YCA engineering Limited

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9251 Yonge Street, Suite 8557
Richmond Hill, ON L4C 9T3

ENVIRONMENTAL NOISE ASSESSMENT

BROCK STREET TOWNS
PROPOSED RESIDENTIAL DEVELOPMENT
PART OF LOTS 102 TO 105, PART OF PARK STREET
AND PART OF CENTRE STREET
REGISTERED PLAN H50061 AND
PART OF LOT 31, CONCESSION 7

TOWNSHIP OF UXBRIDGE

PREPARED FOR:

EVENDALE DEVELOPMENTS LTD.

November 2017
Y1735

EXECUTIVE SUMMARY

The proposed residential development is located north of Brock Street East (Highway No. 47) and approximately 750m east of Main Street North in the Township of Uxbridge.

The November 2017 Environmental Noise Assessment is issued to present the assessment of the proposed development and recommend any noise abatement features necessary to achieve sound levels acceptable to the Township of Uxbridge, the Region of Durham and the Ministry of Environment and Climate Change.

The transportation noise sources having the potential to affect the living environment within the proposed development area include Brock Street East (Highway No. 47). The ultimate traffic volumes on this noise source is used as input to the Stamson's 5.04 to generate the resultant sound levels. Copies of the correspondence regarding traffic data is included in Appendix 2 in this report. The stationary noise sources having the potential to affect the proposed development is the existing hydro substation and the commercial building within the proposed development.

Recommended noise abatement measures are described in Sections 5.1, 5.2, 5.3 and 5.4 and summarized in Table 4 of this report and on the attached Figure 2. These measures include:

1. Mandatory air conditioning is required for Block 13 (South Unit), Blocks 14, 15, 16, (All Units), Commercial Building (Apartment Units) and the Condominium Apartment Building (All Units).

2. Provision for air conditioning is required for Blocks 8, 9, 10, 12 (All Units) and Block 13 (Remaining Units).

3. A 2.1m high acoustic barrier is required at the side property line of Block 13 (South Unit) and returned to the rear property line and the side wall of the house as shown on the attached Figure 2.

4. Standard windows and exterior wall constructions meeting the Ontario Building Code requirement are sufficient for all residential units within the proposed development.

5. All applicable warning clauses shall be listed in the Township's Development Agreement and also be inserted in the Agreements of Purchase and Sale or Lease and registered on title.

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1.0 INTRODUCTION

PURPOSE

A residential development has been proposed by Evendale Developments Ltd. in the Township of Uxbridge. This report is an analysis of future sound levels within the development and describes the types and locations of noise mitigation measures which will be required.

SITE DESCRIPTION AND LOCATION

The proposed development will consist of Semi-Bungalow units, 2 storey Townhouse units, a Commercial building (with retail commercial at the ground floor and residential apartments on top) and a 4 storey Condominium Apartment Building located north of Brock Street East (Highway No. 47) at approximately 750m east of Main Street North in the Township of Uxbridge.

The surrounding land uses are existing residential development to the north, south and west, with an existing hydro substation to the west and vacant lands/open spaces to the east.

KEY PLAN

The location of the proposed development is further indicated by the Key Plan below.

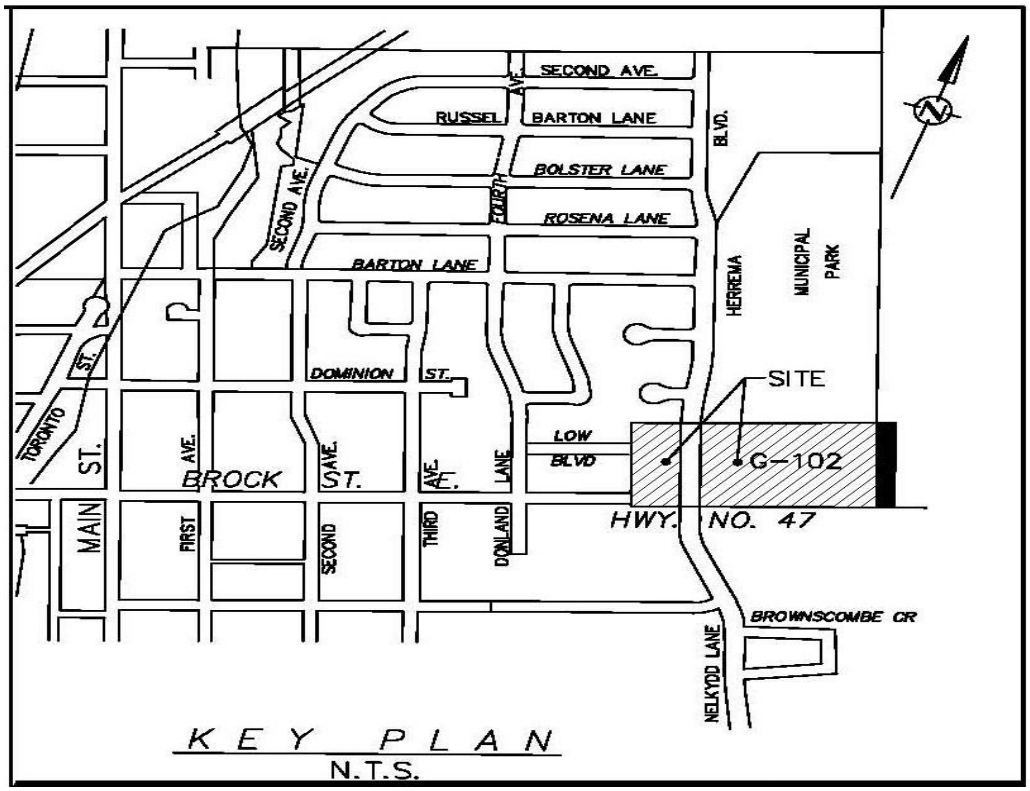


FIGURE 1

2.0 SOUND LEVEL CRITERIA

OUTDOOR SOUND LEVEL CRITERIA

Outdoor Activity Areas (7 a.m. – 11 p.m.) – 16 Hr. Leq. = 55 dBA

If daytime outdoor sound levels at the backyards (outdoor activity areas) of residential areas exceed 60 dBA, physical noise attenuation measures such as acoustical fences, increased building setbacks or reorientation of dwellings and lots must be employed to reduce the sound levels. In some cases, outdoor sound levels may be allowed to exceed the above criteria by a maximum of 5 dBA. If such excesses occur, purchasers must be informed of the existence of potentially annoying sound levels by means of warning clauses registered on title.

