Tank	TK28069	40.92	1	14.63
Tank	TK28070	41.46	1	14.63
Tank	TK28071	52.59	1	17.07
Tank	TK28072	52.59	1	17.07
Tank	TK28073	52.59	1	17.07

Downwash Type	Modeled Building ID	Tank Diameter (m)	Number of Tiers	Maximum Height (m)
Tank	TK28074	54.74	1	17.07
Tank	TK28075	52.59	1	16.76
Tank	TK28076	52.59	1	16.76
Tank	TK28077	38.42	1	14.63
Tank	TK28078	22.19	1	12.19
Tank	TK28080	52.59	1	17.07
Tank	TK28086	57.90	1	14.63
Tank	TK28087	57.91	1	17.07
Tank	TK28088	57.91	1	17.07
Tank	TK28089	57.91	1	17.07
Tank	TK28090	57.91	1	17.07

5.2.6 Receptor Grid

North American Datum 1983 UTM Zone 14N will be used. The modeled Cartesian receptor grids to be used for this analysis will include:

+ Receptors placed along the fenceline with a 25-meter spacing;
+ Tight grid receptors (25-meter spacing) placed at the fenceline out to a distance of 200 meters; and
+ Fine grid receptors (100-meter spacing) placed 200 meters from the fenceline to a distance of 1,000 meters.
+ Medium grid receptors (500-meter spacing) placed 1 km from the fenceline to a distance of 5 km.
+ Coarse grid receptors (1 km spacing) placed 5 km from the fenceline to a distance of 10 km.

Based on previous modeling analyses at the sites adjacent to the Project location, we believe the maximum concentration from the modeled emission sources will be well within 10 km. Also, there will be no significant concentration gradient from site emissions beyond 10 km for both NO_2 and $PM_{2.5}$. Documentation for this will be provided in the modeling report.

5.2.7 Meteorological Data

Representative meteorological data sets for Ingleside, San Patricio County, Texas, for the 2017-2021 calendar years were retrieved from the TCEQ website for use in the AQA. The data set is comprised of surface and upper air station data from Corpus Christi International Airport, Texas (Surface Station ID No. 12924). A profile base elevation of 13.4 meters and anemometer height of 10.06 meters will be used in the model based on the available information for this meteorological station.

The TCEQ has prepared and made available for use pre-processed AERMET files for all areas of Texas. Based on a study conducted of surface roughness parameters for areas in Texas, the TCEQ identified three representative ranges of surface roughness and processed the meteorological data with an established surface roughness parameter within the categorical ranges. The categories, ranges, and surface roughness parameter used to process the meteorological data are as follows:

Table 5-3: Surface Roughness Categories

Category	Range of Surface Roughness Parameters (m)	Selected Surface Roughness Parameter (m)
1 (Flat Areas)	0.001 – 0.1	0.05
2 (Rural/Suburban)	0.1 – 0.7	0.5
3 (Urban Industrial)	0.7 – 1.5	1.0

To select the appropriate meteorological data set to be used for the AQA, information for the project site has been used to run AERSURFACE to estimate a site-specific surface roughness parameter. The site-specific surface roughness was determined to be within the category 2 range and therefore the medium surface roughness pre-processed AERMET data set will be used. The output from the AERSURFACE run is provided in Appendix F of this document.

5.2.8 Terrain Data

United States Geological Survey (USGS) NED GeoTIFF terrain data will be used for all modeling. As of March 19, 2009, USGS NED GeoTIFF is the terrain data that is recommended by the US EPA for use in the United States for regulatory purposes. It will be processed and run through the most recent version of AERMAP.

6.0 MODELING METHODOLOGY

6.1 Class II Air Quality Analysis

This section discusses the air quality dispersion modeling methodologies that will be followed to demonstrate compliance with the applicable NAAQS and Class II PSD Increments. This section specifically relates to the PSD pollutants for this project: CO, NO_2, and $PM_{2.5}$.

Class II air quality dispersion analyses are organized into two major sub-sections based on US EPA modeling guidance: the Preliminary Impact Analysis and the Full Impact Analysis. Each analysis that will be conducted is discussed in detail below.

6.1.1 Preliminary Impact Analysis

In the preliminary impact analysis, the increase in emissions of CO, NO_2, and $PM_{2.5}$ from the proposed project will be modeled to evaluate whether there will be potential for a significant impact upon the area surrounding the Plant. As explained in Section 4.0, modeled emissions will be the full proposed permitted emissions for each source. The AERMOD predicted maximum short-term and annual average concentrations for CO, NO_2, and $PM_{2.5}$ (as appropriate) will be compared with the corresponding SIL listed in Table 1-1 in Section 1.0.

If the AERMOD predicted maximum concentration from project emissions are less than the corresponding SIL value for all pollutants and averaging times, no further analysis is required. If the AERMOD predicted maximum concentration exceeds the corresponding SIL value for any pollutant and averaging period, then further evaluation is required to compare the project's impacts to the Class II PSD Increment and the NAAQS for the specific pollutant and averaging period.

6.1.2 Area of Impact (AOI) Determination

If modeling results exceed any SIL, the AOI will be determined for that pollutant and averaging period. The AOI is a circular area around the source with a radius equal to the distance to the furthest receptor with a concentration equal to or greater than the SIL. The AOI will not exceed 50 km due to constraints of the AERMOD dispersion model. The AOI is utilized to define the inventory for the full impact analysis.

Emission and source parameters for off-site sources within the modeling domain have been obtained from TCEQ. Initially, the off-site sources may be screened using the "20D" approach whereby sources whose potential allowable emissions (in tpy) are less than 20 times the distance between the two sources (in km) may be excluded from modeling.[4] Any source excluded using the "20D" approach will be identified in the AQA. Additionally, the concentration gradient(s) of these off-site sources at the nearest AOI receptor will be determined. If the concentration gradient(s) is above the SIL, the sources will be included. However, any source with impact below the SIL in the AOI will be excluded.

[4] North Carolina Department of Environment and Natural Resources, North Carolina PSD Modeling Guidance (January 6, 2012, https://files.nc.gov/ncdeq/Air%20Quality/permits/mets/psd_guidance.pdf).

6.1.3 Preconstruction Monitoring Analysis

Pre-construction ambient monitoring may be required for any regulated pollutant that requires PSD review to develop the design background concentration. If the maximum concentration for the project exceeds a monitoring de minimis concentration, ambient monitoring may be required unless existing ambient monitoring data are deemed representative of local conditions. The applicable monitoring de minimis concentration values are presented in Table 1-1 in Section 1.0.

Representative ambient monitoring data are available for both NO_2 and $PM_{2.5}$ for this project and are discussed in Section 3.0. Therefore, pre-construction monitoring is not required for this project.

6.1.4 Compliance Demonstration with PSD Class II Increment

For any pollutant and averaging period with a modeled concentration equal or greater than the corresponding SIL, a Class II PSD Increment consumption analysis will be performed if an increment has been established for that pollutant and averaging period. All receptors inside the AOI exceeding the SIL in the preliminary impact analysis will be included in the increment analysis.

The modeling assessment will include other off-site increment consuming or expanding sources within the AOI+50 km (including existing on-site sources). For the analysis, PSD increment inventory data for off-site sources will be collected from TCEQ and processed as discussed in Section 4.2. These data will be used in the analysis after appropriate gap filling as detailed in Appendix C. If required, increment consumption and expansion will be considered using the appropriate major source baseline date, trigger date, and minor source baseline date for the modeled pollutant and actual emissions changes from the baseline date for the off-site emission sources.

