# Environmental Noise Assessment

## 177-179 Albert Street, Waterloo

### 14688210 Canada Inc.

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# 1.0 Introduction

SLR Consulting (Canada) Ltd. (SLR) was retained by 14688210 Canada Inc. to prepare an environmental noise assessment for the proposed development at 177-179 Albert Street in Waterloo, Ontario ("the Project site"). This report is in support of the planned Official Plan Amendment (OPA) and Zoning By-law Amendment (ZBA) application for the proposed development.

Copies of the required Declaration Statements are included in **Appendix A**.

## 1.1 Focus of Report

In keeping with the Ministry of Environment, Conservation and Parks (MECP), the City of Waterloo and the Regional Municipality of Waterloo (RMOW) requirements, this report examines the potential for:

- Impacts of the environment on the proposed development;
- Impacts of the proposed development on the environment; and
- Impacts of the proposed development on itself.

Mechanical systems associated with the development (e.g., cooling and ventilation equipment) have not been sufficiently designed at this stage and can be assessed at a future date, if required. A general discussion has been included in this report to address the impacts of the proposed development on the environment and on itself.

## 1.2 Nature of the Surroundings

The Project site is surrounded by the following:

- Residential dwellings, mid- and high-rise residential towers, and University Avenue West to the north;
- Albert Street and the Wilfred Laurier University campus to the east;
- Seagram Drive, residential dwellings, mid-rise residential towers, and University Stadium to the south; and
- Student dormitories, Laurier Academy of Music and Arts, Lester Street, and mid-/ high-rise student housing buildings beyond to the west.

A context plan is shown in **Figure 1**.

## 1.3 Description of Proposed Development

The proposed development is located at northwest corner of Albert Street and Seagram Drive. Two 2-storey residential buildings are currently located on the Project site. They will be demolished to accommodate the new development.

The proposed development will consist of a 24-storey residential building with 2 levels of underground parking. The ground floor will have the main entry, indoor amenities (fitness spaces), as well as parking space. Levels 2 to 24 will contain residential dwelling units.

Development drawings are provided for reference in **Appendix B**.

# PART 1: IMPACTS OF THE ENVIRONMENT ON THE DEVELOPMENT

In evaluating potential impacts of the environment on the proposed development, the focus of this report is assessment of:

- Transportation noise from surrounding roadways; and
- Stationary noise from surrounding industries/facilities on the development.

The nearest railway (the ION Rapid Transit) is located more than 458 m west of the proposed development. Based on guidance outlined in the document entitled “Guidelines for New Development in Proximity to Railway Operations” prepared for the Railway Association of Canada and the Federation of Canadian Municipalities (RAC/FCM), the proposed development is outside of the recommended minimum noise influence area. Furthermore, based on site observations, the ION Rapid Transit was not audible from the Project site. Therefore, rail traffic noise has not been considered further in this assessment.

The proposed development is also not located in proximity to any airports; therefore, an assessment of aircraft noise is not required.

# 2.0 Transportation Noise Impacts

## 2.1 Transportation Noise Sources

Transportation sources of interest with the potential to produce road traffic noise at the proposed development include:

- Albert Street; and
- Seagram Drive.

Roadway sound levels from Albert Street and Seagram Drive has been predicted, and this information has been used to identify façade, ventilation, and warning clause recommendations/ requirements for the proposed development.

## 2.2 Surface Transportation Noise Criteria

### 2.2.1 Ministry of Environment Publication NPC-300

#### Noise-Sensitive Development

Ministry of the Environment, Conservation and Parks (MECP) Publication NPC-300 provides sound level criteria for noise-sensitive developments. The applicable portions of NPC-300 are Part C – Land Use Planning and the associated definitions outlined in Part A – Background. **Tables 1** to **4** summarize the applicable surface transportation (road and rail) criteria.

#### Location-Specific Criteria

**Table 1** summarizes criteria in terms of energy equivalent sound levels ($L_{eq}$) for specific noise-sensitive locations. Both outdoor and indoor locations are identified, with the focus of outdoor areas being amenity spaces. Indoor criteria vary with sensitivity of the space. As a result, Sleeping Quarters have more stringent criteria than Living/Dining room spaces.

**Table 1: NPC-300 Sound Level Criteria for Road and Rail Noise**

| Type of Space | Time Period | Energy Equivalent Sound Level $L_{eq}$ [5] (dBA) | | Assessment Location |
|---|---|---|---|---|
| | | Road | Rail [1] | |
| Outdoor Amenity Area | Daytime (0700-2300h) | 55 | 55 | Outdoors [2] |
| Living/Dining Room [3] | Daytime (0700-2300h) | 45 | 40 | Indoors [4] |
| | Night-time (2300-0700h) | 45 | 40 | Indoors [4] |
| Sleeping Quarters | Daytime (0700-2300h) | 45 | 40 | Indoors [4] |
| | Night-time (2300-0700h) | 40 | 35 | Indoors [4] |

**Notes:** [1] Whistle noise is excluded for OLA noise assessments and included for Living/Dining Room and Sleeping Quarter assessments, where applicable.

[2] Road and Rail noise impacts are to be combined for assessment of OLA impacts.

[3] Residence area Dens, Hospitals, Nursing Homes, Schools, Daycares are also included. During the nighttime period, Schools and Daycares are excluded.

[4] An assessment of indoor noise levels is required only if the criteria in **Table 4** are exceeded.

[5] $L_{eq}$ – the energy equivalent sound level, integrated over the time period shown.

### Outdoor Living Areas

**Table 2** summarizes the noise mitigation requirements for communal outdoor amenity areas ("Outdoor Living Areas" or "OLAs").

For the assessment of outdoor sound levels, total surface transportation noise is determined by combining road and rail traffic sound levels. Whistle noise from trains is not included in the determination of outdoor sound levels.

**Table 2: NPC-300 OLA Sound Level Criteria for Road and Rail Noise**

| Time Period | OLA Energy Equivalent Sound Level $L_{eq}$ (dBA) | Mitigation Requirements/Warning Clause Recommendations |
|---|---|---|
| Daytime (0700-2300h) | ≤ 55 | • None |
| | 56 to 60 inc. | • Noise barrier OR Type A Warning Clause |
| | > 60 | • Noise barrier to reduce noise to 55 dBA OR<br>• Noise barrier to reduce noise to 60 dBA and Type B Warning Clause |

### Ventilation and Warning Clauses

**Table 3** summarizes recommendations for ventilation where windows would potentially have to remain closed as a means of noise control. Despite implementation of ventilation measures where recommended, if sound levels exceed the guideline limits in **Table 1**, warning clauses advising future occupants of the potential excesses are also recommended. Warning clauses also apply to OLAs.

**Table 3: NPC-300 Ventilation and Warning Clause Recommendations**

| Assessment Location | Time Period | Energy Equivalent Sound Level – $L_{eq}$ (dBA) | | Ventilation and Warning Clause Recommendations [2] |
|---|---|---|---|---|
| | | Road | Rail [1] | |
| Outdoor Living Area | Daytime (0700-2300h) | 56 to 60 incl. | | Type A Warning Clause |
| Plane of Window | Daytime (0700-2300h) | ≤ 55 | | None |
| | | 56 to 65 incl. | | Forced Air Heating with provision to add air conditioning + Type C Warning Clause |
| | | > 65 | | Central Air Conditioning + Type D Warning Clause |
| | Night-time (2300-0700h) | 51 to 60 incl. | | Forced Air Heating with provision to add air conditioning + Type C Warning Clause |
| | | > 60 | | Central Air Conditioning + Type D Warning Clause |

**Notes:** [1] Whistle noise is excluded from assessment.
[2] Road and Rail noise is combined for determining Ventilation and Warning Clause requirements

### Building Component Requirements

**Table 4** provides sound level thresholds which, if exceeded, trigger a requirement for the building shell components (i.e., exterior walls, windows) to be designed accordingly to meet the applicable indoor sound criteria.

**Table 4: NPC-300 Building Component Assessment Requirements**

| Assessment Location | Time Period | Energy Equivalent Sound Level – $L_{eq}$ (dBA) | | Component Requirements |
|---|---|---|---|---|
| | | Road | Rail [1] | |
| Plane of Window | Daytime (0700-2300h) | > 65 | > 60 | Designed/ Selected to Meet Indoor Requirements [2] |
| | Night-time (2300-0700h) | > 60 | > 55 | |

**Notes:** [1] Whistle noise is included in assessment
[2] Building component requirements are assessed separately for Road and Rail, and then combined for a resultant sound isolation parameter.

### 2.2.2 Regional Municipality of Waterloo – Noise Policy Implementation Guidelines

The RMOW has published Noise Policy Implementation Guidelines (last updated October 22, 2019) for assessment of surface transportation (road and rail) sound levels. The applicable portions for new developments are outlined in Part A – New Development Impacted by Noise from Roads and Railways.

The RMOW Noise Policy Implementation Guidelines and associated sound level limits, ventilation requirements and building component requirements generally follow those in MECP Publication NPC-300. The exception is that night-time indoor sound level limits are not prescribed for living/dining room spaces. For these indoor spaces, guideline limits from MECP Publication NPC-300 have been applied. RMOW-specific warning clauses also differ from those discussed in **Section 2.2.1**, and these been adopted in the assessment.

## 2.3 Traffic Data and Future Projections

### 2.3.1 Road Traffic Data

For Albert Street and Seagram Drive, future year 2033 average annual daily traffic (AADT) volume and details (day/night split, medium/heavy truck percentages and speed limits) were provided by the RMOW. Copies of traffic data and calculations are provided for reference in **Appendix C**. **Table 5** summarizes the road traffic data used in the analysis.

**Table 5: Summary of Road Traffic Data Used in Transportation Analysis**

| Roadway Link[1] | Traffic Volumes AADT | % Day/Night Volume Split | | Commercial Vehicle Breakdown | | Vehicle Speed (km/hr) |
|---|---|---|---|---|---|---|
| | | Daytime | Night-time | % Medium Trucks | % Heavy Trucks | |
| Albert Street | 8,400 | 90 | 10 | 1.0 | 1.0 | 50 |
| Seagram Drive | 4,700 | 90 | 10 | 0.0 | 1.0 | 50 |

**Notes:** [1] Based on data provided by the Regional Municipality of Waterloo.

## 2.4 Predicted Sound Levels

Future road traffic sound levels at the proposed development were predicted using Cadna/A, a commercially available noise propagation modelling software package. Roadways were modelled as line sources of sound, with sound emission rates calculated using the ORNAMENT algorithms, the road traffic noise model of the MECP. These predictions were validated and are equivalent to those made using the MECP's ORNAMENT or STAMSON v5.04 road traffic noise models. A STAMSON validation file and output are included for reference in **Appendix D**.

Sound levels were predicted along the facades of the proposed development using the "building evaluation" feature of Cadna/A. This feature allows for noise levels to be predicted across the entire façade of a structure. OLA sound levels were assessed at a height of 1.5 m above terrace level, at the centre of the terrace spaces.

Global ground absorption was conservatively considered to be reflective (G = 0.0), and 1 m topographic contours for the Project site and surrounding area were included in the model.

### 2.4.1 Façade Sound Levels

Predicted worst-case façade sound levels due to road traffic are presented in **Table 6**.

The roadway façade sound levels on the proposed development, showing the ranges of predicted daytime and night-time sound levels are shown in **Figure 2** (daytime) and **Figure 3** (night-time).

**Table 6: Summary of Predicted Worst-Case Transportation Façade Sound Levels**

| Building Section | Façade[1] | Maximum Predicted Road Traffic Sound Levels[2] | |
|---|---|---|---|
| | | $L_{eq}$ Daytime (dBA) | $L_{eq}$ Night-time (dBA) |
| Podium (Ground Floor to 6th Floor) | North | 57 | 50 |
| | East | 61 | 55 |
| | South | 60 | 53 |
| | West | 54 | 47 |
| Tower (7th Floor to 24th Floor) | North | 55 | 48 |
| | East | 58 | 52 |
| | South | 57 | 51 |
| | West | 52 | 45 |
| **Notes:** [1] Building façade roadway sound levels are shown in **Figure 2** (daytime) and **Figure 3** (night-time)<br>[2] Sound levels presented above are the highest for the identified building facade. | | | |

The façade roadway sound levels are predicted to below 65 dBA and 60 dBA during the daytime and night-time periods, respectively (i.e., the thresholds described in **Table 4**) at all locations within the proposed development. An assessment of building components is therefore not required.

### 2.4.2 Outdoor Living Area Sound Levels

The Outdoor Living Area (OLAs) of the proposed development are located at the elevated terrace, west and south of the tower. The assessment locations are shown on **Figure 4**.

A parapet barrier wall and rooftop screen were considered, based on information shown in the elevation drawings and also shown on **Figure 4**. The parapet wall varies from 1.3 m high down to 0.5 m high, and the north-south return is a 3.2 m high screen. The perimeter barriers/parapet wall/rooftop screen can be composed of several materials such as concrete, glass or plexiglass. The construction material should be selected so that the barrier wall has a minimum surface density of 20 kg/m$^2$. The panels and frames should be free of gaps and cracks on the sides and bottom, except for small, localized openings required for drainage purposes. The systems should also be designed to withstand any wind loading.

Predicted OLA sound levels from adjacent roadways are presented in **Table 7** for the elevated terrace and are shown in **Figure 4**.

**Table 7: Summary of Predicted Transportation OLA Sound Levels**

| OLA Location | Predicted Sound Level, $L_{eq}$ Daytime (dBA) |
|---|---|
| OLA-1 (West of Tower) | 45 |
| OLA-2 (South of Tower) | 53 |

The predicted sound levels at the rooftop patio are predicted to be 55 dBA or lower. Additional mitigation and warning clauses are therefore not required for OLAs.

## 2.5 Noise Control Measures

### 2.5.1 Façade Assessment

An assessment of indoor noise levels is not required because façade sound levels due to road traffic do not exceed 65 dBA during daytime hours or 60 dBA during night-time hours at any project locations.

Exterior wall and window (glazing) assemblies meeting the minimum non-acoustical requirements of the Ontario Building Code (OBC) are expected to be sufficient to meet the indoor sound level guidelines of the MECP and RMOW.

### 2.5.2 Ventilation and Warning Clause Recommendations

#### 2.5.2.1 Façade Recommendations

The triggers for warning clauses are summarized in **Table 3** and supplementary documentation to the RMOW Noise Policy Implementation Guideline. Where required, the warning clauses should be included in agreements registered on Title for the residential units and included in all agreements of purchase and sale or lease and all rental agreements.

Based on the predicted façade sound levels, a warning clause and the provision for installing air conditioning at a later date is required for all residential suites in the proposed development. This typically takes the form of a forced air heating system that can be converted to air conditioning at the occupant's discretion.

Ventilation and warning clause recommendations are summarized in **Appendix E**.

#### 2.5.2.2 Outdoor Living Area Recommendations

The predicted sound levels at OLA-1 and OLA-2 are below 55 dBA. Therefore, additional mitigation and warning clauses are not required for the proposed development.





# 3.0 Stationary Source Noise Assessment

A site visit to the Project site and surrounding area was completed by SLR personnel on July 10, 2023. The focus of the site visit was to identify nearby facilities with the potential for stationary source noise impacts at the proposed development. The site was found to be primarily surrounded by institutional and residential land uses.

There are no industrial facilities in proximity to the proposed development. Noise sources in the area requiring assessment were determined based on the MECP Guideline D-6 Potential Influence Areas. The institutional buildings that are part of Wilfred Laurier University are considered to be Class I industries, in which a 70 m influence area was applied for considering assessment of stationary sources. The closest Class II and Class III industries are located outside of the 300 m and 1000 m areas of influence, respectively. Therefore, no Class II or Class III industries have been considered in this assessment.

An exhaust louvre at the Wilfrid Laurier University Library (75 University Avenue West, Waterloo) was identified during the site visit, located within 70 m north of the Project site identified as a source of noise requiring assessment. Additionally, SLR identified rooftop air-cooled chillers at the Martin Luther University College across Albert Street, at the corner of Bricker Avenue, as a source of noise requiring assessment.

No other stationary sources of noise were identified in proximity to the proposed development that require further assessment.

## 3.1 Stationary Source Modelling

Based on information obtained during the site visit, and a review of aerial photography, the sources of noise with the potential to produce noise at the proposed development have been identified. Sound levels for the sources were determined based on at-grade measurements collected during the site visit on July 10, 2023 and information contained in the SLR in-house database.

Modelled sources of noise include an exhaust louvre at the Wilfred Laurier University Library and three rooftop air-cooled chillers atop Martin Luther University College.

Sound levels from stationary sources were modelled using Cadna/A, a software implementation of the internationally recognized ISO-9613-2 environmental noise propagation algorithms. Cadna/A / ISO-9613 is the preferred noise model of the MECP. The ISO-9613 equations account for:

- Source to receiver geometry;
- Distance attenuation;
- Atmospheric absorption;
- Reflections off of the ground and ground absorption;
- Reflections off of vertical walls; and
- Screening effects of buildings, terrain, and purpose-built noise barriers (noise walls, berms, etc.).

The following additional parameters were used in the modelling, which are consistent with providing a conservative (predictable worst-case assessment of noise levels):

- Temperature: 10°C;

- Relative Humidity: 70%;
- Ground Absorption G: G = 0.0 (reflective) as the default global parameter;
- Reflection: One (1) order of reflection was used (accounts for noise reflecting from walls);
- Wall Absorption Coefficients: Set to 0.21 or 0.37 (21%/37% of energy is absorbed, 79%/63% reflected); and
- Terrain: Topographical contours obtained from City of Waterloo Open Data Portal.

Sound level data from site visit source/spot-check measurements and generic SLR historical sound level data were applied in the stationary noise modelling assessment. A summary of the sound levels used in the analysis and equipment operating conditions is included in **Appendix F**. All stationary sources modelled are shown in **Figure 5**.

## 3.2 Stationary Source Noise Criteria

MECP guidelines for stationary source noise impacting residential developments are given in MECP Publication NPC-300. The applicable portions of NPC-300 are Part C – Land Use Planning and the associated definitions outlined in Part A – Background.

The acoustic environment surrounding the proposed development is generally dominated by roadway noise from Albert Street and Seagram Drive during all periods of the day. Therefore, the proposed development is considered to be located in a Class 1 area.

The sound level limits for steady sound sources are expressed as a 1-hr equivalent sound level ($L_{eq}$ (1 hr) values, in dBA) and is the higher of the NPC-300 exclusionary limits and the existing background sound level. The NPC-300 stationary source guidelines for a Class 1 Area are summarized in **Table 8** for steady sound sources.

