# APPENDIX I

## Environmental Noise Assessment Reports

# Environmental Noise Assessment

# Derry Road (Regional Road 7) Transportation Corridor Improvements

## Class Environmental Assessment

Milburough Line (Regional Road 24) to McNiven Road
City of Burlington and Town of Milton

July 22, 2010
Project: 109-183

Prepared for

**R and R Associates Inc.**

Prepared by


John Emeljanow, B.Eng., P.Eng.

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# Environmental Noise Assessment

# Derry Road (Regional Road 7) Transportation Corridor Improvements

## Class Environmental Assessment

Milburough Line (Regional Road 24) to McNiven Road
City of Burlington and Town of Milton

## 1.0 INTRODUCTION

The Regional Municipality of Halton has initiated a Class Environmental Assessment Study for transportation corridor improvements on Derry Road (Regional Road 7) from Milburough Line (Regional Road 24) to McNiven Road at the boundary of the Town of Milton and the City of Burlington. See Figure 1.

This report summarizes the expected noise impact from the proposed improvements, including the potential impact of construction noise. In addition, the need for noise mitigation based on the requirements of the Ministry of Transportation (MTO)/Ministry of the Environment (MOE) protocol is evaluated.

## 2.0 ENVIRONMENTAL NOISE GUIDELINES

### 2.1 MOE

The MOE does not have noise guidelines specifically relating to the construction or widening of roadways. However, the MOE does have a protocol with the MTO relating to Provincial Highway Expansions. The protocol states that the primary objective is to achieve sound exposures not exceeding 55 dBA or the preconstruction ambient sound exposure, whichever is higher, at outdoor receptor locations.

In addition to the absolute sound exposure, changes are also considered. Changes of 0 to 3 dBA are considered insignificant; 4 to 5 dBA are just noticeable and considered minor; 10 dBA and above are considered significant (perceived to be about twice as loud). The MTO/MOE protocol indicates that no mitigation is required for sound exposure increases of 0 to 5 dBA. Increases of greater than 5 dBA require investigation into the administrative, economic, and technical feasibility of effective noise mitigation. To be implemented, a sound barrier must be shown to provide at least 5 dBA of attenuation.

### 2.2 REGION OF HALTON

The Region of Halton *Noise Abatement Policy for Regional Roads* indicates that for local improvement or retrofit noise walls, a daytime sound exposure of 60 dBA is the objective for outdoor amenity areas. Residents at receiver locations whose absolute noise levels are greater than 60 dBA may apply for noise walls under the

Region's retrofit program which is separate from the Class EA process for the proposed roadway improvements for Derry Road. As per the MOE/MTO protocol, any sound barriers must be shown to provide at least 5 dBA of attenuation.

## 3.0 NOISE SENSITIVE AREAS

Land uses designated as noise sensitive by the MOE/MTO consist of residential developments, hospitals, nursing/retirement homes, etc.

Figure 2 identifies receptor locations which were analyzed in detail. These residential dwellings are representative of the noise sensitive areas within the study area, in accordance with Section 9.3.2.1.3-2) of the MTO *Environmental Office Manual*. Other dwellings with similar setback and orientation to the noise source will receive similar sound exposures and noise impacts. Dwellings further removed from the roadway will receive lower sound exposures due to increased distance attenuation.

Receptor locations were identified on drawings provided by R and R Associates Inc. The receptor locations were confirmed during a site visit to the study area.

## 4.0 NOISE IMPACT ASSESSMENT

### 4.1 TRAFFIC DATA

Existing (year 2008) and future (year 2031) traffic information for Derry Road was provided by R and R Associates Inc.

The percentages of heavy and medium trucks were determined from the information provided by R and R Associates Inc. The road traffic data is summarized in Table 1 and in Appendix A.

### 4.2 PROCEDURE

Sound exposures were calculated using STAMSON V5.04-ORNAMENT, the computerized road traffic noise prediction model of the MOE. This is an accepted approach by the MTO, as outlined in their *Environmental Office Manual Technical Areas – Noise*.

Using the road traffic data, the daytime ($L_{eq\ Day}$) sound exposure in the rear yard amenity area was calculated at each receptor location. To assess the noise impact, the predicted future "do nothing" sound exposures (year 2031) were compared to those with the proposed road improvements.

