

Environmental Noise Assessment

79 Collier Street

Proposed Mixed-use Development

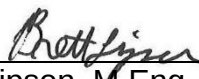
City of Barrie

January 29, 2021
Project: 120-0144

Prepared for

Vitmont Holdings (Barrie) Inc.

Prepared by



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Reviewed by



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Revision History

Revision #	Date	Description of Changes
1.0	September 11, 2020	Issued for use
2.0	January 29, 2021	Update based on revised site plan

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Environmental Noise Assessment

79 Collier Street

Proposed Mixed-use Development

City of Barrie

EXECUTIVE SUMMARY

Valcoustics Canada Ltd. (VCL) previously prepared an Environmental Noise Assessment report, dated September 11, 2020 for the proposed mixed-use development located at the southwest corner of the intersection of Mulcaster Street and Collier Street in the City of Barrie. This update report has been prepared to address changes to the site plan and building design.

The proposed development will consist of a 17-storey residential building with a 4-storey podium and commercial units located on the ground floor, fronting onto Mulcaster Street and Collier Street. Common indoor and outdoor amenity space will be provided on the 5th floor. Many of the dwelling units will be provided with small (less than 4 m in depth) private balconies or terraces. The development will be provided with one level of underground parking as well as three levels of parking within the podium.

The significant transportation noise source in the vicinity is road traffic on Collier Street, Mulcaster Street and Dunlop Street East. There are no stationary noise sources in the vicinity with the potential to impact the site.

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.

To meet the applicable transportation noise source guideline limits:

- All residential suites in the development require mandatory air conditioning for noise control purposes; and
- Exterior wall construction meeting a Sound Transmission Class (STC) rating of 40 and exterior windows with STC ratings up to 27 would be required.

1.0 INTRODUCTION

Valcoustics Canada Ltd. (VCL) previously prepared an Environmental Noise Assessment report, dated September 11, 2020 for the proposed mixed-use development located at the southwest corner of the intersection of Mulcaster Street and Collier Street in the City of Barrie. This update

report has been prepared to address changes to the site plan. The potential sound levels and noise mitigation measures needed for the proposed development to comply with the MECP noise guideline requirements are outlined herein.

1.1 THE SITE AND SURROUNDING AREA

The site is located at the southwest corner of the intersection of Collier Street and Mulcaster Street in the City of Barrie and is bounded by:

- Collier Street, with Barrie City Hall beyond, to the north;
- Existing mixed-use developments, to the west;
- Existing mixed-use developments, with Dunlop Street East beyond, to the south; and
- Mulcaster Street and the existing Grey & Simcoe Foresters Regimental Museum, with the existing MacLaren Art Centre beyond, to the east.

A Key Plan is included as Figure 1.

The study is based on the architectural drawing set, prepared by MCL Architects, dated January 15, 2021. The Site Plan is shown as Figure 2.

1.2 THE PROPOSED DEVELOPMENT

The proposed development will consist of a 17-storey residential building with a 4-storey podium and commercial units located on the ground floor, fronting towards the intersection of Mulcaster Street and Collier Street. Common indoor and outdoor amenity space will be provided at the 5th floor. Many of the dwelling units will be provided with small (less than 4 m in depth) private balconies or terraces. The development will be provided with one level of underground parking as well as three levels of parking within the podium.

2.0 NOISE SOURCES

2.1 TRANSPORTATION NOISE SOURCES

The transportation noise source with potential to impact the proposed development is road traffic on Collier Street, Mulcaster Street and Dunlop Street East. Traffic volumes on the other surrounding roadways are anticipated to be minor and no significant noise impact is expected.

Current (year 2020) road traffic data for Collier Street, Mulcaster Street and Dunlop Street East was obtained from the City of Barrie. The ratio of medium trucks to heavy trucks was assumed to be 60%/40% of the total truck volume. The day/night split was assumed to be 90%/10% as is typical for well-travelled roadways. A growth rate of 1%, compounded annually, was used to obtain future (year 2031) traffic volumes as recommended by the City of Barrie.

