Environmental Noise Feasibility Study

484 Plains Road East

Proposed Mixed-use Development

City of Burlington

October 23, 2017
Project: 117-0269

Prepared for

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Canada Ltd.

Document Version Index:

Version	Date	Description of Changes
1.0	October 23, 2017	Final Issued to Client

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Environmental Noise Feasibility Study

484 Plains Road East

Proposed Mixed-use Development

City of Burlington

EXECUTIVE SUMMARY

Valcoustics Canada Ltd. (VCL) was retained to prepare an Environmental Noise Assessment report for the proposed development located at 484 Plains Road East in the City of Burlington. The proposed development will consist of two 8-storey buildings (Buildings A and B) with ground floor commercial uses, and seven 3-storey stacked back-to-back townhouse blocks (Buildings C to H and J). The 8-storey buildings will be provided with common outdoor amenity areas ("Outdoor Living Areas" - OLA's) at the rooftops and private balconies and terraces for several of the units. The townhouse units will be provided with rooftop and grade level OLA's. There will be one level of underground parking for the entirety of the site.

The significant noise sources in the vicinity are road traffic on Plains Road East and rail traffic on the Canadian National Railway (CN) Oakville Subdivision.

The sound levels on site have been determined and compared with the applicable Ministry of the Environment and Climate Change (MOE) noise guideline limits to determine the need for noise mitigation.

To meet the applicable transportation noise source guideline limits:

- All residential suites in Buildings A and B require mandatory air conditioning.
- Dwelling units in townhouse Building J require the provision for adding air conditioning.
- Parapet sound barriers are required at the common rooftop amenity areas at Buildings A and B.
- Parapet sound barriers are required at the 7th storey private terrace located on the west side of Building B.
- At Buildings A and B, exterior wall construction meeting a minimum Sound Transmission Class (STC) rating of 54 (on the north, east and west facades) and upgraded windows with STC ratings up to 40 would be required.

- At all other dwellings, exterior wall and window construction meeting the minimum non-acoustical requirements of the Ontario Building Code (OBC) will be sufficient to meet the indoor noise criteria.

Final requirements should be checked when detailed building plans are available. This is usually done as a condition for obtaining a building permit.

1.0 INTRODUCTION

VCL was retained to prepare an Environmental Noise Feasibility Study for the proposed development in support of the Official Plan Amendment (OPA) and Zoning By-law Amendment (ZBA) approval submissions to the City of Burlington.

The potential sound levels and noise mitigation measures needed for the proposed development to comply with the MOE noise guideline requirements are outlined herein.

1.1 THE SITE AND SURROUNDING AREA

The site is located at 484 Plains Road East in the City of Burlington.

The site is bounded by:

- Plains Road East, with an existing commercial development, a school, a four storey multi-family residential building and single family residential dwellings beyond, to the north;
- an existing commercial strip plaza to the west;
- existing single family residential dwellings to the south; and
- existing low-rise detached commercial/office buildings and residential dwellings to the east.

There are existing commercial developments on site that will be demolished as part of the development.

The CN Oakville Subdivision is located approximately 500 m to the north, with several rows of development in between.

A Key Plan is included as Figure 1. The study is based on the Site Plan, prepared by Kirkor + Planners, dated October 11, 2017. The Site Plan is included as Figure 2.

1.2 THE PROPOSED DEVELOPMENT

The development will consist of two 8-storey 'L'-shaped residential buildings (Buildings A and B) and seven 3-storey stacked back-to-back townhouse blocks (Buildings C to H and J). Buildings A and B are located at the northwest and northeast corners of the site, respectively. The townhouse blocks are located to the south of Buildings A and B. The site access is located off of Plains Road in between Buildings A and B and both of these buildings will also have ground floor retail uses. There will be surface parking for the retail uses as well as one level of underground parking beneath the entirety of the site for the residents.

There will be common OLA's located on the rooftops of Buildings A and B. Several of the units will also be provided with private balconies and terraces. The private terrace at the south side of the 7th floor of Building A and the west side of the 7th floor of Building B are greater than 4 m in depth.

All other private terraces and balconies will be less than 4 m in depth. The townhouse units will be provided with outdoor amenity space at the rooftops and at grade.

2.0 NOISE SOURCES

The noise sources with potential to impact the proposed development are road traffic on Plains Road East and rail traffic on the CN Oakville Subdivision. Traffic volumes on the other surrounding roadways are anticipated to be minor and no significant noise impact is expected at the subject site.

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

There are also a few stationary noise sources in the vicinity. However, significant noise impact from these sources is not expected. See Section 2.2.2 below.

2.1 TRANSPORTATION NOISE SOURCES

2.1.1 Road Traffic

Road traffic volumes applicable to the year 2015 for Plains Road East were obtained from turning movement count data provided by the City of Burlington. A day/night split of 90%/10% was used as is typical for well-travelled roadways. A growth rate of 2%, compounded annually, was used to obtain future (year 2027) traffic volumes. Truck percentages were obtained from the turning movement counts. The ratio of medium trucks to heavy trucks was assumed to be 60%/40%. Note that there is a reduction in speed from 60 km/h to 40 km/h in the vicinity of the site to accommodate the school across the street. To be conservative, a speed of 60 km/h was applied to the entire stretch of Plains Road East in the vicinity of the site.

2.1.2 Rail Traffic

2.1.2.1 CN

Rail traffic data for the CN Oakville Subdivision applicable to the year 2017 was obtained directly from CN. The CN rail traffic data was escalated to the year 2027 design condition using a growth rate of 2.5% compounded annually. This escalation rate is suggested by the MOE for preparing environmental noise studies.