**Table 8: NPC-300 Class 1 Continuous Sound Level Limits**

| Point of Reception Category | Time Period | Minimum Exclusionary Sound Level Limit $L_{eq}$(1-hr), dBA[1] |
|---|---|---|
| Outdoors | Daytime (0700-1900h) | 50 |
| | Evening (1900-2300h) | 50 |
| | Night-time (2300-0700h) | N/A[3] |
| Plane of Window [2] | Daytime (0700-1900h) | 50 |
| | Evening (1900-2300h) | 50 |
| | Night-time (2300-0700h) | 45 |

**Notes:** [1] Or minimum hourly $L_{eq}$ of background noise; whichever is higher.
[2] Applicable for windows opening into “noise-sensitive spaces” as defined in NPC-300.
[3] Sound level limits during night-time hours are not applicable at outdoor points of reception.

The Class 1 minimum exclusionary limits were applied in the assessment.

## 3.3 Predicted Stationary Source Sound Levels

The “building evaluation” feature of Cadna/A was used to assess facade sound levels on the residential portions of the proposed development podiums and towers. This feature allows for noise levels to be predicted across the entire façade of a structure.

Outdoor sound levels were assessed at a height of 1.5 m above terrace level, at all usable locations within the terrace. The parapet wall shown in the elevation drawings was considered surrounding the terrace, as discussed previously in **Section 2.4.2**.

### 3.3.1 Façade Sound Levels

A summary of the predicted sound levels on each façade due to simultaneous operation of all modelled stationary sources are shown in **Table 9** and summarized in **Figure 6** (daytime/evening) and **Figure 7** (night-time), respectively. Stationary source operating scenarios are provided for reference in **Appendix F.**

Predicted stationary sound levels at all façade locations associated with proposed development were determined to meet NPC-300 Class 1 minimum exclusionary limits during worst-case daytime, evening and night-time hours.

**Table 9: Summary of Predicted Stationary Source Façade Sound Levels**

| Project Building | Façade | Predicted Stationary Source Sound Levels $L_{eq}$(1-hr) (dBA) | | |
|---|---|---|---|---|
| | | $L_{eq}$ Day (dBA) | $L_{eq}$ Evening (dBA) | $L_{eq}$ Night (dBA) |
| Podium (Ground Floor to 6th Floor) | North | 40 | 40 | 39 |
| | East | 50 | 50 | 45 |
| | South | 50 | 50 | 44 |
| | West | 33 | 33 | 27 |
| Tower (7th Floor to 25th Floor) | North | 40 | 40 | 39 |
| | East | 50 | 50 | 44 |
| | South | 50 | 50 | 44 |
| | West | 39 | 39 | 33 |

**Notes:** [1] Façade locations are identified on **Figure 6** and **Figure 7**.
[2] Sound levels shown represent the calculated worst-case impact along the identified facade.

An MECP Type E warning clause is recommended for all residential units due to the proximity of the proposed development to nearby noise sources.

### 3.3.2 Outdoor Sound Levels – Unmitigated

The predicted worst-case noise impacts from the stationary sources are summarized in **Table 10** and shown in **Figure 8** for daytime and evening periods. The predicted sound levels at the outdoor points of reception are predicted to exceed 50 dBA at a portion of the elevated terrace (OPOR-3). Therefore, mitigation is required.

**Table 10: Summary of Predicted Stationary Source Outdoor Sound Levels – Unmitigated**

| Outdoor Assessment Location [1] [2] | Stationary Source Sound Levels | |
|---|---|---|
| | $L_{eq}$ Daytime (dBA) | $L_{eq}$ Evening (dBA) |
| OPOR-1 (West of tower) | 32 | 32 |
| OPOR-2 (South of tower) | 50 | 50 |
| OPOR-3 (Southwest of tower) | 51 | 51 |

**Notes:** [1] Outdoor assessment locations are shown in **Figure 8**.
[2] Rooftop parapets with a height of 1.3 m and 0.5 m, and a 3.2 m high screen, are included for these predicted values. Refer to **Section 2.4.2** and **Figure 8**.

### 3.3.3 Outdoor Sound Levels – Mitigated

To meet applicable guideline limits at all OPOR location, the 0.5 m high portion of the barrier wall should be increased in height to 1.3 m, to match the other portion of the parapet wall. Refer to **Figure 9**. The same requirements noted in **Section 2.4.2** for the barrier should be met with respect to surface density and construction.

The predicted mitigated worst-case noise impacts from the stationary sources are summarized in **Table 11** and shown in **Figure 9** for daytime and evening periods. A sample calculation is provided in **Appendix F**.

The predicted sound levels at the outdoor points of reception are predicted to be meet application guideline limits at all OPOR locations with the recommended mitigation measures in place.

**Table 11: Summary of Predicted Stationary Source Outdoor Sound Levels – Mitigated**

| Outdoor Assessment Location [1] [2] | Stationary Source Sound Levels | |
|---|---|---|
| | $L_{eq}$ Daytime (dBA) | $L_{eq}$ Evening (dBA) |
| OPOR-1 (West of tower) | 28 | 28 |
| OPOR-2 (South of tower) | 49 | 49 |
| OPOR-3 (Southwest of tower) | 49 | 49 |

**Notes:** [1] Outdoor assessment locations are shown in **Figure 9**.
[2] Rooftop parapet with a height of 1.3 m and a 3.2 m high screen were considered for these predicted values. Refer to **Figure 9**.

# PART 2: IMPACTS OF THE DEVELOPMENT ON ITSELF

## 4.0 Stationary Source Noise from the Development on Itself

At the time of this assessment, mechanical systems for the proposed development have not been sufficiently designed to complete a detailed assessment of stationary source noise from the development on itself.

For common mechanical systems that will be implemented as part of the proposed development, sound levels from all noise-generating equipment should comply with the guideline limits in MECP Publication NPC-300. The potential noise from mechanical equipment in the proposed development (such as from make-up air units, cooling towers, parking garage exhaust fans, emergency generators, etc.) should be assessed as part of the final building design. The applicable criteria can be met at all on-site receptors through appropriate selection of mechanical equipment, by locating equipment with sufficient setback from noise sensitive locations, and by incorporating control measures (e.g., silencers) into the design. This can be confirmed either later in the site plan approval process, or at the building permit approval stages.

If individual air conditioning systems are to be implemented for individual residential units within the proposed development, the sound levels from each unit should meet the requirements of MECP Publication NPC-216.

It is recommended that the mechanical systems be reviewed by an acoustical consultant prior to final equipment selection.





# PART 3: IMPACTS OF THE DEVELOPMENT ON THE SURROUNDING AREA

## 5.0 Stationary Source Noise from the Development on the Surroundings

With respect to the acoustic environment of the area, it is expected that the proposed development will have a negligible effect on neighbouring noise-sensitive properties.

Traffic related to the proposed development will be small relative to the existing traffic volumes within the area and is not of concern with respect to potential transportation noise.

Other sources associated within the proposed development with the potential to generate noise are mechanical equipment (e.g., air conditioning units, make up air units, cooling units, and parking garage exhaust fans). Sound levels due to operation of these sources should meet MECP Publication NPC-300 noise guidelines at all off-site noise sensitive receptors.

Off-site sound levels are not expected to be of concern are not anticipated because systems will be designed to ensure that the applicable noise guidelines are met at on-site receptors.

Regardless, off-site sound levels from mechanical equipment should be assessed as part of the final building designs. The applicable criteria can be met at all surrounding receptors though the use of routine mitigation measures, including the appropriate selection of mechanical equipment, by locating equipment with sufficient setback from noise sensitive locations, and by incorporating control measures (e.g., silencers, barriers) into the designs.

If individual air conditioning systems are to be implemented for individual residential units within the proposed development, the sound levels from each unit should meet the requirements of MECP Publication NPC-216.

It is recommended that the mechanical systems be reviewed by an acoustical consultant prior to final selection of equipment.





# 6.0 Conclusions and Recommendations

The potential for noise impacts on and from the proposed development have been assessed. Impacts of the environment on the development, the development on itself, and the development on the surrounding area have been considered. Based on the results of this assessment, the following conclusions have been reached:

**Transportation Noise**

- An assessment of transportation sound levels from surrounding roadways has been completed.
- Based on transportation façade sound levels, exterior wall and window (glazing) construction meeting the minimum non-acoustical requirements of the OBC are expected to be sufficient to meet MECP indoor transportation noise guidelines.
- Ventilation and warning clause recommendations are outlined in **Section 2.5.2**.
    - The provision for installing air conditioning at a later date and a warning clause are recommended for all suites within the proposed development.
- Warning clauses should be included in agreements registered on Title for the residential units and included in agreements of purchase and sale/rental agreements.
    - Warning clauses are summarized in **Appendix E**.

**Stationary Source Noise**

- Stationary source sound levels from the surrounding institutional sources were assessed against the applicable MECP NPC-300 Class 1 Area guidelines.
- Stationary source sound levels from the surrounding establishments were found to meet the applicable guideline limits with an increase in the parapet height planned around the elevated 6$^{th}$ floor terrace, as outlined in **Section 3.3.3**.
- As the proposed development is located in proximity to stationary noise sources, an MECP Type E warning clause is recommended for all units.

**Overall Assessment**

- Noise from the environment on the proposed development can be adequately controlled with the inclusion of ventilation and warning clause recommendations as detailed in **Part 1** of this report.
- Noise from the proposed development on itself is not expected to be of concern and can be adequately controlled by following the design guidance outlined in **Part 2** of this report.
- Noise from the proposed development on the surroundings is expected to meet the applicable guideline limits, and can be adequately controlled by following the design guidance outlined in **Part 3** of this report.
- As the mechanical systems for the proposed development have not been designed in detail, the acoustical design should be reviewed by an acoustical consultant during site plan approval process, or as part of the final building design.

Regards,

**SLR Consulting (Canada) Ltd.**






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Senior Acoustics Engineer
kmallinen@slrconsulting.com

Distribution: 1 electronic copy – 14688210 Canada Inc.
1 electronic copy – SLR Consulting (Canada) Ltd.

# 7.0 References

Federation of Canadian Municipalities and the Railway Association of Canada, Guidelines for New Development in Proximity to Railway Operations, 2013.

International Organization for Standardization, ISO 9613-2: Acoustics – Attenuation of Sound During Propagation Outdoors Part 2: General Method of Calculation, Geneva, Switzerland, 1996.

Ontario Ministry of the Environment, Conservation and Parks, 1989, Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT).

Ontario Ministry of the Environment, Conservation and Parks, Publication NPC-300: Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning, 2013.

Ontario Ministry of the Environment, Conservation and Park, STAMSON v5.04: Road, Rail and Rapid Transit Noise Prediction, 1996.

Ontario Ministry of the Environment and Energy, Publication NPC-216: Residential Air Conditioning Devices, 1993.

# Figures

## Environmental Noise Assessment

177-179 Albert Street, Waterloo

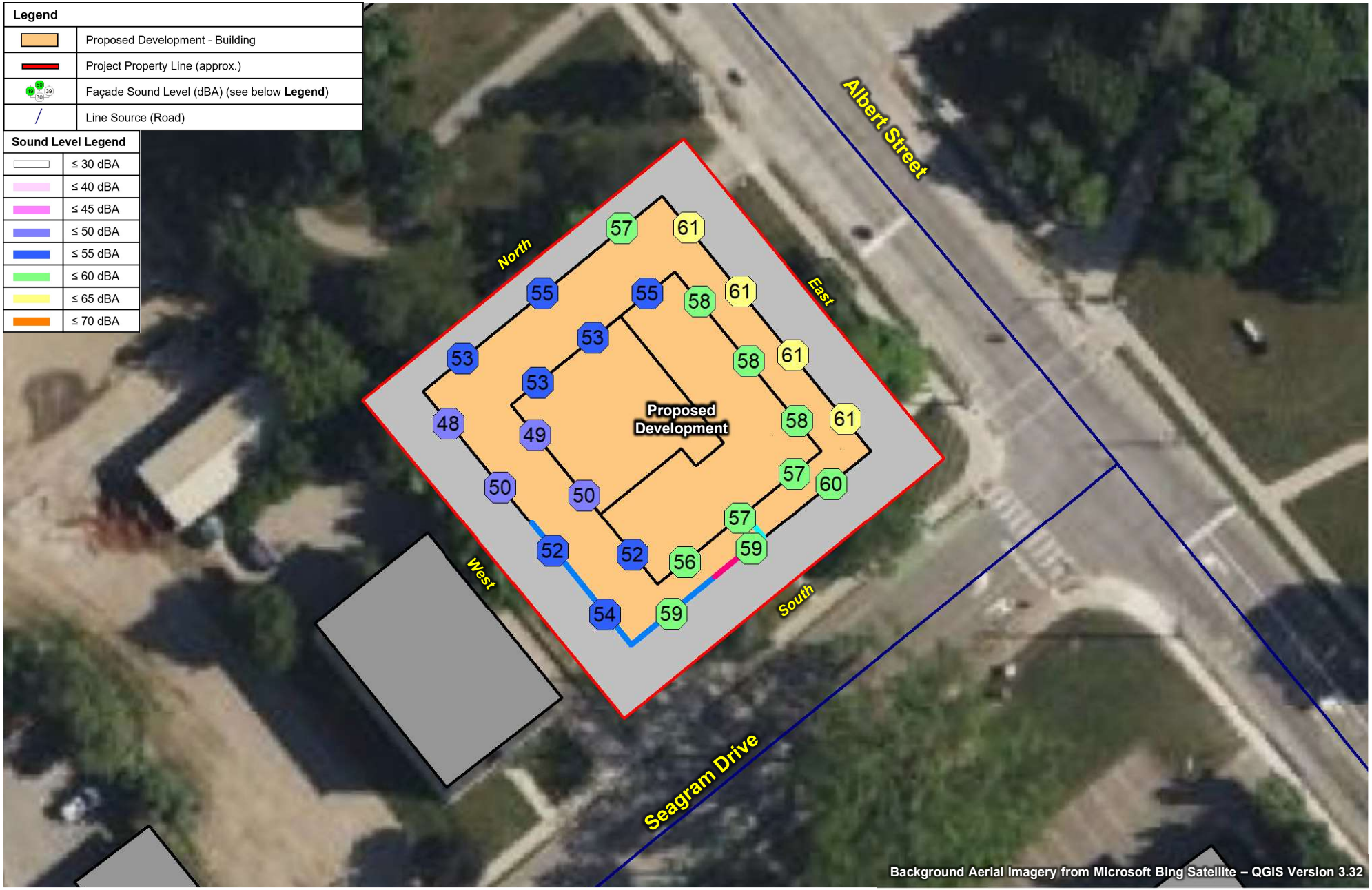
**14688210 Canada Inc.**

SLR Project No.: 241.030998.00001

November 22, 2023




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|---|---|---|---|---|
| **14688210 CANADA INC.** | True North | Scale: 1:3,000 | METRES | SLR |
| 177-179 ALBERT STREET, WATERLOO | | Date: Nov. 22, 2023 Rev 1.0 | Figure No. **1** | |
| CONTEXT PLAN | | Project No. 241.030998.00001 | | |




