

**NOISE IMPACT STUDY
PROPOSED RESIDENTIAL DEVELOPMENT
390 DERRY ROAD WEST
CITY OF MISSISSAUGA**

FOR

390 DERRY DEVELOPMENT INC.

PREPARED BY



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1.0 INTRODUCTION

At the request of Time Development Group, J.E. COULTER ASSOCIATES LIMITED has reviewed the proposed residential development to be located at 390 Derry Road West in Mississauga, Ontario (see attached Figures in Appendix A). The site is located on the south side of Derry Road, east of McLaughlin Road. The purpose of this study is to establish any noise mitigation measures that may be necessary to satisfy the noise requirements of the Ministry of the Environment and Climate Change, City of Mississauga, and Region of Peel.

2.0 APPLICABLE CRITERIA

The Ministry of the Environment and Climate Change's (MOECC) applicable criteria to a site such as this are found in its publication *NPC-300* "Environmental Guide for Noise, Stationary and Transportation Sources – Approval and Planning." *NPC-300* is the more current guideline, having been approved for use in 2013.

As per *NPC-300*, this development would be considered a Class 1 – Urban area. The noise guidelines can be broken down into two components: stationary noise and transportation noise. Please see Figure 2 in Appendix A for a site plan of the proposed development.

2.1 Transportation Noise Guidelines

Transportation noise sources addressed by *NPC-300* include aircraft, rail traffic, and roadway traffic (which includes cars, trucks, buses, etc.).

Where the sound levels exceed 55 dB L_{eq} in private outdoor amenity areas (OLA), MOECC requires noise mitigation measures to be incorporated into the subdivision design (i.e., intervening structures such as acoustic barriers or buildings and/or greater setbacks from the noise source). MOECC will permit sound levels up to 60 dB L_{eq} daytime (5 dB above the criterion level of 55 dB L_{eq}) in private outdoor amenity areas (OLA), if it is not technically feasible to achieve 55 dB. Where the criterion levels are marginally exceeded, a warning clause is required in the *Agreement of Purchase and Sale* and the subdivision agreement. With respect to condominiums, balconies are considered OLAs only if they are 4m or greater in depth.

For residential buildings, the Ministry's ventilation requirements are based on the sound level at the exterior building façade. Where the sound levels at the exterior of the building façade exceed 55 dB L_{eq} daytime at the living room window or 50 dB L_{eq} nighttime at the bedroom window, the unit must be provided with forced air heating, with a provision for future air conditioning by the owner. An excess up to 10 dB is permissible, provided a warning clause is given. Where the sound levels exceed this limit (i.e., 65 dB L_{eq} daytime or 60 dB L_{eq} nighttime), central air conditioning must be incorporated into the building design prior to occupancy. Warning clauses are applicable as well.

Air-conditioning requirements are applied so that adequate interior sound levels can be maintained by closing the windows.

The MOECC also stipulates acceptable indoor sound levels limits, which vary depending on whether they are railway noise sources or roadway noise sources.

The applicable MOECC criteria are summarized in Table 1, below.

Table 1: Noise Criteria Summary

Type of Space	Road		Rail	
	Daytime (dB L _{eq}) (0700-2300)	Nighttime (dB L _{eq}) (2300-0700)	Daytime (dB L _{eq}) (0700-2300)	Nighttime (dB L _{eq}) (2300-0700)
Outdoor Living Area (O.L.A.)	55	N/A	55	N/A
Bedrooms	45	40	40	35
Living/Dining	45	45	40	40
Kitchen/Baths	45	45	40	40

Note: OLAs for condominiums are terraces/balconies greater than 4m in depth and common amenity areas such as rooftop patios.

