YCA engineering Limited

Phone: 416-894-3213
hava@ycaengineering.com
9580 Yonge Street, Suite 9557
Richmond Hill, ON L4C 1V6

ENVIRONMENTAL NOISE ASSESSMENT

PROPOSED TOWNHOUSE DEVELOPMENT
OAK RIDGES SEATON (A11)
NORTHWEST CORNER OF ALEXANDER KNOX ROAD
AND WHITES ROAD

PART OF LOT 27, CONCESSION 4

CITY OF PICKERING

PREPARED FOR:

OAK RIDGES SEATON INC.

November 2024
Y2309

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1.0 INTRODUCTION

PURPOSE

A residential development has been proposed by Oak Ridges Seaton Inc. in the City of Pickering. This report is an analysis of future sound levels within the proposed residential developments and describes the types and locations of noise mitigation measures which will be required based on the latest Draft Plan of Subdivision dated April 2024.

SITE DESCRIPTIONS AND LOCATIONS

The proposed residential development consists of townhouses units and internal roads located north of Alexander Knox Road, west of the Whites Road in the City of Pickering. The surrounding lands are expected to be proposed residential developments.

KEY PLAN

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

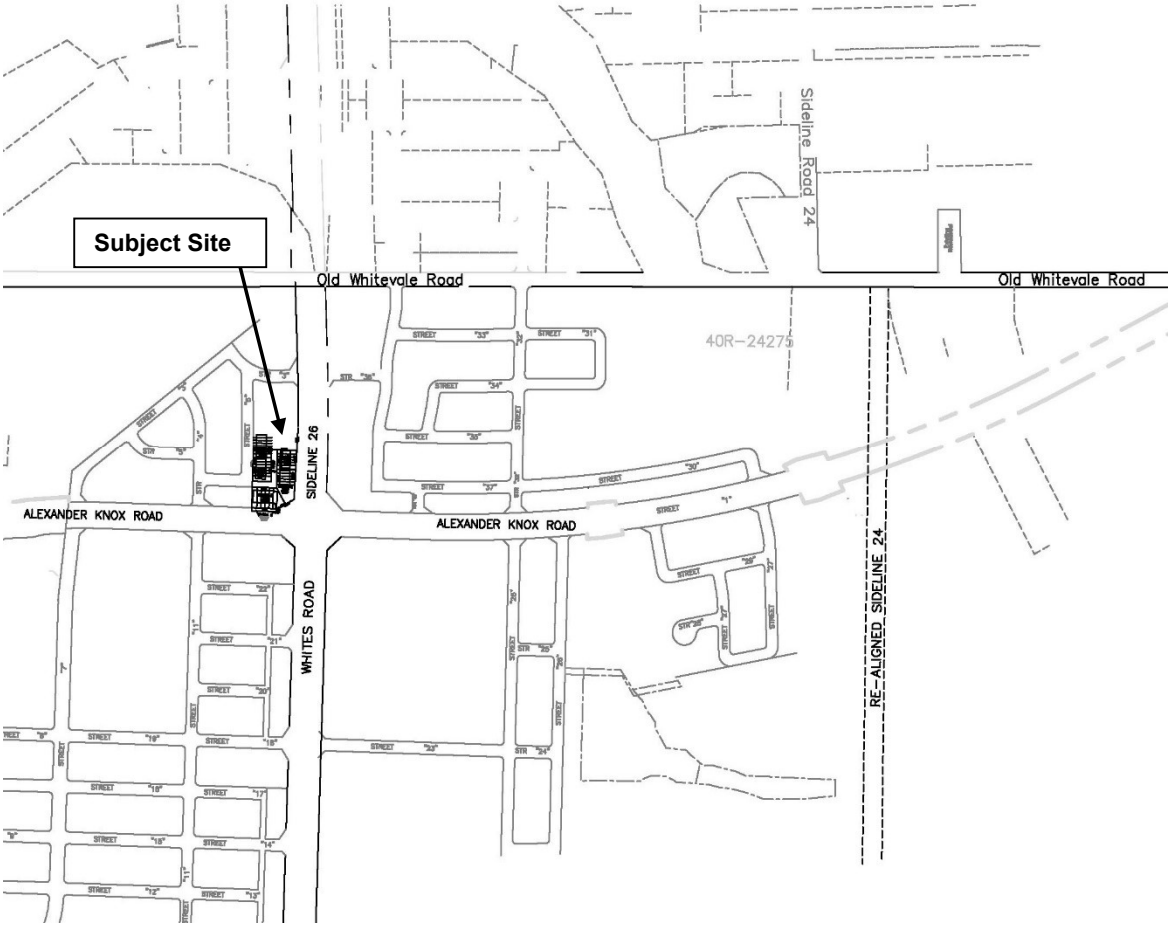


FIGURE 1

2.0 SOUND LEVEL CRITERIA

The sound level descriptor (L_{eq} in dBA) is 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 Roads

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

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.E.C.P. guidelines (Publication NPC-300), this development is considered to be a Class 1 or 2 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 45 dBA during night-time (1900-0700).

3.0 NOISE SOURCES

ROAD TRAFFIC

The proposed developments will be located north of Alexander Knox Road, west of Whites Road in the City of Pickering.

Therefore, noise generated by Alexander Knox Road and Whites Road have the potential to affect future residents. All other roads within this site are local roadways. Due to distance separation and low traffic volumes, all other local roads are considered acoustically insignificant.

Traffic volume information for Alexander Knox Road and Whites Road were obtained from the Region of Municipality of Durham dated March 2023. The traffic data is summarized in Tables 1 and 2 below:

TABLE 1: ALEXANDER KNOX ROAD TRAFFIC DATA

Projected Annual Average Daily Traffic *	27,000
Percent Trucks	8%
Heavy and Medium trucks ratio	50:50
Speed (km/hr)	80
Number of Lanes	4

TABLE 2: WHITES ROAD TRAFFIC DATA

Projected Annual Average Daily Traffic *	30,000
Percent Trucks	8%
Heavy and Medium trucks ratio	30:70
Speed (km/hr)	70
Number of Lanes	6

* The projected traffic data provided by the Region of Durham.