The CN rail traffic data included volumes for freight way freight, and passenger traffic.

2.1.2.2 GO Transit

Commuter rail traffic for the GO Transit Lakeshore West line, applicable to the year 2025, was obtained directly from GO Transit /Metrolinx. The GO Transit rail traffic data was escalated to the year 2027 design condition using a growth rate of 2.5% compounded annually.

The GO Transit /Metrolinx rail traffic data included commuter trains.

Since the beginning of 2016, Metrolinx has made significant revisions to its forecasts. The most significant changes from the noise perspective are:

- Service is being intensified along all Metrolinx corridors as part of its Regional Express Rail service.

- It is anticipated that GO services on the CN Oakville Subdivision will be comprised by a mix of diesel and electric trains within (at least) a 10-year time horizon.

Metrolinx has not yet made final decisions regarding the electric train technology to be used. In the interim, for the purposes of environmental noise studies, Metrolinx is recommending that the noise level and spectrum of a diesel train be used to model the impact from the electric trains. However, it is likely that this is conservative, since the reference sound levels for electric trains are not expected to be as high as for diesel trains. As the information on the specific train technology to be used has not yet been finalized and the reference sound level data for the electric trains has not been verified, the use of this modelling method should not be considered precedent setting for other sites in the vicinity.

2.2 STATIONARY NOISE SOURCES

2.2.1 Aldershot Rail Yard

The CN rail yard is located approximately 550 m to the northwest of the subject site. Based on information provided by CN, the main activity is train assembly throughout the yard, local switching activities and shunting. The rail yard operates 24 hours a day. The main noise sources with potential for impact are the impulses, which would be considered frequent at certain times.

As part of the assessment of noise emissions from the rail yard, a 3-D acoustic model was created to predict the noise impact. The impulse activity at the yard was modelled using sound level data on hand from the VCL database for such activity, including measurements done previously at the Aldershot rail yard. The results indicate that the sound levels at the site will be below the applicable sound level limits. This is in part due the substantial separation distance (and several rows of existing intervening development) but also due to the higher ambient environment in the vicinity (due to road traffic on Plains Road East).

In addition, as part of a previous project, VCL completed two separate area visits and measured sound levels from activity at this rail yard. In both cases, the measured sound levels were less than the library data on hand. Thus, the assessment done, which concludes compliance with the MOE sound level limits, would be considered conservative. As such, the rail yard is not expected to cause any significant noise impact at the subject site and has not been considered further in this assessment.

2.2.2 Commercial Developments

There is an existing Shoppers Drug Mart to the north of the site, on the north side of Plains Road East. There is also an existing low-rise multi-tenant commercial building to the east of the site (tenants include an optical store, a cell phone repair shop, a bulk food store, a tax office, a comic store and salons) and small detached commercial/offices uses to the west of the site (an insurance company and a natural health service provider). The only noise sources associated with these uses would be the rooftop mechanical equipment and truck deliveries at the Shoppers Drug Mart. Based on the separation distance, ambient sound levels from Plains Road East and the location of the Shoppers Drug Mart loading area which is on the opposite side of the building from the development, significant noise impact from these sources is not expected. This was confirmed through preliminary acoustic modelling as well as a site visit, when noise from these sources was

not audible at the site over the ambient road traffic noise. Thus, these sources have not been considered further in this assessment.

3.0 ENVIRONMENTAL NOISE GUIDELINES

3.1 MOE PUBLICATION NPC-300

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 B.

3.1.1 Transportation Noise Sources

3.1.1.1 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 indoor criteria for rail noise are 5 dBA more stringent than those for the road; that is 40 dBA for living/dining rooms, dens and bedrooms during the daytime and nighttime periods except for bedrooms where the nighttime indoor criterion is 35 dBA.

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

3.1.1.2 Ventilation

In accordance with the MOE noise guideline for road traffic sources, if the daytime sound energy 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).

3.1.1.3 Outdoors

For OLA's, the guideline is 55 dBA $L_{eq\ Day}$ (0700 to 2300 hours), 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) $L_{eq\ Day}$ - 16 hour energy equivalent continuous sound level (0700-2300 hours).
(2) $L_{eq\ Night}$ - 8 hour energy equivalent continuous sound level (2300-0700 hours).

3.2 FEDERATION OF THE CANADIAN MUNICIPALITIES (FCM) AND RAILWAY ASSOCIATION OF CANADA (RAC)

The standard mitigation requirements outlined in the FCM/RAC guidelines suggest a dwelling setback of 30 m for a residential development adjacent to a principal main line, if in combination with a safety berm at least 2.5 m above the property line grade. A 5.5 m high sound barrier is also suggested (e.g., 3.0 m high acoustic fence atop 2.5 m high safety berm).

Warning clauses are also recommended.

Aside from "standard" requirements regarding the setback of dwellings and safety berm/sound barrier configuration, the sound level design objectives of FCM/RAC are similar to those of the MOE

Note, due to the substantial setback distance of the site to the rail line as well as the several rows of intervening development, the railway specific requirements do not apply.

3.3 REGION OF HALTON

The site is not located adjacent to any Regional Roads. Thus, there are no regional requirements over and above those of the MOE that apply.

4.0 NOISE IMPACT ASSESSMENT

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

The daytime and nighttime sound levels at the building facades were calculated at the top floor windows (23.1 m above grade for the 8-storey buildings and 7.5 m above grade for the townhouse buildings), the worst case location. Daytime sound levels at the OLA's were calculated at a height of 1.5 m above the floor height for elevated terraces and 1.5 m above grade for rear yard spaces. Inherent screening of each building due to its orientation to the noise source was taken into account. Screening from the existing developments in the vicinity of the site was also included in the OLA sound level assessments.