INDOOR SOUND LEVEL CRITERIA

Living and Dining Area (7am–11pm) – 16 Hr. Leq. = 45 dBA Roads, 5 NEF/NEP Aircrafts
Bedrooms (11 p.m. – 7 a.m.) – 8 Hr. Leq. = 40 dBA Roads, 0 NEF/NEP Aircrafts

Appropriate building components such as walls, doors and windows are chosen with reference to the following. If daytime sound levels at the external dwelling walls are 65 dBA or less (roadways), and 60 dBA or less (railways), then the indoor sound level criteria described above will be achieved using standard (Ontario Building Code) construction methods and building components. If night-time sound levels are 60 dBA or less (roadways) and 55 dBA or less (railways), standard construction methods and building components can be utilized. If the external sound levels exceed the above criteria, then components having extra sound insulation properties may be required.

Ventilation requirements are determined with reference to the following. If night-time sound levels at the bedroom window of a dwelling unit are in the range of 50 to 60 dBA, the ventilation system must be designed to allow the optional installation of central air conditioning at the owner's discretion. If night-time sound levels are greater than 60 dBA, central air conditioning must be installed. If daytime sound levels at the living room/dining room windows are in the range of 55 to 65 dBA, the ventilation system must be designed to allow optional installation of central air conditioning. For daytime sound levels greater than 65 dBA, central air conditioning must be installed.

STATIONARY SOURCES

As per the M.O.E.C.C. guidelines (Publication NPC-300), this area is considered to be a Class 2 classification area. The noise produced by a stationary source at the plane of window for noise sensitive spaces is the energy equivalent sound level (L_{EQ}), 50 dBA during daytime and evening time (0700-2300) or 45 dBA during night-time (2300-0700). For outdoor receptors, the energy equivalent sound level (L_{EQ}) is 50 dBA during daytime (0700-2300) and 45 dBA during night-time (2300-0700).

3.0 NOISE SOURCES

ROAD TRAFFIC

As indicated on Figures 1 and 2, the proposed residential development will be located north of Brock Street (Highway No. 47) and at approximately 750m east of Main Street in the Township of Uxbridge. Noise generated by Brock Street (Highway No. 47) has the potential to affect future development. All other roads within or near this site are considered acoustically insignificant due to low traffic volumes and distance separation.

Traffic volume information for Brock Street East (Highway No. 47) was obtained from the Regional Municipality of Durham dated October 19, 2017. The traffic data obtained is summarized in Table 1 below:

TABLE 1: BROCK STREET EAST (HIGHWAY NO. 47) TRAFFIC DATA

Projected Annual Average Daily Traffic*	11,000
Percent Trucks	15%
Heavy to Medium trucks ratio	80/20
Speed (km/hr)	50
Number of Lanes	4
Day/Night Traffic split	90/10

* Projected traffic provided by the Region of Durham.

EXISTING STATIONARY NOISE SOURCES

An existing hydro substation is located west of the proposed development at approximately 25m from the nearest receptor R1 (4 Storey Condominium Apartment Building). Based on a site visit conducted, the hydro substation resulted in a tonal sound level lower than the background traffic noise. However, a warning clause should advise the future residents of possible noise levels during low ambient times.

Retail commercial units are proposed at the first floor of the commercial building. The details of retail commercial units and hours of operation are unknown at this time. Further investigation is recommended to ensure the sound levels at the adjacent receptor locations meet the MOECC sound levels limits once this information becomes available.

The garbage pickup for the proposed commercial development is expected to occur during the daytime and are excluded from the stationary source noise sources, although some activities may be audible at times. It is recommended that the occasional deliveries occur from 07:00 to 19:00 where the ambient sound level is higher.

4.0 NOISE ASSESSMENT

4.1 ROAD TRAFFIC NOISE ASSESSMENT

Figure 2 is based on the latest Site Plan dated November 2017 showing various noise analysis locations and noise mitigation measures within the proposed development. Sound levels were calculated using the Ministry of Environment's Stamson 5.04 computer based noise prediction model. The noise criteria and warning clauses are listed in Appendix 4.

Table 2 lists the unattenuated sound levels at various locations.

TABLE 2: UNATTENUATED SOUND LEVELS

LOCATIONS	DISTANCE TO CENTRELINE OF ROAD (m)	DAYTIME 16 Hr. Leq dBA		NIGHT-TIME 8 Hr. Leq dBA
		REAR YARD	DWELLING WALL	SECOND STOREY
Semi-Bungalows	135.0[1] 153.0[1]	- <55	53.13 -	47.61 -
Block 10	70.0[1] 86.0[1]	- <55	57.83 -	52.06 -
Block 12	68.0[1] 70.0[1]	- 55.87	58.04	52.25
Block 13	28.0[1] 30.0[1]	- 63.41	67.59 -	61.06 -
Block 16	27.0[1] 43.0[1]	- <55	67.75 -	61.22 -
Condo Apartment Building	32.0[1]	-	67.01	60.48
Commercial Building	28.0[1]	-	67.59	61.06

[1] Brock Street East (Highway No. 47 Road)

4.2 STATIONARY NOISE SOURCES ASSESSMENT

The noise impact from the existing hydro substation and the proposed commercial developments with mechanical units and occasional truck activities have the potential to exceed the sound level limits at the proposed residential development.

Based on a site visit conducted, the existing hydro substation resulted in a tonal sound level lower than the background traffic noise. However, a sound level of 81 dBA $_{(PWL)}$ or less was taken into account for noise analysis based on similar sound measurements.

All mechanical units are assumed to be operating 100% of the time during the daytime/evening and operating 50% of the time during the night-time. Analysis is included in Appendix 3.

The sound levels were calculated using the CadnaA Version 2017 computer program using the International Standard ISO 9613-2.

TABLE 3 - STATIONARY SOURCES SOUND LEVELS (UMITIGATED)

RECEPTOR	SOUND LEVEL RESULTS (dBA)		EXCEEDANCE (dBA)
	DAYTIME/ EVENING (0700 -2300)	NIGHTTIME (2300 -0700)	
R1 (Condo Apartment, West)	43	43	No
R2 (Block 1)	39	36	No
R3 (Block 17)	35	32	No
R4 (Condo Apartment, East)	42	39	No
R5 (Block 16)	47	44	No

The total sound level results from the existing hydro substation and proposed mechanical units are expected to meet the sound level limit during the daytime and night-time at all receptor locations.

