Appendix H

Air Impact Assessment

DILLON CONSULTING

UTILITIES KINGSTON

Air Impact Assessment

Kingston Biosolids and Biogas Facility

July 2024 – 22-4641

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Executive Summary

Utilities Kingston has undertaken an Environmental Screening Report (ESR) pursuant to the *Environmental Assessment Act* (*EA Act*) to investigate the feasibility of the construction of a combined biosolids and source separated organics (SSO) processing facility at Knox Farm in the City of Kingston (Facility, Site, or Project). The Facility will process organic wastes from the City's existing wastewater treatment plants (WWTPs) and "Green Bin" program to produce renewable natural gas (biogas) and other beneficial resources.

This Air Impact Assessment has been developed to address indicator air emissions (particulate [TSP, PM_{10}, $PM_{2.5}$], SO_2, CO, NOx (expressed as NO_2), and H_2S), and odour from the development of the facility.

Background air quality was characterized through the analysis of data obtained from the most representative monitoring stations operated by the Ontario Ministry of the Environment, Conservation and Parks (MECP), Environment Canada and Climate Change (ECCC) National Air Pollution Surveillance Program (NAPS), and ECCC reference documentation.

Contaminant emission rates were prepared for the proposed Facility operations and exhaust systems using industry accepted methodologies.

The environmental effects assessment includes a combination of the background air quality for the region and the contribution of all anticipated activities at the Facility with the potential to impact the atmospheric environment. In addition to the evaluation of environmental effects, a compliance assessment was performed to determine whether the site would be anticipated to operate in compliance with MECP Point of Impingement (POI) limits.

Atmospheric dispersion modelling was conducted using the MECP approved AERMOD version 22112, MECP terrain data, and an MECP processed site-specific 5-year meteorological dataset.

The predicted concentrations of indicator compounds are anticipated to meet relevant regulatory compliance criteria. The assessment of all anticipated sources on-site demonstrated that the site can meet relevant air quality criteria.

1.0 Introduction

Utilities Kingston has undertaken an Environmental Screening Report (ESR) pursuant to the *Environmental Assessment Act (EA Act)*[1] to investigate the feasibility of the construction of a combined biosolids and source separated organics (SSO) processing facility at Knox Farm in the City of Kingston (Facility, Site, or Project) (**Figure 1**). The Facility will aim to process organic wastes from the City's wastewater treatment plants (WWTPs) and "Green Bin" program to produce renewable natural gas (biogas) and other beneficial resources.

The Project is following a Schedule 'C' undertaking as outlined in the Municipal Class Environmental Assessment (October 2000, as amended). This Project builds on the Master Plan for Enhanced Biosolids Management and Biogas Utilization project completed in 2020 and the Knox Farm Suitability Assessment completed in April 2023.

1.1 Role of Atmospheric Impact Assessment

In this assessment, the potential net effects of the facility on the atmospheric characteristics of the surrounding area were considered from an air quality impact perspective. The criteria used in the assessment are designed to identify and evaluate the potential impacts of the proposed facility as required by the *EA Act*[2] and related Code of Practice[3].

The primary objective of this assessment is to address the requirements of Section 17.6(2)(c) and (d) of the *EA Act*, as it pertains to the atmospheric environment; specifically:

> *(c) a description of,*
>
> *(i) the environment that will be affected or that might reasonably be expected to be affected, directly or indirectly,*
>
> *(ii) the effects that will be caused or that might reasonably be expected to be caused to the environment, and*
>
> *(iii) the actions necessary or that may reasonably be expected to be necessary to prevent, change, mitigate or remedy the effects upon or the effects that might reasonably be expected upon the environment, by the undertaking, the*

[1] Ministry of the Environment, Conservation and Parks (1990). *Environmental Assessment Act*, R.S.O. 1990, c. E.18. Last Updated: February 2024.

[2] Ministry of the Environment, Conservation and Parks (1990). *Environmental Assessment Act*, R.S.O. 1990, c. E.18. Last Updated: February 2024.

[3] Ministry of the Environment, Conservation and Parks (2014). Code of Practice: Preparing and Reviewing Environmental Assessments in Ontario, January 2014. Last updated November 2023.

alternative methods of carrying out the undertaking and the alternatives to the undertaking;

(d) an evaluation of the advantages and disadvantages to the environment of the undertaking.

Phase 4 of the Class EA process involves preparation of the ESR. The Atmospheric Impact Assessment (AIA) report was prepared as a supporting document to the ESR.

1.2 Scope of Assessment

The scope of the Air Impact Assessment (AIA) includes a review of existing background conditions and the cumulative effects of the potential impacts of the proposed Facility. To provide predicted impacts, atmospheric modelling is complete to provide insight into the atmospheric setting and help to understand the physical, chemical, and biochemical processes occurring at the Site. This complex model includes: the atmospheric conceptual framework, the geometry and structure of the site features, assumptions and limitations, processes, boundary conditions, governing equations, and a solution method.

1.2.1 Environmental Effects Assessment

The potential air quality impacts have been determined through an assessment at sensitive receptors located within the Study Area. Environmental assessments generally consider sensitive receptors in locations where human activities may regularly occur. The environmental effects assessment includes a combination of the background air quality for the region and the activities identified at the proposed Facility with the potential to cause residual effects on the atmospheric environment.

1.2.2 Compliance Assessment

A compliance assessment was performed to determine whether the site would be anticipated to operate in compliance under *O.Reg. 419/05*. The compliance assessment includes the predicted impact from the proposed Facility to the MECP's compliance level receptor grid.

1.3 Study Area

Knox Farm is a municipally-owned property located off of Perth Road just northwest of the Highway 401 and Division Street interchange in the City of Kingston (**Figure 1**). The site is north of Highway 401, with frontage to the west side of Perth Road and south of Little Cataraqui Creek Conservation Area and the Cataraqui Region Conservation Authority (CRCA). Knox Farm covers nearly 75 hectares (ha) of land, of which approximately 9.3 ha is a former dewatering facility that previously held an Environmental Compliance Approval (ECA) and is now decommissioned. A portion of the property is currently in use as a snow management facility. The proposed Site boundary is located outside of the City of Kingston's Urban Boundary.

Figure 1: Location of Project Study Area

2.0 Existing Atmospheric Conditions

The potential for impact of the site operations on the atmospheric environment was evaluated. The applicable criteria and background concentrations of the indicator compounds for the Study Area are described in the following sections.

2.1 Indicator Compounds

Indicator compounds were selected for this assessment based on the typical emissions from biosolids and biogas facilities. When considering typical emissions from these types of facilities, the following compounds are expected to have the highest potential for impacts to the atmospheric environment:

- Nitrogen oxides (expressed as NO_2);
- Carbon monoxide (CO);
- Sulphur dioxide (SO_2);
- Particulate matter (TSP, PM_{10}, and $PM_{2.5}$);
- Hydrogen sulphide (H_2S); and
- Odour.

The environment surrounding the site consists of primarily rural (conservation) land uses to the north and more urban commercial land uses to the south. It is expected that the ambient odours would be characteristic of these land uses and no baseline value (magnitude and characteristics) was defined for odour.

This assessment reviewed the ambient levels of contaminants which were expected to be emitted from the proposed facility for comparison against relevant criteria and/or guidelines. The review provided an indication of how degraded the current airshed is with respect to the indicator compounds.

2.1.1 Air Quality Criteria

The criteria for air quality in Ontario are established in *Ontario Regulation (O.Reg.) 419/05*[4] and in Ontario's Ambient Air Quality Criteria[5] (AAQC). *O.Reg. 419/05* provides contaminant concentration standards, guidelines, and limits to assess industrial facility impacts for permitting requirements (i.e., compliance). The AAQCs developed by the MECP are commonly used in environmental assessments, special studies using ambient air monitoring data, assessment of general air quality in a community, and annual reporting on air quality across the province.

[4] Ministry of the Environment, Conservation and Parks (2019). *Environmental Protection Act. O.Reg. 419/05: Air Pollution – Local Air Quality.* January 2019. Last amendment 90/22.

[5] Ministry of the Environment, Conservation and Parks (2020). Ontario's Ambient Air Quality Criteria. May 2020. Last updated October 2023.

The applicable Ontario standards and criteria are provided in **Table 1**.

