YCA engineering Limited

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# ENVIRONMENTAL NOISE ASSESSMENT

DRAFT PLAN OF SUBDIVISION
620 LOCKHART ROAD
CITY OF BARRIE

PREPARED FOR:

MATTAMY (LOCKHART) LIMITED

July 2021
Y2118

## EXECUTIVE SUMMARY

The proposed residential development is located north of Lockhart Road at approximately 580m west of Yonge Street in the City of Barrie.

The July 2021 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 City of Barrie and the Ministry of Environment.

The transportation noise sources having the potential to affect the living environment within the proposed development area include Lockhart Road and the future Collector Roads. The ultimate traffic volumes on these noise sources are 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 1 in this report.

Recommended noise abatement measures are described in Sections 5.1, 5.2, 5.3 and 5.4 and summarized in Table 6 of this report and on the attached Figure 2. These measures include:

1. Mandatory air conditioning is required for Lots 165, 191, Blocks 351, 352, 353, 369, 375 and 376 (South Unit).

2. Provision for adding air conditioning in the future is required for Lots 1, 16, 42, 43, 68, 69, 97, 98, 128, 129, 145 to 164, 166 to 186, 192 to 196, 214, 232, 261, 289 to 294, 347, and partial lots along Streets 'B' and 'C', Blocks 350, 357, 363, 364, 372 (All Units), Blocks 351, 352, 353, 369, 375, 376 (Remaining Units), Block 348, 366 (North Unit), Block 356 (South Unit), Block 365 (East Unit).

3. For Lots 165, 191 and Blocks 351, 369 (South Unit) flanking onto Lockhart Road, a 2.6m high acoustic barrier (fence and berm combination) is required along the side properties returning to the side wall of the houses and the rear property lines of Lot 191 and Block 351 (South Unit) as shown on Figures 2 to achieve a sound level of 59 dBA or less.

   For Lots 192, 193 and Block 351 (Remaining Units), a 2.1m high acoustic fence is required along the rear property lines as shown on the attached Figure 2 to achieve sound level of 59 dBA or less.

   For Blocks 352, 353 (South Unit), a 2.1m high acoustic barrier (fence and berm combination) is required along the side property returning to the side wall of the house as shown on the attached Figure 2 to achieve a sound level of 59 dBA or less.

   For Lot 16, a 1.8m high acoustic fence is required along the side property returning to the side wall of the house as shown on the attached Figure 2 to achieve a sound level of 55 dBA or less.

4. The windows and exterior wall constructions for the residential units adjacent to Lockhart Road need to be slightly upgraded. For other residential units standard OBC windows and exterior walls are sufficient for all residential units to meet the indoor sound levels. See Table 6 for details.

5. It is recommended that the acoustic barrier heights and locations to be reviewed once the detailed grading plans are available.

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

7. Prior to construction of the buildings and dwelling units, it is recommended that the architectural plans to be reviewed to ensure all building components, ducting systems and air conditioning locations meet the acoustical requirements.

8. Prior to the issuance of occupancy permits, the City's building inspector or a Professional Engineer qualified to perform acoustical engineering services in Ontario shall certify that the noise control measures have been properly installed and constructed.

## TABLE OF CONTENTS

**PAGE**

## 1.0 INTRODUCTION

PURPOSE

A residential development has been proposed by Mattamy (Lockhart) Limited in the City of Barrie. This report is an analysis of future sound levels within the proposed development and describes the types and locations of noise mitigation measures which will be required.

SITE DESCRIPTION AND LOCATION

The development will consist of residential townhouse units located north of Lockhart Road at approximately 580m west of Yonge Street in the City of Barrie.

The surrounding land uses are existing and proposed residential developments to the north, east, south and an existing commercial development.

