Environmental Noise Feasibility Study

2100 Brant Street

Proposed Residential Development

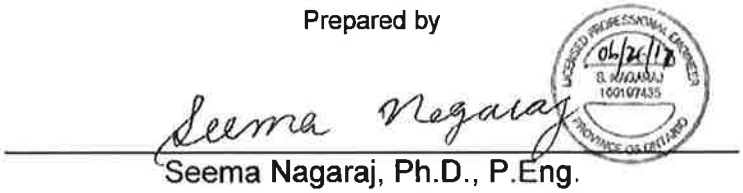
City of Burlington

June 26, 2017
Project: 117-0204

Prepared for

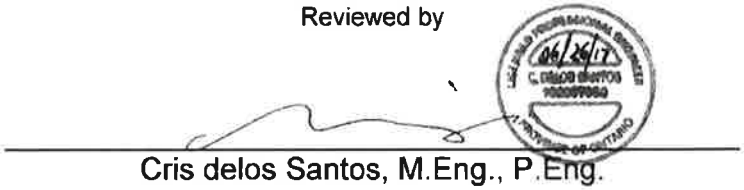
National Homes

Prepared by



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

Reviewed by



Cris delos Santos, M.Eng., P.Eng.

VALCOUSTICS

Canada Ltd.

Document Version Index:

Version	Date	Description of Changes
1.0	June 26, 2017	Final - Issued to Client

TABLE OF CONTENTS

EXECUTIVE SUMMARY. 1

1.0 INTRODUCTION. 1
1.1 THE SITE AND SURROUNDING AREA. 2
1.2 THE PROPOSED DEVELOPMENT. 2

2.0 NOISE SOURCES. 2
2.1 TRANSPORTATION NOISE SOURCES. 2
2.2 STATIONARY NOISE SOURCES. 2

3.0 ENVIRONMENTAL NOISE GUIDELINES. 3
3.1 MOE PUBLICATION NPC-300. 3
3.1.1 Transportation Noise Source Guidelines. 3
3.1.1.1 Architectural Elements. 3
3.1.1.2 Ventilation. 3
3.1.1.3 Outdoors. 4
3.2 REGION OF HALTON. 4

4.0 NOISE IMPACT ASSESSMENT - TRANSPORTATION NOISE SOURCES 4
4.1 ROAD TRAFFIC SOUND LEVELS. 4
4.2 NOISE ABATEMENT REQUIREMENTS. 5
4.2.1 Indoors. 5
4.2.1.1 Architectural Elements. 5
4.2.1.2 Ventilation Requirements. 6
4.2.2 Outdoors. 6
4.2.3 Warning Clauses. 6

5.0 CONCLUSIONS. 6

6.0 REFERENCES. 6

LIST OF TABLES

TABLE 1 ROAD TRAFFIC DATA. 8

TABLE 2 PREDICTED FUTURE UNMITIGATED SOUND LEVELS. 9

TABLE 3 RECOMMENDED NOISE ABATEMENT MEASURES. 10

LIST OF FIGURES

FIGURE 1 KEY PLAN

FIGURE 2 CONCEPTUAL SITE PLAN

LIST OF APPENDICES

APPENDIX A ROAD TRAFFIC DATA

APPENDIX B ENVIRONMENTAL NOISE GUIDELINES

APPENDIX C SAMPLE SOUND LEVEL CALCULATION

Environmental Noise Feasibility Study

2100 Brant Street

Proposed Residential Development

City of Burlington

EXECUTIVE SUMMARY

Valcoustics Canada Ltd. (VCL) was retained to prepare an Environmental Noise Feasibility Study for the proposed development at 2100 Brant Street in the City of Burlington. The proposed project will consist of 33 two-and-a-half-storey townhouse units arranged in 4 blocks (Block 1 to 4), 27 three-storey dual-frontage townhouse units arranged in 5 blocks (Blocks 5 to 9) adjacent to Brant Street and 173 two-storey townhouse units arranged in 24 blocks (Blocks 10 to 33). The dual frontage townhouse units will be provided with small (less than 4 m deep) private terraces, and the two- and two-and-a-half-storey townhouse units will be provided with grade level rear yard amenity spaces ("Outdoor Living Areas" - OLA's).

The significant noise source in the vicinity is road traffic on Brant Street.

