Environmental Noise Feasibility Study

St. Luke's Dixie Seniors Residence Expansion

Proposed Seniors Residence Expansion

4150 Westminster Place
City of Mississauga

October 7, 2022
Project: 122-0276

Prepared for

Saint Luke's Dixie Seniors Residence

Prepared by

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VALCOUSTICS
Canada Ltd.

Version History

Version #	Date	Comments
1.0	October 7, 2022	Final – Issued to Client

TABLE OF CONTENTS

…/cont'd

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

Environmental Noise Feasibility Study

St. Luke's Dixie Seniors Residence Expansion

Proposed Seniors Residence Expansion

4150 Westminster Place
City of Mississauga

EXECUTIVE SUMMARY

Valcoustics Canada Ltd. (VCL) has been retained to prepare an Environmental Noise Feasibility Study for the proposed expansion to the existing seniors residence in support of the re-zoning application submission to the City of Mississauga.

The proposed expansion will consist of an 8-storey residential building with a single storey connection to the existing 3-storey residential building. The development will have one level of underground parking.

The sound levels on site have been determined and compared with the applicable Ministry of the Environment, Conservation and Parks (MECP) noise guideline limits to determine the need for noise mitigation.

The transportation noise source with potential to impact the proposed development is road traffic on Rathburn Road East and Tomken Road. To meet the applicable transportation noise source guideline limits:

- All residential suites in the development require mandatory air conditioning for noise control purposes.
- To meet the indoor sound level limits, exterior wall and window construction meeting the minimum non-acoustical requirements of the Ontario Building Code (OBC) will be sufficient.
- Final requirements should be checked when detailed building plans are available. This is usually done as a condition for obtaining a building permit.

1.0 INTRODUCTION

VCL was retained to prepare an Environmental Noise Feasibility Study in support of the re-zoning application submission to the City of Mississauga. The potential sound levels and the mitigation measures required for the proposed development to comply with the MECP noise guideline requirements are outlined herein.

1.1 THE SITE AND SURROUNDING AREA

The development is located at 4150 Westminster Place, in the City of Mississauga. The site is currently occupied by an existing 3-storey seniors residential building, most of which will remain as part of the development.

The site is bounded by:

- Existing single-family dwellings, to the north;
- Westminster Place, with an existing commercial plaza beyond, to the east;
- Rathburn Road East, with existing residential buildings beyond, to the south; and
- Two existing schools: St. Vincent De Paul Separate School and John Cabot Catholic Secondary School, to the west.

A Key Plan is included as Figure 1. The study is based on the architectural drawing set prepared by Kearns Mancini Architects, dated April 4, 2022. The Site Plan from the drawing set is shown as Figure 2.

1.2 THE PROPOSED DEVELOPMENT

The proposed expansion will consist of an 8-storey, 70-unit residential building to be added at the southwest corner of the site. The proposed building will connect to the existing 3-storey residential building via a single storey connection. The proposed building will have one level of underground parking.

Common indoor amenity space will be provided at Levels 1 to 8. A common outdoor amenity area will be provided in the form of a rooftop patio.

2.0 NOISE SOURCES

2.1 TRANSPORTATION NOISE SOURCES

2.1.1 Road Sources

The transportation noise source with potential to impact the proposed development is road traffic on Rathburn Road East and Tomken Road. Cawthra Road is located approximately 475 m to the west of the site. Due to the distance separation, Cawthra Road is not expected to have a significant noise impact at the subject site and has not been considered further in this assessment. Traffic volumes on the other surrounding roadways are anticipated to be minor and no significant noise impact is expected. Thus, these roadways have not been considered further in this assessment.

Ultimate road traffic data for Rathburn Road East and Tomken Road was obtained from the City of Mississauga.

The traffic data is shown in Appendix A and summarized in Table 1.

2.1.1 Aircraft Traffic

The site lies outside the NEF 25 contour for the Toronto Pearson International Airport. Thus, as per the MECP noise guidelines, noise from aircraft traffic using the Toronto Pearson International Airport has not been considered further.

2.2 STATIONARY NOISE SOURCES

2.2.1 Tomken Plaza

An existing commercial plaza (Tomken Plaza) is located at 925 Rathburn Road East, approximately 75 m east of the proposed seniors' residence expansion. The plaza consists of a large multitenant commercial building with a No Frills grocery store at the east end as well as a smaller multitenant building to the northwest of the plaza entrance and Rathburn Road intersection that has a Bulk Barn and Dairy Queen. Tenants in the large multitenant building include restaurants, banks and general retail uses.

The environmental noise sources associated with the commercial plaza are rooftop mechanical units as well as truck delivery activities to the No Frills loading areas, located along the north side of the plaza. All other tenants do not have loading docks and their deliveries are expected to be infrequent. In accordance with the MECP guidelines, infrequent deliveries to the remaining tenants are not part of the stationary noise source and do not need to be included in a noise impact assessment.

The location of the mechanical units was determined from satellite images of the plaza. Preliminary modelling of the noise impact from the rooftop mechanical equipment and the truck activity at the loading docks, using typical reference sound levels measured at other similar facilities, indicates that the noise guideline limits will be met at the proposed seniors' building.

