

Environmental Noise Feasibility Study

Rainsong Development – Phase 2

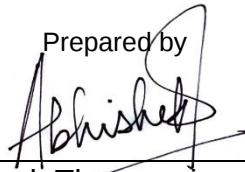
Proposed Mixed-Use Development
Yonge Street and Lockhart Road
City of Barrie

February 3, 2022
Project: 116-0517.100

Prepared for

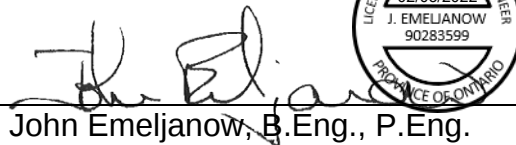
Rainsong Land Development Inc.

Prepared by



Abhishek Thyagarajan, M.S.

Reviewed by



John Emeljanow, B.Eng., P.Eng.



Version History

Version #	Date	Comments
1.0	February 3, 2022	Final – Issued to Client

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Environmental Noise Feasibility Study

Rainsong Development – Phase 2

Proposed Mixed-Use Development Yonge Street and Lockhart Road City of Barrie

EXECUTIVE SUMMARY

Valcoustics Canada Ltd. (VCL) was retained to prepare an Environmental Noise Feasibility Study to support the application for a mixed-use development within the City of Barrie. VCL previously prepared the Environmental Noise Study for Phase 1 of this development.

The project will consist of 194 single detached dwelling units, 118 semi-detached dwelling units, 147 street townhouses, 8 units in a future development block and an institutional (school) block. The sources of noise that could impact the proposed development are road traffic on Yonge Street and Lockhart Road and rail traffic on the GO Transit Newmarket line.

To meet the applicable transportation noise source guideline limits:

- The dwellings on Blocks 259, 260, 261, 265, 266, 267, 268, and 274 require the provision for adding air conditioning;
- For all townhouse units and detached dwellings, exterior wall and window construction meeting the minimum non-acoustical requirement of the OBC is adequate to meet the indoor sound level criteria of the MECP noise guidelines;
- A 2.25 m high sound barrier along the southernmost property line and the rear (eastern) property line of the five southernmost dwelling units in Block 260;
- A 2 m high sound barrier along the southernmost property line of Blocks 261 and 265; and
- A 2 m high sound barrier along the southernmost property line and the rear (western) property line of the two southernmost dwelling units in Block 274.

Final requirements should be checked when site grading and detailed building plans are available. This could be done as a condition for obtaining a building permit.

1.0 INTRODUCTION

Valcoustics Canada Ltd. (VCL) was retained to prepare an Environmental Noise Feasibility Study to support the application for a mixed-use development within the City of Barrie. VCL previously prepared the Environmental Noise Study for Phase 1 of this development.

The predicted sound levels and noise mitigation measures needed for the proposed development to comply with the MECP noise guidelines are outlined herein.

1.1 THE SITE AND SURROUNDING AREA

The proposed development is located at near the intersection of Yonge Street and Lockhart Road in Barrie, Ontario. The site is bounded by:

- Agricultural lands and future residential development with Maplevue Drive beyond, to the north;
- Existing agricultural lands proposed for institutional uses, mixed use development and a recreational center with Yonge Street and the GO Newmarket rail line beyond, to the east;
- Lockhart Road, with agricultural and rural residential dwellings beyond, to the south; and
- Agricultural residential dwellings to the west.

A Key Plan is included as Figure 1.

This report was prepared using the Draft Plan of Subdivision, prepared by Jones Consulting Group Ltd. issued January 20, 2022. The Draft Plan is included as Figure 2.

1.2 THE PROPOSED DEVELOPMENT

The proposed development is located to the north-west of the intersection of Yonge Street and Lockhart Road in Barrie, Ontario. It will consist of 194 single detached dwelling units, 118 semi-detached dwelling units, 147 street townhouses, 8 units in a future development block and an institutional (school) block.

2.0 NOISE SOURCES

2.1 TRANSPORTATION SOURCES

The noise sources with the potential to impact the proposed development are road traffic on Yonge Street and Lockhart Road, and rail traffic on the GO Transit Newmarket rail line.

Road traffic volumes applicable to the year 2018, including Annual Average Daily Traffic (AADT), posted speed limit and percentage of trucks for Yonge Street and Lockhart Road were obtained from the City of Barrie. The medium/heavy truck split was assumed to be 70%/30% of total truck volume. The day/night split was assumed to be 90%/10%. Traffic volumes were projected to the year 2032 using the estimated annual growth rates provided by the City of Barrie.