The highest unmitigated daytime/nighttime sound levels of 71 dBA/68 dBA are predicted to occur at the exterior plane of windows facing north towards Plains Road East at both Buildings A and B.

The rooftop common amenity areas at Buildings A and B are predicted to have daytime OLA sound levels of 66 dBA.

The 7th storey private terrace at the south side of Building A is predicted to have a daytime OLA sound level of 60 dBA.

The 7th storey private terrace at the west side of Building B is predicted to have a daytime OLA sound level of 63 dBA.

All other private terraces and balconies in Buildings A and B are less than 4 m in depth and therefore are not considered OLA's under the MOE noise guidelines.

For the townhouse units, the highest unmitigated daytime OLA sound level at the grade level amenity areas occurs at Building C and is predicted to be 51 dBA. All other OLA's are farther setback and are more screened from the noise sources, and would therefore experience lower sound levels. The rooftop terraces are less than 4 m in depth and therefore do not qualify as OLA's under the MOE guidelines.

Table 2 summarizes the unmitigated daytime and nighttime sound level predictions.

5.0 NOISE ABATEMENT REQUIREMENTS

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

(a) Architectural elements to achieve acceptable indoor noise guidelines;

(b) Design features to protect the OLA's.

Noise abatement requirements are summarized on Figure 2 and in Table 3 along with the notes to Table 3.

5.1 INDOORS

5.1.1 Architectural Elements

The indoor noise level guidelines can be achieved by using appropriate construction for exterior walls, windows and doors. In determining the worst-case architectural requirements for the residential units, wall and window areas at Buildings A and B were assumed to be 20% and 80%, respectively, at each facade of a corner room with both facades directly exposed or at an angle to the noise sources. For the townhouse units, wall and window areas were assumed to be 80% and 30%, respectively, at each facade of a corner room.

For Buildings A and B, based on the predicted sound levels, exterior wall construction meeting an STC of 54 (at a minimum of the three facades exposed to the noise sources: north, east, and west) and window construction with STC ratings up to 40 would be required to meet the indoor noise guideline criteria of the MOE. At locations along the interior of the "L" shapes that are screened from the traffic noise sources, exterior windows meeting the minimum non-acoustical requirements of the OBC would be sufficient.

At the townhouse blocks, exterior wall and window construction meeting the minimum non-acoustical requirements of the OBC will be sufficient to meet the indoor noise criteria of the MOE.

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

Note, the STC rating applies to the window as a whole, including frame elements, gasketing, etc. Acoustical test data from an accredited laboratory indicating the window assemblies can meet the required STC ratings should be submitted by the window supplier for review.

5.1.2 Ventilation Requirements

Based on the predicted daytime and nighttime sound levels, all dwellings units in Buildings A and B require mandatory air conditioning to allow windows to remain closed for noise control purposes. Dwellings in townhouse Building J require the provision for adding air conditioning.

5.2 OUTDOORS

The unmitigated daytime sound levels at the rooftop amenity areas at Buildings A and B are predicted to be 67 dBA at the approximate centre of the spaces. A 2.4 m high sound barrier around the perimeters of the amenity areas would be required to mitigate the sound levels to 60 dBA, the upper allowable limit of the MOE. Meeting the 55 dBA objective sound level would require even higher sound barriers. The 2.4 m high sound barrier is not considered practical at these locations, as the sound barriers would alter the aesthetics of the buildings and impede the view for residents. There are areas on the common amenity terraces that are inherently screened from the noise sources by portions of the buildings. As a result, these partially screened areas, which include the barbeque areas near the mechanical penthouses and the seating areas near the access stairs would experience lower sound levels. For these areas, 1.4 m high sound barriers around the perimeters of the amenity areas will mitigate the daytime sound levels to 60 dBA. The 1.4 m high sound barriers would be more feasible, more practical to implement and would provide adequate acoustical protection for portions of the amenity terraces. As such, the 1.4 m high sound barriers are recommended in this context.

The unmitigated daytime sound levels at the 7th floor private amenity terrace at the west side of Building B is predicted to be 63 dBA. A 2.6 m high parapet sound barrier would mitigate the sound level to the 55 dBA design objective. However, a barrier of this height is not considered practical for this terrace. A 1.3 m high parapet sound barrier/parapet would mitigate the daytime OLA sound levels to 59 dBA and is recommended at this location. The mitigated sound level of 59 dBA is within the upper allowable limit of the MOE.

The sound levels at all other OLA's in the development are predicted to be within the 55 dBA design objective. Thus, sound barriers are not required at these locations for noise control purposes.

5.3 WARNING CLAUSES

Where the sound level guidelines are exceeded, appropriate warning clauses should be registered on title 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.

6.0 CONCLUSIONS

With appropriate acoustical design of the development, a suitable acoustical environment can be provided and the applicable MOE noise guideline requirements met.

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

7.0 REFERENCES

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

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 Assessment in Land-Use Planning 1987", Ontario Ministry of the Environment, February 1987, ISBN 0-7729-2804-5.

4. “Road and Rail Noise: Effects on Housing”, Canada Mortgage and Housing Corporation, Publication NHA 5156, 81/10.

5. “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

Roadway	AADT[1]	% Trucks		Speed Limit (kph)	Day/Night Split (%)
		Medium	Heavy		
Plains Road East[2]	25 904	3.3	2.2	60	90/10

Notes:

(1) AADT - Annual Average Daily Traffic
(2) Obtained from the City of Burlington for the year 2015. Traffic volumes were projected to the year 2027 using a growth rate of 2%, compounded annually. The ratio of medium trucks to heavy trucks was assumed to be 60%/40%.