Since the ambient sound environment in the vicinity of the noise sensitive areas is dominated by Derry Road road traffic, noise sources other than Derry Road were ignored. This is a conservative approach since, in the noise impact assessment, these secondary noise sources would tend to reduce the significance of sound exposure changes (i.e. impact) due to the improvement of Derry Road.

### 4.3 RESULTS

Table 2 shows, for each receptor, the existing sound exposures, the future sound exposures without the proposed improvements, the future sound exposures for each improvement alternative and the resulting noise impact (i.e., change between the future without improvements and future with improvements scenarios) for each improvement alternative.

The results shown in Table 2 indicate that the future (year 2031) sound exposure without the proposed improvements are predicted to be about 3.6 dBA higher than the existing (year 2008) sound exposures. The

increase in sound exposure is due to the almost doubling of background traffic as well as the increase in truck traffic between 2008 and 2031.

The predicted noise impact for each improvement alternative is 1 dBA or less. This is considered insignificant. Thus, from an acoustical perspective, all three improvement alternatives are considered equal. Table 3 shows the significance of the increased sound exposures.

**Since the noise impact for each improvement alternative is 5 dBA or less and the resultant daytime sound exposure in the rear yard amenity area at all receptors is less than 60 dBA, noise mitigation is not required in accordance with the MOE/MTO Protocol and the Region of Halton's Noise Abatement Policy.**

## 5.0 CONSTRUCTION NOISE

Construction noise is temporary noise and depends on the type of work required. The impact of construction noise depends on the type of equipment used, number of pieces of equipment, time and duration of operation and the proximity to noise sensitive receivers in question.

### 5.1 APPLICABLE MUNICIPAL NOISE CONTROL BY-LAWS

Derry Road, along the extent of the project, is located at the boundary between the City of Burlington and the Town of Milton. Therefore, the noise control by-laws for the City of Burlington (By-law Nos. 19-2003 and 49-2008) and the Town of Milton (By-law No. 16-84) apply.

#### 5.1.1 City of Burlington Noise By-law

The following summarizes the applicable sections of the City of Burlington Noise Control By-law concerning construction noise:

> 5.(1) *"No person shall emit or cause or permit the emission of sound resulting from any act listed in Schedule 1 – General Prohibitions, and which sound is clearly audible at a point of reception."*

Item 7 in Schedule 1 prohibits *"the operation of any item of construction equipment without effective muffling devices in good working order and in constant operation"*.

> 5.(2) *"No person shall emit or cause or permit the emission of sound resulting from any act listed in Schedule 2 – Time and Place Prohibitions, if clearly audible at a point of reception located in any area of the municipality specified within a prohibited time shown for such an area"*.

Item 8 in Schedule 2 prohibits *"the operation of any construction equipment in connection with construction"* between 7:00 p.m. and 7:00 a.m. and all day on Sunday and Statutory holidays.

> 6.(2) *No person shall emit or cause or permit the emission of any sound from any piece of construction equipment referred to in Schedule 4 – Publications, Publication NPC-115, at a work site, any part of which is located within 600 m of a residential area, unless:*
>
> *a) the piece of construction equipment was put into use prior to January 1, 1979; or*
>
> *b) the piece of construction equipment bears a label affixed by the manufacturer or distributer which states:*

*i) the year of manufacture; and*
*ii) that the item of equipment complies with the residential sound emission standards set out in Schedule 4 – Publications, Publication NPC-115, as applicable to that type of equipment and date of manufacture; or*

*c) the owner, operator, manufacturer or distributor provides proof that the item of equipment complies with the residential sound emission standard set out in Schedule 4 – Publications, Publication NPC-115 as applicable to that type of equipment and date of manufacture."*

### 5.1.2 Town of Milton Noise By-law

The following summarizes the applicable section of the Town of Milton Noise Control By-law (No. 16-84) concerning construction noise:

*3 q) "Any noise that disturbs or is likely to disturb persons in any office, hospital or in any dwelling, hotel or other type of residence, or of any persons in the vicinity arising between the hours of 2100 hours of one day and 0700 hours of the next day from an excavation, quarry or construction work whatsoever, including the erection, demolition, alteration or repair of any building."*

## 5.2 RECOMMENDATIONS

- The noise control by-laws for the City of Burlington (By-law Nos. 19-2003 and 49-2008) and Town of Milton Noise Control By-law (No. 16-84) will be obeyed. Exemptions, where required, will be applied for through the municipality and should be included in the construction contract documents.

