

NOISE IMPACT STUDY
“TOWNHOUSE DEVELOPMENT”
3151 MONTROSE ROAD
NIAGARA FALLS, ON
REGION OF NIAGARA

Prepared for:

1000441695 Ontario Inc.
4025 Dorchester Road, Suite 312
Niagara Falls, ON
L2E 7K8

Prepared By:



Frank Westaway
Qualified Acoustical Consultant

Revised August 2023
April 2023
Our File No: 23-4028

dBA ACOUSTICAL CONSULTANTS INC.
P.O Box 32059
1447 Upper Ottawa
Hamilton, ON
L8W 3K0

TABLE OF CONTENTS

1.0 INTRODUCTION.....	Page 3
2.0 SITE DESCRIPTION.....	Page 3
3.0 NOISE IMPACT ASSESSMENT.....	Page 3
3.1 NOISE CRITERIA.....	Page 3
3.2 ROAD NOISE.....	Page 4
4.0 RECOMMENDATIONS - NOISE CONTROL.....	Page 6
4.1 OUTDOOR NOISE LEVELS.....	Page 6
4.2 INDOOR NOISE LEVELS.....	Page 6
5.0 VENTILATION / WARNING CLAUSES.....	Page 7
6.0 SUMMARY OF RECOMMENDATIONS.....	Page 7
7.0 CONCLUSIONS.....	Page 8
FIGURE 1 – KEY PLAN	
FIGURE 2 – SITE PLAN	
FIGURE 3 – RECEPTOR LOCATIONS	
FIGURE 4 – 2.43m NOISE BARRIER LOCATIONS	
APPENDIX “A”	
2016 MTO AADT - QEW	
2021 Niagara Region AADT – Montrose Road	
Stamson Calculations	
Site Statistics	
Exterior Wall STC Ratings	

1.0 INTRODUCTION

dBA Acoustical Consultants Inc. has been retained by 1000441695 Ontario Inc., to provide a noise impact study for the proposed 3151 Montrose Road Townhouse Development located in Niagara Falls, ON, Region of Niagara.

The purpose of the study will determine the noise impact from Montrose Road and the QEW vehicular traffic that may impact the proposed townhouse development, as required for application approval for the City of Niagara Falls, Region of Niagara.

This study will detail noise impact relative to the site plan and recommend noise control measures necessary (if applicable) to meet Ministry of Environment Conservation and Parks (MECP) Publication NPC-300 entitled “Stationary & Transportation Sources-Approval & Planning guidelines while satisfying the planning requirements of the City of Niagara Falls, Region of Niagara.

Vibration is not considered as there are no heavy industrial operations in the proposed development site area. Aircraft is not a concern as the development is located outside the NEF 25 contour of the area. See attached Figure 1 Site Location.

2.0 SITE DESCRIPTION

Proposed are two 2-storey single family dwellings (1 & 2), a Block of three (3) Bungalow townhouses (Block 4) a Block of five (5) Bungalow townhouses (Block 5) as well as an existing single-family dwelling located at 3151 Montrose Road. House 1 will be completely shielded from road traffic noise from the existing properties to the south and west as well as by the other buildings in the proposed development. To the immediate north of House 2, is a proposed 2-storey single family dwelling that will shield QEW and Montrose traffic noise in the rear yard of house 2.

The proposed townhouse development is located approximately 20m west of Montrose Road, which is a two-lane roadway with a posted speed limit of 50km/hr. The QEW is approximately 170m northeast of the proposed townhouse development and has 2 lanes of traffic in each direction separated by a median and has a posted speed limit of 100 km/hr. Other area local streets do not have an acoustical impact on the townhouse development due to low traffic volumes and speed limits. Surrounding the townhouse development are 2-storey single family dwellings as well as 2-storey townhouses. See attached Figure 2 Site Plan.

3.0 NOISE IMPACT ASSESSMENT

3.1 NOISE CRITERIA

The MECP specifies limits for road noise relative to new residential developments. The MECP Publication NPC-300 entitled “Stationary & Transportation Sources-Approval & Planning, specifies the criteria, summarized as follows:

TABLE 2- Road Traffic Sound Levels Limits	
Time Period	Leq (dBA)
07:00 – 23:00 (16 hr.)	55 Outdoor Living area
07:00 – 23:00 (16 hr.)	55 Plane of Window
23:00 – 07:00 (8 hr.)	50 Plane of Bedroom window

The OLA refers to an outdoor patio, a backyard, a terrace or other area where outdoor passive recreation is expected. Noise levels are calculated at the upper storey bedroom window to represent nighttime (23:00-0700) periods.

TABLE 3 –Noise Control Requirements		
Time Period	Noise Level Leq (dBA)	Action Required
07:00 - 23:00 Daytime (OLA)	55 to 60	Warning Clause Type “A”
	> 60	Barrier & Warning Clause Type “B”
07:00 – 23:00 Daytime (POW)	>55	Provision for A/C, Warning Clause “C”
	>65	Central A/C, Warning Clause “D”
	>65	Building Component Specification
23:00 to 07:00 Nighttime (POW)	> 50	Provision for A/C and Warning Clause Type “C”
	> 60	Building Component Specification
	> 60	Central Air and Warning Clause Type “D”

Where nighttime noise levels exceed 60 dBA, building components must be designed to meet Table 3 indoor sound level limits.

TABLE 4 - Indoor Road Sound Levels Limits		
Indoor Location	Leq (dBA)	
	Road	Rail
Living/Dining 7:00 – 23:00	45	NA
Bedroom 23:00 - 07:00	40	NA

3.2 ROAD NOISE

Predicted road traffic noise levels were calculated for Montrose Road and the QEW which are considered the major road noise sources in the proposed townhouse development area. The most current road traffic volumes for Montrose Road are 2021 AADT (Annual Average Daily Traffic) and provided via email from the Region of Niagara, Transportation Department. See Appendix “A”.