RAIL TRAFFIC

The Canadian Pacific Railway is located more than 1km from the proposed residential development. Due to distance separation, the noise impact from the railway is considered acoustically insignificant.

AIRCRAFT TRAFFIC

Due to the proximity of the future Pickering Airport, the proposed residential development has been verified and the proposed site is outside the NEF 25 Noise Contour Line. The noise contour line map for the future Pickering Airport is included in Appendix 1.

4.0 NOISE ASSESSMENT

Figure 2 is based on the latest Draft Plan of Subdivision plan dated April 2024 prepared by KLM Planning showing various noise analysis locations adjacent to noise sources and noise mitigation measures within the proposed residential developments.

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 3 lists the unattenuated sound levels at various locations.

TABLE 3: 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
Block 1	Front Wall	75.0[1] 28.0[2]	-	64.01 69.90 (70.90)	57.48 63.37 (64.37)
	Balcony#	77.0[1] 40.0[2]	57.96 51.34 (58.82)	-	-
Block 2	Front Wall	48.0[1] 160.0[2]	-	65.95 69.90 (71.37)	59.42 63.37 (64.84)
	Balcony#	74.0[1] 157.0[2]	59.93 56.73 (61.63)	-	-
Block 3	Front Wall	25.0[1] 48.0[2]	-	71.79 64.55 (72.54)	65.26 58.01 (66.01)
	Balcony#	40.0[1] 50.0[2]	57.51 58.53 (61.06)	-	-
Block 4	Front Wall	58.0[1] 65.0[2]	-	65.43 60.54 (66.65)	58.90 54.01 (60.12)
	Balcony#	60.0[1] 67.0[2]	59.73 54.53 (60.88)	-	-
Block 5	Front Wall	88.0[1] 65.0[2]	-	63.67 59.65 (65.12)	57.14 53.11 (58.59)
	Balcony#	90.0[1] 67.0[2]	56.86 56.65 (59.77)	-	-

[1] Alexander Knox Road
[2] Whites Road

The designated Outdoor Amenity Areas for these blocks are the private balconies above garages.

5.0 RECOMMENDED NOISE MITIGATION MEASURES

5.1 OUTDOOR MEASURES

The outdoor amenity areas for all the Town Blocks 1 to 5 are the balconies above the garages mostly shielded from traffic noise sources by the buildings themselves.

Based on the sound level results in Table 3, the daytime sound levels at the balconies above garages for end units within Blocks 2 and 3 and Block 4 (3 South Units) are expected to be above 60dBA due to Alexander Knox Road and Whites Road traffic in the absence of mitigative measures.

Therefore, noise mitigation measures are required for these locations indicated below:

- Block 2 (South Unit), Block 3 (East Unit), Block 4 (3 South Units)

NOISE BARRIERS

In accordance with M.O.E. policy, mitigative measure are required for Block 2 (South Unit), Block 3 (East Unit) and Block 4 (3 South Units) to reduce the sound levels to below 60 dBA and as close to 55 dBA as technically, economically and administratively feasible.

For Block 2 (South Unit) and Block 3 (East Unit), a 1.5m high noise fence/wing wall is required along the side of the balcony as shown on the attached Figure 2 to achieve a sound level of 59 dBA or less.

For Block 4 (3 South Units), a 1.5m high noise fence/wing wall is required along the front of the balcony as shown on the attached Figure 2 to achieve a sound level of 59 dBA or less.

The recommended barriers should be constructed of a material, which provides a minimum surface density of 20 kg per square meter.

5.2 VENTILATION REQUIREMENTS

Ventilation requirements were determined using the sound levels at the building facades listed in Table 3.

MANDATORY AIR CONDITIONERS/VENTILATION SYSTEM

Based on the information in Table 3, the following residential dwelling units are expected to be above 65dBA during the daytime and/or above 60dBA during the nighttime.

Therefore, mandatory air conditioning/ ventilation system is required for the following locations:

- Blocks 1 to 5 (All Units)

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

Warning Clause Type D:

"This dwelling unit was fitted with a central air conditioner/ventilation system 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: The location and installation of the outdoor air conditioning device should be done so as to comply with noise criteria of MOE thus minimize the noise impacts both on and in the immediate vicinity of the subject property)."

PROVISION FOR AIR CONDITIONERS/VENTILATION SYSTEM

There are no provision for air conditioning requirements for this development as all the blocks are required to be provided with Mandatory air conditioning /ventilation system.

5.3 BUILDING COMPONENTS

Building components within the proposed development were analyzed using the STC (Sound Transmission Class) method recommended by the M.E.C.P. 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 30% of the floor area and the same side exterior walls are assumed to be 70% of the floor area.

DAYTIME SOUND LEVELS

For the worst-case location during daytime, Block 3 daytime dwelling wall sound level of 73dBA was calculated at the first storey living/dining room. To ensure acceptable daytime indoor sound levels of 45dBA, the overall building components must provide an STC rating of 36 for windows and STC 43 for exterior wall construction.

NIGHT-TIME SOUND LEVELS

For the worst-case location during night-time, Block 3 night-time dwelling wall sound level of 66dBA was calculated at the second storey bedroom. To ensure acceptable night-time indoor sound levels of 40dBA, the overall building components must provide an STC rating of 32 for windows and STC 40 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, upgraded window and exterior wall constructions are required for Blocks 1, 2, 3 and 4 (All Units).

Standard building components for Block 5 (All Units) are acceptable to meet the indoor sound levels.

If the exterior wall constructions for building of Blocks 1 to 3 (All Units) are upgraded to STC 54 with a brick veneer/ masonry construction, the window STC ratings may drop to STC 32.