Table 1: Ontario Air Quality Standards and Criteria

Pollutant	CAS #	Averaging Period	Criterion (µg/m³)	Regulation/Guideline
NO_2	10102-44-0	1 hour	400	*O.Reg. 419/05*, Ontario AAQC
		24 hour	200	*O.Reg. 419/05*, Ontario AAQC
$PM_{2.5}$	-	24 hour	27	Ontario AAQC
		Annual	8.8	Ontario AAQC
PM_{10}	-	24 hour	50	Ontario AAQC
TSP	-	24 hour	120	*O.Reg. 419/05*, Ontario AAQC
		Annual	60	Ontario AAQC
SO_2	7446-09-5	10 minutes	175	Ontario AAQC
		1 hour	79	Ontario AAQC
			100	*O.Reg. 419/05*
		Annual	10	*O.Reg. 419/05*, Ontario AAQC
CO	630-08-0	0.5 hour	6,000	*O.Reg. 419/05*
		1 hour	36,200	Ontario AAQC
		8 hour	15,700	Ontario AAQC
H_2S	7783-06-04	10 minutes	13	*O.Reg. 419/05*, Ontario AAQC
		24 hour	7	*O.Reg. 419/05*, Ontario AAQC
Odour	-	10 minutes	1 OU/m³	MECP Guideline

2.1.2 Background Air Quality

Background air quality was quantified through historic monitoring data proximate to the Study Area. The MECP and Environment and Climate Change Canada (ECCC) National Air Pollution Surveillance Program (NAPS) data from nearby stations was reviewed for each indicator compound. The closest monitoring station to the Study Area with a three-year data set was selected.

A summary of NAPS station IDs and the available data for each indicator compound is summarized in **Table 2** below. It is noted that data was not available for CO and SO_2 in closer proximity to the Study Area than the ECCC NAPS Ottawa station. As the area surrounding Ottawa contains higher population and more industry than Kingston the data obtained from the Ottawa station is anticipated to serve as a conservative surrogate for Kingston air quality conditions for CO and SO_2.

Table 2: Indicator Compound MECP and ECCC NAPS Station ID

Indicator Compound	Station ID	Data Range
TSP	NA	NA
PM_{10}	NA	NA
$PM_{2.5}$	ECCC NAPS – Kingston (60304)	2018-2020
Nitrogen Dioxide (NO_2)	ECCC NAPS – Kingston (60304)	2018-2020
Hydrogen Sulphide (H_2S)	NA	NA
Carbon Monoxide (CO)	ECCC NAPS – Ottawa (60104)	2018-2020
Sulphur Dioxide (SO_2)	ECCC NAPS – Ottawa (60104)	2018-2020
Odour[a]	NA	NA

The background concentrations for the indicator compounds from the MECP and ECCC NAPS stations were calculated for the respective contaminant averaging periods.

Ambient monitoring data for hydrogen sulphide is not readily available for the study areas. ECCC documents an overall average concentration of 1.4 µg/m^3, measured in urban areas presumed to be away from major anthropogenic sources in Canada[6], which was used as the background concentration for this assessment.

$PM_{2.5}$ is the only particulate species which is monitored by MECP or ECCC. To be consistent with using three years of background data where possible, the monitored MECP $PM_{2.5}$ data was adjusted to estimate TSP and PM_{10} background data. As $PM_{2.5}$ is a size fraction subset of PM_{10}, and PM_{10} is a size fraction subset of TSP, the PM_{10} and TSP background concentrations can be estimated based on the $PM_{2.5}$ background concentration by applying a $PM_{2.5}/PM_{10}$ ratio of 0.54 and a $PM_{2.5}$/TSP ratio of 0.3 as shown below[7]:

- $PM2.5_{concentration} / 0.3 = TSP_{concentration}$; and
- $PM2.5_{concentration} / 0.54 = PM10_{concentration}$

The baseline environment at the Site is not characterized by an odour profile typical of the proposed biosolids Facility. Therefore, background concentrations for odour have not been defined and the potential impact of the Facility's odour emissions on the surrounding environment has been assessed.

[6] Environment and Climate Change Canada (2017). Draft Screening Assessment: Hydrogen Sulfide (H_2S), Sodium Sulfide (NA(SH)) and Sodium Sulfide (Na_2S), September 2017.

[7] Lall, R., Kendall, M., Ito, K., and G. Thurston (2004). Estimation of Historical Annual $PM_{2.5}$ Exposures for Health Effects Assessment. Atmospheric Environment 38 (2004) 5217-5226.

2.1.2.1 Background Air Quality Results and Discussion

The background concentrations for each indicator compound for the Study Area are summarized in **Table 3** through **Table 7**.

Table 3: Nitrogen Dioxide Ambient Air Quality Summary

Averaging Period	Ambient Concentration (µg/m³)			Percentage of Criterion (%)			Criterion (µg/m³)	Regulation/Guideline
	Max	90th Percentile	Average	Max	90th Percentile	Average		
1-hour	94.1	38.2	19.3	24%	10%	5%	400	*O.Reg. 419*/AAQC
24 hour	39.3	13.7	7.3	20%	7%	4%	200	*O.Reg. 419*/AAQC

A review of the three years of ambient monitoring data from the Kingston Station indicated that the ambient concentrations of nitrogen dioxide are below all applicable criteria.

Table 4: Particulate Matter Ambient Air Quality Summary

Pollutant	Averaging Period	Ambient Concentration (µg/m³)			Percentage of Criterion (%)			Criterion (µg/m³)	Regulation/Guideline
		Max[1]	90th Percentile	Average	Max	90th Percentile	Average		
$PM_{2.5}$	24 hour	26.3	10.1	5.5	97%	37%	20%	27	AAQC
	Annual	5.5	--	5.5	63%	--	63%	8.8	AAQC
PM_{10}	24 hour	48.7	18.7	10.2	97%	37%	20%	50	AAQC
TSP	24 hour	87.6	33.6	18.4	73%	28%	15%	120	*O.Reg. 419*/AAQC
	Annual	18.4	--	18.4	31%	--	31%	60	AAQC

Notes:

(1) Annual ambient concentrations compared to the AAQC criteria are taken as the average 24 hour concentrations for the dataset.

A review of the three years of ambient monitoring data from the Kingston Station indicated that the ambient concentrations of each relevant particulate matter species are below all applicable criteria.

It is noted that the maximum values for $PM_{2.5}$ and PM_{10} represent a relatively high percentage when compared to the AAQC criteria. However, the 90th percentile and average concentration values for these contaminants are well below their respective criteria indicating that concentrations approach but do not exceed the maximum on an infrequent basis.

Table 5: Sulphur Dioxide Ambient Air Quality Summary

Averaging Period	Ambient Concentration (µg/m³)			Percentage of Criterion (%)			Criterion (µg/m³)	Regulation/Guideline
	Max[1]	90th Percentile	Average	Max	90th Percentile	Average		
10 minutes	10.5	2.1	1.0	6%	1%	1%	175	AAQC
1 hour	10.5	2.1	1.0	13%	3%	1%	79	AAQC
	10.5	2.1	1.0	10%	2%	1%	100	*O.Reg. 419*
Annual	0.4	--	0.4	4%	--	4%	10	*O.Reg. 419*/AAQC

Notes:

(1) Annual ambient concentrations compared to the O.Reg. 419/18 and AAQC criteria are taken as the average 24 hour concentrations for the dataset.

A review of the three years of ambient monitoring data from the Ottawa Station indicated that the ambient concentrations of sulphur dioxide are well below all applicable criteria.

Table 6: Carbon Monoxide Ambient Air Quality Summary

Averaging Period	Ambient Concentration (µg/m³)			Percentage of Criterion (%)			Criterion (µg/m³)	Regulation/Guideline
	Max	90th Percentile	Average	Max	90th Percentile	Average		
0.5 hour	1.1	0.5	0.2	<1%	<1%	<1%	6,000	AAQC
1 hour	1.1	0.5	0.2	<1%	<1%	<1%	36,200	AAQC
8 hour	0.7	0.3	0.2	<1%	<1%	<1%	15,700	AAQC

A review of the three years of ambient monitoring data from the Ottawa Station indicated that the ambient concentrations of carbon monoxide are well below all applicable criteria.

Table 7: Hydrogen Sulphide Ambient Air Quality Summary

Averaging Period	Ambient Concentration (µg/m³) (1)	Percentage of Criterion (%)	Criterion (µg/m³)	Regulation/Guideline
10 minute	1.4	11%	13	AAQC
24 hour	1.4	20%	7	AAQC

Notes:

(1) Ambient concentrations taken from Environment and Climate Change Canada (2017). Draft Screening Assessment: Hydrogen Sulfide (H_2S), Sodium Sulfide (NA(SH)) and Sodium Sulfide (Na_2S), September 2017.

As ambient monitoring data was unavailable for hydrogen sulphide, a review of the noted ECCC document provided the background concentration for this assessment. The ambient concentration of hydrogen sulphide is well below the applicable criteria.

Based on a review of ambient monitoring data, all contaminants were below their respective criteria in the region where Knox Farm is located. Although some maximum ambient concentrations of NO_2, $PM_{2.5}$, and PM_{10} were approaching their respective criteria, the 90th percentile and average ambient concentrations were well below these criteria. Typically, environmental assessments use the 90th percentile ambient concentrations when considering cumulative impacts from facility operations at off-site sensitive receptors.

3.0 Assessment Methodology

An environmental effects assessment was completed which includes a combination of the background air quality for the region and the contribution of all activities at the Facility with the potential to impact the atmospheric environment. In addition to the evaluation of environmental effects, a compliance assessment was performed to determine whether the site would be anticipated to operate in compliance with MECP POI limits.

The methodology used in these assessments, including source identification, emissions rate development, dispersion modelling, and results assessment are described in the following sections.