KEY PLAN

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

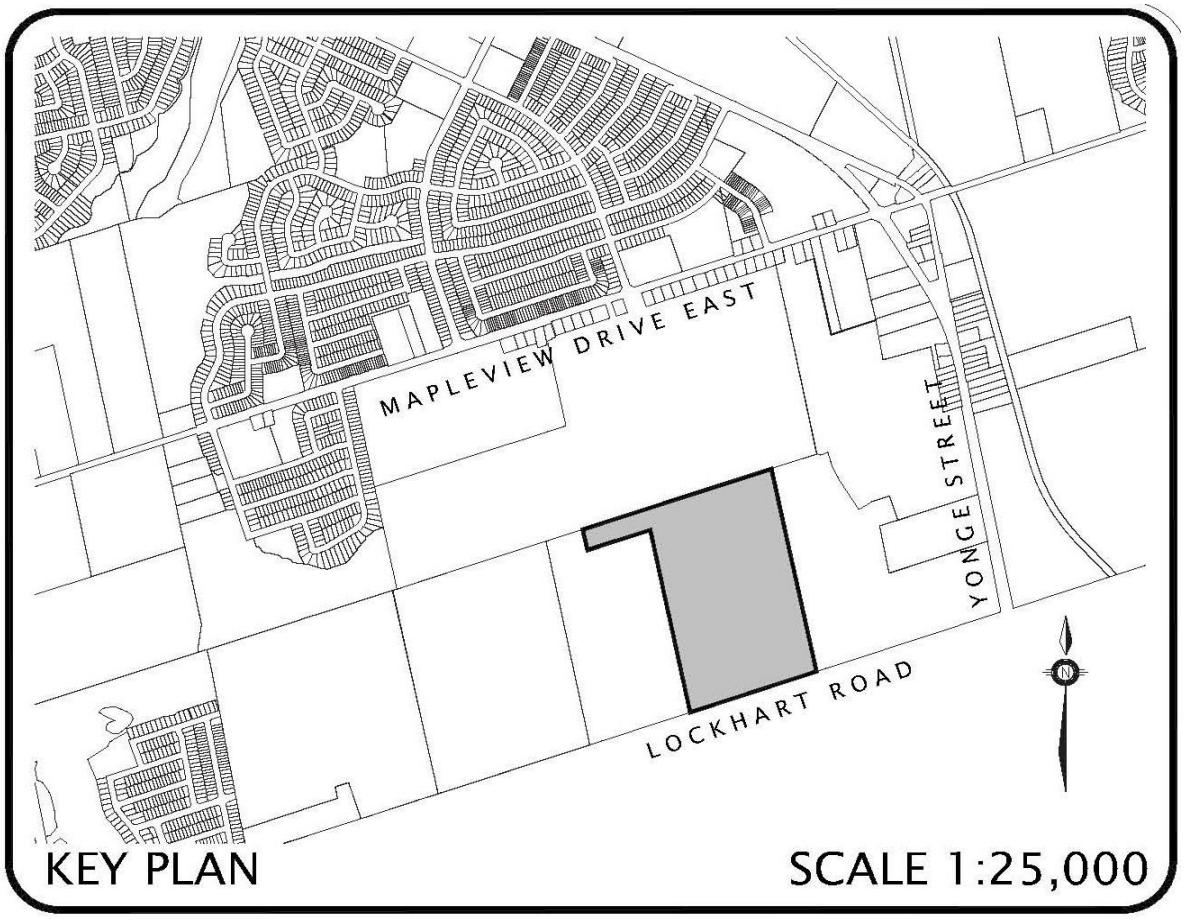


**FIGURE 1**

## 2.0 SOUND LEVEL CRITERIA

TRANSPORTATION:

The sound level descriptor ($L_{eq}$ in dBA) are for 16 hours (daytime) and 8 hours (night-time) based on MECP Guideline NPC-300.

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.

Living and Dining Area and Bedroom (7 a.m.–11 p.m.) = 45 dBA Roads, 40 dBA Railways
Living and Dining Area (11 p.m.–7 a.m.) = 45 dBA Roads, 40 dBA Railways
Bedrooms (11 p.m. – 7 a.m.) = 40 dBA Roads, 35 dBA Railways

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 MECP guidelines (Publication NPC-300), this area is considered to be a Class 1 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 (0700-1900) or 50 dBA during evening-time (1900-2300).

## 3.0 NOISE SOURCES

ROAD TRAFFIC

As indicated on the attached Figure 2, the proposed residential development will be located north of Lockhart Road and approximately 580m west of Yonge Street in the City of Barrie. Future Collector Roads are proposed within the development. Noise generated by Lockhart Road and the Future Collector Roads have 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 Lockhart Road was obtained from the City of Barrie dated June 2021 and projected to the year 2041. The traffic data obtained is summarized in Table 1 below:

| **TABLE 1: LOCKHART ROAD TRAFFIC DATA** | |
|---|---|
| Projected Annual Average Daily Traffic* | 25,000 |
| Percent Trucks | 7% |
| Medium and Heavy trucks ratio | 50/50 |
| Speed (km/hr) | 60 |
| Future Number of Lanes | 5 |
| Day/Night Traffic split | 90/10 |

* The forecasted traffic data provided by the City of Barrie projected to the year 2041.

Traffic volume information for the future Collector Road Street 'A' was obtained from the Traffic Study prepared by JD Northcote Engineering Inc. dated June 2021. The Future Collector Roads traffic volume for Street 'B' and Street 'C' were not available at this time, therefore the traffic volume for these Future Collector Roads were assumed for noise analysis purposes to be the same as similar type of roads and projected to the year 2041.

The traffic data for all the Future Collector Roads are summarized in Tables 2 to 4 below.

| **TABLE 2: COLLECTOR ROAD STREET 'A' TRAFFIC DATA** | |
|---|---|
| Projected Annual Average Daily Traffic** | 6,000 |
| Percent Trucks | 5% |
| Medium and Heavy trucks ratio | 50/50 |
| Speed (km/hr) | 50 |
| Number of Lanes | 2 |

| **TABLE 3: COLLECTOR ROAD STREET 'B' TRAFFIC DATA** | |
|---|---|
| Projected Annual Average Daily Traffic** | 8,000 |
| Percent Trucks | 5% |
| Medium and Heavy trucks ratio | 50/50 |
| Speed (km/hr) | 50 |
| Number of Lanes | 2 |

| TABLE 4: COLLECTOR ROAD STREET 'C' TRAFFIC DATA | |
|---|---|
| Projected Annual Average Daily Traffic** | 4,000 |
| Percent Trucks | 5% |
| Medium and Heavy trucks ratio | 50/50 |
| Speed (km/hr) | 50 |
| Number of Lanes | 2 |

** Traffic volume projected to the year 2041.

RAIL TRAFFIC

A railway is located to the east at approximately 750m from the proposed residential development. Due to distance separation, the noise impact from the railway is considered acoustically insignificant.

STATIONARY NOISE SOURCES

The proposed development is not impacted by stationary noise sources of concern.

## 4.0 NOISE ASSESSMENT

Figure 2 is based on the latest Draft Plan of Subdivision dated July 2021 prepared by Jones Consulting Group Lt. 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 3. Table 5 lists the unattenuated sound levels at various locations.

