ENVIRONMENTAL NOISE IMPACT STUDY

"224 ARDAGH ROAD"
6 STOREY RESIDENTIAL/COMMERCIAL CONDOMINIUM &
3 STOREY TOWNHOUSE DEVELOPMENT
City of Barrie

Prepared for:

2596843 Ontario Inc.
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Nobelton ON
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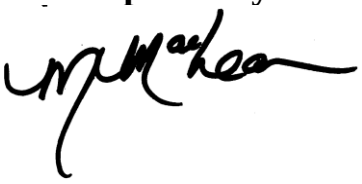
Prepared By:



Melissa MacLean
Vice President

UPDATED June 2019
Our File No: 19-1150

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TABLE OF CONTENTS

1.0 INTRODUCTION

dBA Acoustical Consulting Inc. has been retained to provide a noise impact study on behalf of 2596843 Ontario Inc. for the proposed "224 Ardagh Road 6 Storey Residential/Commercial Condominium & 3 Storey Townhouse Development" located on Ardagh Road and Ferndale Drive South, Barrie ON.

The purpose of the study is to determine the noise impact from Ardagh Road and Ferndale Drive South vehicular traffic that may impact the proposed mixed-use development as required for site plan approval for the City of Barrie.

Proposed for the development is a 6 storey mixed-use building with the first floor consisting of commercial units and floors 2 to 5 consisting of a total of 50 condominium style residential units and 31 three storey townhouse units.

This study will detail noise impact relative to the site plan and recommend noise control measures necessary (if applicable) to meet MOE Publication NPC-300 entitled "Stationary & Transportation Sources-Approval & Planning guidelines while satisfying the planning requirements of the City of Barrie Planning Department. Vibration is not considered as there are no heavy industry or railway lines within the required setback distances. There are no CN/CP Rail within the setback requirements therefore rail is not a noise concern. Aircraft is not a concern as the development is located outside the NEF 25 contour of any area Airports.

2.0 SITE DESCRIPTION

The proposed residential development property is located approximately 20m on the north side of Ardagh Road, Barrie ON. Ardagh Road is a 2-lane roadway, with a center turning lane, and curb side bicycle lane, with a posted speed of 50 km/hr. Immediately abutting the west side of the proposed site at approximately 30m from residential Building C is the Barrie Fire and Emergency Station. The Fire Station is considered an emergency response facility, any activity generated during emergencies is exempt from noise mitigation requirements. To the south are 2 storey residential dwellings as well as a large wooded area. To the north and west side of the proposed site are two storey residential dwellings. On north east and south east of the proposed development are commercial plazas. Key Plan attached as Figure 1.

Ferndale Drive South is located approximately 20m east of the proposed development, consisting of 2-lanes with curb side parking and a posted speed of 50 km/hr. See Figure 2 for Site Plan.

3.0 NOISE IMPACT ASSESSMENT

3.1 NOISE CRITERIA

The Ministry of Environment (MOE) specifies limits for road noise relative to new residential developments. The MOE Publication NPC-300 entitled "Stationary & Transportation Sources-Approval & Planning, specifies the criteria, summarized as follows:

TABLE1- Road Traffic Sound Levels Limits

Time Period	Leq (dBA)
07:00 – 23:00 (16 hr.)	55 Outdoor Living area
	55 Plane of Window
23:00 – 07:00 (8 hr.)	50 Plane of Bedroom window

Where noise levels estimated at the Plane of the Window (POW) are equal to or less than the values listed in Table 1, no noise control measures are required. Where noise levels exceed Table 1 values, the following action is required:

TABLE 2 –Noise Control Requirements		
Time Period	**Noise Level Leq (dBA)**	**Action Required**
07:00 - 23:00 Daytime (OLA)	56 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 3 - Indoor Road Sound Levels Limits	
Indoor Location	**Leq (dBA)**
	Road
Living/Dining/ Bedroom 7:00 – 23:00	45
Living/Dining/ Bedroom 23:00 - 07:00	40

3.2 ROAD NOISE

Predicted road traffic noise levels were calculated for Ardagh Road and Ferndale Drive South, the main road noise sources in the proposed site area. The 2014 AADT road traffic volumes for Ardagh Road and Ferndale Drive South respectfully, were sourced from the City of Barrie Interactive Mapping Portal website. See Appendix "A" for traffic counts.

The MOE computer program STAMSON version 5.04 was used to carry out prediction calculations (See Appendix "A"). Traffic data is summarized in Table 4. The daytime/nighttime volume ratios relative to Ardagh Road and Ferndale Drive South is typically calculated using a 90/10 split and a 16/8 hr assessment is required by the MOE.

The percentage of annual growth for Ardagh Road was figured at 2.0% over 15 years. The AADT (Annual Average Daily Traffic) volumes used are reflective of the worst-case scenario. Truck volumes were factored at 2% medium and 3% heavy of the total vehicle volumes for the roadway segment.

The percentage of annual growth for Ferndale Drive South was figured at 2.0% over 15 years. The AADT (Annual Average Daily Traffic) volumes used are reflective of the worst-case scenario. Truck volumes were factored at 2% medium and 4% heavy of the total vehicle volumes for the roadway segment. Table 5 summarizes the "free field" traffic noise prediction results, modeled at 13 receptor locations representative of the OLA's and Facades for townhouses and, Plain of the Window (POW) of the building facade for all floors of the proposed commercial/residential development and the amenity area located at the north east corner of the proposed development. (See Figure 3 Receptor Locations).

TABLE 4 – Future Road Traffic Volumes			
Ardagh Road	**AADT - 13145 Vehicles**		
	Cars	**Medium Trucks**	**Heavy Trucks**
Day	11239	237	355
Night	1249	26	39
Ferndale Drive South	**AADT - 17617 Vehicles**		
	Cars	**Medium Trucks**	**Heavy Trucks**
Day	14904	317	634
Night	1656	35	70

The following Table 5 represents the free field noise levels of combined road traffic from Ardagh Road and Ferndale Drive South. Table 5 is representative of the 2nd and top floor mixed-use condo units and specific facades of the townhouse units.

TABLE 5 – Predicted Combined Future Traffic Noise (dBA)		
Location	**07:00 – 23:00**	**23:00 – 07:00**
R1- Building F – South Façade- 2nd Floor	67.0 dba	61.0 dba
R2- Building F – South Façade- Top Floor	67.0 dba	59.0 dba
R3- Building F – East Façade- 2nd Floor	68.0 dba	61.0 dba
R4- Building F – East Façade- Top Floor	68.0 dba	62.0 dba
R5 - Building F – North Façade- 2nd Floor	60.0 dba	53.0 dba
R6- Building F – North Façade- Top Floor	64.0 dba	57.0 dba
R7 – Building A – South Façade	56.0 dba	49.0 dba
R8 - Building A – North Façade	55.0 dba	49.0 dba
R9- Building D – East Façade	56.0 dba	49.0 dba
R10- Building D – West Façade	63.0 dba	56.0 dba
R11- Building E – East Façade	60.0 dba	54.0 dba
R12- Building E – West Façade	60.0 dba	54.0 dba
R13- Central Outdoor Amenity Area (OLA)	64.0 dba	NA

The following Table 5A represents the mitigated noise levels of at the Central Outdoor OLA and Building A and Building D rear yard amenity spaces.