**14688210 CANADA INC.**

177-179 ALBERT STREET, WATERLOO

PREDICTED FAÇADE SOUND LEVELS – ROAD TRAFFIC – DAYTIME

True North

Scale: 1:500

METRES

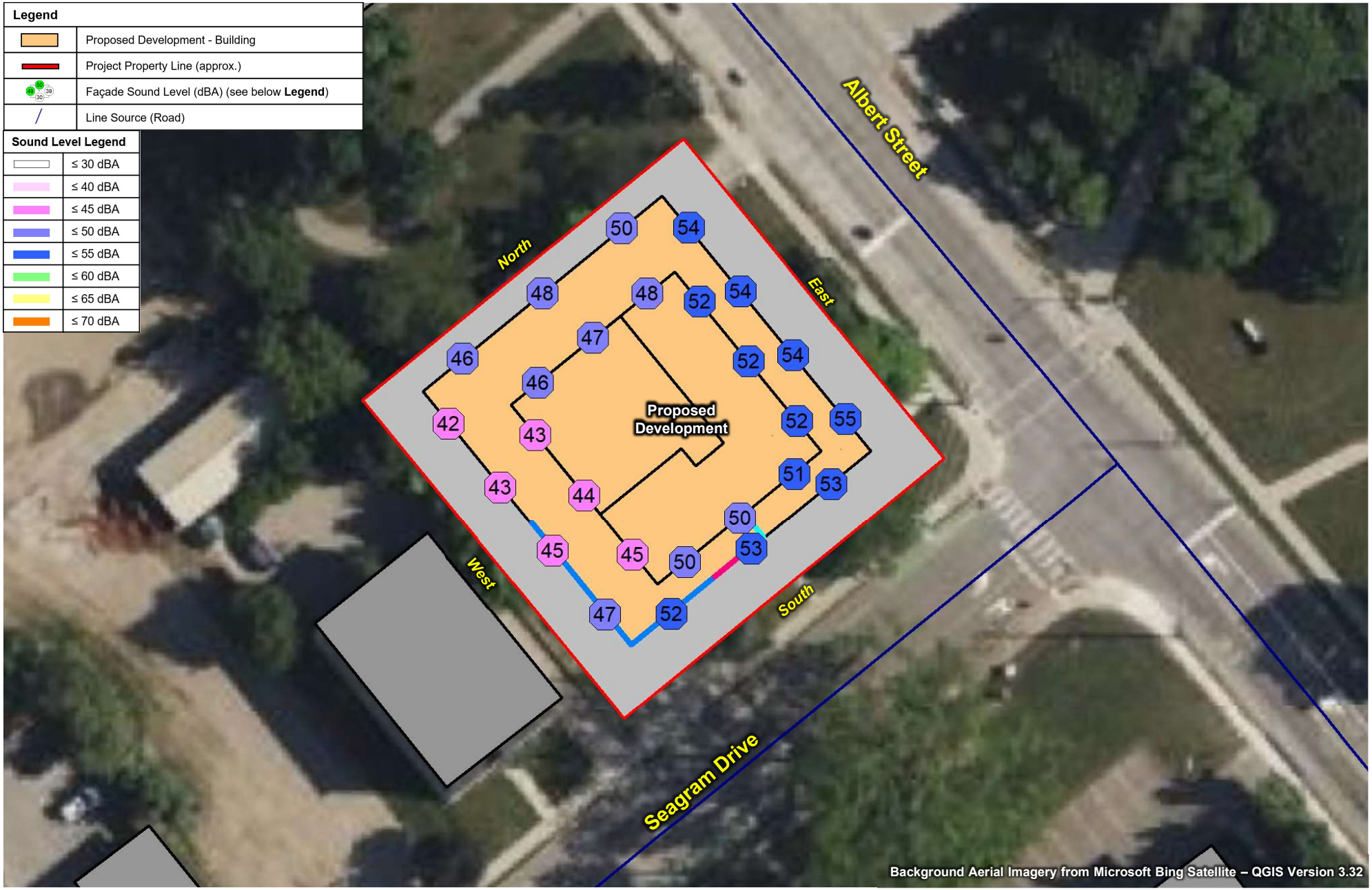
Date: Nov. 22, 2023

Rev 1.0

Figure No. **2**

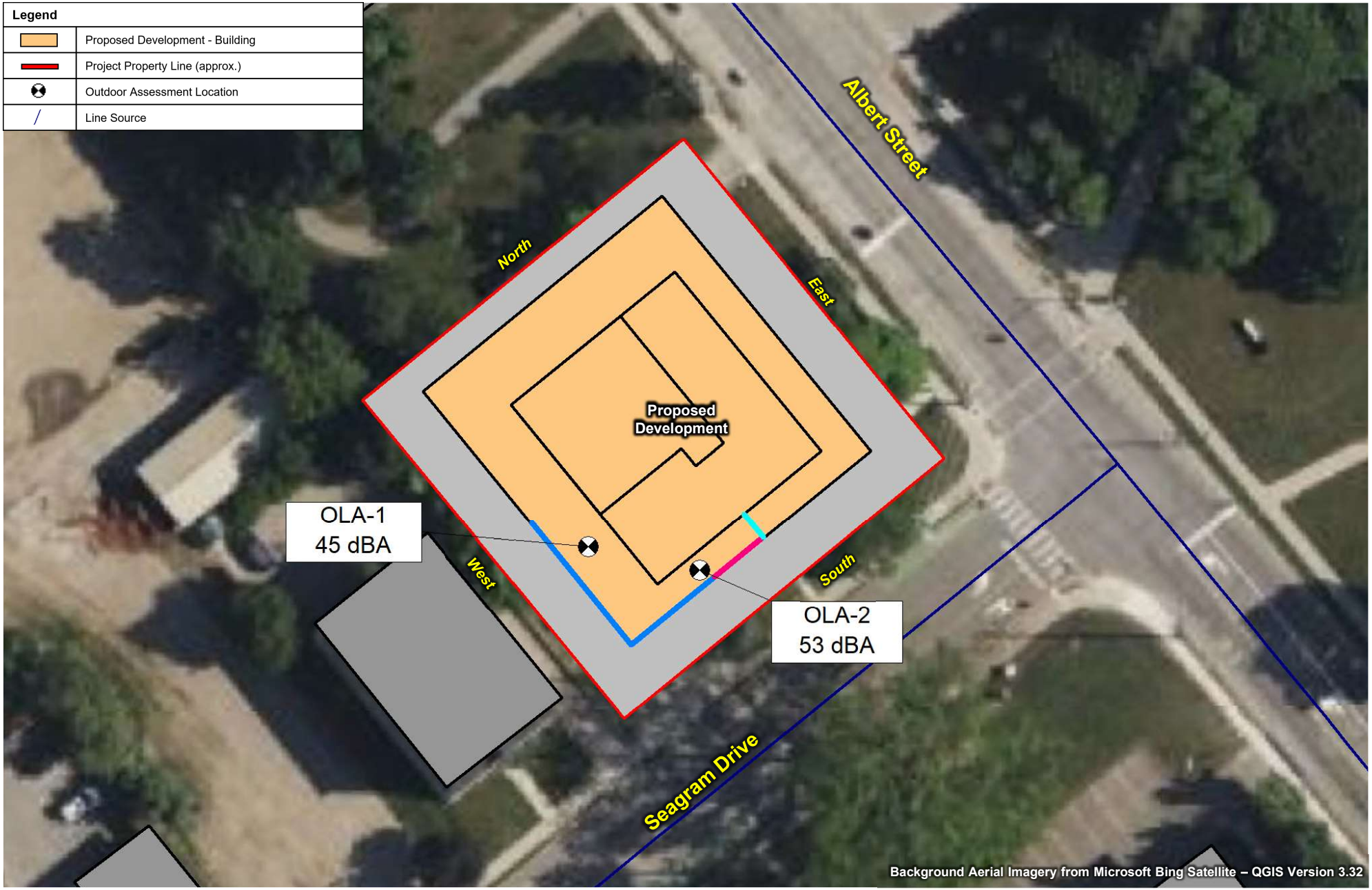
Project No. 241.030998.00001

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| **14688210 CANADA INC.** | True North | Scale: 1:500 | METRES |
| 177-179 ALBERT STREET, WATERLOO | | Date: Nov. 22, 2023 Rev 1.0 | Figure No. **3** |
| PREDICTED FAÇADE SOUND LEVELS – ROAD TRAFFIC – NIGHT-TIME | | Project No. 241.030998.00001 | |

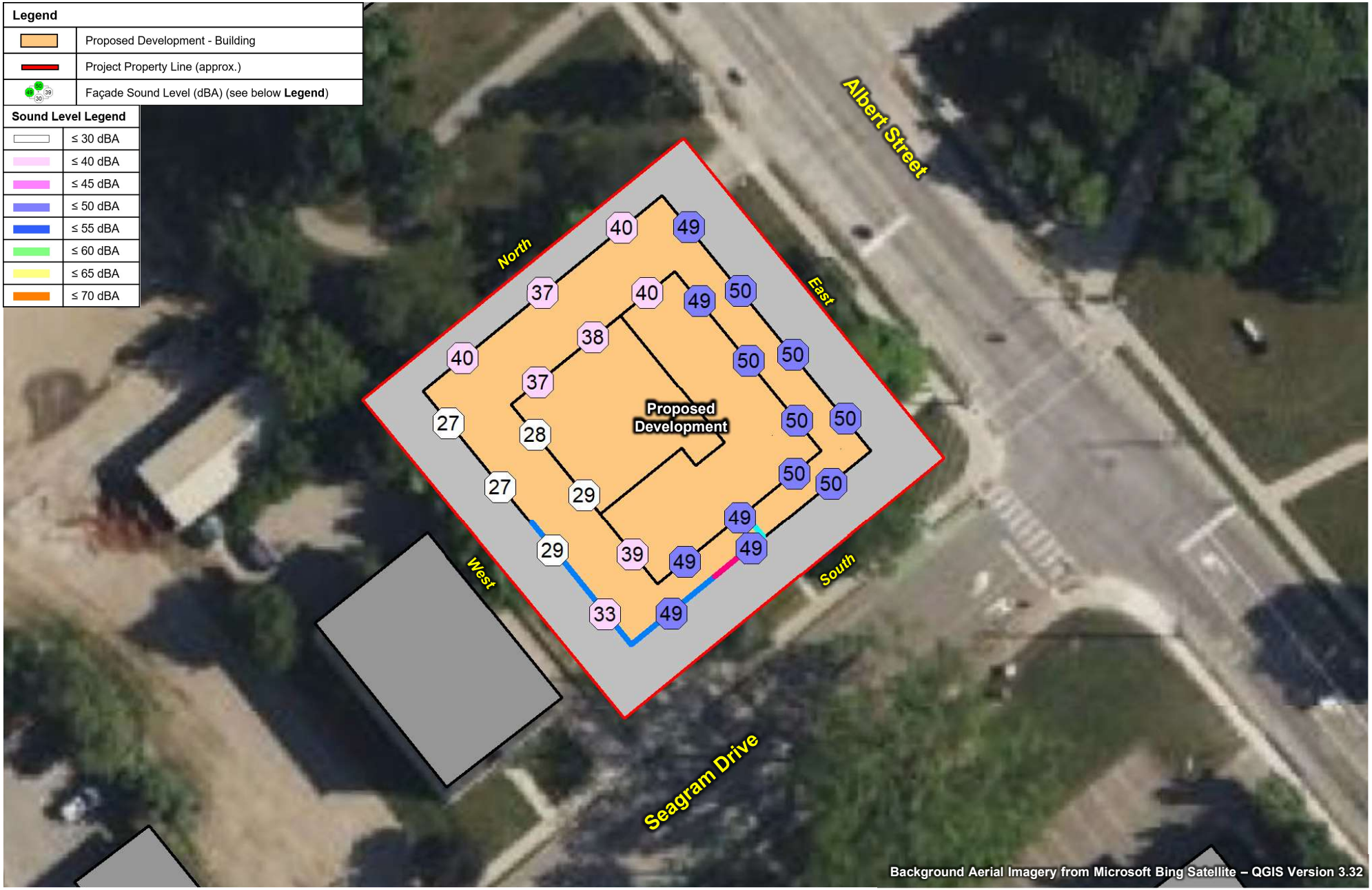
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| 177-179 ALBERT STREET, WATERLOO | | Date: Nov. 22, 2023 Rev 1.0 | Figure No. **4** | |
| PREDICTED OUTDOOR LIVING AREA SOUND LEVELS – ROAD TRAFFIC – DAYTIME | | Project No. 241.030998.00001 | | |

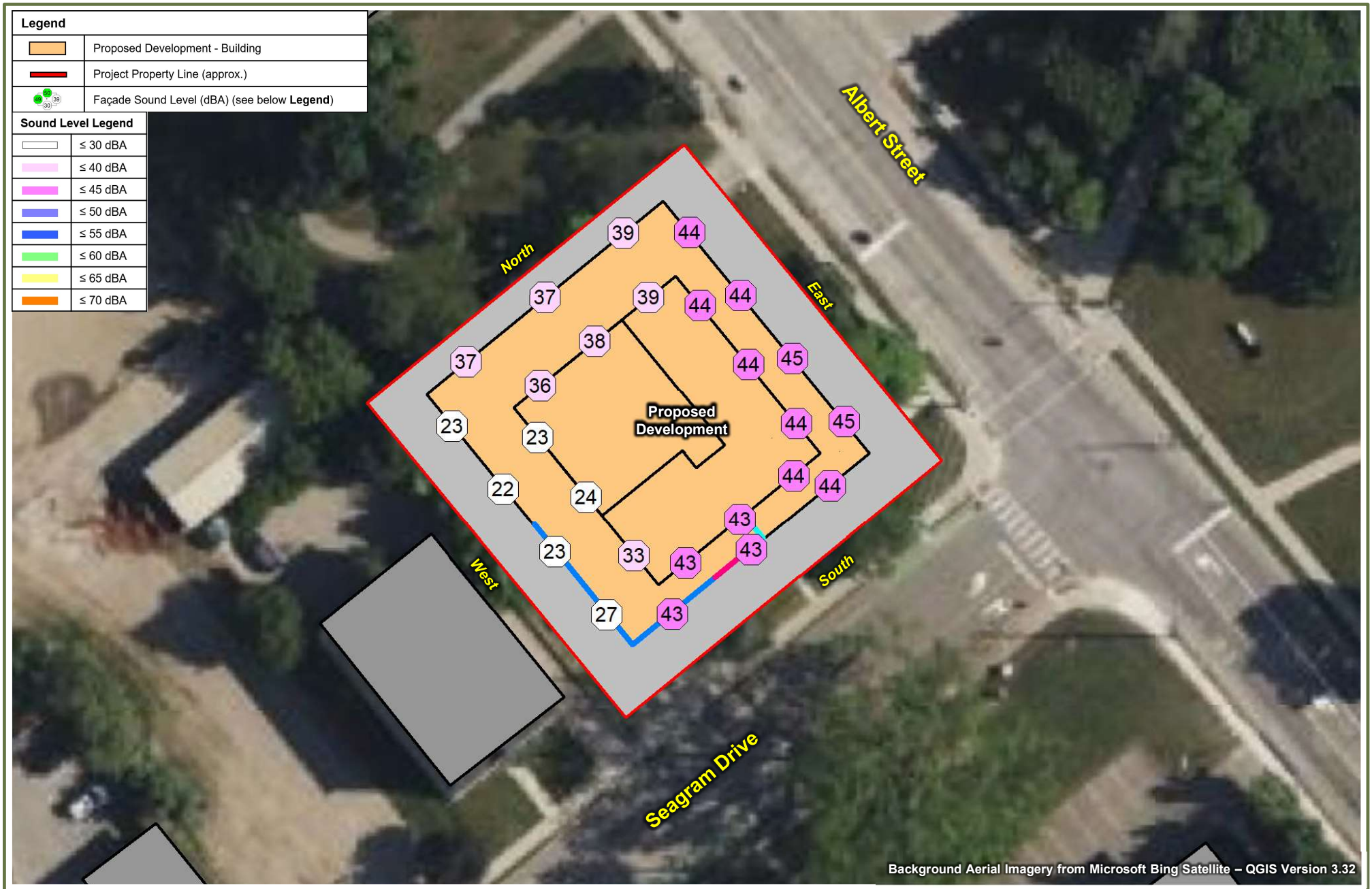



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| 177-179 ALBERT STREET, WATERLOO | | Date: Nov. 22, 2023 Rev 1.0 | Figure No. **5** | |
| SURROUNDING STATIONARY SOURCE LOCATIONS | | Project No. 241.030998.00001 | | |

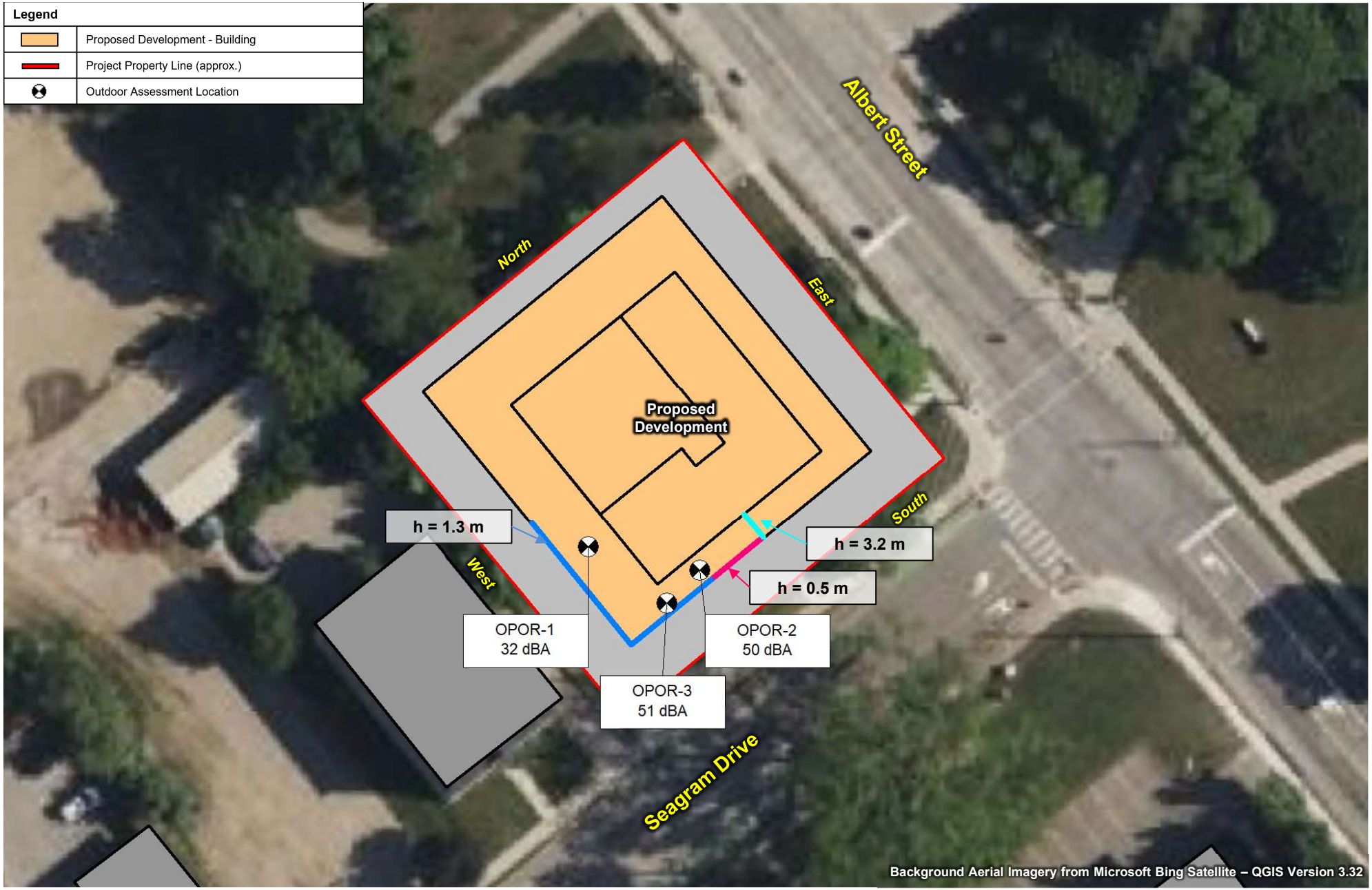



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| **14688210 CANADA INC.** | True North | Scale: 1:500 | METRES |
| 177-179 ALBERT STREET, WATERLOO | | Date: Nov. 22, 2023 Rev 1.0 | Figure No. **6** |
| PREDICTED FAÇADE SOUND LEVELS – STATIONARY SOURCES – DAYTIME/EVENING | | Project No. 241.030998.00001 | |