3.1 Source Identification and Emission Rate Estimates

The air emissions from sources at the Facility were estimated for the expected operating years of the Site. The proposed on-Site operations with potential to generate emissions of indicator compounds include the following:

- Biofilter;
- Renewable natural gas (RNG) off-spec/emergency flare;
- Natural gas-fired comfort heating and process equipment; and
- Diesel-fired emergency generator.

A summary of the sources and contaminants are provided in **Table 8** below.

Table 8: Source and Contaminants Identification

Source Identifier	Source Description	General Location	Contaminants
S1	Biofilter	Biofilter	Odour
			Hydrogen sulphide
S2	RNG Plant Off-Spec/Emergency Flare	RNG Plant	Nitrogen Oxides (as NO_2)
			Sulphur Dioxide
			Carbon Monoxide
			Particulate Matter (TSP, PM_{10}, and $PM_{2.5}$)
			Hydrogen sulphide
NG_1	Natural Gas-Fired Comforting Heating Equipment – Site Office	Site Office	Nitrogen Oxides (as NO_2)
NG_2	Natural Gas-Fired Comforting Heating Equipment – Main Building	Main Building	Nitrogen Oxides (as NO_2)
NG_3	Natural Gas Comforting Heating Equipment – RNG Plant	RNG Plant	Nitrogen Oxides (as NO_2)
EG_1	Diesel-Fired Emergency Generator	Main Building	Nitrogen Oxides

3.2 Identification of Negligible Sources of Contaminants

The estimated number of vehicles ether dropping off sludge from the WWTPs or removing liquid digestate for end users is 6 to 10 per day. Directly south of the proposed Facility is Highway 401, which contributes 46,000 AADT and of those 10,000 of those are truck traffic per day based on historical provincial highways traffic volumes form the Ministry of Transportation. The potential incremental increase of truck traffic at the site is anticipated to be negligible compared to this main traffic artery.

The Ministry of Transportation Air Quality & Greenhouse Gas Guide dated May 2020 (MTO Guide) indicates that for major roads, the collective experience of the scientific community suggests that the affected immediate vicinity is limited to the area within approximately 500 metres (m) of the road. As the nearest residential point-of-reception is ~500 m north of the proposed facility entrance, it can be anticipated that the potential impacts from the Facility truck traffic would be not significant. All other sensitive receptors reviewed for air quality impacts are well above the 500 m threshold typically used for delineating the assessment boundary for environmental assessments as outlined in the MTO Guide.

It is noted that the drive-in movie theatre to the north of the site was included for the assessment of odour-based contaminants as an outdoor public recreational area as an activity where human activities regularly occur. These receptors are not typically included for assessment of impacts of contaminants at points-of-impingement as defined in *O.Reg. 419/05*.

The Facility is not listed in Table 7-2 or 7-3 (Waste Treatment as Disposal clarified as landfills only) of Section 7.4 of the ESDM Procedure Document and accordingly dust emissions from these sources can be considered as insignificant. The on-site roadways will be paved which will significantly reduce potential for fugitive dust to be generated by vehicle traffic. Further, prior to operation, the Facility is expected to implement a fugitive dust and odour best management practices plan (BMPP), which will include management practices such as road cleaning and compliant response.

Figure 2 details the Site layout and source configuration for the operation of the Facility.

Figure 2: Site Layout and Source Configuration

The technical rationale, including sample calculations, required to substantiate the emission rates are documented in **Appendix A**.

Biofilter (source ID S1)

Air will be collected from within the material processing building and directed through a biofilter before being discharged to the atmosphere through the Biofilter stack. The Biofilter is expected to emit odour and hydrogen sulphide.

The maximum permissible emission rate of odour and hydrogen sulphide emitted from the Biofilter was back-calculated following methodologies prescribed by the MECP's Air Dispersion Modelling Guideline for Ontario (the ADMGO)[8] and the Ontario Standards Development Branch Technical Bulletin for modelling odour (Odour Technical Bulletin)[9].

RNG Plant Off-Spec/Emergency Flare (source ID S2)

The Site is proposing the installation of an RNG facility which will include an off-specification gas flare. The biogas collected will be directed to the RNG facility where odorous/volatile compounds will be removed and the biogas will be upgraded to RNG. The flare is included to accommodate any off-spec gas and upset conditions. The flare is expected to emit products of combustion (NO_2, SO_2, CO, TSP, PM_{10}, $PM_{2.5}$) and residual/un-combusted hydrogen sulphide.

Natural Gas-Fired Comfort Heating Equipment (source ID NG_1, NG_2, and NG_3)

It is expected that the Site will use a variety of natural gas-fired equipment (rooftop heating units, make-up air units, etc.) that provide comfort heating to the Facility buildings. These sources are expected to emit nitrogen oxides.

Diesel-Fired Emergency Generator (source ID EG_1)

It is expected that the Site will use an emergency diesel generator for standby power. This source is expected to emit products of diesel combustion. It is likely that the emergency generator will be designed to meet the exemption requirements outlined in *O.Reg. 524/98* – Exemptions from Section 9 of the Act; however, to support a conservative analysis, nitrogen oxides has been assessed following the MECP's Emergency Generator Checklist Supplement to Application for Approval, EPA s.9.

[8] Ministry of the Environment, Conservation and Parks (2017). Air Dispersion Modelling Guideline for Ontario (ADMGO). February 2017. Last updated November 2023.

[9] Ministry of the Environment, Conservation and Parks (2016) Methodology for Modelling Assessments of Contaminants with 10-minute Averaging Standards and Guidelines for Odour under *O.Reg. 419/05*. Last updated July 2021.

3.3 Source Summary

Table 9 below is a source summary table which lists the source data and emissions data used in the assessment.

Table 9: Source Summary Table

Source Identifier	Source Description	Source Orientation	Source Data						UTM Coordinate		Emissions Data						
			Stack Gas Flow Rate	Stack Velocity	Exhaust Temperature	Stack Exit Diameter	Stack Height Above Grade	Stack Height Above Roof			Contaminant	CAS No.	Max Emission Rate	Averaging Period	Data Quality	Estimation Technique	Percent of Overall Emission
			[m^3/s]	[m/s]	[°C]	[m]	[m]	[m]	X	Y			[g/s]	[hours]			
S1	Biofilter	Vertical	45.2 (3)	17.3	10	1.823 (4)	50 (4)	--	379897.1	4903289.0	Odour	N/A	1.05E+05	10-min	AA	EC	100.0%
											Hydrogen sulphide	7783-06-04	1.16E+00	10-min	AA	EC	100.0%
											Hydrogen sulphide	7783-06-04	1.16E+00	24	AA	EC	100.0%
S2	RNG Flare	Vertical	10.2 (4)	5.6 (4)	650 (4)	1.52 (4)	12 (4)	--	379859	4903257.2	Nitrogen Oxides (as NO_2)	10102-44-0	8.59E-02	1, 24	A	EF	65.4%
											Sulphur Dioxide	7446-09-05	1.98E-02	10-min, 1, annual	A	EF	100.0%
											Carbon Monoxide	630-08-0	1.00E-01	0.5, 1, 8	A	EF	100.0%
											TSP	N/A - TSP	3.24E-02	24, annual	A	EF	100.0%
											PM_{10}	N/A - PM_{10}	3.24E-02	24	A	EF	100.0%
											$PM_{2.5}$	N/A - $PM_{2.5}$	3.24E-02	24, annual	A	EF	100.0%
											Hydrogen sulphide	7783-06-04	1.05E-02	10-min, 24	M	EC	100.0%
NG_1	Natural Gas-Fired Comforting Heating Equipment - Site Office	Area	*modelled as an area source*				4	--	379824.4	4903383.9	Nitrogen Oxides (as NO_2)	10102-44-0	5.03E-03	1, 24	A	EF	3.8%
NG_2	Natural Gas-Fired Comforting Heating Equipment - Main Building	Area	*modelled as an area source*				9	--	379848.1	4903290.3	Nitrogen Oxides (as NO_2)	10102-44-0	2.69E-02	1, 24	A	EF	20.5%
NG_3	Natural Gas Comforting Heating Equipment - RNG Plant	Area	*modelled as an area source*				9	--	379823.7	4903244.4	Nitrogen Oxides (as NO_2)	10102-44-0	1.34E-02	1, 24	A	EF	10.2%
EG_1	Diesel-Fired Emergency Generator	Vertical	0.60 (4)	34.0	50 (4)	0.15 (4)	9 (4)	--	379846.5	4903299.7	Nitrogen Oxides	10102-44-0	1.23E+00	0.5	M	EF	100.0%

3.4 Dispersion Modelling

This section provides a description of how the dispersion modelling was conducted at the facility to calculate the maximum concentration at a point-of-impingement (POI).

The AERMOD modelling system has been identified by the MECP as one of the approved dispersion models under *O.Reg. 419/05*. The AERMOD modelling system is made up of the AERMOD dispersion model, the AERMET meteorological pre-processor and the AERMAP terrain pre-processor. AERMOD version 22112 was used for this application.

