Rail Traffic Noise and Vibration Feasibility Study
Proposed Zone Change for 6 Residential Lots
Inkerman Street
Guelph, Ontario

For
Granite Holdings Ontario Limited
160 Southgate Drive
Guelph, Ontario
N1G 4P5

Prepared by
Sheeba Paul, MEng, PEng

Reviewed by
Bill Gastmeier, MASc, PEng

November 2, 2012
1 INTRODUCTION AND SUMMARY

HGC Engineering was retained by Granite Holdings Ontario Limited to conduct a rail noise and vibration feasibility study for a zone change to permit the development of six lot residential lots along Inkerman Street, in the City of Guelph, Ontario. The lands are located on the south side of the Goderich Exeter Railway (GEXR) and to the south of an existing industrial building which is a separate parcel. The surrounding lands to the east, west and south of the subject site are existing residential. The study is required by the municipality as part of their planning and approvals process in support of a zone change application.

Rail traffic data was obtained from the GEXR. The data was used to predict future traffic sound levels at the locations of the proposed dwelling facades and the future outdoor living areas. The predicted sound levels were compared to the guidelines of the Ministry of Environment (MOE), and the GEXR and the Canadian National (CN) railway.

The sound level predictions indicate that the future rail traffic sound levels will exceed MOE guidelines at the lot with the greatest exposure to the railway line. Forced air ventilation systems with ductwork sized for the future installation of central air conditioning by the occupant will be required for the dwelling unit with the most exposure to the railway line. Brick exterior wall constructions and glazing constructions meeting the minimum requirements of the Ontario Building code will be required for the future dwellings on the lots with exposure to the railway line. Warning clauses are also recommended, to inform future residents of the rail traffic noise impacts and to address sound level excesses.

Vibration levels are below the MOE and CN/GEXR guidelines for train passbys at the location of the closest residential dwelling facade. Vibration mitigation measures are not required for any of the dwelling units on this site.
2 SITE DESCRIPTION AND NOISE SOURCES

Figure 1 is a key plan showing the location of the site. The site is located to the south of the GEXR railway line on the north side of Inkerman Street between Edinburgh Road South and Alma Street, in Guelph, Figure 2 is a proposed concept plan prepared by Astrid J. Clos Planning Consultants dated August 1, 2012. The proposed development will consist of six lots with 2-storey homes.

The land will be graded to be essentially flat. Since the closest residential façade is located within 75 m of the railway right-of-way, a vibration study has been conducted. A site visit was made by HGC Engineering personnel on October 1, 2012, to make observations of the acoustical environment and to perform vibration measurements. During the site visit, it was observed that the GEXR railway to the north is the dominant source of noise. The areas to the east, west and south are existing residential. Immediately to the north of the site is an existing industrial building. This building will provide some shielding from rail traffic noise. No significant stationary sources of sound were observed within 500 m of the subject site.

3 NOISE LEVEL CRITERIA

Guidelines for acceptable levels of rail traffic noise impacting residential developments are given in the MOE publication LU-131, “Noise Assessment Criteria in Land Use Planning”, its Annex and its accompanying document, “Requirements, Procedures and Implementation, 1997”, and are listed in Table I below. The values in Table I are energy equivalent (average) sound levels \( \text{L}_{\text{EQ}} \) in units of A-weighted decibels [dBA].
Table I: MOE Rail Traffic Noise Criteria (dBA)

<table>
<thead>
<tr>
<th>Area</th>
<th>Daytime $L_{EQ}$ (16 hour) Rail</th>
<th>Nighttime $L_{EQ}$ (8 hour) Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outside Bedroom Windows</td>
<td>--</td>
<td>50 dBA</td>
</tr>
<tr>
<td>Outdoor Living Area</td>
<td>55 dBA</td>
<td>--</td>
</tr>
<tr>
<td>Inside Living/Dining Rooms</td>
<td>40 dBA</td>
<td>--</td>
</tr>
<tr>
<td>Inside Bedrooms</td>
<td>--</td>
<td>35 dBA</td>
</tr>
</tbody>
</table>

Daytime refers to the period between 07:00 and 23:00. Nighttime refers to the time period between 23:00 and 07:00. The term "Outdoor Living Area" (OLA) is used in reference to an outdoor patio, backyard, terrace, or other area where passive recreation is expected to occur, provided that it has a minimum depth of 4 m, and is outside the exterior building façade and unenclosed.