SLR

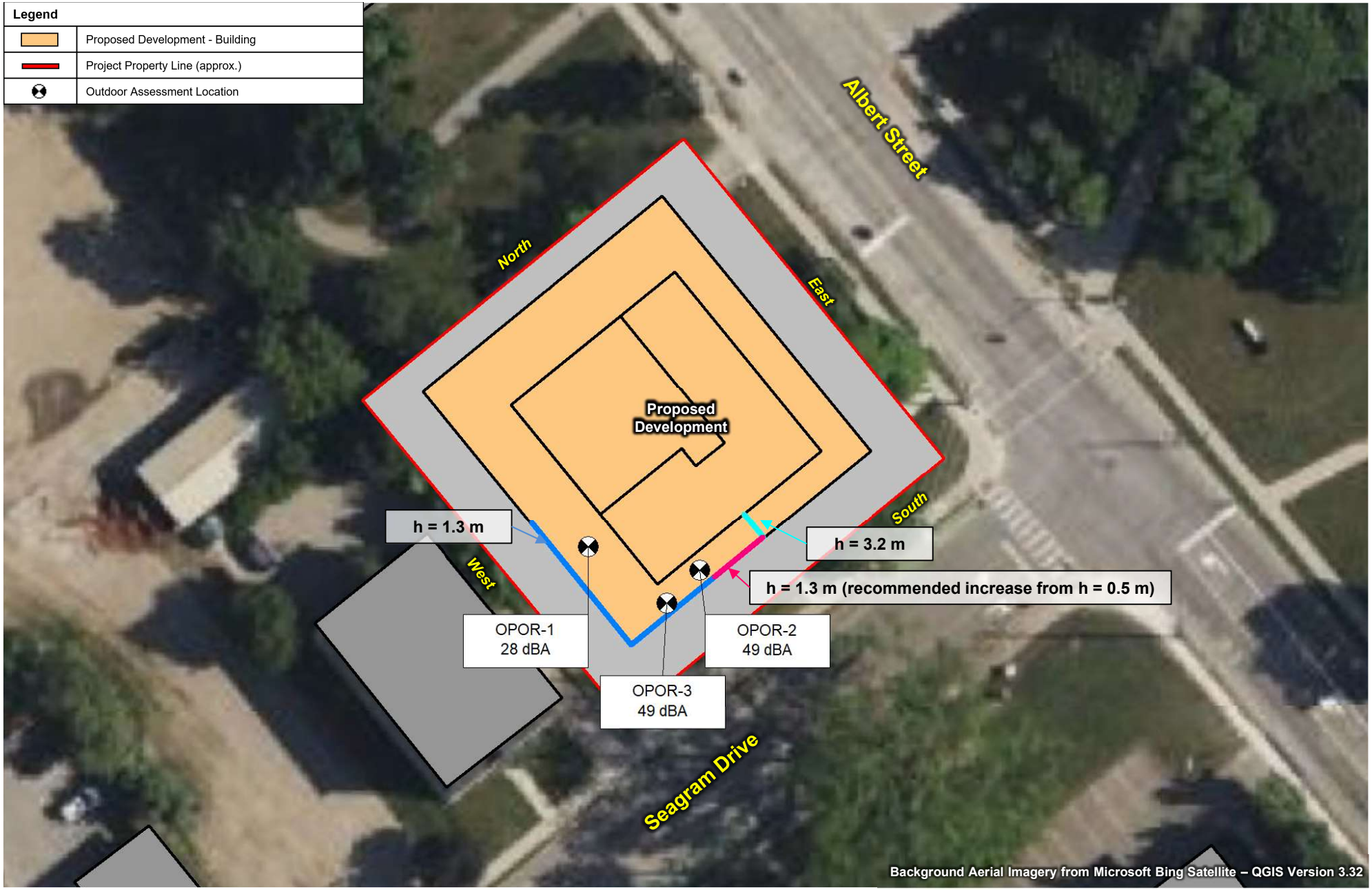



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| **14688210 CANADA INC.** | True North | Scale: 1:500 | METRES | SLR |
| 177-179 ALBERT STREET, WATERLOO | | Date: Nov. 22, 2023 Rev 1.0 | Figure No. **7** | |
| PREDICTED FAÇADE SOUND LEVELS – STATIONARY SOURCES – NIGHT-TIME | | Project No. 241.030998.00001 | | |




| | | | |
|---|---|---|---|
| **14688210 CANADA INC.** | True North | Scale: 1:500 | METRES |
| 177-179 ALBERT STREET, WATERLOO | | Date: Nov. 22, 2023 Rev 1.0 | Figure No. **8** |
| PREDICTED OUTDOOR SOUND LEVELS – STATIONARY SOURCES – DAYTIME/EVENING – UNMITIGATED | | Project No. 241.030998.00001 | |

SLR




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|---|---|---|---|
| **14688210 CANADA INC.** | True North | Scale: 1:500 | METRES |
| 177-179 ALBERT STREET, WATERLOO | | Date: Nov. 22, 2023 Rev 1.0 | Figure No. **9** |
| PREDICTED OUTDOOR SOUND LEVELS – STATIONARY SOURCES – DAYTIME/EVENING – MITIGATED | | Project No. 241.030998.00001 | |

# Appendix A Declaration Statements

## Environmental Noise Assessment

177-179 Albert Street, Waterloo

**14688210 Canada Inc.**

SLR Project No.: 241.030998.00001

November 22, 2023

| | | |
|---|---|---|
| CANADA | ) | In the Matter of the |
| | ) | Environmental Protection |
| PROVINCE OF ONTARIO | ) | Act and the Planning Act |
| | ) | |
| | ) | And in the Matter of 177-179 Albert |
| | ) | Street in the City of Waterloo |
| | ) | in the Regional Municipality |
| | ) | of Waterloo |

I, _Zhengyu Cui_, of the City of ___Waterloo__, in the

County of ___Regional Municipality of Waterloo_, SOLEMNLY DECLARE THAT:

1. I am the owner of the property, or the owner's agent, and that I understand and agree with the noise attenuation measures proposed in the study:

   "Environmental Noise Assessment – 177-179 Albert Street, Waterloo – SLR Project No: 241.030998.00001"

   and dated November 22, 2023

2. The application has been designed to avoid the use of berms or walls as noise attenuation features where feasible. Where berms or walls are recommended, the Noise Study provides economic, planning and engineering justification.

3. If the application is changed in a way that may affect the noise level calculations, I will have a revised noise study submitted to the Region.

AND I make this solemn Declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath.

| | | |
|---|---|---|
| DECLARED before me at the City | ) | |
| | ) | |
| of ___Waterloo__, in the | ) | |
| | ) | |
| County of ____Reginal Municipality of Waterloo__, | ) | _____ |
| | ) | |
| this _22nd_ day of _November_, 2023. | ) | |

| | | |
|---|---|---|
| CANADA | ) | In the Matter of the |
| | ) | Environmental Protection |
| PROVINCE OF ONTARIO | ) | Act and the Planning Act |
| | ) | |
| | ) | And in the Matter of 177-179 Albert |
| | ) | Street in the City of Waterloo |
| | ) | in the Regional Municipality |
| | ) | of Waterloo |

I, Keni Mallinen, P.Eng., of the City of Guelph, in Wellington County, SOLEMNLY DECLARE THAT:

1. I am a Professional Engineer employed by SLR Consulting (Canada) Ltd., which holds a Certificate of Authorization from the Association of Professional Engineers of Ontario and have personal knowledge of the matters set out below.
2. I was retained or employed as the principal consultant to undertake the assessment of noise impacts and recommendation of noise mitigation measures for the property described as 177-179 Albert Street in Waterloo, Ontario.
3. I have the expertise required to perform these services. Any assessment activities or recommendations requiring the application of engineering principles have been undertaken or supervised by an engineer qualified to perform such services.
4. The information used in the study entitled:

   "Environmental Noise Assessment – 177-179 Albert Street, Waterloo – SLR Project No: 241.030998.00001"

   and dated November 22, 2023 is based on the best information available as of the date of the study.
5. The noise level calculations, the interpretation of noise attenuation requirements, and the recommended measures are in accordance with Ministry of Environment guidelines, Region Municipality of Waterloo policies, and any applicable policy or guidelines of the Area Municipality, and any other applicable policy or guideline.
6. The physical noise attenuation measures proposed in this study are feasible to implement and will provide the level of attenuation indicated in the study.
7. I acknowledge that this study may be subject to a peer review conducted at my cost.
8. I acknowledge that public authorities and future owners, occupants and others may rely on this statement.

AND I make this solemn Declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath.

| | | |
|---|---|---|
| DECLARED before me at the City | ) | Keni Mallinen |
| of Guelph, in the County of | ) | |
| Wellington, | ) | _____ |
| this 22 day of Nov, 2023. | ) | |

WANDA-LEE HARRIS NOTARY PUBLIC ONTARIO

Wanda-Lee Harris, Notary Public,
County of Wellington, limited to the attestation of instruments and the taking of affidavits, for SLR Consulting (Canada) Ltd. and Novus Environmental.
Expires January 14, 2028

Wanda-Lee Harris

# Appendix B Development Drawings

## Environmental Noise Assessment

177-179 Albert Street, Waterloo

**14688210 Canada Inc.**

SLR Project No.: 241.030998.00001

November 22, 2023

## DRAWING LIST

ARCHITECTURE


| | |
|---|---|
| A101 | ARCHITECTURAL SITE PLAN |
| A200 | LEVEL B3 UNDERGROUND PARKING |
| A201 | LEVEL B2 UNDERGROUND PARKING |
| A202 | LEVEL B1 @ SEAGRAM DRIVE |
| A203 | GROUND FLOOR PLAN @ ALBERT STREET |
| A204 | LEVEL 02 FLOOR PLAN (TYPICAL LEVEL 02-05) |
| A205 | LEVEL 06 FLOOR PLAN |
| A206 | LEVEL 07 FLOOR PLAN (TYPICAL LEVEL 07-24) |
| A301 | BUILDING ELEVATIONS |
| A302 | BUILDING ELEVATIONS |
| A303 | PERSPECTIVES |
| A304 | PERSPECTIVES |
| A401 | BUILDING SECTION - ALBERT STREET |
| A402 | BUILDING SECTION - SEAGRAM DRIVE |


# 14688210 CANADA INC.

## 177-179 ALBERT STREET DEVELOPMENT

### 177-179 Albert Street, Waterloo, ON N2L 3T4

**WalterFedy Project No.: 2022-0400-10**

**2023/10/12**

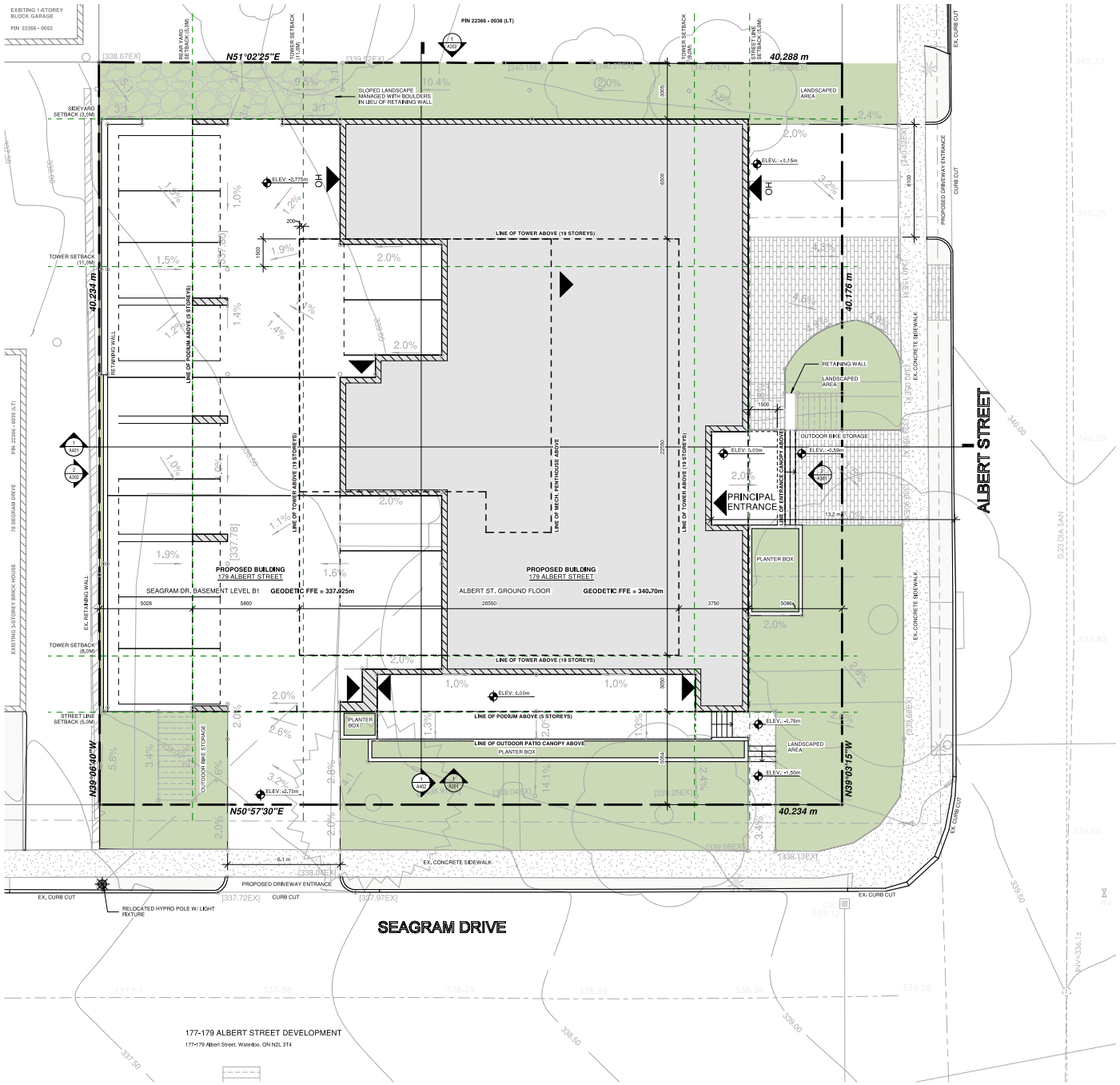

675 Queen Street South, Suite 111

Kitchener, Ontario, Canada N2M 1A1

T 519.576.2150 F 519.576.0499 walterfedy.com


WALTERFEDY

# ARCHITECTURAL SITE PLAN




## 177-179 ALBERT STREET | SITE PLAN DATA CHART

| Planning Information | | | |
|---|---|---|---|
| Assigned Address | 177-179 ALBERT STREET, WATERLOO, ON | | |
| Zoning | RMU-81, UC-81, AND SITE SPECIFIC BY-LAW C-178 | | |
| **Site Breakdown** | | **Metric** | **Imperial** |
| Building Coverage | 59.8% | 966.21 sqm | 10,400.2 sqft |
| Pavement | 4.3% | 70.00 sqm | 753.5 sqft |
| Landscape Open Space (min. 30%) | 24.4% | 393.86 sqm | 4,239.5 sqft |
| Total Site Area | | 1,617.02 sqm | 17,405.4 sqft |
| Lot Frontage (Min. 20m) | | 32.10 m | 105.3 ft |
| **Setbacks** | **Regulation (m)** | **Provided (Albert)** | **Provided (Seagram)** |
| Street Line (Minimum) | 5 | 5.08 m | 5.05 m |
| Street Line (Maximum) | 75% within 6 | 100% @ 5.08 m | 100% @ 5.05 m |
| Tower Setback (Minimum from Podium) | 3 | 3.75 m | 3.05 m |
| | | **Provided (North)** | **Provided (West)** |
| Side Yard (Minimum) | 3 | 3 m | |
| Rear Yard (Minimum) | 5 | | 5 m |
| Tower Setback (Min. from Interior Lot Line) | 11 | 9.50 m | 10.80 m |
| **Landscape Open Space** | **Regulation** | **Required Area** | **Provided Area** |
| | 30% | 485 sqm | 394 sqm |

| Density | | | |
|---|---|---|---|
| Allowable Density (Based on RMU-81) | Minimum | 150 Bedroom/ha | |
| | Maximum | 750 Bedroom/ha | |
| Site Area (ha) | | | 0.162 |
| Maximum Allowable Bedroom Count | | | 121 bedrooms |
| **Total Maximum Allowable Bedrooms** | | **750 bdrm/hec** | **121 bedrooms** |
| **Total Proposed Bedrooms** | | **1064 bdrm/hec** | **172 bedrooms** |

| Building Height | | Required | Provided |
|---|---|---|---|
| Building Height (Minimum) | | 13.50 m | 75.24 m |
| Building Height (Maximum) | | 81.00 m | |
| Height of First Storey (Minimum) | | 4.00 m | 5.00 m |
| **Podium** | | | |
| Podium Height (Minimum) | | 10.50 m | 18.00 m (5 storeys) |
| Podium Height (Maximum) | 6 Storeys | 21.00 m | |

| | | Units | | | | |
|---|---|---|---|---|---|---|
| Floor-by-Floor | Floor Area (sm) | 1bdrm | 2brm | Bedrooms | Indoor Amenity (sm) | Outdoor Amenity (sm) |
| Level B2 PARKING | 1,131 | 0 | 0 | 0 | 0.0 | 0.0 |
| Level B1 | 189 | 0 | 0 | 0 | 0.0 | 0.0 |
| Level 01 | 921 | 0 | 0 | 0 | 188.3 | 0.0 |
| Level 02 | 966 | 11 | 2 | 15 | 21.3 | 0.0 |
| Level 03 | 966 | 11 | 2 | 15 | 21.3 | 0.0 |
| Level 04 | 966 | 11 | 2 | 15 | 21.3 | 0.0 |
| Level 05 | 966 | 11 | 2 | 15 | 21.3 | 0.0 |
| Level 06 | 463 | 4 | 0 | 4 | 95.0 | 156.0 |
| Level 07 | 463 | 4 | 1 | 6 | 0.0 | 0.0 |
| Level 08 | 463 | 4 | 1 | 6 | 0.0 | 0.0 |
| Level 09 | 463 | 4 | 1 | 6 | 0.0 | 0.0 |
| Level 10 | 463 | 4 | 1 | 6 | 0.0 | 0.0 |
| Level 11 | 463 | 4 | 1 | 6 | 0.0 | 0.0 |
| Level 12 | 463 | 4 | 1 | 6 | 0.0 | 0.0 |
| Level 13 | 463 | 4 | 1 | 6 | 0.0 | 0.0 |
| Level 14 | 463 | 4 | 1 | 6 | 0.0 | 0.0 |
| Level 15 | 463 | 4 | 1 | 6 | 0.0 | 0.0 |
| Level 16 | 463 | 4 | 1 | 6 | 0.0 | 0.0 |
| Level 17 | 463 | 4 | 1 | 6 | 0.0 | 0.0 |
| Level 18 | 463 | 4 | 1 | 6 | 0.0 | 0.0 |
| Level 19 | 463 | 4 | 1 | 6 | 0.0 | 0.0 |
| Level 20 | 463 | 4 | 1 | 6 | 0.0 | 0.0 |
| Level 21 | 463 | 4 | 1 | 6 | 0.0 | 0.0 |
| Level 22 | 463 | 4 | 1 | 6 | 0.0 | 0.0 |
| Level 23 | 463 | 4 | 1 | 6 | 0.0 | 0.0 |
| Level 24 | 463 | 4 | 1 | 6 | 0.0 | 0.0 |
| **Subtotal** | | **120** | **26** | | **368.5** | **156.0** |
| **Total** | **14,902** | **146** | | **172** | **524.5** | |
| **GFA excl. basements** | **13,771** | | | | | |

| Amenity Space | | Required | Provided |
|---|---|---|---|
| Amenity Space | 3sqm for the first bedroom + 2sqm for each additional bedroom in a unit | 490.0 sqm | 524.5 sqm |

| Parking (Based on Northdale Rate) | Number of Beds | Parking Required | Parking Provided |
|---|---|---|---|
| Residential (Rate = 0.2/Bed) | 172 | 35 | 35 |
| Visitor Parking (Rate=0.05/Bed) | 172 | 9 | 9 |
| **Total Parking** | | **44** | **44** |
| Surface Parking | | | 18 |
| Parking in Structure - Below Grade | | | 26 |
| Accessible Parking | Type A | 1 | 1 |
| | Type B | 1 | 1 |

| Parking (Based on RMU-81) | Number of Units | Parking Required | Parking Provided |
|---|---|---|---|
| Residential (Rate = 0.6/Unit) | 146 | 88 | 35 |
| Visitor Parking (Rate=0.1/Unit) | 146 | 15 | 9 |
| **Total Parking** | | **103** | **44** |
| Surface Parking | | | 18 |
| Parking in Structure - Below Grade/At Grade/Above Grade | | | 26 |
| Accessible Parking | Type A | 4 | 1 |
| | Type B | 4 | 1 |