The emission rates used in the dispersion model meet the requirements of s.11(1)1 of *O.Reg. 419/05*, which requires that the emission rate used in the dispersion model is at least as high as the maximum emission rate that the source of contaminant is reasonably capable of for the relevant contaminant.

Emissions from the biofilter, RNG flare, and diesel-fired emergency generator were modelled as point sources. Emissions from natural gas-fired comfort heating equipment was modelled as an area source.

The dispersion modelling was conducted in accordance with MECP Guidelines (the ADMGO)[10]. Electronic copies of all input and output files for the dispersion modelling are provided in **Appendix B**. A general description of the input data used in the dispersion model is provided below and summarized in **Table 10**.

[10] Ministry of the Environment, Conservation and Parks (2017). Air Dispersion Modelling Guideline for Ontario (ADMGO). February 2017. Last updated November 2023.

Table 10: Dispersion Modelling Input Summary Table

Relevant Section of the Regulation *O. Reg. 419/05*	Section Title	Description of How the Approved Dispersion Model was Used
Section 8	Negligible sources of contaminant	Sources and contaminants that were considered negligible were explicitly identified in **Section 3.2**, and therefore were not modelled, in accordance with s.8 of *O.Reg. 419/05*.
Section 9	Same structure contamination	Not applicable. Utilities Kingston is the only occupant of the building and there are no sensitive receptors (e.g., child-care facility) at the facility.
Section 10	Operating conditions	All equipment was assumed to be operating at their maximum production rates at the same time.
Section 11	Source of contaminant emission rates	The emission rate for each significant contaminant emitted from a significant source was estimated, the methodology for the calculation is documented in **Appendix A**.
Section 12	Combined effect of assumptions for operating conditions and emission rates	The operating conditions were estimated in accordance with s.10(11)1 and s.11(11)1 of *O.Reg. 419/05* and area emitted.
Section 13	Meteorological data	Site-specific meteorological data provided by the MECP located within the facility geographic region was used in the AERMOD dispersion model.
Section 14	Area of modelling coverage	The model includes contaminant concentrations to a distance of 5 km from the Facility.
Section 15	Stack height for certain new sources of contaminants	Refer to the Source Summary Table located in **Appendix A**.
Section 16	Terrain data	Terrain data provided by the MECP located within the facility geographic region was used in the AERMOD dispersion model.
Section 17	Averaging periods	1 hour, 8 hour, 24 hour, and annual averaged concentrations were calculated by the model. An averaging period correction factor of 1.65 was applied to the 1-hour POI results to obtain the 10-min POI concentration for odour.

3.4.1 Meteorological Data Sources

Sub-paragraph 10 of s.26(1) of *O. Reg. 419/05* requires a description of the local land use conditions if meteorological data described in paragraph 2 of s.13(1) of *O.Reg. 419/05* was used. The dispersion model required a frequency assessment at discrete receptors and therefore 5-year pre-processed local meteorological data from the Kingston Climate monitoring station (located at the Kingston Airport approximately 10 km from the site) was provided by the Air Modelling and Emissions Unit of the MECP.

3.4.2 Terrain

Terrain data was incorporated into the model using MECP provided digital elevation data. The following Canadian Digital Elevation Model (CDEM) Tile was used in the dispersion model for UTM Zone 17:

- cdem_dem_031C.

3.4.3 Receptors

Receptors used in the Environmental Effects Assessment and the Compliance Assessment are described in the following sections.

3.4.3.1 Environmental Effect Discrete Receptors

Potential air quality impacts have been determined through a qualitative assessment at sensitive receptors located within the Study Area. Environmental assessments generally consider sensitive receptors in locations where human activities may regularly occur. Typical land uses that are defined as sensitive receptors for evaluating potential air quality impacts include, but are not limited to: residences, schools, daycares, hospitals, and sports fields.

A review of the surrounding land uses to the south of Knox Farm and Highway 401 show General Industrial, Business Park Industrial, Arterial Commercial, Regional Commercial and Residential land uses. Located in the Arterial Commercial and Regional Commercial areas are five hotels located along the southern perimeter of Highway 401 approximately 250 m to 600 m from the southeast boundary of the proposed site location. Residential dwellings are located approximately 900 m from the southeast boundary of the Proposed Site Location. It is noted that there is a Little Cataraqui Creek Conservation Authority trail (Reservoir Trail) that currently runs through the northwestern part of the Property.

The land use to the north of the Knox Farm boundary is comprised of Rural, Open Space, and Environmental Protection Areas. There are a few residential dwellings to the north of the site. An amusement park area with mini-golf and go-carting activities is present to the northeast of the site. The Little Cataraqui Creek Conservation Area (CA) trails are located in the Environmental Protection Area to the northwest of the boundary of the Proposed Site Location within the Knox Farm boundary and is considered a sensitive receptor for the consideration of potential air quality impacts.

A zoning map of the Facility is provided in **Figure 3** and a receptor location map is provided in **Figure 4** below, which also illustrates the boundaries of the Proposed Site Location.