**TABLE 5: UNATTENUATED SOUND LEVELS**

| LOCATIONS | | DISTANCE TO CENTRELINE OF ROAD (m) | OUTDOOR LIVING AREA (16 hr) Leq dBA | DAYTIME (16 hr) Leq dBA | NIGHT-TIME (8 hr) Leq dBA |
|---|---|---|---|---|---|
| Lot 1 | Side Wall | 15.0[1] | - | 61.22 | 54.85 |
| | Rear Yard | 17.0[1] | 59.64 | - | - |
| Lot 16 | Side Wall | 17.0[2] | - | 61.61 | 55.29 |
| | Rear Yard | 19.0[2] | 60.09 | - | - |
| Lot 149 | Front Wall | 17.0[3] | - | 58.60 | 52.28 |
| | Rear Yard | 32.0[3] | <55 | - | - |
| Lot 160 | Side Wall | 15.0[1] | | 61.22 | 54.85 |
| | | 17.0[3] | - | 55.59 (62.27) | 49.27 (55.91) |
| | Rear Yard | 17.0[1] | 59.40 | | |
| | | 32.0[3] | 47.36 (59.66) | - | - |
| Lot 164 | Side Wall | 16.0[1] | | 60.78 | 54.43 |
| | | 88.0[4] | - | 56.21 (62.08) | 50.55 (55.92) |
| | Rear Yard | 30.0[1] | 49.59 | | |
| | | 90.0[4] | 57.09 (57.80) | - | - |
| Lot 165 | Side Wall | 16.0[1] | | 57.76 | 51.42 |
| | | 22.0[4] | - | 68.70 (69.04) | 62.49 (62.82) |
| | Rear Yard | 30.0[1] | 49.87 | | |
| | | 24.0[4] | 67.01 (67.09) | - | - |
| Lot 186 | Front Wall | 16.0[1] | | 60.78 | 54.43 |
| | | 15.0[3] | - | 56.45 (62.14) | 50.08 55.79) |
| | Rear Yard | 32.0[1] | 49.12 | | |
| | | 17.0[3] | 57.80 (58.35) | - | - |
| Lot 191 | Side Wall | 24.0[4] | - | 66.78 | 60.62 |
| | Rear Yard | 26.0[4] | 65.35 | - | - |
| Lot 192 | Rear Wall | 34.0[4] | - | 62.00 | 55.95 |
| | Rear Yard | 36.0[4] | 61.04 | - | - |
| Block 350 | Rear Wall | 66.0[4] | - | 58.90 | 52.39 |
| | Rear Yard | 68.0[4] | 58.73 | - | - |
| Block 351 | Side Wall | 18.0[4] | - | 68.75 | 62.47 |
| | Rear Yard | 20.0[4] | 67.24 | - | - |
| Block 352 | Side Wall | 34.0[4] | - | 65.75 | 59.23 |
| | Rear Yard | 36.0[4] | 64.56 | - | - |

[1] Future Collector Road (Street 'A')
[2] Future Collector Road (Street 'B')
[3] Future Collector Road (Street 'C')
[4] Lockhart Road

# 5.0 RECOMMENDED NOISE MITIGATION MEASURES

## 5.1 OUTDOOR MEASURES

Table 5 indicates that daytime rear yard sound level at the following locations will be above 60dBA in the absence of mitigative measures. Therefore, outdoor noise mitigation measure is required for:

- Lots 16, 165, 191, 192, 193
- Block 351 (All Units), Blocks 352, 353, 369 (South Unit)

The daytime rear yard sound level at the following locations are expected to be between 55dBA 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:

- Lots 1, 42, 43, 68, 69, 97, 98, 128, 129, 160, 186, 194 to 196,
- Lots 214, 232, 261, 294, 347;
- Blocks 347, 365 (North Unit), Blocks 361, 364 (East Unit)
- Block 350 (All Units)

For Blocks 375 and 376 (Back to Back units), the outdoor amenity areas are the balconies above garages. As per the MECP guidelines, Terraces and Balconies less than 4m in depth are not considered to be outdoor amenity areas which would require noise mitigation measures.

NOISE BARRIERS

In accordance with M.E.C.P, mitigative measure is required for Lots 165, 191, 192, 193, Block 351 (All Units) and Blocks 352, 353, 369 (South Unit) to reduce the sound levels close to 55 dBA.

For Lots 165, 191 and Blocks 351, 369 (South Unit) flanking onto Lockhart Road, a 2.6m high acoustic barrier (fence and berm combination) is required along the side properties returning to the side wall of the houses and the rear property lines of Lot 191 and Block 351 (South Unit) as shown on Figures 2 to achieve a sound level of 59 dBA or less.

For Lots 192, 193 and Blocks 351 (Remaining Units), a 2.1m high acoustic fence is required along the rear property lines as shown on the attached Figure 2 to achieve sound level of 59 dBA or less.

For Block 352, 353 (South Unit), a 2.1m high acoustic barrier (fence and berm combination) is required along the side property returning to the side wall of the house as shown on the attached Figure 2 to achieve a sound level of 59 dBA or less.

For Lot 16, a 1.8m high acoustic fence is required along the side property returning to the side wall of the house as shown on the attached Figure 2 to achieve a sound level of 55 dBA or less.

It is recommended that the acoustic barrier heights and locations to be reviewed once the detailed grading plans are available.

The recommended barriers should be constructed of a material, which provides a minimum surface density of 20 kg per square meter. In accordance with MECP. policy, minimized and localized gaps (25mm maximum) at fence bottoms may be used to accommodate surface drainage, if necessary.

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 following locations. The clause should state:

- Lots 16, 165, 191, 192, 193
- Block 351 (All Units), Blocks 352, 353, 369 (South Unit)

Warning Clause No. B

*"Purchasers/tenants are advised that despite the inclusion of noise control features , the sound levels due to increasing road traffic 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."*

## 5.2 VENTILATION REQUIREMENTS

Ventilation requirements were determined using the sound levels at the building facades listed in Table 5 due to road traffic noise sources.

MANDATORY AIR CONDITIONERS

Based on the information in Table 5, 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:

- Lots 165, 191
- Blocks 351, 352, 353, 369, 375 and 376 (South Unit)

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 locations:

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. (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)."*

PROVISION FOR AIR CONDITIONERS

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.

- Lots 1, 16, 42, 43, 68, 69, 97, 98, 128, 129, 145 to 164, 166 to 186, 192 to 196
- Lots 214, 232, 261, 289 to 294, 347 and partial lots along Streets 'B' and 'C'
- Blocks 350, 357, 363, 364, 372 (All Units)
- Blocks 351, 352, 353, 369, 375, 376 (Remaining Units)
- Blocks 348, 366 (North Unit), Block 356 (South Unit), Block 365 (East Unit)

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 Blocks/Units:

Warning Clause Type C:

*"This dwelling unit was fitted with ducting sized to accommodate a central air conditioning unit. The installation of central air conditioning by the homeowner will allow windows and exterior doors to be kept closed, thereby achieving indoor sound levels within the limits recommended by the Ministry of Environment. (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 central air conditioning units must not exceed the sound emission standards established by the Ministry of Environment)."*

## 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. Detailed floor plans of the proposed dwelling units are required in order to best determine the required building components. Although this information is not yet available for the proposed development, the result is based on the assumption that a living, dining or recreation room is located at the side of the house closest to the roadway and contains three components (two exterior walls and a set of windows). The windows are assumed to be 25% of the floor area and the same side exterior walls are assumed to be 80% of the floor area.