The MECPC computer program STAMSON version 5.04 was used to carry out prediction calculations and the traffic data is summarized in Table 5. The daytime/nighttime volume ratios relative to Montrose Road is calculated using a 90/10 split. The traffic volume ratios relative to the QEW are calculated using a 66/33 split as the MTO and Region of Niagara departments require the noise levels be calculated over a 24-hour period. (See Appendix “A”)

The percentage of annual growth for Montrose Road was figured at 2% over 22 years and is reflective as the worst-case scenario. Montrose Road truck volumes were factored at 2% medium and 2% heavy of the total vehicle volumes. The percentage of annual growth for the QEW was figured at 2% over 17 years. The AADT (Annual Average Daily Traffic) volumes were used and are reflective as the worst-case scenario. QEW truck volumes were factored at 5% medium and 6% heavy of the total vehicle volumes. (See Figure 3 Receptor Locations).

TABLE 5 – Future Road Traffic Volumes (2043)			
Montrose Road	AADT 8194 Vehicles		
	Cars	Medium Trucks	Heavy Trucks
Day	7079	147	147
Night	789	16	16
QEW	AADT 94376 Vehicles		
	Cars	Medium Trucks	Heavy Trucks
24 Hour	83995	4719	5663

The following Table 6A summarizes the Montrose Road “free field” traffic noise prediction results, modeled at 6 receptor locations representative of the east and north façades within the proposed development (See Figure 3 Receptor Locations).

TABLE 6A – Predicted Montrose Road Future Traffic Noise (dBA)		
Montrose Road	07:00 – 23:00	23:00 – 07:00
R1 – House 2 - East Façade 1 st & 2 nd Floors	60 dBA (1.5m)	54 dBA (4.5m)
R2 – House 2 – Rear Yard OLA Free Field	44 dBA (1.5m)	38 dBA (4.5m)
R3 – Block 5 - East Façade 1 st & Loft Floors	60 dBA (1.5m)	54 dBA (7.5m)
R4 – Block 5 - East Façade OLA Mitigated	51 dBA (1.5m)	N/A
R5 – Block 4 - North Façade 1 st & 2 nd Floors	49 dBA (1.5m)	43 dBA (7.5m)
R6 – Block 4 - North Façade OLA Mitigated 2.43m	40 dBA (1.5m)	N/A

The following Table 6B summarizes the QEW “free field” modeled at 6 receptor locations representative of the east and north façades within the proposed development.

TABLE 6B – Predicted QEW Future Traffic Noise (dBA)		
QEW	07:00 – 23:00	23:00 – 07:00
R1 – House 2 - East Façade 1 st & 2 nd Floors	58 dBA (1.5m)	59 dBA (4.5m)
R2 – House 2 – Rear Yard OLA Free Field	53 dBA (1.5m)	54 dBA (4.5m)
R3 – Block 5 - East Façade 1 st & Loft Floors	57 dBA (1.5m)	59 dBA (7.5m)
R4 – Block 5 - East Façade OLA Mitigated 2.43m	49 dBA (1.5m)	N/A
R5 – Block 4 - North Façade 1 st & 2 nd Floors	57 dBA (1.5m)	57 dBA (7.5m)
R6 – Block 4 - North Façade OLA Mitigated 2.43m	49 dBA (1.5m)	N/A

The following Table 6C summarizes the COMBINED “free field” modeled at 6 receptor locations representative of the east and north façades within the proposed development.

TABLE 6C – COMBINED Montrose Road & QEW Future Traffic Noise (dBA)		
Montrose Road	07:00 – 23:00	23:00 – 07:00
R1 – House 2 - East Façade 1 st & 2 nd Floors	62 dBA (1.5m)	59 dBA (4.5m)
R2 – House 2 – Rear Yard OLA Free Field	53 dBA (1.5m)	54 dBA (4.5m)
R3 – Block 5 - East Façade 1 st & Loft Floors	62 dBA (1.5m)	60 dBA (7.5m)
R4 – Block 5 - East Façade OLA Mitigated 2.43m	53 dBA (1.5m)	N/A
R5 – Block 4 - North Façade 1 st & 2 nd Floors	58 dBA (1.5m)	59 dBA (7.5m)
R6 – Block 4 - North Façade OLA Mitigated 2.43m	50 dBA (1.5m)	N/A

4.0 RECOMMENDATIONS - NOISE CONTROL

4.1 OUTDOOR NOISE LEVELS

Calculated daytime road noise levels at the Plane of Window (POW) exceed the 55 dBA criteria for receptors (Block 4 & Block 5) outlined in Table 2. Mitigation to reduce outdoor noise levels is required with the installation of a 2.43m (8 ft) noise barrier are required and noted in Figure 4.

In compliance with MECP guidelines, the noise barrier must have a minimum surface density of 20 kg/m² and be designed and constructed with no cracks or gaps. Any gap under the noise barrier that is necessary for drainage purposes must be minimized and must not distract from the acoustical performance.

4.2 INDOOR NOISE LEVELS

Calculated nighttime road noise levels at the Plane of Window (POW) exceed the 50 dBA criteria outlined in Table 2 for House 2, Block 4 and Block 5, indoor spaces. Specific building components (walls, windows, doors etc.) are required and confirmed using the STC (Sound Transmission Class) method and are summarized in Table 7 following, with minimum window, door and wall construction specified throughout the development. The STC values are calculated for each room type, with a minimum of 2 components and based on window to floor ratios of 80% for noise sensitive areas.