Project sources will be modeled at their proposed emission rate. Off-site emissions sources within the modeling domain will be modeled at actual emission rates for latest year of data available. Per US EPA guidance, intermittent sources will be included in the annual average NO_2 increment analysis. The sum of the impact from the project emissions and the increment consuming and expanding off-site emission sources will be compared with respective increments listed in Table 1-1 in Section 1.0 to demonstrate compliance.

If short-term average emission rates are not available from the TCEQ emission inventory for the off-site sources, these will be estimated based on annual emissions and hours of operation per year. If hours of operation per year data are not available, 8760 hours of operation per year will be used. Justification will be provided for the emission rates used in the modeling.

6.1.5 Demonstration of Compliance with NAAQS

The NAAQS assessment will be based on modeling of the project emissions and nearby off-site sources within the modeling domain with the potential to significantly impact the AOI. The inventory will cover emission sources within AOI and sources within 50 km from the AOI significantly impacting on AOI. The NAAQS emission inventory has been collected from TCEQ. These data will be used in the analysis after appropriate gap filling as discussed above in Section 4.2 and detailed in Appendix C. In addition to the inventory provided, a list of more recently permitted facilities will be requested from TCEQ and included in the analysis, if applicable. Per US EPA guidelines, emission from all sources will be based on allowable emissions or maximum potential to emit estimates except in cases where guidance allows other considerations, such as intermittent sources. Data will be verified as necessary with other public records and any refinements will be documented in the final AQA Report. All receptors within the AOI exceeding SIL in the preliminary impact analysis will be included in the NAAQS analysis.

Per US EPA guidelines, off-site intermittent sources will not be included in the NAAQS compliance demonstration for 1-hour NO_2. The intermittent sources will be included for all other applicable pollutants and averaging times.

If a NAAQS compliance demonstration is required, applicable background ambient concentrations will be included from a representative monitoring station. Representative background concentrations are available for the project as described in Section 3.0. A detailed justification of representative (or conservative) background monitoring station and analysis of the background concentration values is included in Section 3.0 and Appendix B.

The sum of the impacts from the project net emissions, appropriate other onsite emissions sources, off-site emission sources, and representative background concentration will be compared with relevant NAAQS listed in Table 1-1 in Section 1.0 to demonstrate compliance.

6.1.6 Ozone NAAQS Compliance Demonstration

As part of the revisions made to the Guideline on Air Quality Models (January 17, 2017), the US EPA promulgated a two-tiered demonstration approach for addressing single-source impacts on ozone. The first tier involves the use of technically credible relationships between precursor emissions and a source's impact in combination with other supportive information and analysis for the purpose of estimating secondary impacts from a particular source. The second tier involves application of more sophisticated case-specific chemical transport models (e.g., photochemical grid models). For this project, the Tier 1 analysis using the US EPA developed compliance demonstration tool for ozone precursor emissions called Modeled Emission Rates for Precursors (MERPs) will be used.

TCEQ has listed the worst case MERP values for hypothetical Texas sources of NO_X and VOC. These conservative MERPs will be initially used to estimate the project's impact on ambient ozone. If these MERPs are determined to be overly conservative and not representative of the project site, other hypothetical source MERPs listed in the Appendix Q of the TCEQ Air Quality Modeling Guidelines (ADPG 6232v4, Nov 2019) will be used. Justification of other MERP used for the analysis will be included in the AQA.

In this method, the project NO_X and VOC emissions will be divided by respective MERP and the ratios will be summed. If the sum of these ratios is less than the 8-hour ozone SIL of 1 part per billion (ppb), no significant impact is determined from the project emission on ambient ozone and the analysis will be complete. If the sum of ratios exceeds 1 ppb, a cumulative analysis will be conducted. In the cumulative analysis, the project impacts will be added to the regional background concentration obtained from a regional monitor and the sum will be compared with the 8-hr ozone NAAQS of 70 ppb to demonstrate compliance.

6.2 Class I Area Impact Analysis

All Class I areas in Texas and neighboring states are listed in Table 6-1 along with the approximate distance from the project site. As shown in the table, the nearest Class I area is 500 km from the site and is not expected to cause any adverse impact on the nearest Class I area. Therefore, a Class I area impact evaluation will not be included in the AQA.

Table 6-1: Class I Areas

Class I Area	State	Distance from Project Site (km)
Caney Creek Wilderness Area	Arkansas	770
Upper Buffalo Wilderness Area	Arkansas	925
Breton Wilderness Area	Louisiana	810
Bandelier Wilderness Area.	New Mexico	1,200
Bosque del Apache Wilderness Area	New Mexico	1,110
Carlsbad Caverns National Park	New Mexico	830
Gila Wilderness Area	New Mexico	1,250
Pecos Wilderness Area	New Mexico	1,150
Salt Creek Wilderness Area	New Mexico	910
San Pedro Parks Wilderness Area	New Mexico	1,260
Wheeler Peak Wilderness Area	New Mexico	1,190
White Mountain Wilderness Area	New Mexico	1,000
Wichita Mountains Wilderness	Oklahoma	745
Big Bend National Park	Texas	500
Guadalupe Mountains National Park	Texas	840

6.3 Additional Impact Analysis

6.3.1 Growth Analysis

An in-depth growth analysis is only required if the project would result in a significant shift in population and associated activity into the area (i.e., a population increase on the order of thousands of people). This project will not result in a large population shift and therefore, growth analysis is not required for this project.

6.3.2 Visibility Impairment Analysis

The Plant will comply with the visibility and opacity requirements in 30 TAC Chapter 111 and therefore will not be required to complete a visibility impairment analysis.[5]

6.3.3 Soils and Vegetation Analysis

The area surrounding the Plant is not known for sensitive soils or vegetation. For most types of soils and vegetation, ambient concentrations of criteria pollutants below the secondary NAAQS do not result in harmful effects. Therefore, the analysis will be limited to demonstration of compliance with the applicable secondary NAAQS.

[5] TCEQ's Air Quality Modeling Guidelines (APDG6232v4, Nov 2019), Section IV – Conducting the Air Quality Analysis, Additional Impacts Analysis.

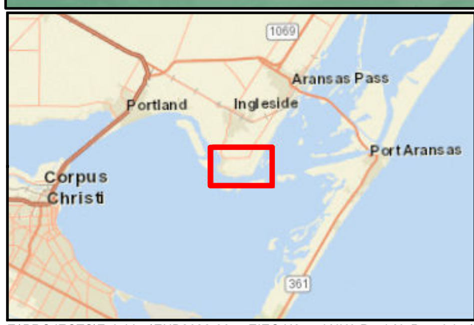
7.0 MODELING RESULTS

On completion of AQA, a report will be prepared and submitted to TCEQ demonstrating compliance with all applicable air quality impact requirements for the project. The report will include the details identified below.

+ Brief overview of proposed project;
+ Site plot plan indicating sources, property line, clear scale, and true north;
+ Emission rate summary for all Plant sources, with units consistent with modeling;
+ Stack parameter summary for all Plant sources, with units consistent with modeling;
+ Any calculations for stack parameters (i.e., combined stacks, flares, etc.);
+ Technical basis for any non-standard procedure with documentation of prior approval;
+ Summary of model inputs (e.g., model used, met data, rural or urban dispersion coefficients, etc.);
+ Comparison of modeling results to the applicable standards; and
+ Electronic copies of pertinent modeling files, including model input files, output files, meteorological data, and building downwash files. Electronic copies of the modeling report, plot plan, and maps will also be provided.