DAYTIME SOUND LEVELS

For the worst case location during daytime, (Lot 165) a daytime sound level of 69 dBA was calculated due to road traffic. To ensure acceptable daytime indoor sound levels, the building components must provide an STC rating of 32 for windows, STC 39 for exterior wall construction.

NIGHT-TIME SOUND LEVELS

For the worst case location during night-time, (Lot 165) night-time sound level of 63 dBA was calculated. To ensure acceptable nighttime indoor sound levels of 40dBA from road

noise sources, the building components must provide an STC rating of 29 for windows, STC 36 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, the windows and exterior wall constructions for the residential units adjacent to Lockhart Road need to be slightly upgraded. For other residential units standard OBC windows and exterior walls are sufficient for all residential units to meet the indoor sound levels. See Table 6 for details.

WINDOWS

The following are some window configurations meeting an STC rating of 32, assuming the ratio of window area to room floor area is 25%:

- double glazing 4mm x 4mm thickness with 16mm air space (Sliders) or
- double glazing 3mm x 3mm thickness with 13mm air space (Casement or fixed) or
- any other window type yielding a similar or greater STC rating

EXTERIOR WALLS

The following exterior wall constructions EW5 meet the STC 39 rating, assuming a ratio of wall area to room floor area of 80%:

EW5 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 brick veneer.

Sample window and exterior wall configurations are included in Appendix 4 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 Blocks/Lots noted below.

- Lots 1, 16, 42, 43, 68, 69, 97, 98, 128, 129, 145 to 164, 166 to 186, 191 to 196
- Lots 214, 232, 261, 289 to 294, 347 and partial lots along Streets 'B' and 'C'
- Blocks 350, 351, 352, 353, 357, 363, 364, 369, 372, 375, 376 (All Units)
- Blocks 348, 366 (North Unit), Block 356 (South Unit), Block 365 (East Unit)

Warning Clause Type A

*"Occupants are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the occupants as the sound level will exceed the Ministry of Environment's noise criteria."*

## 6.0 SUMMARY OF NOISE MITIGATION MEASURES

The summary of noise abatement measures are listed in the following Table 6 identifying ventilation requirements, building components and warning clauses.

**TABLE 6: SUMMARY OF NOISE MITIGATION MEASURES**

| LOCATIONS/UNITS | VENTILATION REQUIREMENTS | BUILDING COMPONENTS | SOUND BARRIERS | WARNING CLAUSES |
|---|---|---|---|---|
| Lots 165, 191<br>Blocks 351, 369 (South Unit) | Mandatory air conditioning | Windows: STC 32<br>Walls: STC 39 | 2.6m[2] | Type A, B D |
| Blocks 352, 353 (South Unit) | Mandatory air conditioning | Windows: STC 30<br>Walls: STC 37 | 2.1m[3] | Type A, B, D |
| Lots 192, 193<br>Block 351 (Remaining Units) | Provision for air conditioning | Windows: OBC [1]<br>Walls: OBC | 2.1m[4] | Type A, B, C |
| Blocks 375 and 376 (South Unit) | Mandatory air conditioning | Windows: OBC<br>Walls: OBC | No | Type A, D |
| Lot 16 | Provision for air conditioning | Windows: OBC<br>Walls: OBC | 1.8m[5] | Type A, B, C |
| Lots 1, 42, 43, 68, 69, 97, 98, 128, 129, 145 to 164, 166 to 186, 194 to 196, 214, 232, 261, 289 to 294, 347 and partial lots along Streets 'B' and 'C'<br>Blocks 350, 357, 363, 364, 372 (All Units)<br>Blocks 351, 352, 353, 369, 375, 376 (Remaining Units)<br>Blocks 348, 366 (North Unit), Block 356 (South Unit), Block 365 (East Unit) | Provision for air conditioning | Windows: OBC<br>Walls: OBC | No | Type A, C |
| All remaining lots/blocks | No Requirements | | | |

1 Standard Ontario Building construction.
2 2.6m high acoustic barrier (fence and berm combination) at the side property.
3 2.1m high acoustic barrier (fence and berm combination) at the side property.
4 2.1m high acoustic barrier (fence and berm combination) at the rear property.
5 1.8m high acoustic fence at the side property.

## 7.0 RECOMMENDATIONS AND CONCLUSION

RECOMMENDATIONS

1. Mandatory air conditioning is required for Lots 165, 191, Blocks 351, 352, 353, 369, 375 and 376 (South Unit).

2. Provision for adding air conditioning in the future is required for Lots 1, 16, 42, 43, 68, 69, 97, 98, 128, 129, 145 to 164, 166 to 186, 192 to 196, 214, 232, 261, 289 to 294, 347 and partial lots along Streets 'B' and 'C', Blocks 350, 357, 363, 364, 372 (All Units), Blocks 351, 352, 353, 369, 375, 376 (Remaining Units), Blocks 348, 366 (North Unit), Block 356 (South Unit), Block 365 (East Unit).

3. For Lots 165, 191 and Blocks 351, 369 (South Unit) flanking onto Lockhart Road, a 2.6m high acoustic barrier (fence and berm combination) is required along the side properties returning to the side wall of the houses and the rear property lines of Lot 191 and Block 351 (South Unit) as shown on Figures 2 to achieve a sound level of 59 dBA or less.

   For Lots 192, 193 and Block 351 (Remaining Units), a 2.1m high acoustic fence is required along the rear property lines as shown on the attached Figure 2 to achieve sound level of 59 dBA or less.

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   For Lot 16, a 1.8m high acoustic fence is required along the side property returning to the side wall of the house as shown on the attached Figure 2 to achieve a sound level of 55 dBA or less.

4. The windows and exterior wall constructions for the residential units adjacent to Lockhart Road need to be slightly upgraded. For other residential units standard OBC windows and exterior walls are sufficient for all residential units to meet the indoor sound levels. See Table 6 for details.

5. It is recommended that the acoustic barrier heights and locations to be reviewed once the detailed grading plans are available.

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

7. Prior to construction of the buildings and dwelling units, it is recommended that the architectural plans to be reviewed to ensure all building components, ducting systems and air conditioning locations meet the acoustical requirements.