TABLE 5A – Mitigated Future Traffic Noise (dBA) with a 2.43m Noise Barrier		
Location	**07:00 – 23:00**	**23:00 – 07:00**
R13- Central Outdoor Amenity Area (OLA)	59.0 dba	NA
R10- Building D – Rear Yard OLA	55.0 dba	NA

4.0 RECOMMENDATIONS - NOISE CONTROL

4.1 OUTDOOR LIVING AREAS

Calculated road noise levels exceed the 55 dBA daytime criteria outlined in Table 1. Condo building designs were not made available at the time of the report and is unknown if balconies will be implemented.

Balconies less than 4m in depth are not considered OLA's (Outdoor Living Areas), and as such, noise mitigation measures would not be required.
Located to the north east of the proposed development is an amenity space. The proposed amenity space is located approximately 67m north of Ardagh Road and approximately 127m west of Ferndale Drive South. As the road noise levels for the amenity space do not exceed the 55 dBA daytime criteria outlined in Table 1, noise mitigation measures are not required. See Figure 4 Barrier Location.

The townhouse Building C noise levels are below 60 dba for the OLA and in lieu of a noise barrier a Type "A" Warning Clause will suffice for all units in the Block. Receptor locations R10-R12 require a 2.43m Noise Barrier for the OLA's. See Figure 4, Barrier Locations.

In compliance with MOE guidelines, the noise barrier must have a minimum surface density of 20 kg/m^2 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. In addition to the recommended physical controls, specifically worded warning clauses may be mandatory.

4.2 INDOOR NOISE LEVELS

Calculated nighttime road noise levels at the Plane of Window (POW) exceed the 50 dBA criteria outlined in Table 1 for indoor space for any residential units throughout the proposed development. Specific building components (walls, windows, doors etc.) are required and confirmed using the STC (Sound Transmission Class) method. Building design specifications were not made available at report time and STC calculations (Sound Transmission Class) method are summarized in Table 6 following.

TABLE 6 – Recommended Door and Wall Construction

LOCATION	STC To Be Used	Wall	Door Construction
R1 & R3			
Livingroom	28	EW1	D1
Bedroom	31	EW1	D1
R2			
Livingroom	31	EW2	D2
Bedroom	30	EW2	D2

5.0 VENTILATION / WARNING CLAUSES

Ventilation and warning clause requirements are required for this project as noted in Table 7 following. The proposed site development has yet to determine heating system and must be addressed prior to Final Site Plan Approval.

TABLE 7 - Ventilation and Warning Clause Requirements

LOCATION	VENTILATION	WARNING CLAUSE
All Residential Building A/Condo Units	A/C Units	Type "B" & "D"
Townhouses Building C	Provisions for A/C Units	Type "A" & "C"
Townhouses Building A (R10-R12)	A/C Units	Type "B" & "D"

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

TYPE A: (Townhouse Building C)

"Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the Municipality's and the Ministry of the Environment's noise criteria."

TYPE B: (All Residential

"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 Ministry of the Environment's noise criteria."

TYPE C:

"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 Ministry of the Environment' noise criteria.

(Note: The location and installation of the outdoor air conditioning device should be done so as to comply with noise criteria of MOE Publication NPC-216, Residential Air Conditioning Devices and thus minimize the noise impacts both on and in the immediate vicinity of the subject property.)"

TYPE D:

"This 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."

6.0 SUMMARY OF RECOMMENDATIONS

The following noise control measures are required to satisfy the indoor and outdoor noise level criterion:

- A/C Units for all Residential Units as recommended in Table 7.
- Provisions for A/C Units for all Residential Units as recommended in Table 7.
- Window, Door, and Wall construction as recommended in Table 6.
- Registered warning clause on title Table 7.
- A 2.43m Noise Barrier for specific locations to be installed as MOE requirements noted in Figure 4.
- A 1.83m Noise Barrier for specific Amenity Space as noted in Figure 4.
- 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 Consulting Inc. provided a noise impact study on behalf of 2596843 Ontario Inc. for the proposed "224 Ardagh Road 6 Storey Residential/Commercial Condominium & 3 Storey Townhouse Development" located on Ardagh Road and Ferndale Drive South, Barrie ON.

The purpose of the study determined the noise impact from Ardagh Road and Ferndale Drive South vehicular traffic that may impact the proposed mixed-use development as required for site plan approval for the City of Barrie.

This study detailed noise impact relative to the site plan and recommend noise control measures necessary to meet MOE Publication NPC-300 entitled "Stationary & Transportation Sources-Approval & Planning guidelines while satisfying the planning requirements of the City of Barrie Planning Department.

