Compatibility & Mitigation Study Air Quality, Dust, Odour, Noise & Vibration

Urban Strategies Inc.

SLR Project No: 241.30440.00000

January 2022

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Compatibility & Mitigation Study Air Quality, Dust, Odour, Noise & Vibration

530, 550, 588 Kerr Street and 131, 171 Speers Road

Oakville, ON

SLR Project No: 241.30440.00000

Prepared by
SLR Consulting (Canada) Ltd.
100 Stone Road West, Suite 201
Guelph, ON N1G 5L3

for

Urban Strategies Inc.
197 Spadina Avenue, Suite 600
Toronto, ON M5T 2C8

January 2022

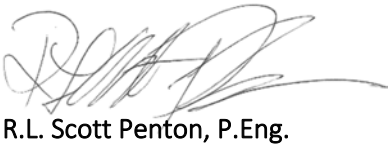
Prepared by:

Aaron Haniff, P.Eng.
Acoustic Specialist / Project Manager

Prepared by:

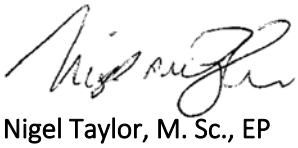
Alice Najjar, B.A
Air Quality Scientist

Reviewed by:



R.L. Scott Penton, P.Eng.
Principal, Technical Director for Noise

Reviewed by



Nigel Taylor, M. Sc., EP
Principal, Air Quality

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EXECUTIVE SUMMARY

SLR Consulting (Canada) Ltd. (SLR), was retained by Urban Strategies Inc. to conduct environmental air quality, noise, and vibration studies on behalf of April Investments Limited (owner of 588 Kerr Street), 527079 Ontario Limited (owner of 530 Kerr Street), Trans County Development Corporation Limited (owner of 131 Speers Road), and Oakville Developments (2010) Inc (owner of 550 Kerr Street). This document is in support of an Official Plan Amendment (the "OPA") to permit the redevelopment of lands municipally addressed 530, 550, 580 Kerr Street, 131 and 171 Speers Road (together known as the "subject site") into a comprehensive mixed use, transit supportive neighbourhood.

The addition of "sensitive" land uses within the Project site, including residential, requires an assessment of land use compatibility with the surrounding proposed, and existing, employment land uses.

This assessment has considered:

- Industrial air quality, odour, and dust emissions;
- Transportation-related air pollution;
- Industrial/ commercial noise and vibration; and
- Transportation-related noise and vibration.

The assessment has included a review of air quality and noise/vibration emissions from industrial facilities in the area.

The required mitigation measures are summarized in Appendix A. These measures can be secured as part of conditions for Project Site Plan Approval. With these physical mitigation measures and warning clauses no adverse impacts from air quality contaminants, dust or odour, or noise are anticipated.

Based on Halton Region's Land Use Compatibility Guidelines (LUCG), the development proposed is anticipated to be compatible with the surrounding land uses from an air quality, perspective. Emissions of dust, and/or odour at the Project site are not anticipated. The Project site is not anticipated to limit surrounding existing, or future industries and their ability to obtain/ maintain their required Ministry of the Environment, Conservation & Parks (MECP) permits and/or approvals.

The requirements of MECP Guideline D-6, and Publication NPC-300 are met. As the applicable policies and guidelines are met, the Project site is:

- Unlikely to result in increased risk of complaint and nuisance claims;
- Unlikely to result in operational constraints for the major facilities;
- Unlikely to result in constraints on major facilities to reasonably expand, intensify or introduce changes to their operations.

VERSIONS

Version	Date	Comment
1	January 31, 2022	First Submission

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1.0 INTRODUCTION

SLR Consulting (Canada) Ltd. (SLR), was retained by Urban Strategies Inc. to conduct environmental air quality, noise, and vibration studies on behalf of April Investments Limited (owner of 588 Kerr Street), 527079 Ontario Limited (owner of 530 Kerr Street), Trans County Development Corporation Limited (owner of 131 Speers Road), and Oakville Developments (2010) Inc (owner of 550 Kerr Street). This document is in support of an Official Plan Amendment (the "OPA") to permit the redevelopment of lands municipally addressed 530, 550, 580 Kerr Street, 131 and 171 Speers Road (together known as the "subject site") into a comprehensive mixed use, transit supportive neighbourhood.

The addition of "sensitive" land uses within the Project site, including residential, requires an assessment of land use compatibility with the surrounding proposed, and existing, employment land uses.

This assessment has considered:

- Industrial air quality, odour, and dust emissions;
- Transportation-related air pollution;
- Industrial/ commercial noise; and
- Transportation-related noise and vibration.

In this assessment, SLR has reviewed the surrounding industrial land uses and major facilities in the area with respect to the following guidelines:

- The Provincial Policy Statement;
- The Provincial Growth Plan;
- The Ministry of the Environment, Conservation and Parks (MECP) land use compatibility guideline (D-Series) including Guideline D-6 – Compatibility Between Industrial Facilities and Sensitive Land Uses (MECP 1995);
- MECP Publication NPC-300 noise guidelines for industrial and transportation;
- Ontario Regulation 419/05: Air Pollution – Local Air Quality and its associated air quality standards and assessment requirements;
- The MECP's draft policies on odour impacts and assessment;
- Rail vibration guidelines published by MECP, Canadian National Railways, Canadian Pacific Railways, Metrolinx, and the Railway Association of Canada / Federation of Canadian Municipalities;
- The Halton Region's Air Quality Guidelines, Regional Official Plan Guidelines; and
- The Halton Region's Noise Abatement Guidelines, Regional Official Plan Guidelines.

This report identifies and evaluates options to achieve land use compatibility through appropriate design, buffering and/or separation distances between the proposed sensitive land uses, including residential uses, and nearby employment areas and/or major facilities.

Recommended measures intended to mitigate negative impacts and adverse effects are provided.

Appendix A summarizes the potential mitigation measures and warning clause recommendations.

2.0 DESCRIPTION OF POTENTIAL FUTURE DEVELOPMENT AND SURROUNDINGS

2.1 Area Context

The Project site is bounded by Speers Road to the south, Kerr Street to the east, the CN Oakville Subdivision rail line to the north and single storey industrial buildings to the west. A context plan is shown in Figure 1.

The following provides more detail related to the surrounding land uses:

- North: Employment lands are located across the CN Oakville Subdivision rail line;
- East: Commercial and Residential lands are located on the opposite side of Kerr Street;
- South: Commercial lands are located across Speers Road, and further south is residential lands; and
- West: Commercial retail on Employment land use is located along the west property boundary.

2.2 Proposed Development

The proposed 530, 550, 588 Kerr Street and 131, 171 Speers Road development is comprised of 5 properties. The current site contains commercial buildings including grocery stores, cinema, bookstore, commercial operations as well as a multiple large parking lots.

The Proposal's Comprehensive Development Plan envisions the development of a range of mid to high-rise mixed use buildings on seven urban development blocks. The heights of the buildings will range from 8 to 28 storeys. Proposed development drawings are included in Appendix B.

2.3 Zoning

2.3.1 City of Oakville By-Law

The Project site is zoned as H1-MU3 - Mixed Use. There is additional MU3 zoned mixed use properties located northeast and the southwest of the Project site.

The lands northwest of the Project site, across the railway, are zoned as Employment (E2).

An excerpt from the City of Oakville Zoning Map is provided in Figure 2.

3.0 ASSESSMENT FRAMEWORK

The intent of this report is to identify any existing and potential land use compatibility issues and to identify and evaluate options to achieve appropriate design, buffering and/or separation distances between the proposed sensitive land uses, including residential uses, and nearby Employment areas and/or major facilities. Recommended measures intended to eliminate or mitigate negative impacts and adverse effects are provided.

The requirements of Ontario's planning regime are organized such that generic policy is informed by specific policy, guidance, and legislation, as follows:

- The Ontario Planning Act Section 2 sets the ground rules for land use planning in Ontario, whereby planning decisions have regard to matters of provincial interest including orderly development, public health, and safety; then
- The Provincial Policy Statement ("PPS") sets out goals to ensure adjacent land uses are compatible from a health and safety perspective and are appropriately mitigated; then
- The Provincial Growth Plan, Section 2.2.5 – builds on the PPS to establish a unique land use planning framework for the Greater Golden Horseshoe, where the development of sensitive land uses will avoid, or where avoidance is not possible, minimize and mitigate adverse impacts on industrial, manufacturing, or other uses that are particularly vulnerable to encroachment; then
- The Halton Region Land Use Compatibility Guidelines developed by the Region to "identify how land use compatibility issues may be addressed by municipalities during a development proposal…" The LUCG were developed by the Region in consideration of the Provincial D-Series of Guidelines, prepared by the Ontario Ministry of Environment, Conservation & Parks ("MECP"). These guidelines set out methods to determine if assessments are required (areas of influence, recommended separation distances, and the need for additional studies); then
- MECP and Municipal regulations, policies, standards, and guidelines then set out the requirements of additional air quality, noise and vibration studies and the applicable policies, standards, guidelines, and objectives to ensure that adverse effects do not occur.

3.1 Ontario Planning Act

The Ontario Planning Act is "provincial legislation that sets out the ground rules for land use planning in Ontario. It describes how land uses may be controlled, and who may control them. The purpose of the Act is to:

- provide for planning processes that are fair by making them open, accessible, timely and efficient;
- promote sustainable economic development in a healthy natural environment within a provincial policy framework;
- provide for a land use planning system led by provincial policy;
- integrate matters of provincial interest into provincial and municipal planning decisions by requiring that all decisions be consistent with the Provincial Policy Statement and conform/not conflict with provincial plans;
- encourage co-operation and coordination among various interests; and
- recognize the decision-making authority and accountability of municipal councils in planning".

Section 2.1 of the Ontario Planning Act describes how approval authorities and Tribunals must have regard to matters of provincial interest including orderly development, public health, and safety.

3.2 Provincial Policy Statement

The PPS "provides policy direction on matters of provincial interest related to land use planning and development. As a key part of Ontario's policy-led planning system, the Provincial Policy Statement sets the policy foundation for regulating the development and use of land. It also supports the provincial goal to enhance the quality of life for all Ontarians."

The PPS is a consolidated statement of the government's policies on land use planning and is issued under section 3 of the Planning Act. Municipalities are the primary implementers of the PPS through policies in their local official plans, zoning by-laws, and other planning related decisions. Policy direction concerning land use compatibility is provided in Section 1.2.6 of the PPS (2020).

"1.2.6 Land Use Compatibility

1.2.6.1 Major facilities and sensitive land uses shall be planned and developed to avoid, or if avoidance is not possible, minimize and mitigate any potential adverse effects from odour, noise, and other contaminants, minimize risk to public health and safety, and to ensure the long-term operational and economic viability of major facilities in accordance with provincial guidelines, standards, and procedures.

1.2.6.2 Where avoidance is not possible in accordance with policy 1.2.6.1, planning authorities shall protect the long-term viability of existing or planned industrial, manufacturing, or other uses that are vulnerable to encroachment by ensuring that the planning and development of proposed adjacent sensitive land uses are only permitted if the following are demonstrated in accordance with provincial guidelines, standards, and procedures:

a) there is an identified need for the proposed use;

b) alternative locations for the proposed use have been evaluated and there are no reasonable alternative locations;

c) adverse effects to the proposed sensitive land use are minimized and mitigated; and

d) potential impacts to industrial, manufacturing, or other uses are minimized and mitigated."

The goals of the PPS are implemented through Municipal and Provincial policies, as discussed below. Provided the Municipal and Provincial policies, guidelines, standards, and procedures are met, the requirements of the PPS will be met.

3.3 Halton Region's Regional Official Plan Guidelines: Land Use Compatibility Guidelines

The purpose of Land Use Compatibility Guidelines development by the Region (LUCG) is to "identify how land use compatibility issues may be addressed by municipalities during a development proposal…" The LUCG were developed by the Region in consideration of the Provincial D-Series of Guidelines, prepared by the Ontario Ministry of the Environment, Conservation and Parks (MECP) in 1995 for planning guidance in evaluating land use compatibility. Section 2 of the LUCG identifies the relevant provincial guidelines and regulations which are to be considered in conducting air quality assessment in Ontario:

> *"The D-Series are used for development applications that require the re-designation (Official Plan Amendment) or rezoning of land uses (Zoning By-law amendment). The MOE's D-Series are only applicable when a:*
>
> - *New sensitive land use requires a land use amendment and is proposed to be located within the influence, or potential influence, area of an impacting use, such as an existing industrial land use; or when a*
> - *New industrial use requires a land use amendment and is proposed to be located near an existing sensitive residential use."*

Included in the Region's summary is a discussion of the "potential areas of influence" approach, as presented in the D-series of guidelines when assessing compatibility of industrial uses with more sensitive uses such as residences.

In preparing the LUCG, the Region has clarified an aspect concerning recommended minimum separation distances. In the LUCG, it is understood that areas of influence of various industrial processes will be site specific. Actual areas of influence are determined through appropriate studies allowing for industrial activities to be compatible with more sensitive land uses within the area of influence and within recommended minimum separation distances which are presented in Table 1. Appropriate studies can provide mitigation strategies, if required.

3.4 Halton Region's REgional Official Plan Guidelines: Air Quality Guidelines

The Region's Air Quality Guidelines (AQG) were developed along with a number of other guidelines for land use planning which came out of the Regional Official Plan Amendment (ROPA 38). In general terms, the AQG recommends consideration of local industrial sources and transportation features when evaluating the siting of a residential land use.

The AQG acts as a summary document of the applicable guidelines for a particular undertaking.

> *"2.1 Under the Region's policy 143(12), any source emission studies may only be applicable when sensitive land uses (residential, natural heritage) are proposed with these 3 conditions present:*
>
> 1) *Within 30 m of a major arterial road or provincial highway or within 150 m of provincial freeway;*
> 2) *In proximity to an industrial use; and a*
> 3) *Utility use"*

SLR conducted a review of identified industrial uses and roadways/highways, as referred to in items 1) and 2) of Section 2.1, of the AQG listed above.

3.5 D-Series of Guidelines

The D-series of guidelines on which the LUCG are based were developed by the MECP in 1995 as a means to assess recommended separation distances and other control measures for land use planning proposals in an effort to prevent or minimize 'adverse effects' from the encroachment of incompatible land uses where a facility either exists or is proposed. D-series guidelines address sources including sewage treatment (Guideline D-2), gas and oil pipelines (Guideline D3), landfills (Guideline D-4), water services (Guideline D-5) and industries (Guideline D-6).

For this project, the applicable guideline is Guideline D-6 - Compatibility *between Industrial Facilities and Sensitive Land Uses*. The guidelines specifically address issues of air quality, odour, dust, noise, and litter.

Adverse effect is a term defined in the Environmental Protection Act and "means one or more of

- impairment of the quality of the natural environment for any use that can be made of it,
- injury or damage to property or to plant or animal life,
- harm or material discomfort to any person,
- an adverse effect on the health of any person,
- impairment of the safety of any person,
- rendering any property or plant or animal life unfit for human use,
- loss of enjoyment of normal use of property, and
- interference with the normal conduct of business".

3.5.1 Guideline D-6 Requirements

This guideline specifically addresses issues of air quality, odour, dust, noise, and litter. To minimize the potential to cause an adverse effect, potential areas of influence and recommended minimum setback distances are included within the guidelines. The potential areas of influence and recommended separation distances from the guidelines are provided in the table below.