- General noise control measures will be referred to, or placed into construction contract documents. The following constraints addressing construction equipment operation and maintenance should be included in the construction contract documents:

  Equipment Maintenance: Equipment shall be maintained in an operating condition that prevents unnecessary noise, including but not limited to non-defective muffling systems, properly secured components and the lubrication of moving parts.

  Equipment Operation: Idling of equipment shall be restricted to the minimum necessary to perform the specified work.

  Additional noise constraints may be included at the discretion of the Environmental Planner. They could include, for example, the siting of the contractor's yard.

- Any initial complaint from the public will require verification that the general noise control measures agreed to are in effect, any noise concerns will be investigated, and the contractor warned of any problems.

- Notwithstanding compliance with the "general noise control measures", a persistent complaint will require a contractor to comply with the MOE sound level criteria for construction equipment contained in the MOE Model Municipal Noise Control By-law. Subject to the results of field investigation, alternative noise control measures will be required, where these are reasonably available.

## 6.0 CONCLUSION

**The improvement of Derry Road between Milburough Townline and McNiven Road will produce insignificant noise impacts at all receptors for the three improvement alternatives. Acoustically, the three improvement alternatives are considered equal. Since the resultant daytime sound exposures in the rear yard amenity areas will be below 60 dBA, noise mitigation is not required.**

## 7.0 REFERENCES

1. "MTO/MOE Protocol Dealing in Noise Concerns of New Highway Projects", Ontario Ministry of Transportation/Ontario Ministry of the Environment, 1986.

2. "Directive QST A-1 (Noise Policy and Acoustic Standards for Provincial Highways)", Ontario Ministry of Transportation, 1992.

3. PC STAMSON 5.04, "Computer Program for Road Traffic Noise Assessment", Ontario Ministry of the Environment.

4. "Environmental Office Manual – Technical Areas – Noise", Ontario Ministry of Transportation, 1992.

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## TABLE 1

## EXISTING AND FUTURE TRAFFIC VOLUME DATA

| Roadway | Existing AADT(1) | 2031 AADT | Posted Speed Limit (kph) |
|---|---|---|---|
| Derry Road | 3 250 | 6 220 | 60 |

Note:

(1) AADT – Annual Average Daily Traffic as derived from information provided by R and R Associates Inc.

## TABLE 2

## NOISE ASSESSMENT RESULTS

| Receptor | Address | Existing $L_{eqDay}$ (dBA) | Future (2031) $L_{eqDay}$ (dBA) | | | | Noise Impact (dBA) | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | No Improvement | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 1 | Alt. 2 | Alt. 3 |
| R1 | 1094 Derry Road | 37 | 41 | 41 | 41 | 41 | – | – | – |
| R2 | 975 Derry Road | 45 | 48 | 48 | 48 | 48 | – | – | – |
| R3 | 1101 Derry Road | 46 | 49 | 49 | 49 | 49 | – | – | – |
| R4 | 1193 Derry Road | 46 | 49 | 49 | 50 | 50 | – | 0.4 | 1.0 |
| R5 | 1215 Derry Road | 46 | 49 | 49 | 50 | 50 | – | 1.0 | 1.0 |
| R6 | 1243 Derry Road | 44 | 48 | 48 | 48 | 48 | – | 0.8 | 0.8 |
| R7 | 1275 Derry Road | 44 | 47 | 47 | 47 | 47 | – | 0.4 | 0.4 |
| R8 | 1301 Derry Road | 40 | 44 | 44 | 44 | 44 | – | 0.1 | 0.2 |
| R9 | 6780 McNiven Road | 49 | 52 | 52 | 52 | 52 | – | – | – |
| R10 | 1200 Derry Road | 42 | 45 | 45 | 45 | 45 | – | -0.4 | -0.4 |

## TABLE 3

## TYPICAL IMPACT OF INCREASED SOUND EXPOSURES(1)

| Incremental Increase Over Background Noise (dBA) | General Perception | Impact |
|---|---|---|
| 0-3 | No Change | Nil |
| 4-5 | Perceptible Change | Low |
| 6-9 | Almost twice as loud | Medium |
| 10 and above | Doubling of loudness or greater | High |