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

To meet the applicable transportation noise source guideline limits:

- Blocks 5 to 9 require mandatory air conditioning;
- Blocks 4, 10, 25, 29, 31 and 33 require provision for adding air conditioning; and
- The indoor noise guidelines at all units are predicted to be met without any special window upgrades beyond the minimum non-acoustical requirements stated in the Ontario Building Code (OBC).

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) application submissions to the City of Burlington. The potential sound levels and noise mitigation measures needed for the proposed development to comply with the MOE and the Region of Halton noise guideline requirements are outlined herein.

1.1 THE SITE AND SURROUNDING AREA

The proposed development is located at 2100 Brant Street in the City of Burlington. The site is bounded by:

- Brant Street, with existing detached single-family residential dwellings beyond, to the east;
- existing townhouse blocks and golf course lands to the south;
- existing golf course lands to the west; and
- existing detached and semi-detached residential dwellings, a paramedic station and a church to the north.

A Key Plan is included as Figure 1. This report is based on the Site Plan Scheme C prepared by Cassidy & Company, dated June 15, 2017. The Site Plan is included as Figure 2.

1.2 THE PROPOSED DEVELOPMENT

The proposed project will consist of 33 two-and-a-half-storey townhouse units arranged in 4 blocks (Block 1 to 4), 27 three-storey dual-frontage townhouse units arranged in 5 blocks (Blocks 5 to 9) adjacent to Brant Street and 173 two-storey townhouse units arranged in 24 blocks (Blocks 10 to 33). The dual frontage townhouse units will be provided with small (less than 4 m deep) private terraces, and the two- and two-and-a-half storey townhouse units will be provided with grade level rear yard OLA's.

2.0 NOISE SOURCES

2.1 TRANSPORTATION NOISE SOURCES

The main transportation noise source with potential for impact on the proposed development is road traffic on Brant Street.

Hourly traffic volumes for Brant Street applicable to the year 2015 were obtained from Halton Region. A growth rate of 2% compounded annually was applied to obtain year 2037 volumes, as per the Region of Halton's guidelines for regional road noise assessments (See Section 3.2 below). A day/night split of 94%/6% was calculated based on the hourly counts. Medium/heavy truck percentages were assumed to be 2%/3% of the total traffic volume, as advised by Halton Region.

Due to setback distance and screening from intervening development, other roadways are not anticipated to have a significant noise impact on the subject site and thus have not been included in the assessment.

Road traffic volumes on the internal roadway in the development were obtained from the Traffic Impact Study, prepared by BA Group, dated May 2017. The traffic volumes are low and are not expected to have a significant noise impact on the site. Thus, noise from road traffic on the internal roadways was not included in the assessment.

Table 1 summarizes the road traffic data. The road traffic data correspondence is included in Appendix A.

2.2 STATIONARY NOISE SOURCES

There is an existing paramedic station and an existing church adjacent to the northeast corner of the site. Emergency operations associated with the paramedic station are exempt from the noise

guideline limits and have not been considered further in this assessment. Based on a site visit by VCL staff on May 3, 2017, there are no other noise sources of concern associated with the paramedic station or the church. Thus, the paramedic station and church have not been considered further in the assessment.

There is an existing commercial plaza located approximately 175 m to the northeast of the site, on the east side of Brant Street. The main noise source associated with the commercial plaza are anticipated to be the rooftop mechanical equipment and vehicle movements on site. Due to the distance separation, the presence of an intervening roadway (Brant Street) and the presence of existing residential development located at a closer setback distance, noise from the commercial plaza is not expected to have a significant impact on the subject site. Thus, the commercial plaza was not considered further in the 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 C.

3.1.1 Transportation Noise Source Guidelines

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 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 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

(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).

(provision for adding air conditioning is required when greater than 50 dBA and less than or equal to 60 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.

3.2 REGION OF HALTON

The Region of Halton Noise Abatement Policy for Regional Roads (Retrofit Locations) and New Developments has been used in this report. The Region's criteria for OLA's is 55 dBA. The Region has decided on a maximum sound barrier height of 3.0 m, where a sound barrier is needed adjacent to Regional Roads. Also, the criteria for traffic noise prediction is required to be based on the 20-year traffic forecast for the adjacent regional roads.