Table 1: Guideline D-6 - Potential Influence Areas and Recommended Minimum Setback Distances for Industrial Land Uses

Industry Classification	Area of Influence	Recommended Minimum Setback Distance
Class I – Light Industrial	70 m	20 m
Class II – Medium Industrial	300 m	70 m
Class III – Heavy Industrial	1000 m	300 m

Industrial categorization criteria are supplied in Guideline D-6-2, and are shown in the following table:

Table 2: Guideline D-6 - Industrial Categorization Criteria

Category	Outputs	Scale	Process	Operations / Intensity	Possible Examples
Class I Light Industry	• Noise: Sound not audible off-property • Dust: Infrequent and not intense • Odour: Infrequent and not intense • Vibration: No ground-borne vibration on plant property	• No outside storage • Small-scale plant or scale is irrelevant in relation to all other criteria for this Class	• Self-contained plant or building which produces/ stores a packaged product • Low probability of fugitive emissions	• Daytime operations only • Infrequent movement of products and/ or heavy trucks	• Electronics manufacturing and repair • Furniture repair and refinishing • Beverage bottling • Auto parts supply • Packaging and crafting services • Distribution of dairy products • Laundry and linen supply

Category	Outputs	Scale	Process	Operations / Intensity	Possible Examples
Class II Medium Industry	• Noise: Sound occasionally heard off-property • Dust: Frequent and occasionally intense • Odour: Frequent and occasionally intense • Vibration: Possible ground-borne vibration, but cannot be perceived off-property	• Outside storage permitted • Medium level of production allowed	• Open process • Periodic outputs of minor annoyance • Low probability of fugitive emissions	• Shift operations permitted • Frequent movements of products and/ or heavy trucks with the majority of movements during daytime hours	• Magazine printing • Paint spray booths • Metal command • Electrical production • Manufacturing of dairy products • Dry cleaning services • Feed packing plants
Class III Heavy Industry	• Noise: Sound frequently audible off property • Dust: Persistent and/ or intense • Odour: Persistent and/ or intense • Vibration: Ground-borne vibration can frequently be perceived off-property	• Outside storage of raw and finished products • Large production levels	• Open process • Frequent outputs of major annoyances • High probability of fugitive emissions	• Continuous movement of products and employees • Daily shift operations permitted	• Paint and varnish manufacturing • Organic chemical manufacturing • Breweries • Solvent recovery plants • Soaps and detergent manufacturing • Metal refining and manufacturing

3.5.2 Requirements for Assessments

Guideline D-6 requires that studies be conducted to assess impacts where sensitive land uses are proposed within the potential area of influence of an industrial facility. This report is intended to fulfill this requirement.

The D-series guidelines reference previous versions of the air quality regulation (Regulation 346) and noise guidelines (Publications NPC-205 and LU-131). However, the D-Series of guidelines are still recognized, and represent current MECP policy and are specifically referenced in numerous other current MECP policies. In applying the D-series guidelines, the current policies, regulations, standards, and guidelines have been used (e.g., Regulation 419, Publication NPC-300).

3.5.3 Requirements for Minimum Separation Distances

Guideline D-6 also *recommends* that no sensitive land use be placed within the Recommended Minimum Separation Distance. However, it should be noted that this is a recommendation, only. Section 4.10 of the guideline allows for development within the Recommended Minimum Separation Distance, in cases of redevelopment, infilling, and transitions to mixed use, provided that the appropriate studies are conducted and that the relevant air quality guidelines are met.

4.0 NEARBY INDUSTRIES AND ENGAGEMENT

The Guideline D-6 setback distances from the Subject Site are shown in **Figure 3**. SLR personnel conducted site visits to the area on December 27, 2021 and January 20, 2022 to review environment noise and air quality. Local industries within 1 km of the Subject Site were inventoried. The lands surrounding the Project site are generally compromised of commercial, industrial, and residential properties.

In Ontario, facilities that emit significant amounts of contaminants to the environment are required to obtain and maintain an Environmental Compliance Approval ("ECA") from the MECP or submit an Environmental Activity and Sector Registry ("EASR"). ECAs/ EASRs within 1 km of the Site were obtained from the MECP's *Access Environment* website. Copies are provided in **Appendix C**.

Table 3 lists the identified industries of interest within 1 km of the site. A more detailed table of the identified industries is provided in **Appendix C.** Industries which lie within their applicable Area of Influence in respect to the Project are discussed further below.

Table 3: Identified Industries Within 1000 m of Subject Lands

Facility	Description	Environmental Compliance Approval No.	Industry Class	Area of Influence Dist (m)	Actual Distance to Site (m)	Additional Assessment Required?
Speedy Auto Service	Automotive Repair	-	I	70	22	Yes
Alliance Labelling	Packaging Company	-	I	70	0	Yes
Dana Canada Corporation	Automotive Part Manufacturing	4354-93HMEV (2014)	II	300	85	Yes
Matos Paving and Stone Supplier	Paving Contractor	-	II	300	180	Yes

The following Industries were identified inside their potential area of influence and, therefore, require additional assessment:

- Speedy Auto Service;
- Dana Canada Corporation;
- Alliance Labelling; and
- Matos Paving and Stone Supplier.

4.1 Class III Heavy Industries

The area within 1000 m of the Subject Site was reviewed and is illustrated on **Figure 3**. No Class III Heavy industries are located within the 1000 m area of influence from the Subject Site.

4.2 Class I Light and Class II Medium Industries

There are many light- and medium-scale facilities in the immediate area. Most of the identified Facilities fall outside of their applicable Areas of Influence of the Site (as detailed in Appendix C). However, five facilities were identified to be within the Area of Influence of the site and are discussed below.

4.2.1 Existing Uses

4.2.1.1 Speedy Auto Service

ADDRESS	112 SPEERS RD
DISTANCE TO SUBJECT SITE:	22 m
D-6 CLASSIFICATION:	Class I Light Industry

Speedy Auto Service is an automotive repair shop located 22 m east of the Project site, along Speers Road. A search of the MECP registry did not yield a permit or registration for this site.

On December 27, 2021, and January 20, 2022, SLR personnel conducted site visits to the area. There was no noise, odour, or visible dust observed from the facility at the time of the site visits.

As suggested in Guideline D-6, automotive repair shops are listed as a Class II facility partly due to the operation of a spray-paint booth. However, auto-repair shops of this sized are now generally considered Class I facilities, as the MECP has a specific Environmental Activity and Sector Registry for this industry with specific operating conditions required which reduces emissions. Auto-repair shops are regulated under Ontario Regulation 347/12: Regulations under part II.2 of the Act – Automotive Refinishing. Therefore, the auto repair shops in the vicinity of the Subject Lands have been classified as Class I facilities, with a minimum recommended separation distance of 20 m and a potential area of influence of 70 m. Speedy Auto Service is outside of the 20 m Recommended Separation Distance but is within the 70 m Potential Area of Influence.

Given the above, there is potential for adverse air and noise impacts from Speedy Auto Service's current operations on the Subject Lands. Additional assessment is, therefore, warranted and provided further in the report.

4.2.1.2 Alliance Labeling Inc.

ADDRESS	201 SPEERS RD
DISTANCE TO SUBJECT SITE:	Adjacent Lot
D-6 CLASSIFICATION:	Class I Medium Industry

Alliance Labelling Inc. is a packaging facility which is located directly west of the Project site. A search of the MECP registry did not yield a permit or registration for this site.

The facility consists of the following processes:

- Labelling; and
- Packaging.

Air quality, noise and sources of interest include sources associated with the packaging process.

On December 27, 2021, and January 20, 2022, SLR personnel conducted site visits to the area. There was no noise, odour, or visible dust observed from the facility at the time of the site visits.

Based on the size and nature of the facility operations, Alliance Labelling Inc. is considered to be a Class I light industry, with a minimum recommended separation distance of 20m, and a potential area of influence of 70m. The Project lies within the potential area of influence.

Given the above, there is potential for adverse air quality and noise impacts from the facility's current operations on the Project. Additional assessment is, therefore, warranted and is provided further in the report.

4.2.1.3 Dana Canada Corporation

ADDRESS	656 KERR STREET
DISTANCE TO SUBJECT SITE:	85 m
D-6 CLASSIFICATION:	Class II Medium Industry

Dana Canada Corporation is a manufacturing, research, development and testing facility for automotive heat exchanger products. The facility is located 85 m north of the Project site and operates under MECP Environmental Compliance Approval (ECA) 4354-93HMEV (2014). Copies of the MECP permit can be found in Appendix C.

On December 27, 2021, and January 20, 2022, SLR personnel conducted site visits to the area. No major sources of no noise, odour, or visible dust observed from the facility at the time of the site visits.

Significant air quality and noise sources of interest based on the MECP permit, site visit, aerial photography, and typical operations for this type of facility include:

- Nickel Plating;
- Stamping, Forming and Pre-Assembly;
- Brazing; and
- Testing Laboratories.

Based on the size and nature of the of the facility operations, with normal operations running 24/7, Dana Canada Corp. is considered a Class II medium industry, with a minimum Recommended Separation Distance of 70 m and Potential Area of Influence of 300 m. The Project site is outside of the Recommended Separation Distance but is within the Potential Area of Influence.

Given the above, there is potential for air and noise impacts from Dana Canada Corp. on the Project site. Additional assessment is, therefore, warrant and provided further within this report.

4.2.1.4 Matos Paving and Stone Supplier

ADDRESS	459 WOODY ROAD
DISTANCE TO SUBJECT SITE:	180 m
D-6 CLASSIFICATION:	Class II Medium Industry

Matos Paving and Stone Supplier is a paving contractor that is located 180 m southwest of the Project site. A search of the MECP registry did not yield a permit or registration for this site.

On December 27, 2021, and January 20, 2022, SLR personnel conducted site visits to the area. The site

was unpaved and contained aggregate piles. The dust observed was local to the site. There was no noise, odour, or visible dust observed from the facility at the Project site.

Based on the size and nature of the facility operations, Matos Paving is considered to be a Class II medium industry, with a minimum recommended separation distance of 70 m, and a potential area of influence of 300 m. The Project lies within the potential area of influence but is outside the recommended separation distance.

Given the above, there is potential for adverse air quality and noise impacts from the facility's current operations on the Project. Additional assessment is, therefore, warranted and is provided further in the report.

4.2.2 Vacant Lots

Under Guideline D-6, the use of vacant buildings must be considered in land use compatibility studies. Lands surrounding the Project site are occupied. There are no vacant parcels of land surrounding the Project site.

If a new industrial operation were to relocate or construct a new facility, these new facilities would be required to obtain an approval from the MECP (either EASR or ECA). In accordance with the MECP permit, the facility would be required to meet the applicable guidelines of O. Reg 419/05 at the facility property line and to meet the applicable requirements of MECP NPC 300. As part of the permitting process, the facility would be required to meet applicable guidelines at existing and approved residential locations.

4.3 Summary

From the list of industries identified in Section 4, the following were identified to require further analysis, as a result of being within their potential Area of Influence:

- Speedy Auto Service
- Dana Canada Corp.;
- Alliance Packaging Inc.; and
- Matos Paving and Stone Supplier.

Provided below are comments and findings related to the compatibility between the proposed development and the above noted identified industrial facilities.

5.0 AIR QUALITY, DUST AND ODOUR ASSESSMENT

5.1 Industrial Sources

5.1.1 Guidelines and Regulations

As previously discussed, within Ontario, facilities which emit significant amounts of air emissions to the environment are required to obtain and maintain an ECA from the MECP or submit an EASR. Facilities with an ECA/EASR should already meet the MECP guidelines for air quality contaminants at their property line.

5.1.1.1 Air Quality Contaminants

Under O.Reg. 419/05, a facility is required to meet prescribed standards for air quality emissions at their

property boundary line and any location off-site. The MECP does not require industries to assess their emissions at elevated points off-site if a receptor does not exist at that location. While the introduction of mid- and high-rise residential properties could trigger a facility to re-assess compliance at new receptor location, the introduction of new low-rise receptors does not introduce any new receptors, as the facility is already required to comply at grade-level at their property line.

5.1.1.2 Odour

There are a select few compounds that are provincially regulated from an odour perspective; however, there is no formal regulation with respect to mixed odours. Impacts from mixed odours produced by industrial facilities are generally only considered and regulated by the MECP in the presence of persistent complaints (ECO 2010).

The MECP assesses mixed odours, in Odour Units, following draft guidelines. One odour unit (1 OU) has been used as a default threshold. This is the concentration at which 50 % of the population will just detect an odour (but not necessarily identify/recognize or object to it). Recognition of an odour will typically occur between 3 and 5 odour units. The following factors may be considered:

- Frequency – How often the odour occurs. The MECP typically allows odours to exceed 1 OU with a 0.5 % frequency.
- Intensity – The strength of the odour, in odour units. 1 OU is often used in odour assessments in Ontario.
- Duration – How long the odour occurs.
- Offensiveness – How objectionable the odour is. The MECP may allow for a higher concentration of pleasant smells such as baking as opposed to off-putting smells such as rotting garbage or rancid meat.
- Location – Where the odour occurs. The MECP assesses odours where human activity is likely to occur.

The MECP has decided to apply odour-based standards to locations "where human activities regularly occur at a time when those activities regularly occur," which is generally accepted to be places that would be considered sensitive such as residences and public meeting places. As a guide, the MECP has provided proposed clarification of human odour receptors, as shown in the following table:

Table 4: Proposed Clarification of Human Receptors (MECP 2008)

Receptor Category	Examples	Exposure Type	Type of Assessment
Permanent potential 24-hour sensitivity	Anywhere someone could sleep including any resident or house, motels, hospitals, senior citizen homes, campgrounds, farmhouse, etc.	Individual likely to receive multiple exposures	Considered sensitive 24 hours per day
Permanent daily hours but with definite periods of shutdown/closure	Schools, daycares, community centres, soccer fields, farmland, churches, bicycle paths, hiking areas, lakes, commercial or institutional facilities (with consideration of hours of operation such as night clubs, restaurants, etc.)	Individual could receive multiple exposures	Night-time or daytime exclusion only (consider all other hours)

Receptor Category	Examples	Exposure Type	Type of Assessment
Seasonal variations with clear restrictions on accessibility during the off season	Golf courses, amusement parks, ski hills, other clearly seasonal private property	Short term potential for exposure	Exclusions allowed for non-seasonal use
Transient	Open fields, roadways, easements, driveways, parking lots, pump houses	Very short-term potential for exposure, may not be a single resident exposed to multiple events	Generally, would not be included as human receptors unless otherwise specified.

Note that commercial facilities are considered to be odour sensitive points of reception, as well as community spaces and residences.

5.1.1.3 Dust

Ontario Regulation 419/05 also provides limits for dust, including limits for suspended particulates and dust fall. Under Reg. 419/05, these air quality limits must be met at the property line and all points beyond. This is not changed by the addition of sensitive uses within the Project site. That is to say, the existing property lines are already a point of reception for dust, and the limits must already be met at that location.

5.1.1.4 Cumulative Assessments

Cumulative impact assessments, examining the combined effects of individual industries, or the combined effects of industry and roadway emissions, are generally not required. Neither the PPS, the D-Series of guidelines, Regulation 419/05, or the current MECP odour assessment protocols require an assessment of cumulative impacts.

Which is not to say that such assessments are never warranted; rather, the need to do so is considered on a case-by-case basis, depending on the nature and intensity of the industrial operation(s), and the nature of the pollutants released. Based on the types of pollutants released by the industries in this area, cumulative effects assessments are not warranted.

5.1.2 Local Meteorology

Surface wind data was obtained to generate a wind rose from data collected at the Pearson International Airport in Toronto from 1986 through 2015, as shown in Figure 4. As can be seen in the wind rose, predominant winds are from the west and northwestern quadrants, while winds from the northeast and southeast quadrants may be the least frequent.

5.1.3 Site Visits and Odour and Dust Observations

A Project site visit was conducted to the area on January 20, 2022, by SLR personnel to identify significant sources of air quality emissions and to identify any significant sources of odour or dust in the Project neighbourhood. During the site visit, the staff members observed existing industries from the sidewalks and other publicly accessible areas. Wind conditions during the site visit were noted as:

- January 2022: northwesterly winds, 13 km/h, -12°C, 62% RH.