Table 1 summarizes the traffic data used in the assessment. Appendix A contains the correspondence regarding the road traffic data.

2.2 STATIONARY NOISE SOURCES

The existing Collier Centre (mixed-use development) is located at northeast corner of the intersection of Collier Street and Mulcaster Street. The main noise source associated with this facility is anticipated to be the HVAC equipment. Based on the distance separation, intervening roadways, and presence of other residential development at a similar setback, it is expected that these noise sources will not impact the proposed development.

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.

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 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 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, providing warning clauses are registered on title. Note that for road traffic sources, a balcony is not considered an OLA, unless it is:

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

(1) $L_{eq\ Day}$ 16-hour energy equivalent sound level (0700-2300 hours).
(2) $L_{eq\ Night}$ 8-hour energy equivalent sound level (0700-2300 hours).

4.0 NOISE IMPACT ASSESSMENT

4.1 ANALYSIS METHOD

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

The daytime and nighttime sound levels at the building facades were assessed at a height of 53.2 m, representing the top floor (worst case) windows.

The daytime OLA sound level at the 5th floor common outdoor amenity area was calculated in the centre of the outdoor area at a height of 1.5 m above the terrace floor slab. All private balconies and terraces are less than 4 m in depth and therefore do not qualify as OLA's under the MECP guidelines.

Inherent screening of each building face due to its orientation to the noise source as well as that provided by the subject development itself was taken into account.

4.2 RESULTS

The highest daytime/nighttime sound levels of 63 dBA/57 dBA are predicted to occur at the north and east facades, in the direction of Collier Street and Mulcaster Street respectively.

The unmitigated daytime OLA sound level at the 5th floor common outdoor amenity area is predicted to be 53 dBA.

Table 2 summarizes the predicted sound levels outdoors at specific locations.

A sample sound level calculation is included in Appendix C.

5.0 NOISE ABATEMENT REQUIREMENTS

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 OLA's.

Noise abatement requirements are summarized in Table 3 and the notes to Table 3.

5.1 INDOORS

5.1.1 Architectural Requirements

The indoor noise exposure guidelines for the transportation sources can be achieved by using appropriate construction for exterior walls, windows and doors. In determining the worst-case

architectural requirements, wall and window areas were calculated based on the elevation and floor plan drawings from the architectural drawing set dated January 15, 2021.

The worst case requirements were determined based on a typical Suite “G” corner living room. The north wall and windows were calculated to be 83% and 33%, respectively, of the associated floor area. The east wall and windows were calculated to be 30% and 45%, respectively, of the associated floor area.

Based on the worst case requirements, exterior walls meeting a minimum Sound Transmission Class (STC) of 40 and windows meeting a minimum STC of 27 will be required to achieve the indoor noise guideline criteria of the MECP.

For walls, a typical spandrel panel with insulated gypsum board back-up wall assembly construction would be expected to achieve the requirement of STC 40. Windows meeting the minimum non-acoustical requirements of the Ontario Building Code (OBC) would be expected to achieve the requirement of STC 27. Note, the window frames themselves must also be designed to ensure that the overall sound isolation performance for the entire window unit meets the sound isolation requirement. This should be confirmed by the window manufacturer.

Wall and window constructions should be reviewed to ensure that they will meet the required sound isolation performance. This is typically required by the Town at the time of building permit application.

5.1.2 Ventilation Requirements

Based on the predicted sound levels, all residential suites in the buildings require the provision for adding air conditioning. In high-rise construction, the provision for adding air conditioning at a later date 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 levels at the 5th floor outdoor amenity area is predicted to meet the 55 dBA objective. Thus, sound barriers are not required for noise control purposes.

5.3 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.

6.0 CONCLUSIONS

With the incorporation of the recommended noise mitigation measures, the applicable 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.