WINDOWS

The following are some window configurations meeting an STC rating of 31, assuming the ratio of window area to room floor area is 30%:

- double glazing 3mm x 3mm thickness with 20mm air space or
- double glazing 4mm x 4mm thickness with 16mm air space or
- any other window type yielding a similar or greater STC rating

EXTERIOR WALLS

The following exterior wall construction EW5 meets more than the STC 54 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/masonry.

Sample window and exterior wall configurations have been provided in Appendix 4.

5.4 WARNING CLAUSES

The following warning clause Type A must be incorporated into the Development Agreements, which will be registered on title and included in all offers of purchase and sale or lease of the dwelling units listed below.

- Blocks 1 to 5 (All Units)

  Warning Clause Type A

  “Purchasers are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling 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 4 identifying sound barriers, mandatory central air conditioners, provision for central air conditioners, building components and warning clauses.

TABLE 4: SUMMARY OF NOISE MITIGATION MEASURES

LOCATIONS	VENTILATION REQUIREMENTS	BUILDING COMPONENTS	SOUND BARRIERS	WARNING CLAUSES
Block 1 (All Units)	Mandatory air conditioning	Windows: STC 35 Walls: STC 42 Or Windows: STC 31 Walls: STC 54	No	Type A, D
Block 2 (South Unit)	Mandatory air conditioning	Windows: STC 35 Walls: STC 42 Or Windows: STC 31 Walls: STC 54	1.5m**	Type A, B and D
Block 2 (Remaining Units)	Mandatory air conditioning	Windows: STC 35 Walls: STC 42 Or Windows: STC 31 Walls: STC 54	No	Type A, D
Block 3 (East Unit)	Mandatory air conditioning	Windows: STC 36 Walls: STC 43 Or Windows: STC 32 Walls: STC 54	1.5m**	Type A, B and D
Block 3 (Remaining Units)	Mandatory air conditioning	Windows: STC 36 Walls: STC 43 Or Windows: STC 32 Walls: STC 54	No	Type A, D
Block 4 (3 South Units)	Mandatory air conditioning	Windows: STC 31 Walls: STC 39	1.5m**	Type A, B and D
Block 4 (Remaining Units)	Mandatory air conditioning	Windows: STC 31 Walls: STC 39	No	Type A, D
Block 5 (All Units)	Mandatory air conditioning	Windows: OBC* Walls: OBC	No	Type A, D

* OBC: Ontario Building Code Standard

** Wing Wall/Acoustic Barrier at the side/front of the balcony as shown the attached Figure 2.

7.0 RECOMMENDATIONS AND CONCLUSION

RECOMMENDATIONS

1. Mandatory air conditioning is required for Blocks 1 to 5 (All Units).

2. For Block 2 (South Unit) and Block 3 (East Unit), a 1.5m high noise fence/wing wall is required along the side of the balcony as shown on the attached Figure 2 to achieve a sound level of 59 dBA or less.

   For Block 4 (3 South Units), a 1.5m high noise fence/wing wall is required along the front of the balcony as shown on the attached Figure 2 to achieve a sound level of 59 dBA or less.

3. Upgraded window and exterior wall constructions are required for Blocks 1 to 4 (All Units). For Block 5, standard Ontario Building Construction will be acoustically acceptable for the exterior wall and window construction. See Table 4 for details.

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

5. Prior to the issuance of a building permit for any dwelling unit for which ventilation or building component requirements have been specified in the Noise Study and after the construction, it is recommended that a qualified engineer should submit a letter to the City indicating that the recommended measures or acceptable alternatives have been incorporated in the dwelling which satisfy the M.E.C.P. criteria.

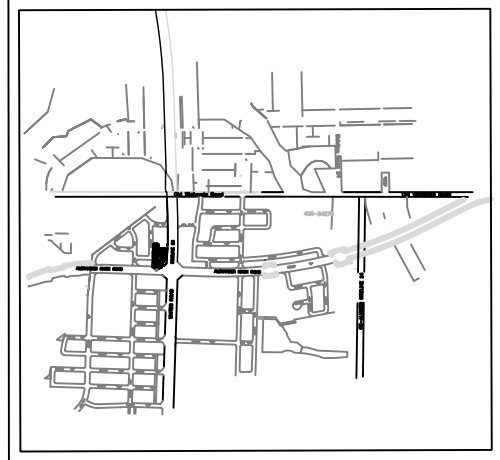
CONCLUSION

This report has determined that sound levels acceptable to the Ministry of Environment, Conservation and Park, City of Pickering 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

Hava Jouharchi, P.Eng.
Senior Project Engineer



LEGEND:

- MANDATORY CENTRAL AIR CONDITIONING. AND WARNING CLAUSE D
- WARNING CLAUSE A
- PROPOSED WING WALL/ ACOUSTIC FENCE AND WARNING CLAUSE B

YCA ENGINEERING Limited
9580 Yonge Street, Suite 9
Richmond Hill, ON, L4C 1V6
Tel: 416-894-3213
Email: hava@ycaengineering.com

DRAFT PLAN NOISE MITIGATION MEASURES

OAK RIDGES SEATON (A11)

Part of Lot 27, Concession 4

City of Pickering

FIGURE 2

Scale: NTS

DATE: November 2024

APPENDIX 1

TRAFFIC DATA

Planning and Economic Development Department

Planning Division

605 ROSSLAND RD. E.
4TH FLOOR
P.O. BOX 623
WHITBY, ON L1N 6A3
CANADA
905-668-7711
1-800-372-1102
Fax: 905-666-6208
E-Mail: planning@durham.ca

www.durham.ca

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, YCA Engineering Limited

Address: 9251 Yonge Street, Suite 8557

Telephone: (416) 894-3213 Fax:

Location of Proposal:

South of Alexander Knox Rd (Between Sideline 24 and 22)

Municipality: Pickering Lot(s): Concession:

Durham Region File No. (if available):

Name of Property Owner (if available):

Date Request Received: March 16, 2023 Received By: Alia Tulloch

Date Forecast Sent: March 23, 2023

Name of Road Segment	Forecasted AADT*	No. of Lanes	% of Trucks	Heavy : Medium Truck Ratio		Speed (km/h)
Alexander Knox (Burkholder and Peter Matthews)	27,000	4	8	50	50	80
	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.