TABLE 7 – Recommended Door, Wall, and Window Construction			
LOCATION	Window STC To Be Used	Exterior Wall STC	Patio Door Construction STC
House 2, Block 4 & Block 5	Example	Example	Example
Bedroom	36	46	36
Living room	36	46	36
House 1	Example	Example	Example
Bedroom	OBC	OBC	OBC
Living room	OBC	OBC	OBC

5.0 VENTILATION / WARNING CLAUSES

Ventilation and Warning Clause requirements are required for this project as noted in Table 8 following. It is recommended that the appropriate Warning Clauses be inserted into all Offers and Agreements of Purchase and Sale or Lease.

TABLE 8 - Ventilation and Warning Clause Requirements		
LOCATION	VENTILATION	WARNING CLAUSE
House 2, Block 4 & Block 5	Central Air Conditioning	Type "B" & "D"
House 1	Provisions for Air Conditioning	Type "C"

TYPE B: (House 2, Block 4 & Block 5)

"Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the buildings units, sound levels due to increasing road traffic may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the Municipality's and the MECP's noise criteria."

TYPE D: (House 2, Block 4 & Block 5)

"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 MECP's noise criteria."

TYPE C: (House 1)

"This dwelling unit had 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 MECP'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 MECP Publication NPC-216, Residential Air Conditioning Devices and thus minimize the noise impacts both on and in the immediate vicinity of the subject property.)"

6.0 SUMMARY OF RECOMMENDATIONS

The following noise control measures are required for this development:

- Central Air Conditioning as recommended for House 2, Block 4 & Block 5 (Table 8).
- Provisions for Air Conditioning as recommended for House 1 (Table 8).
- Specific Window, Door, and Wall construction as recommended in Table 7
- 2.43m Noise Barrier or equivalent for Block 4 & Block 5 (See Figure 4).
- Registered Warning Clause Type "B" & "D" on title, for House 2, Block 4 & Block 5 (Table 8).
- Registered Warning Clause Type "C" on title, for House 1 (Table 8).
- It is recommended that a qualified acoustical consultant certify that the required noise control measures have been incorporated into the builder's plans prior to issuance of a building permit.
- It is recommended that a qualified acoustical consultant certify that the required control measures have been properly installed prior to an occupancy permit.

7.0 CONCLUSIONS

dBA Acoustical Consultants Inc. has been retained by 1000441695 Ontario Inc. and provided a noise impact study for the proposed 3151 Montrose Road Townhouse Development located in Niagara Falls, ON, Region of Niagara.

The study determined the noise impact from Montrose Road and the QEW vehicular traffic that impacted the proposed townhouse development, as required for application approval for the City of Niagara Falls, Region of Niagara.

This study detailed noise impact relative to the site plan and recommended noise control measures necessary to meet Ministry of Environment Conservation and Parks (MECP) Publication NPC-300 entitled “Stationary & Transportation Sources-Approval & Planning guidelines while satisfying the planning requirements of the City of Niagara Falls, Region of Niagara.

