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ORTECH
a Kontrol Technologies Company

Report:

Infinity Development Group
Land Use Compatibility Study and Air Quality Assessment

Date: March 11, 2022





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Prepared for: Infinity Development Group
2275 Upper Middle Road East, Suite 101
Oakville, Ontario L6H 0C3

Prepared by: Ibrahim Syed, P. Eng.
Project Manager, Compliance & Permitting
ORTECH Consulting Inc.
804 Southdown Rd., Mississauga, Ontario L5J 2Y4
Tel: (905) 822-4120, Ext. 238
E-mail: isyed@ortech.ca

Reviewed by: Scott Manser, P.Eng.
Principal, Compliance & Permitting
ORTECH Consulting Inc.
1421 Grand Maris Road West, P.O. Box 35020
Windsor, Ontario N9E 4VO
Tel: (519) 966-8798
E-mail: smanser@ortech.ca

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EXECUTIVE SUMMARY

Infinity Development Group (IDG) retained ORTECH Consulting Inc. (ORTECH) to prepare an air quality based land use compatibility report for a proposed residential development at 1396 Guelph Line in Burlington, Ontario (Site), in accordance with Ministry of Environment, Conservation and Parks (MECP) D-1 and D-6 Land Use Compatibility Guidelines. This report addresses the compatibility of proposed development with existing industrial facilities (with potential air emissions) within 1000 meters (Study Area) of the Site. Further, the impact of air emissions from traffic flow on Guelph Line was assessed through air dispersion modelling. A separate noise based land use compatibility report has been prepared by others.

Based on the compatibility study of existing land uses a number of industrial sources were identified within the Study Area, as shown in Table 2. Based on their potential for air emissions, all industrial facilities within the Study Area were identified as Class II or less, and have adequate separation distances from the Site. The Site abuts the Guelph Line (Regional Road) and hence the direct impact of traffic related air emissions were further assessed by using US EPA's AERMOD model (version 19191), a regulatory dispersion model approved by the MECP.

Estimates of road traffic emissions are based upon Guelph Line traffic data provided by IDG and the United States Environmental Protection Agency (US EPA) MOVES 3.0 model was used for air emissions estimation from roadway traffic. Road traffic emissions were estimated based on projected traffic scenarios for the years 2025 and 2035.

Background air quality conditions were established by reviewing historical ambient air monitoring data from the National Air Pollution Surveillance (NAPS) air monitoring stations 63001 and 60438. Background air concentration represents cumulative levels of air contaminants released from various natural and anthropogenic emission sources such as industrial sources, roadways, etc. in the vicinity. The background air concentrations of the following criteria air contaminants were established.

- Carbon Monoxide (CO)
- Nitrogen Dioxide (NO_2)
- Particulate Matter less than 10 microns in size (PM_{10})
- Particulate Matter less than 2.5 microns in size ($PM_{2.5}$)
- Sulphur Dioxide (SO_2)
- Benzo(a)Pyrene (BaP)
- Benzene
- Acetaldehyde
- Acrolein
- Formaldehyde
- 1,3-Butadiene

These contaminants were modelled using AERMOD and the modelled concentrations of these criteria air contaminants were compared with Ontario's Ambient Air Quality Criteria (AAQC) and Canadian Ambient Air Quality (CAAQ) Standards, for assessment purposes.

Air dispersion modelling suggests that adverse impacts on the proposed development, due to traffic related air emissions are not expected. Modelled concentrations of all contaminants were found to be below respective threshold values of AAQC and CAAQS. Background air quality of all contaminants, except BaP and Benzene, were below respective threshold values. Since the background air quality represents the contribution of all existing sources to the general air quality within a region, the impact of traffic emissions is reflected in background air quality. As such adding the background concentration of contaminants to modelled concentrations may be equivalent to double accounting of traffic emission sources.

Based on assessment presented in this report, ORTECH is of opinion that adverse air quality impacts at the Site are not expected from existing industrial land uses within the Study Area and from traffic flow on Guelph Line. Therefore, the proposed development is considered compatible with existing land uses within the Study Area.

1. INTRODUCTION

Infinity Development Group (IDG) retained ORTECH Consulting Inc. (ORTECH) to prepare an air quality based land use compatibility report for a proposed residential development at 1396 Guelph Line in Burlington, Ontario (Site), in accordance with Ministry of Environment, Conservation and Parks (MECP) D-1 and D-6 Land Use Compatibility Guideline (Guideline). This report addresses the compatibility of proposed development with existing industrial facilities (with potential air emissions) within 1000 meters (Study Area) of the Site. Further, the impact of air emissions from traffic flow on Guelph Line was assessed through air dispersion modelling. A separate noise based land use compatibility report has been prepared by others.

Based on their potential for air emissions, all industrial facilities within the Study Area were identified as Class II or less, and have adequate separation distances from the Site (Table 2). The Site abuts the Guelph Line and hence the direct impact of traffic related air emissions were further studies by using US EPA's AERMOD model (version 19191), a regulatory dispersion model approved by the MECP.

1.1 Description of the Site and Study Area

IDG proposes to develop a 11-storey residential building, with a mechanical penthouse (Appendix A). As per the City of Burlington, the Site is currently zoned as Utility Services (S) land. Lands west of the Site are also zoned as S lands, where electrical transmission lines run in north-south direction. All other sides of the Site are zoned as residential areas. The nearest industrial area is approximately 500 meters south-east of the Site. The Site property abuts Guelph Line, which is classified as a regional road. A land use map within the Study Area is shown in Appendix B, along with a general zoning map.

2. LAND USE COMPATIBILITY ASSESSMENT

The land use compatibility assessment was based on readily available information, such as site plans, satellite imagery and Access Environment website (MECP's map-based tool). Guideline D-6 recommends a 1000-meter study area for land use proposals, defines three classes of industrial facilities: Class I, Class II and Class III (see definitions below), and defines Sensitive Land Uses. Guideline D-6 also defines Minimum Recommended Separation Distances and Potential Influence Areas between industrial facilities and sensitive land uses for each Class as shown in Table 1. The class designations are based on the potential for noise, dust and odours.

A Class I Industrial Facility is "A place of business for a small scale, self-contained plant or building which produces/stores a product which is contained in a package and has low probability of fugitive emissions. Outputs are infrequent, and could be point source or fugitive emissions for any of the following: noise, odour, dust and/or vibration. There are daytime operations only, with infrequent movement of products and/or heavy trucks and no outside storage".

A Class II Industrial Facility is "A place of business for medium scale processing and manufacturing with outdoor storage of wastes or materials and/or there are periodic outputs of minor annoyance. There are occasional outputs of either point source or fugitive emissions for any of the following: noise, odour, dust and/or vibration, and low probability of fugitive emissions. Shift operations are permitted and there is frequent movement of products and/or heavy trucks during daytime hours".

A Class III Industrial Facility is "A place of business for large scale manufacturing or processing, business characterized by: large physical size, outside storage of raw and finished products, large production volumes and continuous movement of products and employees during daily shift operations. It has frequent outputs of major annoyance and there is a high probability of fugitive emissions".

Table 1: Minimum Separation Distances and the Potential Influence Areas from Sensitive Land Uses

Class	Recommended Minimum Separation Distance (m)	Potential Influence Area (m)
I	20	70
II	70	300
III	300	1000

Although Guideline D-6 suggests that distances are normally measured from property line to property line, there is allowance for measuring from a specific source to sensitive receptors. Guideline D-6 also discusses reducing the minimum separation distance required based on mitigation at industrial sites and provides for exceptions to the Recommended Minimum Separation Distances for some development sites including infilling.

Facilities that do not meet the definition of any one of the three classes are expected to have virtually no potential for creating noise, odour, dust or vibration that would give rise to complaints (noted in this report as Class 0). The definitions and examples in the MECP Guidelines relevant to air quality concerns were used to characterize each of the nearby facilities. The D-6 Guideline includes "residences, senior citizens homes, schools, daycare facilities, hospitals, churches and other institutional uses" as sensitive land uses.

As noted above, the guidelines are based on the potential for noise, dust and odours. This study addresses dust, odour sources and other air contaminants but does not address environmental noise or vibration. These impacts are addressed in a separate assessment completed by others. The industrial land uses within the study area of the proposed development are shown in Table 2, according to which, all identified industrial facilities within the study area are either Class I or in the range of Class I to Class II.