7.0 REFERENCES

1. “Environmental Noise Guideline, Stationary and Transportation Sources - Approval and Planning”, Ontario Ministry of the Environment, Publication NPC-300, August 2013.
2. Road and Rail Noise: Effects on Housing”, Canada Mortgage and Housing Corporation, Publication NHA 5156, 81/10.
3. PC STAMSON 5.04, “Computer Program for Road Traffic Noise Assessment”, Ontario Ministry of the Environment.
4. Building Practice Note No. 56: “Controlling Sound Transmission into Buildings”, by J. D. Quirt, Division of Building Research, National Council of Canada, September 1985.
5. “Environmental Noise Assessment, 79 Collier Street, Proposed Mixed-Use Development, City of Barrie”, Valcoustics Canada Ltd., September 11, 2020, Project: 120-0144.

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TABLE 1 ROAD TRAFFIC DATA

Roadway	Year	AADT ^{(1) (3)}	% Trucks		Day/Night (%)	Speed Limit (kph)
			Medium	Heavy		
Collier Street ⁽²⁾	2020 (2031)	9 000 (10 041)	1.2	0.8	90/10	50
Mulcaster Street ⁽²⁾	2020 (2031)	7 500 (8 368)	1.2	0.8	90/10	50
Dunlop Street East ⁽²⁾	2020 (2031)	10 000 (11 157)	2.4	1.6	90/10	50

Notes:

- (1) AADT - Annual Average Daily Traffic.
- (2) Current traffic data (AADT and total truck percentages) was provided by the City of Barrie. Day/night was split was assumed.
- (3) The data shown in brackets is projected to the year 2031 with a 1.0% growth rate, compounded annually.

TABLE 2 PREDICTED UNMITIGATED SOUND LEVELS OUTDOORS⁽¹⁾

Location ⁽²⁾	Source	Distance (m) ⁽³⁾	Leq Day (dBA)	Leq Night (dBA)
Northeast Corner (North Facade)	Collier Street	15	62	55
	Mulcaster Street	18	58	52
	TOTAL	-	63	57
Northeast Corner (East Facade)	Collier Street	15	59	52
	Mulcaster Street	18	61	55
	Dunlop Street East	110	48	41
	TOTAL	-	63	57
Southeast Corner (East Facade)	Collier Street	42	54	48
	Mulcaster Street	17	62	55
	Dunlop Street East	83	50	44
	TOTAL	-	63	56
Southeast Corner (South Facade)	Mulcaster Street	17	59	52
	Dunlop Street East	83	55	48
	TOTAL	-	60	54
5 th Floor Common Outdoor Amenity Area (OLA)	Collier Street	55	45	-
	Mulcaster Street	43	47	-
	Dunlop Street East	70	51	-
	TOTAL	-	53	-

Notes:

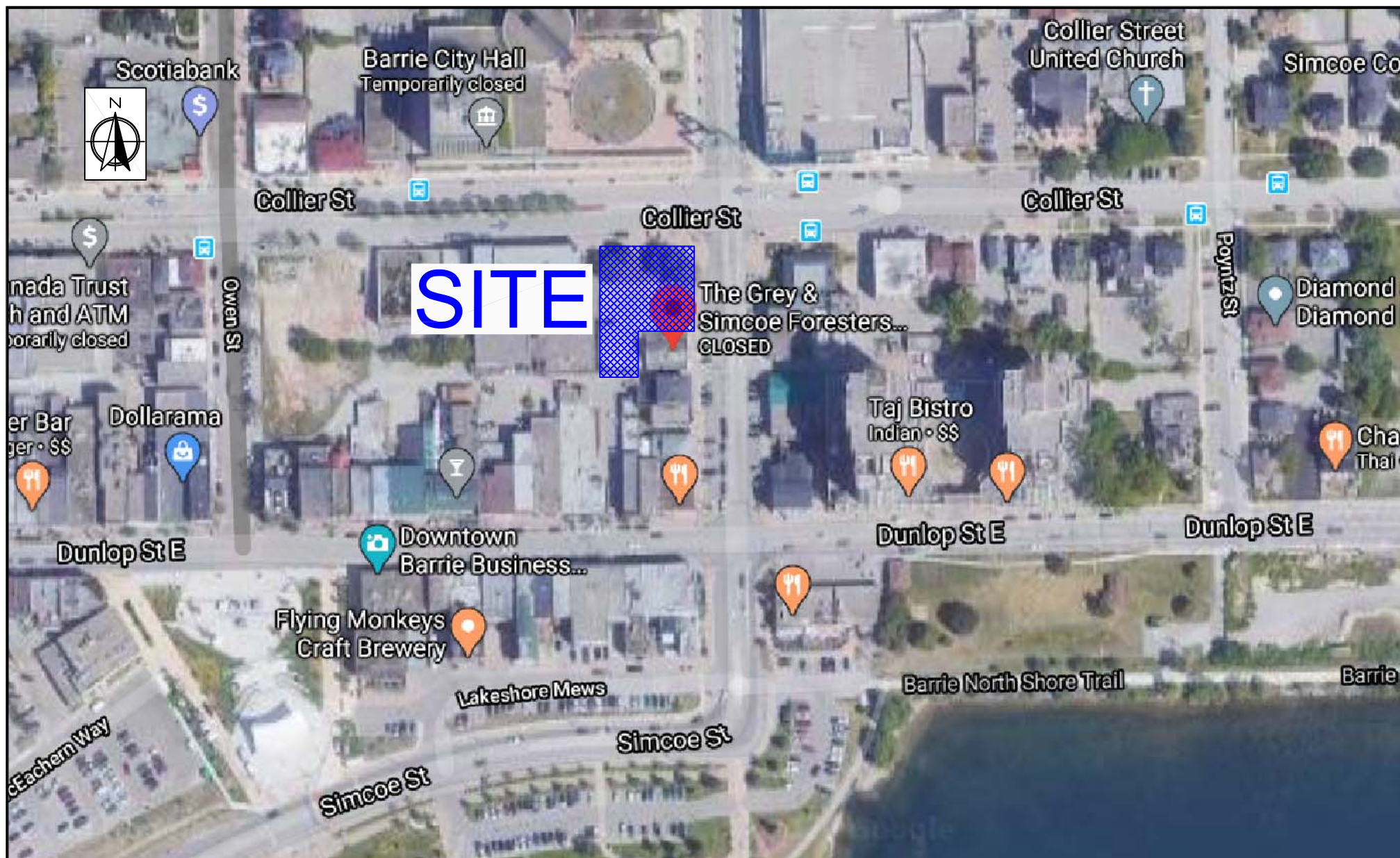
- (1) Daytime/nighttime receptors at the building facades were assessed at the top floor windows at a height of 53.2 m above grade.
- (2) See Figure 2.
- (3) Distance indicated is taken from the centreline of the noise source to the point of reception.