FIGURE 1
SITE LOCATION

FIGURE 2
SITE PLAN

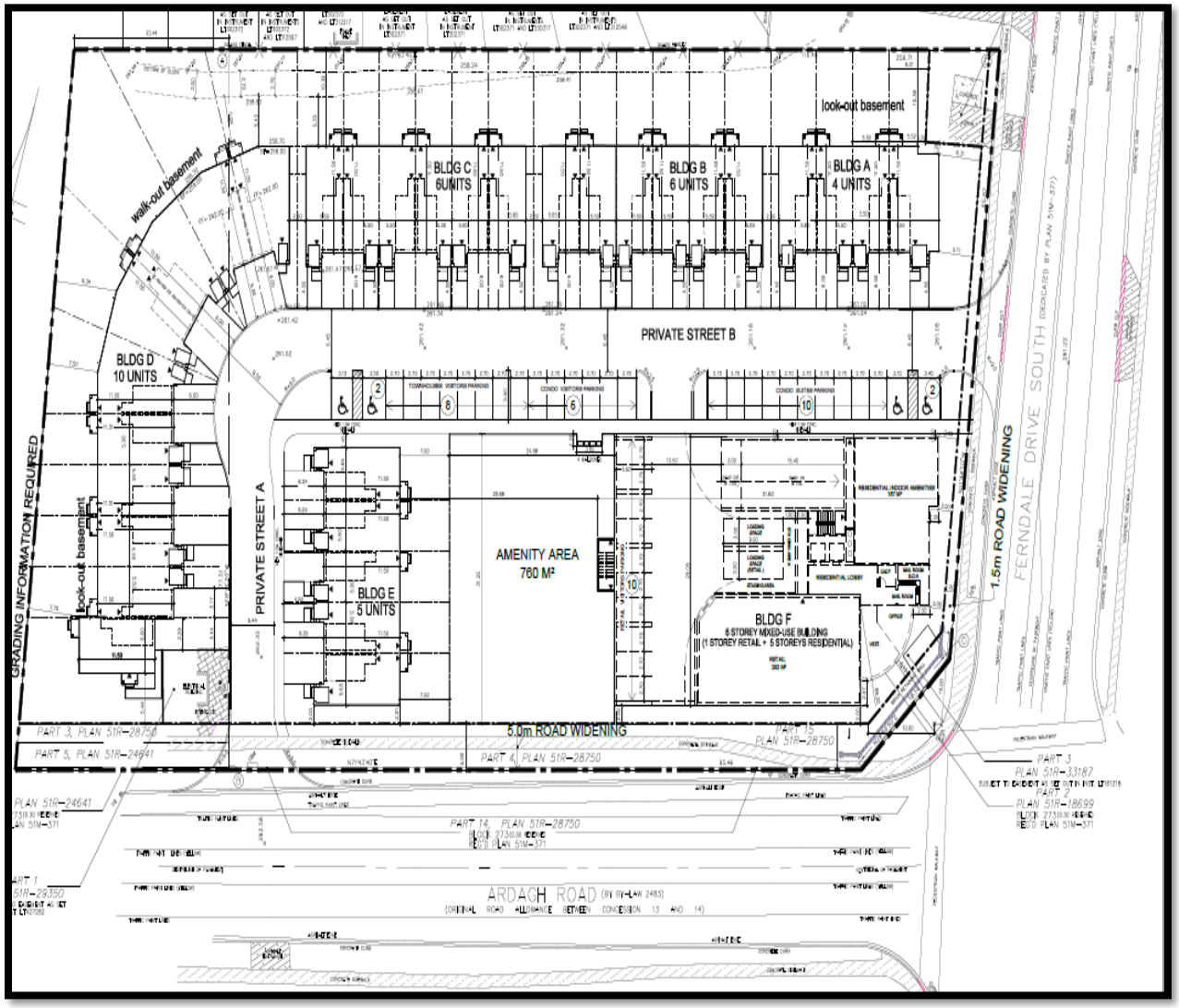
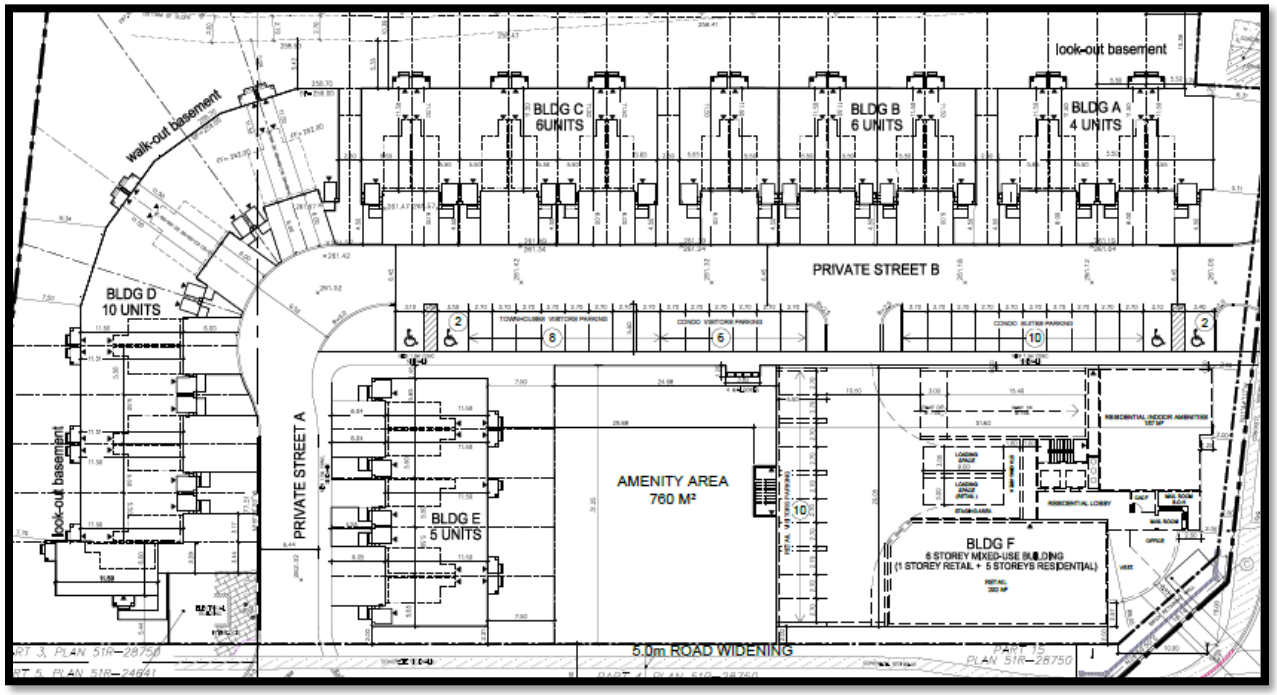