It is noted that there are existing residential dwellings immediately to the north of the plaza. Even though there is a sound barrier fence at the common property line between the plaza and these residential dwellings, the upper-level windows have a direct line of sight to the loading docks and to the truck movements along the north side of the larger commercial building. It is the responsibility of the commercial plaza to comply with the stationary noise source guideline limits at all existing noise sensitive receptor locations, including these existing dwellings immediately to the north of the plaza.

During a site visit by VCL staff on August 30, 2022, noise from the rooftop mechanical equipment was audible on the property of the commercial plaza. When ambient traffic noise was low, noise from the stationary sources at the commercial plaza was barely audible at the subject site and well below the prevailing ambient traffic noise.

Thus, based on our observations during our area visit, the results of the preliminary assessment and the requirement for any sound emissions from the plaza to comply with the stationary noise source limits at all existing residential dwellings, the commercial plaza has not been considered further in this assessment.

2.2.2 Other Stationary Sources

The existing St. Vincent De Paul Separate School and John Cabot Catholic Secondary School are located at 665 and 635 Willowbank Trail, approximately 230 m and 180 m west of the subject site, respectively. The environmental noise source associated with these facilities is the rooftop mechanical equipment. Due to the relatively high ambient sound level from road traffic on Rathburn Road East, noise from the two schools is not anticipated to have a significant impact on the subject site.

An existing residential building is located at 4100 Westminster Place, approximately 40 m south of the subject site, on the south (opposite) side of Rathburn Road East. The environmental noise source at this facility is the rooftop mechanical equipment. Based on the distance separation and the relatively high ambient sound level from road traffic on Rathburn Road East, noise from the residential building is not anticipated to have a significant impact on the subject site.

During a site visit by VCL staff on August 30, 2022, it was observed that no sound from the nearby schools and residential building was audible at the subject site above the ambient traffic noise.

3.0 ENVIRONMENTAL NOISE GUIDELINES

3.1 MECP PUBLICATION NPC-300

The applicable noise guidelines for new residential development are those in MECP Publication NPC-300, "Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning".

The environmental noise guidelines of the MECP, as provided in Publication NPC-300, are discussed briefly below and summarized in Appendix B.

3.1.1 Architectural Elements

In the daytime (0700 to 2300), the indoor criterion for road noise is $L_{eq\ Day}$[1] of 45 dBA for sensitive spaces such as living/dining rooms, dens and bedrooms. At night, the indoor criterion for road noise is $L_{eq\ Night}$[2] of 45 dBA for sensitive spaces such as living/dining rooms and dens and 40 dBA for bedrooms.

The architectural design of the building envelope (walls, windows, etc.) must provide adequate sound isolation to achieve these indoor sound level limits, based on the applicable outdoor sound level on the facades.

3.1.2 Ventilation

In accordance with the MECP noise guideline for road traffic sources, if the daytime sound level, $L_{eq\ Day}$, at the exterior face of a noise sensitive window is greater than 65 dBA, means must be provided so that windows can be kept closed for noise control purposes and central air

(1) 16-hour energy equivalent sound level (0700-2300 hours).
(2) 8-hour energy equivalent sound level (2300-0700 hours).

conditioning is required. For daytime sound levels between 56 dBA and 65 dBA inclusive, there need only be the provision for adding air conditioning at a later date. A warning clause advising the occupant of the potential interference with some activities is also required. At nighttime, air conditioning would be required when the sound level exceeds 60 dBA ($L_{eq\ Night}$) at a noise sensitive window (provision for adding air conditioning is required when greater than 50 dBA).

3.1.3 Outdoors

For outdoor amenity areas ("Outdoor Living Areas" – OLA's), the guideline is $L_{eq\ Day}$ of 55 dBA, with an excess not exceeding 5 dBA considered acceptable if it is technically not practicable to achieve the 55 dBA objective, provided warning clauses are registered on title. Note, a balcony is not considered an OLA, unless it is:

- the only OLA for the occupant;
- at least 4 m in depth; and
- unenclosed.

3.2 REGION OF PEEL

The Region of Peel noise guidelines are essentially the same as the MECP noise guidelines except that the nighttime sound level for triggering the air conditioning requirement is one dBA more stringent (i.e., less than) the sound levels specified by the MECP; i.e., mandatory air conditioning for nighttime sound levels of 60 dBA or greater, and the provision for adding air conditioning for levels between 51 to 59 dBA inclusive.

4.0 TRANSPORTATION NOISE IMPACT ASSESSMENT

4.1 ANALYSIS METHOD

Using the road traffic data in Tables 1, the sound energy levels, in terms of $L_{eq\ Day}$ and $L_{eq\ Night}$, were determined using STAMSON V5.04 – ORNAMENT, the computerized road traffic noise prediction model of the MECP.

The daytime and nighttime sound levels at the building facades were assessed at a height of 25 m above grade, representing the top floor (worst case) locations.

The daytime OLA sound level at the rooftop patio was assessed at a height of 1.5 m above the patio floor slab, at the center of the patio.

Inherent screening of the building due to its orientation to the noise sources was taken into account. To be conservative, screening from the existing developments in the vicinity was not included in the assessment.