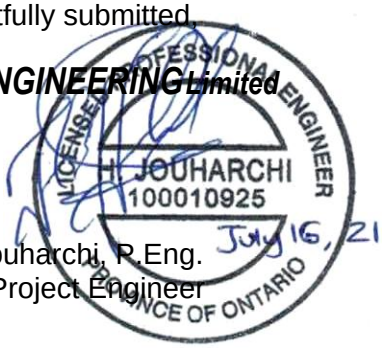
8. Prior to the issuance of occupancy permits, the City's building inspector or a Professional Engineer qualified to perform acoustical engineering services in Ontario shall certify that the noise control measures have been properly installed and constructed.

CONCLUSION

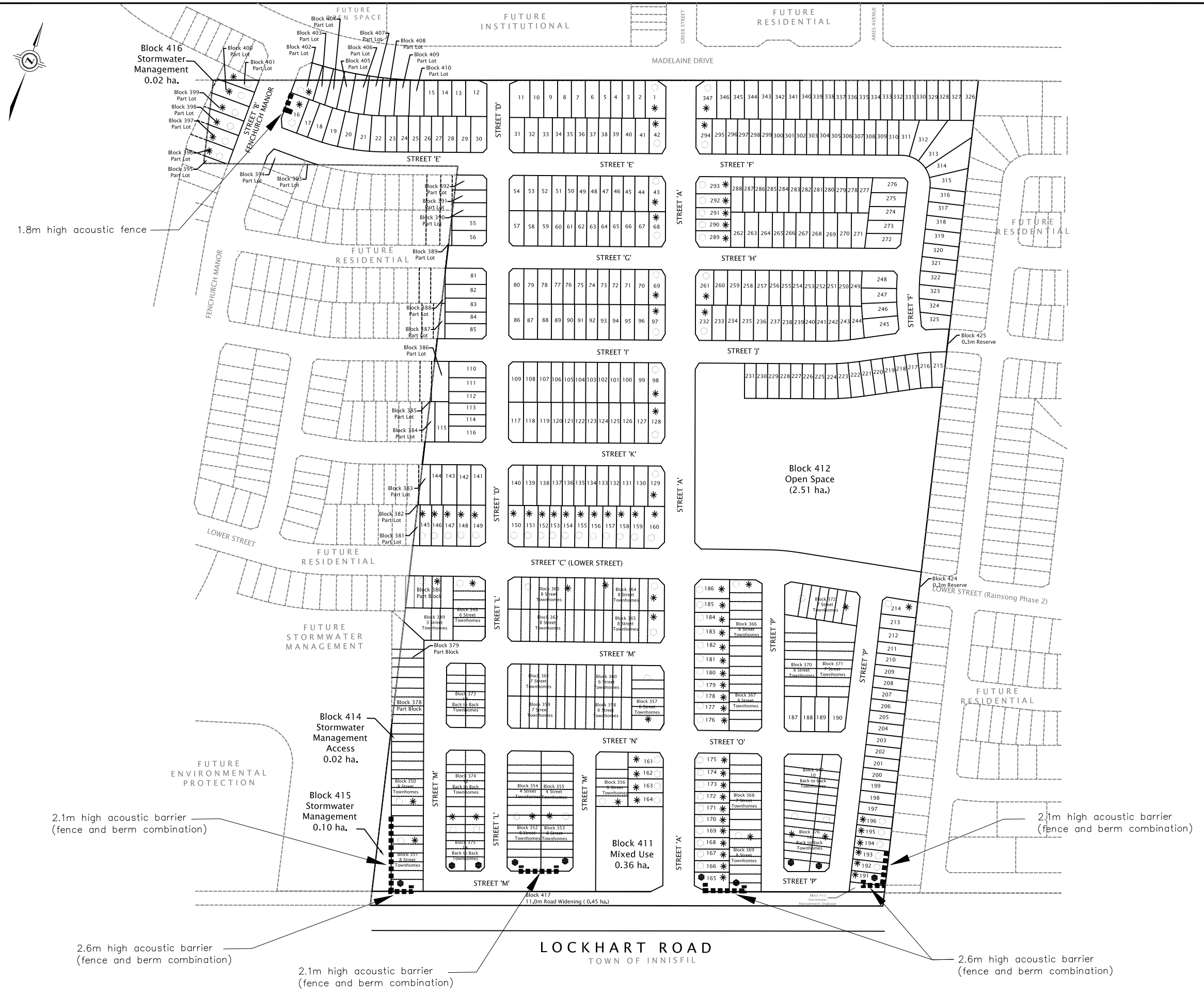
This report has determined that sound levels acceptable to the Ministry of Environment and City of Barrie are expected to be achieved using the abatement measures in this report and as shown on the attached Figure 2.

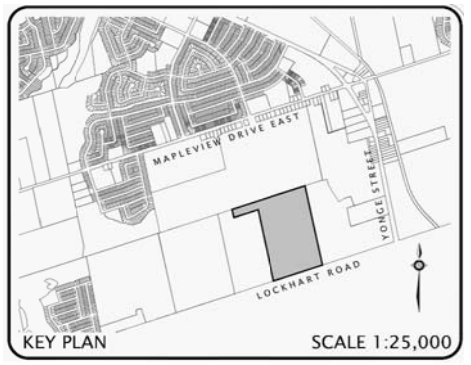
Respectfully submitted,

***YCA ENGINEERING Limited***




Hava Jouharchi, P.Eng.
Senior Project Engineer




LEGEND:

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

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# PLAN OF SUBDIVISION NOISE MITIGATION MEASURES

PROPOSED RESIDENTIAL DEVELOPMENT

620 LOCKHART ROAD

CITY OF BARRIE

FIGURE 2

Scale: NTS

DATE: JULY 2021

# APPENDIX 1

# TRAFFIC DATA

**From:** Justin MacDonald [Justin.MacDonald@barrie.ca]
**Sent:** Monday, June 7, 2021 4:01 PM
**To:** Hava Jouharchi
**Subject:** RE: Traffic Data Request, Barrier (May28,21)

Good afternoon Hava,

Please see below for the requested data.

Current ADT – 4,800 vehicles per day (2017). 10.5%/year to a horizon year of 2031. 2.6%/year from 2031 to 2041.
Percentage of Trucks – 7%
Heavy to medium split - N/A
Posted Speed – 60km/h
Number of Lanes – Current 2 lanes – Future proposed 5 lane cross section.