Planning and Economic
Development Department

Planning Division

605 ROSSLAND RD. E.
4TH FLOOR
P.O. BOX 623
WHITBY, ON L1N 6A3
CANADA
905-668-7711
1-800-372-1102
Fax: 905-666-6208
E-Mail: planning@durham.ca

www.durham.ca

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, YCA Engineering Ltd.

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

Telephone: (416) 894-3213 Fax:

Location of Proposal:

Whites Road (south of Whitevale)

Municipality: Lot(s): Concession:

Durham Region File No. (if available):

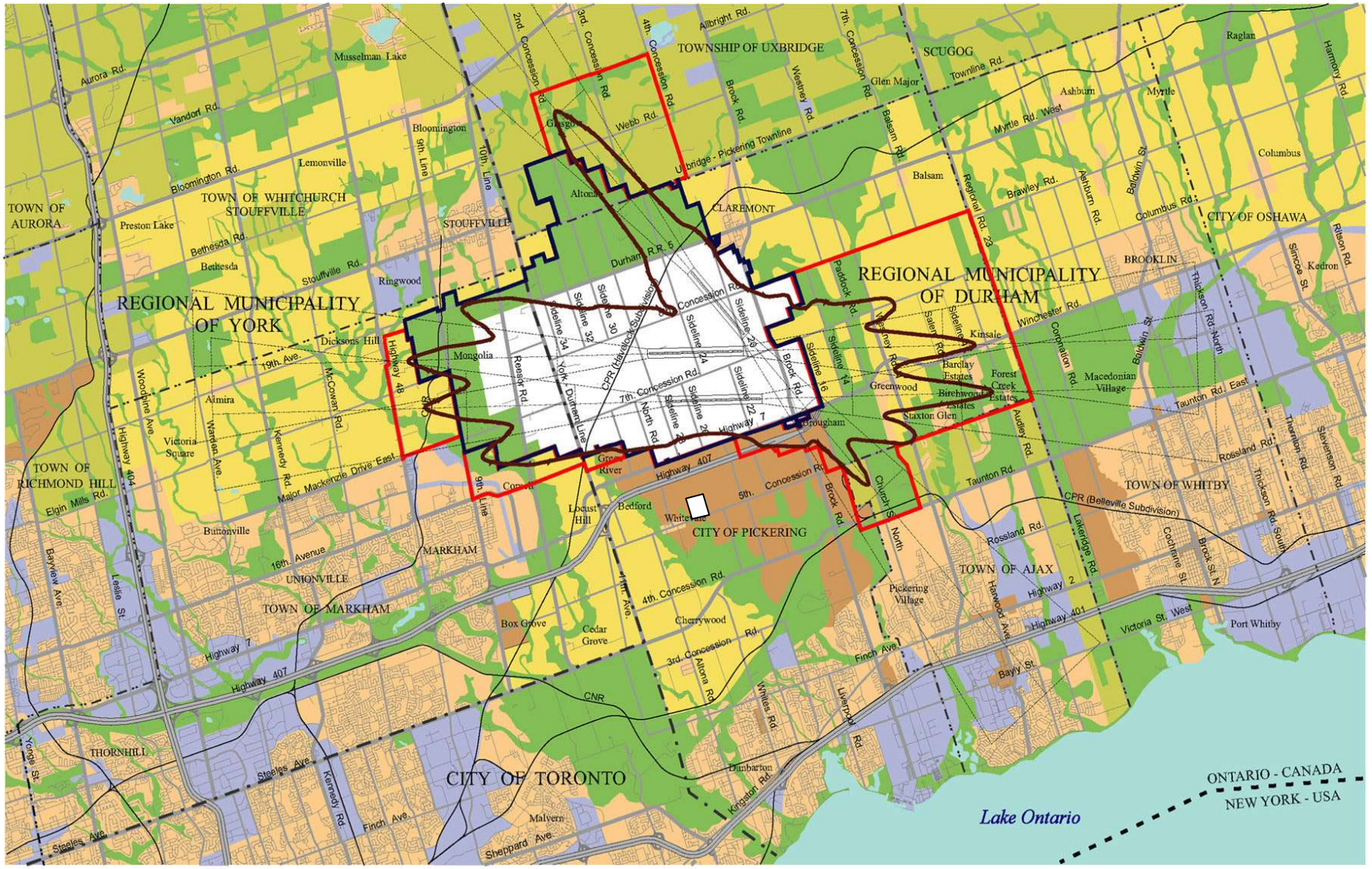
Name of Property Owner (if available):

Date Request Received: March 23, 2023 Received By: Anthony Caruso

Date Forecast Sent: March 28, 2023

Name of Road Segment	Forecasted AADT*	No. of Lanes	% of Trucks	Heavy : Medium Truck Ratio		Speed (km/h)
Whites Road (south of Whitevale)	30,000	6	8	30	70	70

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



LAND USE IN THE VICINITY OF AIRPORT

- Pickering Airport Lands Boundary
- International Boundary
- Regional Boundary
- Municipal Boundary
- 25 NEF Noise Contour
- Interim Airport Protection Area
- Freeways
- Primary/Secondary/Local Roads
- Rail Line
- Residential Area
- Rural Area
- Agricultural Area
- Mixed Use Area
- Employment Area
- Environmental and Open Space Area

1km 0 1 2 3 4 5km

Note: Map has been created using data from the following sources:
- *Ministry of Municipal Affairs and Housing*
- *Public Works Government Services Canada*
- *Printed with the permission of Her Majesty the QueenÕs Printer*
- *Subject to revision as new data become available*
- *Revision: October, 2004*