The guidelines in the MOE publication allow the daytime sound levels in an Outdoor Living Area to be exceeded by up to 5 dBA, without mitigation, if warning clauses are placed in the purchase and rental agreements to the property. Where OLA sound levels exceed 60 dBA, physical mitigation is required to reduce the OLA sound level to below 60 dBA and as close to 55 dBA as technically, economically and administratively feasible.

Indoor guidelines are 5 dBA more stringent for rail noise than for road noise, to account for the low frequency (rumbling) character of locomotive sound, and its greater potential to transmit through exterior wall/window assemblies.

A central air conditioning system as an alternative means of ventilation to open windows is required for dwellings where nighttime sound levels outside bedroom windows exceed 60 dBA or where daytime sound levels outside living room windows exceed 65 dBA. Forced-air ventilation with ducts sized to accommodate the future installation of air conditioning is required when nighttime sound levels at bedroom windows are in the range of 51 to 60 dBA or when daytime sound levels at living room windows are in the range of 56 to 65 dBA.
Building components such as walls, windows and doors must be designed to achieve indoor sound level criteria when the plane of window sound level is greater than 60 dBA or the daytime sound level is greater than 65 dBA due to road traffic noise and when the plane of window sound level is greater than 55 dBA due to rail traffic noise. The use of warning clauses to notify future residents of possible excesses is also recommended.

MOE guidelines recommend brick exterior walls from foundation to rafters as a minimum construction for any dwellings which are within 100 m of the right of way of the railway, where the 24 hour $L_{EQ}$ is greater than 60 dBA. CN typically requires brick for the first row of dwellings.

The railways also provide minimum requirements for safety as well as sound and vibration for proposed residential developments located adjacent to their rights-of-way. The proposed residential lots are not abutting the railway right-of-way. The requirements refer to minimum required setbacks, berms, fencing and warning clauses. The reader is referred to a copy of CN requirements for a new development adjacent to a principal main line, which is located in Appendix A.

### 3.1 Ground-borne Vibration from Rail Traffic

Vibration is typically measured in terms of velocity or acceleration. The CN Rail vibration guidelines are given in terms of ground-borne velocity. In this report, vibration levels are quoted in RMS velocity levels ($L_v$) in units of decibels [dB] relative to a velocity of 1 mm/sec [i.e., 1 mm/s = 0 dB]. The CN guideline limit is 0.14 mm/s, which is equivalent to –17 dB re 1 mm/s.

MOE and CN guidelines require measurements of ground-borne vibration when residential dwelling units are to be located within 75 metres of a line such as the GEXR railway line (Guelph Subdivision).

Vibration is typically measured in terms of oscillatory velocity or acceleration. The MOE guidelines recommend that ground-borne vibration be limited to a vibratory velocity of 0.14 mm/s (-17 dB)
between 10 and 100 Hz. The MOE and CN criteria have been overlaid on the graphs of measured vibration for easy reference (Figures 3 to 5). CN has considered vibration levels exceeding 0.2 mm/s (-14 dB re 1 mm/s) to be a significant problem.

4 RAIL TRAFFIC NOISE PREDICTIONS

4.1 Rail Traffic Data

Rail traffic data for typical operations of the Goderich-Exeter Railway Guelph Subdivision was obtained from the Goderich-Exeter Railway (GEXR) and is provided in Appendix B. The maximum permissible train speed in the area of the site is 16 km/h (10 mph) for freight trains and passenger trains. This maximum speed, as well as the maximum number of cars and locomotives per train was used in the traffic noise analysis to yield a worst cast estimate of train noise. The data was projected to the year 2022. The volumes were grown using a 2.5% per year growth rate. Table II summarises the rail traffic data used in the analysis.

<table>
<thead>
<tr>
<th>Type of Train</th>
<th>Number of locomotives Day/Night</th>
<th>Number of cars Day/Night</th>
<th>Max Speed (km/h)</th>
<th>Existing Volumes Day/Night</th>
<th>Predicted Daytime (07:00-23:00) trains</th>
<th>Predicted Nighttime (23:00-07:00) trains</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freight</td>
<td>2 / 2</td>
<td>75 / 75</td>
<td>16</td>
<td>2 / 0</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Switcher</td>
<td>2 / 1</td>
<td>20 / 10</td>
<td>16</td>
<td>2 / 1</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Passenger</td>
<td>1 / 1</td>
<td>6 / 6</td>
<td>16</td>
<td>7 / 3</td>
<td>9</td>
<td>4</td>
<td>13</td>
</tr>
</tbody>
</table>

Note: *Values are rounded up to the higher integer value for use in the prediction.