The residential components of the site are located within the NEF 30 to 35 contour of Pearson International Airport. New residential development is prohibited in areas louder than NEF 30 under the 2005 Provincial Policy Statement by the Ontario Ministry of Municipal Affairs and Housing (ISBN 0-7794-7484-8). The City of Mississauga Official Plan Section 6.10.2 allows residential development in certain areas within the NEF 30 to 35 contour zone. Note that NPC-300 requires NEF-30 in outdoor living areas. As a result, OLAs (defined above) are not permitted in this development as per NPC-300. All balconies and terraces should be designed to be less than 4m in depth. The City of Mississauga may allow OLAs with appropriate warning clauses.

However, there are indoor sound level limits for aircraft noise as summarized in Table 2.

Table 2: Indoor Aircraft Noise Limits

Type of Space	Indoor NEF/NEP
Living/dining/den areas of residences, hospitals, schools, nursing/retirement homes, daycare centres, etc.	5
Sleeping quarters	0

2.1 Stationary Noise Guidelines

MOECC considers activities generated by fixed or mobile sources of noise within a given property to be stationary sources. NPC-300 basically states the average noise of the stationary source should not exceed the average noise of the roadway traffic during the same hourly time period for Class 1 areas or the exclusion limits, whichever is higher. The exclusion limits that apply are 50 dB Leq during the daytime (0700-1900 hours), 50 dB Leq during the evening (1900-2300 hours) and 45 dB Leq night time (2300-0700 hours), respectively. For Class 3 areas, the criterion levels that apply are 45 dB Leq during the daytime (0700-1900 hours), 40 dB Leq during the evening (1900-2300 hours) and 40 dB Leq night time (2300-0700 hours), respectively, whichever is higher.

A “stationary noise source,” to which the guideline applies, is defined in the interpretation section of the MOECC guideline as being everything on a property, with a series of exceptions. The time period over which the sound is averaged is 1 hour.

There is a Petro Canada car wash located immediately to the west of the site, on the southeast corner of Derry Road and McLaughlin Road. The City of Mississauga Noise bylaw prohibits the operation of a commercial car wash with air-drying equipment between 7pm and 7am Monday to Saturday and up to 9am on Sundays.

3.0 NOISE SOURCES

The transportation sources affecting the proposed development site will be the traffic on Derry Road West and aircraft noise.

3.1 Roadway Noise Sources

The site is bounded immediately to the north by Derry Road West. Traffic counts were provided by the Region of Peel for Derry Road. The 2016 volumes varied depending on the day but were approximately 40,000 vehicles per day with 2% medium trucks and approximately 7% heavy trucks. Day/night volumes are approximately 90%/10%. The speed limit for the roadway is 60 km/h.

The MOECC requests that noise control measures for new developments be based on a minimum 10-year traffic projection. The existing traffic volumes are increased by an annual rate of 2% to provide the 2037 traffic volumes.

3.2 Stationary Noise Sources

As noted, the proposed development is located immediately east of a Petro Canada Carwash. Sound levels are typically greatest at the exit of the car wash and relatively minor at the rear. At the rear, sound levels are dominated by ambient noise from McLaughlin Road and Derry Road West. The rear doors also point directly towards existing residential development, who would be more sensitive to the noise than the future residents of the proposed development at 390 Derry Road.

Measurements were taken at various locations around the car wash. Sound levels are greatest when cars are present. Otherwise, the fans used for drying vehicles do not operate.

Sound levels were taken directly in front of the doors, at a 45 degree angle to the doors, and at a 90 degree angle to the doors at a distance of 12m. These sound level measurements are summarized in Table 3.

Table 3: Car Wash Measurement Locations

Location	Distance (m)	Maximum Sound Level (dBA)
Front	12	78
Side, 45 degrees	12	73
Side, 90 degrees	12	62
Side, 135 degrees	12	55
Rear, 45 degrees	12	52

Typically, car washes do not operate continuously. Fan noise is present less than 50% of the time during the daytime and even less during nighttime (11pm to 7am). Based on the intermittency of the carwash operations, a correction of 3 dB is applied to the daytime determine the average hourly sound levels.