TABLE 3 MINIMUM NOISE ABATEMENT MEASURES

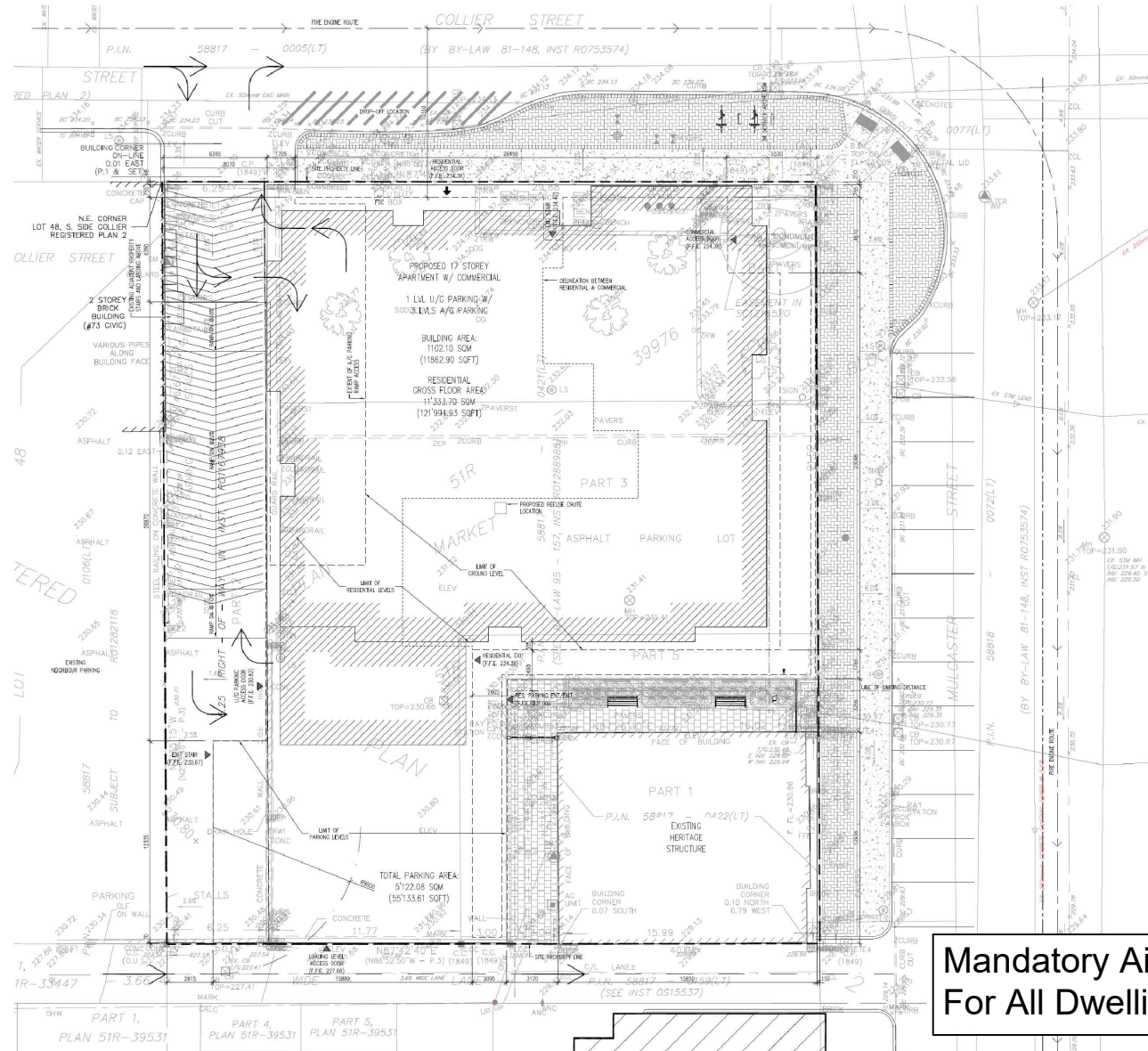
Location	Air Conditioning⁽¹⁾	Exterior Wall⁽²⁾	Exterior Window⁽³⁾	Sound Barrier⁽⁴⁾	Warning Clauses⁽⁵⁾
All Dwelling Units	Mandatory	STC 40	STC 27	None	A + B

Notes:

- 1) Based on the predicted sound levels, all dwelling units require the provision for adding air conditioning. In high-rise construction, the provision for adding air conditioning is typically not practical to implement. Thus, the requirement has been upgraded to mandatory air conditioning, which meets or exceeds the requirement.
- 2) STC - Sound Transmission Class Rating (Reference ASTM-E413). Analyses were based on the architectural drawing set prepared by MCL Architects, dated January 15, 2021. Requirements should be checked if the drawings are revised.
- 3) STC values are based on the architectural drawing set prepared by MCL Architects, dated January 15, 2021. Requirements should be checked if the drawings are revised.
- 4) Sound barriers must be of solid construction with no gaps, cracks or holes and must meet a minimum surface density of 20 kg/m². Suitable material can include wood, concrete metal sandwich panel, glazing or a combination of these.
- 5) The warning clauses to be registered on title and be included in Offers of Purchase and Sale for designated lots:
 - A. "Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road traffic may on occasions 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 an 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."
- 6) All exterior doors shall be fully weather-stripped.