Thanks,

Justin MacDonald.
Transportation Technologist
(705) 739-4220 (705) 739-4220 ext. 5178

**From:** Hava Jouharchi <hava@ycaengineering.com>
**Sent:** Friday, May 28, 2021 3:16 PM
**To:** Justin MacDonald <Justin.MacDonald@barrie.ca>
**Subject:** Traffic Data Request, Barrier (May28,21)

Good Afternoon Justin,
I am working on a noise study in the City of Barrie and I need the traffic data for Lockhart Road.
Key Plan of Location is attached.

Could you please provide the following traffic data for Lockhart Road (west Yonge Street) at your earliest convenience:

. Ultimate/Forecasted traffic volume
. Percentage of trucks
. Heavy to medium truck ratio
. Posted Speed
. Number of lanes

Thanks in advance
Hava

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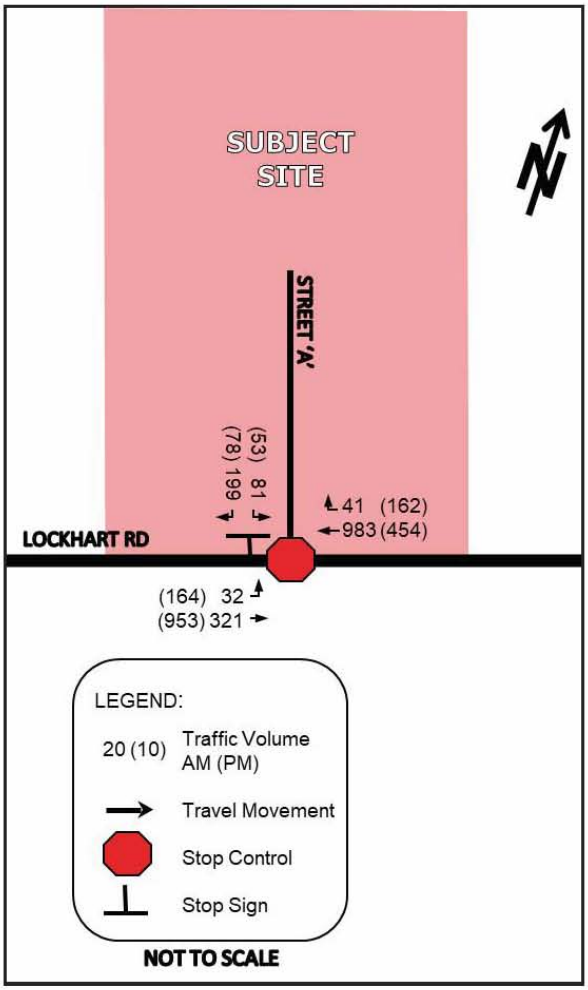
**Figure 15 – Total (2034) Traffic Volumes**



# APPENDIX 2

# STAMSON 5.04
# SOUND LEVEL CALCULATIONS

```
STAMSON 5.0        SUMMARY REPORT        Date: 29-06-2021 10:20:34
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: 1sw.te               Time Period: Day/Night 16/8 hours
Description: Lot 1, Side Wall

Road data, segment # 1: Street A (day/night)
----------------------------------------------
Car traffic volume  :  5130/570   veh/TimePeriod  *
Medium truck volume :   135/15    veh/TimePeriod  *
Heavy truck volume  :   135/15    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):   6000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   2.50
    Heavy Truck  % of Total Volume     :   2.50
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 1: Street A (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  :  15.00 / 15.00  m
Receiver height           :   4.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)

Result summary (day)
--------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Street A         !     1.26 !    61.22 !    61.22
--------------------+---------+---------+---------
                      Total                  61.22 dBA

Result summary (night)
----------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Street A         !     1.26 !    54.85 !    54.85
--------------------+---------+---------+---------
                      Total                  54.85 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 61.22
                           (NIGHT): 54.85
```

```
STAMSON 5.0        SUMMARY REPORT        Date: 29-06-2021 10:20:49
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: 16sw.te              Time Period: Day/Night 16/8 hours
Description: Lot 16, Side Wall

Road data, segment # 1: Street B (day/night)
----------------------------------------------
Car traffic volume  :  6840/760   veh/TimePeriod  *
Medium truck volume :   180/20    veh/TimePeriod  *
Heavy truck volume  :   180/20    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):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   2.50
    Heavy Truck  % of Total Volume     :   2.50
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 1: Street B (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  :  17.00 / 17.00  m
Receiver height           :   4.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)

Result summary (day)
--------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Street B         !     1.26 !    61.61 !    61.61
--------------------+---------+---------+---------
                      Total                  61.61 dBA

Result summary (night)
----------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Street B         !     1.26 !    55.29 !    55.29
--------------------+---------+---------+---------
                      Total                  55.29 dBA


TOTAL Leq FROM ALL SOURCES (DAY): 61.61
                           (NIGHT): 55.29
```

STAMSON 5.0 SUMMARY REPORT Date: 29-06-2021 16:13:04
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: 16ry.te Time Period: Day/Night 16/8 hours
Description: Lot 16, **Rear Yard**

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

```
Car traffic volume  :  6840/760   veh/TimePeriod  *
Medium truck volume :   180/20    veh/TimePeriod  *
Heavy truck volume  :   180/20    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):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   2.50
    Heavy Truck  % of Total Volume     :   2.50
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 1: Street B (day/night)
Angle1   Angle2           : -55.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  19.00 / 19.00  m
Receiver height           :   1.50 / 7.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -55.00 deg   Angle2 : 90.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   4.50 / 4.50   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Result summary (day)
```

| | source height (m) | Road Leq (dBA) | Total Leq (dBA) |
|---|---|---|---|
| 1.Street B | 1.26 | 60.09 | 60.09 * |
| Total | | | 60.09 dBA |

* Bright Zone !