Therefore, noise mitigation measures are not required. However, a warning clause should advise the future residents of possible noise levels during low ambient times

5.0 RECOMMENDED NOISE MITIGATION MEASURES

5.1 OUTDOOR MEASURES

5.1.1 TRAFFIC NOISE OUTDOOR MEASURES

Table 2 indicates that daytime rear yard sound level at the following location will be above 60dBA in the absence of mitigative measures. Therefore, outdoor noise mitigation measure is required for:

- Block 13 (South Unit)

The daytime rear yard sound level at the following locations are expected to be between 55 dB and 60dBA in the absence of mitigative measures. Therefore, outdoor noise mitigation measure are not required. However a warning clause Type A is recommended for:

- Block 12 (All Units) and Block 13 (Remaining Units)

Please note that there are no designated outdoor amenity areas for the Commercial Building (Apartment Units) and the Condominium Apartment Building.

NOISE BARRIERS

In accordance with M.O.E.C.C., mitigative measure is required for Block 13 (South Unit) to reduce the sound levels close to 55 dBA.

For Block 13 (South Unit), a 2.1m high acoustic barrier (fence and berm combination) is required along the side/rear properties as shown on the attached Figure 2 to achieve a sound level of 58 dBA or less.

Following installation of the recommended acoustic barrier, future outdoor sound levels may exceed the sound level limits at the following location due to road traffic noise:

- Block 13 (South Unit)

A warning clause should therefore be incorporated into the Development Agreement, which will be registered on title and should be included in all offers of purchase and sale or lease of the dwelling units at the above locations. The clause should state:

> Warning Clause No. B
>
> *"Purchasers/tenants are advised that despite the inclusion of noise control features , the sound levels due to increasing road traffic, the existing hydro substation and the proposed commercial development may continue to be of concern, occasionally interfering with the activities of the dwelling occupants as the noise levels may exceed the noise criteria of the Municipality and the Ministry of the Environment and Climate Change."*

5.1.2 STATIONARY NOISE OUTDOOR MEASURES

As per the sound level results in Table 3, the noise activities from the existing hydro substation and the proposed commercial development are expected meet the sound level limits at all locations.

Therefore, outdoor noise mitigation measures are not required due to stationary noise sources.

5.2 VENTILATION REQUIREMENTS

5.2.1 VENTILATION REQUIREMENTS DUE TO ROAD TRAFFIC

Ventilation requirements were determined using the sound levels at the building facades listed in Table 2 due to road traffic noise sources.

MANDATORY CENTRAL AIR CONDITIONERS

The following locations are expected to be above 65dBA during the daytime and/or above 60dBA during the nighttime. Therefore, mandatory air conditioning is required for the following locations:

- Block 13 (South Unit) and Blocks 14, 15, 16 (All Units)
- Condominium Apartment Building and Commercial Building (Apartment Units)

The following warning clause Type D must be incorporated into the Development Agreement, which will be registered on title and should be included in all offers of purchase, sale and lease of the above location:

> Warning Clause Type D:
>
> *"This unit was fitted with an air conditioner to allow the windows and exterior doors to remain closed, thereby achieving indoor sound levels within the limits recommended by the Ministry of Environment and Climate Change. (Note: care should be taken to ensure that the condenser unit is located in an area that is not sensitive to noise. The sound rating of air conditioning units must not exceed the sound emission standards established by the Ministry of Environment and Climate Change)."*

PROVISION FOR AIR CONDITIONERS

Based on the information in Table 2, the following locations must be constructed with a forced air heating system with ducting sized to accommodate a central air conditioning unit, in order to allow the homeowner the option of installing central air conditioning should he or she wish to do so in the future due to road traffic:

- Blocks 8, 9, 10, 12 (All Units) and Block 13 (Remaining Units)

In addition, the following warning clause must be incorporated into the Development Agreement, which will be registered on title and should be included in all offers of purchase, sale and lease of the above suites:

Warning Clause Type C:

"This unit was fitted with ducting sized to accommodate a central ventilation system to allow windows and exterior doors to be kept closed, thereby achieving indoor sound levels within the limits recommended by the Ministry of Environment and Climate Change"

5.2.2 VENTILATION REQUIREMENTS DUE TO STATIONARY NOISE SOURCE

The proposed commercial development operation hours are expected to be daytime and evening and the possible noise activities are the mechanical units, and occasional truck loading and unloading activities. Due to high ambient noise as a result of road traffic, the noise impact is not expected to be significant most of the times. However, possible noise activities may exceed the sound level limit at times.

Based on the MOECC Noise Guideline, the use of air conditioning is not acceptable for noise mitigation in the context of controlling the noise from a stationary source. However, if a building is designed with air conditioning due to transportation noise sources, then air conditioning may provide further noise mitigation for stationary noise sources given that the windows are kept closed if the stationary noise sources are audible at times.

5.3 BUILDING COMPONENTS

Building components within the proposed development were analyzed using the STC (Sound Transmission Class) method recommended by the M.O.E.C.C.

DAYTIME SOUND LEVELS

For the worst case location during daytime, (Apartment Units, Commercial Building) a daytime sound level of 68 dBA was calculated due to road traffic. To ensure acceptable daytime indoor sound levels of 45 dBA from road noise source, the building components must provide an STC rating of 30 for windows, STC 38 for exterior wall construction.

NIGHT-TIME SOUND LEVELS

For the worst case location during night-time, (Apartment Units) night-time sound level of 61 dBA was calculated. To ensure acceptable nighttime indoor sound levels of 40 dBA from road noise source, the building components must provide an STC rating of 26 for windows, STC 34 for exterior wall construction

BUILDING COMPONENT REQUIREMENTS

The minimum standard window and exterior wall construction of the Ontario Building Code meets STC 30 and STC 38, respectively. Therefore, standard windows and exterior wall constructions meeting the Ontario Building Code requirement are sufficient for all residential units.