Note:

(1) Note that community sound level assessments are done using an A-weighted logarithmic or decibel (dBA) scale and not a linear scale since humans do not respond linearly to sound. In other words, two cars (or a doubling of background traffic) do not sound twice as loud as one car. Two cars produce a sound level that is 3 dBA higher than a single car, which is the limit of perceptible change to the average person. In fact, it takes a tenfold increase in traffic (a 10 dBA increase) to be perceived as a doubling of loudness.


| STUDY AREA | FIGURE 1 |
|---|---|

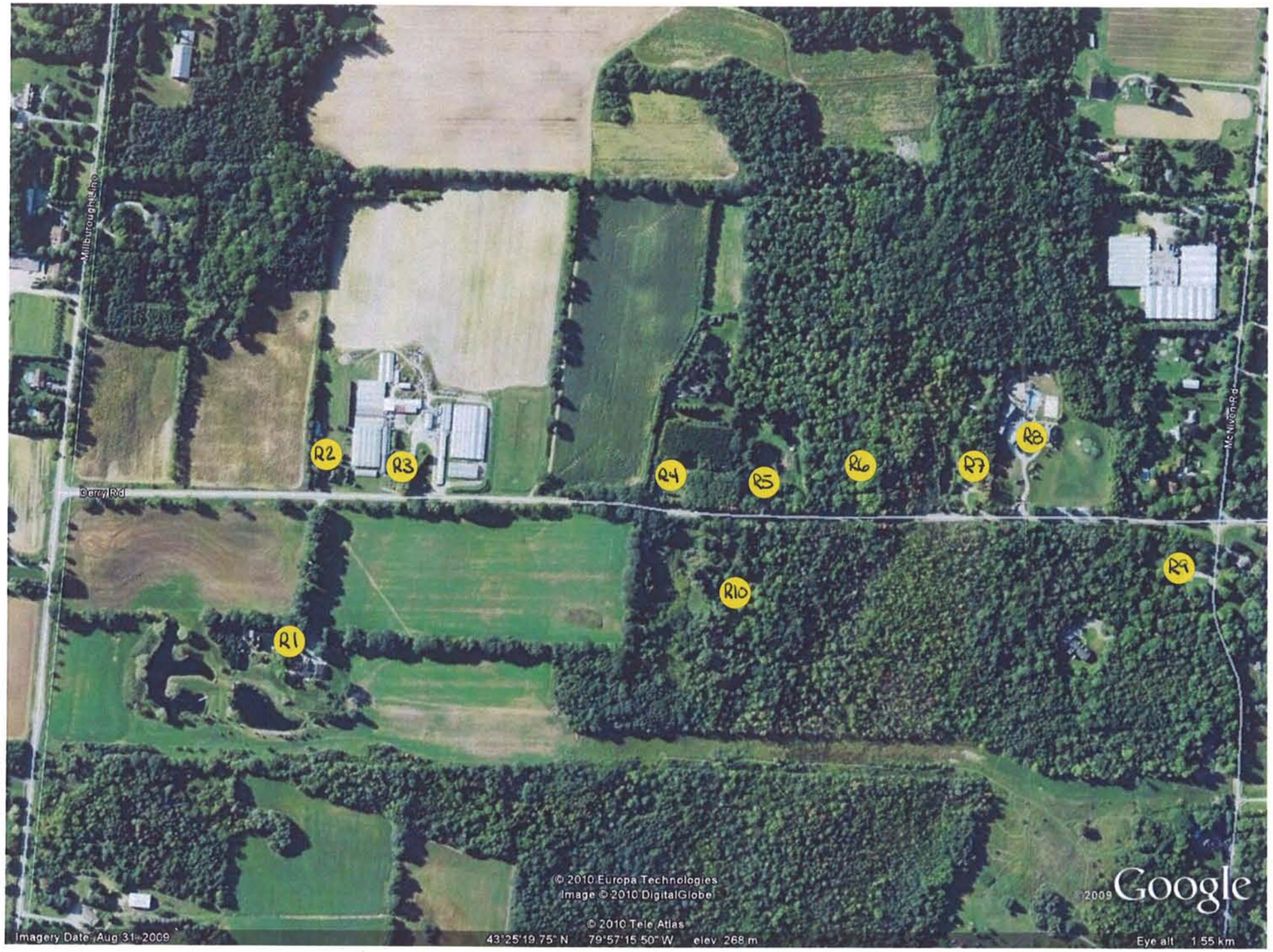


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**FIGURE 2** **RECEPTOR LOCATIONS**