In addition, rail traffic data for the GO Transit railway line was obtained from GO Transit personnel and is provided in Appendix B. The data is projected to the year 2022. Table III summarises the rail traffic data used in the analysis.
4.2 Rail Traffic Noise Predictions

To assess the levels of rail traffic noise which will impact the site in the future, predictions were made using STAMSON version 5.0, a computer algorithm developed by the MOE. Sample STAMSON output is included in Appendix C. As required by the MOE, train whistle noise has not been included in the calculation of the daytime and night-time sound levels at the façade. Engine bells are sounded but whistles are prohibited in this area.

Predictions of the traffic sound levels were made at various locations. The results of these predictions are summarized in Table IV. If the orientation of the lots is changed, the acoustic recommendations will need to be revised.

Sound levels were predicted at ground level in the rear yards during daytime hours to investigate the need for noise barriers. Sound levels were also predicted in the plane of second floor bedroom windows during nighttime hours and in the plane of the first floor living/dining room windows to investigate ventilation and building construction requirements. A 6 m front and 7.5 m rear yard setback and a 0.6 m setback for interior side yards setbacks were used in the analysis. These setbacks are similar for the existing residences.
Table IV: Future Sound Levels due to Rail Traffic, [dBA]

<table>
<thead>
<tr>
<th>Lot No.</th>
<th>Description</th>
<th>Daytime – at Façade, $L_{EQ}(16)$</th>
<th>Nighttime – at Façade, $L_{EQ}(8)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Some exposure to railway</td>
<td>52</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>Outdoor amenity area</td>
<td>&lt;55</td>
<td>NA</td>
</tr>
<tr>
<td>6</td>
<td>North façade with exposure to the railway</td>
<td>53</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>Outdoor amenity area</td>
<td>&lt;55</td>
<td>NA</td>
</tr>
</tbody>
</table>

Note: The existing building is assumed to remain and provides shielding for the proposed dwellings.

5 DISCUSSION AND RECOMMENDATIONS

The predictions indicate that the future traffic sound levels will exceed MOE guidelines by a minor amount at the lot with exposure to the CN railway. Recommendations to address these excesses are discussed below.

5.1 Outdoor Living Areas

The general policies of CN rail for new residential development proposed adjacent to a principal main line stipulate the provision of a safety berm (2.5 m in height) and sound barrier totaling 5.5 m in height (with respect to the top of rail, see Appendix A). However, the proposed residential lots do not abut the railway right of way, therefore, the berm is not required.

The predicted sound level in the rear yard amenity areas with exposure to the railway line is less than 55 dBA, considering the intervening building to the north of the proposed dwellings. There is an existing property and industrial building located between the proposed lots and the railway right of way. Further physical mitigation is not required for the lots. A safety berm, 2.0 m in height is typically a requirement for safety reasons in the event of a derailment on land abutting the railway. The subject property does not abut the railway lands, therefore, the safety berm would not be required.
5.2 Indoor Living Areas

**Forced Air Ventilation**

The future dwelling on Lot 6 with exposure to the railway line will have predicted nighttime sound levels that are greater than 50 dBA but less than 60 dBA. To address these excesses, the MOE guidelines recommend that these dwelling units be equipped with a forced air ventilation systems with ducts sized to accommodate the future installation of air conditioning by the occupant.

Window or through-the-wall air conditioning units are not recommended for any residential units because of the noise they produce and because the units penetrate through the exterior wall which degrades the overall noise insulating properties of the envelope. The location, installation and sound ratings of the outdoor air conditioning devices should minimize noise impacts and comply with criteria of MOE publication NPC-216, Residential Air Conditioning Devices.

5.3 Building Facade Constructions

Since future nighttime sound levels at all the residential units with exposure to the GEXR/CN railway line are less than 55 dBA at night, sound attenuating building constructions (windows, doors and walls) do not need to be specified for the dwelling units.

5.3.1 Exterior Wall Construction

According to MOE and CN guidelines, the dwellings in the first row will require brick or masonry exterior walls, as it is within 100 m from the railway right of way. This applies to all the future dwellings (exposed facades, rear north, east and west) on the proposed six lots.
5.3.2 Glazing Construction

For all the lots, any double glazed window construction meeting the minimum requirements of the Ontario Building Code (OBC) will provide adequate sound insulation for the dwelling units.