APPENDIX A

AREA MAP AND PLOT PLANS



Legend

Property Boundary

3000-ft. Property Boundary Radius

N

0 1,000 2,000

Feet

Scale: 1:25,000

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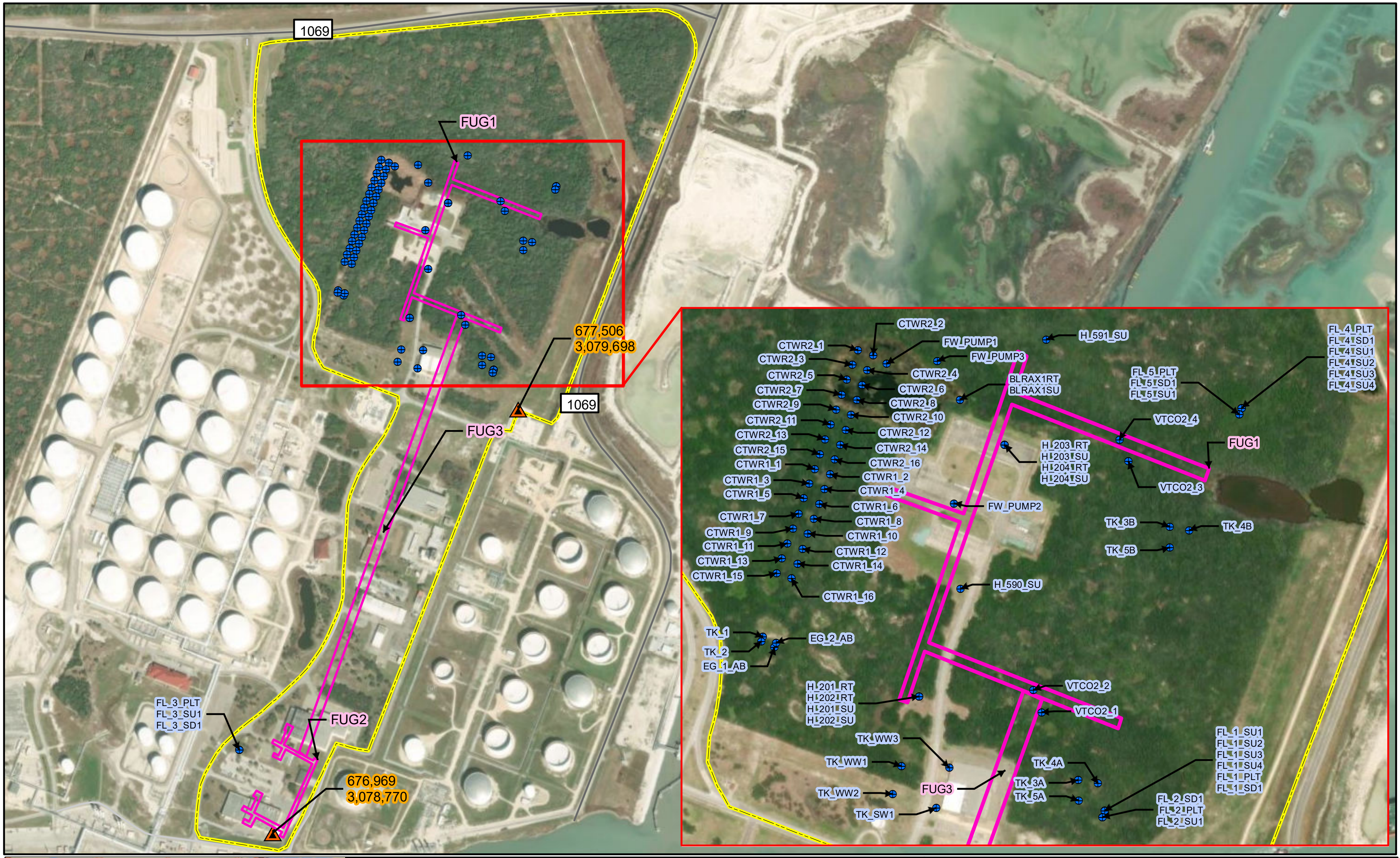
Figure A-1
Area Map

Ingleside Clean Ammonia Partners, LLC
Ingleside Blue Ammonia
Ingleside, San Patricio County, Texas

Z:\PROJECTS\Enbridge\ENB2022-0055 EIEC H2 and NH3 Prod Air Permitting\GIS\Maps\Figure B-1 Area Map.mxd



Legend

- Point Source
- Benchmark
- Area Source
- Property Boundary

N

0 500 1,000

Feet

Scale: 1:12,000

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Figure A-2
Modeled Sources

Ingleside Clean Ammonia Partners, LLC
Ingleside Blue Ammonia
Ingleside, San Patricio County, Texas

Z:\PROJECTS\Enbridge\ENB2022-0055 EIEC H2 and NH3 Prod Air Permitting\GIS\Maps\Figure A-2 Plot Plan Modeling 10_2023.mxd

Legend

- Building Sources
- Property Boundary

N

0 500 1,000
Feet

Scale: 1:12,000

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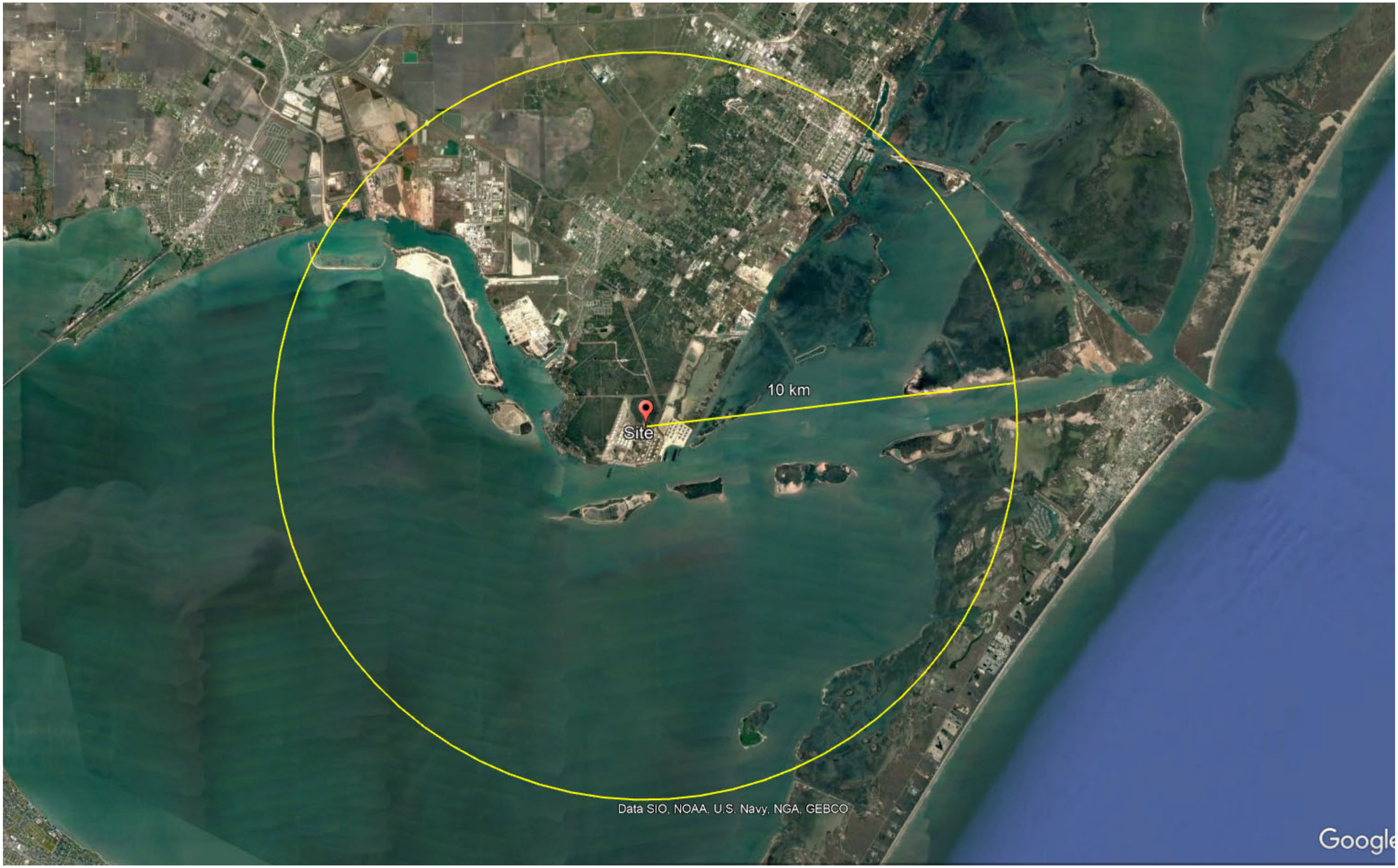
Figure A-3
Buildings