# APPENDIX A

# ROAD TRAFFIC INFORMATION

**Date:** November 20, 2009

**To:** **Mr. John Emeljanow – Valcoustics Canada Ltd.**

**From:** Rick Hein, P.Eng., PTOE, AVS

**Re:** **Derry Road and Guelph Line Transportation Corridor Improvements**
**Class Environmental Assessments**
**Traffic Data**

**Our Ref:** RR-09-019 and RR-09-024

**cc:** N/A

The following traffic data summary and tables outlines the existing and projected future average daily traffic volumes for the following road corridors:

- Derry Road (Regional Road 7) corridor between Milburough Line and McNiven Road; and
- Guelph Line (Regional Road 1) corridor from Conservation Road (formerly Steeles Avenue) to 1 km north of Derry Road.

R and R Associates is currently reviewing both existing and future traffic conditions to the 2021 and 2031 horizon years.

**Derry Road Corridor (Milburough Line to McNiven Road)**

Existing 2008 Traffic Volumes

- Derry Road carries approximately 3,250 vehicles on a daily basis (Average Daily Traffic - ADT).
- Two-way vehicle volumes range from 300 to 380 vehicles per hour during the weekday AM and PM peak periods, respectively.
- Commercial and heavy vehicles represent approximately 3.0 percent of the total traffic on Derry Road during a typical weekday and 1.0 to 2.0 percent of the total traffic during the weekday AM and PM peak periods, respectively.

The following table summarizes the data derived from Halton Region Automatic Traffic Recorder (ATR) Station #100715 located within the study area limits between Milburough Line and McNiven Road. The ATR count provides a 24-hour summary of traffic speed, volume, and vehicle classifications at this location for a typical weekday.

Future 2021 and 2031 Traffic Volumes

Future traffic volumes within the Derry Road corridor are anticipated to grow by approximately three percent per annum to the 2021 and 2031 horizon years based on a review of historical growth trends and an analysis of the Region's transportation forecast model.


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- Derry Road will carry approximately 4,630 and 6,220 vehicles on a daily basis by the 2021 and 2031 horizon years, respectively.
- Two-way vehicle volumes will range from 430 to 540 and 580 to 725 vehicles per hour during the weekday 2021 and 2031 AM and PM peak periods, respectively.
- Commercial and heavy vehicles are anticipated to remain fairly stable based on existing percentages and will represent approximately four percent of the total traffic on Derry Road during the weekday 2021 and 2031AM and PM peak periods, respectively.

The traffic data for the Derry Road corridor is summarized in **Table 1**.

**Table 1**
**Derry Road Corridor (Milburough Line to McNiven Road)**

| Characteristic | Existing (2008) | Future 2021 | Future 2031 |
|---|---|---|---|
| **Posted Speed Limits** | | | |
| Existing (km/hr) | 60 | - | - |
| Future (km/hr) [1] | | 60 | 60 |
| **Traffic Data** | | | |
| ADT (vpd) | 3,250 | 4,630 | 6,220 |
| AM Peak Hour (vph) | 300 | 430 | 580 |
| PM Peak Hour (vph) | 380 | 540 | 725 |
| **Vehicle Classification Percentages** | | | |
| Cars (%) | 97.2 | 96.0 | 96.0 |
| Small Trucks (%) | 1.2 | 2.0 | 2.0 |
| Medium Trucks (%) | 1.0 | 1.0 | 1.0 |
| Heavy Trucks (%) | 0.6 | 1.0 | 1.0 |

[1] Assumed future speed limit.

**Guelph Line Corridor (Conservation Road to 1 km north of Derry Road)**

Existing 2008 Traffic Volumes

- Guelph Line carries approximately 6,400 vehicles on a daily basis (Average Daily Traffic - ADT).
- Two-way vehicle volumes range from 625 to 660 vehicles per hour during the weekday AM and PM peak periods, respectively.
- Commercial and heavy vehicles represent approximately 6.0 percent of the total traffic on Derry Road during a typical weekday and 5.0 to 6.0 percent of the total traffic during the weekday AM and PM peak periods, respectively.