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Table 2: Industrial Land Uses within the Study Area of Proposed Development

Industrial/Commercial Facilities	Street Address as per Access Environment	Approximate Property Line Separation Distances	Relevant Operations/Equipment	Potential Air Emissions	MECP Industrial Class	Comments
690687 Ontario Inc. (Brian Kerr's Collision)	2499 Industrial Road, Burlington	920 m	Paint Booth	Particulates, NO_X and volatiles	Class I	Adequate separation distance
1263337 Ontario Inc. (Burlington Krown Line-X)	2499 Industrial Road, Burlington	920 m	Paint Booth	Particulates, NO_X and volatiles	Class I	Adequate separation distance
Burlington Steel Systems Inc.	1240 Advance Road, Burlington	570 m	Paint Booth and metal fabrication	Particulates, NO_X and volatiles	Class I	Adequate separation distance
Pacific Westeel Racking Inc.	3191 Mainway, Burlington	870 m	Steel Rack Manufacturing	Particulates, NO_X and volatiles	Class I to Class II	Adequate separation distance
Swissline Industries Limited	1240 Advance Road, Burlington	570 m	Wooden Cabinet Manufacturer	Particulates, NO_X and volatiles	Class I to Class II	Adequate separation distance
Thomson-Gordon Group Inc.	3225 Mainway, Burlington	930 m	Non-metallic Polymer Bearings	Particulates, NO_X and volatiles	Class I to Class II	Adequate separation distance
City of Burlington	2300 Upper Middle Road, Burlington	860 m	Standby Generator	Particulates and Combustion products	Class I	Adequate separation distance
Ryan Lee Smyth	3097 Mainway, Burlington	660 m	Automotive Refinishing	Particulates, NO_X and volatiles	Class I	Adequate separation distance
Smartmeds Pharmacy	1252 Northside Road, Burlington	700 m	Standby Generator	Particulates and Combustion products	Class I	Adequate separation distance

2.1 Road Traffic

Tailpipe emissions from vehicular traffic on Guelph Line contains combustion gases and particulate matter. A technical report by World Health Organization (WHO), "Review of evidence on health aspects of air pollution – REVIHAAP Project", compiled findings from various research articles confirming that the contaminant concentration from traffic emissions decreases significantly within first 200 meters from the road.

The proposed building on the Site lies within 200 meters from the Guelph Line, so impact of air emissions from traffic flow was assessed through AERMOD dispersion modelling, as explained in further sections of this report.

2.2 Electrical Transmission Lines

High-voltage electrical transmission lines are not expected to cause direct air pollution. Limited available scientific literature suggests that the high voltage transmission lines may result in slightly elevated near-field ozone concentrations under certain meteorological conditions. Electrical lines can produce a corona discharge which can ionize atmospheric oxygen, resulting in the production of atmospheric ozone. As per Vaida et. al (2009), an average increase of nearly 2% over background ozone concentration was observed near high voltage transmission lines. As per National Air Pollution Surveillance (NAPS) Program, 90th percentile atmospheric ozone concentration in 2019 was recorded as 42 ppb (1-hour averaged) and 41 ppb (8-hour averaged). Typically, the 90th percentile of monitored ambient concentrations are considered background concentrations. Hence, an increase of 2% over background concentrations of ozone in near-field of electrical transmission lines results in approximate ambient concentration of 43 ppb (1-hour averaged) and 42 ppb (8-hour averaged), which are well below ozone threshold values as per AAQC and CAAQS (2025) i.e., 80 ppb (1-hour averaged) and 60 ppb (8-hour averaged) respectively. Based on the above information, air quality impacts from electrical transmission line near the Site are not expected.

3. EMISSIONS ESTIMATION

US EPA AERMOD model (version 19191) is the current regulatory dispersion model in Ontario, as adopted by MECP. AERMOD requires data inputs such as emission intensity (grams/unit time or grams/unit time/unit area) for an emission source (example roads, rail lines, stacks, roofs-top HVAC units etc.) and meteorological data (wind speed, temperature, etc.) to calculate the dispersion of contaminants towards receptor points (residence, schools, etc.).

3.1 Air Emissions from the Existing Industrial Sources within the Study Area

As Identified in Table 2, all industrial facilities within the study area are located at adequate separation distances from the Site, as per D-6 guideline. As such, air emissions from these industrial facilities are not incorporated in dispersion modelling assessment.

3.2 Road Traffic Volumes

Traffic volumes for Guelph Line were provided by IDG for years 2019, 2020 and 2021. Highest recorded traffic volumes were noted for year 2020. For conservatism, traffic volumes of 2020 were assumed to represent the current traffic scenario. Projected traffic scenarios for years 2025 and 2035 were estimated based on a 1% annual increase in traffic volume. The US EPA Motor Vehicle Emission Simulator (MOVES 3.0) is a model which uses information such as traffic volume, fuel mix, and Vehicle Miles Travelled (VMT) to generate emission factors (grams/VMT) for specific vehicle and road types. These emission factors are further processed to generate emission intensities as required by AERMOD. Further sections in this report explain how each of the MOVES input parameters was selected.

3.2.1 Contaminant Emission Rates from Road Traffic – MOVES 3.0

US EPA's MOVES is an emissions modeling system that estimates air pollution emissions for criteria air pollutants, greenhouse gases and air toxics from on-road vehicles such as cars, trucks and buses, and also from non-road equipment such as railways. Appendix D provides input data for the MOVES 3.0 run for the year 2025 and 2035. For the purpose of this assessment, the following specifications were used to setup a MOVES model run (Table 3).

Table 3: MOVES 3.0 Run Specifications

Input Parameter	Specification
Model	On-road
Scale	County Scale
Calculation Type	Emission Rate
Time Span	Run 1 Year: 2025; Run 2 Year: 2035
	Months: February and August
	Days: Weekdays
	Hours: All hours
Geographic Bounds*	Niagara County, New York
On-road vehicles**	21, 32, 52 and 53
Road Types	All
Contaminants***	2, 20, 24, 25, 26, 27, 31, 33, 74, 100, 106, 107, 110, 116, 117, 174
Vehicle Miles Travelled (VMT)	calculated based on extrapolated Annual Average Daily Traffic (AADT) for years 2025 and 2035
Hourly VMT Fraction	Default
Meteorology	2021 meteorological data from Environment and Climate Change Canada station – Burlington Piers (AUT)
Vehicle Age Distribution	Default (Assumed similar fleet composition as Niagara County, New York)
Vehicle Speed Distribution	Default (Assumed similar vehicle speed distribution as Niagara County, New York)
Fuel Options	Default fuel mix (ethanol reassigned to gasoline)

* MOVES is limited to US based locations. Selected location is considered representative of Site.

** 21 – Passenger car, 32 – Light commercial truck, 52 – Single unit short-haul truck and 53 – Single unit long-haul truck

*** 2 – Carbon Monoxide (CO), 20- Benzene, 24 – 1,3-Butadiene, 25 – Formaldehyde, 26 – Acetaldehyde, 27 – Acrolein, 31 – Sulfur Dioxide (SO_2), 33 – Nitrogen Dioxide (NO_2), 74 – BaP Particles, 100 – Primary Exhaust PM_{10} – Total, 106 – PM_{10} Brakewear, 107 – PM_{10} Tirewear, 110 – Primary Exhaust $PM_{2.5}$ – Total, 116 – $PM_{2.5}$ Brakewear, 117 – $PM_{2.5}$ Tirewear and 174 – BaP Gas

Note: Emission rates of contaminants 100, 106 and 107 were added and the total emission rate was used for modelling of PM_{10} emissions. Similarly, emission rates of contaminants 110, 116 and 117 were added for $PM_{2.5}$ and contaminants 74 and 174 were added for BaP.

Vehicle Types

Traffic data provided by IDG consisted of four vehicle categories – cars, small trucks, medium trucks and heavy trucks. For simplification of MOVES run, these vehicle categories were assigned as follows.

- Cars – Passenger cars
- Small trucks – Light commercial trucks
- Medium trucks – Single unit short-haul trucks and
- Heavy trucks – Single unit long-haul trucks

Note that electric vehicles are not included in the list, since actual counts of electric vehicles in Ontario are unknown. In such cases, the default fleet composition of MOVES 3.0 assumes no electric vehicles for conservative emission estimation. ORTECH has assumed zero electric cars in the traffic fleet composition for this report.