Rail traffic forecasts including volumes, number of locomotives, number of cars, and maximum speed for the GO Transit Newmarket rail line was obtained from Metrolinx. The forecast was assumed to be applicable to the 2032 design year.

The road and rail traffic data are summarized in Tables 1A and 1B. Correspondence is included as Appendix A.

2.2 STATIONARY SOURCES

From our visit to the area on January 24, 2022, there are no stationary sources with the potential to impact the subject site. Stationary sources are therefore not considered further in this report.

3.0 ENVIRONMENTAL NOISE GUIDELINES

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 TRANSPORTATION SOURCE NOISE GUIDELINES

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 using the outdoor sound levels at 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. This is typically achieved by providing the dwelling with central air conditioning. For daytime sound levels between 56 dBA and 65 dBA inclusive, there need only be the provision for adding air conditioning. 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 the sound level is greater than 50 dBA).

3.1.3 Outdoors

For outdoor amenity areas (“Outdoor Living Areas” – OLAs), the guideline objective 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, and it is:

- at least 4 m in depth; and
- unenclosed.

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

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

4.0 NOISE IMPACT ASSESSMENT

4.1 TRANSPORTATION NOISE SOURCES

4.1.1 Analysis Method

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

The daytime and nighttime sound levels at the building facades were assessed at 7.5 m above grade for assumed three storey townhouses and 4.5 m above grade for two storey single detached houses. The daytime sound levels at the OLA were assessed at 1.5 m above grade, 3.0 m from the rear facade of the dwelling, in line with the midpoint of the dwelling (or the centreline of the lot).

4.1.2 Sound Level Prediction

The highest daytime/nighttime unmitigated sound levels of 63 dBA/56 dBA are predicted to occur at the south facade of the southeast corner of Block 260. The highest unmitigated daytime sound level in a rear yard Outdoor Living Area (OLA) is predicted to be 61 dBA at the southernmost townhouse unit in Block 260.

Inherent screening of each building face due to its orientation to the noise source was taken into account in this assessment.

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

The sound level calculations are included in Appendix C.

4.2 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 OLAs.

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

4.2.1 Indoors

4.2.1.1 Architectural requirements

The indoor sound level guidelines can be achieved by using appropriate construction for exterior walls, windows, and doors. In determining the worst-case architectural requirements, the ratios of wall and window areas were assumed to be 80% and 30% of the associated floor area respectively. The STC requirements were calculated for Block 260 since it has the highest unmitigated sound levels in the proposed development.

For all the residential units, exterior walls and windows meeting the minimum non acoustic requirements prescribed by the Ontario Building Code (OBC) are sufficient to meet the indoor sound level criteria of the MECP noise guidelines.

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 must be confirmed by the window manufacturer through the submission of acoustical test data.

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.

4.2.1.2 Ventilation requirements

The following ventilation requirements are required for the residential dwellings to meet the indoor noise criteria established by MECP guidelines:

- Blocks 259, 260, 261, 265, 266, 267, 268, and 274 require provision for air conditioning; and
- There are no special ventilation requirements for noise control purposes for the remaining units in this development.

4.2.2 Outdoors

The unmitigated daytime sound levels in the OLAs siding towards and closest to Lockhart Road are above the 60 dBA limit prescribed by the MECP guidelines. Sound barriers are required for noise control purposes. The recommended sound barriers for the proposed development are:

- A 2.25 m high sound barrier along the southernmost property line and rear (eastern) property line of the five southernmost dwelling units in Block 260;
- A 2 m high sound barrier along the southernmost property line of Blocks 261 and 265; and
- A 2 m high sound barrier along the southernmost property line and the rear (western) property line of the two southernmost dwelling units in Block 274.

4.2.3 Warning clauses

Warning clauses are a tool to inform prospective owners/occupants of potential annoyance due to environmental 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.

5.0 CONCLUSIONS

With the incorporation of the recommended noise mitigation measures, the indoor and outdoor transportation noise guideline limits can be met. Future occupants will be made aware of the potential noise situation through warning clauses, as per the MECP guidelines.

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

6.0 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, August 2013.