4.2 RESULTS

At the building facades, the highest unmitigated daytime/nighttime sound levels of 63 dBA/57 dBA are predicted to occur at the south facade, the closest to Rathburn Road East.

The unmitigated daytime OLA sound level is predicted to be 56 dBA at the rooftop terrace.

Table 2 summarizes the predicted unmitigated sound levels. A sample sound level calculation is included in Appendix C.

5.0 NOISE CONTROL MEASURES

The noise control measures can generally be classified into two categories which are interrelated, but which can be treated separately for the most part:

a) Architectural elements to achieve acceptable indoor noise guidelines for transportation sources; and

b) Design features to protect the OLAs.

Noise abatement requirements are summarized in Table 3 and Figure 2.

5.1 INDOORS

5.1.1 Architectural Elements

The indoor noise level guidelines can be achieved by using appropriate construction for exterior walls, windows and doors. As shown on the floor plan drawings in the architectural drawing set, there will not be any residential suites located at the southeast corner of the building. Thus, the worst case rooms will be the southwest corner rooms, which only have windows on the south facade. In determining the worst-case architectural requirements for the residential units, the south wall and window areas were both assumed to be 50% of the associated floor area and the west wall was assumed to be 100% of the associated floor area for living/dining areas and sleeping quarters.

Based on the predicted sound levels, exterior wall and window construction meeting the minimum non-acoustical requirements of the (OBC) will be sufficient to meet the indoor sound level limits.

The final sound isolation requirements should be reviewed when architectural plans are developed. Wall and window constructions should also be reviewed at this point to ensure that they will meet the required sound isolation performance. This is typically required by the City at the time of building permit application.

5.1.2 Ventilation Requirements

Based on the predicted sound levels, all suites in the expansion require the provision for adding air conditioning at a later date. For multi-unit buildings such as the proposed development, the provision for adding air conditioning is typically not practical to implement. Thus, the requirement has been increased to mandatory air conditioning, which exceeds the minimum requirement.

5.2 OUTDOORS

The unmitigated daytime OLA sound level at the rooftop patio is predicted to be 56 dBA. This 1 dBA excess over the 55 dBA objective is considered acoustically insignificant. In addition, the predicted sound levels are within the 5 dB leeway permitted under the MECP guidelines, provided warning clauses are included. Thus, sound barriers are not considered to be warranted for this development.

6.0 WARNING CLAUSES

Warning clauses are a tool to inform prospective owners/occupants of potential annoyance due to existing noise sources. Where the guideline sound level limits are exceeded, appropriate warning clauses should be registered on title or included in the development agreement that is registered on title. The warning clauses should also be included in agreements of Offers of Purchase and Sale and lease/rental agreements to make future occupants aware of the potential noise situation.

Table 3 and the notes to Table 3 summarize the warning clauses for the site.

7.0 EFFECT OF THE BUILDING ON THE SURROUNDING ENVIRONMENT

The main source of noise associated with this development, with the potential for significant impact on surrounding buildings, is the mechanical equipment. The mechanical plans for the development are not yet available.

Mechanical equipment interfacing to the outdoors must comply with the MECP noise guideline limits in NPC-300. By proper engineering design, all requirements can be met, and no significant noise impact would be created for surrounding uses. Appropriate choice of location, equipment type, and noise control features should be considered during detailed design for such items as underground parking garage ventilation systems. Any parking garage air shafts located immediately adjacent to residential uses may need special noise control treatment such as choice of fan type, acoustically lining the shaft, providing silencers or adding carbon monoxide (CO) sensors to the fans. (With CO sensors, the fans operate less frequently. The lesser operation reduces the possibility of noise impact.)

For any emergency generators, appropriate steps should be taken to ensure that the equipment placement, treatment, and the routine testing schedule will not generate adverse noise impact on neighbouring properties. The generator will require silencers on the intake and exhaust cooling air paths, as well as a muffler on the combustion exhaust

8.0 CONCLUSIONS

With the incorporation of the recommended noise mitigation measures, the MECP noise guidelines can be met and a suitable acoustical environment provided for the occupants.

The approvals and administrative procedures are available to ensure that the noise requirements are implemented.

9.0 REFERENCES

1. PC STAMSON 5.04, "Computer Program for Road Traffic Noise Assessment", Ontario Ministry of the Environment.

2. Building Practice Note No. 56: "Controlling Sound Transmission into Buildings", by J. D. Quirt, Division of Building Research, National Council of Canada, September 1985.

3. "Environmental Noise Guideline – Stationary and Transportation Sources, Approval and Planning", Ontario Ministry of the Environment, Publication NPC-300, October 2013.

4. "MECP Publication NPC-300, "Stationary and Transportation Sources – Approval and Planning" Ontario Ministry of the Environment, August 2013.

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TABLE 1 ROAD TRAFFIC DATA

Roadway[2]	Ultimate AADT[1]	% Trucks		Speed Limit (km/h)	Day/Night Split (%)
		Medium	Heavy		
Rathburn Road East	25 700	1.65	1.35	50	90/10
Tomken Road	32 600	1.65	1.35	50	90/10

Notes:

(1) AADT – Annual Average Daily Traffic.

(2) Ultimate traffic data obtained from the City of Mississauga.