4.0 TRANSPORTATION NOISE ASSESSMENT

The MOECC's ORNAMENT noise prediction procedure (STAMSON Version 5.03 computer programme) was used to predict the sound levels. STAMSON 5.03 uses the daily traffic volumes for the road and basic topographical information for the site in its calculations (see Appendix B).

Table 4: Transportation Noise Summary

Townhouse Block	Facade	Daytime (dBA, 16hr, L_{eq})	Nighttime (dBA, 8hr, L_{eq})
A	North	73	67
A	West/East	70	64
C	East	67	61
E	North	67	61
D	North	63	57
F	East	57	50

Notes:

1. Calculations use STAMSON Version 5.03 and are based on the plans provided by A.J. Tregobov Architects, dated April 4, 2017
2. Refer to Appendix A for a site plan.

Please see Appendix B for sample calculations.

As the sound levels exceed 65 dBA during the daytime, indoor sound levels have also been reviewed. Indoor sound levels are calculated using the National Research Council's BPN-56 prediction procedure.

The indoor calculations consider the suites on the loudest part of the development, the northwest corner. Calculations are based on a window-to-floor area assumption of 1:1. That is, the area of windows is equal to the floor area of a given room.

Table 5: Indoor Roadway Sound Level Predictions

Room Type	Daytime (dBA, 16hr, L_{eq})		Nighttime (dBA, 8hr, L_{eq})	
	Predicted Indoor Sound Level	Guideline Indoor Sound Level	Predicted Indoor Sound Level	Guideline Indoor Sound Level
Bedroom	43	45	37	40
Living Room	45	45	39	45

The above analysis indicates the indoor sound levels are expected to be met through the use of standard glazing at the loudest point of the development (the north façade of the north most townhouse block). The indoor guidelines will be met at all other areas. Window glazing consists of two layers of 6mm glass separated by a 13mm air space and is rated to achieve STC 36. Note that this glazing configuration is required primarily for transportation noise but also for aircraft noise.

To address aircraft noise, the roof construction should be designed to achieve a minimum STC 45 rating. An STC 45 roof construction can be achieved with the following assembly

- Standard shingles
- 13mm thick OSB
- 200mm thick blown cellulose insulation
- Standard roof framing joists at 400mm o.c.
- 13mm thick resilient channel
- 16mm thick Type X gypsum board

The development will include exterior walls that are brick veneered. Hence, no upgrades to the exterior wall construction are required.

The proposed development currently does not include any private outdoor living areas greater than 4m in depth. Condominium amenity areas have not been clearly defined. Any such outdoor amenity areas located on the rooftop or exposed to the north, east, or west may need further noise control measures.

5.0 VENTILATION AND WARNING CLAUSE REQUIREMENTS

The MOECC recommends central air conditioning for all affected units where the daytime and nighttime sound levels from roadway traffic exceed 65 dBA and 60 dBA L_{eq} , respectively, and Warning Clause “D”. In addition, residential areas with sound levels above NEF 30 also require central air-conditioning. All units in this development are to be provided with central-air conditioning due to aircraft noise. Warning Clauses “B” and “D” will be inserted into the *Agreement of Purchase and Sale or Lease* as well as the site development agreement, for those affected units as noted above, indicating that the sound levels will exceed MOECC's noise guidelines.

Air-conditioning units provided must adhere to NPC-216 and should not exceed a sound power level of 76 dBA L_w .

6.0 FAÇADE COMPONENTS

STC 36 windows are recommended in order to meet the interior sound level criterion of 40 dB L_{eq} nighttime (bedrooms) and 45 dB L_{eq} daytime (living areas) as required by MOECC due to the road noise. STC 36 window construction typically consists of two layers of 6mm glass separated by a 13mm airspace. This window configuration is slightly heavier than is typical for low-rise construction

The recommended window configuration, in conjunction with brick veneering and upgraded roof construction, is also necessary to ensure that indoor aircraft sound levels do not exceed NEF 0 (~32 dBA).