FIGURE 3
RECEPTOR LOCATIONS



R1- Building F – South Façade- 2nd Floor

R2- Building F – South Façade- Top Floor

R3- Building F – East Façade- 2nd Floor

R4- Building F – East Façade- Top Floor

R5 - Building F – North Façade- 2nd Floor

R6- Building F – North Façade- Top Floor

R7 – Building A – South Façade

R8 - Building A – North Façade

R9- Building D – East Façade

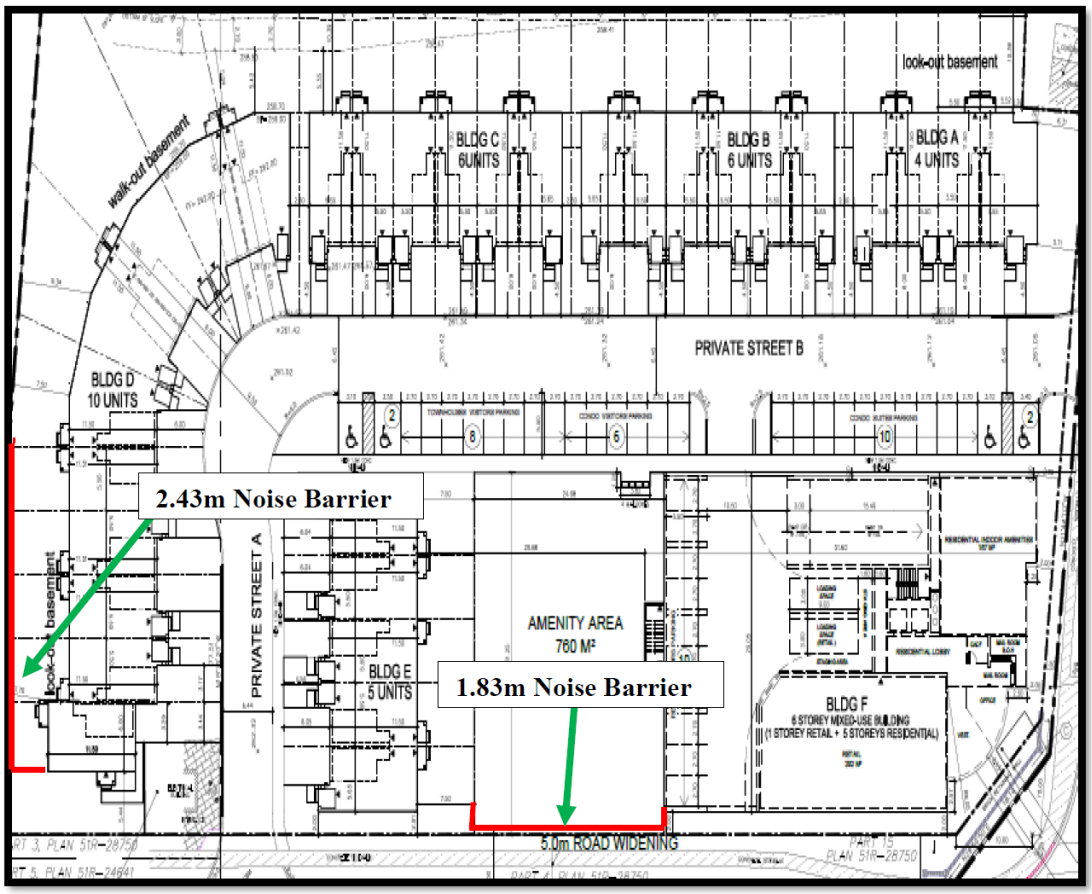
R10- Building D – West Façade

R11- Building E – East Façade

R12- Building E – West Façade

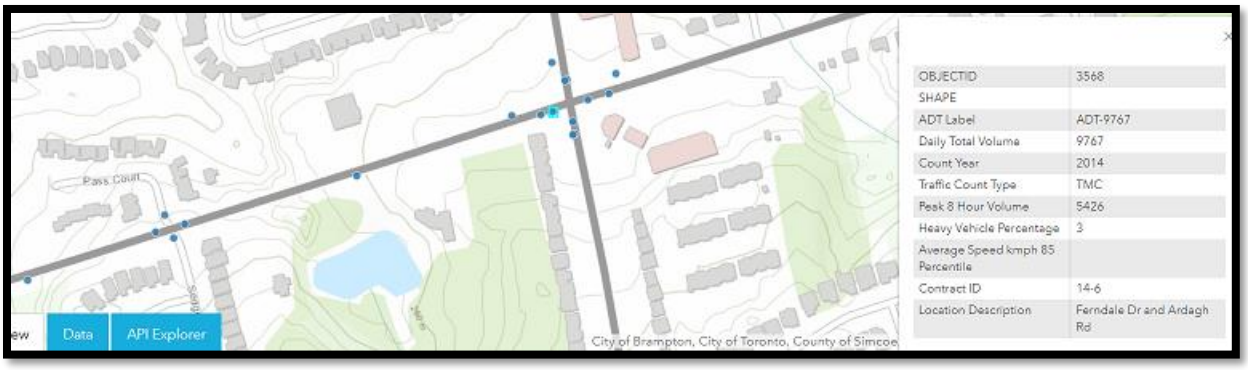
R13- Central Outdoor Amenity Area (OLA)

FIGURE 4
BARRIER LOCATIONS

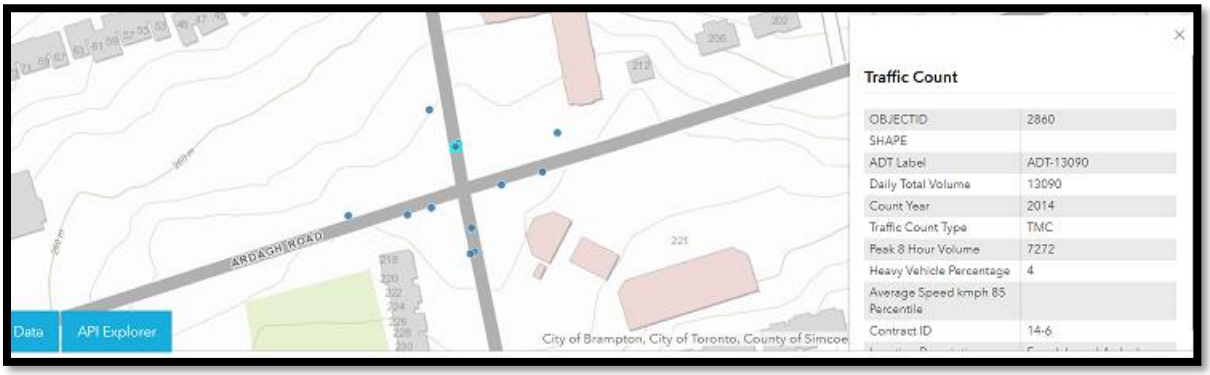


APPENDIX "A"