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TABLE 1A ROAD TRAFFIC DATA⁽¹⁾

Roadway	Year	AADT ⁽²⁾	% Trucks		Day/Night (%)	Posted Speed Limit (kph)
			Medium	Heavy		
Yonge Street ⁽³⁾	2018 (2032)	13000 (21646)	1.2	1.8	90/10	60
Lockhart Road ⁽⁴⁾	2018 (2032)	3000 (14694)	2.8	4.2	90/10	60

Notes:

- (1) Obtained from the City of Barrie
- (2) AADT – Annual Average Daily Traffic
- (3) Growth rates of 4% per year (2018 – 2031) and 1% (2031 – 2041) were provided by the City of Barrie and used to determine the 2032 volume
- (4) Growth rates of 13% per year (2018 – 2031) and 2% (2031 – 2041) were provided by the City of Barrie and used to determine the 2032 volumes

TABLE 1B RAIL TRAFFIC DATA⁽¹⁾

Subdivision	Period	Train Type	Number of Trains	Maximum # of Cars	Maximum # of Locomotives per train	Maximum Speed (kph)
Newmarket	Daytime (0700 to 2300)	GO Transit	60	12	1	97
	Nighttime (2300 to 0700)	GO Transit	12	12	1	97
Newmarket	Daytime (0700 to 2300)	GO Transit	8	12	2	97
	Nighttime (2300 to 0700)	GO Transit	2	12	2	97

Note:

- (1) Rail traffic volumes and maximum speed were obtained from Metrolinx.

TABLE 2 PREDICTED UNMITIGATED SOUND LEVELS ⁽¹⁾

Location ⁽²⁾	Source	Distance (m) ⁽³⁾	L _{eq} Day (dBA)	L _{eq} Night (dBA)
R1 - Block 260 SE corner E facade	Yonge Street	314	47	41
	Lockhart Road	33	60	53
	Rail	650	50	46
	Total	-	60	54
R2 - Block 260 SE corner S facade	Yonge Street	314	44	38
	Lockhart Road	33	63	56
	Rail	650	50	46
	Total	-	63	57
R3 - Block 258 E facade	Yonge Street	327	47	41
	Lockhart Road	150	50	43
	Rail	560	51	47
	Total	-	54	49
R4 - Block 261 SE corner S facade	Yonge Street	365	43	37
	Lockhart Road	34	62	56
	Total	-	63	56
R5 - Block 266 S facade	Lockhart Road	53	59	52
	Total	-	59	52
R6 - Block 195 S facade	Lockhart Road	129	44	37
	Total	-	44	37
R7 - Block 250 W facade	Lockhart Road	90	52	46
	Total	-	52	46
R8 - Block 132 E facade	Yonge Street	390	43	37
	Rail	569	48	44
	Total	-	49	45
R9 - Block 256 E facade	Yonge Street	353	47	40
	Lockhart Road	401	43	36
	Rail	514	51	47
	Total	-	53	48

.../cont'd

TABLE 2 PREDICTED UNMITIGATED SOUND LEVELS ⁽¹⁾ (continued)

Location ⁽²⁾	Source	Distance (m) ⁽³⁾	L _{eq} Day (dBA)	L _{eq} Night (dBA)
OLA 1 - Block 260 Rear yard	Yonge Street	306	45	-
	Lockhart Road	36	61	-
	Rail	648	46	-
	Total	-	61	-
OLA 2 - Block 258 rear yard	Yonge Street	318	45	-
	Lockhart Road	145	48	-
	Rail	558	48	-
	Total	-	52	-
OLA 3 - Block 261 rear yard	Lockhart Road	39	60	-
	Total	-	60	-
OLA 4 - Block 250 rear yard	Lockhart Road	90	51	-
	Total	-	51	-
OLA 5 - Block 256 rear yard	Yonge Street	351	44	-
	Lockhart Road	401	41	-
	Rail	512	48	-
	Total	-	50	-

Notes:

- (1) Daytime/nighttime receptors were taken at the top floor windows. OLA receptors were taken at 1.5 m above grade.
- (2) Receptor locations are shown on Figure 2.
- (3) Distance indicated is from the centreline of the noise source to the facade or OLA.