5.4 Rail Vibration Impact

Measurements of ground-borne rail vibration were conducted at the location of the nearest proposed residential façade. Ground-borne vibration was measured for three separate freight train pass-bys on October 1, 2012 between 06:50 and 08:15.

The vibration measurements were conducted using a Hewlett Packard 3569A Real Time Frequency Analyzer outfitted with a Wilcoxon Research type 794V velocity transducer correctly field calibrated before and after the measurements.

Ground-borne vibration during the passbys were below the MOE and CN limit of 0.14 mm/s (-17 dB) at the closest residential facade. The results are plotted as Figures 3 to 5. Table V shows the peak vibration measurements during each of the train pass-bys.

<table>
<thead>
<tr>
<th>Train Pass-by</th>
<th>Type of Train</th>
<th>Closest dwelling façade from railway (mm/s)</th>
<th>Criteria (mm/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VIA</td>
<td>0.014</td>
<td>0.14</td>
</tr>
<tr>
<td>2</td>
<td>GO</td>
<td>0.012</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Freight</td>
<td>0.022</td>
<td></td>
</tr>
</tbody>
</table>

Vibration levels are below the CN and MOE limit of 0.14 mm/s at the location of the closest residential façade. Vibration mitigation measures are not required for this site.
5.5 Warning Clauses

The MOE guidelines recommend that warning clauses be included in the property and tenancy agreements for all units with anticipated traffic sound level excesses. Examples are provided below.

Suggested wording for future dwellings with sound level excesses of the MOE criteria for which physical mitigation has not been provided is given below.

Type A:

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 rail may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the noise criteria of the Municipality and the Ministry of the Environment.

Suitable wording for future dwellings requiring forced air ventilation systems is given below.

Type B:

Purchasers/tenants are advised that this dwelling unit has been fitted with a forced air heating system and the ducting etc., was sized to accommodate central air conditioning. Installation of central air conditioning will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the Town’s and the Ministry of the Environment’s noise criteria. Purchasers/tenants are advised that the outdoor air cooled condenser unit itself can produce noise to interfere with outdoor recreational activities. Due consideration should be given to this noise factor when selecting the air cooled condenser units location or an alternative quieter type of unit could be selected. The condenser unit sound rating should not exceed 7.6 bels in accordance with ANSI Standard 270-84 for units 3.5 ton or less. The location and installation of the outdoor air conditioning device should be done so as to minimize the noise impacts and have due regard for compliance with criteria of MOE publication NPC-216, Residential Air Conditioning Devices.

GEXR and CN’s standard warning clause which is required for all residential developments located within 300 m of their mainlines is given below.

Type C:

Warning: Canadian National Railways Company or its assigns or successors in interest has or have a rights-of-way within 300 metres from the land subject hereof. There may be alteration to or expansions of the railway facilities on such rights-of-way in the future.
including the possibility that the railway or its assigns or successors as aforesaid may expand its operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwellings. CNR will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid rights-of-way.

The suggested wording for future dwellings near to industrial facilities is given below.

Type D:

Purchasers are advised that due to the proximity of the future and existing industrial facilities, sound levels from the facilities may at times be audible.

These sample clauses are provided by the MOE as examples, and can be modified by the Municipality as required.

6 SUMMARY OF RECOMMENDATIONS

The following list and Table VI summarizes the recommendations made in this report.

1. Forced air ventilation systems with ductwork sized for the future installation of central air conditioning system will be required for all six lots.

2. Noise warning clauses should be placed in the property and tenancy agreements and offers of purchase and sale for the all the dwelling units.

3. Brick exterior wall construction will be required for the east, west and north facades on all lots. Any glazing construction meeting the minimum requirements of the Ontario Building Code will be sufficient for all the lots.
Table VI: Summary of Noise Control Requirements and Noise Warning Clauses

<table>
<thead>
<tr>
<th>Lot</th>
<th>Acoustic Barrier</th>
<th>Ventilation Requirements *</th>
<th>Type of Warning Clause</th>
<th>Brick Exterior Wall Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – 5</td>
<td>--</td>
<td>--</td>
<td>C, D</td>
<td>✅</td>
</tr>
<tr>
<td>6</td>
<td>--</td>
<td>Forced Air</td>
<td>A, B, C, D</td>
<td>✅</td>
</tr>
</tbody>
</table>

