REPORT

2093, 2097 & 2101 OLD LAKESHORE ROAD AND 2096 & 2100 LAKESHORE ROAD

BURLINGTON, ONTARIO

NOISE IMPACT STUDY

RWDI # 1901341

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SUBMITTED TO

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EXECUTIVE SUMMARY

RWDI was retained to complete a Noise and Vibration Impact Study (NVIS) for the proposed 2093, 2097 & 2101 Old Lakeshore Road and 2096 & 2100 Lakeshore Road Development in Burlington, Ontario. Road traffic was identified as the main source of sound with the potential to affect the proposed development. The noise impact was assessed at the proposed development using the applicable noise guidelines to determine noise control requirements. This assessment was based on design drawings dated August 22, 2019.

Based on the analysis, the following noise control measures are required for this development:

- Suite Spandrel wall assembly with sound isolation performance of STC 45
- Suite window and sliding door glazing with sound isolation performance up to STC 32
- Suite exterior solid doors with sound isolation performance up to STC 24
- Installation of air-conditioning for all suites to allow windows to remain closed
- The inclusion of noise warning clauses related to:
    - Transportation noise in indoor spaces
    - Stationary noise sources at plane of suite windows

At this stage in the design, the noise impact of the development on itself and its surroundings could not be quantitatively assessed. However, the noise impact on both itself and its surroundings is expected to be insignificant, provided best practices in the acoustical design are followed.

The objective of this assessment was to determine the feasibility of the proposed residential development that is surrounded by existing sources of environmental noise as well as noise sensitive receptors. The study demonstrates that the development is feasible.

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

1 INTRODUCTION

RWDI was retained by Core Developments Limited to prepare a Noise Impact Study (NIS) for a proposed development at 2093, 2097 & 2101 Old Lakeshore Road and 2096 & 2100 Lakeshore Road in Burlington, Ontario. The location of the proposed development is between Lakeshore Road and Old Lakeshore Road as illustrated in **Figure 1** below. The project includes a 6-storey podium, an outdoor amenity space, and one 27-storey residential tower.

Figure 1 – Google Maps Aerial of Site

This assessment was completed to support the development applications as required by the City of Burlington. This assessment considered the impact from nearby transportation sources on the proposed development and determines the appropriate noise control measures.

The most significant noise source in the area is road traffic noise from Lakeshore Road to the north. There are also several commercial retail facilities and existing multifamily residential buildings in the area, which have rooftop HVAC units. However, since residential land uses are already existing in the area in close proximity to these buildings, the potential noise impact is expected to comply with applicable noise guidelines. Therefore, noise from stationary sources were not assessed in detail as part of this study.

The analysis was completed using the RLS-90 road traffic noise model as implemented in Cadna/A 2018 noise modelling software.

The objective of this assessment was to determine the feasibility of the proposed residential development that is surrounded by existing sources of environmental noise. This assessment was based on design drawings dated August 22, 2019.

2 IMPACT OF ENVIRONMENT ON THE PROPOSED DEVELOPMENT

RWDI assessed the impact of the future noise environment surrounding the development based on road traffic volumes and noise prediction models. This section describes the applicable criteria used for the assessment, the details of the traffic volume data, the points of noise reception considered within the development, the prediction results, and recommendations.

2.1 Applicable criteria

Applicable criteria for transportation noise sources (road traffic) and stationary noise sources (rooftop equipment on adjacent buildings) will be described in this section.

2.1.1 Transportation Noise Sources

Guidance from the Ministry of Environment and Climate Change (MOECC)[1] NPC-300 Environmental Noise Guideline was used to assess environmental noise generated by transportation-related sources including road. There are three aspects to consider, which include the following:

1. Road traffic noise in indoor living areas, which determines façade sound isolation requirements.
2. Road traffic noise in Outdoor Living Areas (OLAs), which determines OLA noise barrier requirements.
3. Road traffic noise at the plane of window, which determines HVAC system requirements.