TABLE 2 PREDICTED UNMITIGATED SOUND LEVELS OUTDOORS

Location[1]	Roadway	Distance[2]	$L_{eq\ Day}$ (dBA)	$L_{eq\ Night}$ (dBA)
Southeast Corner (South Facade)	Rathburn Road East	36	63	57
	Tomken Road	302	52	46
	TOTAL	**-**	**63**	**57**
Southeast Corner (East Facade)	Rathburn Road East	36	60	54
	Tomken Road	302	55	48
	TOTAL	**-**	**61**	**55**
Rooftop Patio (OLA)	Rathburn Road East	40	54	**-**
	Tomken Road	311	53	**-**
	TOTAL	**-**	**56**	**-**

Notes:

(1) See Figure 2 for the locations of the calculations.

(2) Distances measured from the centreline of the roadway to the receptor.

TABLE 3 MINIMUM NOISE ABATEMENT MEASURES

Location	Air Conditioning(1)	Exterior Wall(2)	Exterior Window(2,3)	Sound Barrier	Warning Clause(4)
Proposed Expansion	Mandatory	No special acoustical requirements		None	A + B + C

Notes:

(1) Where means must be provided to allow windows to remain closed for road noise control purposes, a commonly used technique is that of air central conditioning. For multi-unit buildings such as the proposed development, the provision for adding air conditioning is typically not practical to implement. Thus, the requirement has been increased to mandatory air conditioning.

(2) STC - Sound Transmission Class Rating (Reference ASTM-E413).

Requirements were based upon the assumption that all wall and window areas are as indicated in Section 5.1.1 of text. Requirements should be checked once floor plans are available.

(3) STC - Sound Transmission Class Rating (Reference ASTM-E413). A sliding glass walkout door should be considered as a window and be included in the percentage of glazing.

Requirements were based upon the assumption that all wall and window areas are as indicated in Section 5.1.1 of text. Requirements should be checked once floor plans are available.

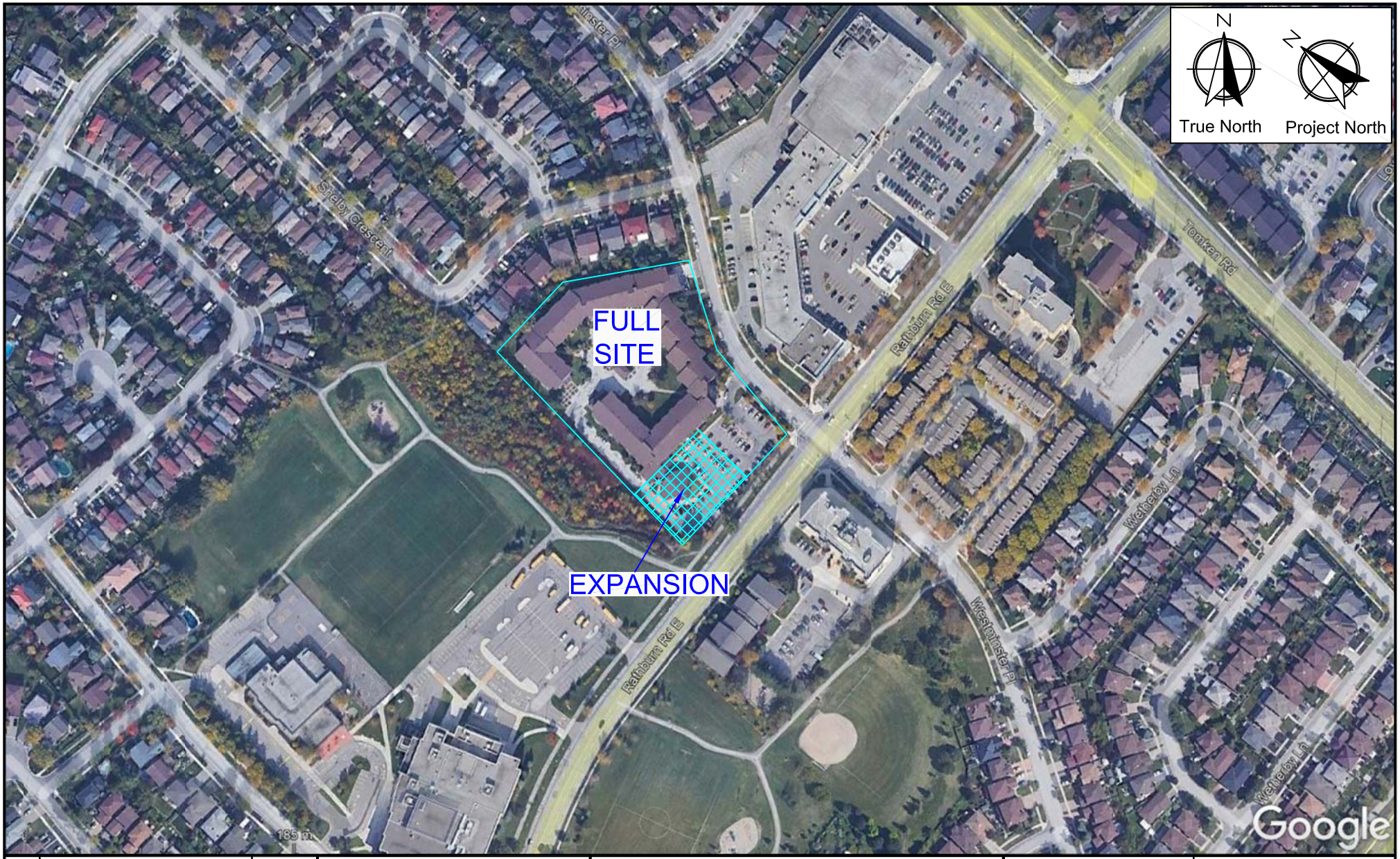
(4) The warning clauses should be included in agreements that are registered on title and be included in Offers of Purchase and Sale, lease/rental agreements and condominium declarations for designated lots/units:

A. "Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within building units, sound levels due to increasing road traffic may on occasion interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks."

B. "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, Conservation and Parks."

C. "Purchasers/tenants are advised that due to the proximity of the existing commercial developments and schools, noise from these buildings may at times be audible."

(5) All exterior doors shall be fully weather stripped.



No.	Revision/Issue	Date

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Title: Key Plan

Project No.: 122-0276

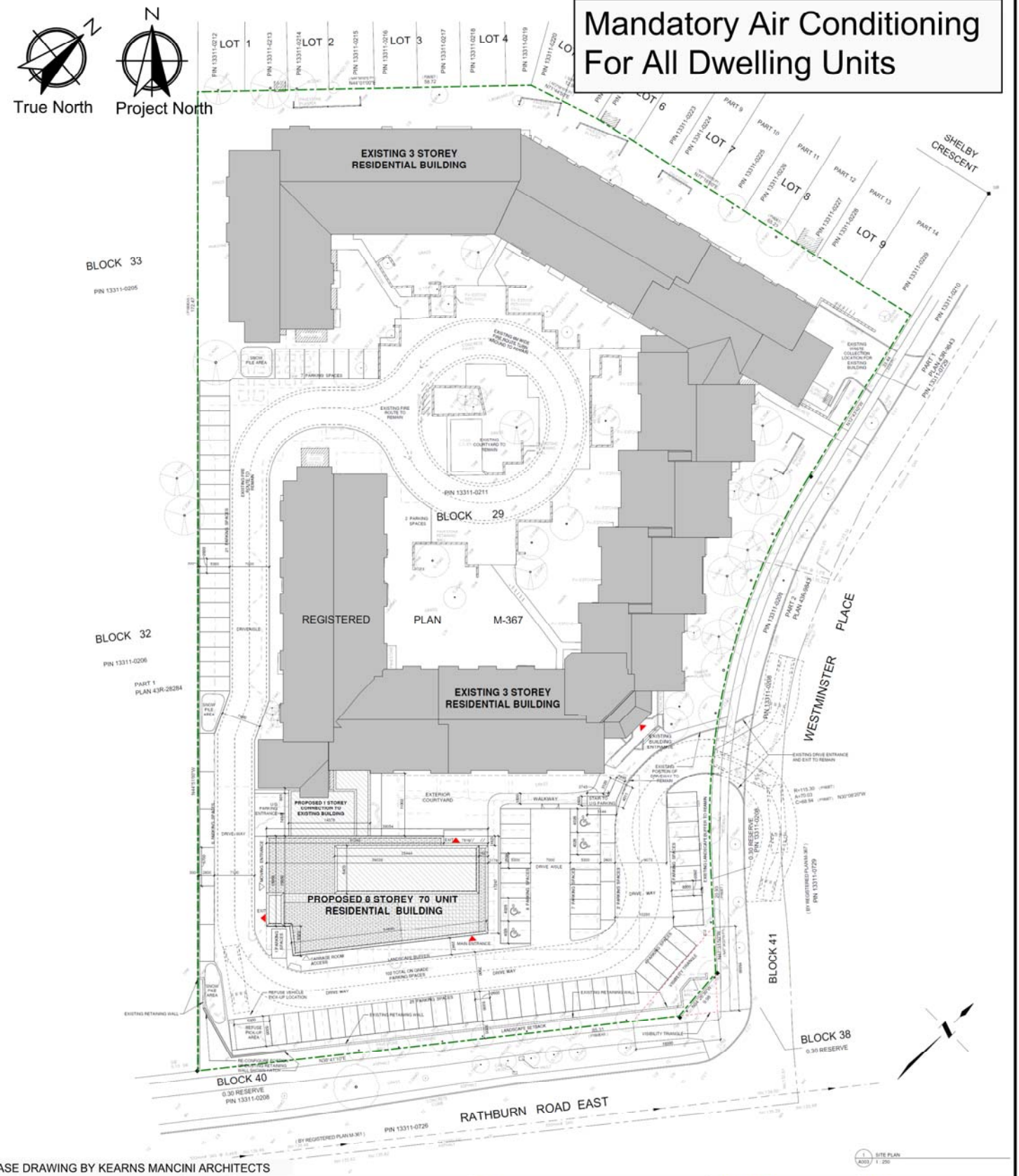
Date: Aug. 30, 2022

Project Name: St. Luke's Dixie Seniors Residence Expansion, Mississauga

Scale: N.T.S.