4.0 NOISE IMPACT ASSESSMENT - TRANSPORTATION NOISE SOURCES

4.1 ROAD TRAFFIC SOUND LEVELS

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

For the two-and-a-half and three-storey townhouse units, the daytime and nighttime sound levels at the building facades were calculated at a height of 7.5 m above grade, corresponding to the top storey (worst case) noise sensitive plane of windows. For the two-storey townhouse units, the daytime and nighttime sound levels at the building facades were calculated at a height of 4.5 m above grade, corresponding to the second-storey (worst case) noise sensitive plane of windows.

The daytime OLA sound levels at the rear yards were calculated at a standing height of 1.5 m above grade, 3 m from the rear wall and aligned with the midpoint of the applicable facade.

The OLA sound level calculations were based on the Grading Plan prepared by Urbantech Consulting, received June 20, 2017. The grading plan indicates there will be a retaining wall at the northeast corner of the site, along the west and south property boundaries of the existing paramedic station. At the rear yard of the easterly unit in Block 4, the top of the retaining wall is approximately 2 m above the grade of the rear yard OLA. Acoustical screening from the retaining wall was included in the assessment.

Inherent screening of each building face due to its orientation to the noise source was taken into account. In addition, screening from the existing development to the north and south was included in the assessment.

At the building facades, the highest daytime/nighttime sound levels of 67 dBA/58 dBA, respectively, are predicted to occur at the east facade of the townhouse units adjacent to Brant Street.

The rear yard OLA's of Block 4 are partially screened by the grade difference between the rear yard (the bottom of the retaining wall) and the paramedic station lands (the top of the retaining wall). The rear yard grades increase moving west such that the Block 3 OLA's are at a similar grade to the paramedic station. As a result, the rear yards at Block 3 do not benefit from the acoustical screening provided by the retaining wall at the easterly unit in Block 4. Thus, the OLA's at the rear yards of Block 3 are predicted to have higher sound levels than Block 4, despite having a greater setback distance from the roadway (the OLA sound levels at the easterly units of Blocks 3 and 4 are 54 dBA and 51 dBA, respectively). Regardless, the OLA sound levels at all locations are predicted to be within the 55 dBA design objective.

Table 2 summarizes the predicted sound levels. A sample sound level calculation in shown in Appendix C.

4.2 NOISE ABATEMENT REQUIREMENTS

The noise control measures for transportation noise sources 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; and

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

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

4.2.1 Indoors

4.2.1.1 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, wall and window areas, as well as the associated floor area, were calculated based on the Concept Floor Plans, prepared by Cassidy & Co. The calculations were based on the dimensions of Bedroom 2 and Bedroom 3 at the three-storey townhouse units. For Bedroom 2 (a non-corner room), the east window and wall areas were taken to be 29% and 51%, respectively, of the associated floor area. For Bedroom 3 (a corner room), the east window and wall were taken to be 21% and 67% respectively, of the associated floor area. The south wall was taken to be 112% of the associated floor area. No windows were shown on the south facade.

Based on the predicted sound levels, exterior wall and window construction meeting the minimum non-acoustical requirements of the OBC will be sufficient achieve the indoor noise guideline 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.

4.2.1.2 Ventilation Requirements

Based on the predicted sound levels, the three-storey townhouse blocks adjacent to Brant Street (Blocks 5 to 9) require mandatory air conditioning.

Blocks 4, 10, 25, 29, 31 and 33 require the provision for addition air conditioning. The provision for addition air conditioning typically takes the form of a ducted forced air heating system suitably sized to allow the future installation of air conditioning at the occupants discretion.

4.2.2 Outdoors

The unmitigated daytime sound levels at the rear yard OLA's of all units are predicted to be within the 55 dBA design objective. Thus, sound barriers are not required for noise control purposes.

Any balconies/terraces that may be present are anticipated to be less than 4.0 m in depth. Thus, according to the MOE guidelines, these areas do not require noise control measures.

The above sound barrier requirements were based on the Grading Plan, prepared by Urbantech Consulting, received June 20, 2017. The sound barrier requirements should be checked if the Grading Plan is revised.

4.2.3 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. The warning clause requirements and the appropriate wording are given in Table 3 and in the notes to Table 3, respectively.

5.0 CONCLUSIONS

With the incorporation of the acoustical requirements outlined above, all applicable MOE noise guideline limits can be met and a suitable acoustical environment can be provided at the subject development.

The approvals and administrative procedures are available to ensure that the acoustical requirements are implemented. Warning clauses are recommended to advise the future occupants of the potential noise situation.