No odours or fugitive dust emissions were detected at the Project site at the time of the site visit.

5.1.4 Assessment of Potential Air Quality Impacts

5.1.4.1 Speedy Auto Service

Speedy Auto Service is an automotive repair shop that specializes in vehicle repair and maintenance. The facility is approximately 22 m southeast of the Project site. A search of the MECP registry did not yield a permit or registration for this site.

As suggested in the D-6 Industrial Categorization criteria, automotive repair shops are listed as a Class II facility partly due to the operation of spray-paint booths. However, given that the MECP has a specific Environmental and Activity Sector Registry (EASR) for this industry with specific operating condition requirements that limit emissions, auto-repair shops can now generally be considered Class I facilities. In addition, the paint types which are now used are less odorous (water- versus solvent-based). Auto-repair shops are regulated under Ontario Regulation 347/12: Regulations Under Part II.2 of the Act – Automotive Refinishing (under the Environmental Protection Act). Therefore, Speedy Auto Service is considered a Class I facility, with a minimum recommended separation distance of 20 m and a potential area of influence of 70 m. Speedy Auto Service is outside of the 20 m Recommended Separation Distance but is within the 70 m Potential Area of Influence.

On January 20, 2022 SLR personnel conducted a site visit to the area. There was no odour, or visible dust observed from the facility at the time of the site visit.

There are existing residential building immediately east and southwest of the facility. These existing sensitive receptors are adjacent to the facility, and, therefore, is closer proximity to the facility than the Project site. If applicable air quality standards and guidelines are met for the emissions from Speedy Auto Services operations at the existing residences, it is expected they would be met at the Project site.

Given the above, the Project site is not anticipated to interfere with the facilities' ability to operate. Mitigation measure at the Project site regarding the Speedy Auto Service is not warranted.

5.1.4.2 Dana Canada Corporation

Dana Canada Corporation is a manufacturing, research, development and testing facility for automotive heat exchanger products. The facility is located 85 m north of the Project site and operates under MECP Environmental Compliance Approval (ECA) 4354-93HMEV (2014). Copies of the MECP permit can be found in Appendix C.

On January 20, 2022, SLR personnel conducted a site visit to the area. There was no noise, odour, or visible dust observed from the facility at the time of the site visit.

Air quality and noise sources of interest based on the MECP permit, site visit, aerial photography, and typical operations for this type of facility include:

- Nickel Plating;
- Stamping, Forming and Pre-Assembly;
- Brazing; and
- Testing Laboratories.

Based on the size and nature of the of the facility operations, with operations running 24/7, Dana Canada Corp. is considered a Class II medium industry, with a minimum Recommended Separation Distance of

70 m and Potential Area of Influence of 300 m. The Project site is outside of the Recommended Separation Distance but is within the Potential Area of Influence.

The Dana Corporation is buffered from the Project site by the rail corridor. The building of the Dana Corporation facility is approximately 40 m from its property boundary.

Although the Dana Corporation's operations are within the potential Area of Influence, they are buffered from the Project site and beyond the Recommend Minimum Separation distance of 70 m.

The facility is required to operate and maintain in compliance with the requirements of their MECP permit. The sources at the facility are likely to be operating with mitigation already in place. The MECP determines compliance to be required at the property boundary and any elevated receptor locations. An existing residence was identified to be located at 623 Kerr Street, directly across from Dana Corporation, with a property-to-property separation distance of the width of Kerr Street or approximately 14 m which is closer than the proposed development site.

Dana Corporation has exhaust stacks that are elevated above the roof height of the facility. The setback distance of the proposed highrise features from the current Dana operations is adequate in relation to the height of the existing stacks, based on screening level analysis. Concentrations of emissions from Dana's operations are not anticipated to be greater at proposed highrise features in comparison to the levels expected at the existing residence or at ground level at the proposed development site. Additional analysis may be considered when greater detail for the proposed development is available, as the Project proceeds through the planning process. Although not anticipated to be required, feasible mitigation measures exist which could be used should adverse impacts be predicted in future detailed studies.

5.1.4.3 Alliance Labeling Inc.

Alliance Labelling Inc. is a packaging facility which is located adjacent and West of the Project site. A search of the MECP registry did not yield a permit or registration for this site. The operation at the facility consists of labelling and packaging.

On January 20, 2022 SLR personnel conducted a site visit to the area. There was no noise, odour, or visible dust observed from the facility at the time of the site visit.

Based on the size and nature of the facility operations, Alliance Labelling Inc. is considered to be a Class II medium industry, with a minimum recommended separation distance of 70m, and a potential area of influence of 300m.

Based on a review of the wind frequency distribution diagram illustrated in **Figure 4**, potential winds come from the southwest directions less than 12% of the time.

There are existing residential houses located immediately southeast of the facility, on Speers Road. These existing sensitive receptors are approximately 20 m from Alliance Labelling Inc. and, therefore, are in similar proximity to the facility as the Project site. If the applicable air quality standards and guidelines from the Alliance operations are met at the existing residences, it is expected they would be met at the Project site.

Given the above, adverse air quality impacts from Alliance Labeling Inc. are not anticipated at the Project site.

5.1.4.4 Matos Paving and Stone Supplier

Matos Paving and Stone Supplier is a paving contractor that is located 180 m southwest of the Project site. A search of the MECP registry did not yield a permit or registration for this site.

On January 20, 2022 SLR personnel conducted a site visit to the area. The site was unpaved and contained aggregate piles. The dust observed was local to the site. There was no noise, odour, or visible dust observed from the facility at the Project site.

Based on the size and nature of the facility operations, Matos Paving is considered to be a Class II medium industry, with a minimum recommended separation distance of 70 m, and a potential area of influence of 300 m. The Project lies within the potential area of influence but is outside the recommended separation distance.

Based on a review of the wind frequency distribution diagram illustrated in Figure 4, potential winds come from the southwest directions less than 12% of the time.

There are existing residential houses located immediately southeast of the facility, on Speers Road. These existing sensitive receptors are approximately 180 m from Matos Paving and, therefore, are in similar in proximity to the facility as the Project site. If the applicable air quality standards and guidelines from the Matos Paving's operations are met at the existing residences, it is expected they would be met at the Project site.

Given the above, adverse air quality impacts from Matos Paving are not anticipated at the Project site.

5.2 Transportation Related Air Pollution

5.2.1 Halton Region's Regional Official Plan Guidelines: Air Quality Guidelines

The Region's Air Quality Guidelines (AQG) were developed along with a number of other guidelines for land use planning which came out of the Regional Official Plan Amendment (ROPA 38). In general terms, the AQG recommends consideration of local industrial sources and transportation features when evaluating the siting of a residential land use.

The AQG acts as a summary document of the applicable guidelines for a particular undertaking.

> *"2.1 Under the Region's policy 143(12), any source emission studies may only be applicable when sensitive land uses (residential, natural heritage) are proposed with these 3 conditions present:*
>
> *1) Within 30 m of a major arterial road or provincial highway or within 150 m of provincial freeway;*
>
> *2) In proximity to an industrial use; and a*
>
> *3) Utility use"*

SLR conducted a review of identified industrial uses and roadways/highways, as referred to in items 1) and 2) of Section 2.1 listed above, as well as the rail line.

5.2.2 Arterial Roadways

As some of the development blocks lie within 30m of a major arterial road, and adjacent to the CN Rail line, the Halton region's Air Quality Guidelines require that these transportation routes be considered as a potential air quality source. The following transportation sources require consideration:

- Speers Road; and
- Kerr Street.

Highway 403/Queen Elizabeth Way (QEW) is greater than 150 m from the Project site, therefore is does not need to be considered in accordance with the Region's Air Quality Guidelines.

Speers Road is a four-lane arterial road with an existing annual average daily traffic (AADT) volume of approximately 28,589 vehicles east of Kerr Street, and 17,735 vehicles west of Kerr Street.

Kerr Street is also a four-lane arterial road that intersects Speers Road, with an existing AADT volume of approximately 14,967 vehicles.

There are existing high-rise residences on the northwest corner of Speers Road and Kerr Street, adjacent to the Project site. These residences are setback approximately 10 m – 20 m from the roadway. The Project will maintain a similar setback distance to the roadway as the existing residences. Since roadway emissions act like a line source, with minimal upward momentum, the introduction of elevated receptors does not introduce a new worst-case receptor location.

Due to the presence of existing residences in similar proximity to Kerr Street/Speers Road, it is our opinion that a detailed transportation study regarding air quality is not required for the proposed development. The following common mitigation strategies for Transportation related Air Pollution (TRAP) could be considered when designing the building and the HVAC system, to minimize air quality impacts from the adjacent transportation sources:

- Filtration – use of air filtration systems to reduce indoor levels of contaminants;
  - MERV filters 5-8 deemed appropriate for "Commercial Buildings" and "Better Residential Buildings"; and
  - MERV filters 9-12 deemed appropriate for "Better Commercial Buildings" and "Superior Residential Buildings".
- Intake/Amenity Location – locate fresh air intakes and outdoor amenity spaces on the rooftop, away from roadways and loading docks;
- HVAC System – timing the ventilation schedule to avoid bringing in fresh air during the peak rush hour vehicle volumes; mechanical HVAC can also be used to provide more make-up air than is exhausted to slightly pressurize the building positively, minimizing the infiltration of polluted air through the building envelope.

5.2.3 CN Oakville Subdivision Rail Corridor

The Oakville Subdivision rail corridor is located immediately adjacent to the Project site boundary. The subdivision consists of three tracks used for through traffic of passenger and freight trains.

The closest existing points of reception are residences along Cornwall Road (10 m). These residences are similar in proximity to the tracks as the Project site (10 m).

Because there is no idling of rail cars associated with storage and yard facilities along this corridor, air emissions from the CN Oakville Subdivision are not anticipated to impact the Project site. However, additional quantitative modelling of the noise and vibration emissions may be required during future planning applications.

5.3 Summary of Air Quality, Dust and Odour Conclusions and Recommendations

The potential for air quality emissions at the Project site, including dust and odour, have been assessed.

Based on the review completed, the Project site development is anticipated to be compatible with the surrounding land uses from an air quality perspective. Emissions of dust and odour at the Project site are not anticipated. The Project site is not anticipated to limit surrounding existing or future industries and the ability to obtain or maintain required MECP permits or approvals.

6.0 NOISE ASSESSMENT

6.1 Industrial (Stationary) Sources

6.1.1 Guidelines

6.1.1.1 MECP Publication NPC-300 Guidelines for Stationary Noise

The applicable MECP noise guidelines for new sensitive land uses adjacent to existing industrial commercial uses are provided in MECP Publication NPC-300. NPC-300 revokes and replaces the previous noise assessment guideline, Publication LU-131 and Publication NPC-205, which was previously used for assessing noise impacts as part of Certificates of Approval / Environmental Compliance Approvals granted by the MECP for industries.

The Region's Noise Abatement Guidelines (NAG) were developed to provide an overview of the approved policy and outlines implementation processes for Existing Residential Development, Regional Capital Road projects and New Developments. The applicable portion of the NAG for this assessment is Section 4.0 – New Development.

In general terms, the NAG requires noise to be addressed from traffic, industry, commercial plazas, and any other noise sources which exceed the Ministry of the Environment, Conversation and Parks (MECP) guidelines. These sources are required to be addressed for noise sensitive land uses, such as residential buildings (e.g. single family homes, apartments and condominiums), and institutional buildings (e.g. hospitals, old age homes, etc.).

The MECP NPC-300 guideline sets out noise limits for two main types of noise sources:

- Non-impulsive, "continuous" noise sources such as ventilation fans, mechanical equipment, and vehicles while moving within the property boundary of an industry. Continuous noise is measured using 1-hour average sound exposures (L_{eq} (1-hr) values), in dBA; and
- Impulsive noise, which is a "banging" type noise characterized by rapid rise time and decay. Impulsive noise is measured using a logarithmic mean (average) level (L_{LM}) of the impulses in a one-hour period, in dBAI.

Furthermore, the guideline requires an assessment at, and provides separate guideline limits for:

- Outdoor points of reception (e.g., back yards, communal outdoor amenity areas); and
- Façade points of reception such as the plane of windows on the outdoor façade which connect onto noise sensitive spaces, such as living rooms, dens, eat-in kitchens, dining rooms and bedrooms.

The applicable noise limits at a point of reception are the higher of:

- The existing ambient sound level due to road/rail traffic, or
- The exclusion limits set out in the guideline.

The following tables set out the exclusion limits from the guideline.

Table 5: NPC-300 Exclusion Limits for Non-Impulsive Sounds (L_{eq} (1-hr), dBA)

Time of Day	Class 1 Area		Class 4 Area	
	Plane of Windows of Noise Sensitive Spaces	Outdoor Points of Reception	Plane of Windows of Noise Sensitive Spaces	Outdoor Points of Reception
7 am to 7 pm	50	50	60	55
7 pm to 11 pm	50	50	60	55
11 pm to 7 am	45	n/a	55	n/a

Table 6: NPC-300 Exclusion Limits for Impulsive Sounds (L_{LLM}, dBAI)

Time of Day	No. of Impulses in a 1-hour Period	Class 1 Area		Class 4 Area	
		Plane of Windows of Noise Sensitive Spaces	Outdoor Points of Reception	Plane of Windows of Noise Sensitive Spaces	Outdoor Points of Reception
7 am to 11 pm	9 or more	50	50	60	55
	7 to 8	55	55	65	60
	5 to 6	60	60	70	65
	4	65	65	75	70
	3	70	70	80	75
	2	75	75	85	80
	1	80	80	90	85
11 pm to 7 am	9 or more	45	n/a	55	n/a
	7 to 8	50	n/a	60	n/a
	5 to 6	55	n/a	65	n/a
	4	60	n/a	70	n/a
	3	65	n/a	75	n/a
	2	70	n/a	80	n/a
	1	75	n/a	85	n/a

Notes:

n/a Not Applicable. Outdoor points of reception are not considered to be noise sensitive during the overnight period.

\- Area classifications are: Class 1 – Urban, Class 4 - Urban Redevelopment.

The applicable guideline limits for infrequent events such as emergency generator set testing are +5 dB higher than the values above.

6.1.2 Proposed Area Classification

Under Ministry of the Environment, Conservation & Parks (MECP) Publication NPC-300 noise guidelines, noise sensitive receptors are defined using area classifications. The receptor areas are classified as either:

- Class 1 – Urban areas
- Class 2 – Suburban / semi-rural areas
- Class 3 – Rural areas
- Class 4 – Infill areas

Depending on the receptor area classification, different guideline limits apply. Classes 1, 2 and 3 were included in the predecessor guidelines to NPC-300, namely MECP Publications NPC-205, NPC-232, and LU-131. The Class 4 designation is a new designation, intended to allow for infill and redevelopment, whilst still protecting residences from undue noise.

Based on the nature of the area, the Class 1 area urban sound level limits apply. The area is urban in nature and dominated by man-made sounds, including road traffic noise and an "urban hum", 24-hours per day. However, the redevelopment site also meets the definition and requirements for a Class 4 area and it could be recommended and appropriate to issue a Class 4 designation for the development lands.

In NPC-300, a Class 4 area is defined as:

> "Class 4 area" means an area or specific site that would otherwise be defined as Class 1 or 2 and which:
>
> - is an area intended for development with new noise sensitive land use(s) that are not yet built;
> - is in proximity to existing, lawfully established stationary source(s); and
> - has formal confirmation from the land use planning authority with the Class 4 area classification which is determined during the land use planning process.