The following table summarizes the data derived from Halton Region Automatic Traffic Recorder (ATR) Station #100112 located within the study area limits between Conservation Road and

Derry Road. The ATR count provides a 24-hour summary of traffic speed, volume, and vehicle classifications at this location for a typical weekday.

Future 2021 and 2031 Traffic Volumes

Future traffic volumes within the Guelph Line corridor are anticipated to grow by approximately two percent per annum to the 2021 and 2031 horizon years based on a review of historical growth trends and an analysis of the Region's transportation forecast model.

- Guelph Line will carry approximately 8,100 and 9,875 vehicles on a daily basis by the 2021 and 2031 horizon years, respectively.
- Two-way vehicle volumes will range from 790 to 835 and 965 to 1,020 vehicles per hour during the weekday 2021 and 2031 AM and PM peak periods, respectively.
- Commercial and heavy vehicles are anticipated to remain fairly stable based on existing percentages and will represent approximately four percent of the total traffic on Guelph Line during the weekday 2021 and 2031AM and PM peak periods, respectively.

The traffic data for the Guelph Line corridor is summarized in **Table 2.**

**Table 2**
**Guelph Line Corridor (Conservation Road to 1 km north of Derry Road)**

| Characteristic | Existing (2008) | Future 2021 | Future 2031 |
|---|---|---|---|
| **Posted Speed Limits** | | | |
| Existing (km/hr) | 60 | - | - |
| Future (km/hr) [1] | | 60 | 60 |
| **Traffic Data** | | | |
| ADT (vpd) | 6,400 | 8,100 | 9,875 |
| AM Peak Hour (vph) | 625 | 790 | 965 |
| PM Peak Hour (vph) | 660 | 835 | 1,020 |
| **Vehicle Classification Percentages** | | | |
| Cars (%) | 94.3 | 96.0 | 96.0 |
| Small Trucks (%) | 0.9 | 2.0 | 2.0 |
| Medium Trucks (%) | 1.8 | 1.0 | 1.0 |
| Heavy Trucks (%) | 3.0 | 1.0 | 1.0 |

[1] Assumed future speed limit.

Also, for your information, we have placed a PDF roll plans (shown at the recent Public Information Centres) on our FTP site. The roll plans show existing conditions within the project study limits for Derry Road and Guelph Line.

Access to the R and R Associates FTP site is as follows:

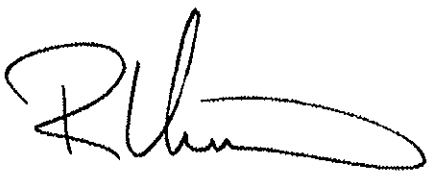
FTP Site - R and R Associates' Client

- FTP Address: ftp://RRClient.randr-associates.com@randr-associates.com/
- Name: RRClient.randr-associates.com
- Pass: RR2008ftp

If you have any questions related to the above or require additional information please contact me at your convenience by phone at 289-241-2624 or via e-mail at RHein@RandR-Associates.com.

Best regards,

**R and R Associates Inc.**



**Rick Hein, P.Eng., PTOE, AVS**
**Principal**

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August 18, 2010

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St. Catharines, Ontario
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Attention: Mr. Rick Hein
rhein@randr-associates.com

**Re: Noise Impact Assessment** **VIA E-MAIL**
**Ambient Sound Level Measurements**
**Derry Road from Milburough Line to McNiven Road**
**Halton Region**
**Our File: 109-183-100**

Dear Mr. Hein:

Valcoustics Canada Ltd. has been retained to prepare a noise impact assessment of the proposed improvements to Derry Road between Milburough Line to McNiven Road. The results of the assessment were presented to the public at a recent Public Information Centre No. 2 which was held on May 4, 2010. During this meeting, concerns regarding the noise impact assessment results were raised by members of the public. To address these concerns, ambient sound level monitoring at the receptor locations was undertaken. The noise monitoring results are presented herein.

## NOISE MONITORING

Sound monitoring was undertaken at five locations on June 8, 2010. The five locations are shown on Figure 1. These locations were chosen as residents had responded to the written request to complete sound measurements on their property.