APPENDIX 2

STAMSON 5.04
SOUND LEVEL CALCULATIONS

```
STAMSON 5.0        SUMMARY REPORT        Date: 30-03-2023 11:47:15
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: bk1fw.te             Time Period: Day/Night 16/8 hours
Description: Block 1, Front Wall

Road data, segment # 1: Alxndr Knox (day/night)
-----------------------------------------------
Car traffic volume  : 22356/2484  veh/TimePeriod  *
Medium truck volume :   972/108   veh/TimePeriod  *
Heavy truck volume  :   972/108   veh/TimePeriod  *
Posted speed limit  :    80 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):  27000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   4.00
    Heavy Truck  % of Total Volume     :   4.00
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 1: Alxndr Knox (day/night)
-----------------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  75.00 / 75.00  m
Receiver height           :   4.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Road data, segment # 2: Whites Rd (day/night)
-----------------------------------------------
Car traffic volume  : 24840/2760  veh/TimePeriod  *
Medium truck volume :  1512/168   veh/TimePeriod  *
Heavy truck volume  :   648/72    veh/TimePeriod  *
Posted speed limit  :    70 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):  30000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   5.60
    Heavy Truck  % of Total Volume     :   2.40
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 2: Whites Rd (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 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Result summary (day)
--------------------
                   !  source  !   Road   !  Total
                   !  height  !   Leq    !   Leq
                   !   (m)    !  (dBA)   !  (dBA)
-------------------+---------+---------+---------
 1.Alxndr Knox     !     1.41 !    64.01 !    64.01
 2.Whites Rd       !     1.24 !    69.90 !    69.90
-------------------+---------+---------+---------
                     Total                  70.90 dBA
Result summary (night)
----------------------
                   !  source  !   Road   !  Total
                   !  height  !   Leq    !   Leq
                   !   (m)    !  (dBA)   !  (dBA)
-------------------+---------+---------+---------
 1.Alxndr Knox     !     1.41 !    57.48 !    57.48
 2.Whites Rd       !     1.24 !    63.37 !    63.37
-------------------+---------+---------+---------
                     Total                  64.37 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.90
                           (NIGHT): 64.37
```

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STAMSON 5.0        SUMMARY REPORT        Date: 30-03-2023 11:49:23
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: bk1ola.te            Time Period: Day/Night 16/8 hours
Description: Block 1, OLA

Road data, segment # 1: Alxndr Knox (day/night)
----------------------------------------------
Car traffic volume  : 22356/2484  veh/TimePeriod  *
Medium truck volume :   972/108   veh/TimePeriod  *
Heavy truck volume  :   972/108   veh/TimePeriod  *
Posted speed limit  :    80 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):  27000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   4.00
    Heavy Truck  % of Total Volume     :   4.00
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 1: Alxndr Knox (day/night)
---------------------------------------------
Angle1   Angle2           : -80.00 deg   80.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  77.00 / 77.00  m
Receiver height           :   1.50 / 7.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -80.00 deg   Angle2 : 80.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   2.00 / 2.00   m
Source elevation          :   0.00 m
Receiver elevation        :   2.80 m
Barrier elevation         :   2.80 m
Road data, segment # 2: Whites Rd (day/night)
---------------------------------------------
Car traffic volume  : 24840/2760  veh/TimePeriod  *
Medium truck volume :  1512/168   veh/TimePeriod  *
Heavy truck volume  :   648/72    veh/TimePeriod  *
Posted speed limit  :    70 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):  30000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   5.60
    Heavy Truck  % of Total Volume     :   2.40
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 2: Whites Rd (day/night)
---------------------------------------------
Angle1   Angle2           : -80.00 deg   80.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  40.00 / 40.00  m
Receiver height           :   1.50 / 7.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -80.00 deg   Angle2 : 80.00 deg
Barrier height            :   3.00 m
Barrier receiver distance :   2.00 / 2.00   m
Source elevation          :   0.00 m
Receiver elevation        :   2.80 m
Barrier elevation         :   2.80 m
Result summary (day)
--------------------
                   !  source  !   Road   !  Total
                   !  height  !   Leq    !   Leq
                   !   (m)    !  (dBA)   !  (dBA)
-------------------+---------+---------+---------
 1.Alxndr Knox     !     1.41 !    57.96 !    57.96 *
 2.Whites Rd       !     1.24 !    51.34 !    51.34
-------------------+---------+---------+---------
                     Total                 58.82 dBA
```

STAMSON 5.0 SUMMARY REPORT Date: 30-03-2023 11:47:32
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: bk2fw.te Time Period: Day/Night 16/8 hours
Description: Block 2, Front Wall

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

Car traffic volume : 22356/2484 veh/TimePeriod *
Medium truck volume : 972/108 veh/TimePeriod *
Heavy truck volume : 972/108 veh/TimePeriod *
Posted speed limit : 80 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
24 hr Traffic Volume (AADT or SADT): 27000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 4.00
Heavy Truck % of Total Volume : 4.00
Day (16 hrs) % of Total Volume : 90.00
Data for Segment # 1: Alxndr Knox (day/night)

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 48.00 / 48.00 m
Receiver height : 4.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Road data, segment # 2: Whites Rd (day/night)

Car traffic volume : 24840/2760 veh/TimePeriod *
Medium truck volume : 1512/168 veh/TimePeriod *
Heavy truck volume : 648/72 veh/TimePeriod *
Posted speed limit : 70 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
24 hr Traffic Volume (AADT or SADT): 30000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 5.60
Heavy Truck % of Total Volume : 2.40
Day (16 hrs) % of Total Volume : 90.00
Data for Segment # 2: Whites Rd (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 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Alxndr Knox	1.41	65.95	65.95
2.Whites Rd	1.24	69.90	69.90
Total			71.37 dBA

Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Alxndr Knox	1.41	59.42	59.42
2.Whites Rd	1.24	63.37	63.37
Total			64.84 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 71.37
(NIGHT): 64.84