Additionally, areas with existing noise sensitive land use(s) cannot be classified as Class 4 areas." Section C4.4.2 of Publication NPC-300 further discusses the use of Class 4 areas:

> "Class 4 area classification is based on the principle of formal confirmation of the classification by the land use planning authority. Such confirmation would be issued at the discretion of the land use planning authority and under the procedures developed by the land use planning authority, in the exercise of its responsibility and authority under the Planning Act.
>
> The following considerations apply to new noise sensitive land uses proposed in a Class 4 area:
>
> - an appropriate noise impact assessment should be conducted for the land use planning authority as early as possible in the land use planning process that verifies that the applicable sound level limits will be met;
> - noise control measures may be required to ensure the stationary source complies with the applicable sound level limits at the new noise sensitive land use;
> - noise control measures may include receptor based noise control measures and/or source based noise control measures;

- source based noise control measures may require an MECP approval;
- receptor based noise control measures may require agreements for noise mitigation, as described in Part A of this guideline;
- prospective purchasers should be informed that this dwelling is located in a Class 4 area through appropriate means and informed of the agreements for noise mitigation. Registration on title of the agreements for noise mitigation is recommended. Additionally, registration on title of an appropriate warning clause to notify purchasers that the applicable Class 4 area sound level limits for this dwelling are protective of indoor areas and are based on the assumption of closed windows, such as warning clause F in Section C8.3 is also recommended; and
- any final agreements for noise mitigation as described in Part A of this guideline and all other relevant documentation are to be submitted to the MECP by the stationary source owner(s) when applying for an MECP approval. These agreements will be assessed during the review of the application for MECP approvals."

The Project meets the definitions and requirements for a Class 4 area listed in Publication NPC-300:

- the site is within an area intended for new high-intensity development;
- the site is in proximity existing lawfully established stationary sources, including Dana Canada Corporation; and
- An appropriate, detailed noise impact assessment has been conducted as part of the zoning by-law amendment application (i.e., this report).

This report will provide the predict sound levels against both Class 1 and Class 4 limits. It is important to note that the Class 4 designation only applies to the development lands. Existing noise-sensitive receptors in the area will remain as Class 1 areas. Therefore, the designation will not allow for industries to increase their noise impacts at existing residences.

6.1.3 Guideline Summary and Interpretation

The following presents a summary of the guidelines and settlements presented above.

- The applicable Ministry of the Environment noise guideline for assessing new residential development applications is Publication NPC-300, which is also referenced in the Regions' NAG.
- The Class 1 and Class 4 limits been examined in this study.

6.1.4 Subject Site Visit and Noise Observations

A site visit to the area were conducted by SLR personnel on December 27th, 2021, to identify significant sources of noise, vibration, odour, or dust in the Subject site neighbourhood. In general, industrial noise was not audible at the Project site.

Dana Canada Corp. is located to the north across the Oakville subdivision rail line. Given the quantity and size of rooftop HVAC and cooling equipment, the facility was modelled in detail.

Alliance Packaging Inc. Is located to the west of the project site. Given the proximity, quantity and size of rooftop HVAC and cooling equipment, the facility was modelled in detail.

Though not audible during the site visit, the rooftop equipment on the Oakville Centre for Vision and potentially open bay door at Speedy Auto-Service were also modelled.

No impulsive noise sources were observed to be present during the site visit by SLR personnel, or would be anticipated based on the types of surrounding land uses. Impulsive noise impacts are not assessed further.

Based on imagery and SLR's site visit, there are no significant sources of industrial vibration in the area that would impact the development. Therefore, an assessment of industrial vibration impacts is not required.

6.1.5 Sources of Interest

Based on the information obtained from the local industries and from our site visits, the significant sources of noise in the area of the project have been identified. Noise emission rates for the equipment/ activities were determined based on aerial photography supplemented by information from SLR's in-house database. Modelled noise sources include:

- HVAC mechanical equipment;
- General exhaust fans;
- Noise emanating from open bay doors; and
- Air cooled condensers.

Figure 5 shows the location of all modelled noise sources. Noise emission data used in the assessment can be found in Appendix D.

6.1.6 Noise Modelling and Results

Worst-case scenario noise levels from the surrounding Commercial/ industrial operations were modelled using Cadna/A, a computerized version of the internationally recognized ISO 9613-2 noise propagation algorithms. This is the preferred noise modelling methodology 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 (worst-case assessment of noise levels):

- Temperature: 10°C;
- Relative Humidity: 70%;
- Ground Absorption G: G=0 (reflective) as default global parameter;
- Reflection: An order of reflection of 1 was used (accounts for noise reflecting from walls);
- Wall Absorption Coefficients: Set to 0.37 (37 % of energy is absorbed, 63% reflected); and
- Terrain: ground level contours added to match existing conditions.

The current level of design for the project does not currently have any outdoor living areas (OLAs). As such this report has not assessed any potential OLAs, but should be included in future reports, if the design incorporates these.

Predicted sound levels were evaluated from surrounding industries. The predicted noise levels are shown in **Figures 6a and 6b**, from the surrounding stationary continuous noise sources during the daytime/evening and night-time, respectively. Impacts compared to the NPC-300 guideline limits are shown in **Table 7** below.

Table 7: Maximum Stationary Sound Levels

Building	Worst Case Façade	Predicted Worst-Case Sound Level		Meets Class 1 Guideline Minimums? (Day & Eve / Night)	Meets Class 4 Guideline Minimums? (Day & Eve / Night)
		Day/Eve (dBA)[1]	Night (dBA)[1]		
A	North	53	53	No / No	Yes / Yes
B	North	49	48	Yes / No	Yes / Yes
C1	North/West	44	43	Yes / Yes	Yes / Yes
C2	North	46	44	Yes / Yes	Yes / Yes
D1	North/East	54	53	No / No	Yes / Yes
D2	West	53	52	No / No	Yes / Yes
D3	North	44	44	Yes / Yes	Yes / Yes

Notes: [1] Sound levels are L_{eq} (1-hr) sound levels, in dBA.

Sound levels are predicted to exceed NPC-300 default exclusionary Class 1 limits on the subject site at multiple buildings. Though not modelled in this report, it is anticipated that the ambient conditions at the project would be elevated due to the road traffic volumes along Kerr Street and Speers Road, as well as the rail volumes along the northern rail corridor. The above presented excess are anticipated to be less than those presented in this report. Potential mitigation measures are discussed in the next section of the report.

The predicted sound levels are expected to meet the default exclusionary Class 4 limits. This will also be further discussed further in the next section.

6.1.7 Required Noise Mitigation Measures

6.1.7.1 Class 1 Area Designation

Based on the noise modelling above, excesses of up of the Class 1 guideline limits are predicted on various façades the proposed development.

The above excesses of the guideline limits (Class 1) are due to a large number of modelled sources at both the Dana Facility and the Alliance Facility. Both facilities were modeled based on generic SLR data and assumed operations of the facilities. Direct contact should be made with both facilities to acquire proper sound levels and facility operations before detailed mitigation measures can be specified.

6.1.7.2 Class 4 Area Designation

Alternatively, requesting a Class 4 Area designation from the Town allows for the application of relaxed guideline limits for the development. The exclusionary sound level limits for the Class 4 Area facades are 10 dBA higher than the MECP default guideline limits for a Class 1 area. A 5 dBA increase in the guideline limits is applied to the outdoor amenity areas of a Class 4 designated area.

Based on a preliminary review, the proposed development meets the requirements outlined in NPC-300 (e.g. new development not yet built, located near lawfully established facilities, etc.), and can be sought from the Town of Oakville.

With a Class 4 designation, the Project site would meet Class 4 guidelines with no additional physical mitigation for all the surrounding stationary noise sources.

6.1.7.3 Noise Warning Clauses

A Type E noise warning clause is required for a Class 1 designation. See Appendix A for warning clause details. The warning clauses must be registered on Title and included in all agreements of purchase and sale or lease and all rental agreements.

If Class 4 Area designation is required, "Type F" warning clause is needed for all units. See Appendix A for warning clause details. The warning clauses must be registered on Title and included in all agreements of purchase and sale or lease and all rental agreements.

6.2 Transportation Sources

6.2.1 Transportation Noise Sources

Noise impacts from transportation sources were investigated in detail. Transportation noise sources of interest with the potential to produce noise at the proposed development are:

- Speers Road;
- Kerr Street;
- Rail traffic along the Oakville Subdivision rail line; and
- Queen Elizabeth Way.

The sound level generated by the Queen Elizabeth Way (QEW) has been deemed to be insignificant at the Project site. This is due to the large setback distance between Project and the QEW.

Sound exposure levels at the development due to these sources have been predicted, and this information has been used to identify façade, ventilation, and warning clause requirements.

6.2.2 MECP Publication NPC-300

6.2.2.1 Noise Sensitive Developments

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 8 to 12 below summarize the applicable surface transportation (road and rail) criteria limits.

6.2.2.2 Location Specific Criteria

Table 8 summarizes criteria in terms of energy equivalent sound exposure (L_{eq}) levels 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, sleep areas have more stringent criteria than Living / Dining room space.

Table 8: MECP Publication NPC-300 Sound Level Criteria for Road and Rail Noise

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

Notes: [1] Whistle noise is excluded for OLA noise assessments and included for Living / Dining Room and Sleeping Quarter assessments.
[2] Road and Rail noise impacts are to be combined for assessment of OLA impacts.

Table 9 summarizes the noise mitigation requirements for outdoor amenity areas ("Outdoor Living Areas" or "OLAs"). This would include the ground level patios/backyards and raised terraces.

Table 9: MECP Publication NPC-300 Outdoor Living Area Mitigation Requirements

Time Period	Equivalent Sound Level in Outdoor Living Area (dBA)	Ventilation Requirements
Daytime (0700-2300h)	$\leq$ 55	• None
	55 to 60 incl.	• Noise barrier **OR** Warning Clause A
	> 60	• Noise barrier to reduce noise to 55 dBA **OR** • Noise barrier to reduce noise to 60 dBA and Warning Clause B

6.2.2.3 Ventilation and Warning Clauses

Table 10 summarizes requirements for ventilation where windows potentially would have to remain closed as a means of noise control. Despite implementation of ventilation measures where required, if sound exposure levels exceed the guideline limits in Table 10, warning clauses advising future occupants of the potential excesses are required.

Table 10: MECP Publication NPC-300 Ventilation & Warning Clause Requirements

Assessment Location	Time Period	Energy Equivalent Sound Exposure Level - L_{eq} (dBA)		Ventilation and Warning Claus Requirements [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 /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/ provision to add air conditioning + Type C Warning Clause
		> 60		Central Air Conditioning + Type D Warning Clause

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

6.2.2.4 Building Shell Requirements

Table 11 provides sound level thresholds which, if exceeded require the building shell and components (i.e., wall, windows) to be designed to ensure that the Table 8 indoor sound criteria are met.

Table 11: MECP Publication NPC-300 Building Component Requirements

Assessment Location	Time Period	Energy Equivalent Sound Exposure 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] Including whistle noise.
[2] Building component requirements are assessed separately for Road and Railway noise. The resultant sound isolation parameter is required to be combined to determine and overall acoustic parameter.

In addition to the building component criteria outlined in Table 11, NPC-300 also includes a façade construction requirement for rail noise only, outlined in Table 12. The façade construction requirements are necessary only if the development is located in the first row of dwellings.

Table 12: MECP Publication NPC-300 Rail Noise Façade Requirements

Assessment Location	Distance to Railway	L_{eq} – 24 hr [1,2] (dBA)	Noise Control Requirement
Plane of Window	Less than 100 m	≤ 60	No additional requirement
		> 60	Brick Veneer or Acoustic Equivalent Required
	Greater than 100m	≤ 60	No additional requirement
		> 60	No additional requirement

Notes: [1] Assessed for development located within the first row of dwellings.
[2] Including whistle noise, if applicable.

6.3 Transportation Impact Assessment

6.3.1 Traffic Data and Future Projections

6.3.1.1 Roadway Traffic Data

Existing traffic data for both Speers Road and Kerr Street were obtained from the Traffic Impact Study (TIS), completed by GHD Limited, dated July 2019. AADT (annual average daily traffic) volumes were calculated based on the growth rate presented in the TIS report. Vehicle breakdown percentages were calculated from the turning movement counts and additional data in the TIS report for the intersection of Speers Road and Kerr Street. Copies of traffic data used can be found in **Appendix E**. The following table summarizes the road traffic volumes used within the analysis.

Table 13: Summary of Road Traffic Data Used in the Transportation Analysis

Roadway Link	2032 Traffic Levels (AADT)	% Day/ Night Volume Split [1]		Commercial Traffic Breakdown		Vehicle Speed (km/h)
		Daytime	Night-time	% Medium Trucks	% Heavy Trucks	
Speers Road – East of Kerr Street	28589	90%	10%	6	0.6	60
Speers Road – West of Kerr Street	17735	90%	10%	8.1	1.1	60
Kerr Street	14967	90%	10%	5.5	0.7	50

Notes: [1] Based on traffic data projected and provided by GHD TIS report.
[2] Commercial traffic breakdown is based on the turning movement counts and Symchro 9 Report data from the GHD TIS report.

6.3.2 Railway Traffic Data

Freight and passenger traffic volumes for the CN Oakville Subdivision rail line were obtained directly from CN, and were assessed based on an annual growth rate of 2.5%. Future railway traffic data for the GO commuter trains were obtained directly from Metrolinx. Both electric and diesel volumes were provided by Metrolinx on January 11th 2022. However, Metrolinx has requested that for acoustic assessments, all trains should employ diesel parameters. There is an anti-whistling by-law in affect at the Kerr Street at-grade crossing, therefore warning horns/whistles are not used and as a result are not included in this study. Copies of the rail traffic data are provided in **Appendix E**. The future rail traffic data used in the assessment is summarized in the following table:

Table 14: Summary of Rail Traffic Data Used in the Transportation Analysis

Rail	Train Type	No. of Trains		Typical No. of Locomotives	Typical No. of Cars	Vehicle Speed (km/h)
		Daytime	Night-time			
CN Freight[1]	Diesel Locomotive	10	0	4	25	97
Via Passenger[1]	Diesel Locomotive	20	0	4	10	153
GO Metrolinx Commuter	Diesel Locomotive	214	41	1/2 [2]	12	153

Notes: [1] Railway traffic data was grown using a default 2.5% annually to 2032.
[2] Mextrolinx's future operations will use both single and double locomotive consists.
- An assessment of warning bell noise was not included in the study.

6.4 Projected Sound Levels

Future (2032) road traffic sound levels at the proposed development were predicted using Cadna/A, a commercially available noise propagation modelling software. Roadways were modelled as line sources of sound, with sound emission rates calculated using ORNAMENT algorithms, the road traffic noise model of the MECP. These predictions are equivalent to those made using the MECP's ORNAMENT or STAMSON v5.04 road traffic noise models.

Future CN and GO Metrolinx rail sound levels at the proposed development were predicted using the FTA/FRA modelling algorithms included in Cadna/A, a commercially available noise propagation modelling software. FTA reference sound levels were used for diesel locomotives and rail cars.

Sound levels were predicted along the façades 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 the structure.

6.4.1 Façade Sound Levels

Predicted worst-case façade sound levels are presented in Table 15. The transportation façade sound levels of the development, showing the ranges of predicted daytime and night-time sound levels are shown in Figures 7a and 7b for the combined roadway and railway impacts on the development.

Table 15: Summary of Transportation Facade Sound Levels

Building	Façade [1]	Combined Transportation Sound Levels [1]	
		L_{eq} Day (dBA)	L_{eq} Night (dBA)
Podium	North	72	68
	East	69	64
	South	68	61
	West	69	65
Tower / Midrise	North	71	67
	East	68	63
	South	65	58
	West	68	64

Notes: [1] Sound Levels shown are the maximums along the facade and are not necessarily for the same location for the various source types.

6.4.1.1 Outdoor Living Areas

At this stage, no outdoor living areas have been presented for the development.