CITY OF BARRIE
TRAFFIC COUNT
ARDAGH ROAD



TRAFFIC COUNT
FERNDALE DRIVE SOUTH



STAMSON CALCULATIONS

```
STAMSON 5.04        NORMAL REPORT        Date: 17-04-2019 13:31:41
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ardaR1.te            Time Period: Day/Night 16/8 hours
Description: R1-Building F South Facade 2nd Floor
                           TOTAL Leq FROM ALL SOURCES (DAY): 67.28
                      (NIGHT): 60.72
Road data, segment # 1: Ferndale Dr (day/night)
-----------------------------------------------
Car traffic volume  : 14904/1656  veh/TimePeriod  *
Medium truck volume :   317/35    veh/TimePeriod  *
Heavy truck volume  :   634/70    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):  13090
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   4.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Ferndale Dr (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  :  28.00 / 28.00  m
Receiver height           :   8.00 / 8.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
Road data, segment # 2: Ardagh Rd (day/night)
-----------------------------------------------
Car traffic volume  : 11239/1249  veh/TimePeriod  *
Medium truck volume :   237/26    veh/TimePeriod  *
Heavy truck volume  :   355/39    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):   9767
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   3.00
    Day (16 hrs) % of Total Volume     :  90.00
```

```
Data for Segment # 2: Ardagh 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  :  15.00 / 15.00  m
Receiver height           :   8.00 / 8.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
Results segment # 1: Ferndale Dr (day)
--------------------------------------
Source height = 1.41 m
ROAD (0.00 + 62.06 + 0.00) = 62.06 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
-90      0   0.00  67.79   0.00  -2.71  -3.01   0.00   0.00   0.00  62.06
-------------------------------------------------------------------------------
Segment Leq : 62.06 dBA
Results segment # 2: Ardagh Rd (day)
------------------------------------
Source height = 1.32 m
ROAD (0.00 + 65.73 + 0.00) = 65.73 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
-90     90   0.00  65.73   0.00   0.00   0.00   0.00   0.00   0.00  65.73
-------------------------------------------------------------------------------
Segment Leq : 65.73 dBA
Total Leq All Segments: 67.28 dBA
Results segment # 1: Ferndale Dr (night)
----------------------------------------
Source height = 1.41 m
ROAD (0.00 + 55.51 + 0.00) = 55.51 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
-90      0   0.00  61.23   0.00  -2.71  -3.01   0.00   0.00   0.00  55.51
-------------------------------------------------------------------------------
Segment Leq : 55.51 dBA
Results segment # 2: Ardagh Rd (night)
--------------------------------------
Source height = 1.31 m
ROAD (0.00 + 59.17 + 0.00) = 59.17 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
 -90    90   0.00  59.17   0.00   0.00   0.00   0.00   0.00   0.00  59.17
-------------------------------------------------------------------------------
Segment Leq : 59.17 dBA

Total Leq All Segments: 60.72 dBA
```

```
STAMSON 5.04        NORMAL REPORT        Date: 17-04-2019 13:45:40
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ardar2.te            Time Period: Day/Night 16/8 hours
Description: R2-Building F South Facade Top Floor
                              TOTAL Leq FROM ALL SOURCES (DAY): 67.28
                                                 (NIGHT): 60.72
Road data, segment # 1: Ferndale Dr (day/night)
----------------------------------------------
Car traffic volume  : 14904/1656  veh/TimePeriod  *
Medium truck volume :   317/35    veh/TimePeriod  *
Heavy truck volume  :   634/70    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):  13090
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   4.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Ferndale Dr (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  :  28.00 / 28.00  m
Receiver height           :  24.00 / 24.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
Road data, segment # 2: Ardagh Rd (day/night)
----------------------------------------------
Car traffic volume  : 11239/1249  veh/TimePeriod  *
Medium truck volume :   237/26    veh/TimePeriod  *
Heavy truck volume  :   355/39    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):   9767
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   3.00
    Day (16 hrs) % of Total Volume     :  90.00
```

```
Data for Segment # 2: Ardagh 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  :  15.00 / 15.00  m
Receiver height           :  24.00 / 24.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
Results segment # 1: Ferndale Dr (day)
--------------------------------------
Source height = 1.41 m
ROAD (0.00 + 62.06 + 0.00) = 62.06 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
-90      0   0.00  67.79   0.00  -2.71  -3.01   0.00   0.00   0.00  62.06
-------------------------------------------------------------------------------
Segment Leq : 62.06 dBA
Results segment # 2: Ardagh Rd (day)
------------------------------------
Source height = 1.32 m
ROAD (0.00 + 65.73 + 0.00) = 65.73 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
-90     90   0.00  65.73   0.00   0.00   0.00   0.00   0.00   0.00  65.73
-------------------------------------------------------------------------------
Segment Leq : 65.73 dBA
Total Leq All Segments: 67.28 dBA
Results segment # 1: Ferndale Dr (night)
----------------------------------------
Source height = 1.41 m
ROAD (0.00 + 55.51 + 0.00) = 55.51 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
-90      0   0.00  61.23   0.00  -2.71  -3.01   0.00   0.00   0.00  55.51
-------------------------------------------------------------------------------
Segment Leq : 55.51 dBA
Results segment # 2: Ardagh Rd (night)
--------------------------------------
Source height = 1.31 m
ROAD (0.00 + 59.17 + 0.00) = 59.17 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
 -90     90   0.00  59.17   0.00   0.00   0.00   0.00   0.00   0.00  59.17
-------------------------------------------------------------------------------
Segment Leq : 59.17 dBA

Total Leq All Segments: 60.72 dBA
```

```
STAMSON 5.04        SUMMARY REPORT        Date: 17-04-2019 14:13:29
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ardar3.te            Time Period: Day/Night 16/8 hours
Description: R3-Building F East Facade 2nd Floor
                              TOTAL Leq FROM ALL SOURCES (DAY): 68.42
                                                 (NIGHT): 61.86
Road data, segment # 1: Ferndale Dr (day/night)
----------------------------------------------
Car traffic volume  : 14904/1656  veh/TimePeriod  *
Medium truck volume :   317/35    veh/TimePeriod  *
Heavy truck volume  :   634/70    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):  13090
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   4.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Ferndale Dr (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  :  15.00 / 15.00  m
Receiver height           :   8.00 / 8.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
Road data, segment # 2: Ardagh Rd (day/night)
----------------------------------------------
Car traffic volume  : 11239/1249  veh/TimePeriod  *
Medium truck volume :   237/26    veh/TimePeriod  *
Heavy truck volume  :   355/39    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):   9767
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   3.00
    Day (16 hrs) % of Total Volume     :  90.00
```

```
Data for Segment # 2: Ardagh 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  :  30.00 / 30.00  m
Receiver height           :   8.00 / 8.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
Result summary (day)
--------------------
                     !  source  !   Road   !  Total
                     !  height  !   Leq    !   Leq
                     !    (m)   !  (dBA)   !  (dBA)
---------------------+---------+---------+---------
 1.Ferndale Dr       !     1.41 !    67.79 !    67.79
 2.Ardagh Rd         !     1.32 !    59.71 !    59.71
---------------------+---------+---------+---------
                       Total                  68.42 dBA
Result summary (night)
----------------------
                     !  source  !   Road   !  Total
                     !  height  !   Leq    !   Leq
                     !    (m)   !  (dBA)   !  (dBA)
---------------------+---------+---------+---------
 1.Ferndale Dr       !     1.41 !    61.23 !    61.23
 2.Ardagh Rd         !     1.31 !    53.15 !    53.15
---------------------+---------+---------+---------
                       Total                  61.86 dBA
```

```
STAMSON 5.04        SUMMARY REPORT        Date: 17-04-2019 14:25:38
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ardar4.te            Time Period: Day/Night 16/8 hours
Description: R4-Building F East Facade Top Floor
                     TOTAL Leq FROM ALL SOURCES (DAY): 68.42
                                                (NIGHT): 61.86
Road data, segment # 1: Ferndale Dr (day/night)
----------------------------------------------
Car traffic volume  : 14904/1656  veh/TimePeriod  *