```
STAMSON 5.0        SUMMARY REPORT        Date: 30-03-2023 11:50:05
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: bk2ola.te            Time Period: Day/Night 16/8 hours
Description: Block 2, OLA

Road data, segment # 1: Alxndr Knox (day/night)
-----------------------------------------------
Car traffic volume  : 22356/2484  veh/TimePeriod  *
Medium truck volume :   972/108   veh/TimePeriod  *
Heavy truck volume  :   972/108   veh/TimePeriod  *
Posted speed limit  :    80 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):  27000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   4.00
    Heavy Truck  % of Total Volume     :   4.00
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 1: Alxndr Knox (day/night)
-----------------------------------------------
Angle1   Angle2           : -45.00 deg   10.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  50.00 / 50.00  m
Receiver height           :   1.50 / 7.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -45.00 deg   Angle2 : 10.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   2.00 / 2.00   m
Source elevation          :   0.00 m
Receiver elevation        :   2.80 m
Barrier elevation         :   2.80 m
Road data, segment # 2: Whites Rd (day/night)
-----------------------------------------------
Car traffic volume  : 24840/2760  veh/TimePeriod  *
Medium truck volume :  1512/168   veh/TimePeriod  *
Heavy truck volume  :   648/72    veh/TimePeriod  *
Posted speed limit  :    70 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):  30000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   5.60
    Heavy Truck  % of Total Volume     :   2.40
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 2: Whites Rd (day/night)
-----------------------------------------------
Angle1   Angle2           :  45.00 deg   80.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  40.00 / 40.00  m
Receiver height           :   4.50 / 7.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  45.00 deg   Angle2 : 80.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   2.00 / 2.00   m
Source elevation          :   0.00 m
Receiver elevation        :   2.80 m
Barrier elevation         :   2.80 m
Result summary (day)
--------------------
                  !  source  !   Road   !  Total
```

	height (m)	Leq (dBA)	Leq (dBA)
1.Alxndr Knox	1.41	59.93	59.93 *
2.Whites Rd	1.24	56.73	56.73 *
	Total		**61.63 dBA**

* Bright Zone !

Barrier table for segment # 1: Alxndr Knox (day)

Barrier Height	Elev of Barr Top	Road dBA	Tot Leq dBA
1.20	4.00	59.93	59.93
1.30	4.10	59.93	59.93
1.40	4.20	55.38	55.38
1.50	**4.30**	**55.26**	**55.26**
1.60	4.40	54.89	54.89
1.70	4.50	54.35	54.35
1.80	4.60	53.67	53.67
1.90	4.70	52.90	52.90
2.00	4.80	52.11	52.11
2.10	4.90	51.31	51.31

Barrier table for segment # 2: Whites Rd (day)

Barrier Height	Elev of Barr Top	Road dBA	Tot Leq dBA
1.20	4.00	56.73	56.73
1.30	4.10	56.73	56.73
1.40	4.20	56.73	56.73
1.50	**4.30**	**56.73**	**56.73**
1.60	4.40	56.73	56.73
1.70	4.50	56.73	56.73
1.80	4.60	56.73	56.73
1.90	4.70	56.73	56.73
2.00	4.80	56.73	56.73
2.10	4.90	56.73	56.73

TOTAL Leq FROM ALL SOURCES (DAY): **59.07 dBA** **(with 1.5m high Wing Wall/Noise Barrier)**

STAMSON 5.0 SUMMARY REPORT Date: 30-03-2023 11:47:46
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: bk3fw.te Time Period: Day/Night 16/8 hours
Description: Block 3, Front Wall

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

Car traffic volume : 22356/2484 veh/TimePeriod *
Medium truck volume : 972/108 veh/TimePeriod *
Heavy truck volume : 972/108 veh/TimePeriod *
Posted speed limit : 80 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
24 hr Traffic Volume (AADT or SADT): 27000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 4.00
Heavy Truck % of Total Volume : 4.00
Day (16 hrs) % of Total Volume : 90.00
Data for Segment # 1: Alxndr Knox (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 : 25.00 / 25.00 m
Receiver height : 4.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Road data, segment # 2: Whites Rd (day/night)

Car traffic volume : 24840/2760 veh/TimePeriod *
Medium truck volume : 1512/168 veh/TimePeriod *
Heavy truck volume : 648/72 veh/TimePeriod *
Posted speed limit : 70 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
24 hr Traffic Volume (AADT or SADT): 30000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 5.60
Heavy Truck % of Total Volume : 2.40
Day (16 hrs) % of Total Volume : 90.00
Data for Segment # 2: Whites Rd (day/night)

Angle1 Angle2 : 0.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 48.00 / 48.00 m
Receiver height : 4.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Alxndr Knox	1.41	71.79	71.79
2.Whites Rd	1.24	64.55	64.55
Total			72.54 dBA

Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Alxndr Knox	1.41	65.26	65.26
2.Whites Rd	1.24	58.01	58.01
Total			66.01 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 72.54
(NIGHT): 66.01

```
STAMSON 5.0        SUMMARY REPORT        Date: 30-03-2023 11:50:25
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: bk3ola.te            Time Period: Day/Night 16/8 hours
Description: Block 3, OLA