Landscaped areas at grade are considered to be publicly accessible; and have not been included as amenity spaces in this assessment.

6.5 Façade Assessment

6.5.1 Glazing Requirements

Based on the sound levels shown in Table 15, façade sound levels were predicted to exceed the above criteria at multiple locations throughout the development. Therefore, an assessment of glazing requirements is necessary for meeting the indoor sound level requirements outlined in Table 11.

Indoor sound levels and required facade Sound Transmission Classes (STCs) were estimated using the procedures outlined in National Research Council Building Practice Note BPN-56.

The following assumptions were considered for both buildings:

- 70% glazing for both living rooms, and 50% glazing and bedroom facades;
- sleeping quarters were assumed to have a façade-to-floor area ratio of 100%;
- living/dining rooms were assumed to have a façade-to-floor area ratio of 50%; and
- non-glazing portion of wall was assumed to have a rating of STC 45 for all locations.

The acoustic requirements are provided below in Table 16, which is the STC rating taking into consideration roadway noise and the assumptions listed above. The façade calculations are included in Appendix E.

Table 16: Façade Sound Transmission Class (STC) Requirements

Building	Façade	Non-Glazing Component	Glazing Requirements [1]	
			Living Room	Bedroom
Podium	North	45	35	36
	East	45	32	32
	South	45	OBC (26)	OBC (26)
	West	45	33	33
Tower	North	45	34	35
	East	45	31	31
	South	45	OBC (22)	OBC (22)
	West	45	32	32

Notes: [1] OBC = Ontario Building Code, meeting a rating of STC 29.

It should be noted that corner units are likely to require an increase of 3 STC points as the space has noise contributions from two (2) exposed sides.

The combined glazing and frame assembly must be designed to ensure the overall sound isolation performance for the entire window unit meets the sound isolation requirements. It is recommended window manufacturers test data be reviewed to confirm acoustical performance is met.

The closest façade of the development (north side of Development [closest to the tracks]) will need to have a brick veneer or acoustic equivalent as listed in Table 12, since the predicted sound levels presented in Table 15 and the setback distance between the closest façade to the rail track is less than 100 m.

The glazing requirements above are approximated, based on the generic room, façade and glazing dimensions. Once detailed floor plans and façade plans become available, the glazing requirements should be re-assessed and reviewed by an Acoustical Consultant.

6.5.2 Ventilation and Warning Clause Requirements

Based on the predicted noise sound levels, warning clauses are recommended to 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.

Forced air heating with provisions for future installation of central air conditioning, and a Type C warning clause, is recommended for all affected units with façade sound levels that are between 56 and 65 dBA during the daytime, or between 51 and 60 dBA during night-time hours.

Central Air Conditioning and a Type D Warning Clause is recommended for all affected units with façade sound levels that are above 65 dBA and 60 dBA during daytime and night-time hours, respectively.

As the Project progresses in design, applicable buildings can have appropriate warning clauses assigned to each. Example warning clause text can be found in Appendix A.

6.6 Impacts of the Development on Itself

Impacts of the proposed development on itself are anticipated to be negligible. At the time of this assessment, the proposed development's mechanical systems have not been sufficiently designed.

If common mechanical systems will be implemented as part of the proposed development, the impacts from all equipment should comply with the MECP Publication NPC-300 guideline limits. For the mechanical equipment that is to be included with proposed development, the potential impacts should be assessed as part of the final building design. The criteria can be met at all surrounding and on-site receptors by the 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 at either the site plan approval or building permit approval stages.

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

6.7 Impacts of the Development the Surrounding Area

The building mechanical systems have not been designed at this time. Impacts of the proposed development on the surrounding area are still anticipated to be negligible.

If common mechanical systems will be implemented as part of the proposed development, such equipment has the potential to result in noise impacts on residential spaces within the development. This equipment is required to meet MECP Publication NPC 300 requirements at the facades of the noise sensitive spaces within the development. Therefore, the potential impacts should be assessed as part of the final building design. The criteria are expected to be met at all on-site receptors with the appropriate selection of mechanical equipment, by locating equipment to minimize noise impacts within the development, and by incorporating control measures (e.g., silencers) into the design.

If individual air conditioning systems are to be implemented for each residential unit for the proposed site, there will be very little chance of offsite impacts as compliance is required to be met onsite.

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

6.8 Summary of Noise Conclusions and Recommendations

The potential for noise impacts on the potential future development have been assessed. Based on the results of our studies:

- SLR staff completed a site visit on December 27th 2021, to the Subject Site and surrounding area. Several industries were identified as contributors to potential stationary noise impacts at portions of the Subject Site.
- An assessment of surrounding stationary noise was conducted. The following are the results, depending on the Class limits assigned to the Project:
  - Noise impacts from surrounding industrial noise are predicted to exceed the NPC-300 Class 1 guideline limits at some Project buildings. Additional mitigation strategies are required. A Type E Warning Clause must be registered on Title and included in all agreements of purchase and sale or lease and all rental agreements.
  - Noise impacts from surrounding industrial noise are predicted to meet the NPC-300 Class 4 guideline limits. No additional mitigation strategies are required. A Type F Warning Clause must be registered on Title and included in all agreements of purchase and sale or lease and all rental agreements.
- An assessment of transportation noise impacts from the surrounding roadways was completed.
- Based on transportation façade sound levels upgraded glazing is required within the development, as outlined in outlined in Section 6.5.1. As the glazing analysis was completed based on generic room and window dimensions, the analysis should be revised once detailed floor and façade plans are available.
- A Type C and / or D Warning Clause will be required for various buildings within the Project. These will be specified later in the approval process.
- As the mechanical systems for the proposed development have not been designed at the time of this assessment, the acoustical design should be reviewed by an Acoustical Consultant as part of the final building design.

7.0 TRANSPORTATION VIBRATION ASSESSMENT

7.1 Transportation Vibration Criteria

The vibration criteria for this project and those for both CN and Metrolinx (GO).

7.1.1 CN/GO Guidelines

For rail activity along the Oakville Sub line, the applicable vibration limits for CN trains is found in the updated 1983 document “Proposed Provincial Policy on the Environmental Protection of New Residential Development Adjacent to Railways”. This is further confirmed in the RAC/FCM , 2007 Report “Proximity Guidelines and Best Practices”. In addition, GO (Metrolinx) also has their own 2010 “Principal Main Line Requirements for New Development” document. These documents have the applicable vibration criteria for dwellings should not exceed 0.14 mm/sec RMS between 4 Hz and 200 Hz.

7.2 Vibration Assessment

The vibration assessment was completed for the trains operating to the north of the proposed development along the Oakville Sub railway line. Vibration levels were measured to assess compliance with the applicable guidelines.

As the development lands are less than 75 m from the railway corridor, a detailed transportation vibration assessment is required under the guidelines.

A site visit was conducted on December 27, 2022 by SLR staff to conduct measurements of ground-borne vibrations on the proposed site and surrounding lands. Vibration data was recorded at at two locations (V1 and V2). The further setback from the train location (V2) was chosen to be closer than the distance of the closest façade of the proposed site. The measurement locations are shown in Figure 8.

Multiple measurements were taken to capture typical operations and to quantify the potential impacts at the proposed development. The data were post-processed to compute the 1-second sliding window RMS amplitudes of vibration velocity in units of mm/s. The measured velocities at V2 location, for the trains along the Oakville Sub ranged between 0.04 mm/s RMS to 0.09 mm/s vertical RMS. This is well below the applicable limits of 0.14 mm/s vertical RMS.

Vibration levels from the trains on the Oakville Sub are expected to meet the 0.14 mm/s vertical RMS criterion at the nearest development façade. Therefore, no vibration mitigation measures are recommended.

8.0 CONCLUSIONS

A Compatibility/ Mitigation assessment has been completed, examining the potential for air quality, dust, odour, noise, and vibration impacts from road and nearby industrial land uses to affect the future development on the Subject Site.

The assessment has included a review of the surrounding industrial facilities in the area. Their available MECP approvals have been reviewed.

The potential for air quality impacts on the potential future development, including dust and odour, have been reviewed. Based on the results of our studies, air quality impacts at the Project site are not anticipated.

The potential for noise impacts on the potential future development have been reviewed. Stationary noise impacts have been calculated and shown to exceed the Class 1 limits, but passes the Class 4 limits. The Project meets the definitions and requirements for a Class 4, if the Town approves the designation. Noise mitigation measure to meet Class 1 limits would require direct contact should be made with both facilities to acquire proper sound levels and facility operations before detailed mitigation measures can be specified. Appropriate Warning Clause E or F will be required to be registered on Title and included in all agreements of purchase and sale or lease and all rental agreements.

Upgraded glazing and façade constructions, as well as various Warning Clauses (include AC conditioning) are required to address transportation noise.

Vibration levels from the trains on the Oakville Sub are expected to meet the criterion at the nearest development façade. Therefore, no vibration mitigation measures are recommended.

With the above suggested mitigation measures, adverse impacts from dust, odour, noise and vibration are not anticipated on the Subject site.

9.0 REFERENCES

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Ontario Ministry of the Environment, Conservation & Parks (MECP), 1993, Publication NPC-207: *Impulse Vibration in Residential Buildings (Draft)*

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Ontario Ministry of the Environment, Conservation & Parks (MECP), 2013, Publication NPC-300: *Environmental Noise Guideline: Stationery and Transportation Sources – Approval and Planning*

Ontario Ministry of Municipal Affairs and Housing (MMAH, 2020). *Provincial Policy Statement*

Ontario Regulation 419/01 – *Local Air Quality.*

Railway Association of Canada/ Federation of Canadian Municipalities (RAC/ FCM), 2013, *Guidelines for New Development in Proximity to Railway Operations*

U.S. Federal Transit Administration (FTA, 2013), *Transit Noise and Vibration Impact Assessment Manual*

10.0 STATEMENT OF LIMITATIONS

This report has been prepared and the work referred to in this report has been undertaken by SLR Consulting (Canada) Ltd. (SLR) for Urban Strategies Inc., hereafter referred to as the "Client". It is intended for the sole and exclusive use of the Client. The report has been prepared in accordance with the Scope of Work and agreement between SLR and the Client. Other than by the Client and as set out herein, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted unless payment for the work has been made in full and express written permission has been obtained from SLR.

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DRAWINGS

Compatibility & Mitigation Study Air Quality, Dust, Odour, Noise & Vibration

Urban Strategies Inc.

SLR Project No: 241.30440.00000

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True North

URBAN STRATEGIES

530, 550, 588 KERR STREET AND
131, 171 SPEERS ROAD
OAKVILLE, ON

SITE AND CONTEXT PLAN

Scale: 1: 4,000		METRES
Date: Jan. 25, 2022	Rev 0.0	Figure No. 1
Project No. 241.30440.00000		

SLR
global environmental solutions

LEGEND:

- Residential
- Residential Apartment
- Open Space
- Utility and Transportation
- Commercial
- Commercial Residential
- Commercial Residential Employment
- Employment Industrial
- Institutional

True North

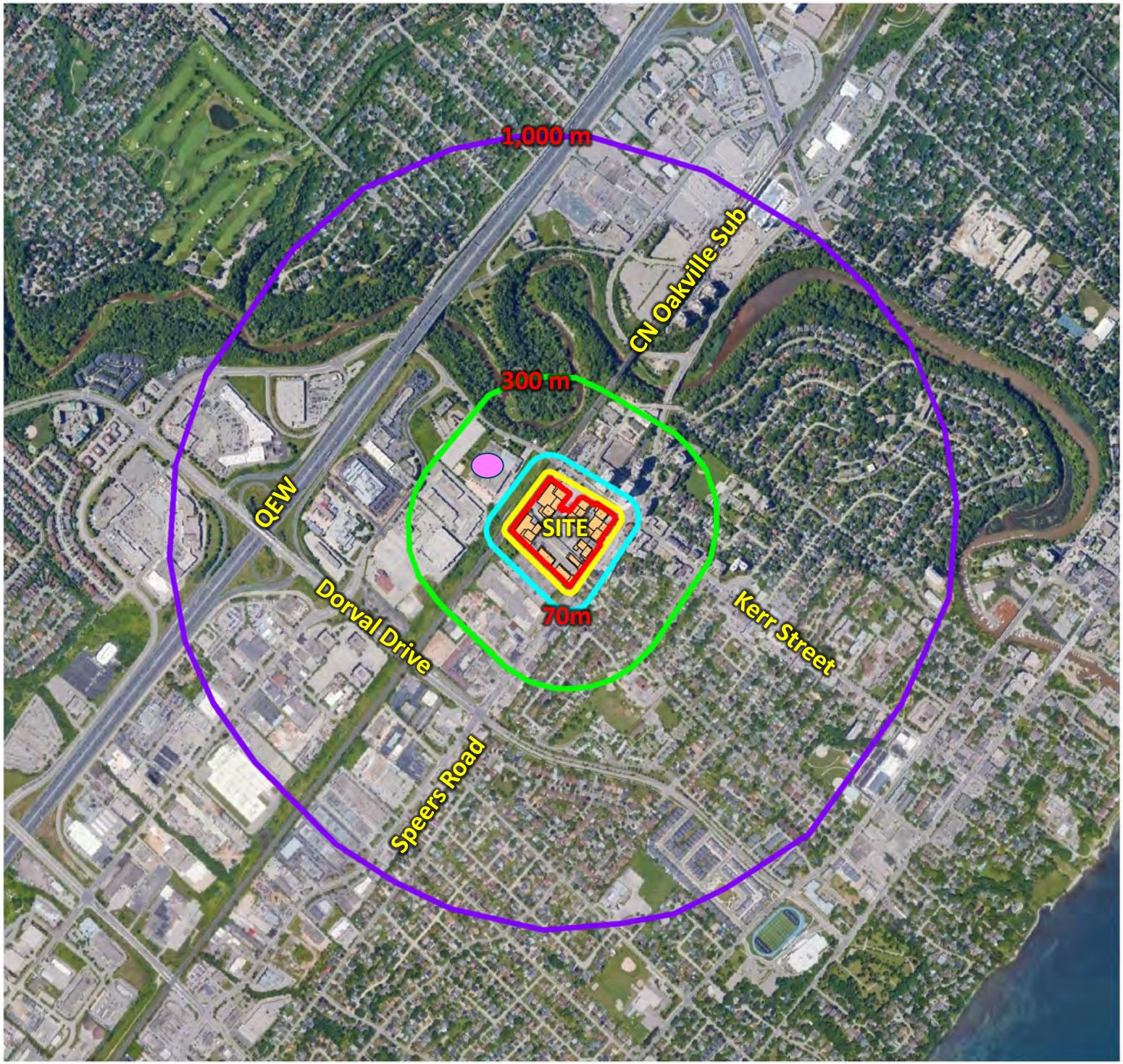
URBAN STRATEGIES

530, 550, 588 KERR STREET AND
131, 171 SPEERS ROAD
OAKVILLE, ON

AREA ZONING MAP

Scale: n/a		METRES
Date: Jan. 25, 2022	Rev 0.0	Figure No. **2**
Project No. 241.30440.00000		

SLR global environmental solutions



LEGEND:

Dana Facility with MECP Permit (ECA/EASR)

