

Environmental Noise Study

655 Hurontario Street
(formerly referred to as 1 Lockhart Road)

Proposed Residential Development
Lockhart Road and Hurontario Street
Town of Collingwood

May 1, 2017
Project: 116-0451

Prepared for

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VALCOUSTICS

Canada Ltd.

Document Revisions Index:

Revision	Date	Description of Changes
1.0	February 3, 2017	Final
2.0	May 1, 2017	Final - Update to respond to City comments

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Environmental Noise Study

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1.0 INTRODUCTION

Valcoustics Canada Ltd. (VCL) was retained to prepare an Environmental Noise study to support the site plan application for the proposed residential development at Lockhart Road in the Town of Collingwood. The proposed development consists of a 4-storey building of 32 residential units with no at-grade amenity space. This report summarizes the potential sound levels and noise mitigation measures needed for the proposed development to comply with the applicable Ministry of the Environment and Climate Change (MOE) guidelines.

The site is bounded by:

- existing residential development to the east;
- existing commercial buildings to the north
- Hurontario Street to the west with Collingwood Collegiate Institute beyond; and,
- Lockhart Road with residential buildings beyond to the south.

Figure 1 shows the Key Plan.

This report is based on the Site Plan prepared by C. C. Tatham & Associates Ltd., plotted date of January, 2017. Figure 2 shows the Site Plan.

2.0 ENVIRONMENTAL NOISE ASSESSMENT

2.1 NOISE SOURCES

2.1.1 Transportation Sources

The environmental noise sources with potential for impact on the proposed development will be road traffic on Hurontario Street and Lockhart Road.

Road traffic data for Hurontario Street and Lockhart Road was provided by the town of Collingwood for the year 2014. This data was projected to the year 2027 using a 2% compound growth rate to provide a conservative estimate. In the absence of truck count data, the truck percentages were assumed to be 5% medium trucks and 5% heavy trucks in order to provide a conservative estimate. The day/night split was assumed to be 90%/10% following Ministry of Transportation (MTO) guidelines. Road traffic on other local streets is minor and is not expected to create adverse noise impact on the proposed development due to the low traffic volumes compared to the primary arterial roads, as well as screening from the existing neighbouring buildings.

The road traffic data is summarized in Table 1.

Road traffic correspondence is contained in Appendix A

2.1.2 Stationary Sources

In MOE terminology, a site and all its activities that create sound (noise) emissions area referred to as a “stationary source”. In this case , two separate conditions exist with respect to stationary sources of noise:

1. Stationary sources beyond the boundary of the subject site which may impact the development; and,
2. Stationary sources of noise which are part of the proposed development which may impact noise sensitive receptors beyond the site boundary (i.e., mechanical equipment and ventilation systems associated with the residential building).

Potential sources outside of the subject site would include Collingwood Collegiate Institute (CCI), a large education facility located on the west side of Hurontario Street, as well as a property to the north which seems to be a converted residence operating as a Pre-fabricated building kit sales office. Beyond this is a small retail plaza which includes a Subway restaurant as well as several other small retail uses.

The site was visited on November 24th, 2016 to determine the potential impacts of the neighbouring commercial/institutional sites. During the site visit, noise from CCI was not noted on the proposed development site. The primary sources of noise for CCI would be rooftop HVAC equipment. This equipment is well removed from the east property boundary of the school (closest to the proposed development).

With regard to the retail operations to the north, no potential noise impact was noted during the site visit. Moreover, there are existing residential dwellings (on Bryan Court) which are closer to the commercial operations than the proposed development site.

Noise impact from “stationary sources” onto the development are not considered further in this report.

Potential sources from the development impacting on to the environment would include in-suite air conditioning for each individual unit. Drawings show that 20 AC units would be on the west facade and 12 AC units would be on the east facade. No rooftop units are planned for this development.

A detailed noise impact assessment of these sources on to the surrounding environment is included below. Please note however that at this stage of the development process, detailed equipment information is not yet available. Rather, the analysis shows the feasibility of the proposed design based on generic equipment data. An update to the analysis would be expected as a condition of building permit approval when more detailed equipment selections are available.