Ingleside Clean Ammonia Partners, LLC
Ingleside Blue Ammonia
Ingleside, San Patricio County, Texas

\\edge-nas01.aadds.edge-es.com\Common\PROJECTS\Enbridge\ENB2022-0055 EIEC H2 and NH3 Prod Air Permitting\GIS\Maps\Figure A-3 Plot Plan Modeling 1023.mxd

APPENDIX B

BACKGROUND MONITOR LOCATION FIGURES



Appendix B-1
10km Radius Around Facility

Ingleside Clean Ammonia Partners, LLC
Ingleside Blue Ammonia
Ingleside, San Patricio County, Texas

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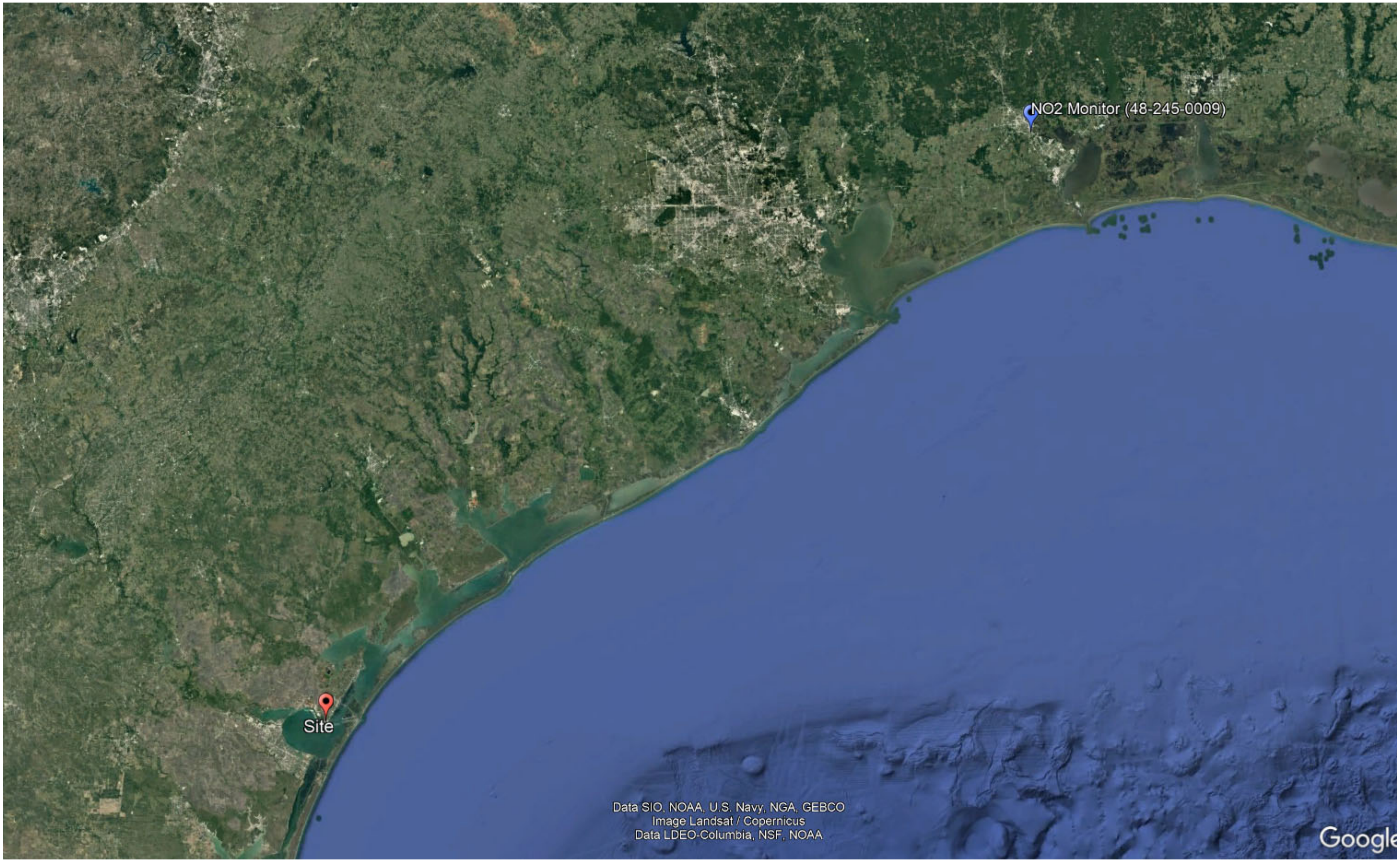

Appendix B-2
NO_2 Monitor Location

Ingleside Clean Ammonia Partners, LLC
Ingleside Blue Ammonia
Ingleside, San Patricio County, Texas