			 30 Wertheim Court, Unit 25 Richmond Hill, Ontario Canada L4B 1B9 solutions@valcoustics.com Phone: (905) 764-5223 Fax: (905) 764-6813	Title Key Plan	Project No. 120-0144	Date Apr. 21, 2020
				Project Name 79 Collier Street, Barrie	Scale N.T.S.	Figure 1
No.	Revision/Issue	Date				



**Mandatory Air Conditioning
For All Dwelling Units**

BASE DRAWING BY MCL ARCHITECTS

			 30 Wertheim Court, Unit 25 Richmond Hill, Ontario Canada L4B 1B9 solutions@valcoustics.com Phone: (905) 764-5223 Fax: (905) 764-6813	Title		Project No.	Date
				Site Plan		120-0144	January 14, 2021
				Project Name		Scale	Figure
				79 Collier Street, Barrie		N.T.S.	2
No.	Revision/Issue	Date					

APPENDIX A

ROAD TRAFFIC DATA

Brett Lipson

From: Justin MacDonald <Justin.MacDonald@barrie.ca>
Sent: Wednesday, April 8, 2020 2:32 PM
To: Brett Lipson
Subject: Re: Traffic Data Request (VCL File: 1200144)

Good afternoon,

For Mulcaster and Collier would be 2% commercial and heavy.

For Dunlop Street would be 4% commercial and heavy.

From: Brett Lipson <blipson@valcoustics.com>
Sent: Wednesday, April 8, 2020 2:17 PM
To: Justin MacDonald <Justin.MacDonald@barrie.ca>
Cc: Seema Nagaraj <seema@valcoustics.com>
Subject: RE: Traffic Data Request (VCL File: 1200144)

Hello Justin,

Thank you for the traffic data. Are medium and heavy truck percentages available for these streets?

Thank you,

Brett Lipson, M.Eng., EIT



30 Wertheim Court, Unit 25
Richmond Hill, Ontario
Canada L4B 1B9
Tel: 905-764-5223 ext. 249
Fax: 905-764-6813
solutions@valcoustics.com

From: Justin MacDonald <Justin.MacDonald@barrie.ca>
Sent: Wednesday, April 8, 2020 1:57 PM
To: Brett Lipson <blipson@valcoustics.com>
Subject: Re: Traffic Data Request (VCL File: 1200144)

Good afternoon Brett,

As per your request:

- Collier Street, west of Mulcaster Street; - 9,000 vehicles per day with a growth rate of 1% compounded annually to a horizon year of 2041.
- Mulcaster Street, south of Collier Street; and - 7,500 vehicles per day with a growth rate of 1% compounded annually to a horizon year of 2041.

- Dunlop Street E, west of Mulcaster Street. - 10,000 vehicles per day with a growth rate of 1% compounded annually to a horizon year of 2041.

From: Brett Lipson <blipson@valcoustics.com>
Sent: Tuesday, March 31, 2020 3:59 PM
To: Justin MacDonald <Justin.MacDonald@barrie.ca>
Cc: Seema Nagaraj <seema@valcoustics.com>
Subject: Traffic Data Request (VCL File: 1200144)

Hello Justin,

We are currently preparing an environmental noise study for a proposed development at Collier Street and Mulcaster Street in Barrie (see attached image for location). Can you please provide ultimate road traffic data for:

Thank you,

Brett Lipson, M.Eng., EIT



30 Wertheim Court, Unit 25
Richmond Hill, Ontario
Canada L4B 1B9
Tel: 905-764-5223 ext. 249
Fax: 905-764-6813
solutions@valcoustics.com

Our staff are working remotely during this period while our office is closed. We will continue to respond to emails and telephone inquiries at our regular extensions. The health and safety of our staff and clients is our top priority surrounding this uncertain period regarding COVID-19. We are closely monitoring the situation and have implemented policies to minimize the risk of exposure.