2.2 ENVIRONMENTAL NOISE GUIDELINES

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

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

2.2.1 Transportation Noise

Architectural Elements

In the daytime, 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.

Ventilation

In accordance with the MOE noise guideline for road traffic sources, if the daytime sound levels, $L_{eq\ Day}$, 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).

Outdoors

The building is not provided with any at-grade outdoor amenity space. Rather, units will be provided with balconies that are less than 4 m in depth. Since the building will have balconies less than 4 m in depth and no common outdoor amenity space, there are no outdoor living areas which must be protected from noise with regard to the NPC-300 limits.

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

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

2.2.2 Stationary Source Noise

Stationary sources are treated differently by the MOE guideline than transportation sources of noise such as road traffic and railways. Stationary source noise criteria used for noise impact assessment are dependent on the type of area and the ambient sound environment. According to the definition in NPC-300, the site and area are Class 1; i.e., an area where the ambient sound environment is dominated by activities of people, usually road traffic.

For any outdoor point of reception in any area amenable for use, the MOE guidelines set a (one hour L_{eq}) limit of 50 dBA, or the ambient due to road traffic noise, if higher, during any hour of the daytime and evening (0700 to 2300), for the sound exposure from a stationary source.

For a plane of window, the MOE guidelines set a (one hour L_{eq}) limit of 50 dBA during the day and evening (0700 to 2300) or 45 dBA at night (2300 to 0700) or the ambient due to the road traffic noise, if higher. The guideline limits apply to habitable spaces such as living/dining/family rooms and sleeping areas. No indoor sound exposure guidelines are provided for stationary sources.

The MOE requires a "worst case" one-hour operating scenario be analysed. This would typically occur when the background ambient sound level is at a minimum and the noise generated from the stationary noise sources is at a maximum.

The MOE guidelines also treat mitigation for stationary sources differently than for transportation sources. Unlike for road noise, upgraded windows and air conditioning to allow windows to remain closed for noise control, are not generally acceptable mitigation for stationary sources, with some exceptions. The noise criteria apply outdoors at the plane of the noise sensitive windows.

2.3 NOISE IMPACT ASSESSMENT

2.3.1 Transportation Noise Assessment

Using the road traffic data in Table 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 MOE.

Daytime and nighttime sound levels were calculated at the facade of the top floor window of the building (4th floor) at a height of 10.5 m above grade. Inherent screening of each building face due to its orientation to the noise source is accounted for.

Table 2 summarizes the predicted sound energy levels outdoors at specific locations. A sample sound level calculation is contained in Appendix C.

The highest unmitigated daytime and nighttime facade sound levels of 67 dBA and 60 dBA, respectively, are predicted to occur at the western facade of the building immediately adjacent to Hurontario Street.

2.3.2 Stationary Source Noise Assessment

The following procedures were used to assess potential noise impacts of the proposed residential development on the environment:

- A 3-D acoustic model of the relevant sources, identified above, as shown in Figure 3, was developed using CadnaA V4.6 environmental noise modelling software, which follows the protocol of the ISO Standard 9613-2, “*Acoustics – Attenuation of Sound During Propagation in Outdoors*”, to determine the predicted sound exposures at each of the receptor locations. Accounting for distance attenuation, ground attenuation, atmospheric effects and inherent screening, where present, the sound level (1 hour L_{eq}) was calculated.
- Flat topography was used in the analysis.
- A calculation height of 4.5 m was used to represent the 2nd floor of the existing 2-storey residential developments to the east of the subject site. This is conservative as some of the dwellings to the east of the subject site are in fact one storey in height. This also represents a more conservative calculation of the sound level at outdoor points of reception, which would be taken at 1.5 m, since there is less ground absorption.
- Typical suite HVAC units, with a sound power rating of 72 dBA, serving individual suites were assumed to operate at a 100% duty cycle during the day and evening, and at 50% duty cycle at night. Please note that the HVAC units are assumed to be situated inside the dwelling units with only the fresh air intake and condenser sections interfacing with the exterior. 20 units on the west facade and 12 units on the east facade were represented as vertical area sources.
- The exclusion MOE guideline limits of 50 dBA daytime (0700-2300 hours) and 45 dBA nighttime (2300-0700 hours) were used in the assessment. This is considered conservative as there may be traffic on the nearby roads and as a result there may be higher ambient sound levels.