True North

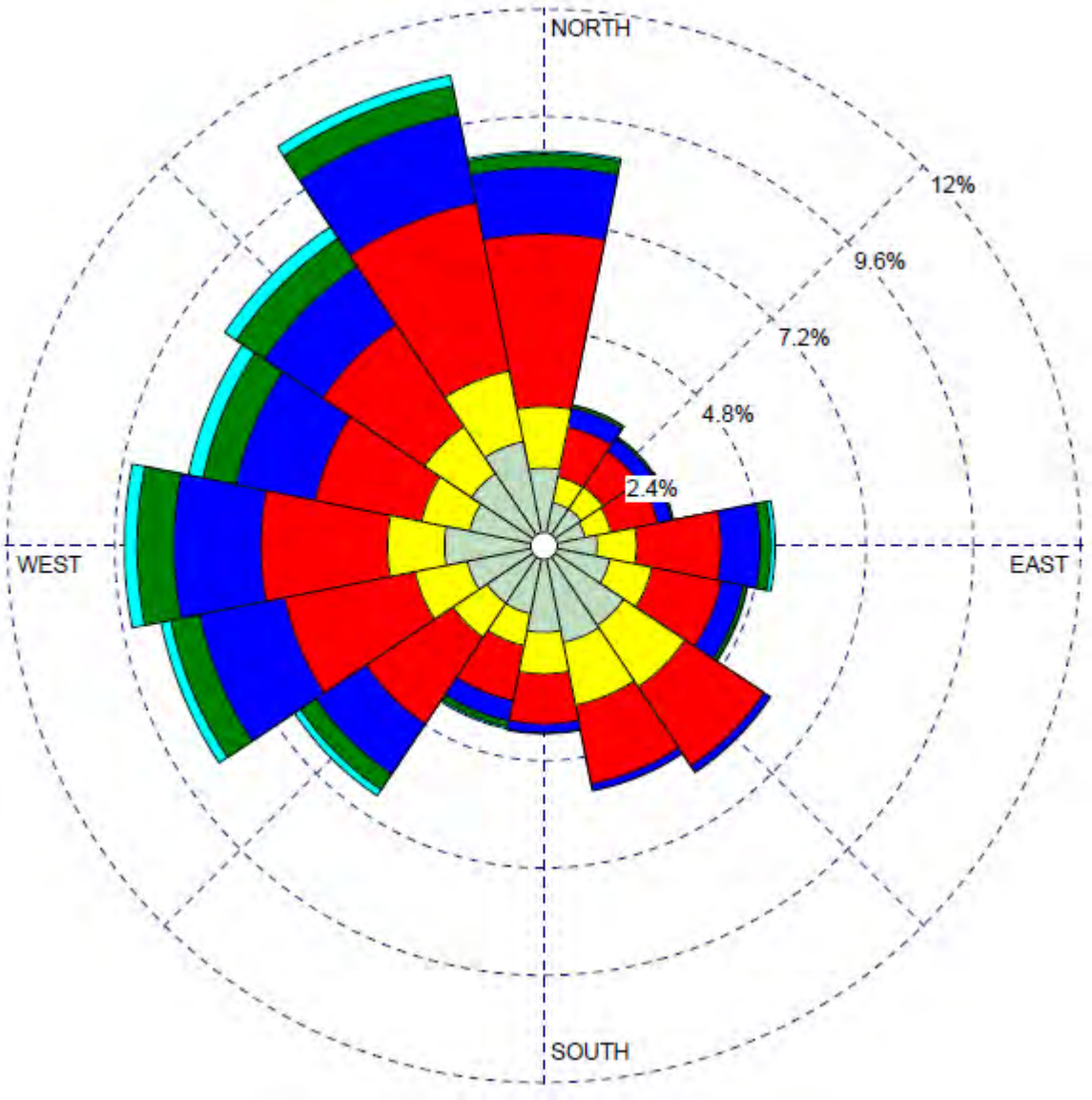
URBAN STRATEGIES

530, 550, 588 KERR STREET AND 131, 171 SPEERS ROAD OAKVILLE, ON

CLASS III GUIDELINE D-6 SETBACK DISTANCES AND LOCAL INDUSTRIES WITHIN 1000 M OF THE SITE

Scale: 1:16,000		METRES
Date: Jan. 25, 2022	Rev 0.0	Figure No. 3
Project No. 241.30440.00000		

SLR global environmental solutions



WIND SPEED
(m/s)

- >= 11.10
- 8.80 - 11.10
- 5.70 - 8.80
- 3.60 - 5.70
- 2.10 - 3.60
- 0.50 - 2.10

Calms: 0.00%

True North

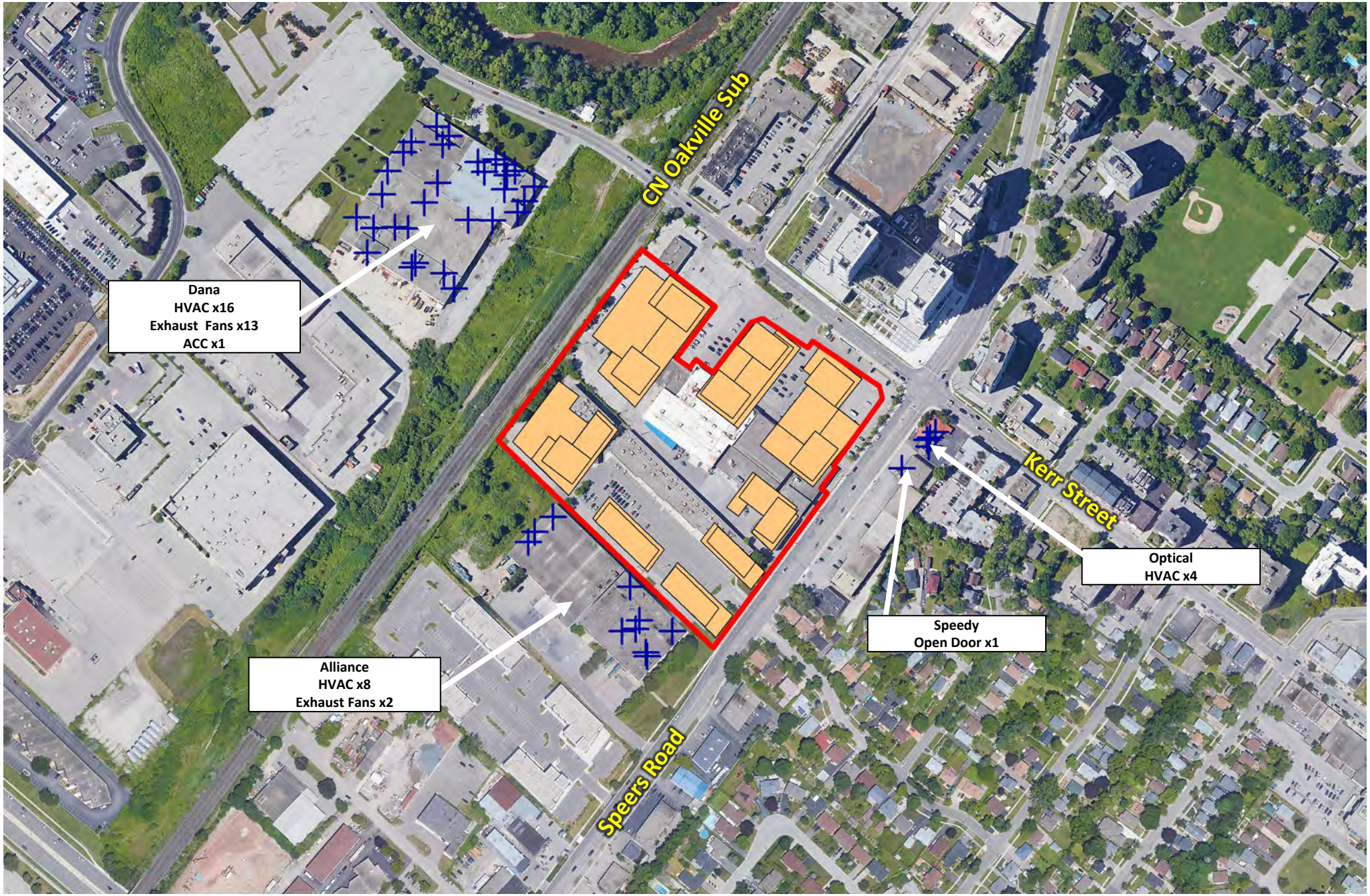
URBAN STRATEGIES

530, 550, 588 KERR STREET AND
131, 171 SPEERS ROAD
OAKVILLE, ON

WIND FREQUENCY DISTRIBUTION DIAGRAM – TORONTO PEARSON INTERNATIONAL AIRPORT

Scale: n/a		METRES
Date: Jan. 25, 2022	Rev 0.0	Figure No. **4**
Project No. 241.30440.00000		

SLR
global environmental solutions



URBAN STRATEGIES

530, 550, 588 KERR STREET AND 131, 171 SPEERS ROAD

STATIONARY SOURCE LOCATION

True North

Scale: 1:4,000

METRES

Date: Jan 25, 2022

Rev 0.0

Project No. 241.30440.00000

Figure No. **5**

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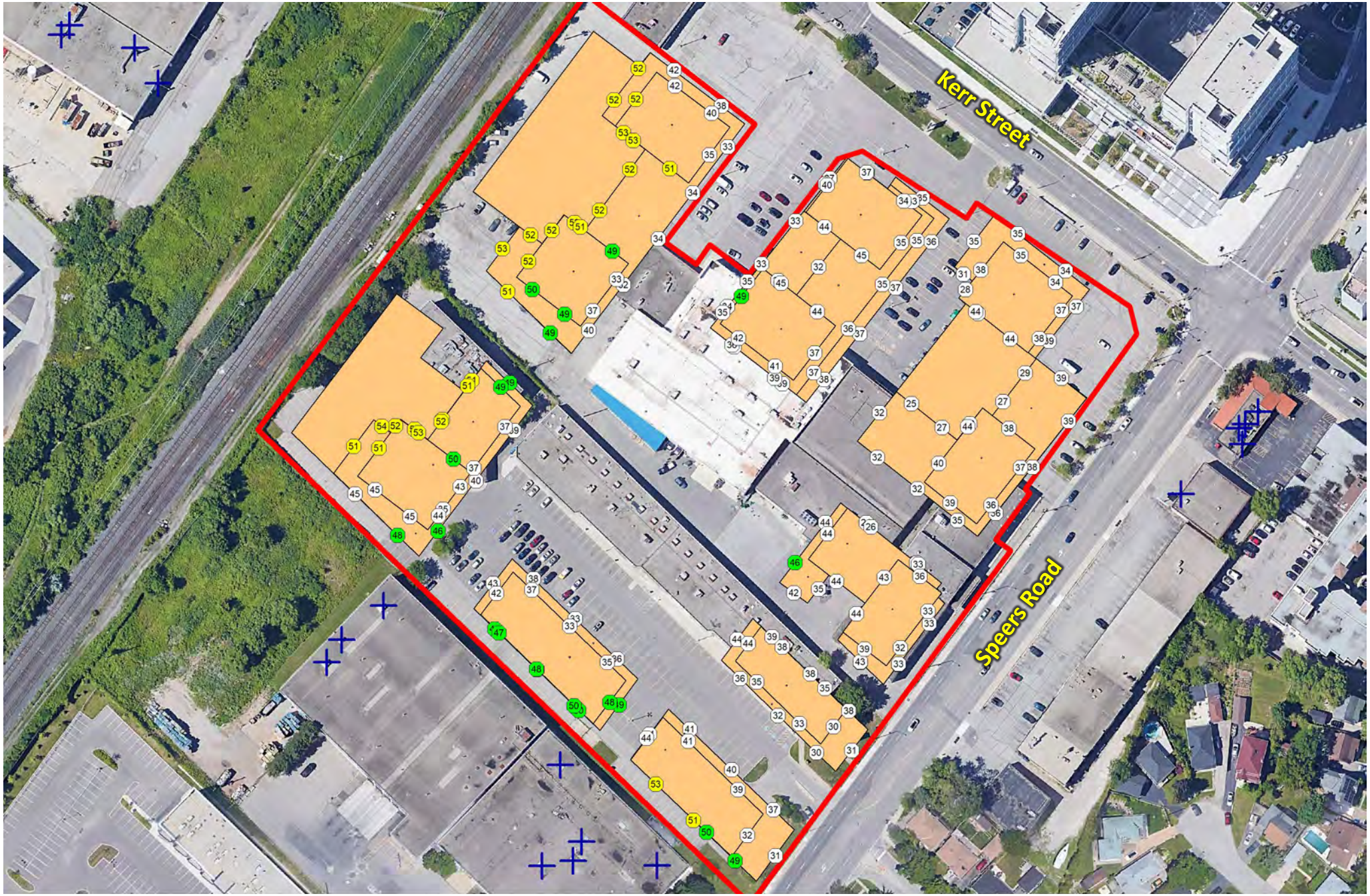