TABLE 1B

RAIL TRAFFIC DATA – CN OAKVILLE SUBDIVISION[1]

Period	Train Type	Maximum # of Trains[3]	Maximum # of Cars/Train	Max # of Locos/Train	Maximum Speed (kph)
Daytime (0700 to 2300)	Freight[1]	12 (15.4)	142	4	97
	Way Freight [1]	3 (3.8)	25	2	97
	Passenger[1]	14 (17.9)	10	2	153
	Commuter[2]	163 (171.3)	12	1	153
Nighttime (2300 to 0700)	Freight[1]	7 (9)	142	4	97
	Way Freight [1]	3 (3.8)	25	2	97
	Passenger[1]	0 (0)	10	2	153
	Commuter[2]	73 (76.7)	12	1	153

Notes:

(1) Obtained from CN for the year 2017.
(2) Obtained from GO Transit for the year 2025.
(3) The data shown in brackets is projected to the year 2027 with a 2.5% growth rate, compounded annually.

TABLE 2

PREDICTED UNMITIGATED SOUND LEVELS AT BUILDING FACADE

Location[1]	Source	Distance (m)[2]	$L_{eq\ Day}$ (dBA)	$L_{eq\ Night}$ (dBA)
Building A Northwest Corner (North Facade)	Plains Road East	23	69	62
	CN Oakville Subdivision	492	67	67
	TOTAL	–	**71**	**68**
Building A Northwest Corner (West Facade)	Plains Road East	23	66	59
	CN Oakville Subdivision	492	64	64
	TOTAL	–	**68**	**65**
Building A Southwest Corner (West Facade)	Plains Road East	66	61	55
	CN Oakville Subdivision	535	64	63
	TOTAL	–	**66**	**64**
Building A Southeast Corner (East Facade)	Plains Road East	43	61	55
	CN Oakville Subdivision	507	62	62
	TOTAL	–	**65**	**63**
Building A 7th Floor Private Terrace at south side (OLA)	Plains Road East	70	56	–
	CN Oakville Subdivision	538	59	–
	TOTAL	–	**60**	**–**
Building B Northeast Corner (North Facade)	Plains Road East	23	69	62
	CN Oakville Subdivision	431	67	67
	TOTAL	–	**71**	**68**
Building B Northeast Corner (East Facade)	Plains Road East	23	66	59
	CN Oakville Subdivision	431	64	63
	TOTAL	–	**68**	**65**
Building B Southwest Corner (West Facade)	Plains Road East	43	62	55
	CN Oakville Subdivision	504	63	62
	TOTAL	–	**65**	**63**
Building B Southeast Corner (East Facade)	Plains Road East	60	62	55
	CN Oakville Subdivision	518	64	63
	TOTAL	–	**66**	**64**

TABLE 2 (continued)

PREDICTED UNMITIGATED SOUND LEVELS AT BUILDING FACADE

Location[1]	Source	Distance (m)[2]	$L_{eq\ Day}$ (dBA)	$L_{eq\ Night}$ (dBA)
Building B 7th Floor Private Terrace (OLA)	Plains Road East	35	51	–
	CN Oakville Subdivision	497	63	–
	TOTAL	**–**	**63**	**–**
Building B Rooftop Common Amenity Area (OLA)	Plains Road East	32	53	–
	CN Oakville Subdivision	495	67	–
	TOTAL	**–**	**67**	**–**
Building C Northwest Unit (West Facade)	Plains Road East	86	55	49
Building C Northwest Unit (OLA)	Plains Road East	88	51	–
Building G Northwest Unit (North Facade)	Plains Road East	79	54	48
Building J Northeast Unit (North Facade)	Plains Road East	71	56	–
Building C Northwest Unit (West Facade)	Plains Road East	86	55	49
Building C Northwest Unit (OLA)	Plains Road East	88	51	–
Building G Northwest Unit (North Facade)	Plains Road East	79	54	48
Building J Northeast Unit (North Facade)	Plains Road East	71	56	–

Notes:

(1) See Figure 2.
(2) 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]
Buildings A and B	Mandatory	STC 54	up to STC 40 See Section 5.1.1	1.4 m high sound barriers at rooftop common amenity areas and 1.3 m high parapet at 7th storey terrace at the west side of Building B	A + B + D
Building J	Provision for adding	No special acoustical requirements		none	A + C + D
All other dwellings	No special acoustical requirements			none	-

Notes:

(1) 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). The upgraded construction is only required on the three facades with exposure to the rail line.

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

(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 finalized.

(4) Sound barriers must be of solid construction with no gaps, cracks or holes and must have a minimum surface density of 20 kg/m². A variety of materials are available including wood, masonry, composites, plastics, earth berms, or a combination of materials.

(5) 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 and rail traffic may occasionally interfere with some activities of the dwelling occupants as the sound level may exceed the sound level limits of the Municipality and the Ministry of the Environment."