Medium truck volume :   317/35    veh/TimePeriod  *
Heavy truck volume  :   634/70    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):  13090
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   4.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Ferndale Dr (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  :  15.00 / 15.00  m
Receiver height           :  24.00 / 24.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
Road data, segment # 2: Ardagh Rd (day/night)
----------------------------------------------
Car traffic volume  : 11239/1249  veh/TimePeriod  *
Medium truck volume :   237/26    veh/TimePeriod  *
Heavy truck volume  :   355/39    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):   9767
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   3.00
    Day (16 hrs) % of Total Volume     :  90.00
```

```
Data for Segment # 2: Ardagh 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  :  30.00 / 30.00  m
Receiver height           :  24.00 / 24.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
Result summary (day)
--------------------
                     !  source  !   Road   !  Total
                     !  height  !   Leq    !   Leq
                     !    (m)   !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Ferndale Dr       !     1.41 !    67.79 !    67.79
 2.Ardagh Rd         !     1.32 !    59.71 !    59.71
--------------------+---------+---------+---------
                       Total                  68.42 dBA
Result summary (night)
----------------------
                     !  source  !   Road   !  Total
                     !  height  !   Leq    !   Leq
                     !    (m)   !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Ferndale Dr       !     1.41 !    61.23 !    61.23
 2.Ardagh Rd         !     1.31 !    53.15 !    53.15
--------------------+---------+---------+---------
                       Total                  61.86 dBA
```

```
STAMSON 5.04        SUMMARY REPORT        Date: 17-04-2019 14:50:08
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ardar5.te            Time Period: Day/Night 16/8 hours
Description: R5-Building North Facade 2nd Floor
                          TOTAL Leq FROM ALL SOURCES (DAY): 59.92
                                                    (NIGHT): 53.37
Road data, segment # 1: Ferndale Dr (day/night)
----------------------------------------------
Car traffic volume  : 14904/1656  veh/TimePeriod  *
Medium truck volume :   317/35    veh/TimePeriod  *
Heavy truck volume  :   634/70    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):  13090
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   4.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Ferndale Dr (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  :  28.00 / 28.00  m
Receiver height           :   8.00 / 8.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
Road data, segment # 2: Ardagh Rd (day/night)
----------------------------------------------
Car traffic volume  : 11239/1249  veh/TimePeriod  *
Medium truck volume :   237/26    veh/TimePeriod  *
Heavy truck volume  :   355/39    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):   9767
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   3.00
    Day (16 hrs) % of Total Volume     :  90.00
```

```
Data for Segment # 2: Ardagh Rd (day/night)
-------------------------------------------
Angle1   Angle2           : -20.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  35.00 / 35.00  m
Receiver height           :   8.00 / 8.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
Result summary (day)
--------------------
                     !  source  !   Road   !  Total
                     !  height  !   Leq    !   Leq
                     !    (m)   !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Ferndale Dr       !     1.41 !    59.05 !    59.05
 2.Ardagh Rd         !     1.32 !    52.51 !    52.51
--------------------+---------+---------+---------
                       Total                 59.92 dBA
Result summary (night)
----------------------
                     !  source  !   Road   !  Total
                     !  height  !   Leq    !   Leq
                     !    (m)   !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Ferndale Dr       !     1.41 !    52.50 !    52.50
 2.Ardagh Rd         !     1.31 !    45.95 !    45.95
--------------------+---------+---------+---------
                       Total                 53.37 dBA
```

```
STAMSON 5.04        SUMMARY REPORT        Date: 17-04-2019 15:03:26
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ardar6.te            Time Period: Day/Night 16/8 hours
Description: R6-Building North Facade Top Floor
                              TOTAL Leq FROM ALL SOURCES (DAY): 63.82
                                                   (NIGHT): 57.26
Road data, segment # 1: Ferndale Dr (day/night)
-----------------------------------------------
Car traffic volume  : 14904/1656  veh/TimePeriod  *
Medium truck volume :   317/35    veh/TimePeriod  *
Heavy truck volume  :   634/70    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):  13090
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   4.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Ferndale Dr (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  :  28.00 / 28.00  m
Receiver height           :  24.00 / 24.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
Road data, segment # 2: Ardagh Rd (day/night)
-----------------------------------------------
Car traffic volume  : 11239/1249  veh/TimePeriod  *
Medium truck volume :   237/26    veh/TimePeriod  *
Heavy truck volume  :   355/39    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):   9767
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   3.00
    Day (16 hrs) % of Total Volume     :  90.00
```

```
Data for Segment # 2: Ardagh Rd (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  :  35.00 / 35.00  m
Receiver height           :  24.00 / 24.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
Result summary (day)
--------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Ferndale Dr      !     1.41 !    62.06 !    62.06
 2.Ardagh Rd        !     1.32 !    59.04 !    59.04
--------------------+---------+---------+---------
                      Total                  63.82 dBA
Result summary (night)
----------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Ferndale Dr      !     1.41 !    55.51 !    55.51
 2.Ardagh Rd        !     1.31 !    52.48 !    52.48
--------------------+---------+---------+---------
                      Total                  57.26 dBA
```

```
STAMSON 5.04        SUMMARY REPORT        Date: 17-04-2019 15:41:16
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ardar7.te            Time Period: Day/Night 16/8 hours
Description: R7-Building A- South Facade
                     TOTAL Leq FROM ALL SOURCES (DAY): 55.58
                                                (NIGHT): 49.03
Road data, segment # 1: Ferndale Dr (day/night)
-----------------------------------------------
Car traffic volume  : 14904/1656  veh/TimePeriod  *
Medium truck volume :   317/35    veh/TimePeriod  *
Heavy truck volume  :   634/70    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):  13090
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   4.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Ferndale Dr (day/night)
-----------------------------------------------
Angle1   Angle2           : -15.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  28.00 / 28.00  m
Receiver height           :   1.50 / 7.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
Road data, segment # 2: Ardagh Rd (day/night)
-----------------------------------------------
Car traffic volume  : 11239/1249  veh/TimePeriod  *
Medium truck volume :   237/26    veh/TimePeriod  *
Heavy truck volume  :   355/39    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):   9767
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   3.00
    Day (16 hrs) % of Total Volume     :  90.00
```

```
Data for Segment # 2: Ardagh Rd (day/night)
-------------------------------------------
Angle1   Angle2           : -15.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  50.00 / 50.00  m
Receiver height           :   1.50 / 7.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
Result summary (day)
--------------------
                     !  source  !   Road   !  Total
                     !  height  !   Leq    !   Leq
                     !    (m)   !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Ferndale Dr       !     1.41 !    54.28 !    54.28
 2.Ardagh Rd         !     1.32 !    49.71 !    49.71
--------------------+---------+---------+---------
                       Total                  55.58 dBA
Result summary (night)
----------------------
                     !  source  !   Road   !  Total
                     !  height  !   Leq    !   Leq
                     !    (m)   !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Ferndale Dr       !     1.41 !    47.73 !    47.73
 2.Ardagh Rd         !     1.31 !    43.15 !    43.15
--------------------+---------+---------+---------
                       Total                  49.03 dBA