Details with respect to source reference sound levels, activity assumptions and calculations are found in Appendix C.

Figure 3 shows the predicted unmitigated sound level contours (50dBA yellow line and 45 dBA green line). For the daytime and evening scenario the yellow line (the 50 dBA daytime/evening limit) does not extend beyond the property line to the east and does not extend beyond Hurontario Street to the west. Similarly for the nighttime scenario, the green line (the 45 dBA nighttime limit) does not extend beyond the property line to the east and does not extend beyond Hurontario Street to the west. As a result the unmitigated sound exposures do not exceed the guideline exclusion limits, and as such, mitigation of stationary sources of noise is not required.

As noted above, an update to the analysis would be expected as a condition of building permit approval when more detailed equipment selections are available.

3.0 NOISE ABATEMENT REQUIREMENTS

Noise abatement requirements are discussed below and are summarized in Table 3 and the notes to Table 3. Noise abatement requirements are also shown in Figure 2.

3.1 INDOORS

3.1.1 Architectural Elements

The indoor noise exposure guidelines can be achieved by using appropriate construction for exterior wall, windows and doors. In determining the worst-case sound isolation requirements of the architectural elements, wall and window areas were assumed to be 80% and 30% of the associated floor area, respectively, on both the facade directly exposed to and the facade perpendicular to the noise source, for living/dining rooms and for bedrooms.

For all residential units in this development, exterior walls meeting a minimum Sound Transmission Class (STC) of 37 and windows with STC ratings up to 27 will be required to achieve the indoor noise guideline criteria of the MOE. These STC ratings are typically achieved with standard materials meeting the minimum non-acoustical requirements of the OBC.

The final sound isolation requirements should be checked when the architectural plans are available, to confirm the assumptions are representative. 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 municipality at the time of the building permit application.

3.1.2 Ventilation Requirements

The predicted sound exposures are such that mandatory air conditioning is required for all residential units within the development.

3.2 WARNING CLAUSES

Where the sound level guidelines are exceeded, appropriate warning clauses should be registered on title and included in Offers of Purchase and Sale of the proposed dwelling units, to make future occupants aware of the potential noise situation. Locations requiring warning clauses and the appropriate wording are given in Table 3 and in the notes to Table 3, respectively. In general, warning clauses are required where the special ventilation measures are required, and/or where the noise criteria is exceeded.

4.0 CONCLUSIONS

With appropriate design of the development, a suitable acoustical environment can be provided for the occupants and the applicable MOE noise guideline requirements can be met. Future occupants will be made aware of the potential noise situation through warning clauses, as per MOE guidelines.

Exterior wall, window and door construction meeting the minimum non-acoustical standards of the OBC will allow the applicable indoor MOE guidelines to be met based on assumed window and wall areas. These aspects should be reviewed once the building plans are available. This is usually done as a condition of obtaining a building permit.

Based on the preliminary analysis of the proposed HVAC systems for the building, it is expected that the MOE sound level limits will be met at all off-site receptors. The analysis should be reviewed once detailed equipment information is available, likely as a condition of building permit.

5.0 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 21, 2013.
4. "Road and Rail Noise: Effects on Housing", Canada Mortgage and Housing Corporation, Publication NHA 5156, 81/10.
5. "Environmental Noise Assessment in Land-Use Planning 1987", Ontario Ministry of the Environment, February 1987, ISBN 0-7729-2804-5.