For assessing sound originating from transportation sources, NPC-300 defines sound level criteria as summarized in **Table 1** for two types of locations: outdoor living areas (OLAs), and indoor areas of sensitive uses. Outdoor sound level limits are specified for OLAs, which include terraces and balconies with a minimum depth of 4 m and common amenity areas of a multi-unit dwelling. Indoor living areas include living rooms and sleeping quarters.

[1] *Currently identified as The Ministry of The Environment, Conservation and Parks (MECP). MOECC is used in this report for consistency with guidelines referenced.*

Table 1 – NPC-300 Limits for Transportation Sources

Assessment Location	Time Period	NPC-300 Limit L_{EQ} (averaged over time period)	Requirement
		Road	
Indoor Living Quarters	16 hr Daytime 0700-2300h	45 dBA	Façade components should be specified to achieve the indicated indoor sound levels based on the assumption of a closed window.
	8 hr Nighttime 2300-0700h		
Indoor Sleeping Quarters	16 hr Daytime 0700-2300h	45 dBA	
	8 hr Nighttime 2300-0700h	40 dBA	
Outdoor Living Areas	16 hr Daytime 0700-2300h	55 – 60 dBA	If technically and economically feasible, noise barriers should be used to achieve 55 dBA sound levels in OLAs. Otherwise warning clause "Type A" or "Type B" would be required for levels between 56-60 dBA. (see section 2.5.4)

Ventilation and warning clauses requirements for residential buildings are determined based on predicted levels of transportation noise at the exterior Plane of Window (POW) as summarized in **Table 2** below.

Table 2 – NPC-300 Ventilation and Warning Clauses Requirements

Assessment Location	Transportation Noise Level		NPC-300 Requirements
	Daytime Leq,16-hr	Nighttime Leq,8-hr	
Plane of Window	Equal or greater than 65 dBA	Equal or greater than 60 dBA	• Building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the sound level limits • Central air conditioning required to allow windows to remained closed • Warning clause "Type D" required
	Between 55 dBA and 65 dBA	Between 50 dBA and 60 dBA	• Provision for the installation of central air-conditioning • Warning clause "Type C" is required
	Less than 55 dBA	Less than 50 dBA	• Noise control measures may not be required

Assessment Location	Transportation Noise Level		NPC-300 Requirements
	Daytime Leq,16-hr	Nighttime Leq,8-hr	
Outdoor Living Areas	Greater than 60 dBA	Not Applicable	• Noise controls (barriers) should be implemented to meet the 55-60 dBA limit. • Warning Clause "Type B" required
	Between 55 dBA and 60 dBA	Not Applicable	• Noise controls (barriers) should be considered, if feasible • Warning Clause "Type A" required
	Less than 55 dBA	Not Applicable	• Noise control measures may not be required

2.1.2 Stationary Noise Sources

Guidance from the MOECC NPC-300 Environmental Noise Guideline was used to evaluate the need to assess noise from stationary noise sources for this development. Sound level limits for stationary noise sources are based on one-hour equivalent sound levels (Leq,1hr) at the Plane of Windows (POW) of residential building. For urban environments, sound level limits for stationary noise sources are typically determined relative to predicted hourly equivalent (Leq,1h) levels of road traffic noise; however, NPC-300 also includes the minimum exclusion limits of 50 dBA during the daytime or 45 dBA during the nighttime.

Based on a review of the area surrounding the project, potential stationary sources would include rooftop mechanical equipment on adjacent commercial and residential buildings. However, since the area already includes residential development near these buildings, it is expected that noise from these sources would comply with applicable sound level limits. Therefore, a quantitative assessment of stationary noise sources associated with adjacent buildings was not performed.

2.2 Road Traffic Data

The main roadway that has the potential to influence the proposed residential development is Lakeshore Road to the north of the development. As required by the NPC-300 guidelines, the volumes were adjusted to account for future growth. A summary of the traffic data used is included in **Table 3** below with more detailed information included in **Appendix A**.