URBAN STRATEGIES

530, 550, 588 KERR STREET AND 131, 171 SPEERS ROAD

MODELLED STATIONARY NOISE IMPACTS – DAYTIME/EVENING

True North

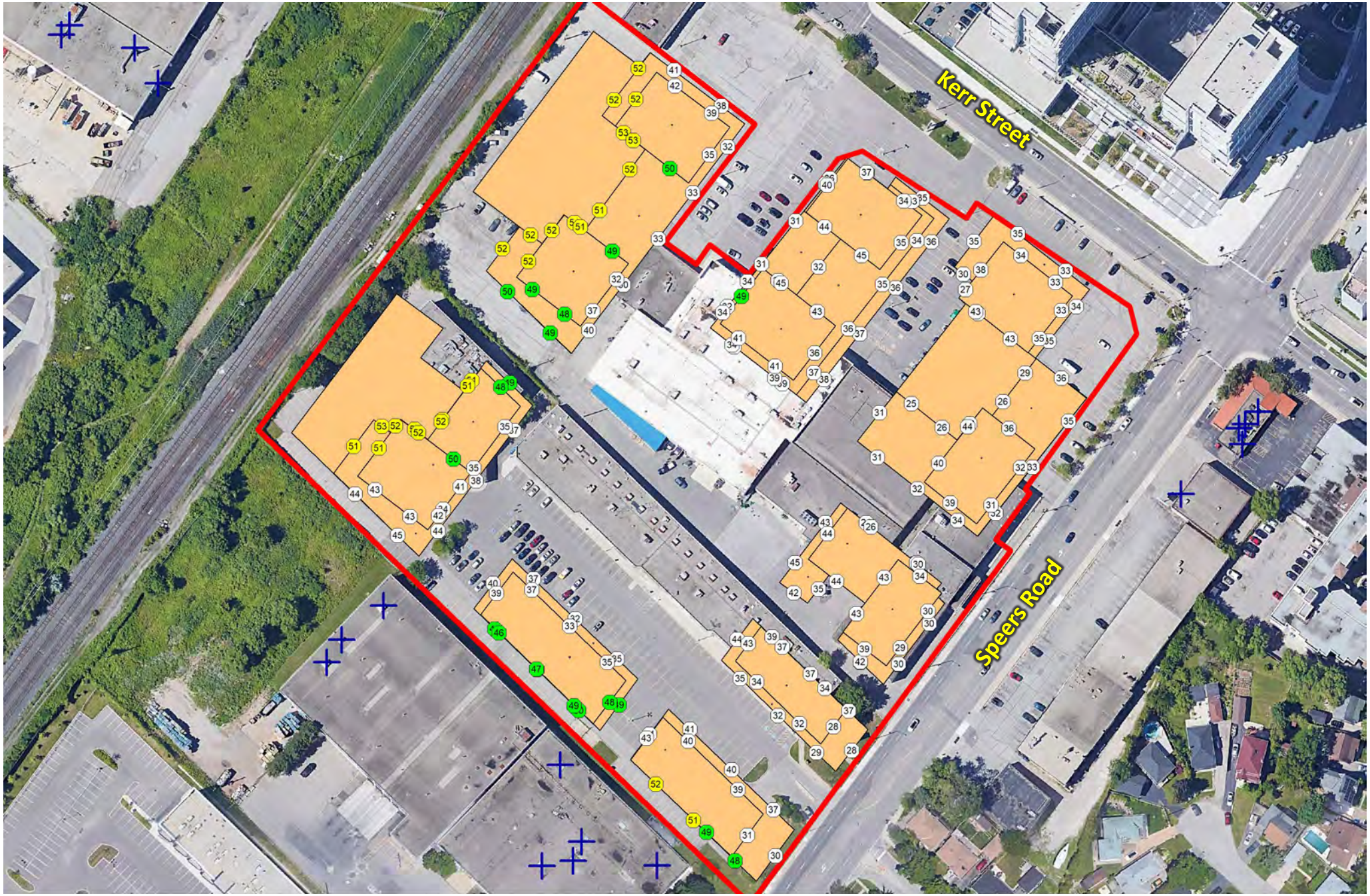
Scale: 1:1750 METRES

Date: Jan 25, 2022 Rev 0.0

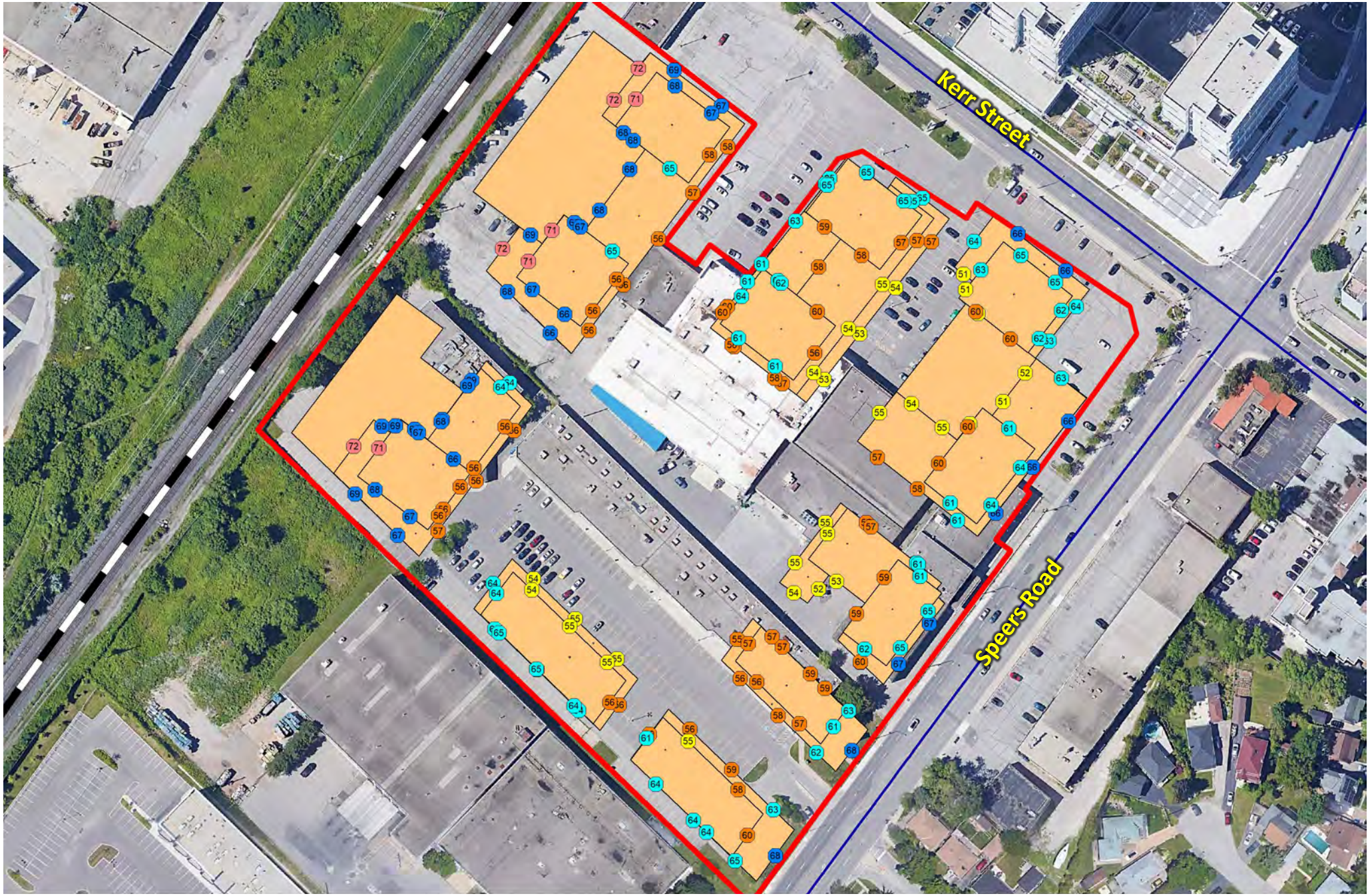
Project No. 241.30440.00000

Figure No. **6a**

SLR global environmental solutions



URBAN STRATEGIES	True North	Scale: 1:1750	METRES	SLR global environmental solutions
530, 550, 588 KERR STREET AND 131, 171 SPEERS ROAD		Date: Jan 25, 2022 Rev 0.0	Figure No. **6b**	
MODELLED STATIONARY NOISE IMPACTS – NIGHTTIME		Project No. 241.30440.00000		



URBAN STRATEGIES

530, 550, 588 KERR STREET AND 131, 171 SPEERS ROAD

MODELLED TOTAL TRANSPORTATION NOISE IMPACTS - DAYTIME

True North

Scale: 1:1750 METRES

Date: Jan 25, 2022 Rev 0.0

Project No. 241.30440.00000

Figure No. **7a**

SLR global environmental solutions

URBAN STRATEGIES

530, 550, 588 KERR STREET AND 131, 171 SPEERS ROAD

MODELLED TOTAL TRANSPORTATION NOISE IMPACTS - NIGHTTIME

True North

Scale: 1:1750 METRES

Date: Jan 25, 2022 Rev 0.0

Project No. 241.30440.00000

Figure No. **7b**

SLR global environmental solutions

URBAN STRATEGIES

530, 550, 588 KERR STREET AND 131, 171 SPEERS ROAD

VIBRATION MONITORING POSITIONS

True North

Scale: 1:1750

METRES

Date: Jan 25, 2022

Rev 0.0

Figure No. **8**

Project No. 241.30440.00000

SLR global environmental solutions

APPENDIX A Mitigation and Warning Clause Summary

Compatibility & Mitigation Study Air Quality, Dust, Odour, Noise & Vibration

Urban Strategies Inc.

SLR Project No: 241.30440.00000

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SUMMARY OF MITIGATION MEASURES AND WARNING CLAUSES

Warning Clauses

Warning Clauses may be used individually or in combination. The following 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:

Transportation Sources (Road and Rail)

MECP Type C Warning Clause

"This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."

MECP Type D Warning Clause

"This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."

Canadian National Railways Warning Clause

"Purchasers are advised that the Canadian National Railway Company or its assigns or successors in interest has or have a right-of-way within 300 metres from the land the subject thereof. There may be alterations to or expansions of the rail facilities on such right-of-way in the future, including the possibility that the railway or its assigns or successors as aforesaid may expand its operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwelling(s). CNR will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid right-of-way."

Metrolinx Warning Clause

"Metrolinx, carrying on business as GO Transit, and its assigns and successors in interest are the owners of lands within 300 metres from the land which is the subject hereof. In addition to the current use of the lands owned by Metrolinx, there may be alterations to or expansions of the rail and other facilities on such lands in the future including the possibility that GO Transit or any railway entering into an agreement with GO Transit to use the Metrolinx lands or Metrolinx and their respective assigns or successors as aforesaid may expand their operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding

the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwellings. Metrolinx will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under its lands."

Industrial Sources

MECP Type E Warning Clause

"Purchasers/tenants are advised that due to the proximity of adjacent industries, noise from these facilities may at times be audible."

MECP Type E Warning Clause

"Purchasers/tenants are advised that sound levels due to the adjacent industries are required to comply with sound level limits that are protective of indoor areas and are based on the assumption that windows and exterior doors are closed. This dwelling unit has been supplied with a ventilation/air conditioning system which will allow windows and exterior doors to remain closed."

APPENDIX B Development Drawing

Compatibility & Mitigation Study Air Quality, Dust, Odour, Noise & Vibration

Urban Strategies Inc.

SLR Project No: 241.30440.00000

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CN Railway Corridor
No residential Zone
23st
22st
26st
Shepherd Road Extension
Shepherd Rd
8st
Central Park
Private Street
22st
24st
Kerr Street
St Augustine Dr. Extension
Private Street
28st
8st
8st
12st
18st
Urban Square
Speers Rd
ugustine Dr.

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APPENDIX C Industries and MECP Permits Within 1000m of Subject Site

Compatibility & Mitigation Study Air Quality, Dust, Odour, Noise & Vibration

Urban Strategies Inc.

SLR Project No: 241.30440.00000

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Land Uses Surrounding 530, 550, 588 Kerr Street and 131, 171 Speers Road

Name	Address	Description	MECP ECA or EASR No. (Date)	MECP Guideline D-6					
				Class	A of I	R M S	Actual Dist.	Within A of I?	Within R M S?
Dana Canada Corp.	656 Kerr Street	Automotive Part Manufacturing	4354-93HMEV (2014)	II	300	70	85	Yes	-
Print Panther	212 Wyecroft Road	Print Shop	-	I	70	20	130	-	-
Speedy Auto Service	112 Speers Road	Automotive Repair	-	I	70	20	22	Yes	-
VL Motion Systems Inc.	212 Wyecroft Road	Industrial Equipment Supplier	-	I	70	20	130	-	-
Fluidline Inc.	208 Wyecroft Road	Hydraulic Equipment Supplier	-	I	70	20	195	-	-
Outside the Box Toronto Inc.	220 Wyecroft Road	Print Shop	-	I	70	20	210	-	-
South Oakville Chrysler Dodge Jeep Service	175 Wyecroft Road	Auto Repair Shop	-	I	70	20	465	-	-
Motion Endeavours	191 Wyecroft Road	Car Dealer	-	I	70	20	415	-	-
Tesla	225 Wyecroft Road	Car Dealer	-	I	70	20	340	-	-
Jaguar	227 Wyecroft Road	Car Dealer	-	I	70	20	360	-	-
TDL Group Corp Head Office	874 Sinclair Road	Standby Generator Set	2109-5VSSDE (2004)	II	300	70	450	-	-
High Reach Inc.	45 Shepherd Road	Forklift Dealer	-	I	70	20	145	-	-
Alliance Labelling	201 Speers Road	Packaging Company		II	300	70	0	Yes	Yes
MechaniQ	230 Speers Road	Automotive Repair	-	I	70	20	195	-	-
Oakville Auto Radiator	234 Speers Road	Automotive Repair	8263-832S4D (2010)	I	70	20	75	-	-
Value Tirecraft Oakville	238 Speers Road	Tire Shop	-	I	70	20	85	-	-
Quik Oil Change	260 Speers Road	Oil Change Service	-	I	70	20	135	-	-
Matos Paving and Stone Supplier	459 Woody Road	Paving Contractor	-	II	300	70	270	Yes	-
Preferred Auto Service	263 Speers Road	Auto Repair Shop	-	I	70	20	325	-	-
Coin op Car Wash	291 Speers Road	Car Wash	-	I	70	20	420	-	-
Abrex Paint Ltd.	280 Wyecroft Road	Paint and Coating Manufacturing	3344-7TKQBQ (2009)	II	300	70	725	-	-
BSC Inc.	735 Weller Court	Chemical Treatment	8817-7VWLPV (2009)	II	300	70	720	-	-
Holcim (Canada) Inc. (NOT ON SITE)	690 Dorval Drive	Portable Asphalt Plant	1421-8YFP7K (2012)	II	300	70	580	-	-
Oakville Transit	430 Wyecroft Road	Bus Storage Facility	1544-8AWNFF (2013)	I	70	20	1000	-	-
Rona	399 Speers Road	Hardware Store	5555-6XCQ42 (2007)	I	70	20	820	-	-

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APPENDIX D Stationary Source Data

Compatibility & Mitigation Study Air Quality, Dust, Odour, Noise & Vibration

Urban Strategies Inc.

SLR Project No: 241.30440.00000

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Table D.1: Summary of Noise Source Sound Power Levels

Source Description	Maximum Sound Power Levels (1/1 Octave Band Levels)									Total PWL (dBA)	Notes
	32 (dB)	63 (dB)	125 (dB)	250 (dB)	500 (dB)	1000 (dB)	2000 (dB)	4000 (dB)	8000 (dB)		
Dana Corporation											
5 ton HVAC	71	74	75	75	74	72	68	64	58	76	- based on SLR historical data - Duty cycle of 60/ 60/ 30 minutes for day, evening, night
10 ton HVAC	76	79	80	80	79	77	73	69	63	81	- based on SLR historical data - Duty cycle of 60/ 60/ 30 minutes for day, evening, night
Exhaust Fan 1	--	104	104	97	93	87	83	77	71	95	- based on SLR historical data
Exhaust Fan 2	--	99	99	92	88	82	78	72	66	90	- based on SLR historical data
Exhaust Fan 3	--	--	88	83	81	74	68	64	60	81	- based on SLR historical data
ACC	94	97	98	98	97	95	91	87	81	99.5	- based on SLR historical data
Alliance											
5 ton HVAC	71	74	75	75	74	72	68	64	58	76	- based on SLR historical data - Duty cycle of 60/ 60/ 30 minutes for day, evening, night
10 ton HVAC	76	79	80	80	79	77	73	69	63	81	- based on SLR historical data - Duty cycle of 60/ 60/ 30 minutes for day, evening, night
Exhaust Fan 1	--	--	80	76	79	71	67	64	59	79	- based on SLR historical data
Exhaust Fan 2	--	99	99	92	88	82	78	72	66	90	- based on SLR historical data
Optical											
5 ton HVAC	71	74	75	75	74	72	68	64	58	76	- based on SLR historical data - Duty cycle of 60/ 60/ 30 minutes for day, evening, night
Speedy											
Open Bay Door	--	85	90	83	87	86	93	92	92	98	- based on SLR historical data - Duty cycle of 60/ 0/ 0 minutes for day, evening, night

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APPENDIX E Traffic Data and Calculations

Compatibility & Mitigation Study Air Quality, Dust, Odour, Noise & Vibration

Urban Strategies Inc.

SLR Project No: 241.30440.00000

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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)	2031 AADT Traffic Volumes	Auto %	Med %	Hvy %	Auto	Med	Heavy	Road Gradient (%)	PWL (dBA)	Source Height, s (m)
Speers_E	Speers Road East of Kerr Street	Daytime Impacts	60	16	25730	93.4%	6.0%	0.6%	24030	1539	160	0	**84.6**	**0.9**
Speers_E	Speers Road East of Kerr Street	Nighttime Impacts	60	8	2859	93.4%	6.0%	0.6%	2670	171	18	0	**78.0**	**0.9**
Speers_W	Speers Road West of Kerr Street	Daytime Impacts	60	16	15962	90.9%	8.1%	1.1%	14502	1286	173	0	**83.4**	**1.0**
Speers_W	Speers Road West of Kerr Street	Nighttime Impacts	60	8	1774	90.9%	8.1%	1.1%	1611	143	19	0	**76.9**	**1.0**
Kerr	Kerr Street	Daytime Impacts	50	16	13470	93.8%	5.5%	0.7%	12630	742	98	0	**79.9**	**0.9**
Kerr	Kerr Street	Nighttime Impacts	50	8	1497	93.8%	5.5%	0.7%	1403	82	11	0	**73.3**	**0.9**

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Train Count Data

System Engineering
Engineering Services

1 Administration Road
Concord, ON, L4K 1B9
T: 905.669.3264
F: 905.760.3406

TRANSMITTAL

To: *Destinataire :*	Novus Environmental 150 Research Lane Suite 105 Guelph, ON N1G 4T2	*Project :*	OAK-22.02-550 Kerr St, Oakville, ON
Att'n:	R.L. Scott Penton	*Routing:*	scottp@novusenv.com
From: *Expéditeur :*	Michael Vallins	*Date:*	09/05/2018
Cc:	Adjacent Development CN via e-mail		

☐ Urgent ☐ For Your Use ☐ For Review ■ For Your Information ☐ Confidential

Re: Train Traffic Data – CN Oakville Subdivision near 550 Kerr St in Oakville, ON

Please find attached the requested Train Traffic Data; this data does not reflect GO Metrolinx Traffic. The application fee in the amount of **$500.00** +HST will be invoiced.