Annual Average Daily Traffic (AADT)

As per the Ontario Ministry of Transportation, AADT is defined as the average 24-hour, two-way traffic for the period January 1st to December 31st. AADT on Guelph line for current scenario is 33,050 vehicles/day (as per IDG data). AADT for project scenarios were estimated to be 34,392 vehicles per day (2025) and 37,991 vehicles/day (2035) based on annual traffic increase of 1%. As per IDG data, the traffic fleet composition is as follows:

- Cars – 95.4%
- Small trucks – 1.4%
- Medium trucks – 1.9% and
- Heavy trucks – 1.3%

Vehicle Miles Travelled (VMT)

VMT is the sum of the number of miles travelled by all vehicles over a period of time. Approximately 1 km of Guelph Line near the Site was modelled as an emission source for the purpose of this report, as shown in Appendix C (dispersion modelling map). VMT was calculated by multiplying the number of each vehicle type travelling over a section by road length.

Meteorology

Local meteorological data from the closest Environment and Climate Change Canada (ECCC) meteorological station was adopted. To the Site, the closest ECCC meteorological station is Burlington Piers (AUT) (WMO ID: 71437). It was observed that the lowest monthly averaged hourly temperatures are recorded in the month of February and the highest monthly averaged hourly temperatures were recorded in August. These two months were selected for the MOVES 3.0 model as representative worst case temperature conditions for the whole year. Appendix D shows the meteorological data used in MOVES 3.0 model.

Air Contaminants

Following contaminants which are typically expected from traffic emissions are selected for the purpose of this report.

- Carbon Monoxide (CO)
- Nitrogen Dioxide (NO_2)
- Particulate Matter less than 10 microns in size (PM_{10})
- Particulate Matter less than 2.5 microns in size ($PM_{2.5}$)
- Sulphur Dioxide (SO_2)
- Benzo(a)Pyrene (BaP)
- Benzene
- Acetaldehyde
- Acrolein
- Formaldehyde
- 1,3-Butadiene

Default MOVES 3.0 Data

Information such as the vehicle age distribution, average diurnal speed distribution of each vehicle type, fuel mix, etc. are not readily available and default data provided by MOVES 3.0 was used in this report. MOVES 3.0 provides default data for United States cities/counties and hence it is critical to select a county representative of the traffic parameters listed above. This approach is acceptable to MECP. Appendix D provides all the default MOVES 3.0 data used in this report.

Running MOVES 3.0

Using the above specifications, MOVES 3.0 was run and the output from MOVES 3.0 was further analyzed to calculate emission rates from road traffic. MOVES 3.0 generates emission rate outputs in grams/VMT. Hence, the MOVES 3.0 output was multiplied by vehicle specific and road type specific VMT (Table 4) to calculate average emission rates for each contaminant from Guelph Line. Summary of MOVES 3.0 emission rates is shown in Table 5.

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Table 4: Road Section Length, AADT and VMT (2025 and 2035)

Road	AERMOD ID	Direction	Description	Length (m)	Length (mi)	Year	21		32		52		53	
							AADT	VMT	AADT	VMT	AADT	VMT	AADT	VMT
Guelph Line	GL	Northbound/southbound	Guelph Line south of Upper Middle Road	1029.9	0.64	2025	32810	20998	482	308	654	419	448	287
				1029.9	0.64	2035	36244	23196	532	340	722	462	494	316

Note: 21 – Passenger car, 32 – Light commercial truck, 52 – Single unit short-haul truck and 53 – Single unit long-haul truck

Table 5: Contaminants Emission Rates from MOVES 3.0 (2025 and 2035)

Road	AERMOD ID	Direction	Description	Year	CO ER (g/s)	Benzene ER (g/s)	1,3-Butadiene ER (g/s)	Formaldehyde ER (g/s)	Acetaldehyde ER (g/s)	Acrolein ER (g/s)	SO_2 ER (g/s)	NO_2 ER (g/s)	BaP ER (g/s)	PM_{10} ER (g/s)	$PM_{2.5}$ ER (g/s)
Guelph Line	GL	Northbound/Southbound	Guelph Line	2025	6.63E-01	2.52E-04	1.50E-05	1.23E-04	8.12E-05	6.62E-06	4.58E-04	4.90E-03	1.65E-07	1.15E-02	1.98E-03
			Northbound/Southbound	2035	3.97E-01	1.13E-04	1.31E-07	5.70E-05	3.54E-05	2.61E-06	4.22E-04	3.52E-03	7.90E-08	1.24E-02	1.93E-03

4. DISPERSION MODELLING METHODOLOGY

This section describes the methodology of selecting model inputs and its rationale, modelling scenarios and model setup.

4.1 Physical Characterization of Emission Sources

The line emission sources (road traffic) were modelled as line volume sources in AERMOD. The AERMOD source ID for Guelph Line, along with modelled road length is provided in Table 4.

4.2 Modelling Scenarios

It is typical for an air quality assessment to consider current and future emission scenarios. To account for timeline of development, a reasonable scenario of 2025 and 2035 traffic emissions were considered for the modelling assessment. MOVES 3.0 default dataset for fuel mix, fleet composition (including electric vehicles) and age distribution of vehicles changes every year. The MOVES 3.0 run for projected traffic data for years 2035 resulted in lower emissions than the emissions for year 2025, for all contaminants except PM_{10}. Future lower emissions could be attributed to MOVES 3.0 default data for future years which accounts for newer vehicles (higher fuel efficiency), fuel composition, etc.

Increase in future PM_{10} emissions would be attributed to increased brakewear and tirewear related particle generation due to increased traffic. Therefore, the AERMOD model for all contaminants, except PM_{10}, was run for year 2025, as it is expected to be the worst-case emission scenario for the Site. For PM_{10}, the AERMOD model was run for year 2035. This combination of modelling scenarios is considered conservative.

4.3 Contaminant Emission Rates

Summary of emissions from Guelph Line is shown in Table 5.

4.4 Buildings and Receptors

The layouts of proposed is provided in Appendix A. Virtual receptors were created around building perimeter at ground level and elevated receptors were placed at midpoint of each floor along the height, representing balconies on each floor.

4.5 Meteorological Data

MECP's regional meteorological data (version April 2020) processed with AERMET 19191 for the Central Region (Toronto) was used, as made available on the Ministry's website. The Suburban dataset was selected since the land use characterization assumed in this dataset best resembles the actual land use conditions around the Site.

4.6 Terrain Data

MECP's NED GeoTIFF file "cdem_dem_030M.tif" was used as digital terrain input to the AERMAP. The US EPA recommended elevation data import technique was used to import the elevations for receptors, sources and buildings.

4.7 Modelling Approach

Since, there is only one emission source setup in the model, the predicted concentration of each contaminant is directly proportional to emission intensity of respective contaminants. Hence, a unit dispersion factor model was run initially to identify the most impacted receptor for each applicable averaging period. Highest 8-hour, 24-hour an annual averaging period dispersion factor concentrations were predicted at same receptor (R1) at ground level near northeast face of the proposed building. Highest 1-hour averaging period dispersion factor was predicted at same location but 7.5 meters above grade (R79). See Appendix C for location of most impacted receptors.

For simplification of modelling and optimization of model run time, the individual contaminant models were run with two most impacted receptors, as identified above, depending on applicable averaging period of each contaminant.

5. RESULTS AND DISCUSSIONS

5.1 AERMOD Modelling Results

Results of AERMOD modelling showed none of the contaminants emitted from Guelph Line exceeded respective air standards (AAQC and CAAQS). Table 6 shows the results of conservative modelling scenarios i.e., 2025 traffic scenario for all contaminants except PM10, which was modelled with 2035 traffic scneario.

Table 6: AERMOD Modelling Results

Contaminant	Maximum Modelled Concentration ($\mu g/m^3$)	Averaging Period	Air Quality Threshold ($\mu g/m^3$)	Standard	% of Air Quality Threshold
CO	179.40	1-hour	36,200	AAQC	0.5%
	116.30	8-hour	15,700	AAQC	1%
PM_{10}	1.86	24-hour	50	AAQC	4%
NO_2	1.33	1-hour	400	AAQC	0.3%
	0.74	24-hour	200	AAQC	0.4%
	1.26	1-hour	78	CAAQ (2025)	2%
	0.27	Annual	22	CAAQ (2025)	1%
$PM_{2.5}$	0.30	24-hour	27	CAAQ	1%
	0.11	Annual	8.8	CAAQ	1%
SO_2	0.20	10-minute	180	AAQC	0.1%
	0.12	1-hour	100	AAQC	0.1%
	0.03	Annual	10	AAQC	0.3%
	0.12	1-hour	170	CAAQ (2025)	0.1%
	0.03	Annual	10	CAAQ (2025)	0%
Benzo(a)pyrene	0.000009	Annual	0.00001	AAQC	89%
	0.000025	24-hour	0.00005	AAQC	50%
Benzene	0.01	Annual	0.45	AAQC	3%
	0.04	24-hour	2.3	AAQC	2%
Acetaldehyde	0.03	0.5-hour	500	AAQC	0.01%
	0.01	24-hour	500	AAQC	0.00%
Acrolein	0.00	1-hour	4.5	AAQC	0.04%
	0.001	24-hour	0.4	AAQC	0.25%
Formaldehyde	0.02	24-hour	65	AAQC	0.03%
1,3-Butadiene	0.00	24-hour	10	AAQC	0.02%
	0.001	Annual	2	AAQC	0.04%

Note:
10-minute, 0.5-hour and 1-hour averaged concentrations were predicted at R79. 8-hour, 24-hour and annual averaged concentrations were predicted at R1. All contaminants except PM10 were modelled as per 2025 traffic scenario. PM_{10} was modelled as per 2035 traffic scenario.