The indoor noise calculations have been based on preliminary estimates of floor plans. It is recommended the final plans be reviewed by the acoustic consultant prior to building permit to confirm that the indoor sound levels can be met through the use of standard glazing.

7.0 STATIONARY NOISE ASSESSMENT

The hourly ambient sound level has been calculated at Locations 1 and 2 at the west wall of Townhouse Block A as shown in Figure 4 in Appendix A.

Table 6: Ambient Sound Levels

Hour Starting	Hourly Ambient Sound Level (dBA $L_{eq,1hr}$)	
	Location 1	Location 2
7:00	71.5	69.2
8:00	71.5	69.2
9:00	70.1	67.8
10:00	69.1	66.8
11:00	68.9	66.6
12:00	69.8	67.5
13:00	69.7	67.4
14:00	70.6	68.3
15:00	71.1	68.8
16:00	72.7	70.4
17:00	73.1	70.8
18:00	72.3	70.0

The predicted sound level at Location 1 from the carwash is 64 dBA L_{eq} . The predicted sound level at Location 2 from the carwash is 62 dBA L_{eq} .

As can be seen in Table 6, the sound levels from the carwash remain well below the ambient sound levels. Even in the unlikely and unrealistic case of continuous fan operation, the car wash would still meet the applicable guidelines at the nearest proposed housing.

8.0 CONCLUSIONS

The analysis indicates modest noise impacts the development due to the close proximity to Derry Road and because it is within the NEF 30 to 35 contour range from Pearson Airport. Some noise mitigation measures to deal with transportation noise will be required, along with warning clauses, to satisfy the various noise criteria. The development will meet the MOECC's and the City's requirements once the recommendations of this report are incorporated.

9.0 SUMMARY OF RECOMMENDATIONS

To meet the current noise guidelines of the Ministry of the Environment and Climate Change, City of Mississauga, and Region of Peel, the following recommendations are proposed:

1. All units in this development should be provided with central air conditioning. Warning Clauses “B” and “D” will be inserted into the Agreement of Purchase and Sale or Lease as well as the site development agreement.
2. All residential air conditioning devices should comply with NPC-216 and should not exceed a sound power level of 76 dBA.
3. It is not expected that noise from the Petro Canada carwash will exceed the noise guidelines. However, Warning Clause “E” should be inserted into the Agreements of Purchase and Sale or Lease for all units in Townhouse Blocks A and D.
4. The detailed unit plans are to be reviewed by a qualified acoustic consultant prior to building permit issuance. Final glazing and building façade construction recommendations will be provided at that time.
5. Private balconies or terraces greater than 4m in depth are not permitted per NPC-300.
6. Outdoor common amenity areas have currently not been detailed. It is recommended that such common amenity areas be reviewed by an acoustic consultant prior to building permit issuance. Modest noise control measures may be needed in order to achieve the target sound levels of 55 to 60 dBA $L_{eq,16hr}$. Such common outdoor areas are also not technically permitted by MOECC in areas that exceed NEF 30.