Table 3 – Road Traffic Data Summary

Roadway	Future Traffic (AADT)[1]	% Day	% Night	Post Speed Limit (km/hr)	% Heavy Trucks Day	% Heavy Trucks Night
Lakeshore Road	24,162	90%	10%	50	3	3

Notes: 1 – Future traffic volumes were based on 1.0% growth rate forecasted to 2029

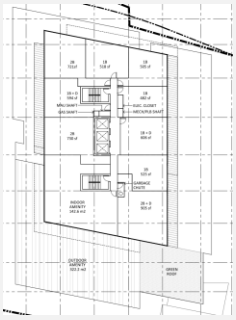
2.3 Representative Receptors for Transportation Sources

The selection of receptors affected by transportation noise sources was based on drawings dated August 22, 2019, which show massing of the towers, suite layouts, designated OLAs, and terrace and balcony dimensions.

Using the "building evaluation" feature of Cadna/A, noise levels across each façade of the residential towers were assessed. For this study, the assessment was based on the range of sound levels predicted in each façade direction.

Daytime sound levels were assessed in qualifying OLAs, which include the common outdoor amenity area as summarized in **Table 4** below.

Table 4 – Outdoor Living Area Receptor Locations

IDs	Location	Labelled Drawing
OLA	Level 7 Outdoor Living Area	

2.4 Methods & Results

Methods and results for the prediction of transportation noise from roads are presented in this section.

2.4.1 Transportation Noise

Sound levels due to the nearby road traffic were predicted using models in the Cadna/A software package. Modelling of the road traffic noise was conducted using the RLS-90 standard (RLS,1990). This allows for full 3-D geometry to be considered along with shielding and reflections from neighbouring buildings that are adjacent to the development.

To assess the impact of transportation noise on suites, ranges of sound levels across each façade were determined with the results summarized in **Table 5**. For the daytime case, predicted levels of road traffic noise across the south and west facades are illustrated in **Figure 2**.

Table 5 – Predicted Levels of Transportation Noise on Facades

Portion of Development	Direction	Maximum Road Traffic Sound Levels on Facade (dBA)	
		Daytime L_{EQ}, 16hr	Nighttime L_{EQ}, 8hr
Podium	North	68	61
	East	65	58
	South	39	32
	West	63	57
Tower	North	66	59
	East	63	56
	South	45	38
	West	62	55
OLA	West	55	n/a

Figure 2 – Daytime Road Traffic Noise Levels ($L_{EQ,8hr}$) across North and West Facades

2.5 Recommendations and Requirements

Based on an analysis of the predicted noise levels, the following recommendations and requirements were determined for the project.

2.5.1 Building Façade Components

Due to the road traffic noise levels in the area, upgraded façade components including spandrel, window glazing, and exterior doors, are required for the development.

To assess the development's feasibility, preliminary window glazing, and door sound isolation requirements were determined. These were based on following assumptions:

- Worst-case estimates of window glazing and exterior door area relative to room floor area (determined from the provided drawings)
    - 100% window glazing to floor area ratio for bedrooms on corners
    - 60% window glazing to floor area ratio for bedrooms not on corners
    - 35% window glazing and 15% exterior door to floor area ratio for living rooms
    - 5% spandrel to floor area ratio for both living rooms and bedrooms
- Acoustical character of rooms
    - Soft acoustical finishes/furniture for bedrooms
    - Intermediate acoustical finishes/furniture for living rooms
- Spandrel wall type assembly achieving a minimum STC 45 rating

Based on the predicted façade sound levels and the assumptions listed above, maximum window glazing and exterior door sound isolation requirements for each façade of each tower were determined using the BPN-56 method. The reported results are in terms of Sound Transmission Class (STC) ratings as summarized in **Table 6**.

Table 6 – Facade Component Maximum Sound Isolation Requirements

Exterior Wall Requirements	Window and Door Glazing Requirements	Solid Exterior Door Requirements
STC 45	STC 32	STC 24

The maximum requirement for the window and door glazing was determined to be STC 32, which is considered feasible using commercially available glazing and sliding glass door systems. The maximum requirement for exterior solid (non-glass) doors was determined to be STC 24. With building components meeting these requirements, the indoor transportation source sound level limits in **Table 1** are predicted to be achieved for this development. It is recommended to consult with window and door suppliers to confirm their products meet the STC rating requirements.