5.2 Background Air Quality

Background air concentration represents cumulative levels of air contaminants released from various emission sources such as industrial sources, roadways, railways, etc. in the vicinity of an air monitoring station where the background air quality levels are recorded.

Background air quality conditions were established by reviewing publicly available historical ambient air monitoring data from National Air pollution Surveillance (NAPS) air monitoring stations closest to the Site (Appendix B). Selection of representative NAPS stations is critical to establish background air quality. NAPS air monitoring stations 63001 located in Burlington and 60512 located in Hamilton are closest to the Site. While station 63001 provided the background air quality data for NO_2 and $PM_{2.5}$, the background concentration for other contaminants were not reported for station 63001. Although 60512 is second closest NAPS station to the Site, the background air quality of Hamilton station may not be representative of Site, due to increased presence of heavy industries in Hamilton area. NAPS station 60438 located in Toronto is considered representative due to similar type of land uses within its vicinity, which is representative of Site.

Hence, the most recent available background levels of $PM_{2.5}$ and NO_2 were adopted from NAPS 63001 and background levels of all other contaminants were adopted from NAPS 60438. Since, the proposed development is non-industrial in nature, no addition of air emissions are expected from the Site. Further, for this assessment, addition of modelled concentration of contaminants from Guelph Line is not added to the background levels of contaminants to avoid double counting of impacts. The background air quality represents contribution from all existing emission sources in a region, including transportation impacts.

From Table 7, it was observed that background levels of BaP and benzene are above respective thresholds of AAQC, which shows that irrespective of location of proposed development, the existing and proposed receptors experience elevated background air quality levels. The quality of air or background concentrations are managed through Federal and Provincial policies and regulations which regulate various emission sources such as industries, transportation corridors, etc.

Table 7: Background Air Quality

Contaminant	Averaging Period	Background Air Quality ($\mu g/m^3$)	NAPS Station ID	Air Quality Threshold ($\mu g/m^3$)	Standard	% Background Air Quality
CO	1-hour	596	60438	36,200	AAQC	2%
	8-hour	538	60438	15,700	AAQC	3%
PM_{10}*	24-hour	24	-	50	AAQC	48%
NO_2	1-hour	40	63001	400	AAQC	10%
	24-hour	30	63001	200	AAQC	15%
	1-hour	40	63001	78	CAAQ (2025)	51%
	Annual	19	63001	22	CAAQ (2025)	86%
$PM_{2.5}$	24-hour	13	63001	27	CAAQ	48%
	Annual	7	63001	8.8	CAAQ	80%
SO_2	10-minute	1.7	60438	180	AAQC	1%
	1-hour	1.0	60438	100	AAQC	1%
	Annual	0.52	60438	10	AAQC	5%
	1-hour	1.0	60438	170	CAAQ (2025)	1%
	Annual	0.52	60438	10	CAAQ (2025)	5%
Benzo(a)pyrene	Annual	0.000065	60438	0.00001	AAQC	**650%**
	24-hour	0.00011	60438	0.00005	AAQC	**220%**
Benzene	Annual	0.484	60438	0.45	AAQC	**108%**
	24-hour	0.638	60438	2.3	AAQC	28%
Acetaldehyde	0.5-hour	9.12	60438	500	AAQC	2%
	24-hour	3.04	60438	500	AAQC	1%
Acrolein	1-hour	0.15	60438	4.5	AAQC	3%
	24-hour	0.06	60438	0.4	AAQC	15%
Formaldehyde	24-hour	2.89	60438	65	AAQC	4%
1,3-Butadiene	24-hour	0.0717	60438	10	AAQC	1%
	Annual	0.0499	60438	2	AAQC	2%

6. CONCLUSIONS AND RECOMMENDATIONS

An air quality based land use compatibility assessment, in accordance with MECP's D-1 and D-6 guidelines indicate that the proposed development at 1396 Guelph Line in Burlington, Ontario is at adequate separation distances from all existing industrial facilities within the Study Area, to avoid adverse air quality impacts.

Dispersion modelling of contaminant emissions from Guelph Line based on the traffic scenarios for years 2025 and 2035 was completed.

Air dispersion modelling suggests that the adverse impacts on the proposed development, due to traffic related air emissions are not expected. Modelled concentrations of all contaminants were found to be below respective threshold values of AAQC and CAAQS. Background air quality of all contaminants, except BaP and Benzene, were below respective threshold values. Since the background air quality represents the contribution of all existing sources to the general air quality within a region, the impact of traffic emissions is reflected in background air quality. As such adding the background concentration of contaminants to modelled concentrations may be equivalent to double accounting of traffic emission sources.

Based on the assessment presented in this report, ORTECH is of opinion that adverse air quality impacts at the Site are not expected from existing industrial land uses within the Study Area or from traffic flow on Guelph Line. Therefore, the proposed development is considered compatible with existing land uses within the Study Area.

7. LIMITATIONS

The assessment, conclusion and recommendations in this report are based on the information provided by IDG, documented technical guidance from regulatory bodies such as MECP, US EPA, relevant technical report(s), national and provincial environmental databases, news articles etc., available in public domain and ORTECH's profession opinion. This report is prepared for exclusive use of IDG, their representatives and stakeholders of development. The assessment presented in this report is not applicable to other sites. Any changes to the site plan may require revision of this assessment.

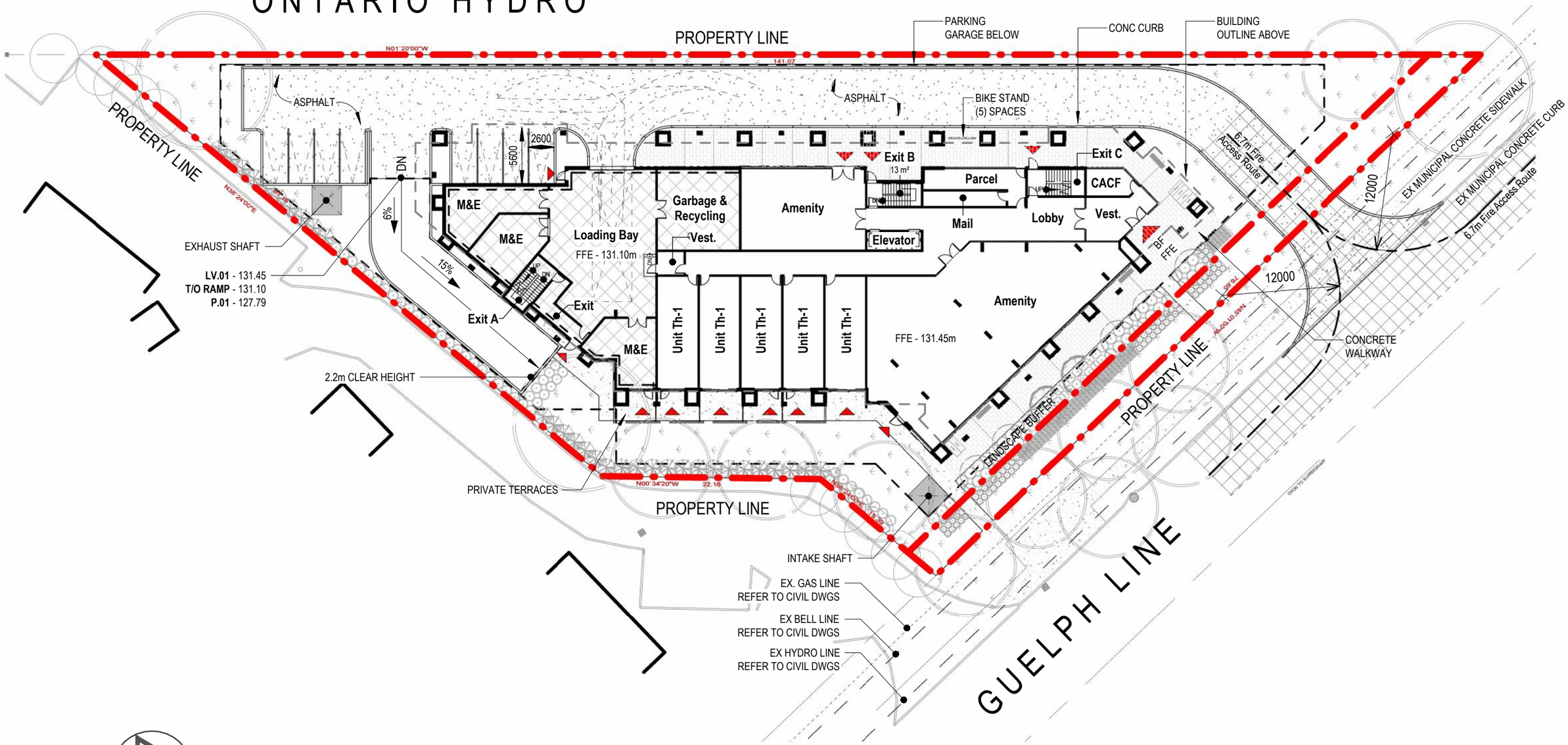
The dispersion model version, input data and technical guidance used for this assessment is current to best of ORTECH's knowledge, at the time of preparation of this report. However, these tools and guidance are dynamic in nature and are updated by relevant authorities in light of latest scientific research. ORTECH does not accept any responsibility for future changes in dispersion model versions, input data requirements and technical guidance. The conclusions presented in this assessment are based, in part, upon computer modelling predictions and actual measured impacts at receptor locations may differ from these predicted values.