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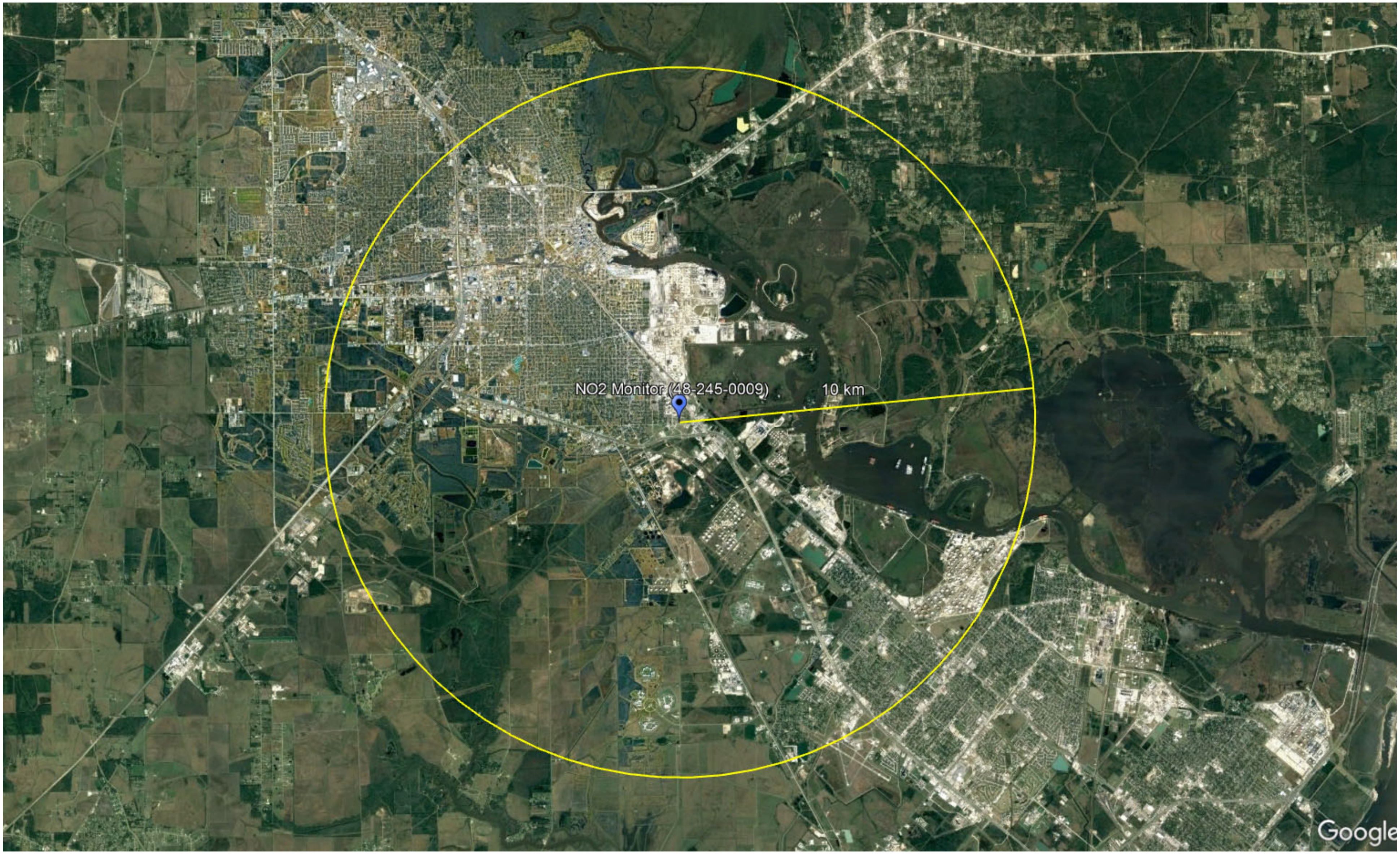

Appendix B-3
10km Radius Around NO_2 Monitor

Ingleside Clean Ammonia Partners, LLC
Ingleside Blue Ammonia
Ingleside, San Patricio County, Texas

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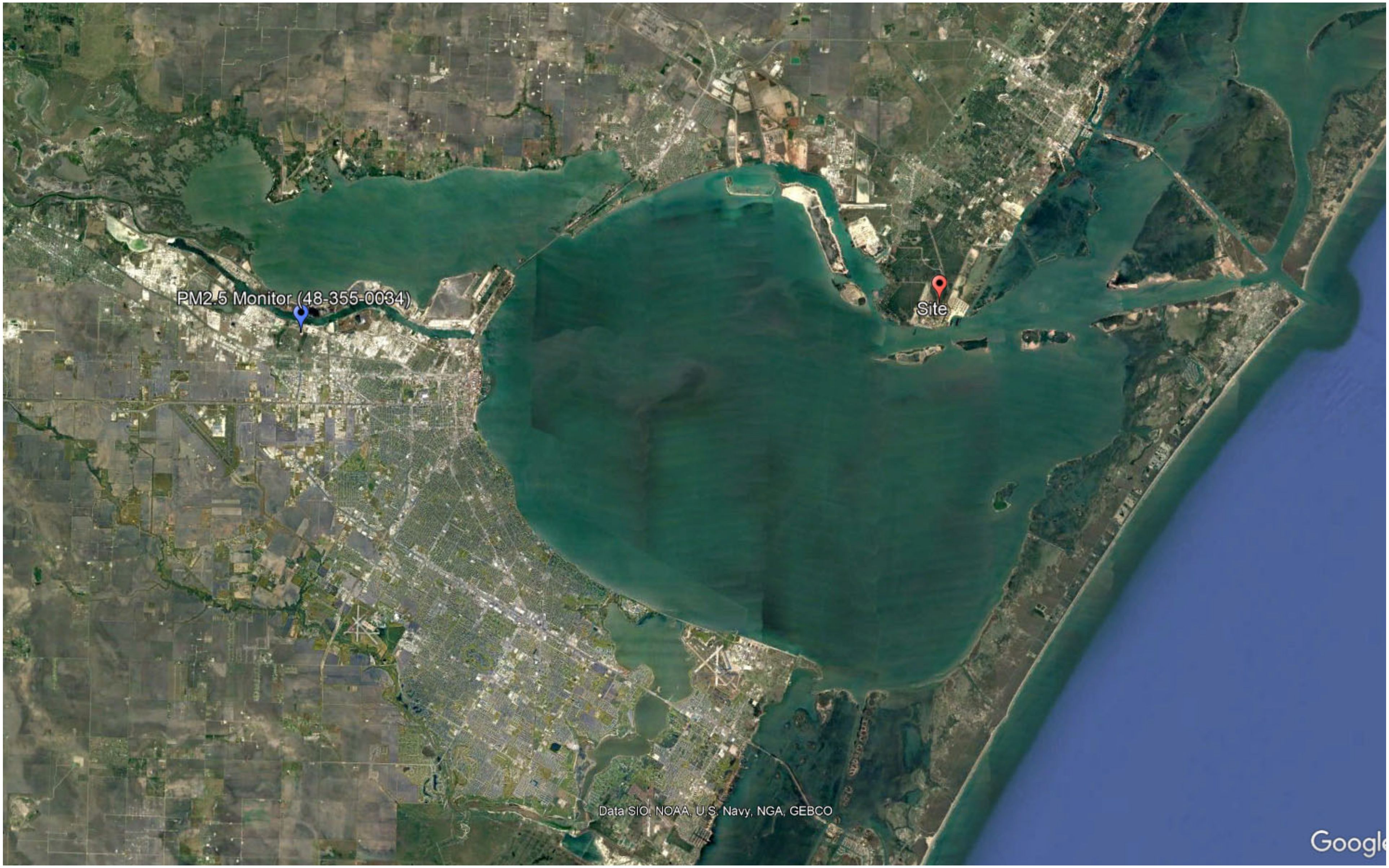
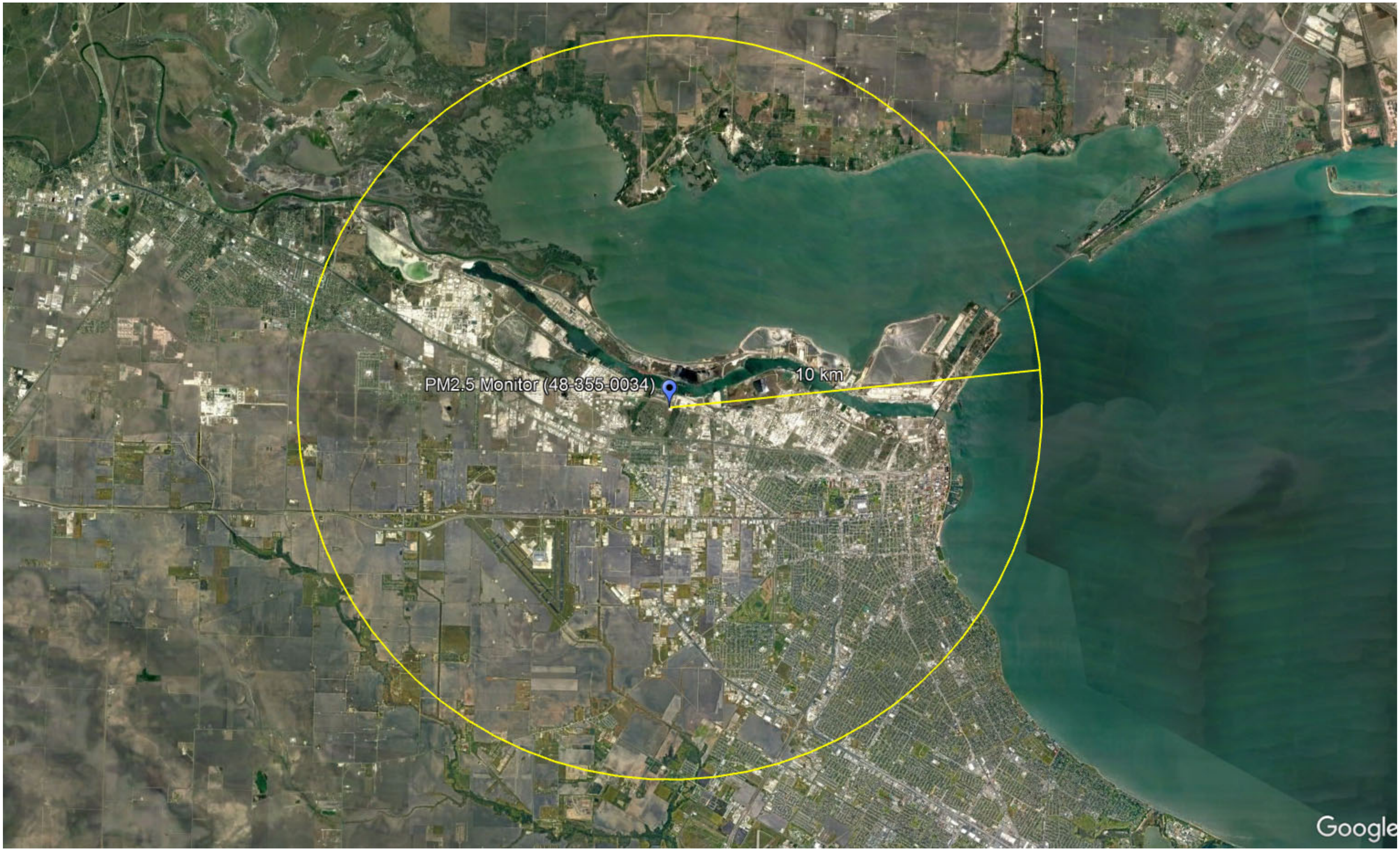