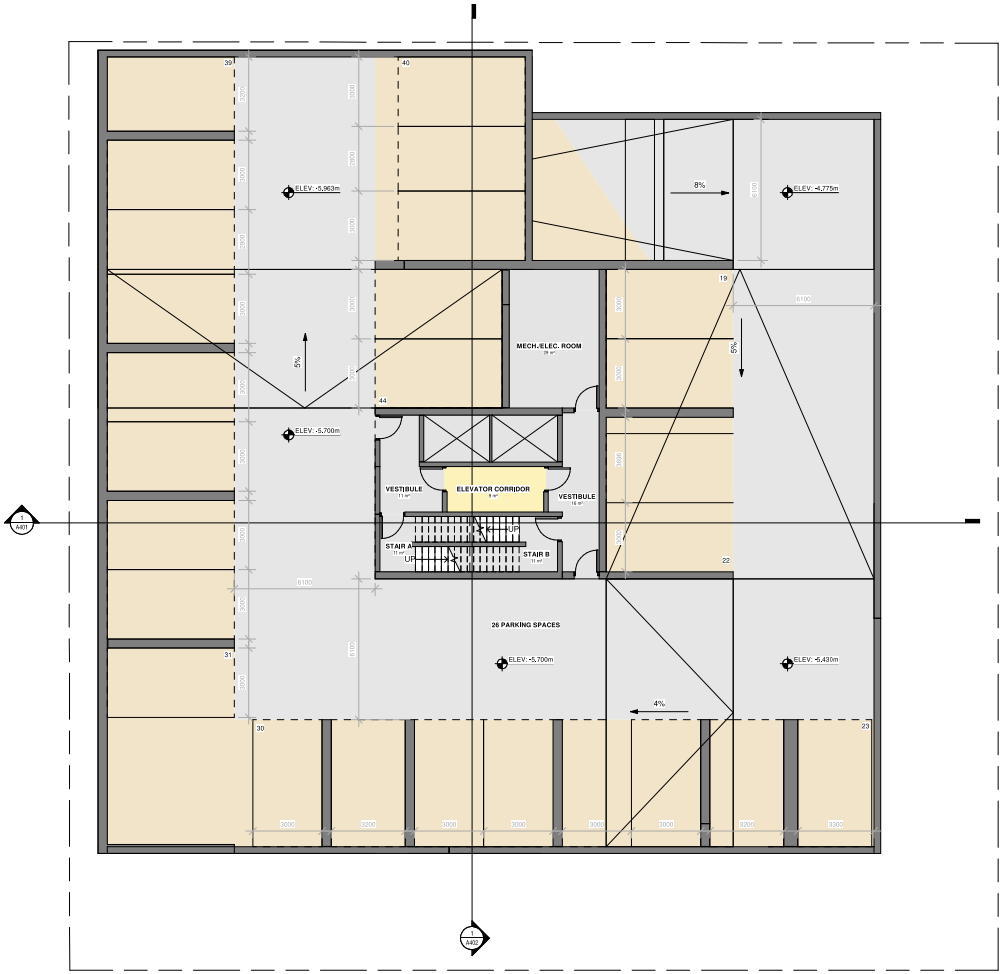
| Bike Parking (Based on RMU-81) | Number of Units | Required | Provided |
|---|---|---|---|
| Type 'A' (secure indoors) (Rate=0.3/Unit) | 146 | 44 | 75 |
| Type 'B' (all other) (Rate=0.3/Unit) | 146 | 44 | 12 |
| **Bike Parking (Based on Northdale Rate)** | **Number of Beds** | **Required** | **Provided** |
| Total Bike Parking (Rate=0.25/Bed) | 172 | 43 | 87 |

177-179 ALBERT STREET DEVELOPMENT
177-179 Albert Street, Waterloo, ON N2L 3T4

**A101**
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2022-0400-10

WALTERFEDY

# LEVEL B2 UNDERGROUND PARKING




PROGRAM LEGEND

- 1 BEDROOM
- 2 BEDROOM
- AMENITY
- OFFICE
- CORRIDOR
- BUILDING SERVICES
- PARKING
- COMMERCIAL

**TOTAL AREA BASEMENT LEVEL B2**

| Name | Area m2 | Area SF |
|---|---|---|
| ELEVATOR A | 7 m² | 79 SF |
| ELEVATOR B | 7 m² | 76 SF |
| ELEVATOR CORRIDOR | 9 m² | 102 SF |
| MECH./ELEC. ROOM | 29 m² | 315 SF |
| PARKING GARAGE | 1035 m² | 11,140 SF |
| STAIR A | 11 m² | 124 SF |
| STAIR B | 11 m² | 118 SF |
| VESTIBULE | 27 m² | 293 SF |
| TOTAL | 1138 m² | 12,247 SF |

177-179 ALBERT STREET DEVELOPMENT

177-179 Albert Street, Waterloo, ON N2L 3T4

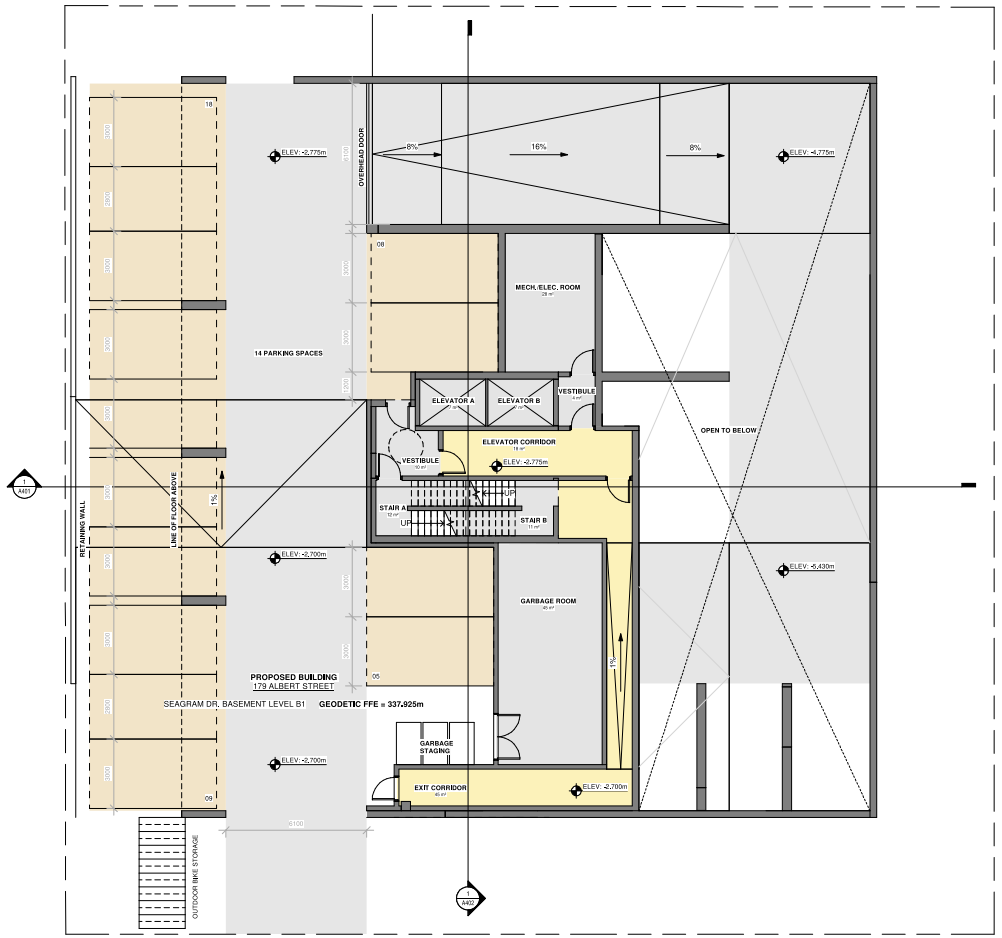
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2022-0400-10

WALTERFEDY

# LEVEL B1 @ SEAGRAM DRIVE




PROGRAM LEGEND

- 1 BEDROOM
- 2 BEDROOM
- AMENITY
- OFFICE
- CORRIDOR
- BUILDING SERVICES
- PARKING
- COMMERCIAL

**TOTAL AREA BASEMENT LEVEL B1 @ SEAGRAM DRIVE**

| Name | Area m2 | Area SF |
|---|---|---|
| ELEVATOR A | 7 m² | 74 SF |
| ELEVATOR B | 7 m² | 74 SF |
| ELEVATOR CORRIDOR | 18 m² | 197 SF |
| EXIT CORRIDOR | 45 m² | 484 SF |
| GARBAGE ROOM | 45 m² | 487 SF |
| MECH./ELEC. ROOM | 28 m² | 296 SF |
| STAIR A | 12 m² | 127 SF |
| STAIR B | 11 m² | 117 SF |
| SURFACE PARKING | 0 m² | 0 SF |
| VESTIBULE | 14 m² | 149 SF |
| TOTAL | 186 m² | 2,006 SF |

177-179 ALBERT STREET DEVELOPMENT

177-179 Albert Street, Waterloo, ON N2L 3T4

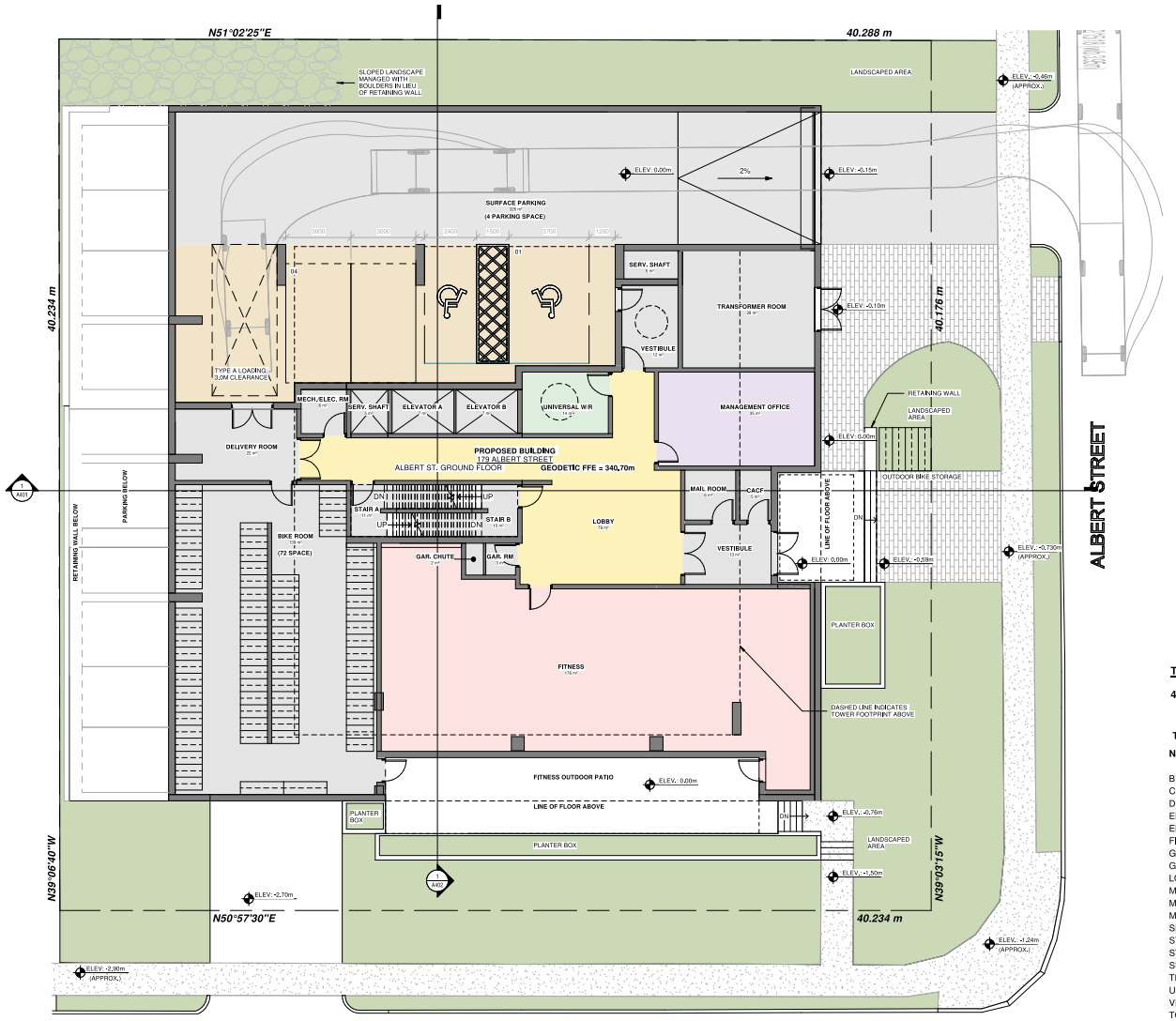
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2022-0400-10

WALTERFEDY

# GROUND FLOOR PLAN @ ALBERT STREET




PROGRAM LEGEND

- 1 BEDROOM
- 2 BEDROOM
- AMENITY
- OFFICE
- CORRIDOR
- BUILDING SERVICES
- PARKING
- COMMERCIAL

**TOTAL PARKING COUNT:**

**44** PARKING SPACES

**TOTAL AREA GROUND FLOOR @ ALBERT STREET**

| Name | Area m2 | Area SF |
|---|---|---|
| BIKE ROOM | 139 m² | 1,498 SF |
| CACF | 5 m² | 50 SF |
| DELIVERY ROOM | 22 m² | 239 SF |
| ELEVATOR A | 7 m² | 79 SF |
| ELEVATOR B | 7 m² | 78 SF |
| FITNESS | 176 m² | 1,899 SF |
| GAR. CHUTE | 2 m² | 18 SF |
| GAR. RM | 3 m² | 28 SF |
| LOBBY | 79 m² | 853 SF |
| MAIL ROOM | 6 m² | 68 SF |
| MANAGEMENT OFFICE | 35 m² | 375 SF |
| MECH./ELEC. RM | 6 m² | 63 SF |
| SERV. SHAFT | 10 m² | 106 SF |
| STAIR A | 11 m² | 114 SF |
| STAIR B | 10 m² | 111 SF |
| SURFACE PARKING | 326 m² | 3,509 SF |
| TRANSFORMER ROOM | 38 m² | 406 SF |
| UNIVERSAL W/R | 14 m² | 148 SF |
| VESTIBULE | 25 m² | 271 SF |
| TOTAL | 921 m² | 9,913 SF |

177-179 ALBERT STREET DEVELOPMENT

177-179 Albert Street, Waterloo, ON N2L 3T4

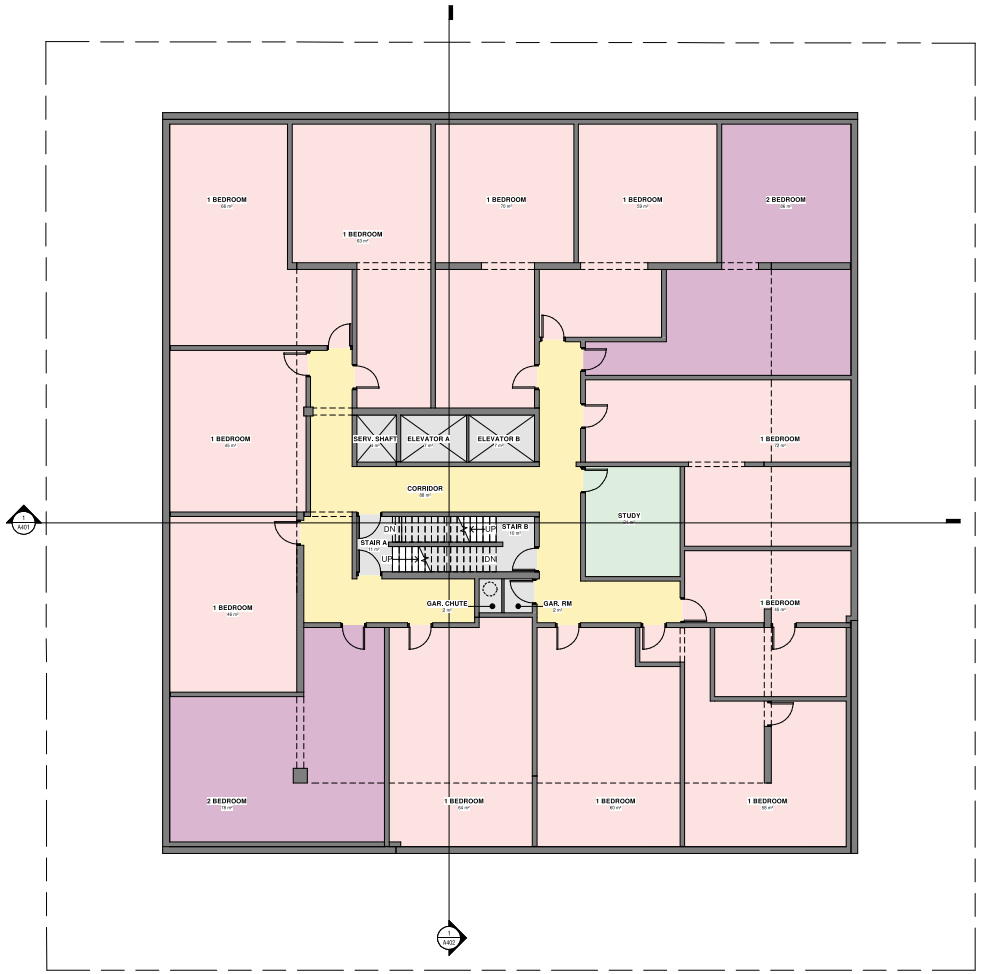
**A203**

1 : 100

2022-0400-10

WALTERFEDY

# LEVEL 02 FLOOR PLAN (TYPICAL LEVEL 02-05)




PROGRAM LEGEND

- 1 BEDROOM
- 2 BEDROOM
- AMENITY
- OFFICE
- CORRIDOR
- BUILDING SERVICES
- PARKING
- COMMERCIAL

**TOTAL AREA LEVEL 02**

| Name | Area m2 | Area SF |
|---|---|---|
| 1 BEDROOM | 649 m² | 6,990 SF |
| 2 BEDROOM | 164 m² | 1,770 SF |
| CORRIDOR | 88 m² | 944 SF |
| ELEVATOR A | 7 m² | 74 SF |
| ELEVATOR B | 7 m² | 74 SF |
| GAR. CHUTE | 2 m² | 21 SF |
| GAR. RM | 2 m² | 25 SF |
| SERV. SHAFT | 4 m² | 47 SF |
| STAIR A | 11 m² | 114 SF |
| STAIR B | 10 m² | 111 SF |
| STUDY | 21 m² | 230 SF |
| TOTAL | 966 m² | 10,400 SF |