The report should not be misconstrued as a comprehensive air quality report for the Site. In addition to traffic emission sources, other emission sources identified in this report may or may not impact the proposed development. The conclusion of this report is solely based on dispersion modelling of traffic running emissions and a reasonable assumption that background air quality levels from identified NAPS station represent the background air quality at Site.

APPENDIX A

Development Plans
(5 pages)

ONTARIO HYDRO



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21-027	Infinity Development Group	1396 Guelph Line Burlington, Ontario	Proposed Site	March 08, 2022	SD1.2

zedd
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www.zeddarchitecture.com info@zeddarchitecture.com

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SD4.3
1
PROPERTY LINE
N01°20'00"W
141.07
1
SD5.2
1
SD5.3
N38°24'00"E
67.16
SD4.4
1
15374
11381
11497
Exit C
ROOF
GARBAGE CHUTE
8134
ROOF
RTU
(Exterior)
M&E
13652
ROOF
17383
LANDSCAPE BUFFER
76.65
N45°01'00"W
PROPERTY LINE
23635
19611
22990
PROPERTY LINE
N00°34'20"W
22.16
N38°24'00"E
15.30
PROPERTY LINE
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SD4.2
2
SD4.1
N

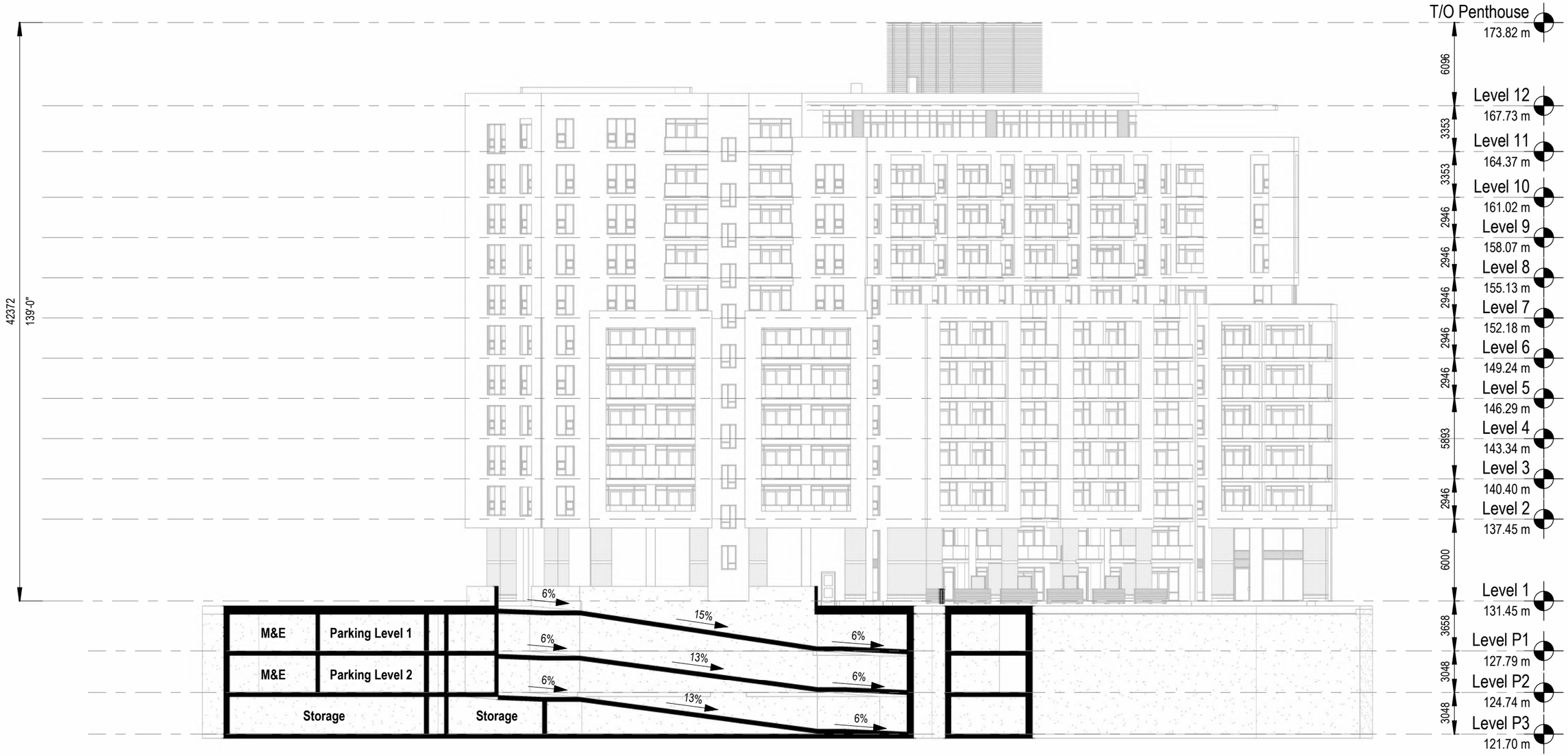
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21-027 | Infinity Development Group | 1396 Guelph Line Burlington, Ontario | Penthouse & Roof Plan | March 08, 2022 | SD2.9