TABLE 3 MINIMUM NOISE ABATEMENT MEASURES

Location	Air Conditioning ⁽¹⁾	Exterior Wall ⁽²⁾	Window STC Rating ⁽³⁾	Sound Barrier ⁽⁴⁾	Warning Clauses ⁽⁵⁾
Blocks 266, 267, and 268	Provision for air conditioning	OBC	OBC	None	A + B
Five southernmost units in Block 260	Provision for air conditioning	OBC	OBC	2.25 m	A + B
Remaining units in Block 260	Provision for air conditioning	OBC	OBC	None	A + B
Blocks 261, 265, and two southernmost units in Block 274	Provision for air conditioning	OBC	OBC	2.0 m	A + B
Remaining units in Block 274	Provision for air conditioning	OBC	OBC	None	A + B
Remaining Units	Not required for noise control	OBC	OBC	None	-

Notes:

- (1) Where methods must be provided to allow windows to remain closed for noise control purposes, a commonly used technique is the use of air conditioning. Provision for adding air conditioning typically takes the form of a ducted ventilation system suitably sized to permit the addition of central air conditioning by the occupant.
- (2) STC - Sound Transmission Class Rating (Reference ASTM-E413). Analyses were based upon the assumption that wall and window areas are as indicated in Section 4.2.1.1 of this report. Requirements should be checked once floor plans have been finalized and exterior wall construction details are defined.
- (3) STC values are based upon the assumption that all wall and window areas are as indicated in Section 4.2.1.1 of this report. Requirements should be checked once floor plans have been finalized and exterior wall construction details are defined.
- (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 designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."
- (6) All exterior doors shall be fully weather-stripped.



Title	Key Plan
Project Name	Rainsong Development - Phase 2

Date 2022-01-24
Project No. 116-0517.100

APPENDIX A

ROAD TRAFFIC DATA

Abhishek Thyagarajan

From: Justin MacDonald <Justin.MacDonald@barrie.ca>
Sent: January 10, 2022 11:54 AM
To: Abhishek Thyagarajan
Cc: John Emeljanow
Subject: RE: Road Traffic Data request (VCL File: 1160517.100)

Good morning,

Thank you for the follow up.

Yonge Street:
Current AADT: 13,000 (2018)
Growth Rate to 2031: 4% per year
Growth Rate from 2031 to 2041: 1% per year
Percentage Trucks: 3%
Posted Speed: 60km/h
Day/Night Split: N/A

Lockhart Road:
Current AADT: 3000 (2018)
Growth Rate to 2031: 13% per year
Growth Rate from 2031 to 2041: 2% per year
Percentage Trucks: 7%
Posted Speed: 60km/h
Day/Night Split: N/A

Justin MacDonald, C.E.T.
Senior Transportation Technologist – Transportation Planning, Development Services
The City of Barrie
Mobile 705-734-8020
Please consider the environment before printing this email.

From: Abhishek Thyagarajan <abhishek@valcoustics.com>
Sent: Wednesday, January 5, 2022 2:06 PM
To: Justin MacDonald <Justin.MacDonald@barrie.ca>
Cc: John Emeljanow <john@valcoustics.com>
Subject: RE: Road Traffic Data request (VCL File: 1160517.100)

Hello Justin,

I am following up on our request for road traffic data at the intersection of Yonge Street and Lockhart Road.

Could you please share the status of this request?

Let me know if you have any questions.

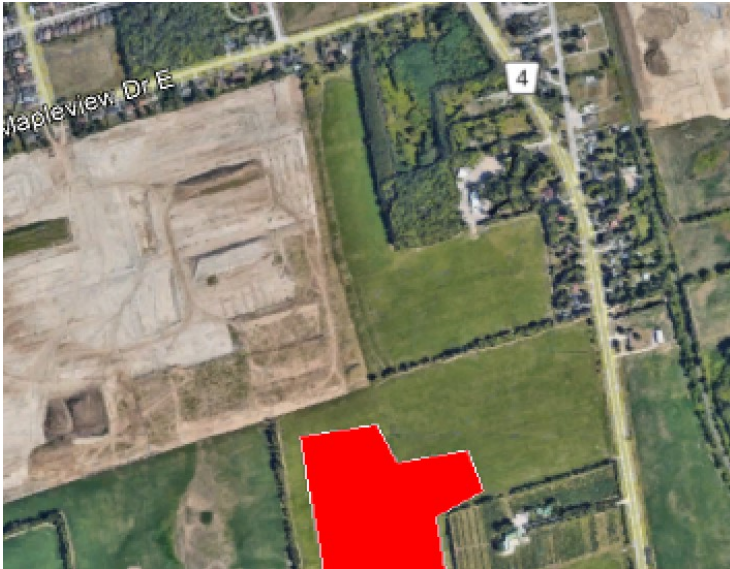
Thank you,

Abhishek

From: Abhishek Thyagarajan
Sent: December 8, 2021 7:28 PM
To: Justin.MacDonald@barrie.ca
Cc: John Emeljanow <john@valcoustics.com>
Subject: Road Traffic Data request (VCL File: 1160517.100)

Hello Justin,

We are working on a noise report for a proposed development located near the intersection of Yonge Street and Lockhart Road (Please see image below).