FIGURE 1 KEY PLAN

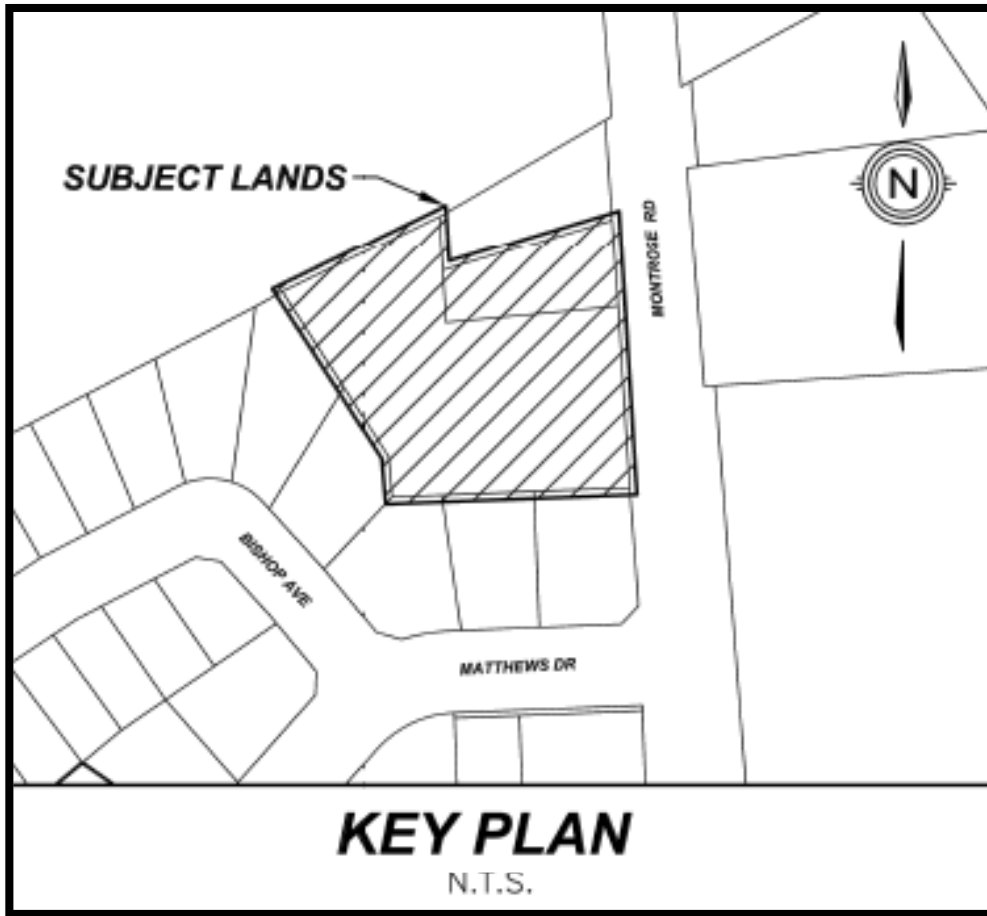


FIGURE 2
 SITE PLAN

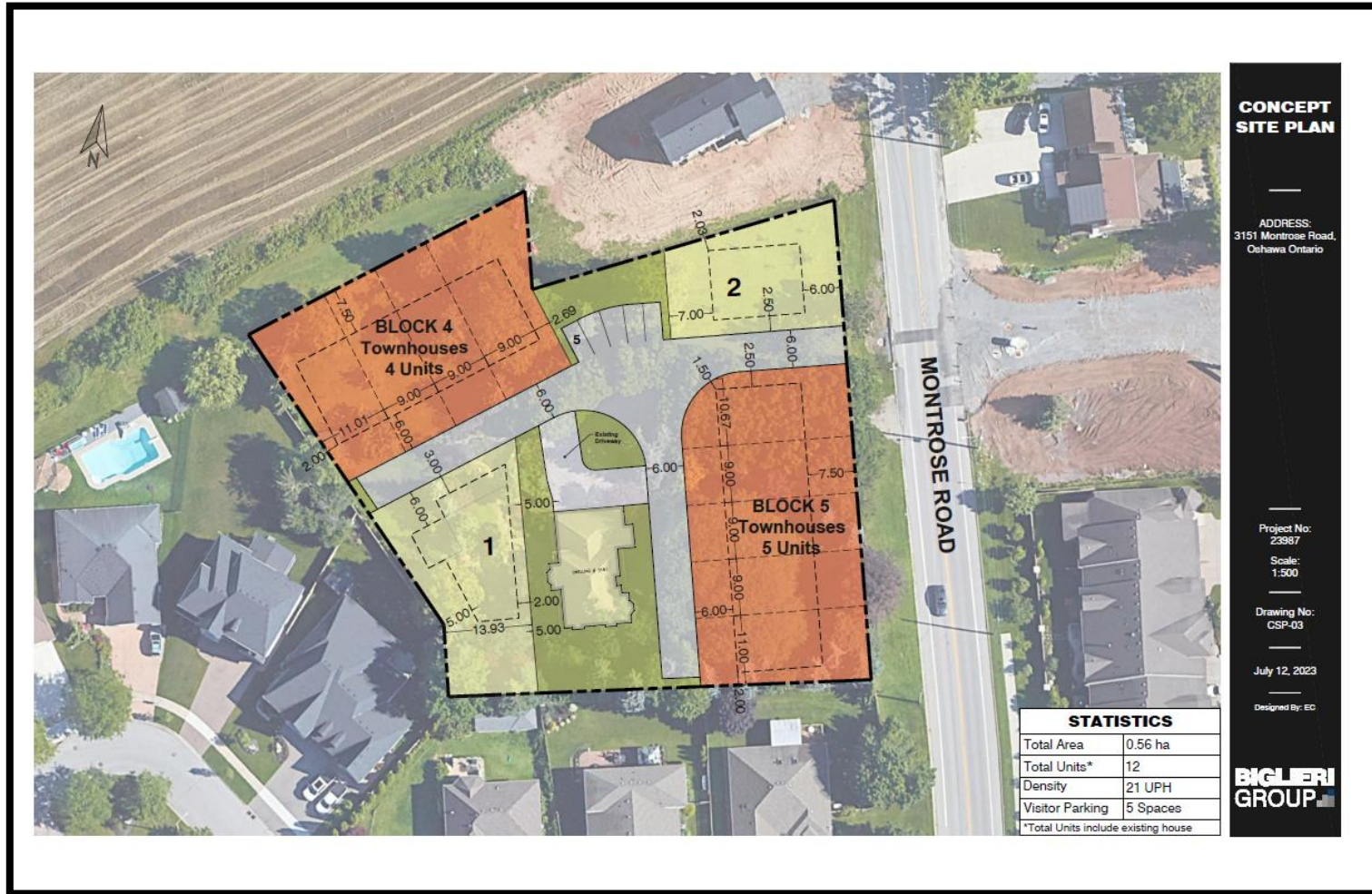
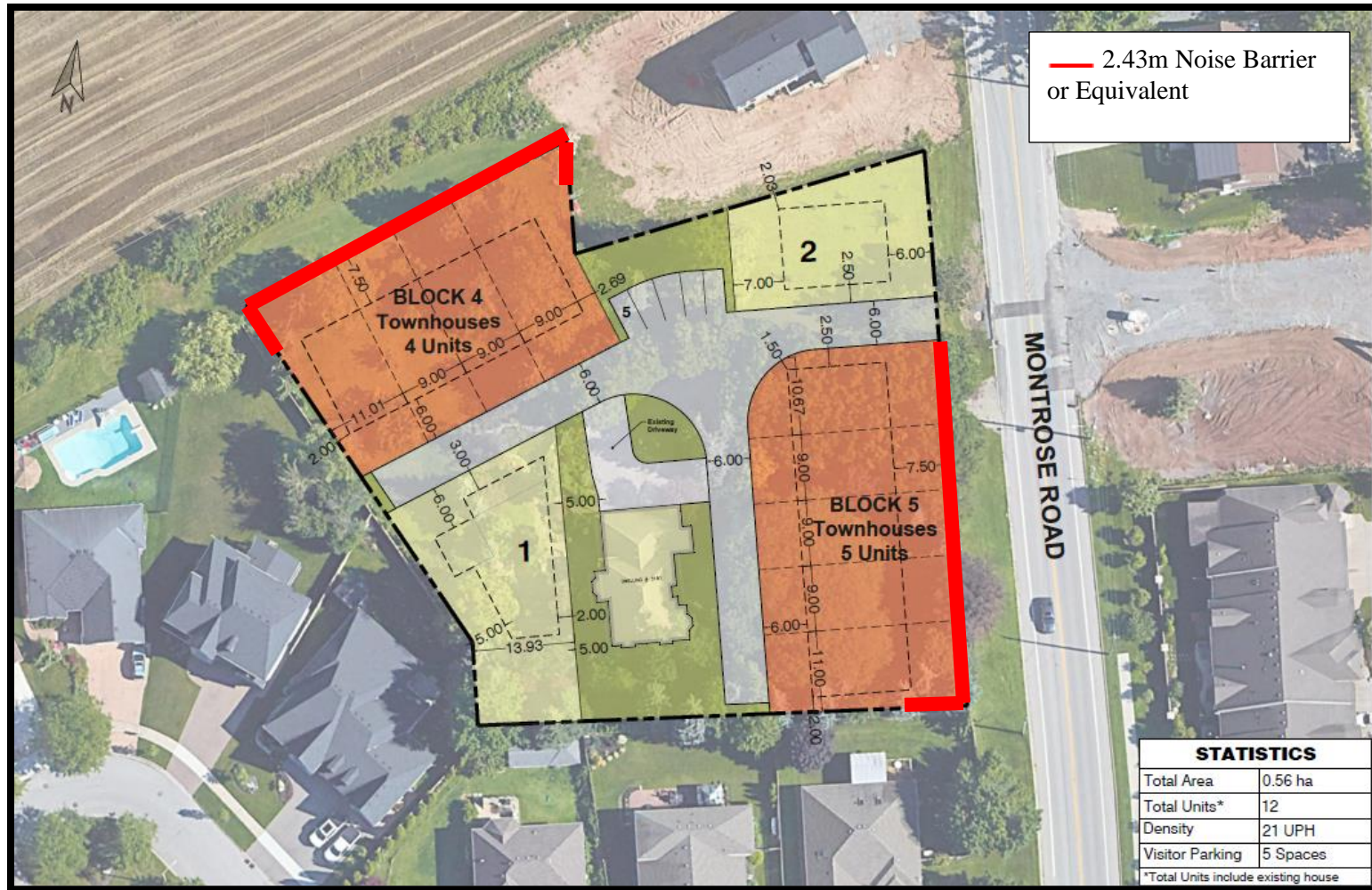