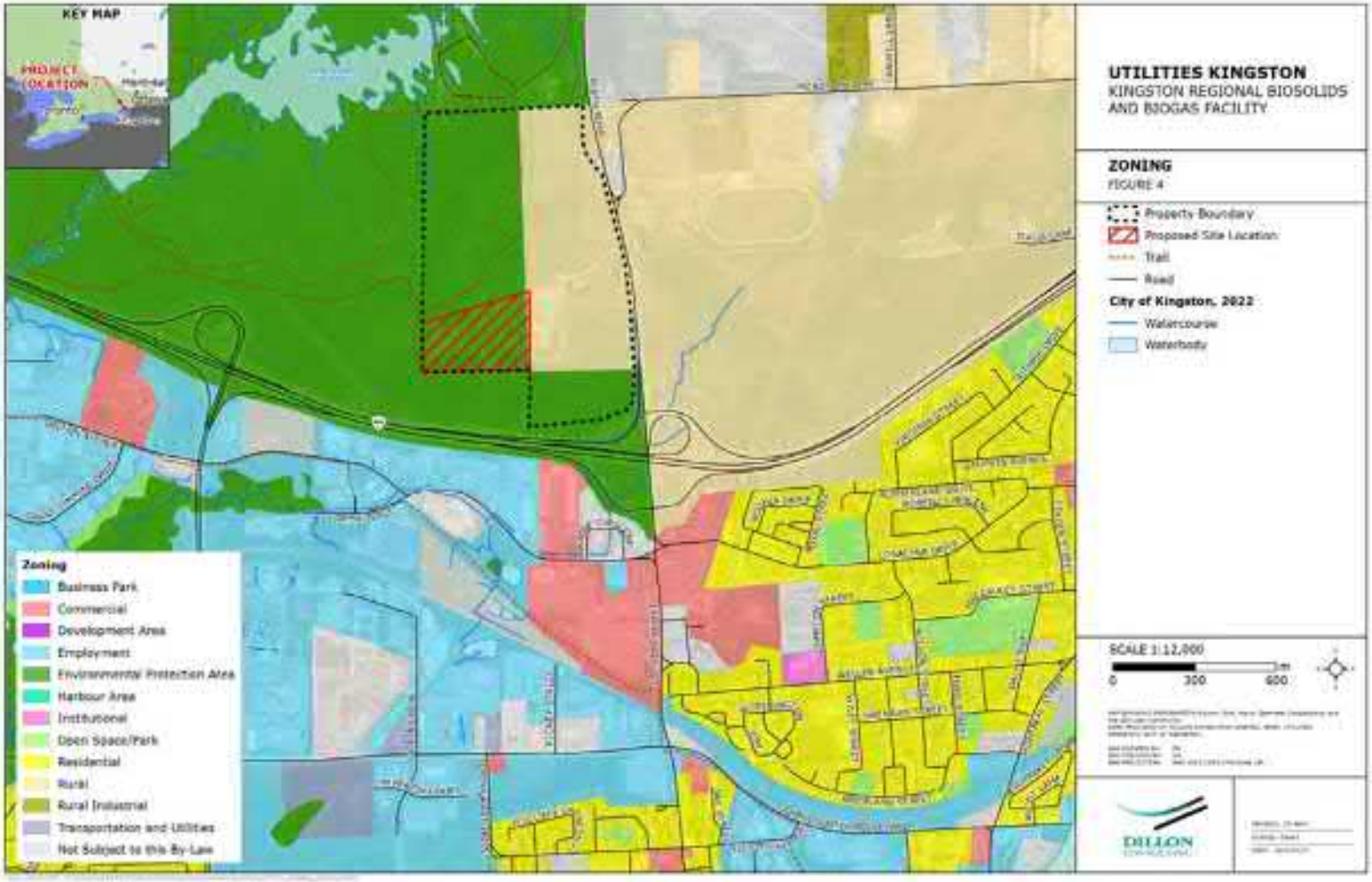


Figure 3: Knox Farm Land Use Zoning Map

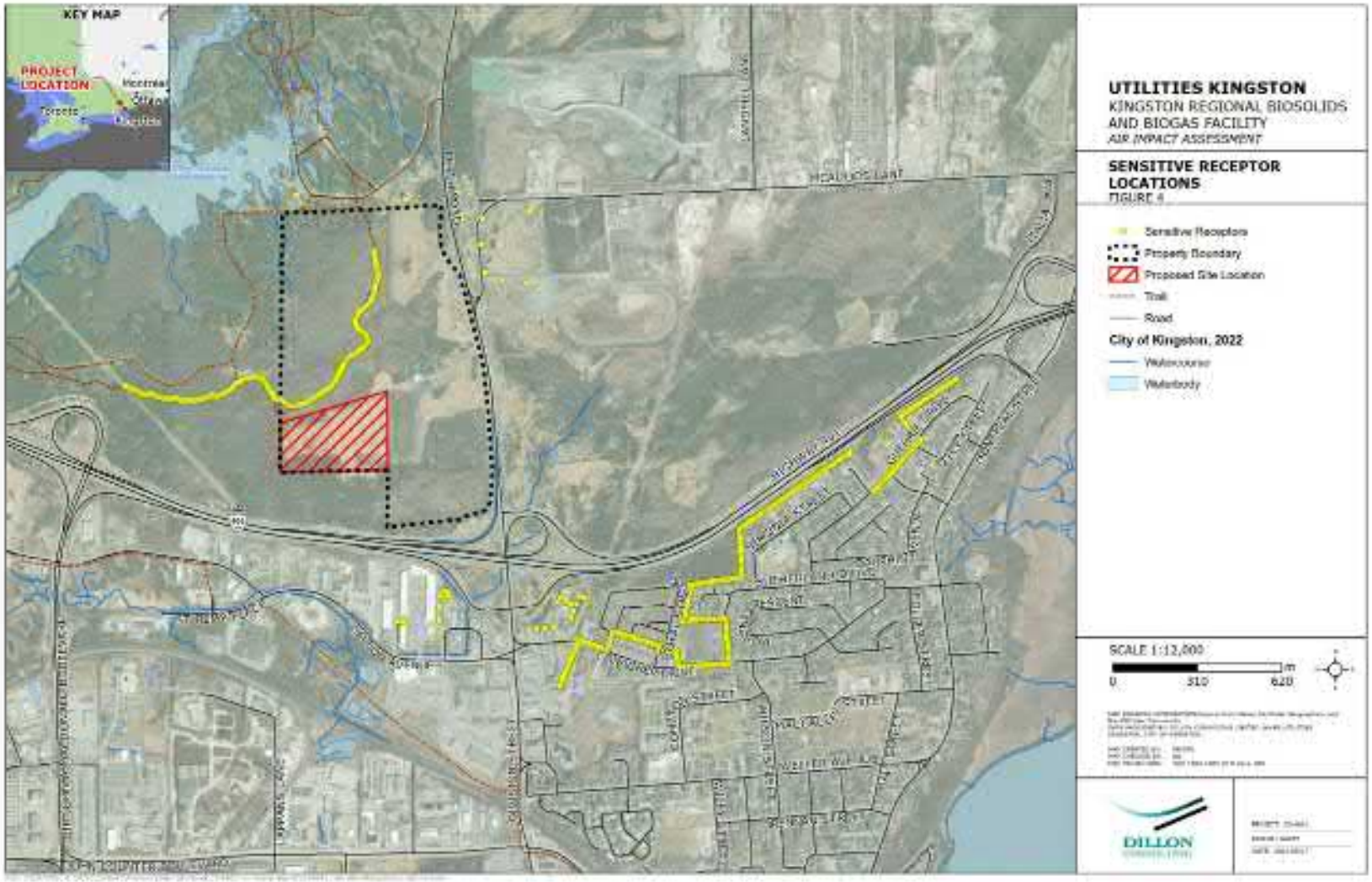


Figure 4: Sensitive Receptor Locations

3.4.3.2 Compliance Assessment MECP Receptor Grid

Receptors were chosen based on recommendations provided in Section 7.1 of the ADMGO, which is in accordance with s.14 of *O.Reg. 419/05*. As the areas of highest impact from site operations are anticipated close to or at the property line, a 5 km multi-tier grid was decided to be appropriate for the modelling that was conducted. Specifically, a nested receptor grid, centered around the buildings at the site, were placed as follows:

a) 20 m spacing, within an area of 200 m by 200 m;
b) 50 m spacing, within an area surrounding the area described in (a) with a boundary at 500 m by 500 m outside of the boundary described in (a);
c) 100 m spacing, within an area surrounding the area described in (b) with a boundary at 1,000 m by 1,000 m outside of the boundary described in (a);
d) 200 m spacing, within an area surrounding the area described in (c) with a boundary at 2,000 m by 2,000 m outside of the boundary described in (a); and
e) 500 m spacing, within an area surrounding the area described in (d) with a boundary at 5,000 m by 5,000 m outside of the boundary described in (a).

In addition to using the nested receptor grid, receptors were also placed every 10 m along the property line. The highest predicted impacts occur at or near the property line and therefore the 5,000 m coverage provided within the model captures the worst-case impacts.

Figure 5 below presents the compliance grid receptors for the Study Area. There is no childcare facility, health care facility, senior's residence, or long-term care facility located at the site. Therefore, same-structure contamination was not assessed.

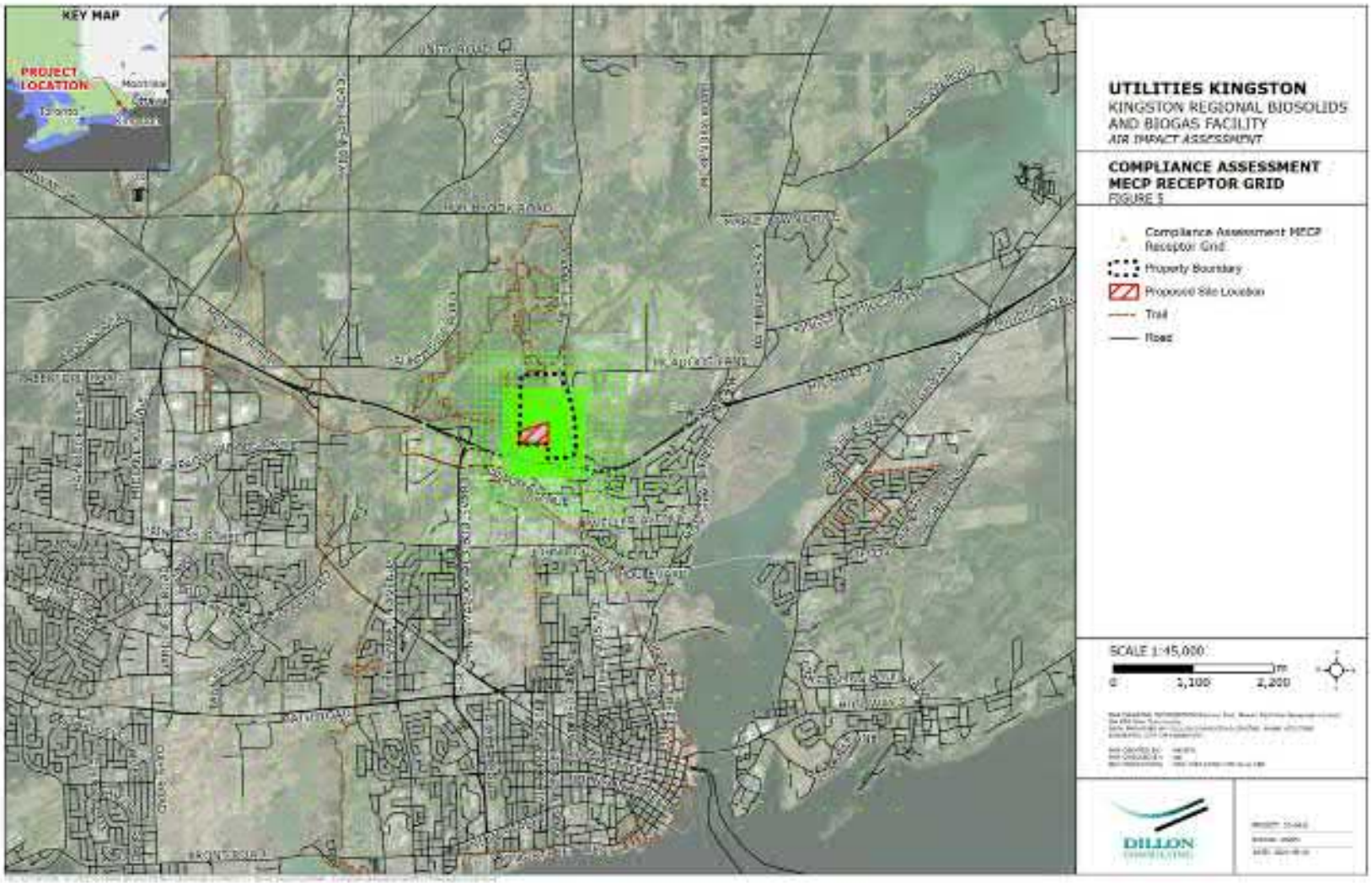


Figure 5: Compliance Assessment MECP Receptor Grid

3.4.4 Building Downwash

Building wake effects were considered in this assessment using the USEPA's Building Profile Input Program (BPIP-PRIME), another pre-processor to AERMOD. The inputs into this pre-processor include the coordinates and heights of the buildings and stacks. The output data from BPIP is used in the AERMOD building wake effect calculations.