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TABLE 1
ROAD TRAFFIC DATA⁽¹⁾

Roadway	2014 AADT ⁽²⁾	% Trucks ⁽³⁾		Day/Night Split (%) ⁽³⁾	Speed Limit (kph)	% Grade
		Medium	Heavy			
Hurontario Street	14112	5	5	90/10	50	≤ 2
Lockhart Road	2166	5	5	90/10	50	≤ 2

Notes:

- (1) Road traffic data obtained from the town of Collingwood.
- (2) Annual Average Daily Traffic.
- (3) Assumed.

TABLE 2
UNMITIGATED SOUND LEVELS AT PROPOSED DWELLINGS

Location ⁽¹⁾	Source	Distance (m) ⁽²⁾	L _{eq} Day (dBA) ⁽³⁾	L _{eq} Night (dBA) ⁽³⁾
Southwest Corner West Facade	Hurontario Street	20	66	60
	Lockhart Road	25	54	47
	TOTAL	–	67	60
Southwest Corner South Facade	Hurontario Street	20	63	57
	Lockhart Road	25	56	50
	TOTAL	–	64	58
Southeast Corner East Facade	Lockhart Road	23	54	48
Northwest Corner North Facade	Hurontario Street	20	63	57

Notes:

- (1) See Figure 2.
- (2) Distance indicated is from the centreline of the road.
- (3) Daytime and Nighttime sound levels for facades apply to the top floor bedroom window at heights of 10.5 m above grade.

TABLE 3

MINIMUM NOISE ABATEMENT MEASURES

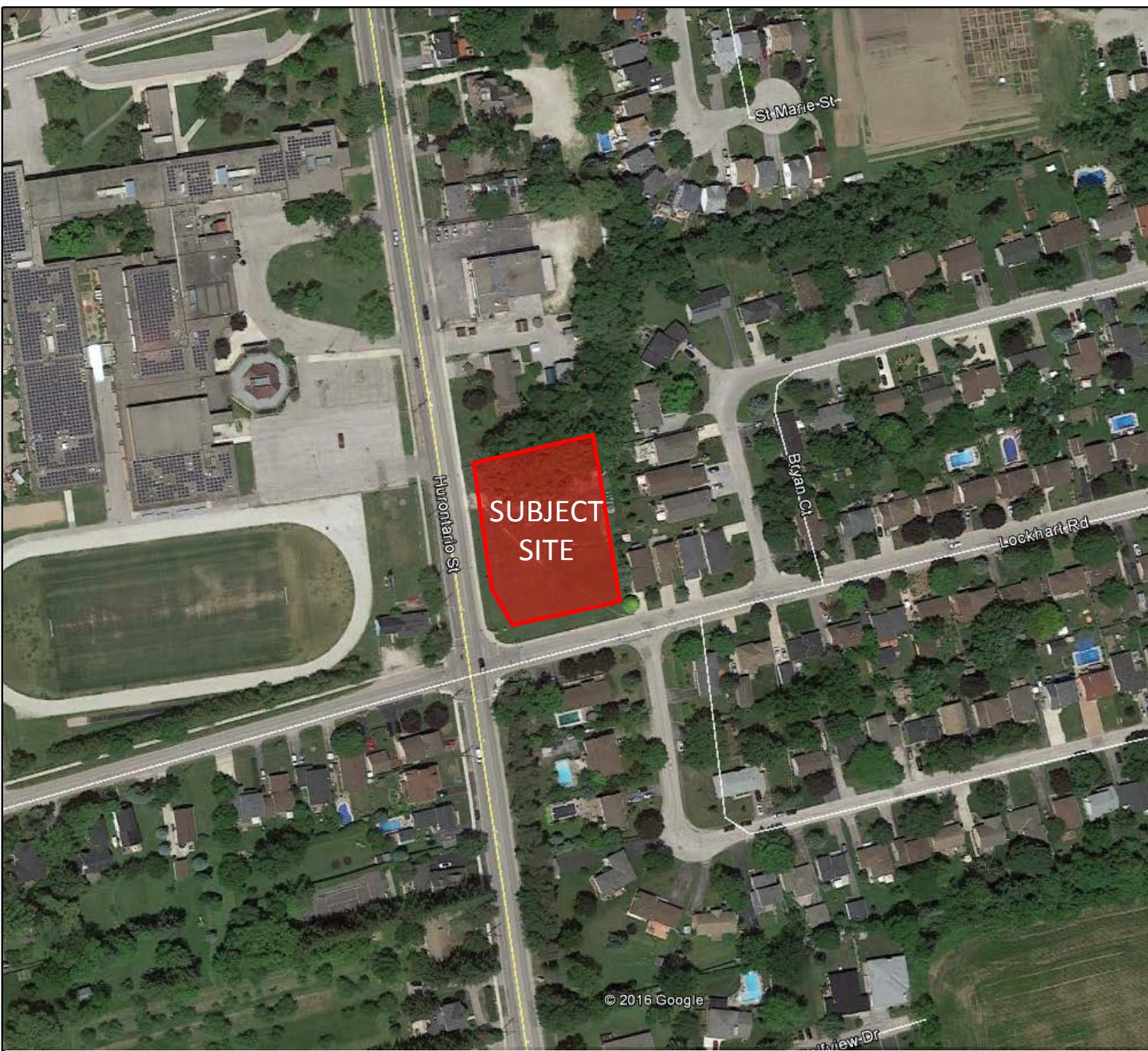
Location	Air Conditioning⁽¹⁾	Exterior Wall STC Rating⁽²⁾	Window STC Rating⁽³⁾	Warning Clauses⁽⁴⁾
All residential units	Mandatory	OBC	OBC	A + B