Appendix B-4
$PM_{2.5}$ Monitor Location

Ingleside Clean Ammonia Partners, LLC
Ingleside Blue Ammonia
Ingleside, San Patricio County, Texas

EDGE ENGINEERING & SCIENCE



Appendix B-5
10km Radius Around $PM_{2.5}$ Monitor

Ingleside Clean Ammonia Partners, LLC
Ingleside Blue Ammonia
Ingleside, San Patricio County, Texas

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APPENDIX C

OFF-PROPERTY SOURCE SUMMARY

This information has been provided electronically in Microsoft® Excel spreadsheets.

APPENDIX D

BREAKDOWN OF MODELING SCENARIOS

Table D-1
Modeled Scenarios - $PM_{2.5}$
Ingleside Blue Ammonia
Ingleside Clean Ammonia Partners, LLC

$PM_{2.5}$

Model ID	Description	Routine1	Routine2	Routine3	MSS1	MSS2	Annual
		EG-1 only	EG-2 only	Both EGs	Train 1 SU	Train 2 SU	ALL
BLRAX1SU	Boiler - Startup				X	X	X
BLRAX1RT	Boiler - Routine	X	X	X			X
H_201_SU	Heater 201 - Startup				X		X
H_202_SU	Heater 202 - Startup				X		X
H_203_SU	Heater 203 - Startup					X	X
H_204_SU	Heater 204 - Startup					X	X
H_201_RT	Heater 201 - Routine	X	X	X			X
H_202_RT	Heater 202 - Routine	X	X	X			X
H_203_RT	Heater 203 - Routine	X	X	X			X
H_204_RT	Heater 204 - Routine	X	X	X			X
H_590_SU	SU Heater 1 - Startup				X		X
H_591_SU	SU Heater 2 - Startup					X	X
FW_PUMP1	FW Pump	X	X	X			X
FW_PUMP2	FW Pump	X	X	X			X
FW_PUMP3	FW Pump	X	X	X			X
EG_1_AB	Emergency Generator	X		X			X
EG_2_AB	Emergency Generator		X	X			X

Table D-2
Scenarios - NO_X and CO
Ingleside Blue Ammonia
Ingleside Clean Ammonia Partners, LLC

NO_X

The 1-hr scenarios are determined as follows.

1. All of the following: Boiler in startup mode, heaters' startup (201+202+590 or 203+204+591), and flare pilots; **and**
2. **A.** 1 SU stream from Flare 1 or Flare 2, and 1 stream from Flare 3;
   B. 1 SU stream from Flare 4 or Flare 5, and 1 stream from Flare 3;
   C. Train 1 (FL-1 + FL-2) + Flare 3 shutting down; **or**
   D. Train 2 (FL-4 + FL-5) flares + Flare 3 shutting down.

Model ID	Description	Routine1	Routine2	1-hr											
				MSS1	MSS2	MSS3	MSS4	MSS5	MSS6	MSS7	MSS8	MSS9	MSS10	MSS11	MSS12
BLRAX1SU	Boiler - Startup			X	X	X	X	X	X	X	X	X	X	X	X
BLRAX1RT	Boiler - Routine	X	X												
H-201_SU	Heater 201 - Startup			X	X	X	X	X	X						
H-202_SU	Heater 202 - Startup			X	X	X	X	X	X						
H-203_SU	Heater 203 - Startup									X	X	X	X	X	X
H-204_SU	Heater 204 - Startup									X	X	X	X	X	X
H-201_RT	Heater 201 - Routine	X	X												
H-202_RT	Heater 202 - Routine	X	X												
H-203_RT	Heater 203 - Routine	X	X												
H-204_RT	Heater 204 - Routine	X	X												
H-590_SU	SU Heater 1 - Startup			X	X	X	X		X						
H-591_SU	SU Heater 2 - Startup									X	X	X	X	X	
FW-PUMP1	FW Pump 1	X	X												
FW-PUMP2	FW Pump 2	X	X												
FW-PUMP3	FW Pump 3	X	X												
EG_1_AB	Emergency Generator	X													
EG_2_AB	Emergency Generator		X												
FL-1_PLT	Flare 1 Pilot	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FL-1_SU1	Flare 1 SU 1			X											
FL-1_SU2	Flare 1 SU 2				X										
FL-1_SU3	Flare 1 SU 3					X									
FL-1_SU4	Flare 1 SU 4						X								
FL-1_SD1	Flare 1 SD 1							X							
FL-2_PLT	Flare 2 Pilot	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FL-2_SU1	Flare 2 SU 1								X						
FL-2_SD1	Flare 2 SD 1							X							
FL-3_PLT	Flare 3 Pilot	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FL-3_SU1	Flare 3 SU 1			X	X	X	X		X	X	X	X	X	X	
FL-3_SD1	Flare 3 SD 1							X							X
FL-4_PLT	Flare 4 Pilot	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FL-4_SU1	Flare 4 SU 1									X					
FL-4_SU2	Flare 4 SU 2										X				
FL-4_SU3	Flare 4 SU 3											X			
FL-4_SU4	Flare 4 SU 4												X		
FL-4_SD1	Flare 4 SD 1														X
FL-5_PLT	Flare 5 Pilot	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FL-5_SU1	Flare 5 SU 1													X	
FL-5_SD1	Flare 5 SD 1														X