3.4.5 NOx to NO_2 Conversion Methods

AERMOD has a three-tiered approach to converting NO_x concentrations to NO_2 for use in predicting potential nitrogen dioxide impacts.

For the comparison of potential NO_2 concentrations to the AAQC, a tier 1 (full conversion) approach was taken. This approach conservatively estimates that all of the NO_x emitted from site operations are expressed as NO_2.

3.4.6 Approach to Odour Modelling

Air dispersion modelling was completed using AERMOD to back-calculate a maximum permissible odour and hydrogen sulphide emission rate where compliance to their respective odour-based POI limits at sensitive receptors is achieved.

Biofilter stack parameters were selected and a 1 g/s emission rate was applied in the dispersion model. Results from the modelling were used to back-calculate a maximum permissible emission rate that would result in the odour-based POI limits.

The Odour Technical Bulletin provides guidelines on the methodology that should be used for evaluating POI concentrations for contaminants with an odour-based POI limit that have a 10-minute averaging period. As documented in the Odour Technical Bulletin, "For a facility that emits a contaminant with a 10 minute odour-based standard or guideline, and for assessment purposes only, it is considered acceptable if the modelling shows that at a location of a human receptor the standard or guideline is exceeded less than 0.5% of the time". Therefore, the maximum permissible emission rate that would result in the POI concentrations at sensitive receptors meeting the odour-based limits at a frequency of 99.5% were provided.

3.4.7 Averaging Time and Conversions

The shortest time scale that AERMOD predicts is a 1-hr average value. 10-minute odour concentrations were determined by using an "x1.65" scaling factor applied to the modelled 1-hour concentrations. The x1.65 scaling factor was implemented directly within the AERMOD modelling system. The x1.65 scaling

factor represents the MECP recommended conversion factors as per the MECP's ESDM procedure document[11].

3.4.8 Dispersion Modelling Options

The regulatory default options for AERMOD were used for this assessment. Some of the options used are summarized below in **Table 11**.

Table 11: Dispersion Modelling Options

Modelling Parameter	Description	Used in the Assessment?
DFAULT	Specifies the regulatory default options will be used	**Yes**
CONC	Specifies that concentration values will be calculated	**Yes**
DRYDPLT	Specifies that dry deposition will be calculated	**No**
WETDPLT	Specifies that wet deposition will be calculated	**No**
FLAT	Specifies that the non-default option of assuming flat terrain will be used	**No**
NOSTD	Specifies that the non-default option of no-stack tip downwash will be used	**No**
AVERTIME	Averaging periods used	**1-hour, 8 hour, 24-hour, and annual**
URBANOPT	Specifies that the urban dispersion coefficients will be used	**No**
URBANROUGHNESS	Specifies the urban roughness (m) if URBANOPT is used	**Default**
FLAGPOLE	Specifies that receptor heights above local ground level are allowed on the receptors	**Yes**

3.5 Predicted Air Quality

Predicted concentrations for each indicator compound were generated based on the emission rates provided in **Section 3.3** and the modelling that was conducted.

3.5.1 Environmental Effects Predicted Air Quality

The predicted air quality for the Facility development are summarized in **Table 12** below. The predicted POI concentrations from the dispersion model have been added to the background concentrations to determine the cumulative air quality.

The cumulative air quality for each indicator compound was compared against the AAQC. The predicted concentrations are below their respective criteria for each indicator compound.

[11] Ministry of the Environment, Conservation and Parks (2018). Procedure for Preparing an Emission Summary and Dispersion Modelling Report. March 2018.

Under the current Biofilter design stack configuration (provided in the source summary table in **Section 3.3**), the maximum permissible in-stack concentration of odour and hydrogen sulphide is 2,329 OU/m^3 and 18.5 ppm, respectively. Isopleths for NOx (as NO_2), odour, and H_2S are provided in **Appendix C**.

Table 12: Environmental Effects Emission Summary Table

Contaminant Name	CAS No.	Total Facility Emission Rate [g/s]	Maximum POI Concentration [ug/m³][1]	Background Concentration [ug/m³]	Cumulative POI Concentration [ug/m³]	Averaging Periods [hrs]	MECP POI Limit [ug/m³][1]	Regulation/Guideline	Percent of Criteria [%]
Nitrogen Oxides (as NO_2)	10102-44-0	1.31E-01	24.6	38.2	62.8	1	400	*O.Reg. 419/05/*	15.7%
Nitrogen Oxides (as NO_2)	10102-44-0	1.31E-01	3.9	13.7	17.6	24	200	AAQC	8.8%
Nitrogen oxides - Emergency	10102-44-0	1.32E+00	267.4	38.2	305.6	0.5	500[3]	*O.Reg. 419/05/*	61.1%
Sulphur dioxide	7446-09-05	1.98E-02	0.44	2.1	2.5	10-min	180	AAQC	1.4%
Sulphur dioxide	7446-09-05	1.98E-02	0.19	2.1	2.3	1	100	*O.Reg. 419/05*/AAQC	2.3%
Sulphur dioxide	7446-09-05	1.98E-02	0.02	0.4	0.4	Annual	10	*O.Reg. 419/05*/AAQC	4.2%
Carbon monoxide	630-08-0	1.00E-01	26.9	0.5	27.4	0.5	6,000	*O.Reg. 419/05*	<1%
Carbon monoxide	630-08-0	1.00E-01	1.6	0.5	2.1	1	36,200	AAQC	<1%
Carbon monoxide	630-08-0	1.00E-01	1.6	0.3	1.9	8	15,700	AAQC	<1%
TSP	N/A - TSP	3.24E-02	0.32	33.6	33.9	24	120	*O.Reg. 419/05*/AAQC	28.3%
TSP	N/A - TSP	3.24E-02	0.03	18.4	18.4	Annual	60	AAQC	30.7%
PM_{10}	N/A - PM_{10}	3.24E-02	0.32	18.7	19.0	24	50	AAQC	38.0%
$PM_{2.5}$	N/A - $PM_{2.5}$	3.24E-02	0.32	10.1	10.4	24	27	AAQC	38.6%
$PM_{2.5}$	N/A - $PM_{2.5}$	3.24E-02	0.03	5.5	5.5	Annual	8.8	AAQC	62.8%
Hydrogen sulphide[2]	7783-06-04	1.18E+00	11.10	1.4	12.5	10-min	13	*O.Reg. 419/05*/AAQC	96.2%
Hydrogen sulphide	7783-06-04	1.18E+00	4.3	1.4	5.7	24	7	*O.Reg. 419/05*/AAQC	81.1%
Odour - Sensitive Receptors[2]	N/A - Odour	1.05E+05 OU/s	1.0	-	1.0	10-min	1 OU/m3	MECP Guideline	100.0%

Notes:

(1) Criteria listed in the MECP Air Contaminants Benchmarks (ACB) List: Standards, Guidelines, and Screening Levels for Assessing POI Concentrations of Air Contaminants, Version 3.0, dated April, 2023 or the MECP's Ambient Air Quality Criteria (AAQC).

(2) Maximum concentration corresponding to 99.5% frequency occurrence at sensitive receptors. The frequency analysis is calculated as per Section 3.1 of Methodology for Modeling Assessments of Contaminants with 10 Minute Average Standards and Guidelines under O.Reg. 419/05.

(3) Taken from the MECP's Emergency Generator Checklist, supplement to application for approval EPA s.9.

3.5.2 Compliance Assessment Emission Summary

The predicted concentrations for each indicator compound of all potential sources included in the assessment of compliance are provided in **Table 13** below.

The concentrations for each indicator compound were compared against the applicable criteria. The predicted concentrations are below their respective criteria for each indicator compound. This AIA demonstrates that the Site is predicted to operate in compliance with *O.Reg. 419/05*.

Table 13: Compliance Assessment Emission Summary Table

Contaminant Name	CAS No.	Total Facility Emission Rate [g/s]	Maximum POI Concentration [ug/m³](1)	Averaging Periods [hrs]	MECP POI Limit [ug/m³](1)	Percent of Criteria [%]
Nitrogen Oxides (as NO_2)	10102-44-0	1.31E-01	52.21	1	400	13.1%
Nitrogen Oxides (as NO_2)	10102-44-0	1.31E-01	15.22	24	200	7.6%
Nitrogen oxides – Emergency	10102-44-0	1.32E+00	1,765	0.5	1880(3)	93.9%
Sulphur dioxide	7446-09-05	1.98E-02	1.36	1	100	1.4%
Sulphur dioxide	7446-09-05	1.98E-02	0.05	Annual	10	<1%
Carbon monoxide	630-08-0	1.00E-01	8.25	0.5	6000	<1%
TSP	N/A - TSP	3.24E-02	1.52	24	120	1.3%
Hydrogen sulphide(2)	7783-06-04	1.18E+00	11.10	10-min	13	85.4%
Hydrogen sulphide	7783-06-04	1.18E+00	4.30	24	7	61.4%
Odour – Sensitive Receptors(2)	N/A - Odour	1.05E+05 OU/s	1.00	10-min	1 OU/m³	100.0%

Notes:

(1) Criteria listed in the MECP Air Contaminants Benchmarks (ACB) List: Standards, Guidelines, and Screening Levels for Assessing POI Concentrations of Air Contaminants, Version 3.0, dated April, 2023 or the MECP's Ambient Air Quality Criteria (AAQC).