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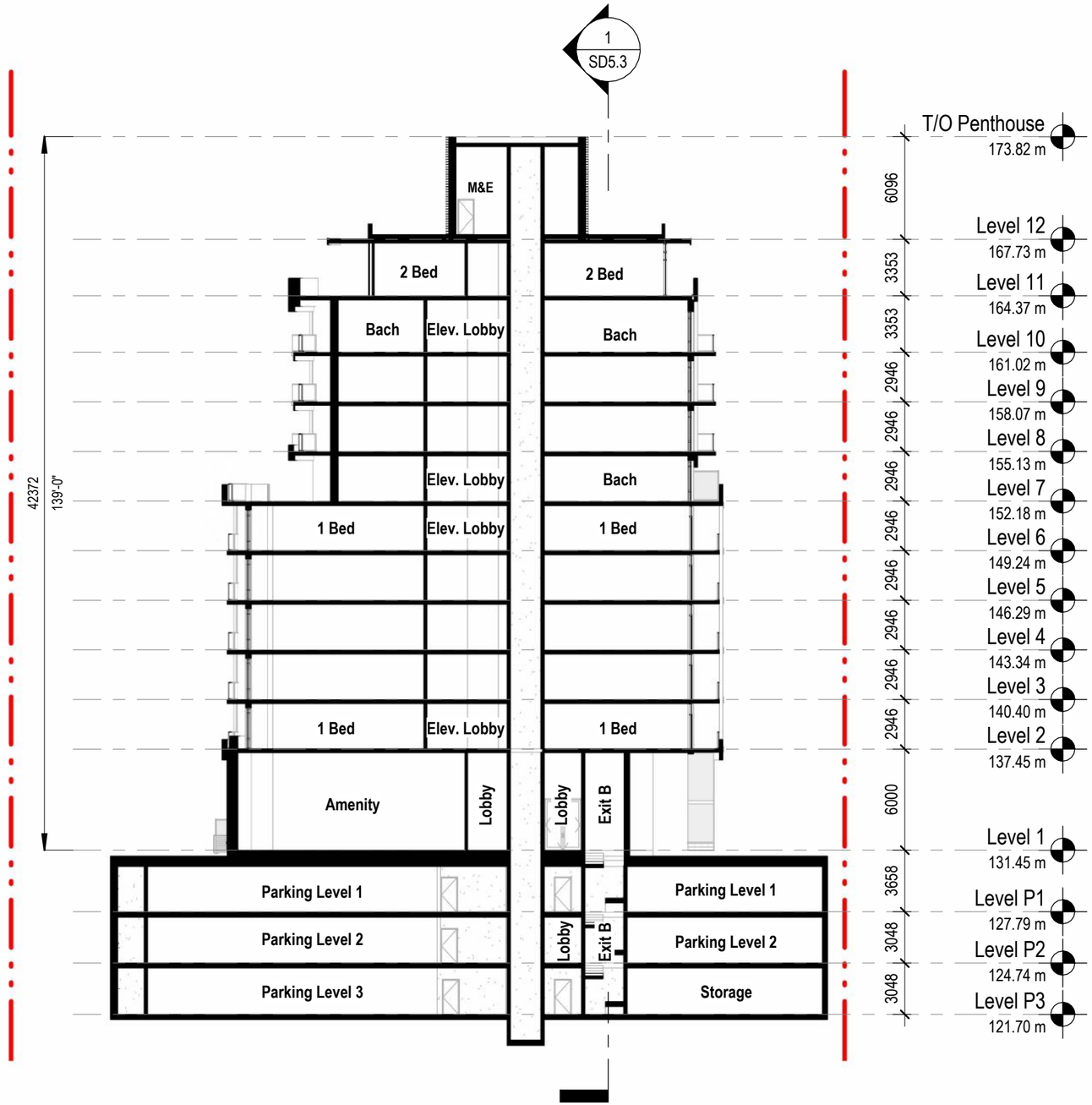
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21-027	Infinity Development Group	1396 Guelph Line Burlington, Ontario	Parking Ramp Section	March 08, 2022	SD5.1

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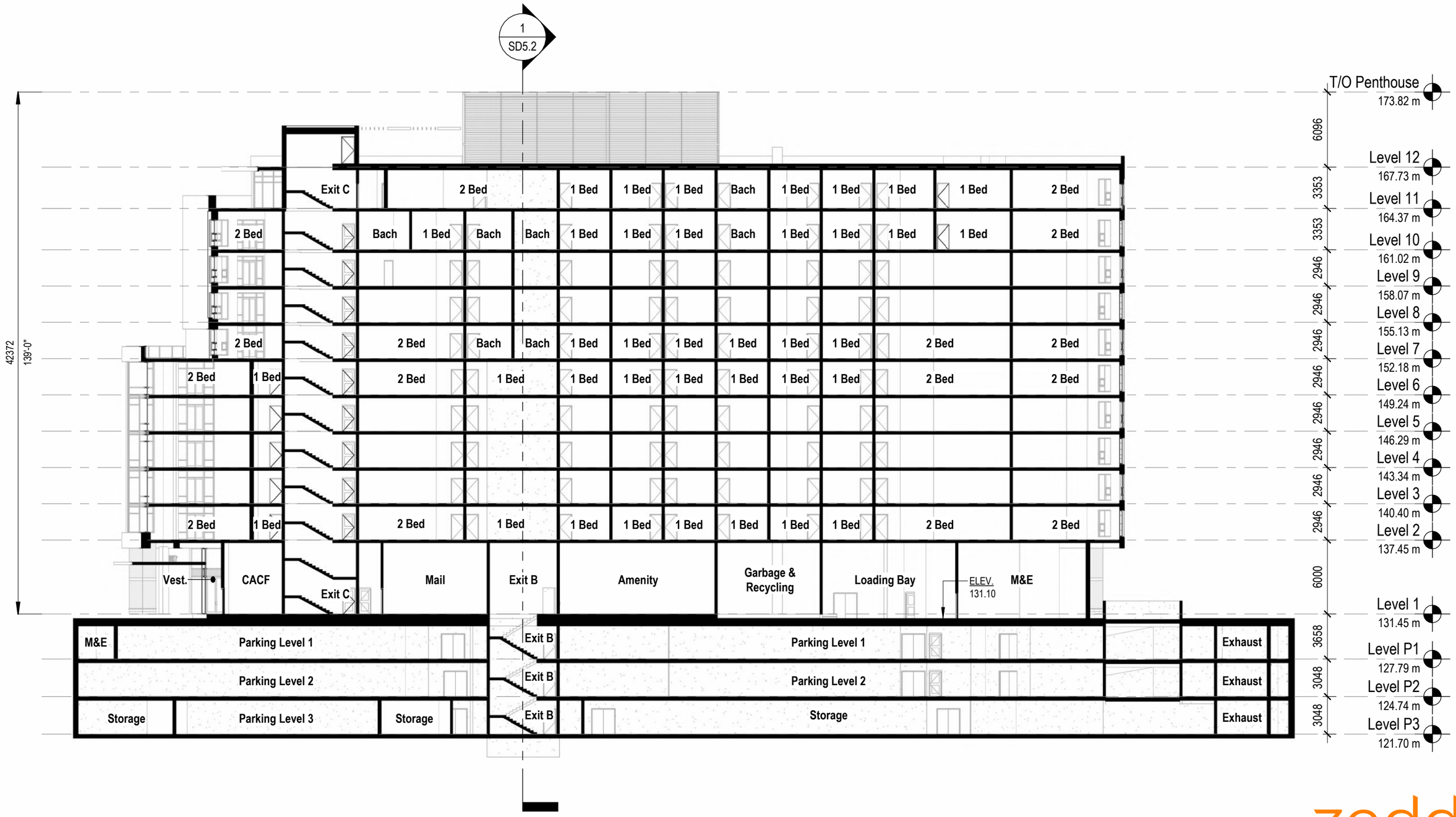


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21-027	Infinity Development Group	1396 Guelph Line Burlington, Ontario	Building Section	March 08, 2022	SD5.2

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21-027 | Infinity Development Group | 1396 Guelph Line Burlington, Ontario | Building Section | March 08, 2022 | SD5.3

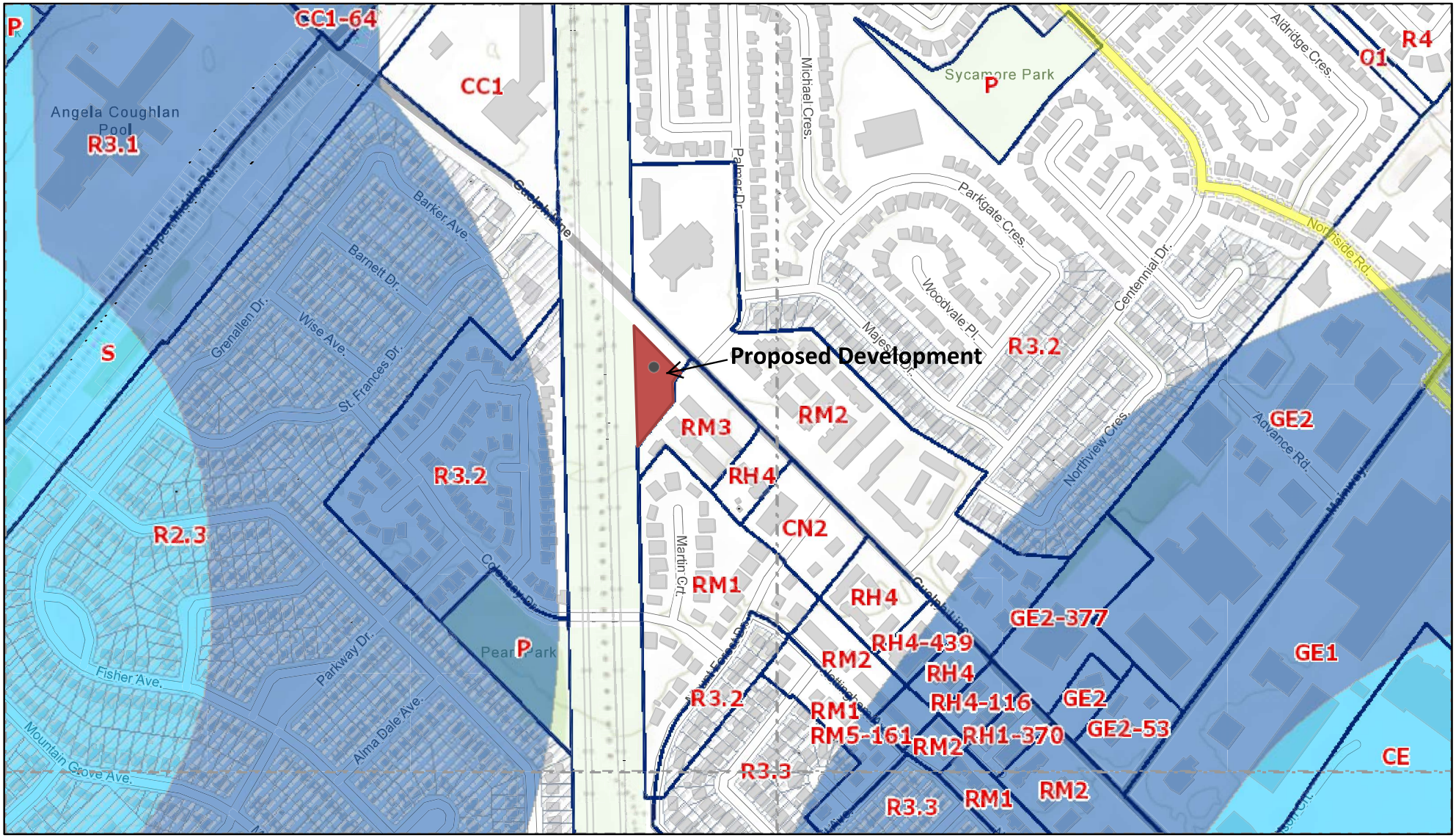
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APPENDIX B