WINDOWS

The following are some window configurations meeting an STC rating of 30, assuming the ratio of window area to room floor area is 25%:

- double glazing 3mm x 3mm thickness with 13mm air space (Sliders) or
- double glazing 4mm x 4mm thickness with 6mm air space (Sliders) or
- double glazing 3mm x 3mm thickness with 6mm air space (Casement or fixed) or
- any other window type yielding a similar or greater STC rating

EXTERIOR WALLS

The following exterior wall construction EW1 meets the STC 38 rating, assuming a ratio of wall area to room floor area of 80%:

EW1 12.7mm gypsum board, vapour barrier and 38 x 89mm studs with 50mm (or thicker) mineral wool or fiberglass batts in interstud cavities, plus sheathing, 25mm air space and vinyl/stucco.

Sample window and exterior wall configurations are included in Appendix 5 for additional options.

5.4 WARNING CLAUSES

We recommend the following warning clauses to be incorporated into the Development Agreement, which will be registered on title and included in all offers of purchase and sale or lease of suites noted below.

- Blocks 8, 9, 10, 12 to 16 (All Units)
- Condominium Apartment Building and Commercial Building (Apartment Units)

Warning Clause Type A:

"Purchasers/tenants are advised that despite the inclusion of noise control features, the sound levels due to increasing road traffic, the existing hydro substation and proposed commercial development may continue to be of concern, occasionally interfering with the activities of the occupants as the noise levels may exceed the noise criteria of the Ministry of the Environment and Climate Change."

6.0 SUMMARY OF NOISE MITIGATION MEASURES

The summary of all noise abatement measures are listed in the following Table 4 identifying ventilation requirements, building components and warning clauses.

TABLE 4: SUMMARY OF NOISE MITIGATION MEASURES

LOCATIONS	VENTILATION REQUIREMENTS	BUILDING COMPONENTS	SOUND BARRIERS	WARNING CLAUSES
Block 13 (South Unit)	Mandatory air conditioning	Windows: OBC* Walls: OBC	2.1m**	Type B and D
Blocks 14, 15, 16 (All Units) Condominium Apartment Building (All Units) Commercial Building (Apartment Units)	Mandatory air conditioning	Windows: OBC Walls: OBC	-	Type A and D
Blocks 8, 9, 10, 12 (All Units) Block 13 (Remaining Units)	Provision for air conditioning	Windows: OBC Walls: OBC	-	Type A and C

* OBC: Ontario Building Code Standard.

** 2.1m high acoustic barrier at the side property line, returned to the rear property line and the side wall of the house as shown on the attached Figure 2.

7.0 RECOMMENDATIONS AND CONCLUSION

RECOMMENDATIONS

1. Mandatory air conditioning is required for Block 13 (South Unit), Blocks 14, 15, 16 (All Units), Commercial Building (Apartment Units) and the Condominium Apartment Building (All Units).

2. Provision for air conditioning is required for Blocks 8, 9, 10, 12 (All Units) and Block 13 (Remaining Units).

3. A 2.1m high acoustic barrier is required at the side property line of Block 13 (South Unit) and returned to the rear property line and the side wall of the house as shown on the attached Figure 2.

4. Standard windows and exterior wall constructions meeting the Ontario Building Code requirement are sufficient for all other faces of the proposed building.

5. The details of the mechanical units at the commercial building are not known at this time. Further investigation is recommended to ensure the sound levels meet the MOECC sound levels limits once this information becomes available.

6. All applicable warning clauses shall be listed in the Township's Development Agreement and also be inserted in the Agreements of Purchase and Sale or Lease and registered on title.

CONCLUSION

This report has determined that sound levels acceptable to the Ministry of Environment and Climate Change, Township of Uxbridge and the Region of Durham are expected to be achieved using the abatement measures in this report and as shown on the attached Figure 2.