6.0 REFERENCES

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

2. "ORNAMENT, Ontario Road Noise Analysis for Environment and Transportation", Technical Document, ISBN-7729-6376, Ministry of Environment, October 1989.

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

4. “Environmental Noise Guideline, Stationary and Transportation Sources - Approval and Planning”, MOE Publication NPC-300, August 2013.

5. "2100 Brant Street Urban Transportation Considerations, City of Burlington", BA Group, May 2017.

SN\CDS\tk\ce
J:\2017\1170204\000\Reports\2100 Brant St, Burlington - Noise v1_0 Fnl.wpd

TABLE 1

ROAD TRAFFIC DATA

Roadway	Year	AADT[1]	% Trucks		Speed Limit (kph)	Day / Night Split
			Medium	Heavy		
Brant Street[2]	2015	23 960	2	3	60	94/6
	2037	37 042				

Notes:

(1) AADT – Annual Average Daily Traffic.
(2) Current (year 2015) road traffic volumes and truck percentages were obtained from the Region of Halton Transportation Services. As per the Region of Halton's guideline for regional roads, traffic volumes shown were further projected to the year 2037 at a growth rate of 2% compounded annually.

TABLE 2

PREDICTED FUTURE UNMITIGATED SOUND LEVELS

Location[1]	Source	Distance (m)[2]	$L_{eq\ Day}$[3] (dBA)	$L_{eq\ Night}$[3] (dBA)
Block 3 Easterly Unit (North Facade)	Brant Street (Northbound)	122	51	42
	Brant Street (Southbound)	108	52	43
	TOTAL	**–**	**55**	**46**
Block 3 Easterly Unit (OLA)	Brant Street (Northbound)	125	50	–
	Brant Street (Southbound)	111	51	–
	TOTAL	**–**	**54**	**–**
Block 4 Easterly Unit (East Facade)	Brant Street (Northbound)	74	56	48
	Brant Street (Southbound)	60	57	48
	TOTAL	**–**	**60**	**51**
Block 4 Easterly Unit (OLA)	Brant Street (Northbound)	77	48	–
	Brant Street (Southbound)	63	49	–
	TOTAL	**–**	**51**	**–**
Block 9 (East Facade)	Brant Street (Northbound)	37	62	53
	Brant Street (Southbound)	23	65	56
	TOTAL	**–**	**67**	**58**
Block 10 Easterly Unit (OLA)	Brant Street (Northbound)	70	47	–
	Brant Street (Southbound)	56	49	–
	TOTAL	**–**	**51**	**–**
Block 31 Easterly Unit (East Facade)	Brant Street (Northbound)	74	56	47
	Brant Street (Southbound)	60	56	47
	TOTAL	**–**	**59**	**50**

Notes:

(1) See Figure 2.
(2) Distance indicated is from centreline of noise source to receptor point.
(3) Daytime and nighttime calculations were done at a top storey unit of a receptor height of 7.5 m for the two-and-a-half and three-storey units and 4.5 m for the two-storey units. The daytime predictions at an OLA receptor were done at a height of 1.5 m above grade.

TABLE 3

RECOMMENDED NOISE ABATEMENT MEASURES

Blocks	Air Conditioning[1]	Exterior Wall[2]	Window STC Rating[3]	Sound Barrier[4]	Warning Clauses[5]
Blocks 4 and 25	Provision for adding	No special acoustical requirements	No special acoustical requirements	none	A + C + D
Blocks 10, 29, 31 and 33	Provision for adding	No special acoustical requirements	No special acoustical requirements	none	A + C
Block 5	Mandatory	No special acoustical requirements	No special acoustical requirements	none	A + B + D
Blocks 6 to 9	Mandatory	No special acoustical requirements	No special acoustical requirements	none	A + B
All remaining blocks	No special acoustical requirements				

Notes follows on the next page

Notes To Table 3

(1) The provision for adding air conditioning typically takes the form of a forced air heating systems suitably sized to allow the future installation of air conditioning.

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

The requirements are based on the Concept Floor Plans, prepared by Cassidy & Co., dated April 18, 2017. The requirements should be checked if the plans are revised.

(3) A sliding glass walkout door should be considered as a window and be included in the percentage of glazing.

The requirements are based on the Concept Floor Plans, prepared by Cassidy & Co., dated April 18, 2017. The requirements should be checked if the plans are revised.