```

```
STAMSON 5.04        SUMMARY REPORT        Date: 17-04-2019 15:50:13
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ardar8.te            Time Period: Day/Night 16/8 hours
Description: R8-Building A- North Facade
                     TOTAL Leq FROM ALL SOURCES (DAY): 55.48
                                                (NIGHT): 48.92
Road data, segment # 1: Ferndale Dr (day/night)
-----------------------------------------------
Car traffic volume  : 14904/1656  veh/TimePeriod  *
Medium truck volume :   317/35    veh/TimePeriod  *
Heavy truck volume  :   634/70    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):  13090
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   4.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Ferndale Dr (day/night)
-----------------------------------------------
Angle1   Angle2           : -15.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  28.00 / 28.00  m
Receiver height           :   1.50 / 7.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
Road data, segment # 2: Ardagh Rd (day/night)
-----------------------------------------------
Car traffic volume  : 11239/1249  veh/TimePeriod  *
Medium truck volume :   237/26    veh/TimePeriod  *
Heavy truck volume  :   355/39    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):   9767
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   3.00
    Day (16 hrs) % of Total Volume     :  90.00
```

```
Data for Segment # 2: Ardagh Rd (day/night)
-------------------------------------------
Angle1   Angle2           : -15.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  55.00 / 55.00  m
Receiver height           :   1.50 / 7.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
Result summary (day)
--------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Ferndale Dr      !     1.41 !    54.28 !    54.28
 2.Ardagh Rd        !     1.32 !    49.30 !    49.30
--------------------+---------+---------+---------
                      Total                  55.48 dBA
Result summary (night)
----------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Ferndale Dr      !     1.41 !    47.73 !    47.73
 2.Ardagh Rd        !     1.31 !    42.73 !    42.73
--------------------+---------+---------+---------
                      Total                  48.92 dBA
```

```
STAMSON 5.04        SUMMARY REPORT        Date: 17-04-2019 16:16:26
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ardar9.te            Time Period: Day/Night 16/8 hours
Description: R9-Building D- East Facade
                          TOTAL Leq FROM ALL SOURCES (DAY): 56.02
                                                    (NIGHT): 49.46
Road data, segment # 1: Ferndale Dr (day/night)
-----------------------------------------------
Car traffic volume  : 14904/1656  veh/TimePeriod  *
Medium truck volume :   317/35    veh/TimePeriod  *
Heavy truck volume  :   634/70    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):  13090
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   4.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Ferndale Dr (day/night)
-----------------------------------------------
Angle1   Angle2           : -15.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  85.00 / 85.00  m
Receiver height           :   1.50 / 7.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
Road data, segment # 2: Ardagh Rd (day/night)
-----------------------------------------------
Car traffic volume  : 11239/1249  veh/TimePeriod  *
Medium truck volume :   237/26    veh/TimePeriod  *
Heavy truck volume  :   355/39    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):   9767
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   3.00
    Day (16 hrs) % of Total Volume     :  90.00
```

```
Data for Segment # 2: Ardagh Rd (day/night)
-------------------------------------------
Angle1   Angle2           : -15.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  15.00 / 15.00  m
Receiver height           :   1.50 / 7.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
Result summary (day)
--------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Ferndale Dr      !     1.41 !    49.46 !    49.46
 2.Ardagh Rd        !     1.32 !    54.94 !    54.94
--------------------+---------+---------+---------
                      Total                  56.02 dBA
Result summary (night)
----------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Ferndale Dr      !     1.41 !    42.91 !    42.91
 2.Ardagh Rd        !     1.31 !    48.38 !    48.38
--------------------+---------+---------+---------
                      Total                  49.46 dBA
```

```
STAMSON 5.04        SUMMARY REPORT        Date: 17-04-2019 16:32:08
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ardar10.te           Time Period: Day/Night 16/8 hours
Description: R10-Building D- West Facade
                     TOTAL Leq FROM ALL SOURCES (DAY): 62.90
                                                (NIGHT): 56.34
Road data, segment # 1: Ferndale Dr (day/night)
-----------------------------------------------
Car traffic volume  : 14904/1656  veh/TimePeriod  *
Medium truck volume :   317/35    veh/TimePeriod  *
Heavy truck volume  :   634/70    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):  13090
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   4.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Ferndale Dr (day/night)
---------------------------------------------
Angle1   Angle2           : -15.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  95.00 / 95.00  m
Receiver height           :   1.50 / 7.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: Ardagh Rd (day/night)
---------------------------------------------
Car traffic volume  : 11239/1249  veh/TimePeriod  *
Medium truck volume :   237/26    veh/TimePeriod  *
Heavy truck volume  :   355/39    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):   9767
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   3.00
    Day (16 hrs) % of Total Volume     :  90.00
```

```
Data for Segment # 2: Ardagh Rd (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  :  15.00 / 15.00  m
Receiver height           :   1.50 / 7.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
Result summary (day)
--------------------
                     !  source  !   Road   !  Total
                     !  height  !   Leq    !   Leq
                     !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Ferndale Dr       !     1.41 !    48.98 !    48.98
 2.Ardagh Rd         !     1.32 !    62.72 !    62.72
--------------------+---------+---------+---------
                       Total                  62.90 dBA
Result summary (night)
----------------------
                     !  source  !   Road   !  Total
                     !  height  !   Leq    !   Leq
                     !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Ferndale Dr       !     1.41 !    42.43 !    42.43
 2.Ardagh Rd         !     1.31 !    56.16 !    56.16
--------------------+---------+---------+---------
                       Total                  56.34 dBA
```

```
STAMSON 5.04        SUMMARY REPORT        Date: 17-04-2019 16:45:41
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ardar11.te           Time Period: Day/Night 16/8 hours
Description: R11-Building E- East Facade
                            TOTAL Leq FROM ALL SOURCES (DAY): 60.25
                                                 (NIGHT): 53.70
Road data, segment # 1: Ferndale Dr (day/night)
-----------------------------------------------
Car traffic volume  : 14904/1656  veh/TimePeriod  *
Medium truck volume :   317/35    veh/TimePeriod  *
Heavy truck volume  :   634/70    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):  13090
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   4.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Ferndale Dr (day/night)
-----------------------------------------------
Angle1   Angle2           : -15.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  60.00 / 60.00  m
Receiver height           :   1.50 / 7.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
Road data, segment # 2: Ardagh Rd (day/night)
-----------------------------------------------
Car traffic volume  : 11239/1249  veh/TimePeriod  *
Medium truck volume :   237/26    veh/TimePeriod  *
Heavy truck volume  :   355/39    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):   9767
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   3.00
    Day (16 hrs) % of Total Volume     :  90.00
```

```
Data for Segment # 2: Ardagh Rd (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  :  15.00 / 15.00  m
Receiver height           :   1.50 / 7.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
Result summary (day)
--------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Ferndale Dr      !     1.41 !    50.97 !    50.97
 2.Ardagh Rd        !     1.32 !    59.71 !    59.71
--------------------+---------+---------+---------
                      Total                  60.25 dBA
Result summary (night)
----------------------
                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Ferndale Dr      !     1.41 !    44.42 !    44.42
 2.Ardagh Rd        !     1.31 !    53.15 !    53.15