Road data, segment # 1: Alxndr Knox (day/night)
----------------------------------------------
Car traffic volume  : 22356/2484  veh/TimePeriod  *
Medium truck volume :   972/108   veh/TimePeriod  *
Heavy truck volume  :   972/108   veh/TimePeriod  *
Posted speed limit  :    80 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):  27000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   4.00
    Heavy Truck  % of Total Volume     :   4.00
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 1: Alxndr Knox (day/night)
----------------------------------------------
Angle1   Angle2           : -80.00 deg   -45.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  40.00 / 40.00  m
Receiver height           :   1.50 / 7.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -80.00 deg   Angle2 : -45.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   2.00 / 2.00   m
Source elevation          :   0.00 m
Receiver elevation        :   2.80 m
Barrier elevation         :   2.80 m
Road data, segment # 2: Whites Rd (day/night)
----------------------------------------------
Car traffic volume  : 24840/2760  veh/TimePeriod  *
Medium truck volume :  1512/168   veh/TimePeriod  *
Heavy truck volume  :   648/72    veh/TimePeriod  *
Posted speed limit  :    70 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):  30000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   5.60
    Heavy Truck  % of Total Volume     :   2.40
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 2: Whites Rd (day/night)
----------------------------------------------
Angle1   Angle2           : -10.00 deg   45.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  50.00 / 50.00  m
Receiver height           :   1.50 / 7.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -10.00 deg   Angle2 : 45.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   2.00 / 2.00   m
Source elevation          :   0.00 m
Receiver elevation        :   2.80 m
Barrier elevation         :   2.80 m
Result summary (day)
--------------------
                  !  source  !   Road   !  Total
                  !  height  !   Leq    !   Leq
```

	! (m)	! (dBA)	! (dBA)
1.Alxndr Knox	! 1.41	! 57.51	! 57.51 *
2.Whites Rd	! 1.24	! 58.53	! 58.53 *
	Total		**61.06 dBA**

* Bright Zone !

Barrier table for segment # 1: Alxndr Knox (day)

Barrier Height	Elev of Barr Top	Road dBA	Tot Leq dBA
1.20	4.00	57.51	57.51
1.30	4.10	57.51	57.51
1.40	4.20	53.11	53.11
1.50	**4.30**	**53.04**	**53.04**
1.60	4.40	52.86	52.86
1.70	4.50	52.57	52.57
1.80	4.60	52.20	52.20
1.90	4.70	51.78	51.78
2.00	4.80	51.31	51.31
2.10	4.90	50.83	50.83

Barrier table for segment # 2: Whites Rd (day)

Barrier Height	Elev of Barr Top	Road dBA	Tot Leq dBA
1.20	4.00	58.53	58.53
1.30	4.10	58.53	58.53
1.40	4.20	53.95	53.95
1.50	**4.30**	**53.80**	**53.80**
1.60	4.40	53.43	53.43
1.70	4.50	52.87	52.87
1.80	4.60	52.18	52.18
1.90	4.70	51.42	51.42
2.00	4.80	50.62	50.62
2.10	4.90	49.82	49.82

TOTAL Leq FROM ALL SOURCES (DAY): **56.45 dBA** **(with 1.5m high Wing Wall/Noise Barrier)**

```
STAMSON 5.0        SUMMARY REPORT        Date: 30-03-2023 11:48:02
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: bk4fw.te             Time Period: Day/Night 16/8 hours
Description: Block 4, Front Wall
Road data, segment # 1: Alxndr Knox (day/night)
----------------------------------------------
Car traffic volume  : 22356/2484  veh/TimePeriod  *
Medium truck volume :   972/108   veh/TimePeriod  *
Heavy truck volume  :   972/108   veh/TimePeriod  *
Posted speed limit  :    80 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):  27000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   4.00
    Heavy Truck  % of Total Volume     :   4.00
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 1: Alxndr Knox (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     50 %
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  58.00 / 58.00  m
Receiver height           :   4.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Road data, segment # 2: Whites Rd (day/night)
----------------------------------------------
Car traffic volume  : 24840/2760  veh/TimePeriod  *
Medium truck volume :  1512/168   veh/TimePeriod  *
Heavy truck volume  :   648/72    veh/TimePeriod  *
Posted speed limit  :    70 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):  30000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   5.60
    Heavy Truck  % of Total Volume     :   2.40
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 2: Whites Rd (day/night)
-------------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     50 %
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  65.00 / 65.00  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.Alxndr Knox      !     1.41 !    65.43 !    65.43
 2.Whites Rd        !     1.24 !    60.54 !    60.54
--------------------+---------+---------+---------
                      Total                  66.65 dBA
Result summary (night)
----------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Alxndr Knox      !     1.41 !    58.90 !    58.90
 2.Whites Rd        !     1.24 !    54.01 !    54.01
--------------------+---------+---------+---------
                      Total                  60.12 dBA
TOTAL Leq FROM ALL SOURCES (DAY): 66.65
                           (NIGHT): 60.12
```

```
STAMSON 5.0        SUMMARY REPORT        Date: 30-03-2023 11:50:52
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: bk4ola.te            Time Period: Day/Night 16/8 hours
Description: Block 4, OLA