Respectfully submitted,

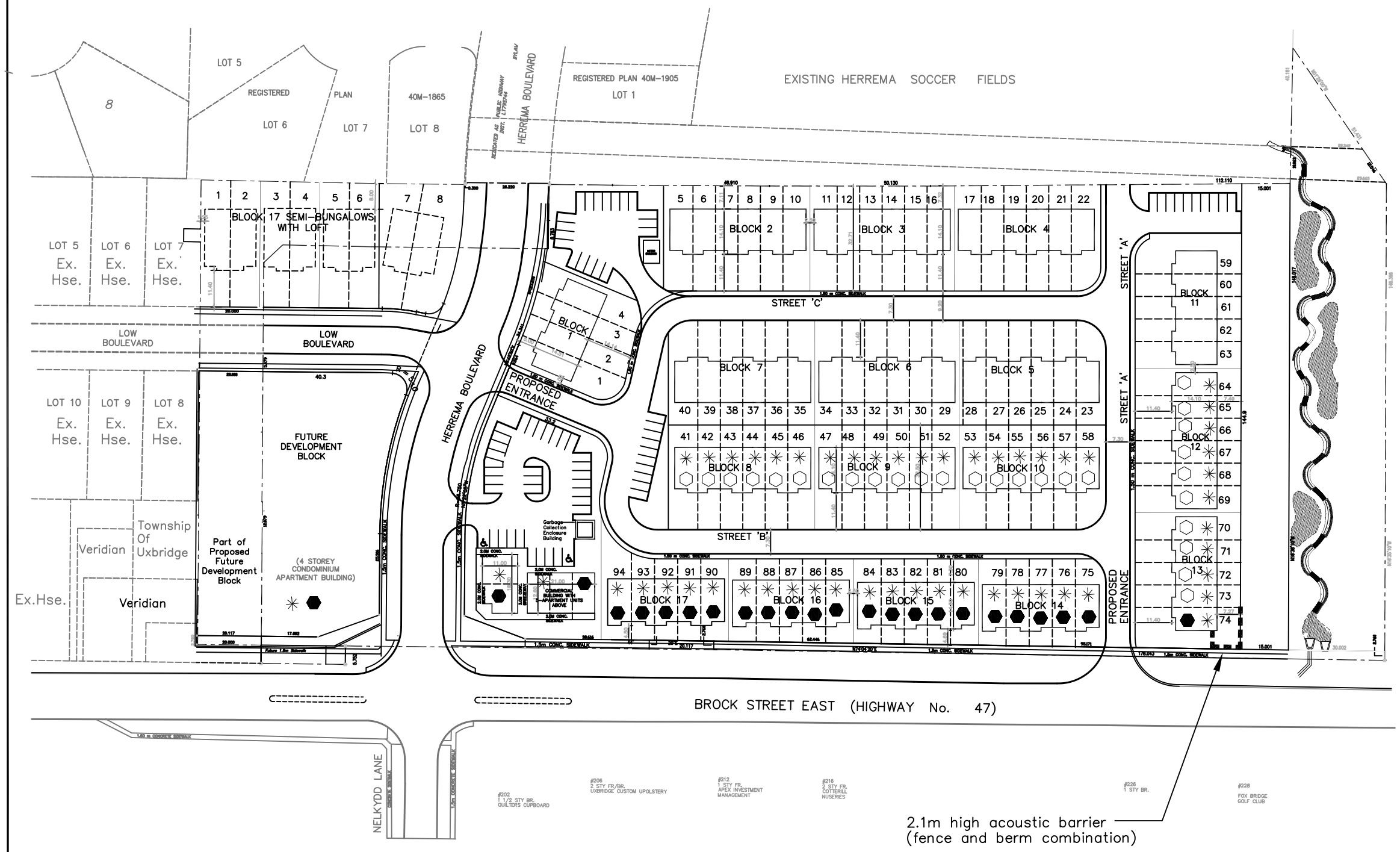
YCA ENGINEERING Limited

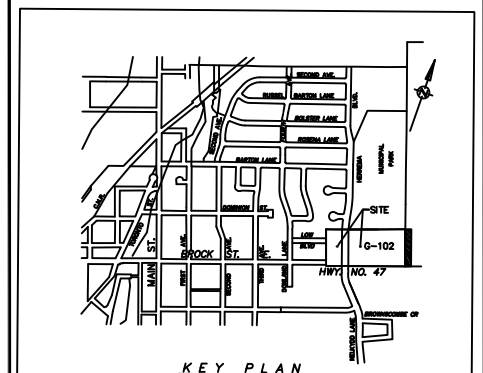
LICENSED PROFESSIONAL ENGINEER
H. JOUHARCHI
100010925
PROVINCE OF ONTARIO
Nov. 6, 17

Hava Jouharchi, P.Eng.
Senior Project Engineer

APPENDIX 1

FIGURES





LEGEND:

- MANDATORY AIR CONDITIONING. AND WARNING CLAUSE D
- OPTIONAL AIR CONDITIONING. AND WARNING CLAUSE C
- WARNING CLAUSE A
- PROPOSED ACOUSTIC BARRIER AND WARNING CLAUSE B

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PLAN – NOISE MITIGATION MEASURES

BROCK STREET TOWNS
PROPOSED RESIDENTIAL

TOWNSHIP OF UXBRIDGE

EVENDALE DEVELOPMENTS LTD

FIGURE 2

Scale: NTS

DATE: NOVEMBER 2017

FIGURE 3

DISTANCES FROM THE STATIONARY NOISE SOURCES

APPENDIX 2

TRAFFIC DATA

Planning and Economic
Development Department

Planning Division

605 ROSSLAND RD. E.
4TH FLOOR
P.O. BOX 623
WHITBY, ON L1N 6A3
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Brian Bridgeman, MCIP, RPP
Commissioner of Planning and
Economic Development

The Regional Municipality of Durham

ROAD SEGMENT TRAFFIC FORECASTS FOR NOISE ANALYSES

This information is to be used as the basis for assessing the potential impacts of noise, generated by traffic on Provincial Highways and arterial roads, on proposed land uses that are sensitive (e.g., residential subdivisions). Arterial roads include existing and future Type A, B and C, as designated in the Durham Regional Official Plan.

Noise assessment reports recommend specific measures to be integrated into the design of sensitive developments to reduce road noise impacts to acceptable levels.

Provided For:

Name / Name of Firm: Hava Jouharchi

Address: YCA

Telephone: (416) 894-4213 Fax:

Location of Proposal:

Brock Street East (Reg. Hwy 47), east of Main Street, Uxbridge

Municipality: Uxbridge Lot(s): Concession:

Durham Region File No. (if available):

Name of Property Owner (if available):

Date Request Received: October-18-17 Received By: Sandra McEleney

Date Forecast Sent: October-19-17

Name of Road Segment	Forecasted AADT*	No. of Lanes	% of Trucks	Heavy : Medium Truck Ratio		Speed (km/h)
Brock Street E. (Reg. Hwy 47)	11,000	4	15	80	20	50
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0

* Average Annual Daily Traffic. Forecast based on ultimate development according to the Durham Regional Official Plan.