177-179 ALBERT STREET DEVELOPMENT

177-179 Albert Street, Waterloo, ON N2L 3T4

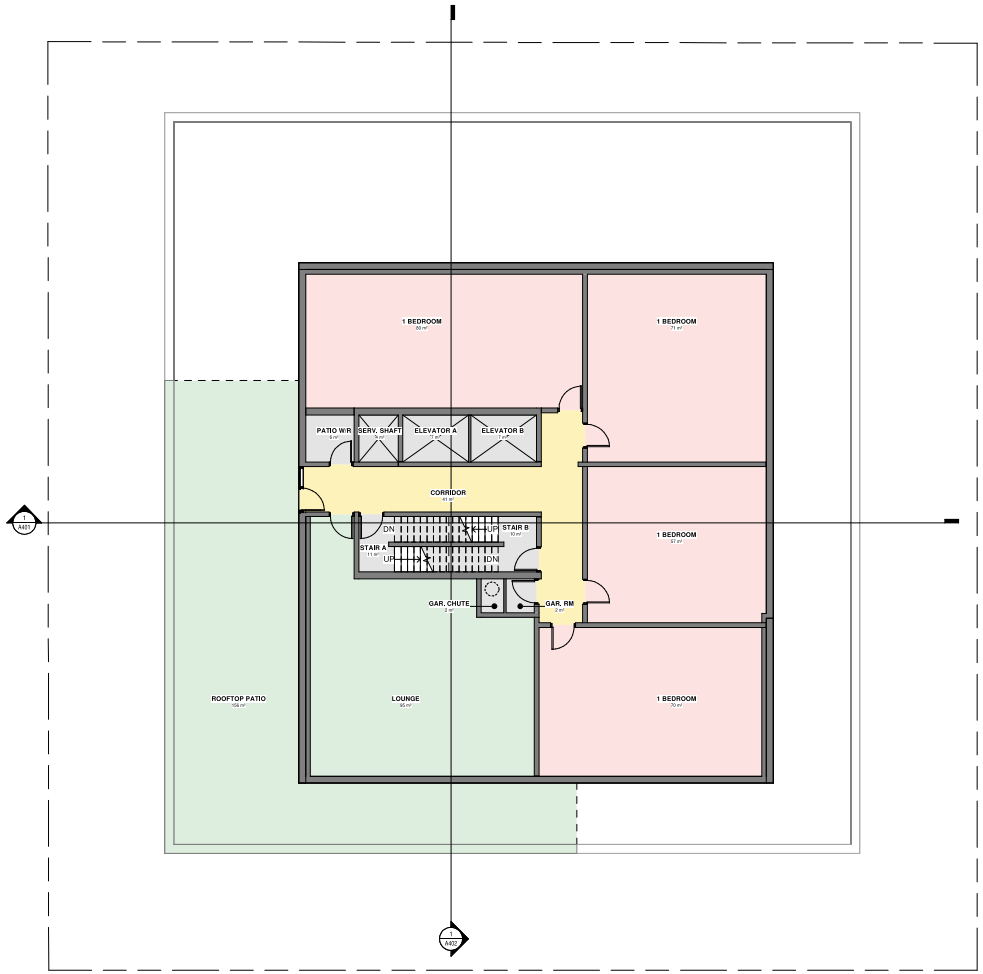
**A204**

1 : 100

2022-0400-10

WALTERFEDY

# LEVEL 06 FLOOR PLAN




PROGRAM LEGEND

- 1 BEDROOM
- 2 BEDROOM
- AMENITY
- CORE
- CORRIDOR
- BUILDING SERVICES
- PARKING
- COMMERCIAL

**TOTAL AREA LEVEL 06**

| Name | Area m2 | Area SF |
|---|---|---|
| 1 BEDROOM | 278 m² | 2,993 SF |
| CORRIDOR | 41 m² | 445 SF |
| ELEVATOR A | 7 m² | 74 SF |
| ELEVATOR B | 7 m² | 74 SF |
| GAR. CHUTE | 2 m² | 21 SF |
| GAR. RM | 2 m² | 25 SF |
| LOUNGE | 95 m² | 1,023 SF |
| PATIO W/R | 6 m² | 62 SF |
| ROOFTOP PATIO | 156 m² | 1,675 SF |
| SERV. SHAFT | 4 m² | 47 SF |
| STAIR A | 11 m² | 114 SF |
| STAIR B | 10 m² | 111 SF |
| TOTAL | 619 m² | 6,663 SF |

177-179 ALBERT STREET DEVELOPMENT

177-179 Albert Street, Waterloo, ON N2L 3T4

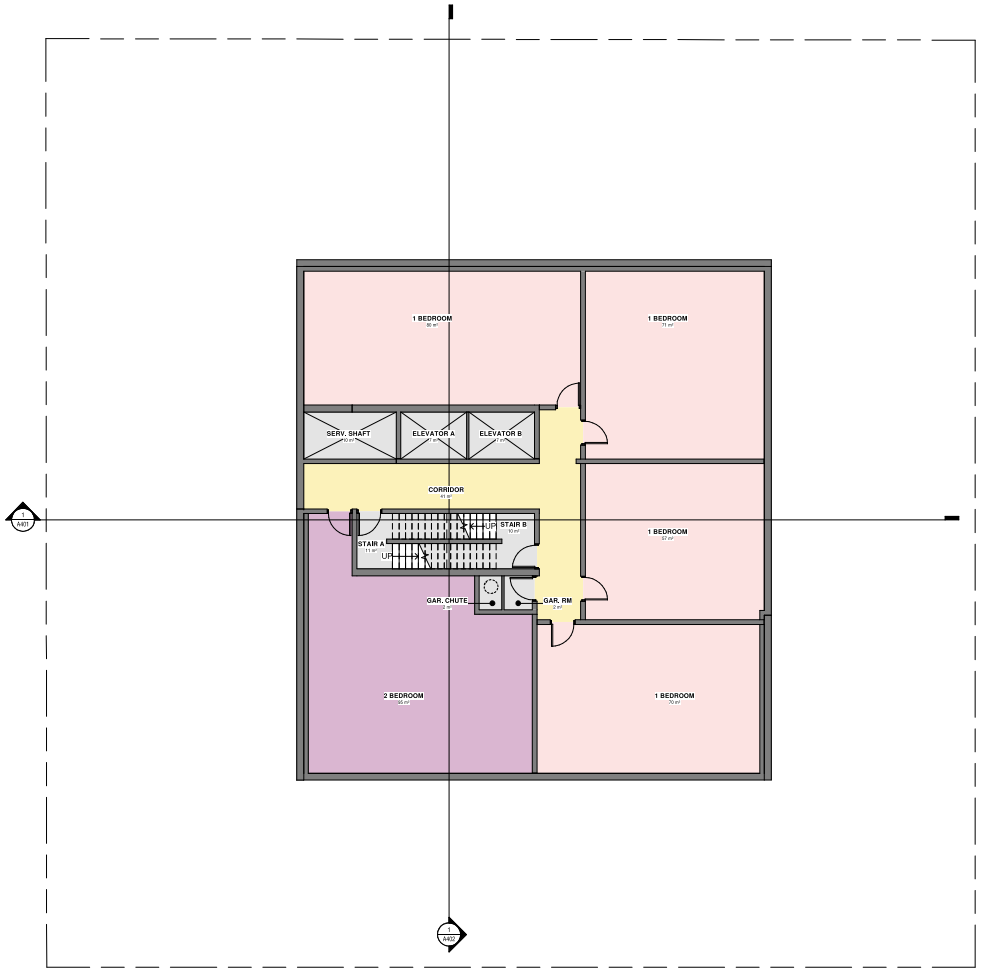
**A205**

1 : 100

2022-0400-10

WALTERFEDY

# LEVEL 07 FLOOR PLAN (TYPICAL LEVEL 07-24)




PROGRAM LEGEND

- 1 BEDROOM
- 2 BEDROOM
- AMENITY
- OFFICE
- CORRIDOR
- BUILDING SERVICES
- PARKING
- COMMERCIAL

**TOTAL AREA LEVEL 07**

| Name | Area m2 | Area SF |
|---|---|---|
| 1 BEDROOM | 278 m² | 2,993 SF |
| 2 BEDROOM | 95 m² | 1,023 SF |
| CORRIDOR | 41 m² | 445 SF |
| ELEVATOR A | 7 m² | 74 SF |
| ELEVATOR B | 7 m² | 74 SF |
| GAR. CHUTE | 2 m² | 21 SF |
| GAR. RM | 2 m² | 25 SF |
| SERV. SHAFT | 10 m² | 109 SF |
| STAIR A | 11 m² | 114 SF |
| STAIR B | 10 m² | 111 SF |
| TOTAL | 463 m² | 4,988 SF |

177-179 ALBERT STREET DEVELOPMENT

177-179 Albert Street, Waterloo, ON N2L 3T4

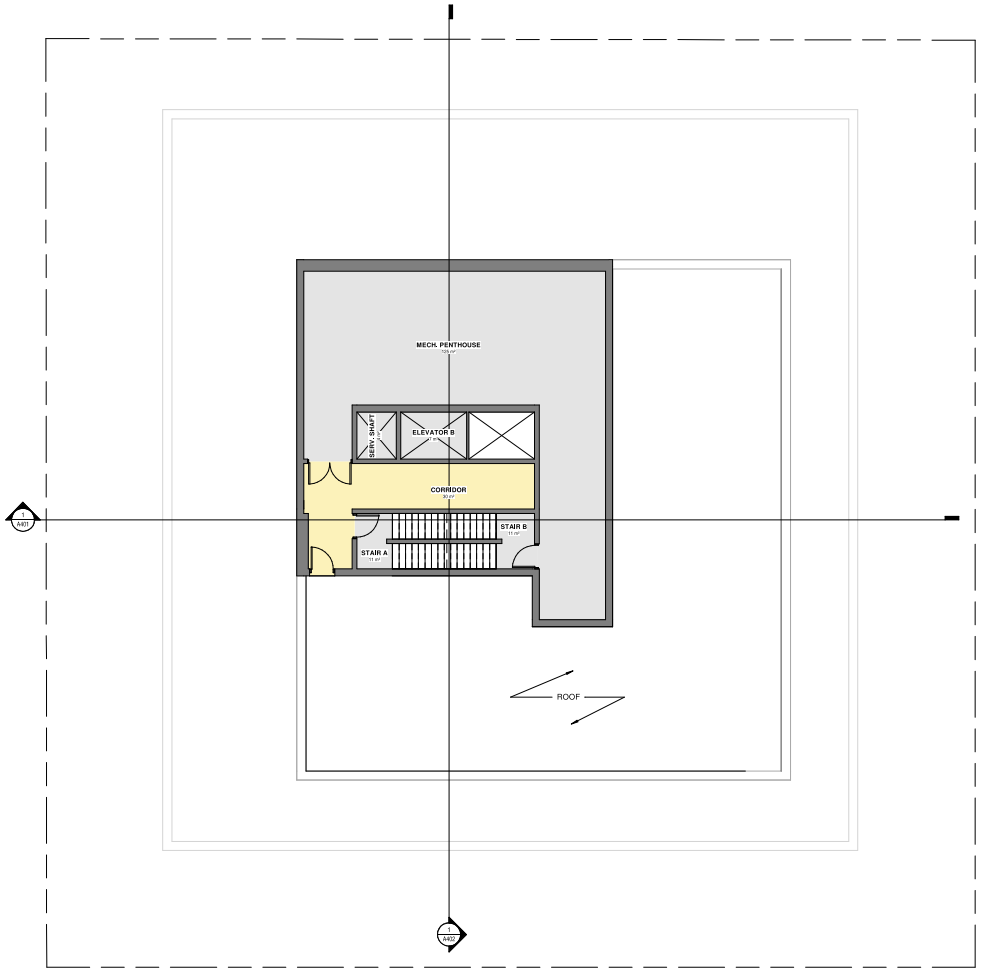
**A206**

1 : 100

2022-0400-10

WALTERFEDY

# LEVEL 25 FLOOR PLAN (ROOF PLAN & MECH. PENTHOUSE)




PROGRAM LEGEND

- 1 BEDROOM
- 2 BEDROOM
- AMENITY
- OFFICE
- CORRIDOR
- BUILDING SERVICES
- PARKING
- COMMERCIAL

**TOTAL AREA LEVEL 26**

| Name | Area m2 | Area SF |
|---|---|---|
| CORRIDOR | 30 m² | 318 SF |
| ELEVATOR B | 7 m² | 74 SF |
| MECH. PENTHOUSE | 125 m² | 1,350 SF |
| SERV. SHAFT | 4 m² | 47 SF |
| STAIR A | 11 m² | 121 SF |
| STAIR B | 11 m² | 117 SF |
| TOTAL | 188 m² | 2,026 SF |

177-179 ALBERT STREET DEVELOPMENT

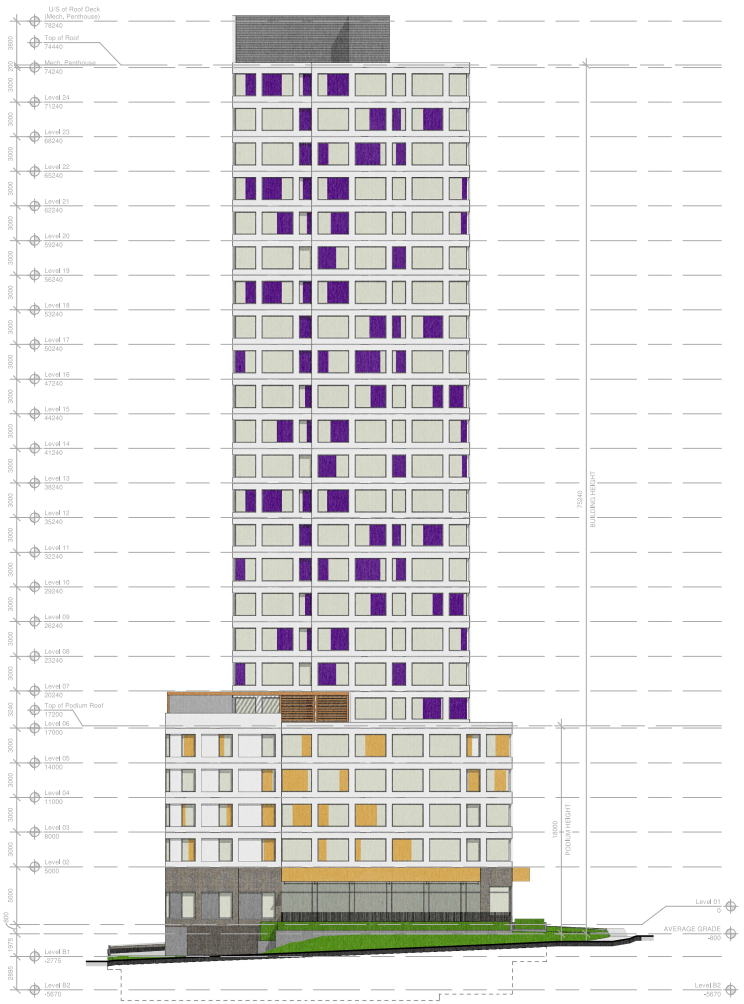
177-179 Albert Street, Waterloo, ON N2L 3T4