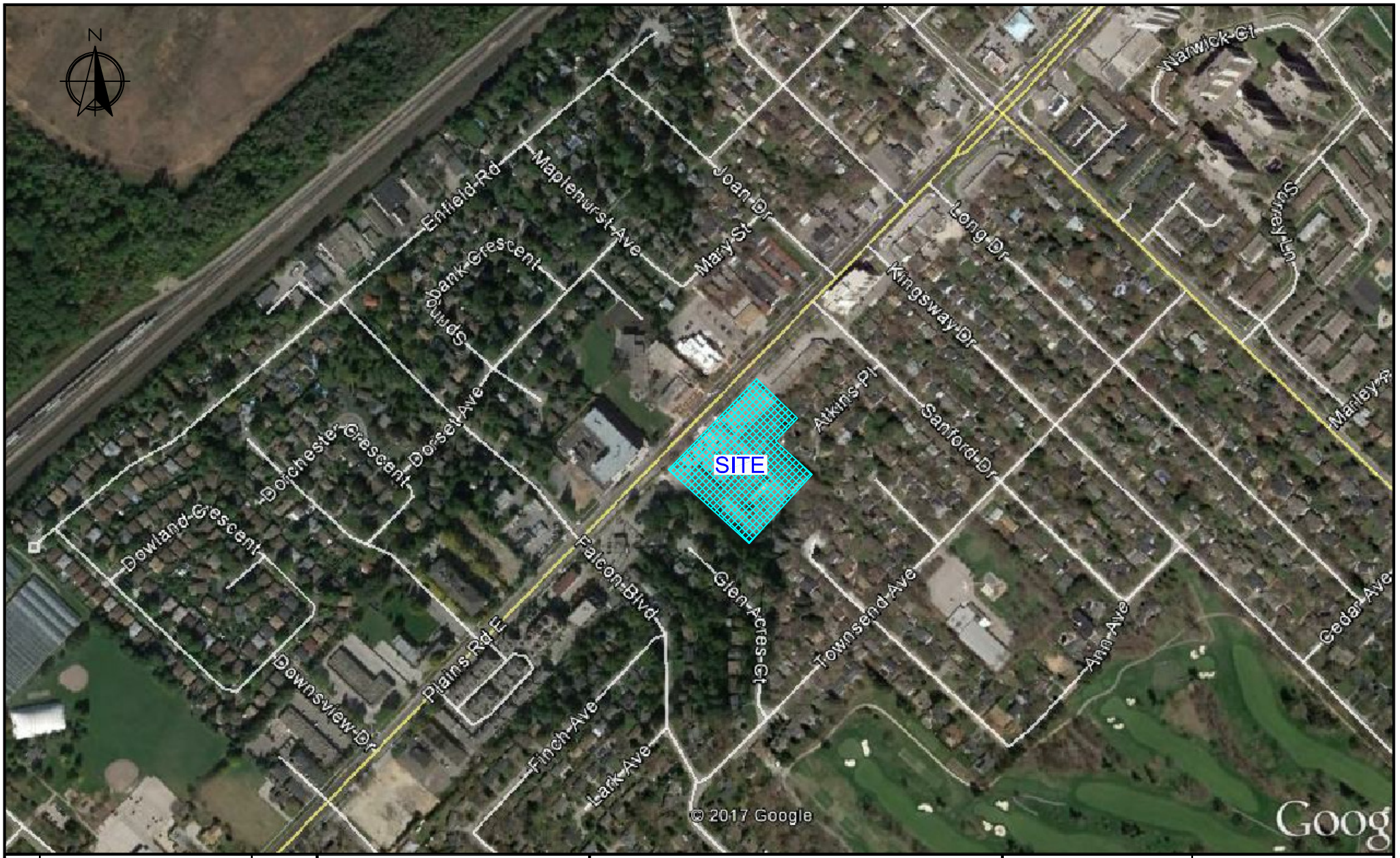
B. "This dwelling has been supplied with an air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."

C. "This dwelling 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."

D. "Purchasers/tenants are advised that due to the proximity of the existing commercial developments to the north, east and west, sound levels from these facilities may at times be audible."

(6) Conventional ventilated attic roof construction meeting OBC requirements is satisfactory.

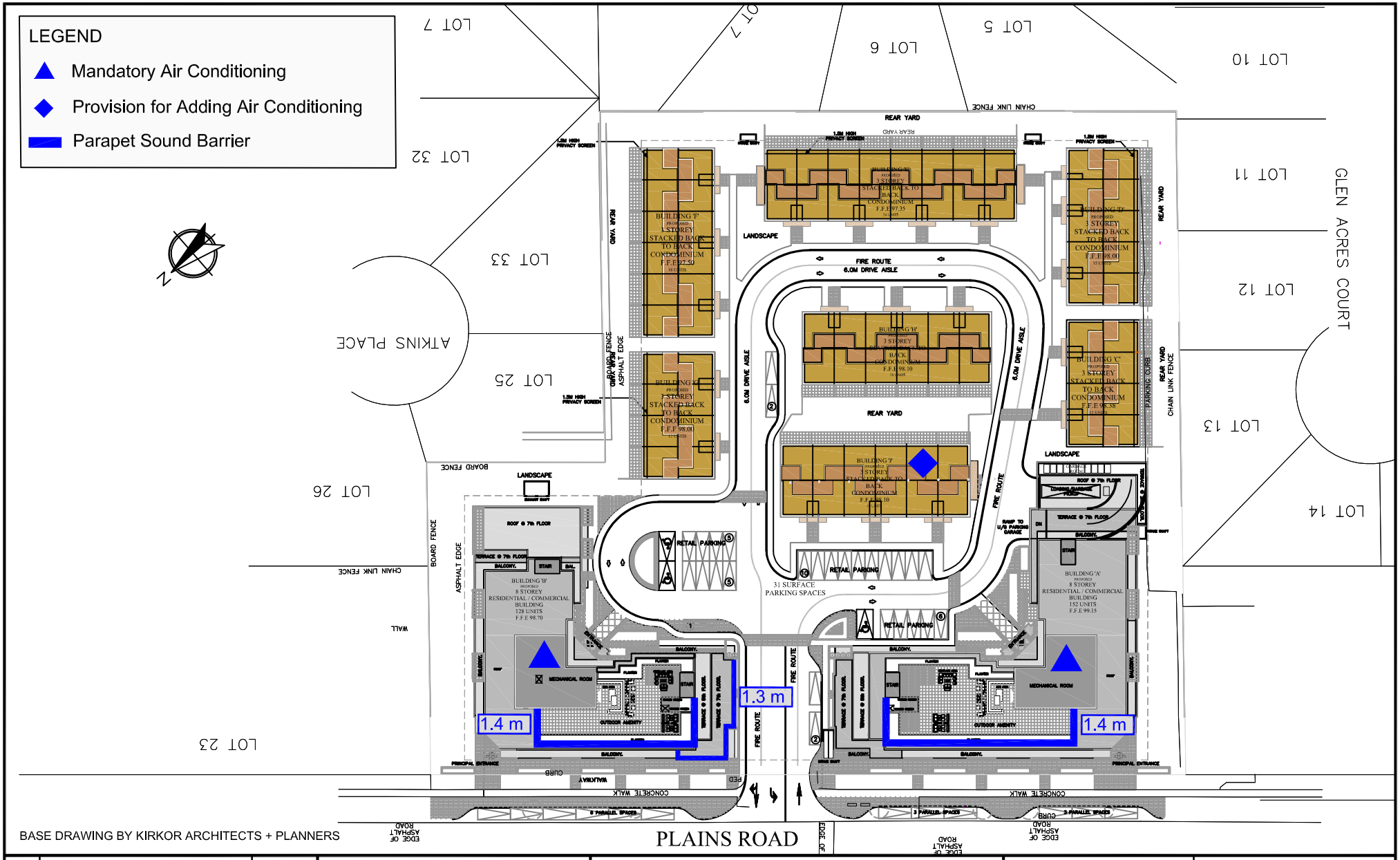
(7) All exterior doors shall be fully weatherstripped.