FIGURE 3
 RECEPTOR LOCATIONS



FIGURE 4
2.43m NOISE BARRIER LOCATIONS



APPENDIX “A”

2016 MTO AADT QEW BETWEEN THOROLD STONE ROAD & MOUNTAIN ROAD

QEW	THOROLD STONE RD IC-32	2.5	1988	UC	39,200	50,800	47,700	32,800	0.6
			1989	UC	41,100	52,100	49,700	35,300	0.9
			1990	UC	43,000	53,600	50,600	37,300	0.8
			1991	UC	40,400	50,900	50,500	35,100	1.1
			1992	UC	40,300	50,700	48,700	34,200	0.7
			1993	UC	40,800	50,100	48,500	35,400	1.0
			1994	UC	40,500	51,800	49,400	34,200	1.0
			1995	UC	44,500	57,000	54,700	37,500	0.8
			1996	UC	45,500	58,200	56,000	38,400	1.1
			1997	UC	46,500	59,500	57,200	39,200	0.5
			1998	UC	47,500	60,300	58,000	40,100	0.3

1988- 2016 Traffic Volumes Publication

Page 10 of 1509

Highway	Location Description	Dist. (KM)	Year	Pattern Type	AADT	SADT	SAWDT	WADT	AR
			1999	UC	48,700	61,400	59,000	41,100	0.6
			2000	UC	50,100	63,100	60,700	42,200	0.6
			2001	UC	50,800	64,000	61,500	42,700	0.3
			2002	UC	52,700	66,500	63,800	44,500	0.4
			2003	UC	53,500	67,400	64,700	45,500	0.6
			2004	UC	55,300	68,700	66,100	46,900	0.5
			2005	UC	54,900	68,000	65,300	46,600	0.7
			2006	UC	57,300	70,900	68,000	48,600	0.5
			2007	UC	58,500	72,500	71,800	49,600	0.7
			2008	UC	59,700	73,900	72,400	50,700	0.5
			2009	UC	61,000	74,600	71,700	51,800	0.3
			2010	UC	62,200	75,700	72,800	52,800	0.4
			2011	UC	56,400	68,800	66,000	47,900	N/A
			2012	UC	63,100	76,400	75,700	53,700	N/A
			2013	UC	63,500	63,500	64,100	60,300	N/A
			2014	UC	65,200	65,200	62,600	61,900	N/A
			2015	UC	66,300	66,300	63,600	63,000	N/A
			2016	UC	67,400	67,400	64,700	64,000	N/A



Ministry of
Transportation

Highway
Standards
Branch

Traffic
Office

**Provincial
Highways**

Traffic Volumes

1988-2016

King's Highways / Secondary Highways / Tertiary Roads

2021 NIAGARA REGION AADT MONTROSE ROAD

to Nicole, M

Hi Nicole,

AADT is 5300 vehicles. This data was from 2021, we had the exact same AADT in 2018 as well.