Barrier table for segment # 1: Street B (day)

| Barrier Height | Elev of Barr Top! | Road dBA | Tot Leq dBA |
|---|---|---|---|
| 1.80 | 1.80 | 54.66 | 54.66 |

```
STAMSON 5.0        SUMMARY REPORT        Date: 29-06-2021 10:21:26
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: 159sw.te             Time Period: Day/Night 16/8 hours
Description: Lot 160, Side Wall

Road data, segment # 1: Street A (day/night)
----------------------------------------------
Car traffic volume  :  5130/570   veh/TimePeriod  *
Medium truck volume :   135/15    veh/TimePeriod  *
Heavy truck volume  :   135/15    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):   6000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   2.50
    Heavy Truck  % of Total Volume     :   2.50
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 1: Street A (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  :  15.00 / 15.00  m
Receiver height           :   4.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Road data, segment # 2: Street C (day/night)
----------------------------------------------
Car traffic volume  :  3420/380   veh/TimePeriod  *
Medium truck volume :    90/10    veh/TimePeriod  *
Heavy truck volume  :    90/10    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):   4000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   2.50
    Heavy Truck  % of Total Volume     :   2.50
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 2: Street C (day/night)
----------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  17.00 / 17.00  m
Receiver height           :   4.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Result summary (day)
--------------------
                   !  source  !   Road   !  Total
                   !  height  !   Leq    !   Leq
                   !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Street A        !     1.26 !    61.22 !    61.22
 2.Street C        !     1.26 !    55.59 !    55.59
--------------------+---------+---------+---------
                     Total                  62.27 dBA
Result summary (night)
----------------------
                   !  source  !   Road   !  Total
                   !  height  !   Leq    !   Leq
                   !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Street A        !     1.26 !    54.85 !    54.85
 2.Street C        !     1.26 !    49.27 !    49.27
--------------------+---------+---------+---------
                     Total                  55.91 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 62.27
                           (NIGHT): 55.91
```

```
STAMSON 5.0        SUMMARY REPORT        Date: 29-06-2021 10:21:49
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: 164sw.te             Time Period: Day/Night 16/8 hours
Description: Lot 165, Side Wall

Road data, segment # 1: Street A (day/night)
----------------------------------------------
Car traffic volume  :  5130/570   veh/TimePeriod  *
Medium truck volume :   135/15    veh/TimePeriod  *
Heavy truck volume  :   135/15    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):   6000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   2.50
    Heavy Truck  % of Total Volume     :   2.50
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 1: Street A (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  16.00 / 16.00  m
Receiver height           :   4.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Road data, segment # 2: Lockhart Rd (day/night)
-----------------------------------------------
Car traffic volume  : 20925/2325  veh/TimePeriod  *
Medium truck volume :   788/88    veh/TimePeriod  *
Heavy truck volume  :   788/88    veh/TimePeriod  *
Posted speed limit  :    70 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):  25000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   3.50
    Heavy Truck  % of Total Volume     :   3.50
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 2: Lockhart Rd (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  :  22.00 / 22.00  m
Receiver height           :   4.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Result summary (day)
--------------------
                   !  source  !   Road   !  Total
                   !  height  !   Leq    !   Leq
                   !   (m)    !  (dBA)   !  (dBA)
-------------------+---------+---------+---------
 1.Street A        !     1.26 !    57.76 !    57.76
 2.Lockhart Rd     !     1.37 !    68.70 !    68.70
-------------------+---------+---------+---------
                     Total                  69.04 dBA
Result summary (night)
----------------------
                   !  source  !   Road   !  Total
                   !  height  !   Leq    !   Leq
                   !   (m)    !  (dBA)   !  (dBA)
-------------------+---------+---------+---------
 1.Street A        !     1.26 !    51.42 !    51.42
 2.Lockhart Rd     !     1.37 !    62.49 !    62.49
-------------------+---------+---------+---------
                     Total                  62.82 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 69.04
                           (NIGHT): 62.82
```

```
STAMSON 5.0        SUMMARY REPORT        Date: 29-06-2021 10:22:24
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: 190sw.te             Time Period: Day/Night 16/8 hours
Description: Lot 191, Side Wall

Road data, segment # 1: Lockhart Rd (day/night)
----------------------------------------------
Car traffic volume  : 20925/2325  veh/TimePeriod  *
Medium truck volume :   788/88    veh/TimePeriod  *
Heavy truck volume  :   788/88    veh/TimePeriod  *
Posted speed limit  :    60 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):  25000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   3.50
    Heavy Truck  % of Total Volume     :   3.50
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 1: Lockhart Rd (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  :  24.00 / 24.00  m
Receiver height           :   4.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Result summary (day)
--------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Lockhart Rd      !     1.37 !    66.78 !    66.78
--------------------+---------+---------+---------
                      Total                 66.78 dBA

Result summary (night)
----------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Lockhart Rd      !     1.37 !    60.62 !    60.62
--------------------+---------+---------+---------
                      Total                 60.62 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.78
                           (NIGHT): 60.62
```

```
STAMSON 5.0        SUMMARY REPORT        Date: 29-06-2021 10:23:25
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: 190ry.te             Time Period: Day/Night 16/8 hours
Description: Lot 191, Rear Yard

Road data, segment # 1: Lockhart Rd (day/night)
----------------------------------------------
Car traffic volume  : 20925/2325  veh/TimePeriod  *
Medium truck volume :   788/88    veh/TimePeriod  *
Heavy truck volume  :   788/88    veh/TimePeriod  *
Posted speed limit  :    60 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):  25000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   3.50
    Heavy Truck  % of Total Volume     :   3.50
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 1: Lockhart Rd (day/night)
----------------------------------------------
Angle1   Angle2           : -90.00 deg   55.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  26.00 / 26.00  m
Receiver height           :   1.50 / 7.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 55.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   4.50 / 4.50   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m

Result summary (day)
--------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+----------+----------+----------
 1.Lockhart Rd      !     1.37 !    65.35 !    65.35 *
--------------------+----------+----------+----------
                      Total                   65.35 dBA

  * Bright Zone  !

Barrier table for segment # 1: Lockhart Rd (day)
-----------------------------------------------
Barrier ! Elev of !  Road   ! Tot Leq !
Height  ! Barr Top!  dBA    !   dBA   !
--------+---------+---------+---------+
   2.00 !    2.00 !   59.56 !   59.56 !
   2.10 !    2.10 !   59.16 !   59.16 !
   2.20 !    2.20 !   58.73 !   58.73 !
   2.30 !    2.30 !   58.29 !   58.29 !
   2.40 !    2.40 !   57.85 !   57.85 !
   2.50 !    2.50 !   57.41 !   57.41 !
   2.60 !    2.60 !   56.98 !   56.98 !
   2.70 !    2.70 !   56.56 !   56.56 !
   2.80 !    2.80 !   56.15 !   56.15 !
   2.90 !    2.90 !   55.76 !   55.76 !
```

```
STAMSON 5.0        SUMMARY REPORT        Date: 29-06-2021 10:25:56
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: bk349ry.te           Time Period: Day/Night 16/8 hours
Description: Block 350, Rear Yard

Road data, segment # 1: Lockhart Rd (day/night)
----------------------------------------------
Car traffic volume  : 20925/2325  veh/TimePeriod  *
Medium truck volume :   788/88    veh/TimePeriod  *
Heavy truck volume  :   788/88    veh/TimePeriod  *
Posted speed limit  :    60 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):  25000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   3.50
    Heavy Truck  % of Total Volume     :   3.50
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 1: Lockhart Rd (day/night)
----------------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  68.00 / 68.00  m
Receiver height           :   1.50 / 7.50   m
Topography                :      0       (Define your own alpha.)
Barrier angle1            :   0.00 deg   Angle2 : 90.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :  10.00 / 10.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Alpha                     :   0.33
Result summary (day)
--------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Lockhart Rd      !     1.37 !    58.73 !    58.73
--------------------+---------+---------+---------
                      Total                  58.73 dBA
```