Table D-2
Scenarios - NO_X and CO
Ingleside Blue Ammonia
Ingleside Clean Ammonia Partners, LLC

CO

The 1-hr scenarios are determined as follows.

1. **All of the following**: Boiler in startup mode, heaters' startup (201+202+590 or 203+204+591), flare pilots, CO_2 vents, and fugitives; **and**

2. **A.** 1 SU stream from Flare 1 or Flare 2, and 1 stream from Flare 3;
   B. 1 SU stream from Flare 4 or Flare 5, and 1 stream from Flare 3;
   C. Train 1 (FL-1 + FL-2) + Flare 3 shutting down; **or**
   D. Train 2 (FL-4 + FL-5) flares + Flare 3 shutting down.

Model ID	Description	Routine1	Routine2	Routine3	1-hr											
		1-hr, EG-1 only	1-hr, EG-2 only	8-hr, Both EGs	MSS1	MSS2	MSS3	MSS4	MSS5	MSS6	MSS7	MSS8	MSS9	MSS10	MSS11	MSS12
BLRAX1SU	Boiler - Startup				X	X	X	X	X	X	X	X	X	X	X	X
BLRAX1RT	Boiler - Routine	X	X	X												
H_201_SU	Heater 201 - Startup				X	X	X	X	X	X						
H_202_SU	Heater 202 - Startup				X	X	X	X	X	X						
H_203_SU	Heater 203 - Startup										X	X	X	X	X	X
H_204_SU	Heater 204 - Startup										X	X	X	X	X	X
H_201_RT	Heater 201 - Routine	X	X	X												
H_202_RT	Heater 202 - Routine	X	X	X												
H_203_RT	Heater 203 - Routine	X	X	X												
H_204_RT	Heater 204 - Routine	X	X	X												
H_590_SU	SU Heater 1 - Startup				X	X	X	X		X						
H_591_SU	SU Heater 2 - Startup										X	X	X	X	X	
FW_PUMP1	FW Pump	X	X	X												
FW_PUMP2	FW Pump	X	X	X												
FW_PUMP3	FW Pump	X	X	X												
EG_1_AB	Emergency Generator	X		X												
EG_2_AB	Emergency Generator		X	X												
FL_1_PLT	Flare 1 Pilot	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FL_1_SU1	Flare 1 SU 1				X											
FL_1_SU2	Flare 1 SU 2					X										
FL_1_SU3	Flare 1 SU 3						X									
FL_1_SU4	Flare 1 SU 4							X								
FL_1_SD1	Flare 1 SD 1								X							
FL_2_PLT	Flare 2 Pilot	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FL_2_SU1	Flare 2 SU 1									X						
FL_2_SD1	Flare 2 SD 1								X							
FL_3_PLT	Flare 3 Pilot	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FL_4_PLT	Flare 4 Pilot	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FL_4_SU1	Flare 4 SU 1										X					
FL_4_SU2	Flare 4 SU 2											X				
FL_4_SU3	Flare 4 SU 3												X			
FL_4_SU4	Flare 4 SU 4													X		
FL_4_SD1	Flare 4 SD 1															X
FL_5_PLT	Flare 5 Pilot	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FL_5_SU1	Flare 5 SU 1														X	
FL_5_SD1	Flare 5 SD 1															X
VTCO2_1	Low Flow CO2 Vent 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
VTCO2_2	High Flow CO2 Vent 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
VTCO2_3	Low Flow CO2 Vent 2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
VTCO2_4	High Flow CO2 Vent 2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FUG1	Fugitives	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FUG2	Fugitives	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FUG3	Fugitives	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

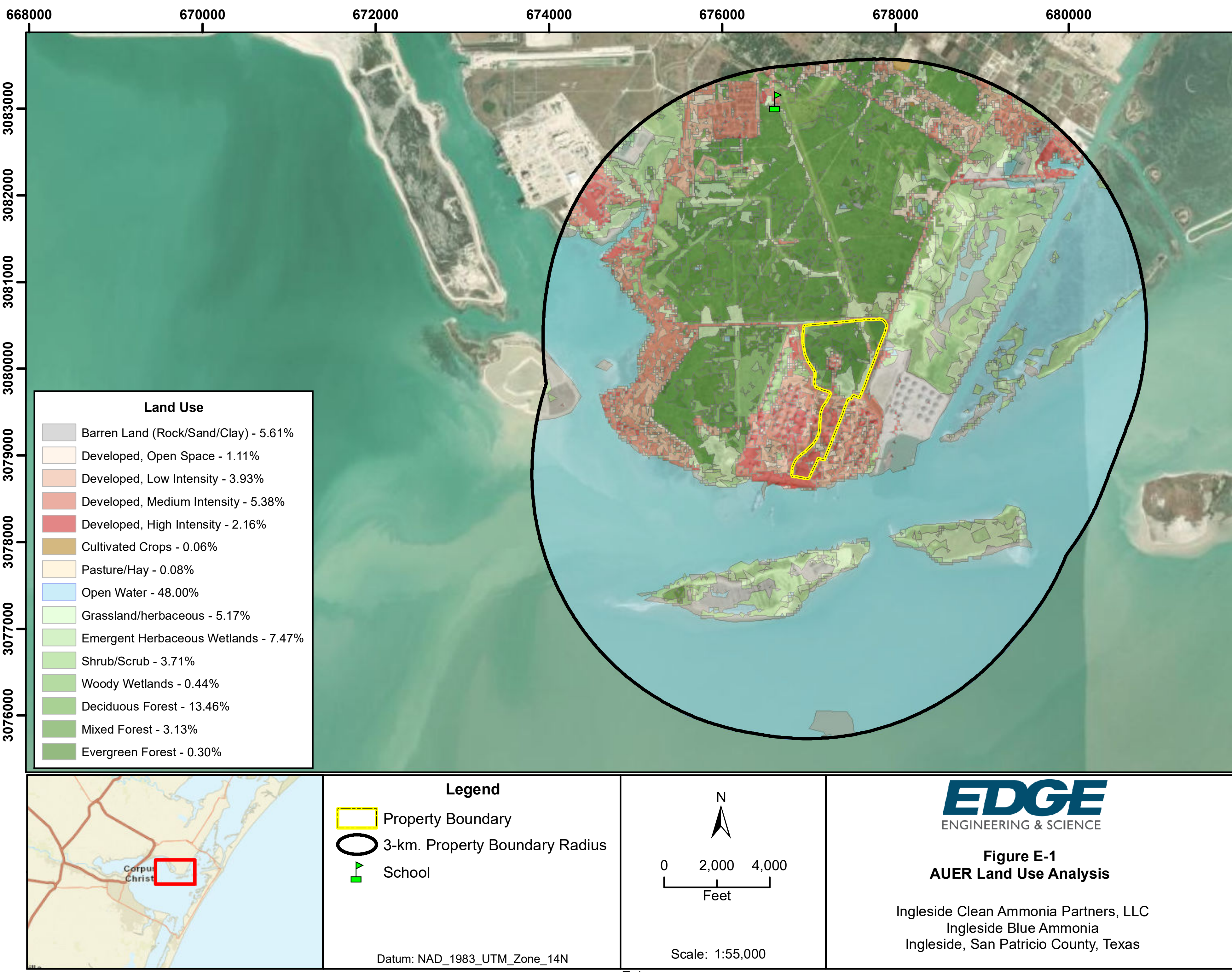
Table D-2
Scenarios - NO_X and CO
Ingleside Blue Ammonia
Ingleside Clean Ammonia Partners, LLC