Zoning Map, Land Use within 1000-meter Study Area and Location of NAPS Stations (3 pages)

City of Burlington Mapping



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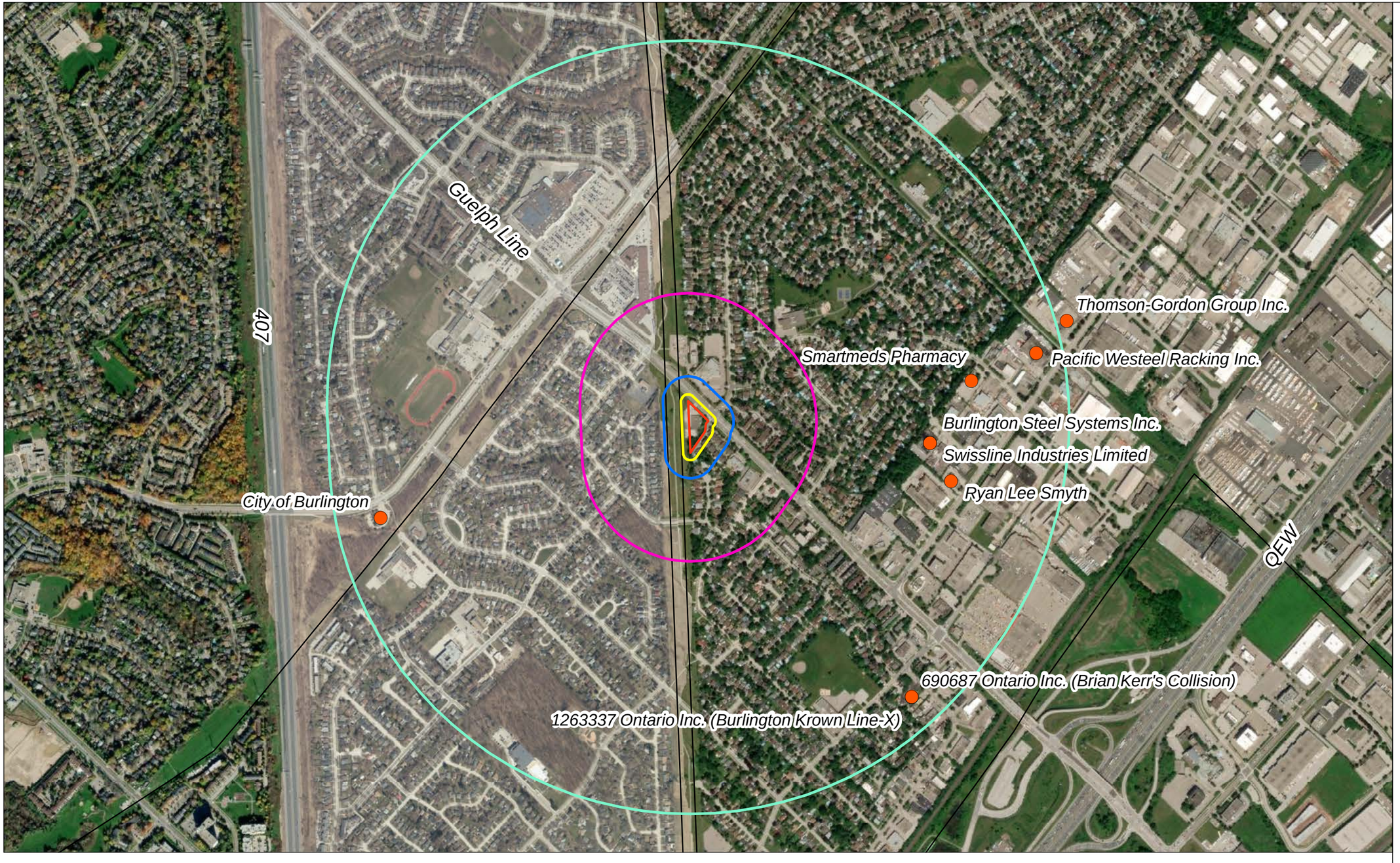
- Override 1
- City Outline
- Consult CH Hazard
- CH Approximate Regulation Limit
- ARL Spill Arrows
- ARL Spill Lines
- MTO Regulated Limits 800M
- MTO Regulated Limits 400M
- MTO Regulated Limits 395C
- MTO Regulated Limits 45M
- Designated area for lot coverage
- Zoning Bylaw
- Shoreacres
- Roseland
- Indian Point
- NEC Development Control

1:8,262

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

Esri, NASA, NGA, USGS, FEMA, HRCA, Sources: NRCan, Esri Canada, and Canadian Community Maps contributors., Esri Community Maps Contributors, City of Burlington, City of Hamilton, Province of Ontario, Esri Canada, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc., METI/NASA, USGS, EPA,



Land Use - Study Area

- Facilities
- Property Boundary
- 20m Buffer
- 70m Buffer
- 300m Buffer
- 1000m Buffer
- Transmission Lines

Industrial/Commercial Facilities	Street Address as per Access Environment	Approximate Property Line Separation Distances	Relevant Operations/Equipment	Potential Air Emissions	MECP Industrial Class	Comments
690687 Ontario Inc. (Brian Kerr's Collision)	2499 Industrial st, Burlington, ON	920 m	Paint Booth	Particulates, NOx and volatiles	Class I	Adequate separation distance
1263337 Ontario Inc. (Burlington Krown Line-X)	2499 Industrial st, Burlington, ON	920 m	Paint Booth	Particulates, NOx and volatiles	Class I	Adequate separation distance
Burlington Steel Systems Inc.	1240 Advance Road, Burlington, ON	570 m	Paint Booth and metal fabrication	Particulates, NOx and volatiles	Class I	Adequate separation distance
Pacific Westeel Racking Inc.	3191 Mainway, Burlington, On	870 m	Steel Rack Manufacturing	Particulates, NOx and volatiles	Class I to Class II	Adequate separation distance
Swissline Industries Limited	1240 Advance Road, Burlington, on	570 m	Wooden Cabinet Manufacturer	Particulates, NOx and volatiles	Class I to Class II	Adequate separation distance
Thomson-Gordon Group Inc.	3225 Mainway, Burlington, on	930 m	Non-metallic Polymer Bearings	Particulates, NOx and volatiles	Class I to Class II	Adequate separation distance
City of Burlington	2300 Upper Middle Road, Burlington, on	860 m	Standby Generator	Particulates and Combustion products	Class I	Adequate separation distance
Ryan Lee Smyth	3097 Mainway, Burlington, on	660 m	Automotive Refinishing	Particulates, NOx and volatiles	Class I	Adequate separation distance
Smartmeds Pharmacy	1252 Northside Road, Burlington, on	700 m	Standby Generator	Particulates and Combustion products	Class I	Adequate separation distance

0 62.5 125 250 Meters

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Data - Access Ontario, LIO, Google, GeoBase
Mar. 10, 2022 - WGS 84 17N