STAMSON 5.0 SUMMARY REPORT Date: 29-06-2021 10:24:51
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: bk350ry.te Time Period: Day/Night 16/8 hours
Description: Block 351, Rear Yard

Road data, segment # 1: Lockhart Rd (day/night)
---
Car traffic volume : 20925/2325 veh/TimePeriod *
Medium truck volume : 788/88 veh/TimePeriod *
Heavy truck volume : 788/88 veh/TimePeriod *
Posted speed limit : 60 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): 25000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 3.50
Heavy Truck % of Total Volume : 3.50
Day (16 hrs) % of Total Volume : 90.00
Data for Segment # 1: Lockhart Rd (day/night)
---
Angle1 Angle2 : -55.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 20.00 / 20.00 m
Receiver height : 1.50 / 7.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -55.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 4.50 / 4.50 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Result summary (day)
---

| | source height (m) | Road Leq (dBA) | Total Leq (dBA) |
|---|---|---|---|
| 1.Lockhart Rd | 1.37 | 67.24 | 67.24 * |
| Total | | | 67.24 dBA |

* Bright Zone !

Barrier table for segment # 1: Lockhart Rd (day)
---

| Barrier Height | Elev of Barr Top | Road dBA | Tot Leq dBA |
|---|---|---|---|
| 2.00 | 2.00 | 61.22 | 61.22 |
| 2.10 | 2.10 | 60.79 | 60.79 |
| 2.20 | 2.20 | 60.33 | 60.33 |
| 2.30 | 2.30 | 59.87 | 59.87 |
| 2.40 | 2.40 | 59.40 | 59.40 |
| 2.50 | 2.50 | 58.94 | 58.94 |
| **2.60** | **2.60** | **58.50** | **58.50** |
| 2.70 | 2.70 | 58.06 | 58.06 |
| 2.80 | 2.80 | 57.64 | 57.64 |
| 2.90 | 2.90 | 57.24 | 57.24 |
| 3.00 | 3.00 | 56.85 | 56.85 |
| 3.10 | 3.10 | 56.48 | 56.48 |
| 3.20 | 3.20 | 56.13 | 56.13 |
| 3.30 | 3.30 | 55.79 | 55.79 |
| 3.40 | 3.40 | 55.47 | 55.47 |

```
STAMSON 5.0         SUMMARY REPORT         Date: 29-06-2021 10:25:25
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: bk351ry.te            Time Period: Day/Night 16/8 hours
Description: Block 352, Rear Yard

Road data, segment # 1: Lockhart Rd (day/night)
----------------------------------------------
Car traffic volume  : 20925/2325  veh/TimePeriod  *
Medium truck volume :   788/88    veh/TimePeriod  *
Heavy truck volume  :   788/88    veh/TimePeriod  *
Posted speed limit  :    60 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):  25000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   3.50
    Heavy Truck  % of Total Volume     :   3.50
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 1: Lockhart Rd (day/night)
---------------------------------------------
Angle1   Angle2           : -80.00 deg   55.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  36.00 / 36.00  m
Receiver height           :   1.50 / 7.50   m
Topography                :      0       (Define your own alpha.)
Barrier angle1            : -80.00 deg   Angle2 : 55.00 deg
Barrier height            :   2.10 m
Barrier receiver distance :   4.50 / 4.50   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Alpha                     :   0.33

Result summary (day)
--------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Lockhart Rd      !     1.37 !    57.91 !    57.91
--------------------+---------+---------+---------
                      Total                  57.91 dBA
```

# APPENDIX 3

# SOUND LEVEL CRITERIA

# MINISTRY OF THE ENVIRONMENT CONSERVATION AND PARKS

## 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 are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling occupants and the outdoor sound level may exceed the Municipality and the Ministry of Environment's noise criteria."*

*TYPE B:*

*"Purchasers are advised that despite the inclusion of noise abatement features within the development area and the individual building units, sound levels due to road traffic may be of concern, occasionally interfering with some activities of the dwelling occupants and the outdoor sound level may exceed the Municipality and the Ministry of Environment's noise criteria."*

*TYPE C:*

*"This dwelling unit has been fitted with a forced air heating system and the ducting, etc. was sized to accommodate central air conditioning. Installation of central air conditioning by the occupant will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the Municipality's and the Ministry of the Environment's noise criteria. (Note: The location and installation of the outdoor air conditioning device should be done so as to comply with noise criteria of MOE Publication NPC-216, Residential Air Conditioning Devices and thus minimize the noise impacts both on and in the immediate vicinity of the subject property.)"*

*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. (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)."*

# APPENDIX 4

# 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.