**A207**

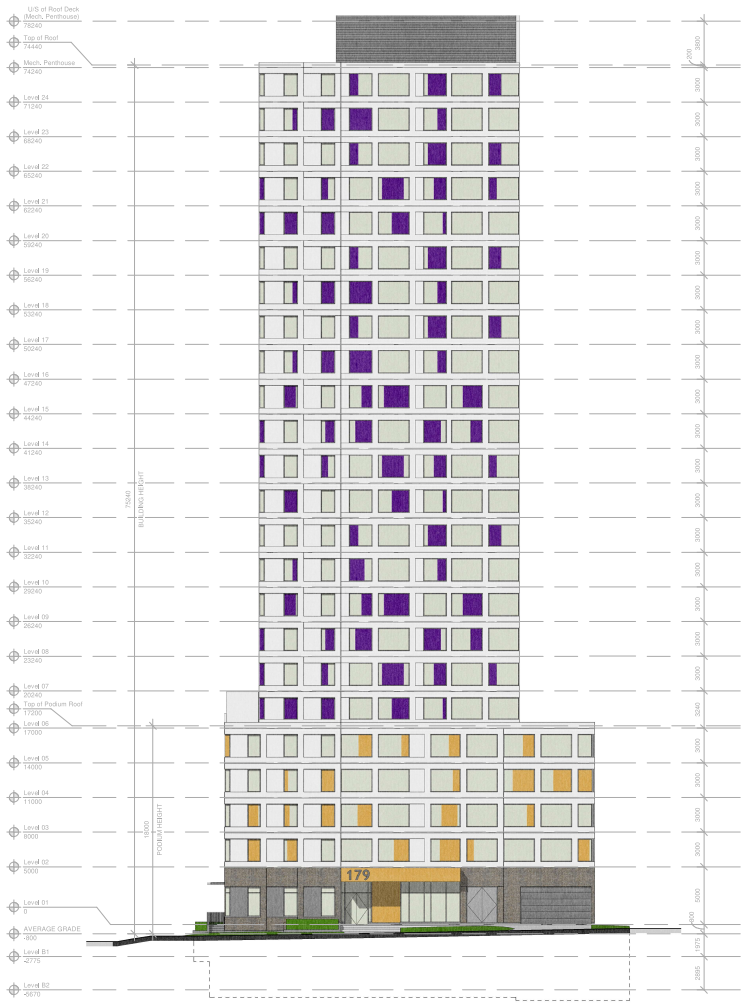
1 : 100

2022-0400-10

WALTERFEDY




1 **SOUTH ELEVATION (SEAGRAM DRIVE)**
SCALE: 1 : 200

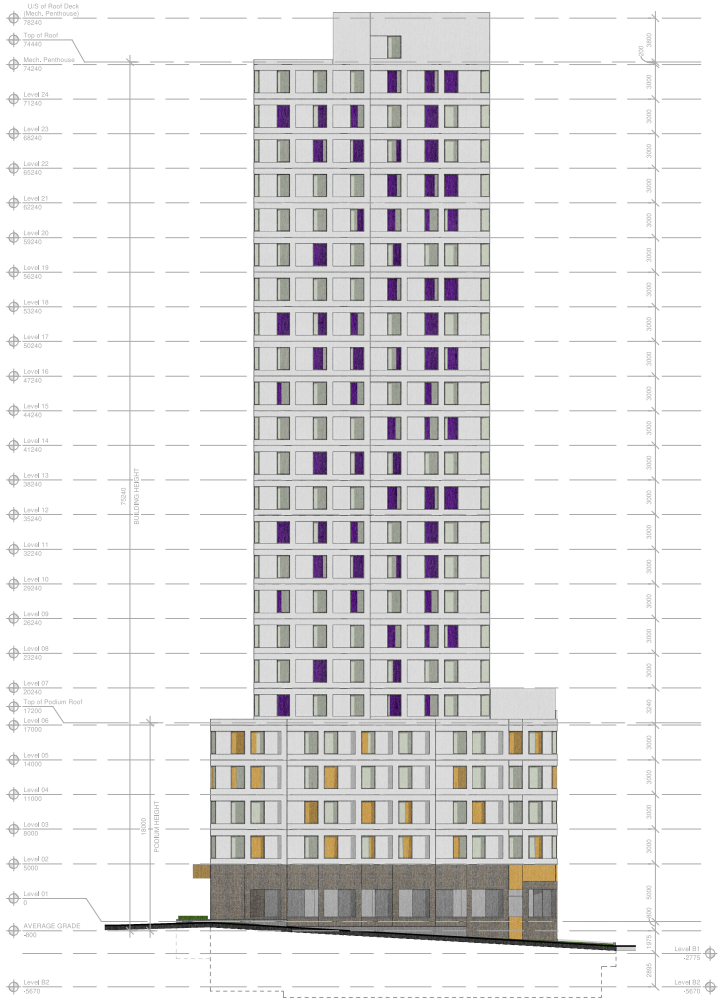



2 **EAST ELEVATION (ALBERT STREET)**
SCALE: 1 : 200

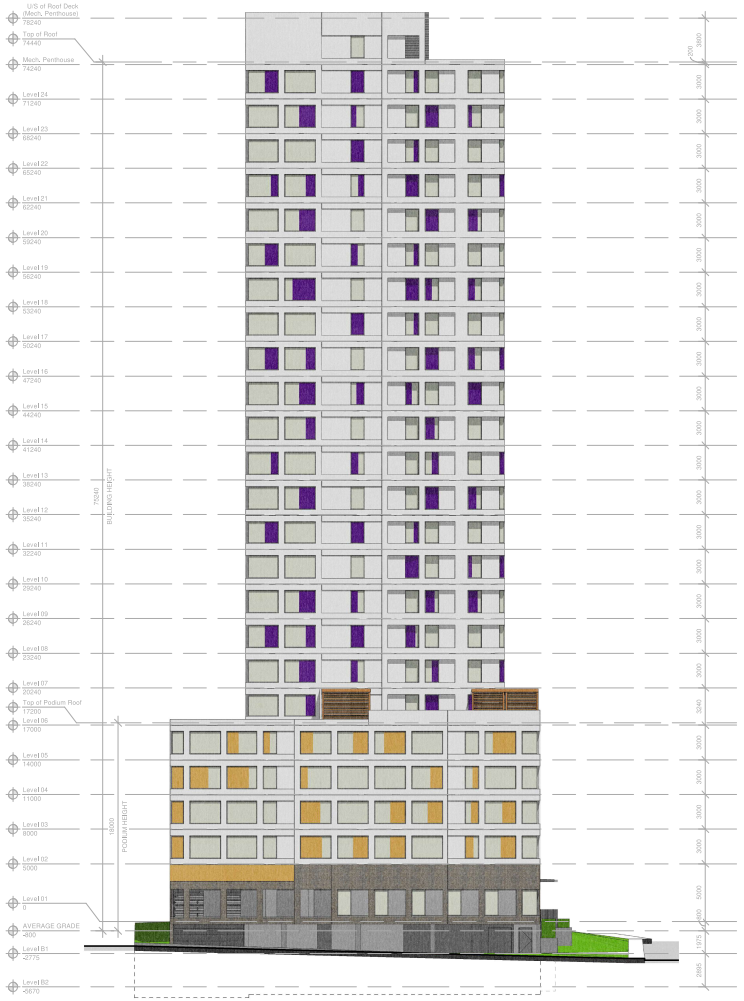
177-179 ALBERT STREET DEVELOPMENT
177-179 Albert Street, Waterloo, ON N2L 3T4

**A301**
1 : 200
2022-0400-10

WALTERFEDY




1 **NORTH ELEVATION**
SCALE: 1:200



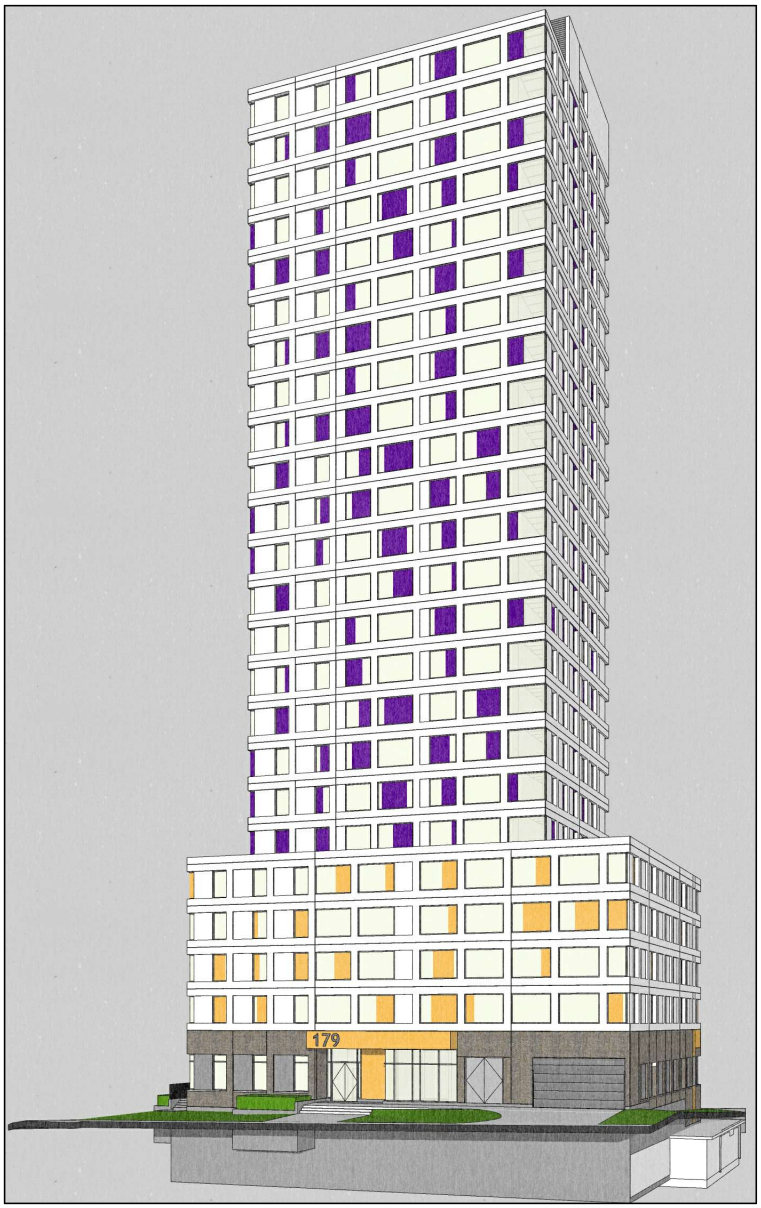

2 **WEST ELEVATION**
SCALE: 1:200

177-179 ALBERT STREET DEVELOPMENT
177-179 Albert Street, Waterloo, ON N2L 3T4

**A302**
1 : 200
2022-0400-10

WALTERFEDY



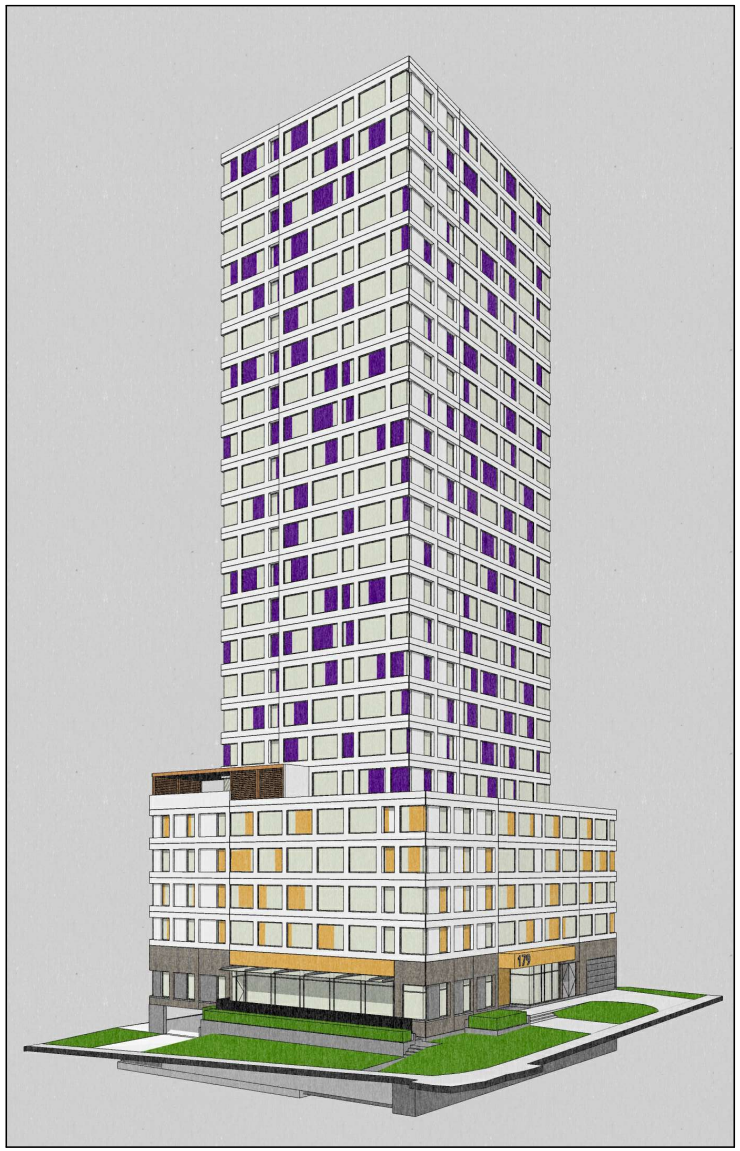

177-179 ALBERT STREET DEVELOPMENT

177-179 Albert Street, Waterloo, ON N2L 3T4

A303

2022-0406-10

WALTERFEDY









177-179 ALBERT STREET DEVELOPMENT

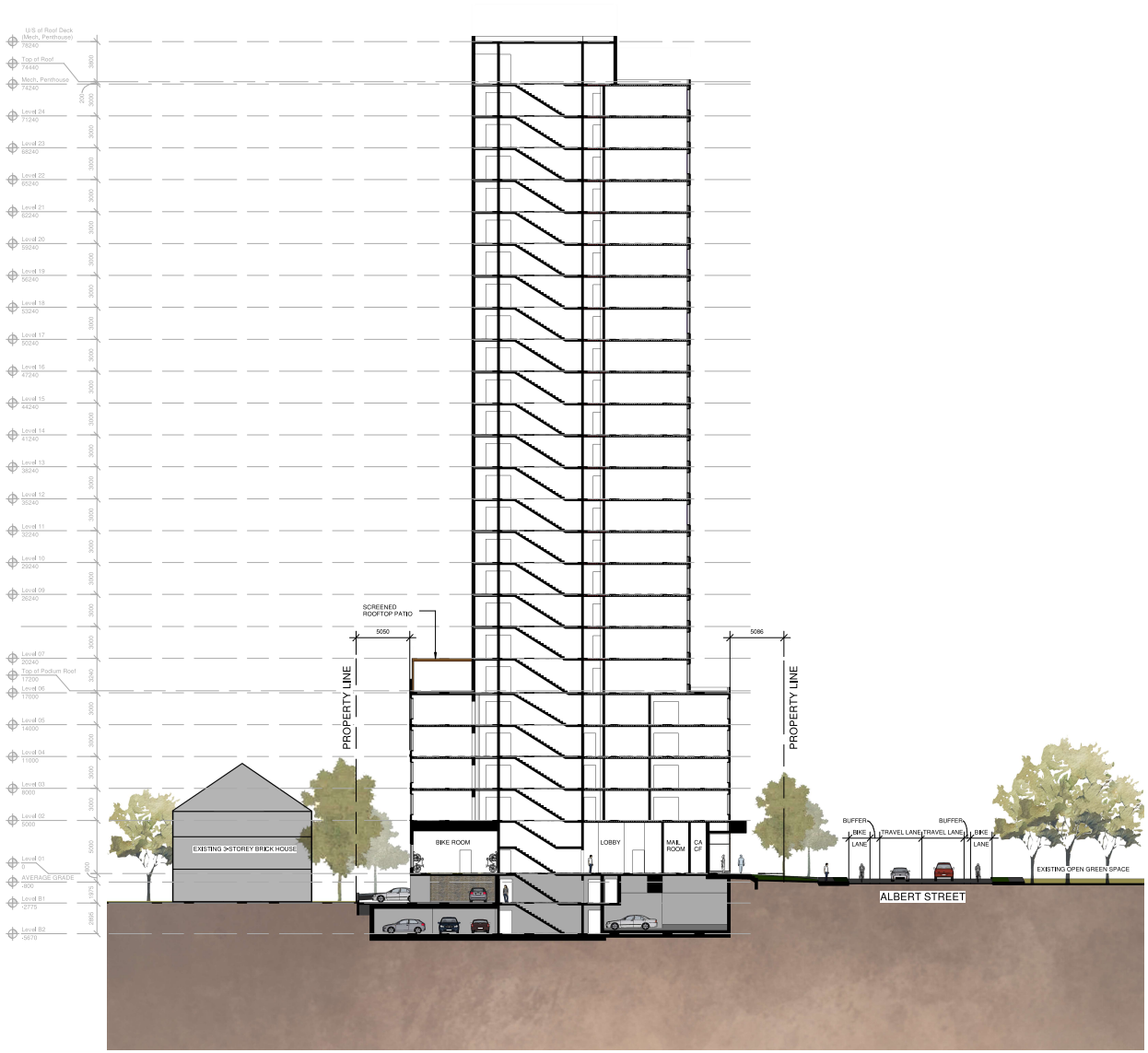
177-179 Albert Street, Waterloo, ON N2L 3T4

A304

2022-0400-10

WALTERFEDY

# BUILDING SECTION - ALBERT STREET




177-179 ALBERT STREET DEVELOPMENT

177-179 Albert Street, Waterloo, ON N2L 3T4

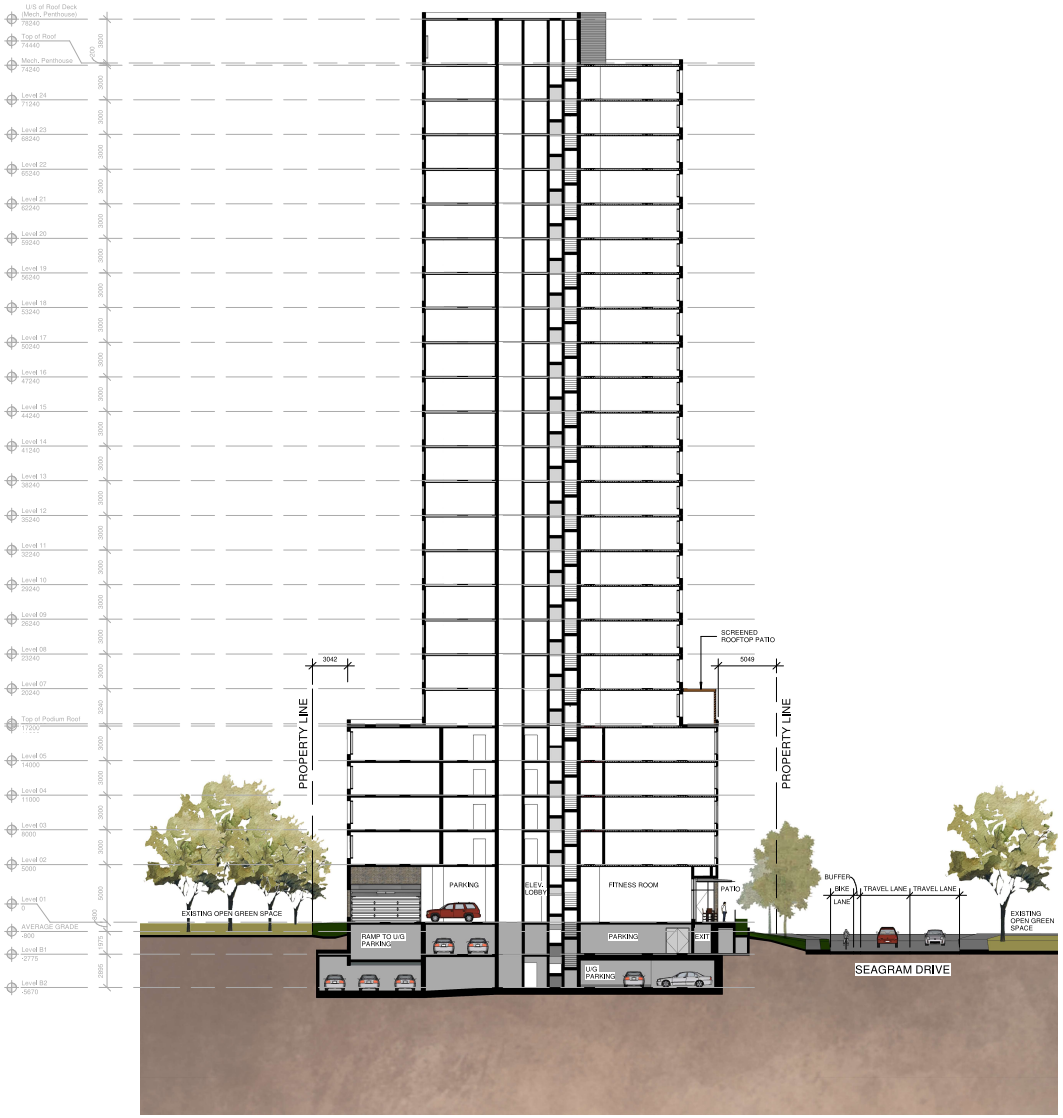
**A401**

1 : 200

2022-0400-10

WALTERFEDY

# BUILDING SECTION - SEAGRAM DRIVE




177-179 ALBERT STREET DEVELOPMENT

177-179 Albert Street, Waterloo, ON N2L 3T4

**A402**

1 : 200

2022-0400-10

WALTERFEDY

# Appendix C Traffic Data and Calculations

## Environmental Noise Assessment

177-179 Albert Street, Waterloo

**14688210 Canada Inc.**

SLR Project No.: 241.030998.00001

November 22, 2023

# Region of Waterloo AADT Forecast for Noise Studies

**1. Development/Location**

177-179 Albert St, Waterloo

**2. Current AADT (2023)**

| Albert St | Seagram Dr |
|---|---|
| 8,000 | 4,500 |

**3. Forecast AADT (2033)**

| Albert St | Seagram Dr |
|---|---|
| 8,400 | 4,700 |

**4. Commercial Vehicle Rates**

| | Albert St | Seagram Dr |
|---|---|---|
| % Medium Trucks | 1% | 0% |
| % Heavy Trucks | 1% | 1% |

**5. Posted Speed Limit**

| Albert St | Seagram Dr |
|---|---|
| 50 km/h | 50 km/h |

**6. Day/Night Splits**

Regional Standard 90/10 Day/Night Split

**7. Expiry**

Dec 31 2023

**8. Notes**

This forecast is intended for the purpose of carrying out a noise assessment for the above mentioned location only.
The above AADTs represents the traffic volumes on Albert St adjacent to the property and Seagram Dr to the south of the property.
As Albert St and Seagram Dr are under the jurisdiction of City of Waterloo, City of Waterloo should verify these forecasts.
This forecast remains valid up to the date indicated above. The Region of Waterloo should be contacted for an updated forecast if there are plans to use this forecast beyond the above validity period.