To help us stop the spread of viruses, we request that all e-mails sent to our office includes project name, number and recipient's name in the subject line.

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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 SOUND LEVEL CALCULATION

STAMSON 5.04 NORMAL REPORT Date: 18-01-2021 78:49:58
MINISTRY OF ENVIRONMENT, CONSERVATION AND PARKS/ NOISE ASSESSMENT

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

Road data, segment # 1: Collier (day/night)

Car traffic volume : 8856/984 veh/TimePeriod *
Medium truck volume : 108/12 veh/TimePeriod *
Heavy truck volume : 72/8 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): 9000
Percentage of Annual Growth : 1.00
Number of Years of Growth : 11.00
Medium Truck % of Total Volume : 1.20
Heavy Truck % of Total Volume : 0.80
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Collier (day/night)

Angle1 Angle2 : 0.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 53.20 / 53.20 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Mulcaster (day/night)

Car traffic volume : 7380/820 veh/TimePeriod *
Medium truck volume : 90/10 veh/TimePeriod *
Heavy truck volume : 60/7 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 9 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 7500
Percentage of Annual Growth : 1.00
Number of Years of Growth : 11.00
Medium Truck % of Total Volume : 1.20
Heavy Truck % of Total Volume : 0.80
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Mulcaster (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 : 18.00 / 18.00 m
Receiver height : 53.20 / 53.20 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: Dunlop (day/night)

Car traffic volume : 9639/1071 veh/TimePeriod *
Medium truck volume : 241/27 veh/TimePeriod *
Heavy truck volume : 161/18 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) : 10000
Percentage of Annual Growth : 1.00
Number of Years of Growth : 11.00
Medium Truck % of Total Volume : 2.40
Heavy Truck % of Total Volume : 1.60
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 3: Dunlop (day/night)

Angle1 Angle2 : -35.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 110.00 / 110.00 m
Receiver height : 53.20 / 53.20 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Collier (day)

Source height = 0.94 m

ROAD (0.00 + 58.80 + 0.00) = 58.80 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

0 90 0.00 61.81 0.00 0.00 -3.01 0.00 0.00 0.00 58.80

Segment Leq : 58.80 dBA

Results segment # 2: Mulcaster (day)

Source height = 0.94 m

ROAD (0.00 + 61.37 + 0.00) = 61.37 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.00 62.16 0.00 -0.79 0.00 0.00 0.00 0.00 61.37

Segment Leq : 61.37 dBA

Results segment # 3: Dunlop (day)

Source height = 1.13 m

ROAD (0.00 + 47.96 + 0.00) = 47.96 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-35	0	0.00	63.72	0.00	-8.65	-7.11	0.00	0.00	0.00	47.96

Segment Leq : 47.96 dBA

Total Leq All Segments: 63.41 dBA

Results segment # 1: Collier (night)

Source height = 0.94 m

ROAD (0.00 + 52.26 + 0.00) = 52.26 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	55.27	0.00	0.00	-3.01	0.00	0.00	0.00	52.26

Segment Leq : 52.26 dBA

Results segment # 2: Mulcaster (night)

Source height = 0.96 m

ROAD (0.00 + 54.93 + 0.00) = 54.93 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	55.73	0.00	-0.79	0.00	0.00	0.00	0.00	54.93

Segment Leq : 54.93 dBA

Results segment # 3: Dunlop (night)

Source height = 1.13 m

ROAD (0.00 + 41.44 + 0.00) = 41.44 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-35	0	0.00	57.21	0.00	-8.65	-7.11	0.00	0.00	0.00	41.44

Segment Leq : 41.44 dBA

Total Leq All Segments: 56.93 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.41
(NIGHT): 56.93