CO

Model ID	Description	8-hr							
		MSS1	MSS2	MSS3	MSS4	MSS5	MSS6	MSS7	MSS8
		The 8-hr scenarios are determined as follows. 1. **All of the following:** Boiler in startup mode, boiler in routine mode, firewater pumps, emergency generators, heaters SU + RT (201+202+590 or 203+204+591), flare pilots, CO_2 vents, and fugitives; **and** 2. **A.** One of the following: [Flare 1: SU 1+2+3], [Flare 1: SU 2+3+4], or [Flare 1: SU 3+4 and Flare 2: SU 1]; **B.** One of the following: [Flare 4: SU 1+2+3], [Flare 4: SU 2+3+4], or [Flare 5: SU 3+4 and Flare 5: SU 1]; **C.** Train 1 (FL-1 + FL-2) + Flare 3 shutting down; **or** **D.** Train 2 (FL-4 + FL-5) flares + Flare 3 shutting down.							
BLRAX1SU	Boiler - Startup	X	X	X	X	X	X	X	X
BLRAX1RT	Boiler - Routine	X	X	X	X	X	X	X	X
H_201_SU	Heater 201 - Startup	X	X	X	X				
H_202_SU	Heater 202 - Startup	X	X	X	X				
H_203_SU	Heater 203 - Startup					X	X	X	X
H_204_SU	Heater 204 - Startup					X	X	X	X
H_201_RT	Heater 201 - Routine	X	X	X	X				
H_202_RT	Heater 202 - Routine	X	X	X	X				
H_203_RT	Heater 203 - Routine					X	X	X	X
H_204_RT	Heater 204 - Routine					X	X	X	X
H_590_SU	SU Heater 1 - Startup	X	X	X					
H_591_SU	SU Heater 2 - Startup					X	X	X	
FW_PUMP1	FW Pump	X	X	X	X	X	X	X	X
FW_PUMP2	FW Pump	X	X	X	X	X	X	X	X
FW_PUMP3	FW Pump	X	X	X	X	X	X	X	X
EG_1_AB	Emergency Generator	X	X	X	X	X	X	X	X
EG_2_AB	Emergency Generator	X	X	X	X	X	X	X	X
FL_1_PLT	Flare 1 Pilot	X	X	X	X	X	X	X	X
FL_1_SU1	Flare 1 SU 1	X							
FL_1_SU2	Flare 1 SU 2	X	X						
FL_1_SU3	Flare 1 SU 3	X	X	X					
FL_1_SU4	Flare 1 SU 4		X	X					
FL_1_SD1	Flare 1 SD 1				X				
FL_2_PLT	Flare 2 Pilot	X	X	X	X	X	X	X	X
FL_2_SU1	Flare 2 SU 1			X					
FL_2_SD1	Flare 2 SD 1				X				
FL_3_PLT	Flare 3 Pilot	X	X	X	X	X	X	X	X
FL_4_PLT	Flare 4 Pilot	X	X	X	X	X	X	X	X
FL_4_SU1	Flare 4 SU 1					X			
FL_4_SU2	Flare 4 SU 2					X	X		
FL_4_SU3	Flare 4 SU 3					X	X	X	
FL_4_SU4	Flare 4 SU 4						X	X	
FL_4_SD1	Flare 4 SD 1								X
FL_5_PLT	Flare 5 Pilot	X	X	X	X	X	X	X	X
FL_5_SU1	Flare 5 SU 1							X	
FL_5_SD1	Flare 5 SD 1								X
VTCO2_1	Low Flow CO2 Vent 1	X	X	X	X	X	X	X	X
VTCO2_2	High Flow CO2 Vent 1	X	X	X	X	X	X	X	X
VTCO2_3	Low Flow CO2 Vent 2	X	X	X	X	X	X	X	X
VTCO2_4	High Flow CO2 Vent 2	X	X	X	X	X	X	X	X
FUG1	Fugitives	X	X	X	X	X	X	X	X
FUG2	Fugitives	X	X	X	X	X	X	X	X
FUG3	Fugitives	X	X	X	X	X	X	X	X

APPENDIX E

RURAL DISPERSION JUSTIFICATION



EDGE ENGINEERING & SCIENCE

Figure E-1
AUER Land Use Analysis

Ingleside Clean Ammonia Partners, LLC
Ingleside Blue Ammonia
Ingleside, San Patricio County, Texas

Z:\PROJECTS\Enbridge\ENB2022-0055 EIEC H2 and NH3 Prod Air Permitting\GIS\Maps\Figure E1 Land Use Analysis.mxd

APPENDIX F

SURFACE ROUGHNESS JUSTIFICATION

```
** Generated by AERSURFACE, Version 20060                              10/03/23 **
**                                                                     16:46:54 **

** Title 1:  Ingleside NH3.AMF AERSURFACE
** Primary Site (Zo):
**   Center UTM Easting  (meters):   677249.7
**   Center UTM Northing (meters):  3080105.5
**   UTM Zone:  14  Datum: NAD83
** NLCD Version:  2016
** NLCD DataFile:
..\NLCD_lF3k1BCViEUIwBsYHzch\NLCD_2021_Land_Cover_L48_20230630_lF3k1BCViEUIwBsYHzch
.tiff
** MPRV Version:  2016
** MPRV DataFile:
..\NLCD_lF3k1BCViEUIwBsYHzch\NLCD_2021_Impervious_L48_20230630_lF3k1BCViEUIwBsYHzch
.tiff
** CNPY Version:  2016
** CNPY DataFile:
..\NLCD_lF3k1BCViEUIwBsYHzch\nlcd_tcc_conus_2021_v2021-4_lF3k1BCViEUIwBsYHzch.tiff
** Non-Airport Sector IDs: All
** Zo Method: ZORAD
** Zo Radius (m):   1000.0
** Continuous snow cover: N
** Surface moisture: Average;  Arid: N
** Month/Season assignments: Default
** Late autumn after frost and harvest, or winter with no snow: 1  2 12
** Winter with continuous snow on the ground:
** Transitional spring (partial green coverage, short annuals): 3  4  5
** Midsummer with lush vegetation: 6  7  8
** Autumn with unharvested cropland: 9 10 11


   FREQ_SECT  ANNUAL  1
   SECTOR   1    0.00  360.00

**                    Sect    Alb      Bo        Zo
   SITE_CHAR    1       1     0.13     0.23     0.298
```