No.	Revision/Issue	Date

VALCOUSTICS Canada Ltd.
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.: 117-0269	Date: Oct. 18, 2017
Project Name: 484 Plains Road East, Burlington		Scale: N.T.S.	Figure: 1



BASE DRAWING BY KIRKOR ARCHITECTS + PLANNERS

No.	Revision/Issue	Date
1	DRAFT	01/01

VALCOUSTICS Canada Ltd.
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Title	Project No.	Date
Site Plan	117-0269	Oct. 18, 2017
Project Name	**Scale**	**Figure**
484 Plains Road East, Burlington	N.T.S.	2

APPENDIX A

ROAD AND RAIL TRAFFIC DATA

Plains Rd E @ King Rd

Annual Average Daily Traffic Diagram

Total Factor = Monthly Factor(0.94) x Daily Factor(0.93) x 24 Hour Factor(1.85) = 1.617270

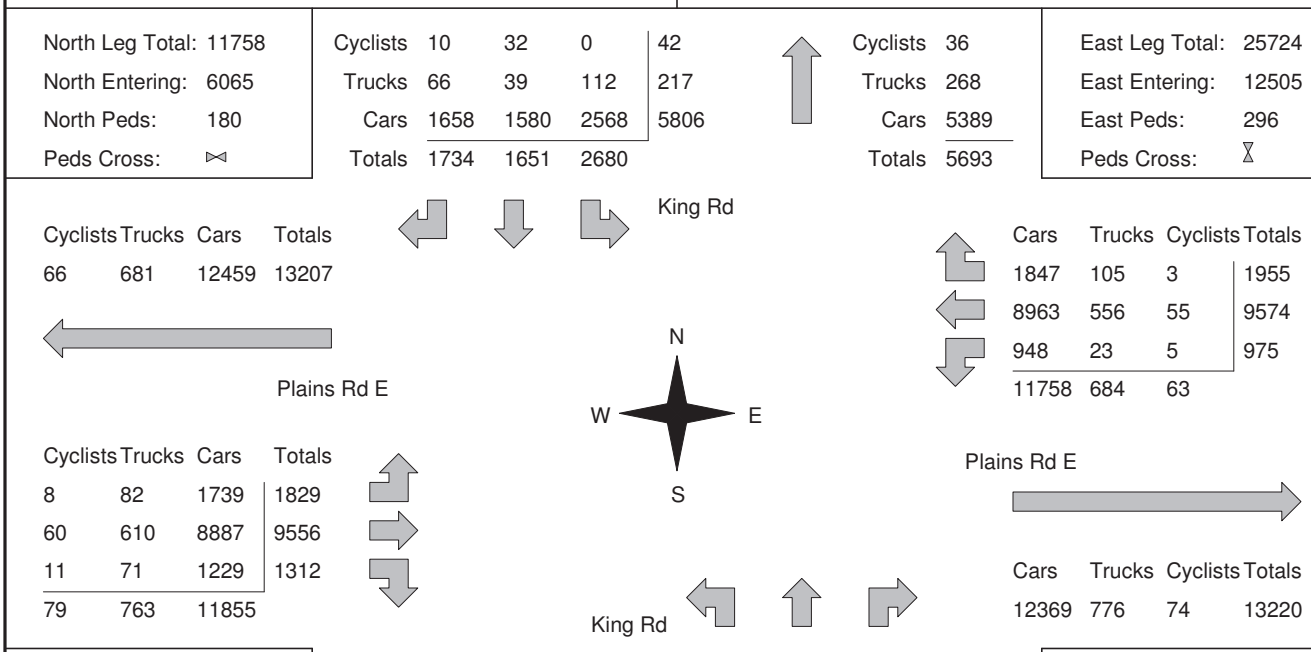
Municipality: Burlington
Site #: 0000201155
Intersection: Plains Rd E & King Rd
TFR File #: 2
Count date: 2-Jun-2015

Weather conditions:
Sunny/Dry

Person(s) who counted:
Rick

**** Signalized Intersection ****

Major Road: Plains Rd E runs W/E



Comments

Seema Nagaraj

From: Derek Basso <Derek.Basso@cn.ca>
Sent: Thursday, June 01, 2017 10:14 AM
To: Seema Nagaraj
Subject: RE: Rail data confirmation (VCL File: 117-0269)

Still valid.