Notes:

- (1) Where means must be provided to allow windows to remain closed for noise control purposes, a commonly used technique is that of air conditioning. Air conditioning equipment must comply with any guidelines laid out within the local municipal code. Air cooled condenser units should be located in a noise insensitive location.
- (2) STC - Sound Transmission Class Rating (Reference ASTM-E413). Other wall and window construction configurations may be possible to achieve the MOE indoor noise guidelines.

The requirements are based on assumed percentages of wall and window area to associated floor area and should be checked once building plans are finalised.
- (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.

The requirements are based on assumed percentages of wall and window area to associated floor area and should be checked once building plans are finalised.
- (4) Warning clauses are a tool to inform prospective owners/occupants of potential annoyance due to existing noise sources. Where required, the following warning clauses should be registered on title or included in the development agreement that is registered on title. The following warning clauses should also be included in agreements of Offers of Purchase and Sale and Lease/Rental Agreements:
 - A. "Purchasers 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 occasionally interfere with some activities of the dwelling occupants as the sound level may exceed the noise guidelines of the Municipality and the Ministry of the Environment."
 - B. "This dwelling unit has been fitted 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 Municipality's and the Ministry of the Environment's road noise criteria."
- (5) All exterior doors shall be fully weatherstripped.



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Project Name
1 Lockhart Road