The measurement microphone was set up 3 m from the rear of the dwelling at a worst case location where the screening of road traffic on Derry Road is minimized. The measurement location was selected in accordance with the Ministry of Transportation (MTO)/Ministry of the Environment (MOE) noise protocol requirements.

Sound monitoring was done continuously for 2.5 hours at each location. The 2.5 hour time period was divided into five 30 minute intervals to maximize the amount of data collected at each measurement location. The 30 minute $L_{eq}$ or the energy averaged sound level that occurred over the 30 minute measurement period was determined.

Traffic counts were also completed during the sound level measurements to permit prediction of the sound exposure level at the measurement locations from the actual traffic volumes that occurred during the measurement intervals.

## RESULTS

The measurement results and the sound exposure prediction results for the same time period, using the traffic count information, are presented in Table 1. The existing sound exposure, as presented in our original noise analysis, is also shown in Table 1.

Review of Table 1 indicates:

- The noise prediction model tends to somewhat over predict the resultant sound exposures although the results correlate very well with the measured sound exposure levels.

- At some locations for a few time periods, the measured sound exposure levels are higher than the predicted sound exposure level. This is likely due to other sound sources that were present during the measurement period.

- The measured sound exposure levels are consistent with the existing sound exposure levels outlined in the original noise analysis.

## CONCLUSIONS

The results of the ambient sound monitoring indicate that the sound levels outlined in the noise impact analysis have been accurately predicted. Thus, the conclusions and recommendations outlined within the report remain valid.

If there are any questions or if additional information is needed, please do not hesitate to call.

Yours truly,

**VALCOUSTICS CANADA LTD.**

**Per:** _____

**John Emeljanow, B.Eng., P.Eng.**

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Enclosures

## TABLE 1

## Derry Road – Milburough Line to McNiven Road – Sound Measurements

## RESULTS

| Receptor | Address | Existing $L_{eq}$ (1) (dBA) | Time Period | Predicted $L_{eq}$ (2) (dBA) | Measured $L_{eq}$ (3) (dBA) |
|---|---|---|---|---|---|
| R5 | 1215 Derry Road | 46 | 1115 to 1145 | 47 | 46 |
| | | | 1145 to 1215 | 47 | 45 |
| | | | 1215 to 1245 | 43 | 42 |
| | | | 1245 to 1315 | 44 | 45(4) |
| | | | 1315 to 1345 | 45 | 44 |
| | | | *Average(5)* | *45* | *44* |
| R7 | 1275 Derry Road | 44 | 0820 to 0850 | 47 | 49(4) |
| | | | 0850 to 0920 | 44 | 45(4) |
| | | | 0920 to 0950 | 46 | 46 |
| | | | 0950 to 1020 | 47 | 45 |
| | | | 1020 to 1050 | 47 | 45 |
| | | | *Average(5)* | *46* | *46* |
| R9 | 6781 McNiven Road | 49 | 0830 to 0900 | 52 | 50 |
| | | | 0900 to 0930 | 50 | 48 |
| | | | 0930 to 1000 | 52 | 48(6) |
| | | | 1000 to 1030 | 52 | 49(6) |
| | | | 1030 to 1100 | 53 | 48(6) |
| | | | *Average(5)* | *52* | *49* |
| R10 | 1200 Derry Road | 42 | 1130 to 1200 | 43 | 43 |
| | | | 1200 to 1230 | 41 | 41 |
| | | | 1230 to 1300 | 42 | 42 |
| | | | 1300 to 1330 | 40 | 44(4) |
| | | | 1330 to 1400 | 43 | 40 |
| | | | *Average(5)* | *42* | *42* |
| New | 6780 McNiven Road | 49 | 0800 to 0830 | 56 | 53 |
| | | | 0830 to 0900 | 52 | 52 |
| | | | 0900 to 0930 | 50 | 51 |
| | | | 0930 to 1000 | 51 | 51 |
| | | | 1000 to 1030 | 52 | 52 |
| | | | *Average(5)* | *52* | *52* |

Notes:

(1) Existing sound exposure from the original noise report.
(2) Predicted sound exposure for the indicated time period using the ORNAMENT model and the actual traffic counts.
(3) Measured sound exposure for the indicated time period.
(4) Measured sound levels are higher than predicted due to noise sources other than road traffic on Derry Road. Aircraft activity was observed during these measurement periods.
(5) The average is the numerical average of the above five results.
(6) Predicted levels are 3 dBA or greater, more than the measured levels. It is likely that there is more acoustical screening, likely due to dense woods, than has been accounted for in the assessment.