(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 and Leases on designated units:

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

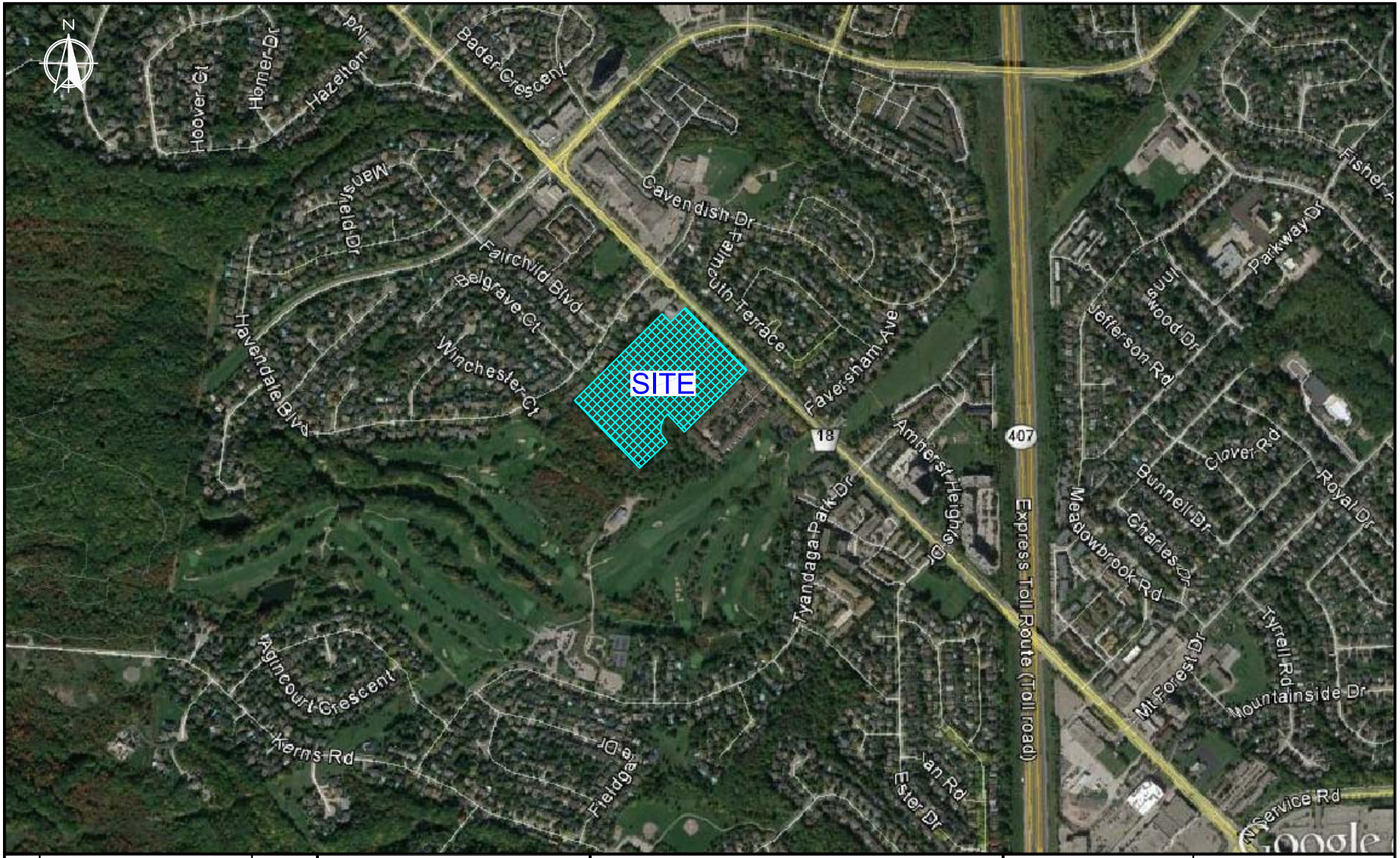
B. "This dwelling has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment".

C. "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."

D. "Purchasers/tenants are advised that due to the proximity of the existing paramedic station and church, sound levels from these facilities may at times be audible."

(5) Conventional roof construction meeting Ontario Building Code requirements is satisfactory in all cases.