Figure: 1

Mandatory Air Conditioning For All Dwelling Units



BASE DRAWING BY KEARNS MANCINI ARCHITECTS

No.	Revision/Issue	Date

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Title	Project No.	Date
Site Plan	122-0276	Aug. 30, 2022
Project Name	**Scale**	**Figure**
St. Luke's Dixie Seniors Residence Expansion, Mississauga	N.T.S.	2

APPENDIX A
ROAD TRAFFIC DATA

Date:	30-Jun-22

REQUESTED BY:

Name:	Brett Lipson
Company:	Valcoustics Canada Ltd.

PREPARED BY:

Name	Loudel Uy
Tel#:	(905) 615- 3200

MISSISSAUGA

NOISE REPORT FOR PROPOSED DEVELOPMENT

Location: •Rathburn Road E, west of Tomken Road; and
•Tomken Road, north of Rathburn Road E.

ID# 555

ON SITE TRAFFIC DATA

Specific	Street Names				
[redacted]	Rathburn Road E	Tomken Road			
AADT:	25700	32600			
# of Lanes:	4	4			
% Trucks:	3%	3%			
Medium/Heavy Trucks Ratio:	55/45	55/45			
Day/Night Split:	90/10	90/10			
Posted Speed Limit:	50 km/hr	50 km/hr			
Gradient Of Road:	<2%	<2%			
Ultimate R.O.W:	16.8 m	22.5 m			

Comments: Ultimate Traffic Data only (2041).

APPENDIX B

ENVIRONMENTAL NOISE GUIDELINES

APPENDIX B

ENVIRONMENTAL NOISE GUIDELINES

MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS (MECP)

Reference: MECP Publication NPC-300, October 2013: *"Environmental Noise Guideline, Stationary and Transportation Source – Approval and Planning"*.

SPACE	SOURCE	TIME PERIOD	CRITERION
Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc.	Road	07:00 to 23:00	45 dBA
	Rail	07:00 to 23:00	40 dBA
	Aircraft	24-hour period	NEF/NEP 5
Living/dining, den areas of residences, hospitals, nursing homes, etc. (except schools or daycare centres)	Road	23:00 to 07:00	45 dBA
	Rail	23:00 to 07:00	40 dBA
	Aircraft	24-hour period	NEF/NEP 5
Sleeping quarters	Road	07:00 to 23:00	45 dBA
	Rail	07:00 to 23:00	40 dBA
	Aircraft	24-hour period	NEF/NEP 0
Sleeping quarters	Road	23:00 to 07:00	40 dBA
	Rail	23:00 to 07:00	35 dBA
	Aircraft	24-hour period	NEF/NEP 0
Outdoor Living Areas	Road and Rail	07:00 to 23:00	55 dBA
Outdoor Point of Reception	Aircraft	24-hour period	NEF/NEP 30[#]
	Stationary Source		
	Class 1 Area	07:00 to 19:00[(1)]	50[*] dBA
		19:00 to 23:00[(1)]	50[*] dBA
	Class 2 Area	07:00 to 19:00[(2)]	50[*] dBA
		19:00 to 23:00[(2)]	45[*] dBA
	Class 3 Area	07:00 to 19:00[(3)]	45[*] dBA
		19:00 to 23:00[(3)]	40[*] dBA
	Class 4 Area	07:00 to 19:00[(4)]	55[*] dBA
		19:00 to 23:00[(4)]	55[*] dBA

…./cont'd

SPACE	SOURCE	TIME PERIOD	CRITERION
Plane of a Window of Noise Sensitive Spaces	Stationary Source		
	Class 1 Area	07:00 to 19:00(1)	50* dBA
		19:00 to 23:00(1)	50* dBA
		23:00 to 07:00(1)	45* dBA
	Class 2 Area	07:00 to 19:00(2)	50* dBA
		19:00 to 23:00(2)	50* dBA
		23:00 to 07:00(2)	45* dBA
	Class 3 Area	07:00 to 19:00(3)	45* dBA
		19:00 to 23:00(3)	45* dBA
		23:00 to 07:00(3)	40* dBA
	Class 4 Area	07:00 to 19:00(4)	60* dBA
		19:00 to 23:00(4)	60* dBA
		23:00 to 07:00(4)	55* dBA

\# may not apply to in-fill or re-development.
* or the minimum hourly background sound exposure $L_{eq(1)}$, due to road traffic, if higher.
(1) Class 1 Area: Urban.
(2) Class 2 Area: Urban during day; rural-like evening and night.
(3) Class 3 Area: Rural.
(4) Class 4 Area: Subject to land use planning authority's approval.

Reference: MECP Publication ISBN 0-7729-2804-5, 1987: *"Environmental Noise Assessment in Land-Use Planning"*.