APPENDIX 3

SOUND LEVEL CALCULATIONS

```
STAMSON 5.04        SUMMARY REPORT        Date: 31-10-2017 10:27:39
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: blk10fw.te           Time Period: Day/Night 16/8 hours
Description: Block 10, Front Wall

Road data, segment # 1: Brock Street (day/night)
-----------------------------------------------
Car traffic volume  :  8415/935   veh/TimePeriod  *
Medium truck volume :   297/33    veh/TimePeriod  *
Heavy truck volume  :  1188/132   veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):  11000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   3.00
    Heavy Truck  % of Total Volume     :  12.00
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 1: Brock Street (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  :  70.00 / 70.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)

Result summary (day)
--------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Brock Street     !     1.86 !    57.83 !    57.83
--------------------+---------+---------+---------
                      Total                  57.83 dBA

Result summary (night)
----------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Brock Street     !     1.86 !    52.06 !    52.06
--------------------+---------+---------+---------
                      Total                  52.06 dBA


TOTAL Leq FROM ALL SOURCES (DAY): 57.83
                           (NIGHT): 52.06
```

```
STAMSON 5.04        SUMMARY REPORT        Date: 01-11-2017 11:03:10
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: blk13sw.te           Time Period: Day/Night 16/8 hours
Description: Block 13, Side Wall

Road data, segment # 1: Brock Street (day/night)
-----------------------------------------------
Car traffic volume  :  8415/935   veh/TimePeriod  *
Medium truck volume :   297/33    veh/TimePeriod  *
Heavy truck volume  :  1188/132   veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):  11000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   3.00
    Heavy Truck  % of Total Volume     :  12.00
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 1: Brock Street (day/night)
-----------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  28.00 / 28.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)

Result summary (day)
--------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Brock Street     !     1.86 !    67.59 !    67.59
--------------------+---------+---------+---------
                      Total                  67.59 dBA

Result summary (night)
----------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Brock Street     !     1.86 !    61.06 !    61.06
--------------------+---------+---------+---------
                      Total                  61.06 dBA


TOTAL Leq FROM ALL SOURCES (DAY): 67.59
                           (NIGHT): 61.06
```

```
STAMSON 5.04        SUMMARY REPORT        Date: 31-10-2017 10:29:52
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: blk13ry.te           Time Period: Day/Night 16/8 hours
Description: Block 13, Rear Yard

Road data, segment # 1: Brock Street (day/night)
-----------------------------------------------
Car traffic volume  :  8415/935   veh/TimePeriod  *
Medium truck volume :   297/33    veh/TimePeriod  *
Heavy truck volume  :  1188/132   veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):  11000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   3.00
    Heavy Truck  % of Total Volume     :  12.00
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 1: Brock Street (day/night)
-----------------------------------------------
Angle1   Angle2           : -90.00 deg   57.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  30.00 / 30.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 57.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   7.00 / 7.00   m
Source elevation          :   0.50 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m

Result summary (day)
--------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+----------+----------+----------
 1.Brock Street     !     1.86 !    63.41 !    63.41 *
--------------------+----------+----------+----------
                      Total                   63.41 dBA
  * Bright Zone  !

Barrier table for segment # 1: Brock Street (day)
-------------------------------------------------
Barrier ! Elev of !  Road   ! Tot Leq !
Height  ! Barr Top!  dBA    !   dBA   !
--------+---------+---------+---------+
   1.80 !    1.80 !   58.84 !   58.84 !
   1.90 !    1.90 !   58.76 !   58.76 !
   2.00 !    2.00 !   58.62 !   58.62 !
   2.10 !    2.10 !   58.42 !   58.42 !
   2.20 !    2.20 !   58.18 !   58.18 !
   2.30 !    2.30 !   57.89 !   57.89 !
   2.40 !    2.40 !   57.57 !   57.57 !
   2.50 !    2.50 !   57.24 !   57.24 !
   2.60 !    2.60 !   56.89 !   56.89 !
   2.70 !    2.70 !   56.53 !   56.53 !
```

STAMSON 5.04 SUMMARY REPORT Date: 31-10-2017 10:31:08
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: comerc.te Time Period: Day/Night 16/8 hours
Description: Commercial Building

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

Car traffic volume : 8415/935 veh/TimePeriod *
Medium truck volume : 297/33 veh/TimePeriod *
Heavy truck volume : 1188/132 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
24 hr Traffic Volume (AADT or SADT): 11000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 3.00
Heavy Truck % of Total Volume : 12.00
Day (16 hrs) % of Total Volume : 90.00
Data for Segment # 1: Brock Street (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 28.00 / 28.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Brock Street	1.86	67.59	67.59
Total			67.59 dBA

Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Brock Street	1.86	61.06	61.06
Total			61.06 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 67.59
(NIGHT): 61.06

```
STAMSON 5.04        SUMMARY REPORT        Date: 31-10-2017 10:31:31
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: condo.te             Time Period: Day/Night 16/8 hours
Description: Condominium Building

Road data, segment # 1: Brock Street (day/night)
----------------------------------------------
Car traffic volume  :  8415/935   veh/TimePeriod  *
Medium truck volume :   297/33    veh/TimePeriod  *
Heavy truck volume  :  1188/132   veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):  11000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   3.00
    Heavy Truck  % of Total Volume     :  12.00
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 1: Brock Street (day/night)
----------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  32.00 / 32.00  m
Receiver height           :  10.00 / 10.00  m
Topography                :      1       (Flat/gentle slope; no barrier)

Result summary (day)
--------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Brock Street     !     1.86 !    67.01 !    67.01
--------------------+---------+---------+---------
                      Total                  67.01 dBA

Result summary (night)
----------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Brock Street     !     1.86 !    60.48 !    60.48
--------------------+---------+---------+---------
                      Total                  60.48 dBA


TOTAL Leq FROM ALL SOURCES (DAY): 67.01
                           (NIGHT): 60.48
```

Project: Brock Street Towns
Date: Oct31,17

Receiver Table

Name	ID	Level Lr		Limit. Value		Land Use	Height		Coordinates		
		Day	Night	Day	Night	Type			X	Y	Z
		(dBA)	(dBA)	(dBA)	(dBA)		(m)		(m)	(m)	(m)
R1	R1	42.5	42.5	50	45		10	r	112.64	876.96	10
R2	R2	38.7	35.7	50	45		4.5	r	181.5	928.03	4.5
R3	R3	34.8	32.3	50	45		3	r	147.9	948.94	3
R4	R4	42.4	39.4	50	45		10	r	150.86	869.04	10
R5	R5	47	44	50	45		4.5	r	226.9	861.53	4.5

Source Table

Name	ID	Result. PWL			Lw / Li		Operating Time			K0	Freq.	Direct.	Height		Coordinates		
		Day	Evening	Night	Type	Value	Day	Special	Night						X	Y	Z
		(dBA)	(dBA)	(dBA)			(min)	(min)	(min)	(dB)	(Hz)		(m)		(m)	(m)	(m)
T1	T1	80.3	80.3	80.3	Lw	RTU				0		(none)	1.5	r	94.17	866.02	1.5
T2	T2	77.4	77.4	77.4	Lw	T1				0		(none)	2	r	85.07	880.3	2
RTU1	RTU1	80.3	80.3	80.3	Lw	RTU	720	240	240	0		(none)	1	g	190.36	869.03	6.5
RTU2	RTU2	80.3	80.3	80.3	Lw	RTU	720	240	240	0		(none)	1	g	190.76	864.66	6.5
RTU3	RTU3	73.8	73.8	73.8	Lw	RTU	720	240	240	0		(none)	1	g	190.82	859.34	6.5
RTU4	RTU4	80.3	80.3	80.3	Lw	RTU	720	240	240	0		(none)	1	g	203.2	860.83	6.5
RTU5	RTU5	80.3	80.3	80.3	Lw	RTU	720	240	240	0		(none)	1	g	210.08	860.04	6.5
RTU6	RTU6	80.3	80.3	80.3	Lw	RTU	720	240	240	0		(none)	1	g	216.76	860.59	6.5

Result Table

Receiver		Land Use	Limiting Value		rel. Axis			Lr w/o Noise Control		dL req.	
Name	ID		Day	Night	Station	Distance	Height	Day	Night	Day	Night
			dB(A)	dB(A)	m	m	m	dB(A)	dB(A)	dB(A)	dB(A)
R1	R1		50	45				42.5	42.5	-	-
R2	R2		50	45				38.7	35.7	-	-
R3	R3		50	45				34.8	32.3	-	-
R4	R4		50	45				42.4	39.4	-	-
R5	R5		50	45				47	44	-	-

APPENDIX 4

SOUND LEVEL CRITERIA

MINISTRY OF THE ENVIRONMENT AND CLIMATE CHANGE

ENVIRONMENTAL NOISE GUIDELINE
Stationary and Transportation Sources - Approval and Planning
Publication NPC-300

August 2013

Day-time Outdoor Sound Level Limit

Table C-1 gives the equivalent sound level (L_{eq}) limit for designated Outdoor Living Areas. The limit applies to the entire day-time period from 07:00 to 23:00.