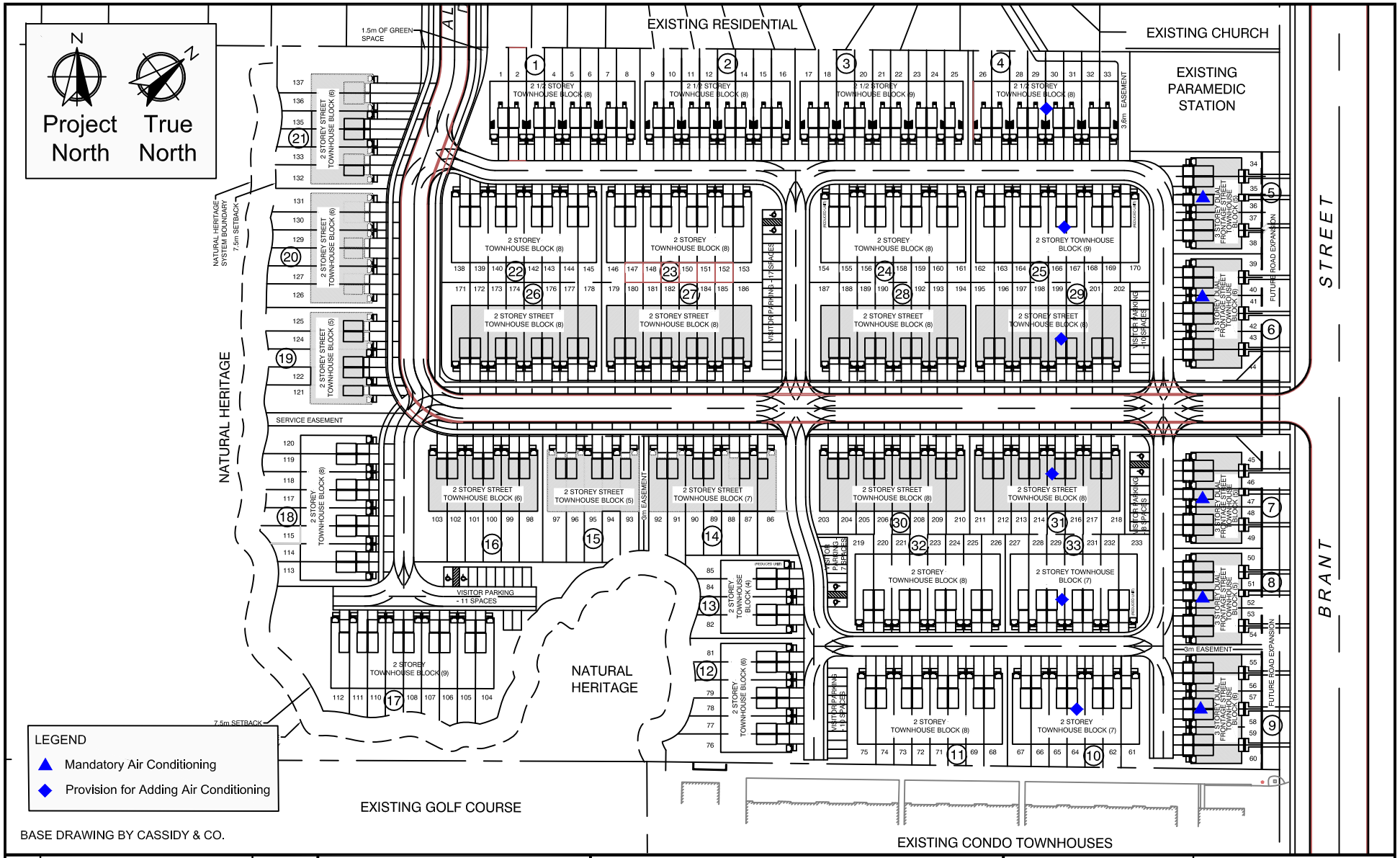
(6) All exterior doors shall be fully weatherstripped.



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.: 117-0204	Date: June 21, 2017
Project Name: 2100 Brant Street, Burlington		Scale: N.T.S.	Figure: 1



BASE DRAWING BY CASSIDY & CO.

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	Project No.	Date
Site Plan Scheme C	117-0204	June 21, 2017
Project Name	**Scale**	**Figure**
2100 Brant Street, Burlington	N.T.S.	2

APPENDIX A

ROAD TRAFFIC DATA

Prepared For: Halton Region
Prepared By: *PYRAMID* Traffic Inc.
Location: REG. RD. #1 north of Upper Middle Rd
Start Date: Tuesday Apr 21, 2015

Site ID: 100105
Interval: 15 min.