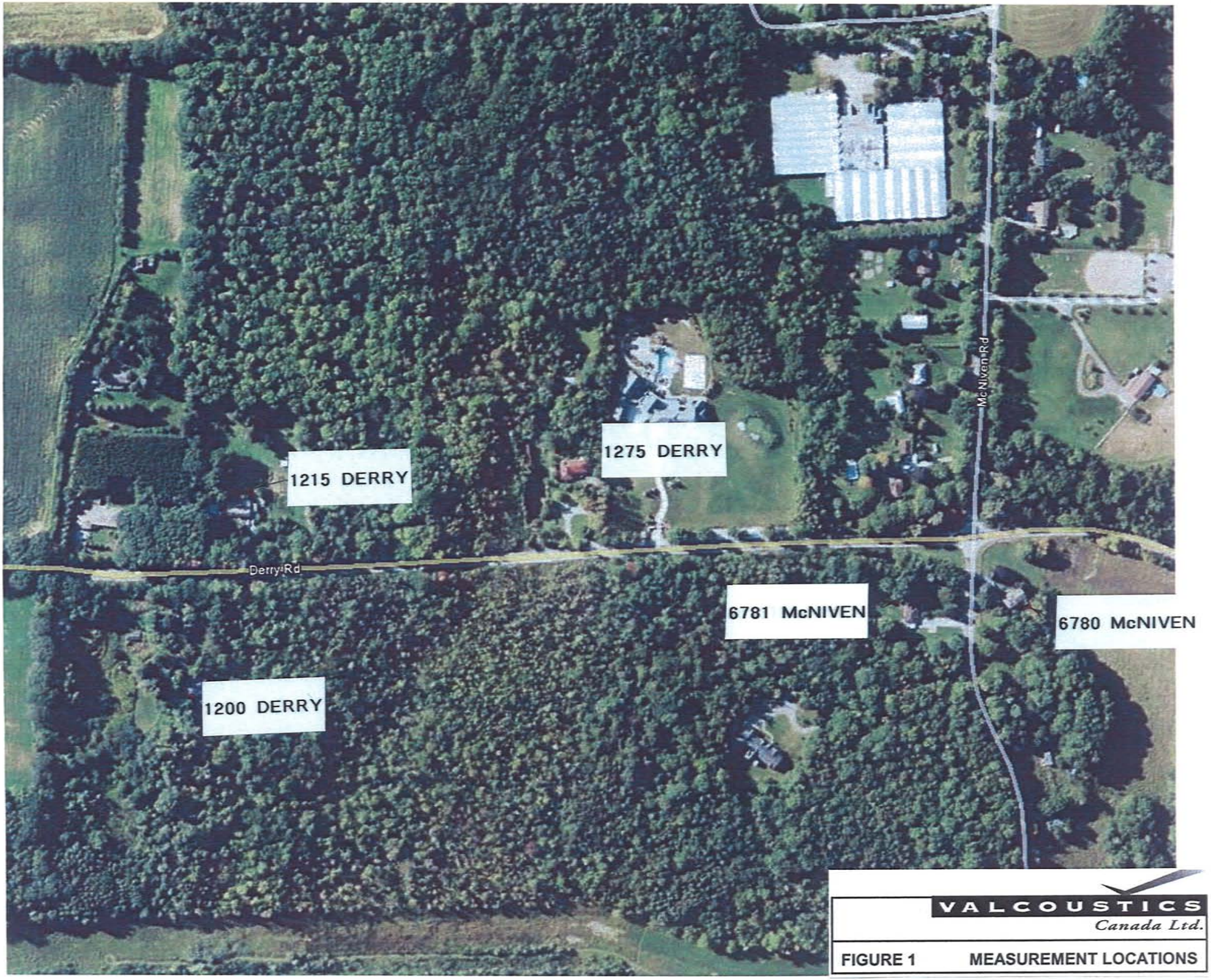


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FIGURE 1 MEASUREMENT LOCATIONS