Notes:
-- no specific requirement
* The location, installation and sound rating of the air conditioning condensers must be compliant with MOE Guideline NPC-216.
OBC – meeting the minimum requirements of the Ontario Building Code

6.1 Implementation

To ensure that the noise control recommendations outlined above are fully implemented, it is recommended that:

1) That the City’s building inspector or a Professional Engineer qualified to perform acoustical engineering services in the Province of Ontario shall certify that the noise control measures have been properly installed and constructed as recommended by this report.
Figure 1 - Key Plan
Figure 2 - Proposed Site Plan
Figure 3: Pass-by 1
Measured Vibratory Velocity Level (VIA Train Eastbound)

Figure 4: Pass-by 2
Measured Vibratory Velocity Level (Eastbound GO Train)
**Figure 5: Pass-by 3**

Measured Vibratory Velocity Level (Freight Train)

GO Transit Limit: 0.14 mm/s = -17
APPENDIX A

CN Principal Main Line Requirements and Correspondence
Sheeba Paul

From: Nick Coleman <Nick.Coleman@cn.ca>
Sent: October-26-12 9:52 AM
To: Sheeba Paul
Subject: RE: Rail Data Request - Guelph Ontario
Attachments: PML.pdf; SML.pdf; Transfer of Easement - Corridor version.doc

Follow Up Flag: Follow up
Flag Status: Flagged
Categories: Red Category

Sheeba, the Guelph was classified as a secondary main line until about 5 years ago, when on GEXR’s advice, it was upgraded to a principal main line to reflect the anticipated growth in GO/Metrolinx service, and the associated track improvements that would facilitate increased capacity and speeds.

The main difference between the two sets of requirements is the height of the safety berm, which increases 0.5m for a principal main line. There is also an increase of 1.0m to the target noise barrier height, although in practice, the actual height is determined by the noise analysis and report recommendations.

Regards,
Nick

From: Sheeba Paul [mailto:spaul@hgcengineering.com]
Sent: Thursday, October 25, 2012 11:25
To: Nick Coleman
Subject: re: Rail Data Request - Guelph Ontario

Hi Nick,

HGC Engineering is performing a noise study for a proposed development along Inkerman Street in Guelph, ON. The site is located to the south of the railway line.

http://maps.google.ca/maps?q=inkerman+street+and+meadowview+ave,+guelph,+on&hl=en&ll=43.536774,‐80.258839&spn=0.009178,0.020664&sll=43.53649,‐80.259638&sspn=0.002294,0.00721&t=h&gl=ca&hnear=Inkerman+St+%26+Meadowview+Ave,+Guelph,+Wellington+County,+Ontario&z=16

We have rail data from GEXR.

Do you know the classification of this railway line? I want to attach the requirements in the Appendix of the report.

Thank you.

Ms. Sheeba Paul, MEng, PEng
Senior Engineer, Associate

HGC Engineering  NOISE | VIBRATION | ACOUSTICS
Howe Gastmeier Chapnik Limited
This e-mail and any attachments may contain confidential and privileged information. If you are not the intended recipient, please notify the sender immediately by return e-mail, delete this e-mail and destroy any copies. Any dissemination or use of this information by a person other than the intended recipient is unauthorized and may be illegal.
PRINCIPAL MAIN LINE REQUIREMENTS

A. Safety setback of habitable buildings from the railway rights-of-way to be a minimum of 30 metres in conjunction with a safety berm. The safety berm shall be adjoining and parallel to the railway rights-of-way with returns at the ends, 2.5 metres above grade at the property line, with side slopes not steeper than 2.5 to 1.

B. The Owner shall engage a consultant to undertake an analysis of noise. At a minimum, a noise attenuation barrier shall be adjoining and parallel to the railway rights-of-way, having returns at the ends, and a minimum total height of 5.5 metres above top-of-rail. Acoustic fence to be constructed without openings and of a durable material weighing not less than 20 kg. per square metre of surface area. Subject to the review of the noise report, the Railway may consider other measures recommended by an approved Noise Consultant.

C. Ground-borne vibration transmission to be evaluated in a report through site testing to determine if dwellings within 75 metres of the railway rights-of-way will be impacted by vibration conditions in excess of 0.14 mm/sec RMS between 4 Hz and 200 Hz. The monitoring system should be capable of measuring frequencies between 4 Hz and 200 Hz, ±3 dB with an RMS averaging time constant of 1 second. If in excess, isolation measures will be required to ensure living areas do not exceed 0.14 mm/sec RMS on and above the first floor of the dwelling.