Period Ending	Channel 1 NB	Channel 2 SB	Hourly Summary
0:15	24	9	
0:30	24	6	
0:45	16	2	
1:00	7	4	92
1:15	6	4	69
1:30	7	10	56
1:45	4	5	47
2:00	4	5	45
2:15	7	3	45
2:30	5	2	35
2:45	4	4	34
3:00	5	4	34
3:15	3	3	30
3:30	2	4	29
3:45	2	6	29
4:00	4	5	29
4:15	6	9	38
4:30	7	8	47
4:45	6	12	57
5:00	6	21	75
5:15	18	29	107
5:30	20	35	147
5:45	20	56	205
6:00	41	58	277
6:15	48	59	337
6:30	76	85	443
6:45	75	111	553
7:00	106	136	696
7:15	116	154	859
7:30	175	209	1082
7:45	156	269	1321
8:00	178	298	1555
8:15	211	340	1836
8:30	191	358	2001
8:45	155	298	2029
9:00	156	281	1990
9:15	149	184	1772
9:30	133	179	1535
9:45	159	168	1409
10:00	118	193	1283
10:15	125	156	1231
10:30	129	159	1207
10:45	146	182	1208
11:00	145	158	1200
11:15	169	174	1262
11:30	187	146	1307
11:45	156	155	1290
12:00	176	170	1333
12:15	158	169	1317
12:30	188	173	1345
12:45	173	165	1372
13:00	179	177	1382
13:15	190	159	1404
13:30	144	176	1363
13:45	176	140	1341
14:00	156	156	1297
14:15	141	152	1241
14:30	209	201	1331
14:45	183	190	1388
15:00	193	195	1464
15:15	192	184	1547
15:30	219	254	1610
15:45	230	218	1685
16:00	231	236	1764
16:15	250	270	1908
16:30	253	254	1942
16:45	273	278	2045
17:00	284	245	2107
17:15	308	239	2134
17:30	310	263	2200
17:45	304	243	2196
18:00	261	264	2192
18:15	246	261	2152
18:30	212	209	2000
18:45	210	168	1831
19:00	176	201	1683
19:15	169	185	1530
19:30	165	163	1437
19:45	152	125	1336
20:00	157	108	1224
20:15	141	115	1126
20:30	170	104	1072
20:45	153	82	1030
21:00	122	83	970
21:15	139	68	921
21:30	134	60	841
21:45	71	57	734
22:00	81	65	675
22:15	70	38	576
22:30	64	41	487
22:45	40	38	437
23:00	45	39	375
23:15	38	32	337
23:30	35	20	287
23:45	24	25	258
0:00	26	18	218

AM Peak: 2029 PM Peak: 2200 24 HR VOLUME: 23960

Seema Nagaraj

From: Krusto, Matt <Matt.Krusto@halton.ca>
Sent: May-01-17 8:39 AM
To: Seema Nagaraj
Subject: RE: Road traffic data request (VCL File: 117-0204)

Hi Seema,

Please use - 2% medium, 3% heavy trucks (similar to a recent study on an adjacent Regional road).

Matt

From: Seema Nagaraj [mailto:seema@valcoustics.com]
Sent: Monday, May 01, 2017 7:35 AM
To: Krusto, Matt
Subject: RE: Road traffic data request (VCL File: 117-0204)

Hi Matt,

Thank you for your quick response. In the existing traffic data, the trucks appear to be broken down by length classification rather than medium/heavy. Do you have a conversion that you would typically use to convert between the two, or do you have typical medium/heavy truck percentages for this type of roadway that we can use?

Thank you,

Seema

From: Krusto, Matt [mailto:Matt.Krusto@halton.ca]
Sent: April-30-17 11:44 AM
To: Seema Nagaraj
Subject: RE: Road traffic data request (VCL File: 117-0204)

Hi Seema,

Please use 2% growth to determine the 2031 ultimate AADT.

Please base the truck percentages on the existing traffic data. Assume 6 lanes for ultimate scenario.

Matt

Matt Krusto
Transportation Planning Coordinator
Infrastructure Planning & Policy
Public Works
Halton Region
905-825-6000, ext. 7225 | 1-866-442-5866

From: Sealey, Jonathan [mailto:Jonathan.Sealey@halton.ca]
Sent: April-28-17 11:44 AM
To: Seema Nagaraj
Cc: Krusto, Matt
Subject: RE: Road traffic data request (VCL File: 117-0204)

Good Afternoon Dr. Nagaraj,

I have attached our most up to day volume, speed and class data for our ATR located along Brant street between Upper Middle Road and the 407. To obtain an Ultimate AADT Matt Krusto (CC'd) on this email will be your best contact.