EXCESS ABOVE RECOMMENDED SOUND LEVEL LIMITS (dBA)	CHANGE IN SUBJECTIVE LOUDNESS ABOVE	MAGNITUDE OF THE NOISE PROBLEM	NOISE CONTROL MEASURES (OR ACTION TO BE TAKEN)
No excess (<55 dBA)	—	No expected noise problem	None
1 to 5 inclusive (56 to 60 dBA)	Noticeably louder	Slight noise impact	If no physical measures are taken, then prospective purchasers or tenants should be made aware by suitable warning clauses.
6 to 10 inclusive (61 - 65 dBA)	Almost twice as loud	Definite noise impact	Recommended.
11 to 15 inclusive (66 - 70 dBA)	Almost three times as loud	Serious noise impact	Strongly Recommended.
16 and over (>70 dBA)	Almost four times as loud	Very serious noise impact	Strongly Recommended (may be mandatory).

APPENDIX C

SAMPLE CALCULATION OUTPUTS

```
STAMSON 5.04        NORMAL REPORT        Date: 03-10-2022 10:54:16
MINISTRY OF ENVIRONMENT, CONSERVATION AND PARKS / NOISE ASSESSMENT

Filename: se_sf.te             Time Period: Day/Night 16/8 hours
Description: Southeast Corner - South Facade

Road data, segment # 1: Rathburn (day/night)
----------------------------------------------
Car traffic volume  : 22436/2493  veh/TimePeriod  *
Medium truck volume :   382/42    veh/TimePeriod  *
Heavy truck volume  :   312/35    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

    24 hr Traffic Volume (AADT or SADT):  25700
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   1.65
    Heavy Truck  % of Total Volume     :   1.35
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Rathburn (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  36.00 / 36.00  m
Receiver height           :  25.00 / 25.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: Tomken (day/night)
-------------------------------------------
Car traffic volume  : 28460/3162  veh/TimePeriod  *
Medium truck volume :   484/54    veh/TimePeriod  *
Heavy truck volume  :   396/44    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

    24 hr Traffic Volume (AADT or SADT):  32600
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   1.65
    Heavy Truck  % of Total Volume     :   1.35
    Day (16 hrs) % of Total Volume     :  90.00
```

```
Data for Segment # 2: Tomken (day/night)
----------------------------------------
Angle1   Angle2           :  -7.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 302.00 / 302.00 m
Receiver height           :  25.00 / 25.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Rathburn (day)
-----------------------------------

Source height = 1.08 m

ROAD (0.00 + 63.03 + 0.00) = 63.03 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  66.83   0.00  -3.80   0.00   0.00   0.00   0.00  63.03
-------------------------------------------------------------------------------

Segment Leq : 63.03 dBA

Results segment # 2: Tomken (day)
---------------------------------

Source height = 1.08 m

ROAD (0.00 + 52.14 + 0.00) = 52.14 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    -7     90   0.00  67.87   0.00 -13.04  -2.69   0.00   0.00   0.00  52.14
-------------------------------------------------------------------------------

Segment Leq : 52.14 dBA

Total Leq All Segments: 63.37 dBA

Results segment # 1: Rathburn (night)
-------------------------------------

Source height = 1.08 m

ROAD (0.00 + 56.51 + 0.00) = 56.51 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  60.31   0.00  -3.80   0.00   0.00   0.00   0.00  56.51
-------------------------------------------------------------------------------

Segment Leq : 56.51 dBA
```

```
Results segment # 2: Tomken (night)
-----------------------------------

Source height = 1.08 m

ROAD (0.00 + 45.61 + 0.00) = 45.61 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    -7     90   0.00  61.34   0.00 -13.04  -2.69   0.00   0.00   0.00  45.61
-------------------------------------------------------------------------------

Segment Leq : 45.61 dBA

Total Leq All Segments: 56.85 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 63.37
                           (NIGHT): 56.85
```

```
STAMSON 5.04        NORMAL REPORT        Date: 03-10-2022 10:54:31
MINISTRY OF ENVIRONMENT, CONSERVATION AND PARKS / NOISE ASSESSMENT

Filename: se_ef.te             Time Period: Day/Night 16/8 hours
Description: Southeast Corner - East Facade

Road data, segment # 1: Rathburn (day/night)
----------------------------------------------
Car traffic volume  : 22436/2493  veh/TimePeriod  *
Medium truck volume :   382/42    veh/TimePeriod  *
Heavy truck volume  :   312/35    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

    24 hr Traffic Volume (AADT or SADT):  25700
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   1.65
    Heavy Truck  % of Total Volume     :   1.35
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Rathburn (day/night)
------------------------------------------
Angle1   Angle2           : -90.00 deg   6.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  36.00 / 36.00  m
Receiver height           :  25.00 / 25.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Road data, segment # 2: Tomken (day/night)
------------------------------------------
Car traffic volume  : 28460/3162  veh/TimePeriod  *
Medium truck volume :   484/54    veh/TimePeriod  *
Heavy truck volume  :   396/44    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

    24 hr Traffic Volume (AADT or SADT):  32600
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   1.65
    Heavy Truck  % of Total Volume     :   1.35
    Day (16 hrs) % of Total Volume     :  90.00
```

```
Data for Segment # 2: Tomken (day/night)
----------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 302.00 / 302.00 m
Receiver height           :  25.00 / 25.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Rathburn (day)
-----------------------------------

Source height = 1.08 m