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a Kontrol Energy Company

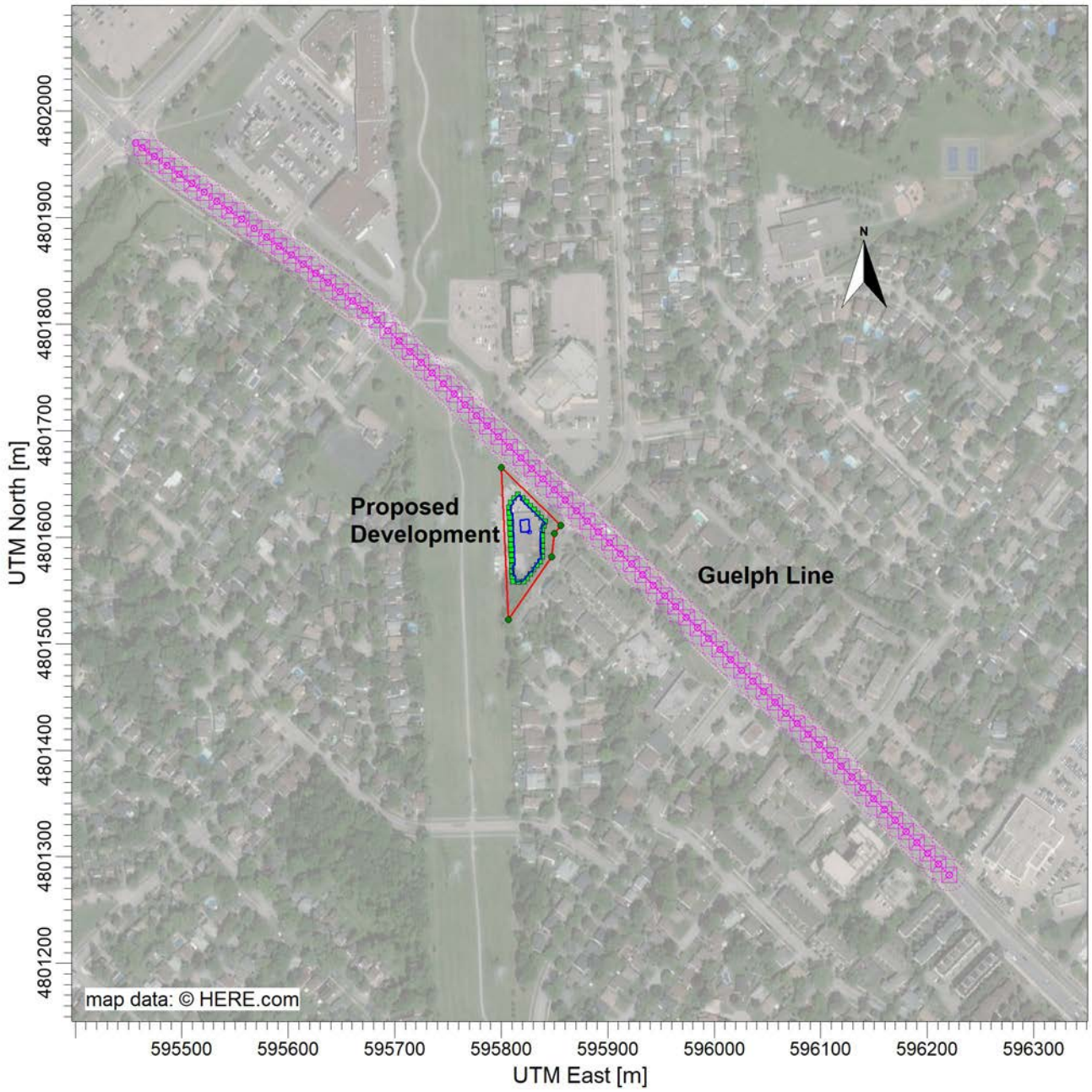

NAPS ID: 60438
Proposed Development (1396 Guelph Line)
NAPS ID: 63001
NAPS ID: 60512
Google Earth
Image Landsat / Copernicus
Image NOAA
N
20 km

APPENDIX C

AERMOD Dispersion Modelling Map
and
Location of Receptors R1 and R79
(2 pages)

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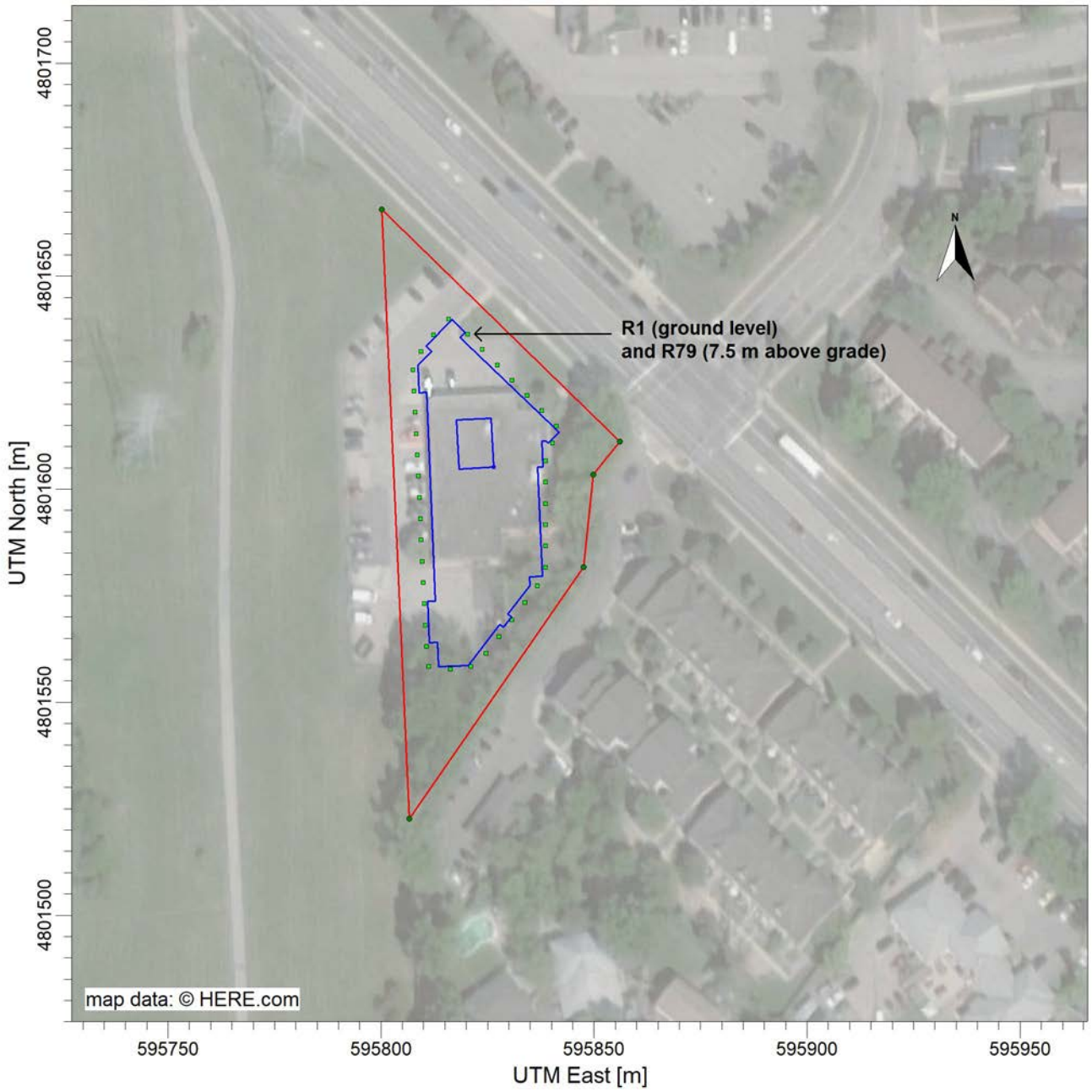
Infinity Development Group, 1396 Guelph Line, Burlington
Dispersion Modelling Map



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			PROJECT NO.: **92560**

PROJECT TITLE:

Infinity Development Group, 1396 Guelph Line, Burlington
Dispersion Modelling Map



COMMENTS:	**1**	COMPANY NAME: **ORTECH Consulting Inc.**	
	503		
		SCALE: 1:1,500 0 0.05 km	
			PROJECT NO.: **92560**

APPENDIX D

MOVES 3.0 Input Files
(Electronic Copy)

APPENDIX E

AERMOD Modelling Files
(Electronic Copy)