Thank You,

From: Seema Nagaraj [mailto:seema@valcoustics.com]
Sent: Tuesday, April 18, 2017 2:11 PM
To: Access Halton
Subject: Road traffic data request (VCL File: 117-0204)

Hello,

We are currently preparing an environmental noise assessment for a proposed development at 2100 Brant Street in Burlington (see attached image for location). For our study, we would like to purchase traffic data for:

- Brant Street, between Upper Middle Road and Highway 407.

Ideally, we are looking for:

- Ultimate AADT
- Current AADT
- Number of Lanes
- Posted Speed
- Truck Percentage (Medium/Heavy)
- Grade
- Day and Night Split

If ultimate traffic data is not available, current counts would also be okay.

Thank you,

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

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

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

Valcoustics Canada Ltd. is not responsible for edited or reproduced versions of this digital data.

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 Rail Aircraft	07:00 to 23:00 07:00 to 23:00 24-hour period	45 dBA 40 dBA NEF/NEP 5
Living/dining, den areas of residences, hospitals, nursing homes, etc. (except schools or daycare centres)	Road Rail Aircraft	23:00 to 07:00 23:00 to 07:00 24-hour period	45 dBA 40 dBA NEF/NEP 5
Sleeping quarters	Road Rail Aircraft	07:00 to 23:00 07:00 to 23:00 24-hour period	45 dBA 40 dBA NEF/NEP 0
Sleeping quarters	Road Rail Aircraft	23:00 to 07:00 23:00 to 07:00 24-hour period	40 dBA 35 dBA NEF/NEP 0
Outdoor Living Areas	Road and Rail	07:00 to 23:00	55 dBA up to 60 dBA allowed in some cases
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 SOUND LEVEL CALCULATION

```
STAMSON 5.04        NORMAL REPORT        Date: 21-06-2017 09:08:13
MINISTRY OF THE ENVIRONMENT AND CLIMATE CHANGE / NOISE ASSESSMENT

Filename: b9_ef.te             Time Period: Day/Night 16/8 hours
Description: Block 9 - East Face

Road data, segment # 1: Brant NB (day/night)
-------------------------------------------
Car traffic volume  : 16539/1056  veh/TimePeriod  *
Medium truck volume :   348/22    veh/TimePeriod  *
Heavy truck volume  :   522/33    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):  11980
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  22.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   3.00
    Day (16 hrs) % of Total Volume     :  94.00

Data for Segment # 1: Brant NB (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  :  37.00 / 37.00  m
Receiver height           :   7.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: Brant SB (day/night)
-------------------------------------------
Car traffic volume  : 16539/1056  veh/TimePeriod  *
Medium truck volume :   348/22    veh/TimePeriod  *
Heavy truck volume  :   522/33    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):  11980
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  22.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   3.00
    Day (16 hrs) % of Total Volume     :  94.00

Data for Segment # 2: Brant SB (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           :   7.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

Results segment # 1: Brant NB (day)

Source height = 1.32 m

ROAD (0.00 + 62.02 + 0.00) = 62.02 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.49	68.99	0.00	-5.82	-1.15	0.00	0.00	0.00	62.02

Segment Leq : 62.02 dBA

Results segment # 2: Brant SB (day)

Source height = 1.32 m

ROAD (0.00 + 65.08 + 0.00) = 65.08 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.49	68.99	0.00	-2.76	-1.15	0.00	0.00	0.00	65.08

Segment Leq : 65.08 dBA

Total Leq All Segments: 66.82 dBA

Results segment # 1: Brant NB (night)

Source height = 1.31 m

ROAD (0.00 + 53.05 + 0.00) = 53.05 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.49	60.02	0.00	-5.83	-1.15	0.00	0.00	0.00	53.05

Segment Leq : 53.05 dBA

Results segment # 2: Brant SB (night)

Source height = 1.31 m

ROAD (0.00 + 56.12 + 0.00) = 56.12 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.49	60.02	0.00	-2.76	-1.15	0.00	0.00	0.00	56.12

Segment Leq : 56.12 dBA

Total Leq All Segments: 57.86 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.82
(NIGHT): 57.86