TABLE C-1
Sound Level Limit for Outdoor Living Areas
Road and Rail

Time Period	*L_{eq}(16) (dBA)*
16 hr, 07:00 - 23:00	*55*

Indoor Sound Level Limit

Table C-2 gives the equivalent sound level (L_{eq}) limits and the applicable time periods for the indicated types of indoor space. The specified sound level criteria are minimum requirements and apply to the indicated indoor spaces with the windows and doors closed.

TABLE C- 2
Indoor Sound Level Limits (Road and Rail)

Type of Space	*Time Period*	*L_{eq} (Time Period) (dBA)*	
		Road	*Rail*
Living/dining, den areas of residences, nursing/retirement homes, hospitals, schools, day-care centers, etc.	*07:00-23:00*	*45*	*40*
Living/dining areas of residences, nursing/retirement homes, hospitals, etc. (except schools or daycare centres)	*23:00 - 07:00*	*45*	*40*
Sleeping quarters	*07:00-23:00*	*45*	*40*
Sleeping quarters	*23:00 - 07:00*	*40*	*35*

SUPPLEMENTARY NOISE LIMITS

Indoor limits for transportation sources applicable to noise sensitive land uses are specified in Table C-2 and Table C-9.

TABLE C-9

Indoor Sound Level Limits (Road and Rail)

Type of Space	*Time Period*	*L_{eq} (Time Period) (dBA)*	
		Road	*Rail*
General offices, reception areas, retail stores, etc.	*16 hours between 07:00-23:00*	*50*	*45*
Living/dining areas of residences, hospitals, schools, nursing/retirement, homes day-care centers, theatres, place of worship, libraries, individual or semi-private offices, conference rooms, reading rooms etc.	*16 hours between 07:00-23:00*	*45*	*40*
Sleeping quarters of hotels/motels	*8 hours between 23:00 - 07:00*	*45*	*40*
Sleeping quarters of residences, hospitals, nursing/retirement homes etc	*8 hours between 23:00 - 07:00*	*40*	*35*

SUMMARY OF MINIMUM NOISE CONTROL AND VENTILATION REQUIREMENTS FOR ROAD AND RAIL NOISE

TABLE 1

COMBINATION OF ROAD AND RAIL NOISE, DAY-TIME (0700 - 2300)

OUTDOOR, VENTILATION AND WARNING CLAUSE REQUIREMENTS

ASSESSMENT LOCATION	*L_{eq} (16 hr) (dBA)*	*VENTILATION REQUIREMENTS*	*OUTDOOR CONTROL MEASURES*	*WARNING CLAUSE*
OUTDOOR LIVING AREA (OLA)	*Less than or equal to 55 dBA*	*N/A*	*None required*	*Not required*
	Greater than 55 dBA to less than or equal to 60 dBA	*N/A*	*Control measures (barriers) not required but should be considered*	*Required if resultant L_{eq} exceeds 55 dBA Type A*
	Greater than 60 dBA	*N/A*	*Control measures (barriers) required to reduce the L_{eq} below 60 dBA and as close to 55 dBA as technically, economically and administratively feasible*	*Required if resultant L_{eq} exceeds 55 dBA Type B*
PLANE OF LIVING ROOM WINDOW	*Greater than 50 dBA to less than or equal to 55 dBA*	*None required*	*N/A*	*Not required*
	Greater than 55 dBA to less than or equal to 65 dBA	*Forced air heating with provision for central air conditioning*	*N/A*	*Required Type C*
	Greater than 65 dBA	*Central air conditioning*	*N/A*	*Required Type D*

TABLE 2

COMBINATION OF ROAD AND RAIL NOISE, NIGHT-TIME (2300 - 0700)

VENTILATION AND WARNING CLAUSE REQUIREMENTS

ASSESSMENT LOCATION	*L_{eq}(8hr) (dBA)*	*VENTILATION REQUIREMENTS*	*WARNING CLAUSE*
PLANE OF BEDROOM WINDOW	*Greater than 50 dBA to less or equal to 60 dBA*	*Forced air heating with provision for central air conditioning*	*Required Type C*
	Greater than 60 dBA	*Central air conditioning*	*Required Type D*

TABLE 3
ROAD AND RAIL NOISE, DAY-TIME (0700 - 2300)
BUILDING COMPONENT REQUIREMENTS

ASSESSMENT LOCATION		*L_{eq} (16 hr)*	*BUILDING COMPONENT REQUIREMENTS*
PLANE OF LIVING ROOM WINDOW	*ROAD*	*Less than or equal to 65 dBA*	*Building compliant with the Ontario Building Code*
		Greater than 65 dBA	*Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria*
	RAIL	*Less than or equal to 60 dBA*	*Building compliant with the Ontario Building Code*
		Greater than 60 dBA	*Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria*

TABLE 4
ROAD AND RAIL NOISE, NIGHT-TIME (2300-0700)
BUILDING COMPONENT REQUIREMENTS

ASSESSMENT LOCATION		*L_{eq} (8 hr)*	*BUILDING COMPONENT REQUIREMENTS*
PLANE OF BEDROOM WINDOW	*ROAD*	*Less than or equal to 60 dBA*	*Building compliant with the Ontario Building Code*
		Greater than 65 dBA	*Building components (walls, windows, etc.) must bed designed to achieve indoor sound level criteria*
	RAIL	*Less than or equal to 60 dBA*	*Building compliant with the Ontario Building Code*
		Greater than 60 dBA	*Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria*