Should you have any questions, please do not hesitate to contact the undersigned at 905-669-3264.

Sincerely,
CN Design & Construction

Michael Vallins P.Eng
Manager of Public Works
public_works_gld@cn.ca

Date: 2018/09/05 Project Number: OAK-22.02-550 Kerr St, Oakville, ON

Dear Scott:

Re: Train Traffic Data – CN Oakville Subdivision near 550 Kerr St in Oakville, ON

The following is provided in response to Scott's 2018/04/17 request for information regarding rail traffic in the vicinity of 550 Kerr Street in Oakville at approximately Mile 22.02 on CN's Oakville Subdivision.

Typical daily traffic volumes are recorded below. However, traffic volumes may fluctuate due to overall economic conditions, varying traffic demands, weather conditions, track maintenance programs, statutory holidays and traffic detours that when required may be heavy although temporary. For the purpose of noise and vibration reports, train volumes must be escalated by 2.5% per annum for a 10-year period.

Typical daily traffic volumes at this site location are as follows:

***Maximum train speed is given in Miles per Hour**

	0700-2300			
Type of Train	Volumes	Max.Consist	Max. Speed	Max. Power
Freight	0	140	60	4
Way Freight	7	25	60	4
Passenger	14	10	95	2

	2300-0700			
Type of Train	Volumes	Max.Consist	Max. Speed	Max. Power
Freight	0	140	60	4
Way Freight	0	25	60	4
Passenger	0	10	95	2

The volumes recorded reflect westbound and eastbound freight and passenger operations on CN's Oakville Subdivision.

Except where anti-whistling bylaws are in effect, engine-warning whistles and bells are normally sounded at all at-grade crossings. There is one (1) at-grade crossing in the immediate vicinity of the study area at Mile 21.94. Anti-whistling bylaws are not in effect at this crossing. Please note that engine warning whistles may be sounded in cases of emergency, as a safety and or warning precaution at station locations and pedestrian crossings and occasionally for operating requirements.

With respect to equipment restrictions, the gross weight of the heaviest permissible car is 286,000 lbs.

The (Quadruple) mainline track is considered to be continuously welded rail throughout the study area. The presence of four (4) switches located at Mile

21.92,22.04,22.05 and 22.13 may exacerbate the noise and vibration caused by train movements.

The Canadian National Railway continues to be strongly opposed to locating developments near railway facilities and rights-of-way due to potential safety and environmental conflicts. Development adjacent to the Railway Right-of-Way is not appropriate without sound impact mitigation measures to reduce the incompatibility. For confirmation of the applicable rail noise, vibration and safety standards, Adjacent Development, Canadian National Railway Properties at Proximity@cn.ca should be contacted directly.

I trust the above information will satisfy your current request.

Sincerely,

Michael Vallins P.Eng
Manager of Public Works
public_works_gld@cn.ca

Aaron Haniff

From: Rail Data Requests <RailDataRequests@metrolinx.com>
Sent: January 11, 2022 1:44 PM
To: Dylan Diebolt
Cc: Aaron Haniff
Subject: RE: Rail Traffic Request - 580 Kerr Street, Oakville

Good afternoon Dylan,

Further to your request dated January 5, 2022, the subject lands (550 and 580 Kerr Street, Oakville) are located within 300 metres of the Metrolinx Oakville Subdivision (which carries Lakeshore West GO rail service).

It's anticipated that GO rail service on this Subdivision will be comprised of diesel and electric trains. The GO rail fleet combination on this Subdivision will consist of up to 2 locomotives and 12 passenger cars. The typical GO rail weekday train volume forecast near the subject lands, including both revenue and equipment trips is in the order of 255 trains. The planned detailed trip breakdown is listed below:

	1 Diesel Locomotive	2 Diesel Locomotives	1 Electric Locomotive	2 Electric Locomotives		1 Diesel Locomotive	2 Diesel Locomotives	1 Electric Locomotive	2 Electric Locomotives
Day (0700-2300)	60	11	101	42	Night (2300-0700)	8	4	21	8

The current track design speed near the subject lands is 95 mph (153 km/h).

There is an *anti-whistling by-law* in affect at the Kerr Street at-grade crossing.

With respect to future electrified rail service, Metrolinx is committed to finding the most sustainable solution for electrifying the GO rail network and we are currently working towards the next phase.

Options have been studied as part of the Transit Project Assessment Process (TPAP) for the GO Expansion program, currently in the procurement phase. The successful proponent team will be responsible for selecting and delivering the right trains and infrastructure to unlock the benefits of GO Expansion. The contract is in a multi-year procurement process and teams have submitted their bids to Infrastructure Ontario and Metrolinx for evaluation and contract award. GO Expansion construction will get underway in late 2022 or 2023

However, we can advise that train noise is dominated by the powertrain at lower speeds and by the wheel- track interaction at higher speeds. Hence, the noise level and spectrum of electric trains is expected to be very similar at higher speeds, if not identical, to those of equivalent diesel trains.

Given the above considerations, it would be prudent at this time, for the purposes of acoustical analyses for development in proximity to Metrolinx corridors, to assume that the acoustical characteristics of electrified and diesel trains are equivalent. In light of the aforementioned information, acoustical models should employ diesel train parameters as the basis for analyses. We anticipate that additional information regarding specific operational parameters for electrified trains will become available in the future once the proponent team is selected.

Operational information is subject to change and may be influenced by, among other factors, service planning priorities, operational considerations, funding availability and passenger demand.

It should be noted that this information only pertains to Metrolinx rail service. It would be prudent to contact other rail operators in the area directly for rail traffic information pertaining to non-Metrolinx rail service.

I trust this information is useful. Should you have any questions or concerns, please do not hesitate to contact me.

Best regards,

Harrison Rong
Project Coordinator, Third Party Projects Review
Metrolinx
20 Bay Street | Suite 600 | Toronto | Ontario | M5J 2W3

From: Dylan Diebolt <ddiebolt@slrconsulting.com>
Sent: January 5, 2022 11:55 AM
To: Rail Data Requests <RailDataRequests@metrolinx.com>
Cc: Aaron Haniff <ahaniff@slrconsulting.com>
Subject: Rail Traffic Request - 580 Kerr Street, Oakville

Hello,

We are working on a residential mixed use development project at 550, 580 Kerr Street in Oakville. The site is southwest of the of the intersection of Kerr St and Speers Rd and located between the rail/road crossings at Dorval Drive and at Kerr Street, as shown below. We need the usual rail traffic data to allow us to complete our transportation noise assessment.

As always, thanks for your help.
Dylan

Dylan Diebolt

Acoustics Noise and Vibration Scientist

O +1 226 706 8080

C +1 226 203 8694

E ddiebolt@slrconsulting.com

SLR Consulting (Canada) Ltd
100 Stone Road West, Suite 201, Guelph, ON N1G 5L3

BPN 56 Calculation Procedure - Required Glazing STC Rating (Fixed Veneer) - ROADWAY

Receptor ID	Receptor Description	Sound Levels			Room / Façade Inputs					Source Inputs		Veneer - Component 1		Glazing - Component 2	
		Façade Sound Level: (dBA)	Free - field Corr: (dBA)	Req'd Indoor Sound Level: (dBA)	Glazing as % of Wall Area	Exp Wall Ht (m)	Exp Wall Length (m)	Room Depth (m)	Room Absorption:	Incident Sound Angle: (deg)	Spectrum type:	Veneer STC (STC)	Component Category:	Component Category:	Req'd Glazing STC (STC)
DAYTIME															
Podium Level	North Façade, Livingroom	56	3	45	70%	3.0	3.0	6.0	Intermediate	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**14**
	North Façade, Bedroom	56	3	45	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**14**
	East Façade, Livingroom	64	3	45	70%	3.0	3.0	6.0	Intermediate	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**22**
	East Façade, Bedroom	64	3	45	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**22**
	South Façade, Livingroom	68	3	45	70%	3.0	3.0	6.0	Intermediate	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**26**
	South Façade, Bedroom	68	3	45	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**26**
	West Façade, Livingroom	64	3	45	70%	3.0	3.0	6.0	Intermediate	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**22**
	West Façade, Bedroom	64	3	45	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**22**
Tower Level	North Façade, Livingroom	55	3	45	70%	3.0	3.0	6.0	Intermediate	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**13**
	North Façade, Bedroom	55	3	45	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**13**
	East Façade, Livingroom	62	3	45	70%	3.0	3.0	6.0	Intermediate	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**20**
	East Façade, Bedroom	62	3	45	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**20**
	South Façade, Livingroom	64	3	45	70%	3.0	3.0	6.0	Intermediate	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**22**
	South Façade, Bedroom	64	3	45	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**22**
	West Façade, Livingroom	60	3	45	70%	3.0	3.0	6.0	Intermediate	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**18**
	West Façade, Bedroom	60	3	45	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**18**
NIGHT-TIME															
Podium Level	North Façade, Livingroom	49	3	45	70%	3.0	3.0	6.0	Intermediate	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**7**
	North Façade, Bedroom	49	3	40	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**12**
	East Façade, Livingroom	58	3	45	70%	3.0	3.0	6.0	Intermediate	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**16**
	East Façade, Bedroom	58	3	40	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**21**
	South Façade, Livingroom	61	3	45	70%	3.0	3.0	6.0	Intermediate	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**19**
	South Façade, Bedroom	61	3	40	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**24**
	West Façade, Livingroom	57	3	45	70%	3.0	3.0	6.0	Intermediate	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**15**
	West Façade, Bedroom	57	3	40	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**20**
Tower Level	North Façade, Livingroom	48	3	45	70%	3.0	3.0	6.0	Intermediate	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**6**
	North Façade, Bedroom	48	3	40	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**11**
	East Façade, Livingroom	56	3	45	70%	3.0	3.0	6.0	Intermediate	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**14**
	East Façade, Bedroom	56	3	40	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**19**
	South Façade, Livingroom	58	3	45	70%	3.0	3.0	6.0	Intermediate	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**16**
	South Façade, Bedroom	58	3	40	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**21**
	West Façade, Livingroom	54	3	45	70%	3.0	3.0	6.0	Intermediate	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**12**
	West Façade, Bedroom	54	3	40	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	D. mixed road traffic, distant aircraft	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**17**

BPN 56 Calculation Procedure - Required Glazing STC Rating (Fixed Veneer) - RAIL LOCOMOTIVE

Receptor ID	Receptor Description	Sound Levels			Room / Façade Inputs					Source Inputs		Veneer - Component 1		Glazing - Component 2	
		Façade Sound Level: (dBA)	Free - field Corr: (dBA)	Req'd Indoor Sound Level: (dBA)	Glazing as % of Wall Area	Exp Wall Ht (m)	Exp Wall Length (m)	Room Depth (m)	Room Absorption:	Incident Sound Angle: (deg)	Spectrum type:	Veneer STC (STC)	Component Category:	Component Category:	Req'd Glazing STC (STC)
DAYTIME															
Podium Level	North Façade, Livingroom	69	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**34**
	North Façade, Bedroom	69	3	40	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**35**
	East Façade, Livingroom	65	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**30**
	East Façade, Bedroom	65	3	40	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**30**
	South Façade, Livingroom	46	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**11**
	South Façade, Bedroom	46	3	40	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**11**
	West Façade, Livingroom	66	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**31**
	West Façade, Bedroom	66	3	40	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**31**
Tower Level	North Façade, Livingroom	68	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**33**
	North Façade, Bedroom	68	3	40	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**34**
	East Façade, Livingroom	64	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**29**
	East Façade, Bedroom	64	3	40	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**29**
	South Façade, Livingroom	46	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**11**
	South Façade, Bedroom	46	3	40	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**11**
	West Façade, Livingroom	65	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**30**
	West Façade, Bedroom	65	3	40	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**30**
NIGHT-TIME															
Podium Level	North Façade, Livingroom	63	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**28**
	North Façade, Bedroom	63	3	35	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**34**
	East Façade, Livingroom	59	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**24**
	East Façade, Bedroom	59	3	35	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**29**
	South Façade, Livingroom	40	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**5**
	South Façade, Bedroom	40	3	35	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**10**
	West Façade, Livingroom	60	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**25**
	West Façade, Bedroom	60	3	35	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**30**
Tower Level	North Façade, Livingroom	62	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**27**
	North Façade, Bedroom	62	3	35	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**33**
	East Façade, Livingroom	59	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**24**
	East Façade, Bedroom	59	3	35	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**29**
	South Façade, Livingroom	41	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**6**
	South Façade, Bedroom	41	3	35	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**11**
	West Façade, Livingroom	59	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**24**
	West Façade, Bedroom	59	3	35	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	F. diesel railway locomotive	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**29**

BPN 56 Calculation Procedure - Required Glazing STC Rating (Fixed Veneer) - RAIL WHEEL

Receptor ID	Receptor Description	Sound Levels			Room / Façade Inputs					Source Inputs		Veneer - Component 1		Glazing - Component 2	
		Façade Sound Level: (dBA)	Free - field Corr: (dBA)	Req'd Indoor Sound Level: (dBA)	Glazing as % of Wall Area	Exp Wall Ht (m)	Exp Wall Length (m)	Room Depth (m)	Room Absorption:	Incident Sound Angle: (deg)	Spectrum type:	Veneer STC (STC)	Component Category:	Component Category:	Req'd Glazing STC (STC)
DAYTIME															
Podium Level	North Façade, Livingroom	70	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**30**
	North Façade, Bedroom	70	3	40	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**30**
	East Façade, Livingroom	66	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**26**
	East Façade, Bedroom	66	3	40	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**26**
	South Façade, Livingroom	47	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**7**
	South Façade, Bedroom	47	3	40	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**7**
	West Façade, Livingroom	67	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**27**
	West Façade, Bedroom	67	3	40	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**27**
Tower Level	North Façade, Livingroom	69	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**29**
	North Façade, Bedroom	69	3	40	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**29**
	East Façade, Livingroom	65	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**25**
	East Façade, Bedroom	65	3	40	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**25**
	South Façade, Livingroom	47	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**7**
	South Façade, Bedroom	47	3	40	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**7**
	West Façade, Livingroom	66	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**26**
	West Façade, Bedroom	66	3	40	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**26**
NIGHT-TIME															
Podium Level	North Façade, Livingroom	65	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**25**
	North Façade, Bedroom	65	3	35	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**30**
	East Façade, Livingroom	61	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**21**
	East Façade, Bedroom	61	3	35	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**26**
	South Façade, Livingroom	43	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**3**
	South Façade, Bedroom	43	3	35	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**8**
	West Façade, Livingroom	62	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**22**
	West Façade, Bedroom	62	3	35	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**27**
Tower Level	North Façade, Livingroom	64	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**24**
	North Façade, Bedroom	64	3	35	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**29**
	East Façade, Livingroom	60	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**20**
	East Façade, Bedroom	60	3	35	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**25**
	South Façade, Livingroom	43	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**3**
	South Façade, Bedroom	43	3	35	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**8**
	West Façade, Livingroom	61	3	40	70%	3.0	3.0	6.0	Intermediate	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**21**
	West Façade, Bedroom	61	3	35	50%	3.0	3.0	3.0	Very Absorptive	0 - 90	B. avg aircraft, railway wheel noise	45	D. sealed thick window, or exterior wall, or roof/ceiling	C. sealed thin window, or openable thick window	**26**