ROAD (0.00 + 60.30 + 0.00) = 60.30 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      6   0.00  66.83   0.00  -3.80  -2.73   0.00   0.00   0.00  60.30
-------------------------------------------------------------------------------

Segment Leq : 60.30 dBA

Results segment # 2: Tomken (day)
---------------------------------

Source height = 1.08 m

ROAD (0.00 + 54.83 + 0.00) = 54.83 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  67.87   0.00 -13.04   0.00   0.00   0.00   0.00  54.83
-------------------------------------------------------------------------------

Segment Leq : 54.83 dBA

Total Leq All Segments: 61.38 dBA

Results segment # 1: Rathburn (night)
-------------------------------------

Source height = 1.08 m

ROAD (0.00 + 53.78 + 0.00) = 53.78 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90      6   0.00  60.31   0.00  -3.80  -2.73   0.00   0.00   0.00  53.78
-------------------------------------------------------------------------------

Segment Leq : 53.78 dBA
```

```
Results segment # 2: Tomken (night)
-----------------------------------

Source height = 1.08 m

ROAD (0.00 + 48.30 + 0.00) = 48.30 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  61.34   0.00 -13.04   0.00   0.00   0.00   0.00  48.30
-------------------------------------------------------------------------------

Segment Leq : 48.30 dBA

Total Leq All Segments: 54.86 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 61.38
                           (NIGHT): 54.86
```

```
STAMSON 5.04        NORMAL REPORT        Date: 03-10-2022 10:54:42
MINISTRY OF ENVIRONMENT, CONSERVATION AND PARKS / NOISE ASSESSMENT

Filename: rt_ola.te            Time Period: Day/Night 16/8 hours
Description: Rooftop OLA

Road data, segment # 1: Rathburn (day/night)
-------------------------------------------
Car traffic volume  : 22436/2493  veh/TimePeriod  *
Medium truck volume :   382/42    veh/TimePeriod  *
Heavy truck volume  :   312/35    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

    24 hr Traffic Volume (AADT or SADT):  25700
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   1.65
    Heavy Truck  % of Total Volume     :   1.35
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Rathburn (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  40.00 / 15.00  m
Receiver height           :   1.50 / 25.00  m
Topography                :      4       (Elevated; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :   0.00 m
Elevation                 :  26.75 m
Barrier receiver distance :   4.50 / 10.00  m
Source elevation          :   0.00 m
Receiver elevation        :  26.75 m
Barrier elevation         :  26.75 m
Reference angle           :   0.00

Road data, segment # 2: Tomken (day/night)
-------------------------------------------
Car traffic volume  : 28460/3162  veh/TimePeriod  *
Medium truck volume :   484/54    veh/TimePeriod  *
Heavy truck volume  :   396/44    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

    24 hr Traffic Volume (AADT or SADT):  32600
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   1.65
    Heavy Truck  % of Total Volume     :   1.35
    Day (16 hrs) % of Total Volume     :  90.00
```

```
Data for Segment # 2: Tomken (day/night)
----------------------------------------
Angle1   Angle2           : -26.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 311.00 / 311.00 m
Receiver height           :   1.50 / 25.00  m
Topography                :      4       (Elevated; with barrier)
Barrier angle1            : -26.00 deg   Angle2 : 90.00 deg
Barrier height            :   0.00 m
Elevation                 :  26.75 m
Barrier receiver distance :   8.50 / 8.50   m
Source elevation          :   0.00 m
Receiver elevation        :  26.76 m
Barrier elevation         :  26.75 m
Reference angle           :   0.00


Results segment # 1: Rathburn (day)
-----------------------------------

Source height = 1.08 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.08 !        1.50 !       -1.56 !        25.19

ROAD (0.00 + 53.72 + 0.00) = 53.72 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  66.83   0.00  -4.26   0.00   0.00   0.00  -8.85  53.72
-------------------------------------------------------------------------------

Segment Leq : 53.72 dBA
```

```
Results segment # 2: Tomken (day)
---------------------------------

Source height = 1.08 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.08 !        1.50 !        0.77 !        27.52

ROAD (0.00 + 52.79 + 0.00) = 52.79 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -26     90   0.00  67.87   0.00 -13.17  -1.91   0.00   0.00  -3.44
49.35*
   -26     90   0.00  67.87   0.00 -13.17  -1.91   0.00   0.00   0.00  52.79
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 52.79 dBA

Total Leq All Segments: 56.29 dBA


Results segment # 1: Rathburn (night)
-------------------------------------

Source height = 1.08 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.08 !       25.00 !       -8.78 !        17.97

ROAD (0.00 + 51.03 + 0.00) = 51.03 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  60.31   0.00   0.00   0.00   0.00   0.00  -9.28  51.03
-------------------------------------------------------------------------------

Segment Leq : 51.03 dBA
```

```
Results segment # 2: Tomken (night)
-----------------------------------

Source height = 1.08 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.08 !       25.00 !       23.62 !        50.37

ROAD (0.00 + 46.26 + 0.00) = 46.26 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -26     90   0.00  61.34   0.00 -13.17  -1.91   0.00   0.00  -0.00
46.26*
   -26     90   0.00  61.34   0.00 -13.17  -1.91   0.00   0.00   0.00  46.26
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 46.26 dBA

Total Leq All Segments: 52.28 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 56.29
                           (NIGHT): 52.28
```