Manny Rataul, C.E.T., rcji
Road Safety Technician
Transportation Services Division, Niagara Region

Email: Manny.Rataul@niagararegion.ca
Address: 1815 Sir Isaac Brock Way St., Thorold ON, L2V4T7
www.niagararegion.ca

STAMSON CALCULATIONS

STAMSON 5.04 SUMMARY REPORT Date: 03-08-2023 14:25:42
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r1mont.te Time Period: 24 hours

Description: R1-Lot 2 free field East Facade
TOTAL Leq FROM ALL SOURCES: 58.24

Road data, segment # 1: Hwy QEW

 Car traffic volume : 83995 veh/TimePeriod *
 Medium truck volume : 4719 veh/TimePeriod *
 Heavy truck volume : 5663 veh/TimePeriod *
 Posted speed limit : 100 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Hwy QEW

 Angle1 Angle2 : -45.00 deg 0.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 150.00 m
 Receiver height : 1.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Result summary

	! source !	Road	! Total
	! height !	Leq	! Leq
	! (m) !	(dBA)	! (dBA)
1.Hwy QEW	! 1.57 !	58.24	! 58.24
	Total		58.24 dBA

STAMSON 5.04 SUMMARY REPORT Date: 04-08-2023 14:06:59
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r2MONTOLA.te Time Period: Day/Night 16/8 hours

Description: R2 1st Floor West Facade Montrose Rd
TOTAL Leq FROM ALL SOURCES

(DAY) : 44.36
(NIGHT) : 37.77

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

```
-----
Car traffic volume : 7079/787 veh/TimePeriod *
Medium truck volume : 147/16 veh/TimePeriod *
Heavy truck volume : 147/16 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

* Refers to calculated road volumes based on the following input:

```
24 hr Traffic Volume (AADT or SADT): 5300
Percentage of Annual Growth : 2.00
Number of Years of Growth : 22.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00
```

Data for Segment # 1: Montrose (day/night)

```
-----
Angle1 Angle2 : -15.00 deg 20.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 200.00 / 200.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Result summary (day)
-----
```

	! source !	Road	Total
	! height !	Leq	Leq
	! (m) !	(dBA)	(dBA)
1.Montrose	! 1.19 !	44.36	44.36
Total		44.36 dBA	

Result summary (night)

	! source !	Road	Total
	! height !	Leq	Leq
	! (m) !	(dBA)	(dBA)
1.Montrose	! 1.18 !	37.77	37.77
Total		37.77 dBA	

STAMSON 5.04 SUMMARY REPORT Date: 04-08-2023 14:02:51
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r2QEWD.te Time Period: 24 hours

Description: R2 1st Floor West Facade

TOTAL Leq FROM ALL SOURCES: 52.97

Road data, segment # 1: Hwy QEW

 Car traffic volume : 83995 veh/TimePeriod *
 Medium truck volume : 4719 veh/TimePeriod *
 Heavy truck volume : 5663 veh/TimePeriod *
 Posted speed limit : 100 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Hwy QEW

 Angle1 Angle2 : -25.00 deg 15.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 300.00 m
 Receiver height : 1.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Result summary

	! source !	Road !	Total !
	! height !	Leq !	Leq !
	! (m) !	(dBA) !	(dBA) !
1.Hwy QEW	! 1.57 !	52.97 !	52.97
	Total		52.97 dBA

STAMSON 5.04 SUMMARY REPORT Date: 04-08-2023 14:01:05
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r2QEWN.te Time Period: 24 hours

Description: R2 @nd Floor West Facade 2nd floor
TOTAL Leq FROM ALL SOURCES: 54.16

Road data, segment # 1: Hwy QEW

```
-----
Car traffic volume : 83995 veh/TimePeriod *
Medium truck volume : 4719 veh/TimePeriod *
Heavy truck volume : 5663 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

Data for Segment # 1: Hwy QEW

```
-----
Angle1    Angle2                    : -25.00 deg    15.00 deg
Wood depth                        : 0             (No woods.)
No of house rows                  : 0
Surface                            : 1             (Absorptive ground surface)
Receiver source distance          : 300.00 m
Receiver height                    : 4.50 m
Topography                        : 1             (Flat/gentle slope; no
barrier)
Reference angle                    : 0.00
```

Result summary

```
-----
! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----+-----
1.Hwy QEW ! 1.57 ! 54.16 ! 54.16
-----+-----+-----+-----
Total                                              54.16 dBA
```

STAMSON 5.04 SUMMARY REPORT Date: 03-08-2023 14:52:08
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r2montBB.te Time Period: Day/Night 16/8 hours

Description: R2-Lot 2 Rear Yard OLA Free Field

TOTAL Leq FROM ALL SOURCES (DAY) : 51.35

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

```
-----
Car traffic volume : 7079/787 veh/TimePeriod *
Medium truck volume : 147/16 veh/TimePeriod *
Heavy truck volume : 147/16 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

* Refers to calculated road volumes based on the following input:

```
24 hr Traffic Volume (AADT or SADT): 5300
Percentage of Annual Growth : 2.00
Number of Years of Growth : 22.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00
```

Data for Segment # 1: Montrose (day/night)

```
-----
Angle1 Angle2 : -15.00 deg 20.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 40.00 / 40.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
```

Result summary (day)

```
-----
! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----
1.Montrose ! 1.19 ! 51.35 ! 51.35
-----+-----+-----
Total 51.35 dBA
```

STAMSON 5.04 SUMMARY REPORT Date: 03-08-2023 15:14:08
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r3montr.te Time Period: Day/Night 16/8 hours

Description: R3-Towns Free Field East Facade Montrose Day

TOTAL Leq FROM ALL SOURCES (DAY): 60.22
(NIGHT): 53.63

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