# O R N A M E N T - Sound Power Emissions & Source Heights

Ontario Road Noise Analysis Method for Environment and Transportation

| Road Segment ID | Roadway Name | Link Description | Speed (kph) | Period (h) | Total Traffic Volumes | Auto % | Med % | Hvy % | Auto | Med | Heavy | Road Gradient (%) | PWL (dBA) | Source Height, s (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AlbertSt_avg | Albert St | Daytime Impacts | 50 | 16 | 7560 | 98.0% | 1.0% | 1.0% | 7409 | 76 | 76 | 0 | **76.4** | **1.0** |
| | Albert St | Night-time Impacts | 50 | 8 | 840 | 98.0% | 1.0% | 1.0% | 823 | 8 | 8 | 0 | **69.8** | **1.0** |
| SeagramDr_avg | Seagram Dr | Daytime Impacts | 50 | 16 | 4230 | 99.0% | 0.0% | 1.0% | 4188 | 0 | 42 | 0 | **73.5** | **1.0** |
| | Seagram Dr | Night-time Impacts | 50 | 8 | 470 | 99.0% | 0.0% | 1.0% | 465 | 0 | 5 | 0 | **66.9** | **1.0** |

# Appendix D STAMSON Output File

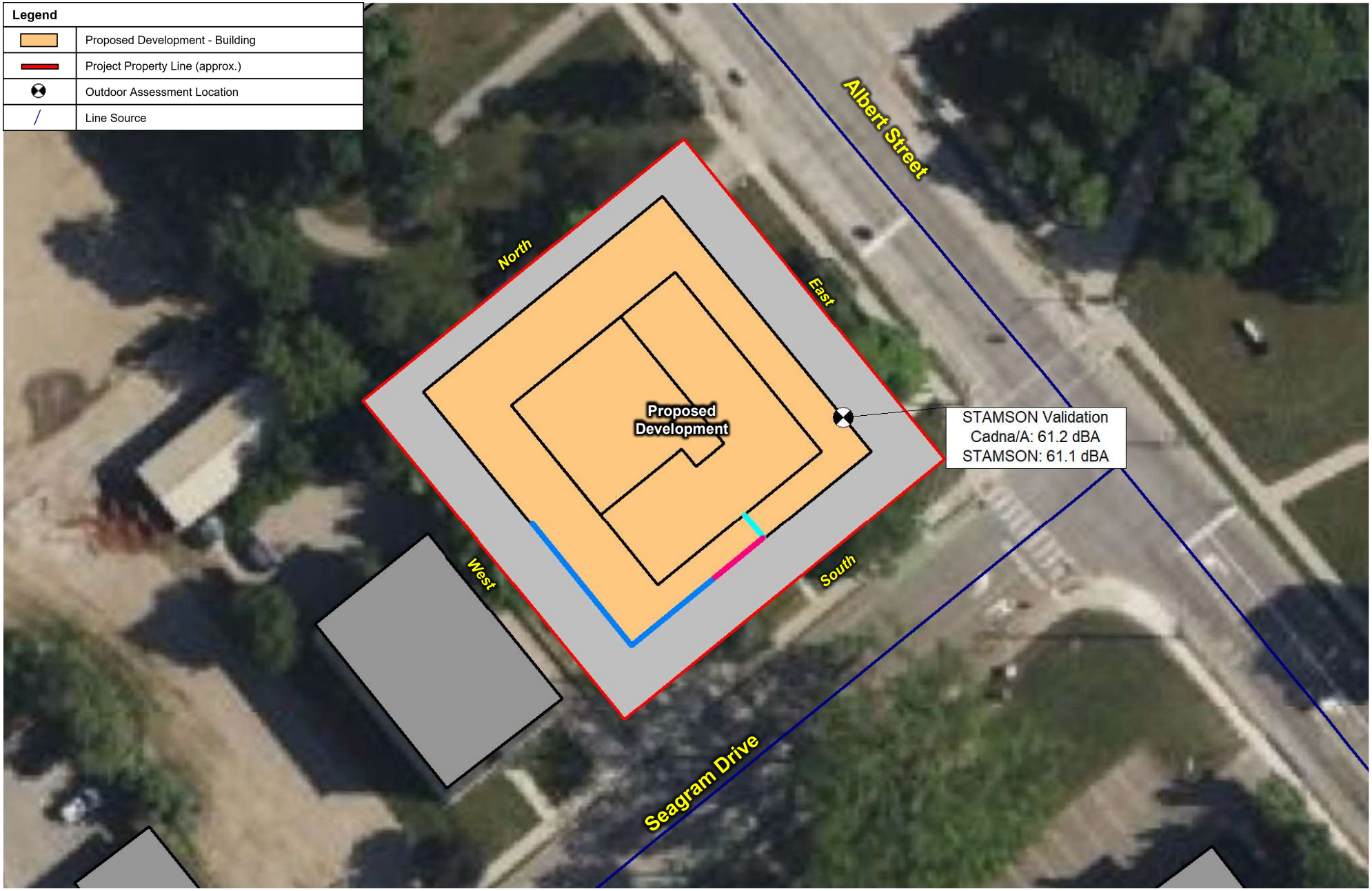
## Environmental Noise Assessment

177-179 Albert Street, Waterloo

**14688210 Canada Inc.**

SLR Project No.: 241.030998.00001

November 22, 2023




| | | | | |
|---|---|---|---|---|
| **14688210 CANADA INC.** | True North | Scale: 1:500 | METRES | SLR |
| 177-179 ALBERT STREET, WATERLOO | | Date: Nov. 22, 2023 Rev 1.0 | Figure No. **D1** | |
| STAMSON VALIDATION – COMPARISON OF CADNA/A AND STAMSON OUTPUT | | Project No. 241.030998.00001 | | |

STAMSON 5.0 NORMAL REPORT Date: 13-07-2023 09:18:35
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: st5_km.te Time Period: 16 hours
Description:

Road data, segment # 1: Seagram Dr
---
Car traffic volume : 4188 veh/TimePeriod
Medium truck volume : 0 veh/TimePeriod
Heavy truck volume : 42 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Seagram Dr
---
Angle1 Angle2 : -41.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 20.10 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Albert St
---
Car traffic volume : 7409 veh/TimePeriod
Medium truck volume : 76 veh/TimePeriod
Heavy truck volume : 76 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: Albert St
---
Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 17.40 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Seagram Dr
---

Source height = 1.00 m

ROAD (0.00 + 50.70 + 0.00) = 50.70 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| -41 | 0 | 0.00 | 58.40 | 0.00 | -1.27 | -6.42 | 0.00 | 0.00 | 0.00 | 50.70 |

Segment Leq : 50.70 dBA

Results segment # 2: Albert St
---

Source height = 1.00 m

ROAD (0.00 + 60.65 + 0.00) = 60.65 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| -90 | 90 | 0.00 | 61.29 | 0.00 | -0.64 | 0.00 | 0.00 | 0.00 | 0.00 | 60.65 |

Segment Leq : 60.65 dBA

Total Leq All Segments: 61.07 dBA

TOTAL Leq FROM ALL SOURCES: 61.07

# Appendix E Ventilation, Warning Clause and Mitigation Summary

## Environmental Noise Assessment

177-179 Albert Street, Waterloo

**14688210 Canada Inc.**

SLR Project No.: 241.030998.00001

November 22, 2023

# Appendix E Ventilation, Warning Clause and Mitigation Summary

The following warning clauses are required for inclusion in agreements registered on Title for the residential units, and included in all agreements of purchase and sale or lease, and all rental agreements.

A summary of the warning clause, ventilation and mitigation recommendations is included in **Table E.1**.

> **RMOW Warning Clause:** "Due to its proximity to Albert Street and Seagram Drive, project noise levels on this property exceed the Noise Level Objectives approved by the Regional Municipality of Waterloo and may cause concerns to some individuals. Moreover, this dwelling has been fitted with a forced air-ducted heating system suitably sized and designed to permit the future installation of a central air conditioning system by the occupants ."
>
> **MECP Type E:** "Purchasers/tenants are advised that due to the proximity of the adjacent institutional facility, noise from the facility may at times be audible."

**Table E.1: Summary of Ventilation, Warning Clause and Mitigation Requirements**

| Development Location/Building | Barrier Requirements | Ventilation Requirements | Warning Clause Requirements |
|---|---|---|---|
| Residential Building | 1.3 m high parapet barrier wall &<br>3.2 m high rooftop screen[1] | Provision for AC | RMOW Warning Clause, Type E |

**Notes:** [1] All portions of the parapet wall should be 1.3 m height as discussed in **Section 3.3.3** of the report. The return portion of the rooftop screen should be 3.2 m in height. Barrier requirements are shown in **Figure 9**.

# Appendix F Stationary Source Modelling Data

## Environmental Noise Assessment

177-179 Albert Street, Waterloo

**14688210 Canada Inc.**

SLR Project No.: 241.030998.00001

November 22, 2023

## STATIONARY SOURCE MODELLING DATA

| Source Description | Maximum Sound Power Level (1/1 Octave Bands) (dB) | | | | | | | | | Modelled Sound Power Level (dBA) | Source Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 31.5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | |
| **Wilfrid Laurier University Library** | | | | | | | | | | | |
| Exhaust Louvre | 86 | 78 | 77 | 77 | 73 | 75 | 77 | 67 | 59 | 81 | Based on measurement by SLR staff conducted July 10, 2023<br>- Operates 60 minutes per hour during daytime/evening/night-time hours |
| **Martin Luther University College** | | | | | | | | | | | |
| Air Cooled Chiller - 10-fan | - | 100 | 106 | 100 | 96 | 92 | 87 | 81 | 72 | 98 | Based on historical SLR data<br>- Operates 60 minutes per hour during daytime/evening hours<br>- Operates 15 minutes per hour during night-time hours |
| Air Cooled Chiller - 2-fan (2 units) | - | 93 | 99 | 93 | 89 | 85 | 80 | 74 | 65 | 91 | Based on historical SLR data<br>- Operates 60 minutes per hour during daytime/evening hours<br>- Operates 15 minutes per hour during night-time hours |

Receiver
Name: OPOR-3
ID: _OPOR-3
X: 537984.37 m
Y: 4813333.17 m
Z: 357.04 m

| Point Source, ISO 9613, Name: "Air Cooled Chiller - 10-fan", ID: "HVAC_CONT" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nr. | X | Y | Z | Refl. | DEN | Freq. | Lw | I/a | Optime | K0 | Di | Adiv | Aatm | Agr | Afol | Ahous | Abar | Cmet | RL | Lr |
| | (m) | (m) | (m) | | | (Hz) | dB(A) | dB | dB | (dB) | (dB) | (dB) | (dB) | (dB) | (dB) | (dB) | (dB) | (dB) | (dB) | dB(A) |
| 1 | 538113.15 | 4813353.16 | 348.12 | 0 | D | A | 97.8 | 0.0 | 0.0 | 0.0 | 0.0 | 53.3 | 0.4 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 47.0 |
| 1 | 538113.15 | 4813353.16 | 348.12 | 0 | N | A | 97.8 | 0.0 | -6.0 | 0.0 | 0.0 | 53.3 | 0.4 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 41.0 |
| 1 | 538113.15 | 4813353.16 | 348.12 | 0 | E | A | 97.8 | 0.0 | 0.0 | 0.0 | 0.0 | 53.3 | 0.4 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 47.0 |
| 4 | 538113.15 | 4813353.16 | 348.12 | 1 | D | A | 97.8 | 0.0 | 0.0 | 0.0 | 0.0 | 53.5 | 0.4 | -3.0 | 0.0 | 0.0 | 7.9 | 0.0 | 1.0 | 37.9 |
| 4 | 538113.15 | 4813353.16 | 348.12 | 1 | N | A | 97.8 | 0.0 | -6.0 | 0.0 | 0.0 | 53.5 | 0.4 | -3.0 | 0.0 | 0.0 | 7.9 | 0.0 | 1.0 | 31.9 |
| 4 | 538113.15 | 4813353.16 | 348.12 | 1 | E | A | 97.8 | 0.0 | 0.0 | 0.0 | 0.0 | 53.5 | 0.4 | -3.0 | 0.0 | 0.0 | 7.9 | 0.0 | 1.0 | 37.9 |

| Point Source, ISO 9613, Name: "Air Cooled Chiller - 2-fan", ID: "HVAC_CONT" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nr. | X | Y | Z | Refl. | DEN | Freq. | Lw | I/a | Optime | K0 | Di | Adiv | Aatm | Agr | Afol | Ahous | Abar | Cmet | RL | Lr |
| | (m) | (m) | (m) | | | (Hz) | dB(A) | dB | dB | (dB) | (dB) | (dB) | (dB) | (dB) | (dB) | (dB) | (dB) | (dB) | (dB) | dB(A) |
| 6 | 538114.24 | 4813345.34 | 348.12 | 0 | D | A | 91.3 | 0.0 | 0.0 | 0.0 | 0.0 | 53.3 | 0.4 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 40.5 |
| 6 | 538114.24 | 4813345.34 | 348.12 | 0 | N | A | 91.3 | 0.0 | -6.0 | 0.0 | 0.0 | 53.3 | 0.4 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 34.5 |
| 6 | 538114.24 | 4813345.34 | 348.12 | 0 | E | A | 91.3 | 0.0 | 0.0 | 0.0 | 0.0 | 53.3 | 0.4 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 40.5 |
| 8 | 538114.24 | 4813345.34 | 348.12 | 1 | D | A | 91.3 | 0.0 | 0.0 | 0.0 | 0.0 | 53.5 | 0.4 | -3.0 | 0.0 | 0.0 | 7.9 | 0.0 | 1.0 | 31.5 |
| 8 | 538114.24 | 4813345.34 | 348.12 | 1 | N | A | 91.3 | 0.0 | -6.0 | 0.0 | 0.0 | 53.5 | 0.4 | -3.0 | 0.0 | 0.0 | 7.9 | 0.0 | 1.0 | 25.4 |
| 8 | 538114.24 | 4813345.34 | 348.12 | 1 | E | A | 91.3 | 0.0 | 0.0 | 0.0 | 0.0 | 53.5 | 0.4 | -3.0 | 0.0 | 0.0 | 7.9 | 0.0 | 1.0 | 31.5 |

| Point Source, ISO 9613, Name: "Air Cooled Chiller - 2-fan", ID: "HVAC_CONT" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nr. | X | Y | Z | Refl. | DEN | Freq. | Lw | I/a | Optime | K0 | Di | Adiv | Aatm | Agr | Afol | Ahous | Abar | Cmet | RL | Lr |
| | (m) | (m) | (m) | | | (Hz) | dB(A) | dB | dB | (dB) | (dB) | (dB) | (dB) | (dB) | (dB) | (dB) | (dB) | (dB) | (dB) | dB(A) |
| 10 | 538116.17 | 4813346.33 | 348.12 | 0 | D | A | 91.3 | 0.0 | 0.0 | 0.0 | 0.0 | 53.5 | 0.4 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 40.4 |
| 10 | 538116.17 | 4813346.33 | 348.12 | 0 | N | A | 91.3 | 0.0 | -6.0 | 0.0 | 0.0 | 53.5 | 0.4 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 34.4 |
| 10 | 538116.17 | 4813346.33 | 348.12 | 0 | E | A | 91.3 | 0.0 | 0.0 | 0.0 | 0.0 | 53.5 | 0.4 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 40.4 |
| 12 | 538116.17 | 4813346.33 | 348.12 | 1 | D | A | 91.3 | 0.0 | 0.0 | 0.0 | 0.0 | 53.6 | 0.4 | -3.0 | 0.0 | 0.0 | 7.9 | 0.0 | 1.0 | 31.3 |
| 12 | 538116.17 | 4813346.33 | 348.12 | 1 | N | A | 91.3 | 0.0 | -6.0 | 0.0 | 0.0 | 53.6 | 0.4 | -3.0 | 0.0 | 0.0 | 7.9 | 0.0 | 1.0 | 25.3 |
| 12 | 538116.17 | 4813346.33 | 348.12 | 1 | E | A | 91.3 | 0.0 | 0.0 | 0.0 | 0.0 | 53.6 | 0.4 | -3.0 | 0.0 | 0.0 | 7.9 | 0.0 | 1.0 | 31.3 |

| Point Source, ISO 9613, Name: "Exhaust Louvre", ID: "ExhaustLouver_CONT" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nr. | X | Y | Z | Refl. | DEN | Freq. | Lw | I/a | Optime | K0 | Di | Adiv | Aatm | Agr | Afol | Ahous | Abar | Cmet | RL | Lr |
| | (m) | (m) | (m) | | | (Hz) | dB(A) | dB | dB | (dB) | (dB) | (dB) | (dB) | (dB) | (dB) | (dB) | (dB) | (dB) | (dB) | dB(A) |
| 15 | 537993.38 | 4813444.32 | 342.03 | 0 | D | A | 80.9 | 0.0 | 0.0 | 3.0 | 0.0 | 52.0 | 0.9 | -3.0 | 0.0 | 0.0 | 25.4 | 0.0 | 0.0 | 8.6 |
| 15 | 537993.38 | 4813444.32 | 342.03 | 0 | N | A | 80.9 | 0.0 | 0.0 | 3.0 | 0.0 | 52.0 | 0.9 | -3.0 | 0.0 | 0.0 | 25.4 | 0.0 | 0.0 | 8.6 |
| 15 | 537993.38 | 4813444.32 | 342.03 | 0 | E | A | 80.9 | 0.0 | 0.0 | 3.0 | 0.0 | 52.0 | 0.9 | -3.0 | 0.0 | 0.0 | 25.4 | 0.0 | 0.0 | 8.6 |
| 18 | 537993.38 | 4813444.32 | 342.03 | 1 | D | A | 80.9 | 0.0 | 0.0 | 3.0 | 0.0 | 53.8 | 1.0 | -3.0 | 0.0 | 0.0 | 28.0 | 0.0 | 2.0 | 2.1 |
| 18 | 537993.38 | 4813444.32 | 342.03 | 1 | N | A | 80.9 | 0.0 | 0.0 | 3.0 | 0.0 | 53.8 | 1.0 | -3.0 | 0.0 | 0.0 | 28.0 | 0.0 | 2.0 | 2.1 |
| 18 | 537993.38 | 4813444.32 | 342.03 | 1 | E | A | 80.9 | 0.0 | 0.0 | 3.0 | 0.0 | 53.8 | 1.0 | -3.0 | 0.0 | 0.0 | 28.0 | 0.0 | 2.0 | 2.1 |



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