APPENDIX A: FIGURES

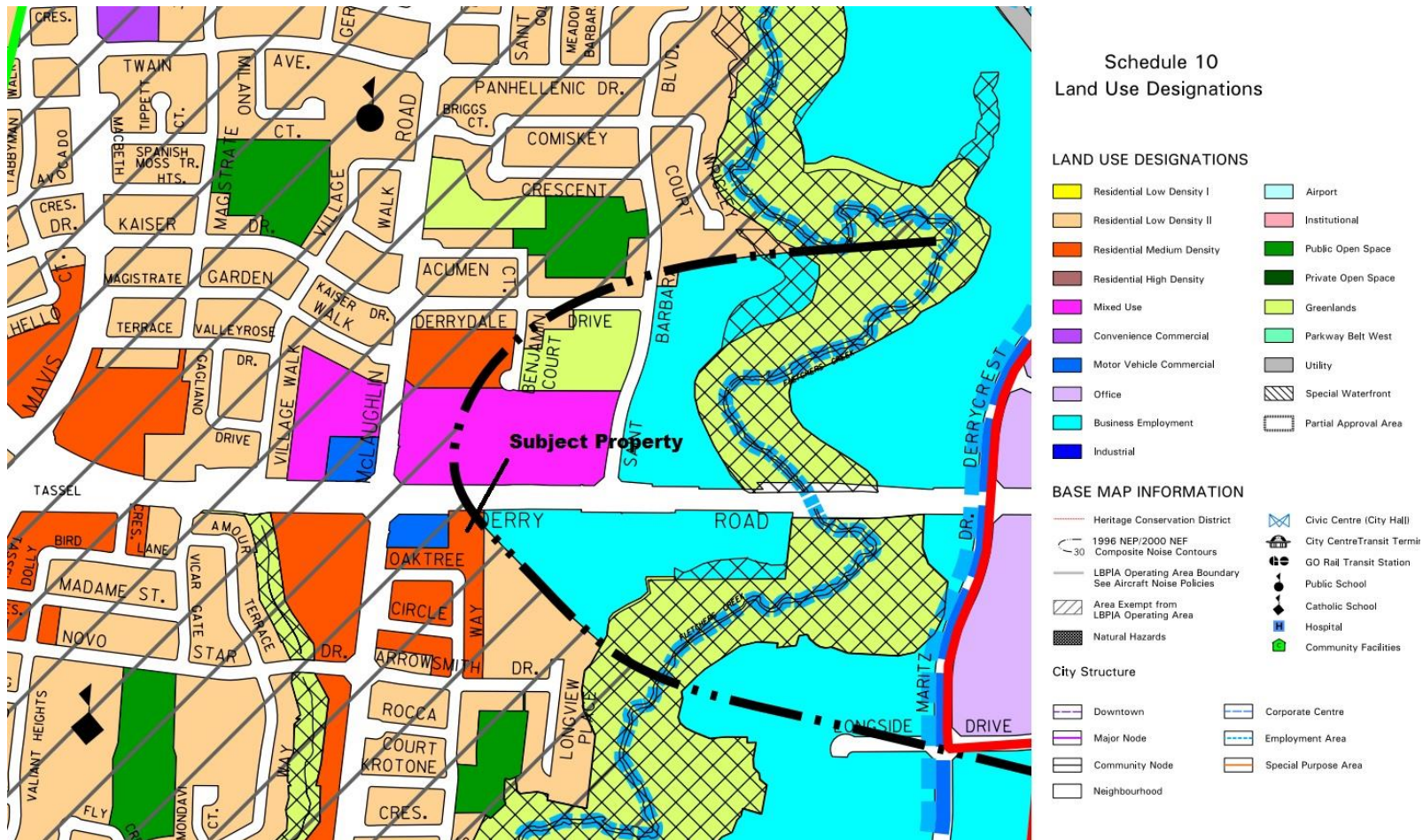
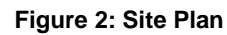