```
-----
Car traffic volume : 7079/787 veh/TimePeriod *
Medium truck volume : 147/16 veh/TimePeriod *
Heavy truck volume : 147/16 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

* Refers to calculated road volumes based on the following input:

```
24 hr Traffic Volume (AADT or SADT): 5300
Percentage of Annual Growth : 2.00
Number of Years of Growth : 22.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00
```

Data for Segment # 1: Montrose (day/night)

```
-----
Angle1 Angle2 : -45.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 20.00 / 20.00 m
Receiver height : 1.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)
```

Result summary (day)

```
-----
! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----
1.Montrose ! 1.19 ! 60.22 ! 60.22
-----+-----+-----
Total 60.22 dBA
```

Result summary (night)

```
-----
! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----
1.Montrose ! 1.18 ! 53.63 ! 53.63
-----+-----+-----
Total 53.63 dBA
```

STAMSON 5.04 SUMMARY REPORT Date: 04-08-2023 10:18:09
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r3QEW.te Time Period: 24 hours

Description: R3 QEW First Floor East Facade
TOTAL Leq FROM ALL SOURCES: 56.65

Road data, segment # 1: Hwy QEW

 Car traffic volume : 83995 veh/TimePeriod *
 Medium truck volume : 4719 veh/TimePeriod *
 Heavy truck volume : 5663 veh/TimePeriod *
 Posted speed limit : 100 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Hwy QEW

 Angle1 Angle2 : -45.00 deg 0.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 187.00 m
 Receiver height : 1.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Result summary

	! source !	Road !	Total !
	! height !	Leq !	Leq !
	! (m) !	(dBA) !	(dBA) !
1.Hwy QEW	! 1.57 !	56.65 !	56.65
	Total		56.65 dBA

STAMSON 5.04 SUMMARY REPORT Date: 03-08-2023 15:11:15
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R3QEWNit.te Time Period: 24 hours

Description: R3-Towns Free Field East Facade Nite
TOTAL Leq FROM ALL SOURCES: 58.71

Road data, segment # 1: Hwy QEW

```
-----
Car traffic volume : 83995 veh/TimePeriod *
Medium truck volume : 4719 veh/TimePeriod *
Heavy truck volume : 5663 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

Data for Segment # 1: Hwy QEW

```
-----
Angle1 Angle2 : -45.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 187.00 m
Receiver height : 7.50 m
Topography : 1 (Flat/gentle slope; no
barrier)
Reference angle : 0.00
```

Result summary

```
-----
! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----+-----
1.Hwy QEW ! 1.57 ! 58.71 ! 58.71
-----+-----+-----+-----
Total 58.71 dBA
```


STAMSON 5.04 SUMMARY REPORT Date: 03-08-2023 15:25:02
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r4montr.te Time Period: Day/Night 16/8 hours
Description: R4-Towns East Facade OLA 2.43m Noise Barrier
TOTAL Leq FROM ALL SOURCES (DAY): 51.05

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

```
-----
Car traffic volume : 7079/787    veh/TimePeriod *
Medium truck volume : 147/16    veh/TimePeriod *
Heavy truck volume : 147/16    veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

* Refers to calculated road volumes based on the following input:

```
24 hr Traffic Volume (AADT or SADT): 5300
Percentage of Annual Growth : 2.00
Number of Years of Growth : 22.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00
```

Data for Segment # 1: Montrose (day/night)

```
-----
Angle1    Angle2                      : -45.00 deg    90.00 deg
Wood depth : 0                      (No woods.)
No of house rows : 0 / 0
Surface : 2                      (Reflective 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 : -45.00 deg    Angle2 : 90.00 deg
Barrier height : 2.43 m
Barrier receiver distance : 3.00 / 3.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00
```

Result summary (day)

```
-----
!    source    !    Road    !    Total
!    height    !    Leq    !    Leq
!    (m)        !    (dBA)    !    (dBA)
-----+-----+-----+-----
1.Montrose        !    1.19    !    51.05    !    51.05
-----+-----+-----+-----
                                Total                                  51.05 dBA
```

STAMSON 5.04 SUMMARY REPORT Date: 03-08-2023 15:23:01
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r4qewOLA.te Time Period: 24 hours
Description: R4-Towns Free Field Facade OLA 2.43m Noise Barrier
TOTAL Leq FROM ALL SOURCES: 48.81

Road data, segment # 1: Hwy QEW

 Car traffic volume : 83995 veh/TimePeriod *
 Medium truck volume : 4719 veh/TimePeriod *
 Heavy truck volume : 5663 veh/TimePeriod *
 Posted speed limit : 100 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Hwy QEW

 Angle1 Angle2 : -45.00 deg 0.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 187.00 m
 Receiver height : 1.50 m
 Topography : 2 (Flat/gentle slope; with barrier)
 Barrier angle1 : -45.00 deg Angle2 : 0.00 deg
 Barrier height : 2.43 m
 Barrier receiver distance : 3.00 m
 Source elevation : 0.00 m
 Receiver elevation : 0.00 m
 Barrier elevation : 0.00 m
 Reference angle : 0.00

Result summary

	! source !	Road !	Total !
	! height !	Leq !	Leq !
	! (m) !	(dBA) !	(dBA) !
1.Hwy QEW	! 1.57 !	48.81 !	48.81
	Total		48.81 dBA

STAMSON 5.04 SUMMARY REPORT Date: 03-08-2023 15:36:01
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r5montr.te Time Period: Day/Night 16/8 hours