Title
Key Plan

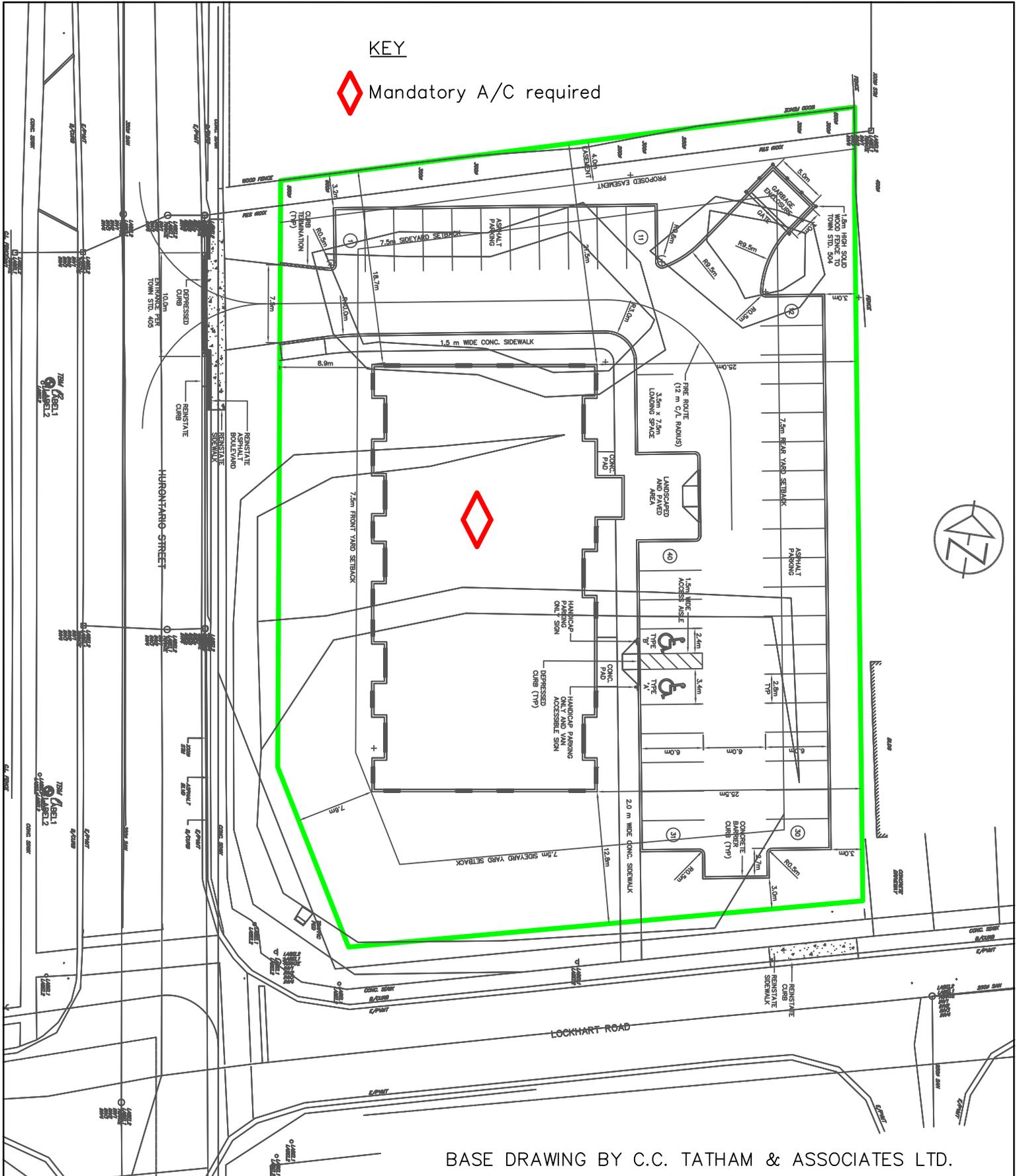
Project No.
116-0451

Date
Feb 1, 2017

Figure
1

KEY

 Mandatory A/C required



BASE DRAWING BY C.C. TATHAM & ASSOCIATES LTD.

	 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	116-0451	Feb 1, 2017
No.	Revision/Issue	Date	Project Name	Scale
			1 Lockhart Road	N.T.S.
				Figure
				2



	Title	Date	Figure
	Project Name	Project No.	
	Predicted Sound Levels due to Unit ACs	Apr 27, 2017	3
	655 Hurontario Street (formerly 1 Lockhart Rd.)	116-0451	

APPENDIX A

ROAD TRAFFIC DATA

	
ENGINEERING SERVICES	
TRAFFIC COUNT LOCATION	
DATE	OCTOBER 2015
SCALE	1" = 30' 000
PERIOD	7 DAY COUNT
PERIOD	24 HOUR COUNT



APPENDIX B

ENVIRONMENTAL NOISE GUIDELINES

APPENDIX B

ENVIRONMENTAL NOISE GUIDELINES

MINISTRY OF THE ENVIRONMENT AND CLIMATE CHANGE (MOE)

Reference: MOE 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 level $L_{eq}(1)$, 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: MOE 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 CALCULATIONS