Derek

Derek Basso
Public Works Officer | Eastern Canada Division of Engineering
Design and Construction

1 Administration Road, Concord, ON, L4K 1B9
O - 905-669-3184
F - 905-760-3406
E - Derek.Basso@cn.ca

From: Seema Nagaraj [mailto:seema@valcoustics.com]
Sent: Thursday, June 01, 2017 10:05 AM
To: Derek Basso <Derek.Basso@cn.ca>
Cc: Stefan Linder <Stefan.Linder@cn.ca>
Subject: Rail data confirmation (VCL File: 117-0269)

Hi Derek,

We are working on an environmental noise report for a proposed development in Burlington in the vicinity of the Oakville Subdivision west of King Road (see attached image for specific location). We have data from a project east of Waterdown Road from 2015 (attached). Can you please confirm if this data is applicable to our site or if we will need to purchase updated counts?

Thank you,

Seema Nagaraj, Ph.D., P.Eng.
Acoustical Engineer

VALCOUSTICS Canada Ltd.
consulting acoustical engineers
30 Wertheim Court, Unit 25
Richmond Hill, Ontario
Canada L4B 1B9
Tel: 905-764-5223 ext. 243
Fax: 905-764-6813
solutions@valcoustics.com

Date: 2015/03/12 Project Number: OAK-34.50 - 101 Masonry Court

Dear Seema;

Re: Train Traffic Data – CN Oakville Subdivision near 101 Masonry Court in Burlington

The following is provided in response to Seema's 2015/03/12 request for information regarding rail traffic in the vicinity of 101 Masonry Court in Burlington at approximately Mile 34.50 on CN's Oakville Subdivision.

Typical daily traffic volumes are recorded below. However, traffic volumes may fluctuate due to overall economic conditions, varying traffic demands, weather conditions, track maintenance programs, statutory holidays and traffic detours that when required may be heavy although temporary. For the purpose of noise and vibration reports, train volumes must be escalated by 2.5% per annum for a 10-year period.

Typical daily traffic volumes at this site location are as follows:

***Maximum train speed is given in Miles per Hour**

	0700-2300			
Type of Train	Volumes	Max.Consist	Max. Speed	Max. Power
Freight	12	142	60	4
Way Freight	3	25	60	2
Passenger	14	10	95	2

	2300-0700			
Type of Train	Volumes	Max.Consist	Max. Speed	Max. Power
Freight	7	142	60	4
Way Freight	3	25	60	2
Passenger	0	10	95	2

The volumes recorded reflect westbound and eastbound freight and passenger operations on CN's Oakville Subdivision.

Except where anti-whistling bylaws are in effect, engine-warning whistles and bells are normally sounded at all at-grade crossings. There are no at-grade crossing in the immediate vicinity of the study area at Mile 34.50 (101 Masonry Court). Anti-whistling bylaws ARE in effect at this location. Please note that engine warning whistles may be sounded in cases of emergency, as a safety and or warning precaution at station locations and pedestrian crossings and occasionally for operating requirements.

With respect to equipment restrictions, the gross weight of the heaviest permissible car is 286,000 lbs.

The Triple mainline track is considered to be continuously welded rail throughout the study area. The presence of 7 switches located at Mile 33.18 - 34.75 which may exacerbate the noise and vibration caused by train movements.

The Canadian National Railway continues to be strongly opposed to locating developments near railway facilities and rights-of-way due to potential safety and environmental conflicts. Development adjacent to the Railway Right-of-Way is not appropriate without sound impact mitigation measures to reduce the incompatibility. For confirmation of the applicable rail noise, vibration and safety standards, Mr. Raymond Beshro, Canadian National Railway Properties at 514-399-7627 should be contacted directly.

I trust the above information will satisfy your current request.

Sincerely,

Derek Basso
Engineering Technician
Derek.Basso@cn.ca

cc. Raymond Beshro – CN – via e-mail

Seema Nagaraj

From: Adam Snow <Adam.Snow@gotransit.com>
Sent: Tuesday, March 08, 2016 9:54 AM
To: Seema Nagaraj
Cc: Christine Fandrich; Vasya Jeyakanthan
Subject: RE: Rail traffic data request (VCL File: 114-357)

Hello Seema – Further to your February 4, 2016 request (attached below), it is anticipated that GO Service on the nearby Lakeshore West (CN Oakville Subdivision) will be compromised by a mix of diesel and electric trains (with power supplied by overhead catenaries) within a 10 year time horizon. The preliminary midterm (2025) weekday commuter train volume forecast at this location is in the order of 236 trains (Diesel: 44 Day, 20 Night; Electric: 119 Day, 53 Night). Trains will be comprised of a single locomotive and up to 12 passenger cars.

The maximum design speed on this line, adjacent to the subject site, is 153 kph (95 mph).

I note that this information is subject to change and may be influenced by service planning priorities, operational considerations, funding availability and passenger demand.

Given the close proximity of Aldershot GO Station, the analysis should consider the noise implications of train accelerations and decelerations. Train bells and whistles will be used as per normal procedures at the station and in the event of emergencies on the line.