TABLE 5
FACADE REQUIREMENT FOR RAIL NOISE ONLY - 24 HOURS

ASSESSMENT LOCATION	*DISTANCE TO RAILWAY (m)*	*L_{eq} (24 hr) (dBA)*	*NOISE CONTROL REQUIREMENT*
PLANE OF BEDROOM WINDOW	*Less than 100 m*	*Less than or equal to 60 dBA*	*No additional requirement*
		Greater than 60 dBA	*Brick veneer or acoustically equivalent*
	Greater than 100 m	*Less than or equal to 60 dBA*	*No additional requirement*
		Greater than 60 dBA	*No additional requirement*

TABLE B- 1
Exclusion Limit Values of One-Hour Equivalent Sound Level (Leq dBA)
Outdoor Points of Reception

Time of Day	*Class 1 Area*	*Class 2 Area*	*Class 3 Area*	*Class 4 Area*
07:00-19:00	*50*	*50*	*45*	*55*
19:00 -23:00	*50*	*45*	*40*	*55*

TABLE B- 2
Exclusion Limit Values of One-Hour Equivalent Sound Level (Leq dBA)
Plane of Window of Noise Sensitive Spaces

Time of Day	*Class 1 Area*	*Class 2 Area*	*Class 3 Area*	*Class 4 Area*
07:00-19:00	*50*	*50*	*45*	*60*
19:00 -23:00	*50*	*50*	*40*	*60*
23:00-07:00	*45*	*45*	*40*	*55*

WARNING CLAUSES

The following warning clauses may be used individually or in combination:

TYPE A:

"Purchasers/tenants are advised that despite the inclusion of noise control features, sound levels due to increasing road traffic, the existing hydro substation and proposed commercial development may occasionally interfere with some activities of the occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of Environment and Climate Change."

TYPE B:

"Purchasers/tenants are advised that despite the inclusion of noise control features , the sound levels due to increasing road traffic, the existing hydro substation and the proposed commercial development may continue to be of concern, occasionally interfering with the activities of the dwelling occupants as the noise levels may exceed the noise criteria of the Municipality and the Ministry of the Environment and Climate Change."

TYPE C:

"This unit was fitted with ducting sized to accommodate a central ventilation system to allow windows and exterior doors to be kept closed, thereby achieving indoor sound levels within the limits recommended by the Ministry of Environment and Climate Change"

TYPE D:

"This unit has been supplied with a central air conditioning system which will allow the 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 Environment and Climate Change."

APPENDIX 5

SAMPLE WINDOW AND EXTERIOR WALL CONFIGURATIONS

WINDOW STC RATINGS

STC	Double Glazing of indicated glass thickness					Triple Glazing	
	2mm and 2mm glass	**3mm and 3mm glass**	**4mm and 4mm glass**	**3mm and 6mm glass**	**6mm and 6mm glass**	**3mm 3mm and 3mm glass**	**3mm 3mm and 6mm glass**
	Interpane Spacing (mm)					Interpane Spacing (mm)	
27	6						
28	13						
29	15	6					
30	18	13	6				
31	22	16	13	6	6	6,6	
32	28	20	16	13	13	6,10	6,6
33	35	25	20	16	16	6,15	6,10
34	42	32	25	20	20	6,20	6,15
35	50	40	32	25	24	6,30	6,20
36	63	50	40	32	30	6,40	6,30
37	80	63	50	40	37	6,50	6,40
38	100	80	63	55	50	6,65	6,50
39	125	100	80	75	70	6,80	6,65
40	150	125	100	95	90	6,100	6,80
41		150	125	110	100		6,100
42			150	135	125		

Source: National Research Council, Division of Building Research

EXPLANATORY NOTES:

1. STC data listed in the table are for the well-fitted weather-stripped units that can be opened. The STC values apply only when the windows are closed. For windows fixed and sealed to the frame, add three to the STC given in the table.

2. If the interpane spacing or glass thickness for a specific double-glazed window is not listed in the table, the nearest listed values should be used.

3. If the interpane spacing for a specific triple-glazed window are not listed in the table, use the listed case whose combined spacing are nearest the actual combined spacing.

4. The STC data listed in the table are for typical windows, but details of glass mounting, window seals, etc., may result in slightly different performance for some manufacturer's products. If the laboratory sound transmission loss data (conforming to ASTM test method E-90) are available, these should be used.

EXTERIOR WALL STC RATINGS

Wall Configuration	EW1	EW2	EW3	EW4	EW1R	EW2R	EW3R	EW5	EW4R	EW6	EW7 EW5R	EW8
STC Rating	**38**	**40**	**43**	**46**	**47**	**48**	**49**	**54**	**55**	**57**	**58**	**62**

Source: National Research Council, Division of Building Research

NOTES:

1 The common structure of walls EW1 to EW5 is composed of 12.7mm gypsum board, vapour barrier and 38x89 mm studs with 50 mm (or thicker) mineral wool or glass fibre batts in inter-stud cavities.

- EW1 denotes the common structure, plus sheathing, plus wood siding or metal siding and fibre backer board
- EW2 denotes the common structure, plus rigid insulation (25 to 30 mm), and wood siding or metal siding and fibre backer board.
- EW3 denotes simulated mansard with the common structure, plus sheathing, 28 X89 mm framing, sheathing and asphalt roofing material
- EW4 denotes the common structure, plus sheathing and 20 mm stucco.
- EW5 denotes the common structure, plus sheathing, 25 mm air space, 100mm brick veneer.
- EW6 denotes exterior wall composed of 12.7 mm gypsum board, rigid insulation (25 to 50 mm), 100 mm back-up block 100 mm face brick.
- EW7 denotes exterior wall composed of 12.7 mm gypsum board, rigid insulation (25 to 50 mm), 140mm back-up block, 100 mm face brick.
- EW8 denotes exterior wall composed of 12.7 mm gypsum board, rigid insulation (25 to 50 mm), 200 mm concrete.

2 R signifies the mounting of the interior gypsum board on resilient clips.

3 An exterior wall conforming to rainscreen design principles and composed of 12.7 mm gypsum board, 100 mm concrete block, rigid insulation (25 to 50 mm), 25 mm air space, and 100 mm brick veneer has the same STC as EW6.

4 An exterior wall described in EW1 with the addition of rigid insulation (25 to 50 mm) between the sheathing and the external finish has the same STC as EW2.