2.5.2 Outdoor Living Areas

The noise level in the OLA was predicted to be 55 during daytime hours. Since this is less than the 55-dBA requirement, no noise control measures are necessary for the OLA.

2.5.3 Ventilation Requirements

Since the average road traffic sound levels exceed 65 dBA during the day and 60 dBA during the night. Air conditioning is a mandatory requirement for all units. Since air-conditioning is a standard feature of this development, this requirement is considered feasible and will be achieved.

2.5.4 Warning Clauses

Warning clauses must be included on all development agreements, offers of purchase and agreements of purchase and sale or lease. Warning clauses may be used individually or in combination.

The following warning clauses are recommended by the MOECC relating to transportation sources:

Type D: required to address transportation noise in indoor spaces

"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."

Type E: required to address stationary noise sources

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

3 IMPACT OF PROPOSED DEVELOPMENT ON ITS SURROUNDINGS

3.1 Applicable Criteria

The noise produced by stationary noise sources associated with the development itself would be evaluated based on the MOECC NPC-300 Environmental Noise Guideline.

3.2 Recommendations

The impact of noise from the development on its surroundings is expected to be insignificant. Traffic noise related to the proposed development will be insignificant in relation to the traffic noise on the major roads immediately adjacent to the development. Traffic noise is therefore not of concern.

On-site stationary sources for the development are expected to consist of HVAC related equipment in the roof-top mechanical penthouse as well as various exhaust fans. As the design is currently in progress, a detailed assessment of the noise impact by the development on the surrounding environment is not possible.

Provided that best practices for the acoustical design of the building are followed, noise from mechanical equipment associated with the development is expected to be insignificant due to the nature of the proposed development.

4 IMPACT OF THE PROPOSED DEVELOPMENT ON ITSELF

4.1 Applicable Criteria

The noise produced by stationary noise sources associated with the development itself would be evaluated based on the MOECC NPC-300 Environmental Noise Guideline.

4.2 Recommendations

Consideration should be given to control air-borne and structure-born noise generated within the proposed development. Within the development itself, the main sources of noise that are likely to affect the uses of the building are the mechanical systems.

Provided that best practices for the acoustical design of the building are followed, noise from mechanical equipment associated with the development is expected to be insignificant due to the nature of the proposed development.

5 CONCLUSIONS

RWDI completed a Noise Impact Study for the proposed development at 2093, 2097 & 2101 Old Lakeshore Road and 2096 & 2100 Lakeshore Road in Burlington, Ontario. Road traffic was identified as the main sources of sound with the potential to affect the proposed development. The noise emissions were assessed at the proposed development using the applicable guidance to determine required noise control measures. This assessment was based on design drawings dated August 22, 2019.

The following noise control measures are required for this development:

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The objective of this assessment was to determine the feasibility of the proposed residential development that is surrounded by existing sources of environmental noise as well as noise sensitive receptors. The study demonstrates that the development is feasible.

6 REFERENCES

1. RLS, 1990 (RLS). Richtlinien für den Lärmschutz an Strassen. BM für Verkehr, Bonn, 1990.

2. Ontario Ministry of the Environment and Climate Change (MOECC), August 2013, Publication NPC-300, Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning

3. Controlling Sound Transmission into Buildings (BPN-56), National Research Council Canada (NRCC), 1985.

APPENDIX A

Daily Traffic Information for Noise Analysis

Estimates for 2010, Based on City Counts

Roadway Section	Two Way Daily Traffic Volume (vehicles per day)	Percent Trucks & Heavy Vehicles
Lakeshore Road, east of Elizabeth Street	20,000	3%
Elizabeth Street, south of Lakeshore Road	300	3%

Year of Data: 2010
Future Year: 2029
Year Growth: 19
Growth Rate: 1%

24,162

90/10 Day-night Split

Day: 21,745
Night: 2416

Hourly Volumes
Day:1359/hr
Night: 302/hr