With respect to electrified service, it should be noted that Metrolinx has not made a final decision regarding the electric train technology or technologies to be deployed. Similarly, we are only beginning of understand potential noise and vibration implications associated with electrification. We can, however, provide the following interim information which may be helpful:

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

2. Along with electrification, Metrolinx will intensify service levels along all of its corridors to deliver the promised Regional Express Rail (RER) service. Everything else being equal, this will likely result in an overall increase in train noise emissions.

Given the above considerations, it would be prudent, at this time, to not expect any improvement in noise impacts due to electrification. Additional information regarding specific operational parameters will become available in the near future. General information about the program can be found here:
http://www.gotransit.com/electrification/en/info/fact_sheets.aspx

With respect to other (non-Metrolinx) train traffic in this area, it would be prudent to contact the individual freight and passenger operators.

I trust that this information is useful. Please feel free to contact me should you have any additional questions.

Best regards,

Adam

Adam Snow
Third Party Projects Officer, Rail Corridor Management Office, Rail Corridors, GO Transit
Metrolinx I 335 Judson Street I Toronto I Ontario I M8Z 1B2
T: 416-354-7746 C: 416-528-4864 F: 416-354-7731

From: Seema Nagaraj [mailto:seema@valcoustics.com]
Sent: February-04-16 3:14 PM
To: Adam Snow; Christine Fandrich
Subject: Re: Rail traffic data request (VCL File: 114-357)

Hi Adam and Christine,

We are preparing an update to our environmental noise study for a proposed development at 101 Masonry Court in Burlington. We received the data below in 2014. Could you please provide the current forecasts for this location (Oakville Subdivision, east of Waterdown Road – please see attached image for specific location).

Thank you,

Seema Nagaraj, Ph.D., EIT

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APPENDIX B

ENVIRONMENTAL NOISE GUIDELINES

APPENDIX B

ENVIRONMENTAL NOISE GUIDELINES

MINISTRY OF THE ENVIRONMENT AND CLIMATE CHANGE (MOE)

Reference: MOE Publication NPC-300, August 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 STAMSON CALCULATION

STAMSON 5.04 NORMAL REPORT Date: 18-10-2017 17:08:09
MINISTRY OF THE ENVIRONMENT AND CLIMATE CHANGE / NOISE ASSESSMENT

Filename: a_nw_nf.te Time Period: Day/Night 16/8 hours
Description: Building A - North Face

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

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
* 1. Freight	15.4/9.0	97.0	4.0	142.0	Diesel	Yes
* 2. Way Freight	3.8/3.8	97.0	2.0	25.0	Diesel	Yes
* 3. Passenger	17.9/0.0	150.0	2.0	10.0	Diesel	Yes
* 4. GO Commuter	171.3/76.7	150.0	1.0	12.0	Diesel	Yes

* The identified number of trains have been adjusted for
future growth using the following parameters:

No	Train type: Name	Unadj. Trains	Annual % Increase	Years of Growth
1.	Freight	12.0/7.0	2.50	10.00
2.	Way Freight	3.0/3.0	2.50	10.00
3.	Passenger	14.0/0.0	2.50	10.00
4.	GO Commuter	163.0/73.0	2.50	2.00

Data for Segment # 1: CN Oakville (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	: 492.00 / 492.00 m	
Receiver height	: 23.10 / 23.10 m	
Topography	: 1	(Flat/gentle slope; no barrier)
No Whistle		
Reference angle	: 0.00	

Results segment # 1: CN Oakville (day)

LOCOMOTIVE (0.00 + 66.46 + 0.00) = 66.46 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	81.62	-15.16	0.00	0.00	0.00	0.00	66.46

WHEEL (0.00 + 58.70 + 0.00) = 58.70 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.04	74.62	-15.80	-0.12	0.00	0.00	0.00	58.70

Segment Leq : 67.13 dBA

Total Leq All Segments: 67.13 dBA

```
Results segment # 1: CN Oakville (night)
----------------------------------------

LOCOMOTIVE (0.00 + 65.99 + 0.00) = 65.99 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     90   0.00  81.15 -15.16   0.00   0.00   0.00   0.00  65.99
-------------------------------------------------------------------------

WHEEL (0.00 + 58.45 + 0.00) = 58.45 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     90   0.04  74.37 -15.80  -0.12   0.00   0.00   0.00  58.45
-------------------------------------------------------------------------

Segment Leq : 66.69 dBA

Total Leq All Segments: 66.69 dBA

Road data, segment # 1: Plains Road (day/night)
-----------------------------------------------
Car traffic volume  : 27941/3105  veh/TimePeriod  *
Medium truck volume :   976/108   veh/TimePeriod  *
Heavy truck volume  :   650/72    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):  25904
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  12.00
    Medium Truck % of Total Volume     :   3.30
    Heavy Truck  % of Total Volume     :   2.20
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Plains Road (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  :  23.00 / 23.00  m
Receiver height           :  23.10 / 23.10  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Plains Road (day)
--------------------------------------

Source height = 1.22 m

ROAD (0.00 + 68.96 + 0.00) = 68.96 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.02  70.92   0.00  -1.89  -0.06   0.00   0.00   0.00  68.96
-------------------------------------------------------------------------------

Segment Leq : 68.96 dBA

Total Leq All Segments: 68.96 dBA
```

```
Results segment # 1: Plains Road (night)
----------------------------------------

Source height = 1.22 m

ROAD (0.00 + 62.42 + 0.00) = 62.42 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.02  64.38   0.00  -1.89  -0.06   0.00   0.00   0.00  62.42
-------------------------------------------------------------------------------

Segment Leq : 62.42 dBA

Total Leq All Segments: 62.42 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 71.15
                           (NIGHT): 68.07
```