Figure 1: Land Use Plan



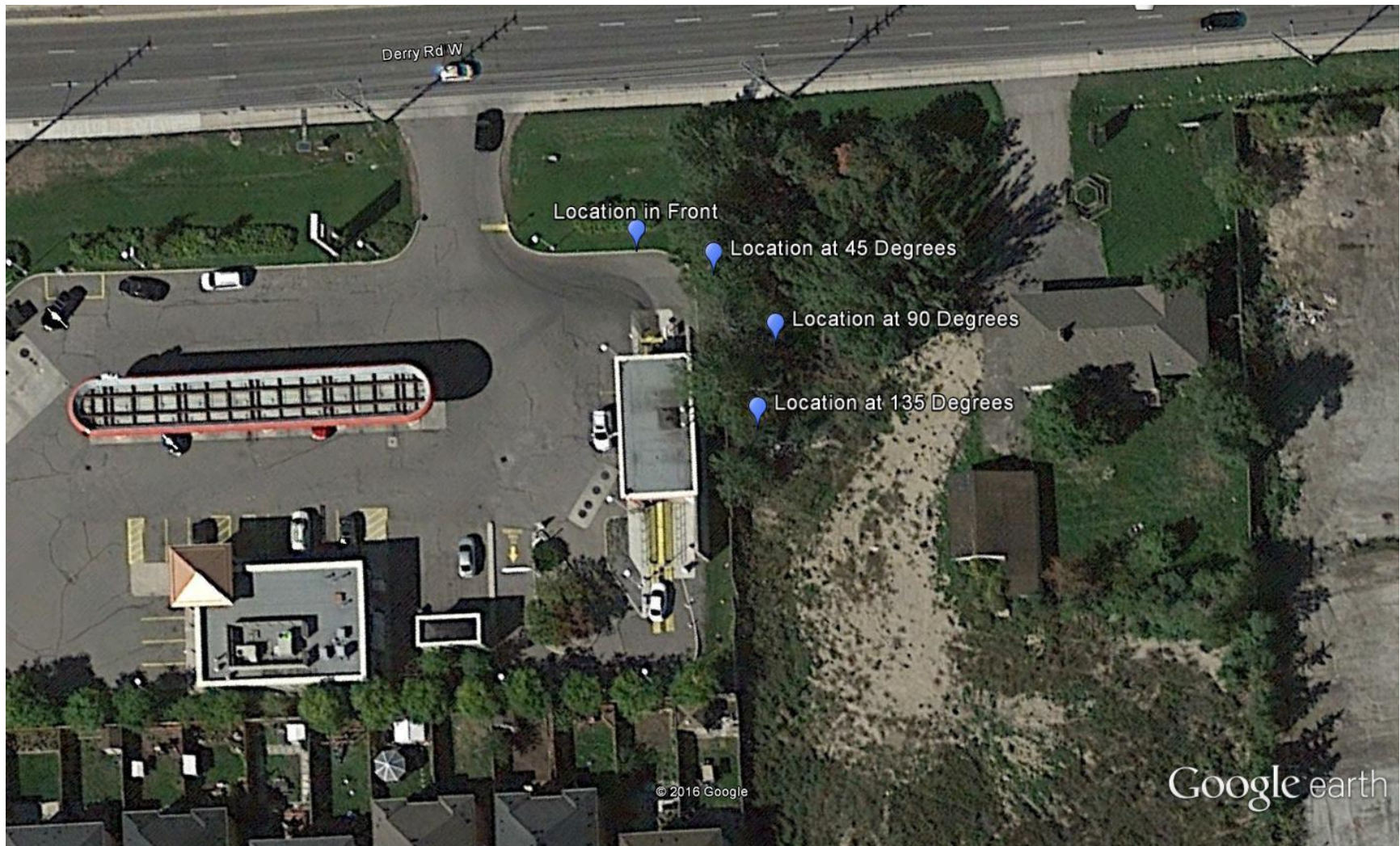


Figure 3: Carwash Measurement Locations

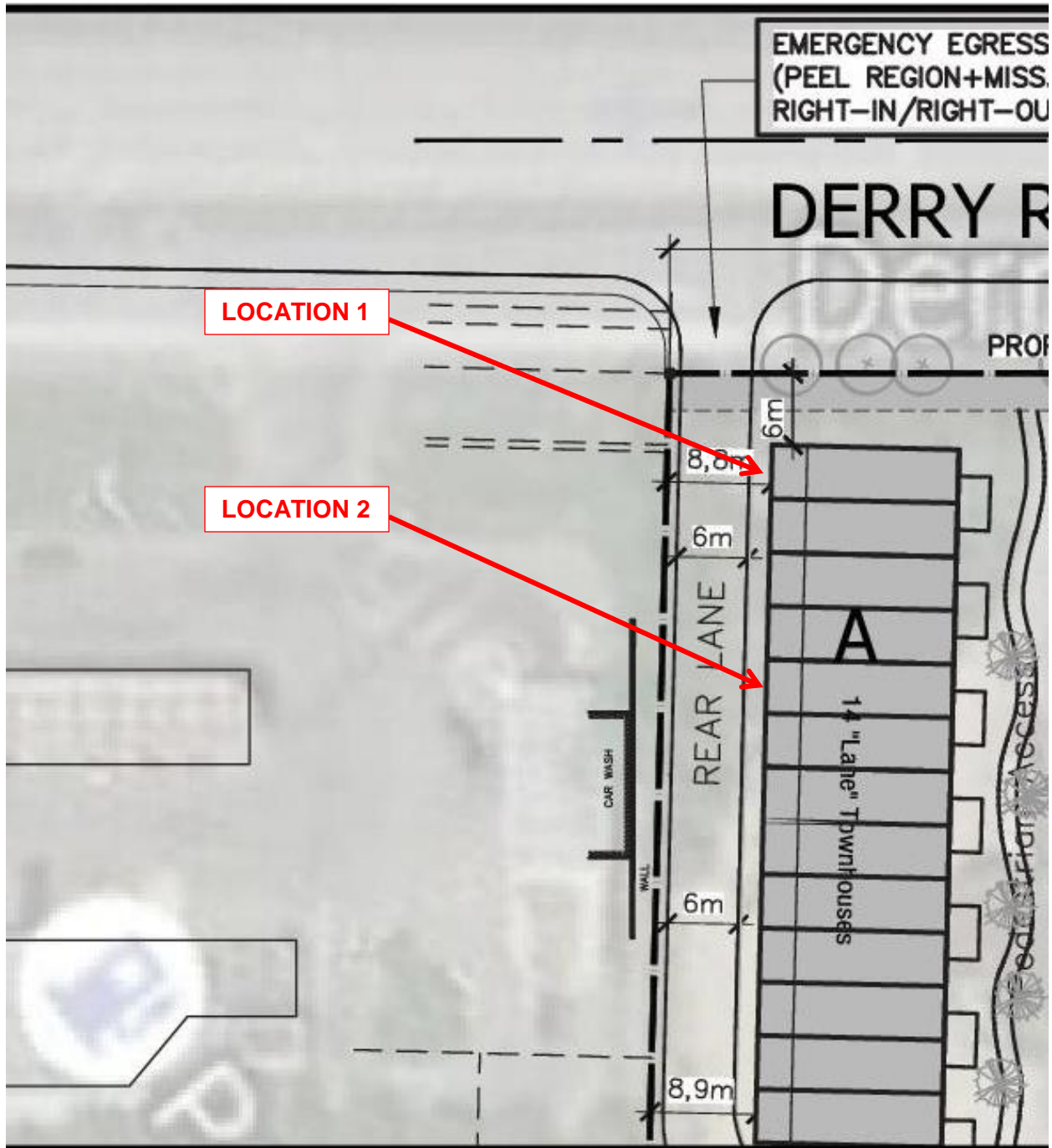


Figure 4: Assessment Locations

APPENDIX B: SAMPLE CALCULATIONS

STAMSON 5.0 NORMAL REPORT Date: 15-12-2017 16:48:13
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: loc1n.te Time Period: Day/Night 16/8 hours
 Description: Location 1 - North Facade

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

```
-----
Car traffic volume   : 40733/4526   veh/TimePeriod  *
Medium truck volume :   895/99     veh/TimePeriod  *
Heavy truck volume  :  3133/348    veh/TimePeriod  *
Posted speed limit  :    60 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):  40000
Percentage of Annual Growth       :    2.00
Number of Years of Growth         :   11.00
Medium Truck % of Total Volume    :    2.00
Heavy Truck % of Total Volume     :    7.00
Day (16 hrs) % of Total Volume    :   90.00
```