Road data, segment # 1: Alxndr Knox (day/night)
-----------------------------------------------
Car traffic volume  : 22356/2484  veh/TimePeriod  *
Medium truck volume :   972/108   veh/TimePeriod  *
Heavy truck volume  :   972/108   veh/TimePeriod  *
Posted speed limit  :    80 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):  27000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   4.00
    Heavy Truck  % of Total Volume     :   4.00
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 1: Alxndr Knox (day/night)
-----------------------------------------------
Angle1   Angle2           : -80.00 deg   80.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     50 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  60.00 / 60.00  m
Receiver height           :   1.50 / 7.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -80.00 deg   Angle2 : 80.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   2.00 / 2.00   m
Source elevation          :   0.00 m
Receiver elevation        :   2.80 m
Barrier elevation         :   2.80 m
Road data, segment # 2: Whites Rd (day/night)
-----------------------------------------------
Car traffic volume  : 24840/2760  veh/TimePeriod  *
Medium truck volume :  1512/168   veh/TimePeriod  *
Heavy truck volume  :   648/72    veh/TimePeriod  *
Posted speed limit  :    70 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):  30000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   5.60
    Heavy Truck  % of Total Volume     :   2.40
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 2: Whites Rd (day/night)
-----------------------------------------------
Angle1   Angle2           :   0.00 deg   80.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     50 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  67.00 / 67.00  m
Receiver height           :   1.50 / 7.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :   0.00 deg   Angle2 : 80.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   2.00 / 2.00   m
Source elevation          :   0.00 m
Receiver elevation        :   2.80 m
Barrier elevation         :   2.80 m
Result summary (day)
--------------------
```

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Alxndr Knox	1.41	59.73	59.73 *
2.Whites Rd	1.24	54.53	54.53 *
Total			60.88 dBA

* Bright Zone !

Barrier table for segment # 1: Alxndr Knox (day)

Barrier Height	Elev of Barr Top	Road dBA	Tot Leq dBA
1.20	4.00	59.73	59.73
1.30	4.10	59.73	59.73
1.40	4.20	59.73	59.73
1.50	**4.30**	**57.99**	**57.99**
1.60	4.40	57.77	57.77
1.70	4.50	57.39	57.39
1.80	4.60	56.90	56.90
1.90	4.70	56.34	56.34
2.00	4.80	55.74	55.74
2.10	4.90	55.13	55.13

Barrier table for segment # 2: Whites Rd (day)

Barrier Height	Elev of Barr Top	Road dBA	Tot Leq dBA
1.20	4.00	54.53	54.53
1.30	4.10	54.53	54.53
1.40	4.20	54.53	54.53
1.50	**4.30**	**52.79**	**52.79**
1.60	4.40	52.58	52.58
1.70	4.50	52.22	52.22
1.80	4.60	51.74	51.74
1.90	4.70	51.18	51.18
2.00	4.80	50.59	50.59
2.10	4.90	49.98	49.98

TOTAL Leq FROM ALL SOURCES (DAY): **59.14 dBA** **(with 1.5m high Wing Wall/Noise Barrier)**

STAMSON 5.0 SUMMARY REPORT Date: 30-03-2023 11:48:14

```
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: bk5fw.te              Time Period: Day/Night 16/8 hours
Description: Block 5, Front Wall
Road data, segment # 1: Alxndr Knox (day/night)
----------------------------------------------
Car traffic volume  : 22356/2484  veh/TimePeriod  *
Medium truck volume :   972/108   veh/TimePeriod  *
Heavy truck volume  :   972/108   veh/TimePeriod  *
Posted speed limit  :    80 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):  27000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   4.00
    Heavy Truck  % of Total Volume     :   4.00
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 1: Alxndr Knox (day/night)
---------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     50 %
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  88.00 / 88.00  m
Receiver height           :   4.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Road data, segment # 2: Whites Rd (day/night)
---------------------------------------------
Car traffic volume  : 24840/2760  veh/TimePeriod  *
Medium truck volume :  1512/168   veh/TimePeriod  *
Heavy truck volume  :   648/72    veh/TimePeriod  *
Posted speed limit  :    70 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):  30000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   5.60
    Heavy Truck  % of Total Volume     :   2.40
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 2: Whites Rd (day/night)
---------------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     60 %
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  65.00 / 65.00  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.Alxndr Knox      !     1.41 !    63.67 !    63.67
 2.Whites Rd        !     1.24 !    59.65 !    59.65
--------------------+---------+---------+---------
                      Total                  65.12 dBA
Result summary (night)
----------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Alxndr Knox      !     1.41 !    57.14 !    57.14
 2.Whites Rd        !     1.24 !    53.11 !    53.11
--------------------+---------+---------+---------
                      Total                  58.59 dBA
TOTAL Leq FROM ALL SOURCES (DAY): 65.12
                           (NIGHT): 58.59
```

```
STAMSON 5.0        SUMMARY REPORT        Date: 30-03-2023 11:51:13
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: bk5ola.te            Time Period: Day/Night 16/8 hours
Description: Block 5, OLA
Road data, segment # 1: Alxndr Knox (day/night)
----------------------------------------------
Car traffic volume  : 22356/2484  veh/TimePeriod  *
Medium truck volume :   972/108   veh/TimePeriod  *
Heavy truck volume  :   972/108   veh/TimePeriod  *
Posted speed limit  :    80 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):  27000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   4.00
    Heavy Truck  % of Total Volume     :   4.00
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 1: Alxndr Knox (day/night)
----------------------------------------------
Angle1   Angle2           : -80.00 deg   80.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     50 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  90.00 / 90.00  m
Receiver height           :   1.50 / 7.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -80.00 deg   Angle2 : 80.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   2.00 / 2.00   m
Source elevation          :   0.00 m
Receiver elevation        :   2.80 m
Barrier elevation         :   2.80 m
Road data, segment # 2: Whites Rd (day/night)
----------------------------------------------
Car traffic volume  : 24840/2760  veh/TimePeriod  *
Medium truck volume :  1512/168   veh/TimePeriod  *
Heavy truck volume  :   648/72    veh/TimePeriod  *
Posted speed limit  :    70 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):  30000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   5.60
    Heavy Truck  % of Total Volume     :   2.40
    Day (16 hrs) % of Total Volume     :  90.00
Data for Segment # 2: Whites Rd (day/night)
----------------------------------------------
Angle1   Angle2           : -80.00 deg   80.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     60 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  67.00 / 67.00  m
Receiver height           :   1.50 / 7.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -80.00 deg   Angle2 : 80.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   2.00 / 2.00   m
Source elevation          :   0.00 m
Receiver elevation        :   2.80 m
Barrier elevation         :   2.80 m
Result summary (day)
--------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Alxndr Knox      !     1.41 !    56.86 !    56.86 *
 2.Whites Rd        !     1.24 !    56.65 !    56.65 *
--------------------+---------+---------+---------
                      Total                 59.77 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 and the future commercial developments 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 and the future commercial developments 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 and thus minimize the noise impacts both on and in the immediate vicinity of the subject property.)"

TYPE D:

"This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the 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 and thus minimize the noise impacts both on and in the immediate vicinity of the subject property.)"

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.