STAMSON 5.04 SUMMARY REPORT Date: 03-02-2017 09:54:32
MINISTRY OF THE ENVIRONMENT AND CLIMATE CHANGE / NOISE ASSESSMENT

Filename: w.te Time Period: Day/Night 16/8 hours

Description:

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

Car traffic volume : 14787/1643 veh/TimePeriod *
Medium truck volume : 821/91 veh/TimePeriod *
Heavy truck volume : 821/91 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): 14112
Percentage of Annual Growth : 2.00
Number of Years of Growth : 13.00
Medium Truck % of Total Volume : 5.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Hurontario S (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 20.00 / 20.00 m
Receiver height : 10.50 / 10.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 2270/252 veh/TimePeriod *
Medium truck volume : 126/14 veh/TimePeriod *
Heavy truck volume : 126/14 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): 2166
Percentage of Annual Growth : 2.00
Number of Years of Growth : 13.00
Medium Truck % of Total Volume : 5.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Lockhart Rd (day/night)

```

-----
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth           :           0   (No woods.)
No of house rows    :           0 / 0
Surface             :           1   (Absorptive ground surface)
Receiver source distance : 24.90 / 24.90 m
Receiver height     : 10.50 / 10.50 m
Topography          :           1   (Flat/gentle slope; no barrier)
Reference angle     :           0.00
  
```

Result summary (day)

```

-----
! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----
1.Hurontario S ! 1.50 ! 66.30 ! 66.30
2.Lockhart Rd ! 1.50 ! 53.82 ! 53.82
-----+-----+-----
Total 66.54 dBA
  
```

Result summary (night)

```

-----
! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----
1.Hurontario S ! 1.49 ! 59.76 ! 59.76
2.Lockhart Rd ! 1.50 ! 47.29 ! 47.29
-----+-----+-----
Total 60.00 dBA
  
```

TOTAL Leq FROM ALL SOURCES (DAY): 66.54
 (NIGHT): 60.00

Configuration	
Parameter	Value
General	
Country	International
Max. Error (dB)	0.00
Max. Search Radius (m)	2000.00
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (m)	1000.00
Min. Length of Section (m)	1.00
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Reference Time Day (min)	960.00
Reference Time Night (min)	480.00
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	0.00
Night-time Penalty (dB)	0.00
DTM	
Standard Height (m)	0.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	2
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rcvr - Reflector	1.00 1.00
Min. Distance Source - Reflector	1.00
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	
	Excl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (°C)	10
rel. Humidity (%)	70
Ground Absorption G	1.00
Wind Speed for Dir. (m/s)	3.0
Roads (RLS-90)	
Strictly acc. to RLS-90	
Railways (Schall 03 (1990))	
Strictly acc. to Schall 03 / Schall-Transrapid	
Aircraft (???)	
Strictly acc. to AzB	

116-0451 655 Hurontario Street (formerly 1 Lockhart Road)

Vertical Area Sources

Name	M.	ID	Result. PWL			Result. PWL*			Lw / Li			Correction			Sound Reduction		Attenuation			Operating Time			K0	Freq.	Direct.
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area	Day	Special	Night	(dB)	(Hz)				
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)										(min)	(min)	(min)	(dB)	(Hz)			
12 A/Cs on East Facade			82.8	82.8	82.8	55.9	55.9	55.9	Lw	AC2+10*log10(12)		0.0	0.0	0.0			60.00	60.00	30.00	3.0		(none)			
20 A/Cs on West Facade			85.0	85.0	85.0	58.2	58.2	58.2	Lw	AC2+10*log10(20)		0.0	0.0	0.0			60.00	60.00	30.00	3.0		(none)			

Sound Level Library

Name	ID	Type	Oktave Spectrum (dB)												Source
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	
AC Unit	AC1	Lw		0.0	0.0	0.0	0.0	0.0	68.0	0.0	0.0	0.0	68.0	68.0	Manufacturer's Data
AC Unit	AC2	Lw		0.0	0.0	0.0	0.0	0.0	72.0	0.0	0.0	0.0	72.0	72.0	Manufacturer's Data