Data for Segment # 1: Derry Road (day/night)

```
-----
Angle1  Angle2           : -90.00 deg   90.00 deg
Wood depth           :      0           (No woods.)
No of house rows     :      0 / 0
Surface              :      2           (Reflective ground surface)
Receiver source distance : 25.00 / 23.00 m
Receiver height       :   1.50 / 4.50 m
Topography           :      1           (Flat/gentle slope; no barrier)
Reference angle       :      0.00
```

Results segment # 1: Derry Road (day)

Source height = 1.63 m

ROAD (0.00 + 73.21 + 0.00) = 73.21 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	75.43	0.00	-2.22	0.00	0.00	0.00	0.00	73.21

Segment Leq : 73.21 dBA

Total Leq All Segments: 73.21 dBA

Results segment # 1: Derry Road (night)

Source height = 1.63 m

ROAD (0.00 + 67.04 + 0.00) = 67.04 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	68.89	0.00	-1.86	0.00	0.00	0.00	0.00	67.04

Segment Leq : 67.04 dBA

Total Leq All Segments: 67.04 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 73.21
(NIGHT): 67.04

STAMSON 5.0 NORMAL REPORT Date: 15-12-2017 16:49:07
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: loc2w.te Time Period: Day/Night 16/8 hours
Description: Location 2 - West Facade

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

Car traffic volume : 40733/4526 veh/TimePeriod *

Medium truck volume : 895/99 veh/TimePeriod *

Heavy truck volume : 3133/348 veh/TimePeriod *

Posted speed limit : 60 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): 40000

Percentage of Annual Growth : 2.00

Number of Years of Growth : 11.00

Medium Truck % of Total Volume : 2.00

Heavy Truck % of Total Volume : 7.00

Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Derry Road (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 : 50.00 / 50.00 m
 Receiver height : 1.50 / 4.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Results segment # 1: Derry Road (day)

Source height = 1.63 m

ROAD (0.00 + 67.19 + 0.00) = 67.19 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	75.43	0.00	-5.23	-3.01	0.00	0.00	0.00	67.19

Segment Leq : 67.19 dBA

Total Leq All Segments: 67.19 dBA

Results segment # 1: Derry Road (night)

Source height = 1.63 m

ROAD (0.00 + 60.65 + 0.00) = 60.65 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	68.89	0.00	-5.23	-3.01	0.00	0.00	0.00	60.65

Segment Leq : 60.65 dBA

Total Leq All Segments: 60.65 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 67.19
 (NIGHT): 60.65

APPENDIX C: WARNING CLAUSES

- TYPE A: “Purchasers/tenants are advised that sound levels due to increasing road traffic and rail traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment and Climate Change.”
- TYPE B: “Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road traffic and rail traffic may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment and Climate Change.”
- TYPE C: “This dwelling unit has been designed with the provision for adding central air conditioning at the occupant’s discretion. Installation of central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment and Climate Change.”
- 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 sound level limits of the Municipality and the Ministry of the Environment and Climate Change.”
- TYPE E: “Purchasers/tenants are advised that due to the proximity of the adjacent industry, noise from the industry may at times be audible.”

APPENDIX D: REFERENCES

1. Ministry of the Environment, "Model Municipal Noise Control By-Law, Final Report", August 1978.
2. Ministry of the Environment, Environmental Approvals and Land Use Planning Branch, "Guidelines for Road Traffic Noise Assessment", July 1986.
3. Ministry of the Environment's *STAMSON* Computer Programme (Version 5.03) for the IBM PC.
4. Ministry of the Environment, *ORNAMENT*, "Ontario Road Noise Analysis Method for Environment and Transportation", November 1988.
5. Quirt, D.J., "Controlling Sound Transmission into Buildings", National Research Council, Building Practice Note 56, Update 1.1.
6. Ministry of the Environment, *STEAM* "Sound from Trains Environmental Analysis Method", July 1990
7. Ministry of the Environment and Climate Change, "Environmental Noise Guideline: Stationary and Transportation Sources – Approval and Planning", Publication *NPC-300*, August 2013.