Description: R5 Block 4 Towns North Facade

TOTAL Leq FROM ALL SOURCES

(DAY) : 49.43

(NIGHT) : 42.84

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

```
-----
Car traffic volume : 7079/787 veh/TimePeriod *
Medium truck volume : 147/16 veh/TimePeriod *
Heavy truck volume : 147/16 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

* Refers to calculated road volumes based on the following input:

```
24 hr Traffic Volume (AADT or SADT): 5300
Percentage of Annual Growth : 2.00
Number of Years of Growth : 22.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00
```

Data for Segment # 1: Montrose (day/night)

```
-----
Angle1 Angle2 : -45.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 80.00 / 80.00 m
Receiver height : 1.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)
```

Result summary (day)

```
-----
! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----+
1.Montrose ! 1.19 ! 49.43 ! 49.43
-----+-----+-----+
Total 49.43 dBA
```

Result summary (night)

```
-----
! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----+
1.Montrose ! 1.18 ! 42.84 ! 42.84
-----+-----+-----+
Total 42.84 dBA
```

STAMSON 5.04 SUMMARY REPORT Date: 03-08-2023 15:38:43
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r5monnit.te Time Period: 24 hours

Description: R5 Block 4 Towns North Facade Nite

TOTAL Leq FROM ALL SOURCES: 56.85

Road data, segment # 1: Hwy QEW

```
-----
Car traffic volume : 83995 veh/TimePeriod *
Medium truck volume : 4719 veh/TimePeriod *
Heavy truck volume : 5663 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

Data for Segment # 1: Hwy QEW

```
-----
Angle1 Angle2 : -45.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 182.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Result summary

```
-----
! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----+-----
1.Hwy QEW ! 1.57 ! 56.85 ! 56.85
-----+-----+-----+-----
Total 56.85 dBA
```

STAMSON 5.04 SUMMARY REPORT Date: 03-08-2023 15:32:02
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r5monDay.te Time Period: 24 hours

Description: R5 Block 4 Towns North Facade

TOTAL Leq FROM ALL SOURCES:

56.85

Road data, segment # 1: Hwy QEW

Car traffic volume : 83995 veh/TimePeriod *
Medium truck volume : 4719 veh/TimePeriod *
Heavy truck volume : 5663 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Hwy QEW

Angle1 Angle2 : -45.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 182.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no
barrier)
Reference angle : 0.00

Result summary

! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----+-----
1.Hwy QEW ! 1.57 ! 56.85 ! 56.85
-----+-----+-----+-----
Total 56.85 dBA

STAMSON 5.04 SUMMARY REPORT Date: 03-08-2023 15:42:18
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r6montr.te Time Period: Day/Night 16/8 hours
Description: R6-OLA Rear Yard 2.43m Noise Barrier
TOTAL Leq FROM ALL SOURCES (DAY) : 39.76

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

```
-----
Car traffic volume   : 7079/787   veh/TimePeriod *
Medium truck volume : 147/16    veh/TimePeriod *
Heavy truck volume  : 147/16    veh/TimePeriod *
Posted speed limit  : 50 km/h
Road gradient       : 0 %
Road pavement      : 1 (Typical asphalt or concrete)
```

* Refers to calculated road volumes based on the following input:

```
24 hr Traffic Volume (AADT or SADT): 5300
Percentage of Annual Growth       : 2.00
Number of Years of Growth         : 22.00
Medium Truck % of Total Volume    : 2.00
Heavy Truck % of Total Volume     : 2.00
Day (16 hrs) % of Total Volume    : 90.00
```

Data for Segment # 1: Montrose (day/night)

```
-----
Angle1  Angle2      : -45.00 deg  0.00 deg
Wood depth      : 0 (No woods.)
No of house rows : 0 / 0
Surface         : 2 (Reflective ground surface)
Receiver source distance : 80.00 / 80.00 m
Receiver height  : 1.50 / 7.50 m
Topography      : 2 (Flat/gentle slope; with barrier)
Barrier angle1   : -45.00 deg  Angle2 : 0.00 deg
Barrier height   : 2.43 m
Barrier receiver distance : 3.00 / 3.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle  : 0.00
```

Result summary (day)

```
-----
! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----+-----
1.Montrose ! 1.19 ! 39.76 ! 39.76
-----+-----+-----+-----
Total 39.76 dBA
```

STAMSON 5.04 SUMMARY REPORT Date: 04-08-2023 10:35:19
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r6QEOLAM.te Time Period: 24 hours
 Description: R6- QEW OLA Rear Yard 2.43m Noise Barrier
 TOTAL Leq FROM ALL SOURCES: 48.99

Road data, segment # 1: Hwy QEW

 Car traffic volume : 83995 veh/TimePeriod *
 Medium truck volume : 4719 veh/TimePeriod *
 Heavy truck volume : 5663 veh/TimePeriod *
 Posted speed limit : 100 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Hwy QEW

 Angle1 Angle2 : -45.00 deg 0.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 182.00 m
 Receiver height : 1.50 m
 Topography : 2 (Flat/gentle slope; with barrier)
 Barrier angle1 : -45.00 deg Angle2 : 0.00 deg
 Barrier height : 2.43 m
 Barrier receiver distance : 3.00 m
 Source elevation : 0.00 m
 Receiver elevation : 0.00 m
 Barrier elevation : 0.00 m
 Reference angle : 0.00

Result summary

	! source !	Road !	Total !
	! height !	Leq !	Leq !
	! (m) !	(dBA) !	(dBA) !
1.Hwy QEW	! 1.57 !	48.99 !	48.99
	Total		48.99 dBA

SITE STATISTICS

STATISTICS	
Total Area	0.56 ha
Total Units*	12
Density	21 UPH
Visitor Parking	5 Spaces
*Total Units include existing house	

EXTERIOR WALL STC RATING

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.