(2) Maximum concentration corresponding to 99.5% frequency occurrence at sensitive receptors. The frequency analysis is calculated as per Section 3.1 of Methodology for Modeling Assessments of Contaminants with 10 Minute Average Standards and Guidelines under O.Reg. 419/05.

(3) Taken from the MECP's Emergency Generator Checklist, supplement to application for approval EPA s.9.

4.0 Mitigative Measures

It is anticipated that during the final design phase of the proposed Facility, consideration to mitigative measures will be given for the management of air emissions associated with construction and operation of on-site activities.

It is expected that air quality impacts associated with construction activities will be minimized through the development of an air quality/fugitive dust BMPP. Inspection and/or monitoring of fugitive dust releases will be conducted during construction to ensure effective emissions management. It is anticipated that a fugitive dust BMPP will also be prepared when the site is operational to further reduce the potential for fugitive dust generated from truck traffic.

It is anticipated that an odour BMPP will be required to support and application for Environmental Compliance Approval (ECA) for the Facility. Final design of odour mitigation systems will be assessed to ensure off-site odour compliance will be met prior to construction. These mitigative measures will be typical of normal operations of a waste management facility and consistent with industry best practices.

Table 14 provides a summary of mitigative measures to be considered.

Table 14: Summary of Mitigative Measures

Indicator	Mitigation Specifics	Works & Activities Affected	Net Effects
Construction and Operation: Particulates (TSP, PM_{10}, and $PM_{2.5}$)	It should be noted that any specifics at this time are preliminary recommendations to be considered and further detailed in a fugitive dust BMPP. A few suggested good management practices are: • Road cleaning and application of dust suppressants on a regular basis • Equipment selection with exhaust considerations • Paved driveway post-construction	• On-site vehicle movement • Roadways	• Reduced particulate emissions
Operation: Odour	It should be noted that any specifics at this time are preliminary recommendations to be considered during the design & operation of the Facility and further detailed in an odour BMPP. A few suggestions are: • Maintain the process facility under negative pressure • The use of Receiving bay air curtains • Biofilter to control odorous emissions • Source testing to assess emission control	• Waste receiving • Waste processing • Emissions controls	• Control of odour emissions

5.0 Conclusions

The AIA included the analysis of air quality impacts from the proposed Facility. The following are the results of this assessment:

- The predicted concentrations of indicator compounds are below their respective criteria for the environmental effects assessment;
- The predicted concentrations of indicator compounds are anticipated to meet relevant *O.Reg. 419/05* regulatory compliance criteria;
- Under the current Biofilter design stack configuration, the maximum permissible in-stack concentration of odour and hydrogen sulphide is 2,329 OU/m^3 and 18.5 ppm, respectively.
- It is expected that, prior to construction a fugitive dust BMPP should be implemented; and upon finalization of the Facility design and operations, a fugitive dust and odour BMPP may be required prior to ECA application.

DILLON CONSULTING LIMITED

Appendix A

Calculation Summary

Table A.1

Flare Emission Estimates

Utilities Kingston

Source	Source ID	Contaminant	CAS No.	Molecular Weight	Emission Factor ($kg/10^6 dscm_{CH4}$)[1]	Total Emission Rate (g/s)
RNG Flare	S2	Nitrogen Oxides	10102-44-0	44.01	631	8.59E-02
		Sulphur Dioxide	7446-09-05	66.01	–[2]	1.98E-02
		Carbon Monoxide	630-08-0	28.01	737	1.00E-01
		Particulate Matter	N/A - TSP	–	238	3.24E-02
		Hydrogen sulphide	7783-06-04	34.08	–[7]	1.05E-02

Notes:

(1) Emission factors obtained from US EPA AP-42 Chapter 2.4 Table 2.4-4 "Emission Factors for Secondary Compounds Exiting Control Devices" for a flare.

(2) Emission estimates obtained from US EPA AP-42 Chapter 2.4 equations 3, 4, 7, and 8.

(3) Flare parameters:

Biogas Flare Flow[4]	0.2	m^3/s
Methane Content[5]	64	%
Destruction Efficiency[6]	97.7	%

(4) Estimated from the maximum sludge and SSO tonnages projected to be received at the Facility.

(5) Taken from historical biogas methane content at the Ravensview and Cat Bay WWTPs.

(6) Typical destruction efficiency for flare taken from US EPA AP-42 Chapter 2.4 Table 2.4.3 "Control Efficiencies for NMOC and VOC.

(7) Hydrogen sulphide concentration in the biogas was estimated to be 35.5 ppm as per US EPA AP-42 Chapter 2.4 Table 2.4-2 "Default Concentrations for LFG Constituents"

Table A.2

Natural Gas-Fired Comfort Heating Equipment Emission Estimates

Utilities Kingston

Source ID	Source Description	Unit Name	Make	Model #	Quantity	Heat Input Rating (BTU/hr)[1]	NOx Emission Factor ($kg/10^6 m^3$)[1]	NOx Emission Rate (g/s)
NG_1	Natural Gas-Fired Comfrting Heating Equipment – Site Office	To be determined during design phase				400,000	1600	5.04E-03
NG_2	Natural Gas-Fired Comforting Heating Equipment – Main Building	To be determined during design phase				2,137,000	1600	2.69E-02
NG_3	Natural Gas Comforting Heating Equipment - RNG Plant	To be determined during design phase				1,068,500	1600	1.34E-02

Notes:

Dillon has estimated the required comfort heating units for the site based on experience with similar industries.

Site Office - 2 HVAC Units (200,000 BTU/hr each)

Main Building - 2 RTU Units (800,000 BTU/hr each) and 1 MUA Unit (937,000 BTU/hr)

RNG Plant - 1 RTU Unit (800,000 BTU/hr) and 1 half-size MUA Unit (468,500 BTU/hr)

(1) Emission factor taken from US EPA Chapter 1.4 Natural Gas Combustion for boilers less than 100 MMBtu/hr.

Table A.3
Emergency Generator Emission Estimates
Utilities Kingston

Fuel Input 2.21 MMBTU/hr

Contaminant	CAS	Emission Factor[1] (lb/MMBTU)	Maximum Allowable Emission Rate (g/s)
Nitrogen oxides	10102-44-0	4.41	1.23E+00

Notes:

Emission factor taken from US EPA AP-42 Chapter 3 - Stationary Internal Combustion Sources, Tabel 3.3-1 for uncontrolled diesel industrial engines.

Table A.4

Maximum Allowable Biofilter In-Stack Concentration

Utilities Kingston

Source ID	Source Description	Conaminant	Averaging Period (hrs)	Maximum in-stack Emission Rate (OU/s or g/s)	Flow Rate (m3/s)	Maximum in-stack Concentration (OU or ppm)
S1	Biofilter	Odour	10-min	105,174	45.17	2,329
S1	Biofilter	Hydrogen Sulphide	10-min	1.16	45.17	18.5

Appendix B

Air Dispersion Modelling Files (Electronic)

Appendix C

Isopleths

PROJECT TITLE:

Utilities Kingston
Odour Isopleth - 10 minute

PLOT FILE OF 99.50TH PERCENTILE 1-HR VALUES FOR SOURCE GROUP: ALL OU

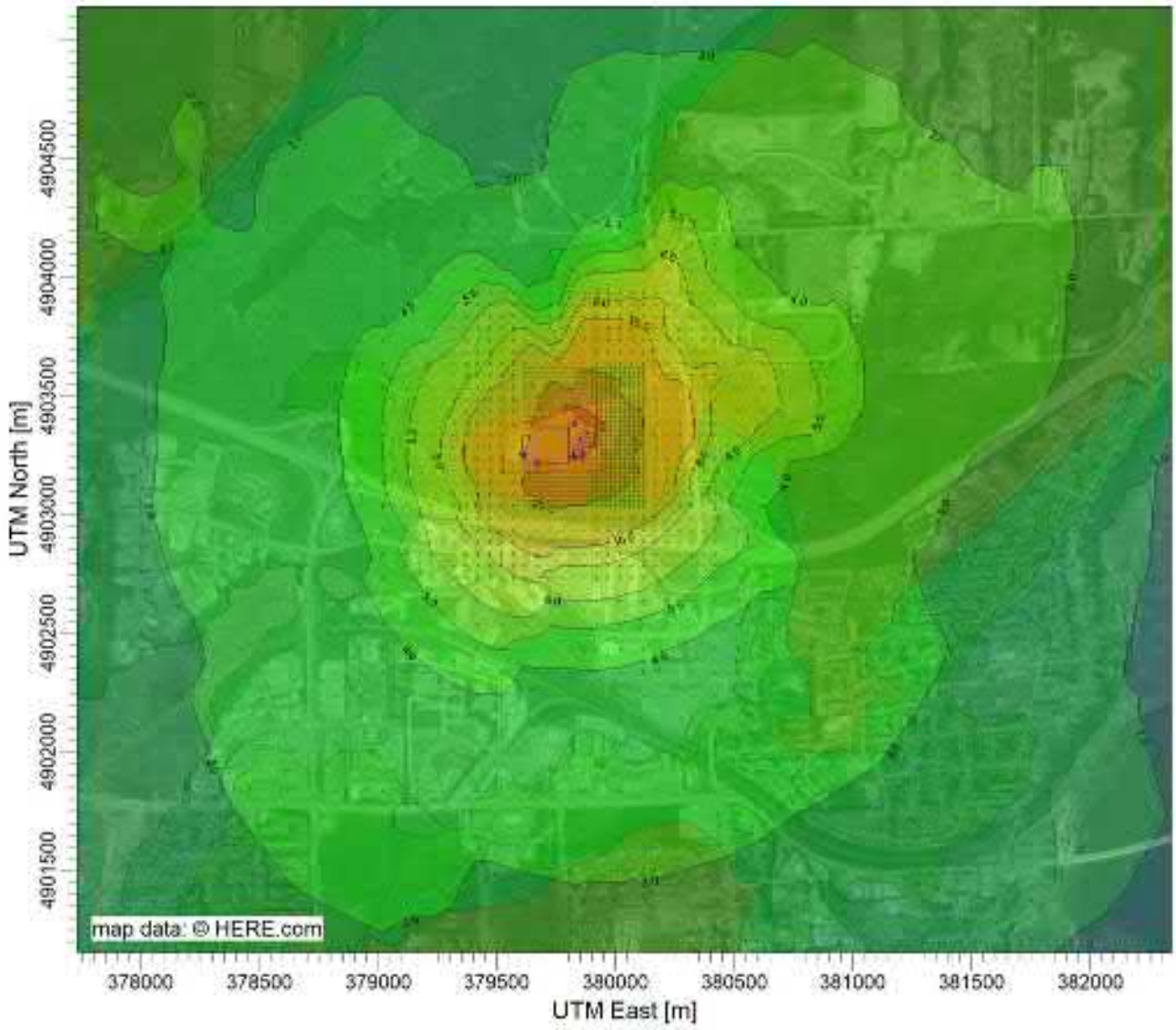
Max: 9.98E-01 [OU] at (379764.84, 4903573.97)

2.00E-02 4.00E-02 5.00E-02 7.00E-02 1.00E-01 3.00E-01 5.00E-01 7.00E-01 9.00E-01 1.00E+00

COMMENTS: Appendix C Odour Isopleth Environmental Effects Modelling	SOURCES: **6**	COMPANY NAME:	
	RECEPTORS: **920**	MODELER:	
	OUTPUT TYPE: **Concentration**	SCALE: 1:29,000 0 1 km	
	MAX: **9.98E-01 OU**	DATE: **2024-04-25**	PROJECT NO.: **22-4641**

PROJECT TITLE:

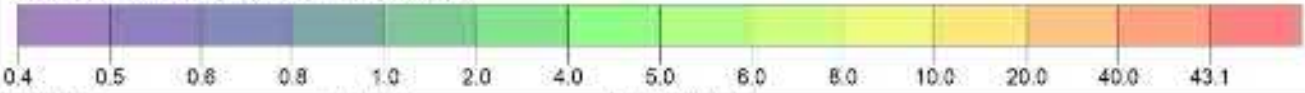
Utilities Kingston
NOx Isopleth - 1 hour



PLOT FILE OF HIGH 1ST HIGH 1-HR VALUES FOR SOURCE GROUP: ALL

ug/m^3

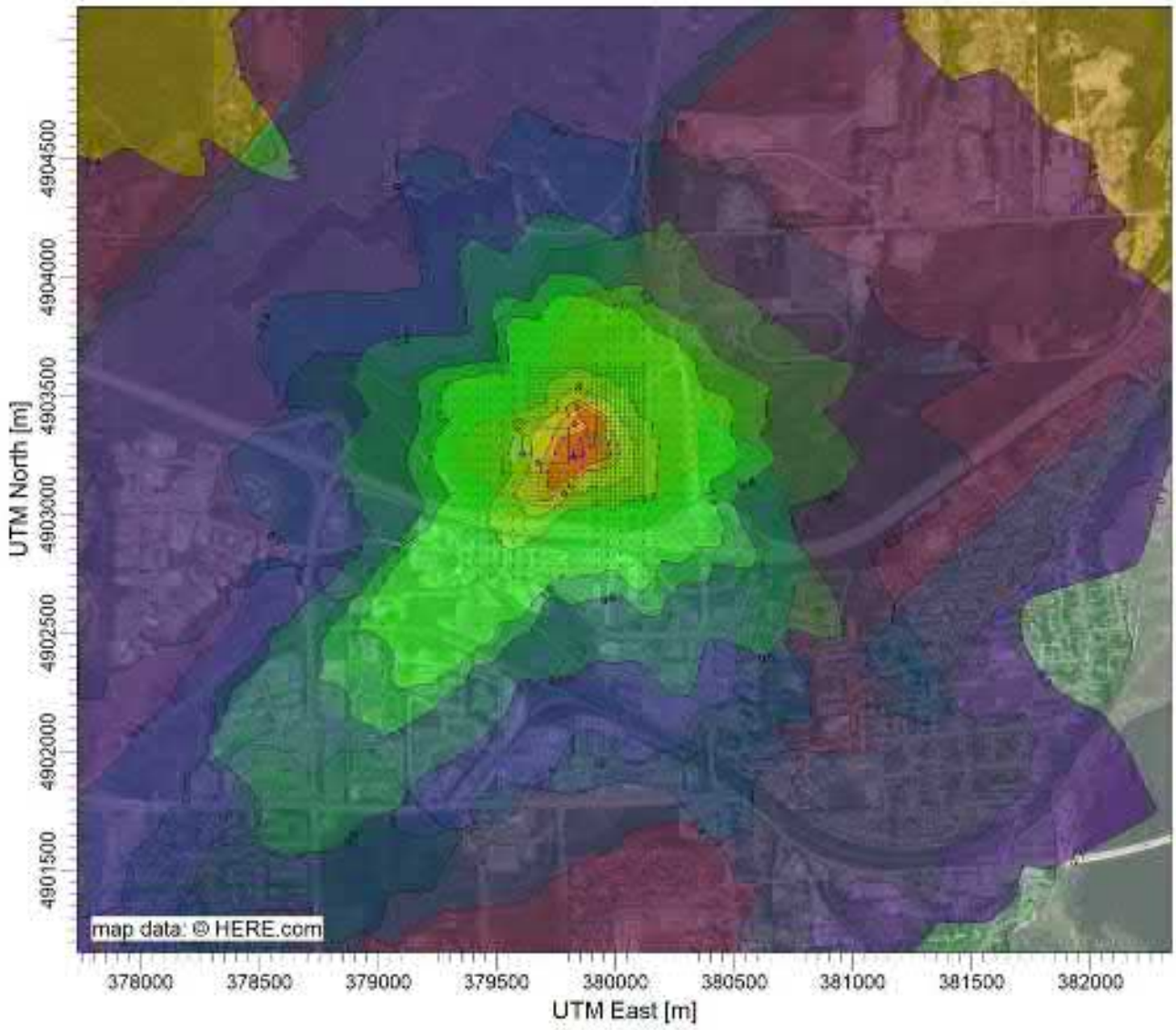
Max: 43.1 [ug/m^3] at (379798.36, 4903456.82)



COMMENTS: Appendix C NOx - 1 hour	SOURCES: **6**	COMPANY NAME:	
	RECEPTORS: **2068**	MODELER:	
	OUTPUT TYPE: **Concentration**	SCALE: 1:29,000 0 1 km	
	MAX: **43.1 ug/m^3**	DATE: **2024-04-25**	PROJECT NO.: **22-4641**

PROJECT TITLE:

Utilities Kingston
NOx Isopleth - 24 hour



PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: ALL

ug/m^3

Max: 14.6 [ug/m^3] at (379778.36, 4903176.82)

0.1 0.3 0.5 0.8 1.0 3.0 5.0 8.0 10.0 14.6

COMMENTS: Appendix C NOx - 24 hour	SOURCES: **6**	COMPANY NAME:	
	RECEPTORS: **2068**	MODELER:	
	OUTPUT TYPE: **Concentration**	SCALE: 1:29,000 0 1 km	
	MAX: **14.6 ug/m^3**	DATE: **2024-04-25**	PROJECT NO.: **22-4641**