We require road traffic data for Yonge Street between Victoria Street and Mapleview Drive, and Lockhart Road east of Huronia Road for this study.

Can you please provide data including AADT, number of lanes, maximum speed, ROW, day/night split, medium/heavy truck split and grade?

Please let me know if you need any other information from my end.

Thank you,

Abhishek Thyagarajan, M.S.
Acoustic Specialist



Abhishek Thyagarajan

From: Rail Data Requests <RailDataRequests@metrolinx.com>
Sent: December 15, 2021 11:44 AM
To: Abhishek Thyagarajan
Cc: John Emeljanow
Subject: RE: 1160517.100 - Rainsong Development-Phase 2/Noise Feas

Good morning Abhishek,

Further to your request dated December 8, 2021, the subject lands (Yonge Street & Lockhart Road, Innisfil) are located within 300 metres of the Metrolinx Newmarket Subdivision (which carries Barrie GO rail service).

It's anticipated that GO rail service on this Subdivision will be comprised of electric trains. The GO rail fleet combination on this Subdivision will consist of up to 2 locomotives and 12 passenger cars. The typical GO rail weekday train volume forecast near the subject lands, including both revenue and equipment trips is in the order of 82 trains. The planned detailed trip breakdown is listed below:

	1 Electric Locomotive	2 Electric Locomotives		1 Electric Locomotive	2 Electric Locomotives
Day (0700-2300)	60	8	Night (2300-0700)	12	2

The current track design speed near the subject lands is 60 mph (97 km/h).

There is an *anti-whistling by-law* in affect at Mapleview Drive East at-grade crossing.

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

Options have been studied as part of the Transit Project Assessment Process (TPAP) for the GO Expansion program, currently in the procurement phase. The successful proponent team will be responsible for selecting and delivering the right trains and infrastructure to unlock the benefits of GO Expansion. The contract is in a multi-year procurement process and teams are currently completing the bids that will close in 2021. GO Expansion construction will get underway in 2022.

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

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

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

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

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

Best regards,

Harrison Rong

Project Coordinator, Third Party Projects Review

From: Abhishek Thyagarajan <abhishek@valcoustics.com>
Sent: December 8, 2021 7:27 PM
To: Rail Data Requests <RailDataRequests@metrolinx.com>
Cc: John Emeljanow <john@valcoustics.com>
Subject: 1160517.100 - Rainsong Development-Phase 2/Noise Feas

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Hello,

We are working on a noise report for a proposed development located near the intersection of Yonge Street and Lockhart Road (Please see image below).



We require rail traffic data for the GO Newmarket Line for this study.

Would you please be able to provide rail data including volumes, number of engines, number of cars and maximum speed?

Please let me know if you need any other information from me.

Thank you,

Abhishek Thyagarajan, M.S.
Acoustic Specialist



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 CALCULATIONS

STAMSON 5.04 NORMAL REPORT Date: 28-01-2022 07:25:55
MINISTRY OF ENVIRONMENT, CONSERVATION AND PARKS / NOISE ASSESSMENT

Filename: r1.te Time Period: Day/Night 16/8 hours
Description:

Rail data, segment # 1: G01 (day/night)

Train Type	! Trains !	! Speed ! ! (km/h) !	# loc ! !/Train!	# Cars! /Train!	Eng ! type	!Cont !weld
1.	!	60.0/12.0	!	97.0	!	1.0 ! 12.0 !Diesel! Yes

Data for Segment # 1: G01 (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	:	650.00 / 650.00 m	
Receiver height	:	7.50 / 7.50 m	
Topography	:	1	(Flat/gentle slope; no barrier)
No Whistle			
Reference angle	:	0.00	

Rail data, segment # 2: G02 (day/night)