--------------------+---------+---------+---------
                      Total                  53.70 dBA
```

```
STAMSON 5.04        SUMMARY REPORT        Date: 17-04-2019 16:54:34
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ardar12.te           Time Period: Day/Night 16/8 hours
Description: R12-Building E- West Facade
                     TOTAL Leq FROM ALL SOURCES (DAY): 60.22
                                                (NIGHT): 53.66
Road data, segment # 1: Ferndale Dr (day/night)
-----------------------------------------------
Car traffic volume  : 14904/1656  veh/TimePeriod  *
Medium truck volume :   317/35    veh/TimePeriod  *
Heavy truck volume  :   634/70    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):  13090
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   4.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Ferndale Dr (day/night)
---------------------------------------------
Angle1   Angle2           : -15.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  65.00 / 65.00  m
Receiver height           :   1.50 / 7.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: Ardagh Rd (day/night)
---------------------------------------------
Car traffic volume  : 11239/1249  veh/TimePeriod  *
Medium truck volume :   237/26    veh/TimePeriod  *
Heavy truck volume  :   355/39    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):   9767
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   3.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 2: Ardagh Rd (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  :  15.00 / 15.00  m
Receiver height           :   1.50 / 7.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
Result summary (day)
--------------------
                     !  source  !   Road   !  Total
                     !  height  !   Leq    !   Leq
                     !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Ferndale Dr       !     1.41 !    50.63 !    50.63
 2.Ardagh Rd         !     1.32 !    59.71 !    59.71
--------------------+---------+---------+---------
                       Total                  60.22 dBA
Result summary (night)
----------------------
                     !  source  !   Road   !  Total
                     !  height  !   Leq    !   Leq
                     !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Ferndale Dr       !     1.41 !    44.07 !    44.07
 2.Ardagh Rd         !     1.31 !    53.15 !    53.15
--------------------+---------+---------+---------
                       Total                  53.66 dBA
```

```
STAMSON 5.04        SUMMARY REPORT        Date: 17-04-2019 17:10:45
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ardar13.te           Time Period: Day/Night 16/8 hours
Description: R13-Central OLA
                              TOTAL Leq FROM ALL SOURCES (DAY): 63.67
                                                 (NIGHT): 57.11
Road data, segment # 1: Ferndale Dr (day/night)
-----------------------------------------------
Car traffic volume  : 14904/1656  veh/TimePeriod  *
Medium truck volume :   317/35    veh/TimePeriod  *
Heavy truck volume  :   634/70    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):  13090
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   4.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Ferndale Dr (day/night)
---------------------------------------------
Angle1   Angle2           : -15.00 deg   10.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  50.00 / 50.00  m
Receiver height           :   1.50 / 7.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: Ardagh Rd (day/night)
---------------------------------------------
Car traffic volume  : 11239/1249  veh/TimePeriod  *
Medium truck volume :   237/26    veh/TimePeriod  *
Heavy truck volume  :   355/39    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):   9767
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   3.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 2: Ardagh Rd (day/night)
```

```
-----------------------------------------
Angle1   Angle2           : -50.00 deg   50.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  15.00 / 15.00  m
Receiver height           :   1.50 / 7.00   m
Topography                :      1     (Flat/gentle slope; no barrier)
Reference angle           :   0.00
Result summary (day)
--------------------
                     !  source  !   Road   !  Total
                     !  height  !   Leq    !   Leq
                     !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Ferndale Dr       !     1.41 !    53.98 !    53.98
 2.Ardagh Rd         !     1.32 !    63.18 !    63.18
--------------------+---------+---------+---------
                       Total                  63.67 dBA
Result summary (night)
----------------------
                     !  source  !   Road   !  Total
                     !  height  !   Leq    !   Leq
                     !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Ferndale Dr       !     1.41 !    47.43 !    47.43
 2.Ardagh Rd         !     1.31 !    56.62 !    56.62
--------------------+---------+---------+---------
                       Total                  57.11 dBA
```

```
STAMSON 5.04        SUMMARY REPORT        Date: 17-04-2019 17:36:18
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R10OLA.te            Time Period: Day/Night 16/8 hours
Description: R10-Central OLA 2.43m Noise Barrier
                                TOTAL Leq FROM ALL SOURCES (DAY): 55.41

Road data, segment # 1: Ferndale Dr (day/night)
-----------------------------------------------
Car traffic volume  : 14904/1656  veh/TimePeriod  *
Medium truck volume :   317/35    veh/TimePeriod  *
Heavy truck volume  :   634/70    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):  13090
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   4.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Ferndale Dr (day/night)
---------------------------------------------
Angle1   Angle2           : -15.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  95.00 / 95.00  m
Receiver height           :   1.50 / 7.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: Ardagh Rd (day/night)
---------------------------------------------
Car traffic volume  : 11239/1249  veh/TimePeriod  *
Medium truck volume :   237/26    veh/TimePeriod  *
Heavy truck volume  :   355/39    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):   9767
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   3.00
    Day (16 hrs) % of Total Volume     :  90.00
```

```
Data for Segment # 2: Ardagh Rd (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  :  15.00 / 15.00  m
Receiver height           :   1.50 / 7.00   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 0.00 deg
Barrier height            :   2.43 m
Barrier receiver distance :  10.00 / 10.00  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.Ferndale Dr       !     1.41 !    48.98 !    48.98
 2.Ardagh Rd         !     1.32 !    54.29 !    54.29
--------------------+---------+---------+---------
                       Total                 55.41 dBA
```

```
STAMSON 5.04        SUMMARY REPORT        Date: 17-04-2019 17:26:17
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R13OLA.te            Time Period: Day/Night 16/8 hours
Description: R13-Central OLA 1.83m Noise Barrier
                                   TOTAL Leq FROM ALL SOURCES (DAY): 58.69
Road data, segment # 1: Ferndale Dr (day/night)
-----------------------------------------------
Car traffic volume  : 14904/1656  veh/TimePeriod  *
Medium truck volume :   317/35    veh/TimePeriod  *
Heavy truck volume  :   634/70    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):  13090
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   4.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Ferndale Dr (day/night)
-----------------------------------------------
Angle1   Angle2           : -15.00 deg   10.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  50.00 / 50.00  m
Receiver height           :   1.50 / 7.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
Road data, segment # 2: Ardagh Rd (day/night)
-----------------------------------------------
Car traffic volume  : 11239/1249  veh/TimePeriod  *
Medium truck volume :   237/26    veh/TimePeriod  *
Heavy truck volume  :   355/39    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):   9767
    Percentage of Annual Growth        :   2.00
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   3.00
    Day (16 hrs) % of Total Volume     :  90.00
```

```
Data for Segment # 2: Ardagh Rd (day/night)
-------------------------------------------
Angle1   Angle2           : -50.00 deg   50.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  15.00 / 15.00  m
Receiver height           :   1.50 / 7.00   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -50.00 deg   Angle2 : 50.00 deg
Barrier height            :   1.83 m
Barrier receiver distance :  10.00 / 10.00  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.Ferndale Dr      !     1.41 !    53.98 !    53.98
 2.Ardagh Rd        !     1.32 !    56.90 !    56.90
--------------------+---------+---------+---------
                      Total                 58.69 dBA
```