Train Type	! Trains !	! Speed ! ! (km/h) !	# loc ! !/Train!	# Cars! /Train!	Eng ! type	!Cont !weld
1.	!	8.0/2.0	!	97.0	!	2.0 ! 12.0 !Diesel! Yes

Data for Segment # 2: G02 (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	:	650.00 / 650.00 m	
Receiver height	:	7.50 / 7.50 m	
Topography	:	1	(Flat/gentle slope; no barrier)
No Whistle			
Reference angle	:	0.00	

Results segment # 1: G01 (day)

LOCOMOTIVE (0.00 + 48.38 + 0.00) = 48.38 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.41	72.36	-23.00	-0.99	0.00	0.00	0.00	48.38

WHEEL (0.00 + 39.06 + 0.00) = 39.06 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.51	64.97	-24.72	-1.19	0.00	0.00	0.00	39.06

Segment Leq : 48.86 dBA

Results segment # 2: GO2 (day)

LOCOMOTIVE (0.00 + 41.74 + 0.00) = 41.74 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.41	65.72	-23.00	-0.99	0.00	0.00	0.00	41.74

WHEEL (0.00 + 30.64 + 0.00) = 30.64 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.51	56.55	-24.72	-1.19	0.00	0.00	0.00	30.64

Segment Leq : 42.06 dBA

Total Leq All Segments: 49.68 dBA

Results segment # 1: GO1 (night)

LOCOMOTIVE (0.00 + 44.40 + 0.00) = 44.40 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.41	68.38	-23.00	-0.99	0.00	0.00	0.00	44.40

WHEEL (0.00 + 35.09 + 0.00) = 35.09 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.51	60.99	-24.72	-1.19	0.00	0.00	0.00	35.09

Segment Leq : 44.88 dBA

Results segment # 2: GO2 (night)

LOCOMOTIVE (0.00 + 38.73 + 0.00) = 38.73 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.41	62.71	-23.00	-0.99	0.00	0.00	0.00	38.73

WHEEL (0.00 + 27.63 + 0.00) = 27.63 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.51	53.54	-24.72	-1.19	0.00	0.00	0.00	27.63

Segment Leq : 39.05 dBA

Total Leq All Segments: 45.89 dBA

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

Car traffic volume : 19086/2121 veh/TimePeriod *
Medium truck volume : 236/26 veh/TimePeriod *
Heavy truck volume : 354/39 veh/TimePeriod *
Posted speed limit : 60 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): 21646
Percentage of Annual Growth : 1.00
Number of Years of Growth : 1.00
Medium Truck % of Total Volume : 1.20
Heavy Truck % of Total Volume : 1.80
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: YongeSt (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 : 314.00 / 314.00 m
Receiver height : 7.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 12545/1394 veh/TimePeriod *
Medium truck volume : 378/42 veh/TimePeriod *
Heavy truck volume : 567/63 veh/TimePeriod *
Posted speed limit : 60 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): 14694
Percentage of Annual Growth : 2.00
Number of Years of Growth : 1.00
Medium Truck % of Total Volume : 2.80
Heavy Truck % of Total Volume : 4.20
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Lockhart (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 : 33.00 / 33.00 m
Receiver height : 7.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: YongeSt (day)

Source height = 1.16 m

ROAD (0.00 + 47.42 + 0.00) = 47.42 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.49	68.26	0.00	-19.68	-1.16	0.00	0.00	0.00	47.42

Segment Leq : 47.42 dBA

Results segment # 2: Lockhart (day)

Source height = 1.43 m

ROAD (0.00 + 59.63 + 0.00) = 59.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.48	68.86	0.00	-5.07	-4.15	0.00	0.00	0.00	59.63

Segment Leq : 59.63 dBA

Total Leq All Segments: 59.88 dBA

Results segment # 1: YongeSt (night)

Source height = 1.16 m

ROAD (0.00 + 40.87 + 0.00) = 40.87 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.49	61.71	0.00	-19.68	-1.16	0.00	0.00	0.00	40.87

Segment Leq : 40.87 dBA

Results segment # 2: Lockhart (night)

Source height = 1.43 m

ROAD (0.00 + 53.10 + 0.00) = 53.10 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.48	62.33	0.00	-5.07	-4.15	0.00	0.00	0.00	53.10

Leq : 53.10 dBA

Total Leq All Segments: 53.35 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.28
(NIGHT): 54.07