D. The Owner shall install and maintain a chain link fence of minimum 1.83 metre height along the mutual property line.

E. The following clause should be inserted in all development agreements, offers to purchase, and agreements of Purchase and Sale or Lease of each dwelling unit within 300m of the railway right-of-way: “Warning: Canadian National Railway Company or its assigns or successors in interest has or have a rights-of-way within 300 metres from the land the subject hereof. There may be alterations to or expansions of the railway facilities on such rights-of-way in the future including the possibility that the railway or its assigns or successors as aforesaid may expand its operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwelling(s). CNR will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid rights-of-way.”

F. Any proposed alterations to the existing drainage pattern affecting railway property must receive prior concurrence from the Railway and be substantiated by a drainage report to the satisfaction of the Railway.

G. The Owner shall through restrictive covenants to be registered on title and all agreements of purchase and sale or lease provide notice to the public that the safety berm, fencing and vibration isolation measures implemented are not to be tampered with or altered and further that the Owner shall have sole responsibility for and shall maintain these measures to the satisfaction of CN.

H. The Owner shall enter into an Agreement with CN stipulating how CN's concerns will be resolved and will pay CN's reasonable costs in preparing and negotiating the agreement.

I. The Owner shall be required to grant CN an environmental easement for operational noise and vibration emissions, registered against the subject property in favour of CN.
APPENDIX B

Rail Traffic Information
Sheeba Paul, MEng, PEng.  
Senior Engineer, Associate  
HGC Engineering  
2000 Argentia Road, Plaza One, Suite 203  
Mississauga, Ontario  
L5N 1P7

September 19, 2012

Re: Rail Traffic Data -- City of Guelph (Inkerman and Edinburgh Rd. North), Guelph Subdivision

As per your request, the following information is provided for the operation of Goderich-Exeter trains on the Guelph Subdivision in the City of Guelph.

The typical daily rail traffic volumes are representative of a twenty four (24) hour period, seven (7) days per week, but I must caution that such volumes are subject to overall economic conditions and will fluctuate with varying traffic demands, weather conditions, track maintenance programs and statutory holidays.

The Guelph Subdivision is currently a single track main line with both freight and passenger trains operating at any time in a 24 hour period. The subdivision extends from mile 30 in the City of Georgetown, Ontario west to mile 118.8 in the City of London, Ontario. It is federally regulated. There are a number of public road crossing in the area of study and a rail passenger station approximately one quarter of a mile to the east. These crossings require the ringing of the engine bell as prescribed by Canadian Rail Operating Rule 13 only. Sounding of the engine horn is prohibited at all public crossings in the study area (R-36160) except to prevent an accident.

Daily, the number of trains which are scheduled to operate between 0600hrs and 1800hrs starting in the morning are: An eastbound GO train at approximately 0614hrs with one (1) locomotive and ten (10) coaches, another GO passenger train at approximately 0732hrs with one (1) engine and 10 coaches, a manifest freight train which normally operates with two (2) locomotives and on average fifty to seventy five (50-75) rail cars at approximately 0845hrs and a VIA train at approximately 0940hrs with one (1) locomotive and six (6) coaches. There is then a westbound passenger train with one (1) locomotive and two (2) coaches at approximately 1208hrs. Anytime between 1200hrs and 1600hrs there is a westbound manifest freight train which normally operates with two (2) locomotives and on average fifty to seventy five (50-75) rail cars.
In addition daily on week days between approximately 0900hrs and 2100hrs there are two road switchers operating. One assignment would typically operate with one (1) locomotive and an average of ten (10) cars. The other assignment typically operates with two (2) locomotives and an average of twenty (20) cars. These assignments may operate in any direction at any time in this window and occasionally at any other time of day or day of the week as required.

Daily between the hours of 1800 and 0600 there is a westbound GO passenger train at approximately 1818hrs with one (1) locomotive and ten (10) coaches followed by a westbound VIA passenger train at approximately 1852hrs with one (1) locomotive and on average six (6) coaches then another westbound GO passenger train at approximately 1918hrs with one (1) locomotive and ten (10) coaches. There is then one final eastbound VIA passenger train at approximately 2205hrs.

From Sunday night to Friday night there is a westbound passenger train at approximately 2328hrs with one (1) engine and usually five (5) coaches.

From Monday to Friday there is an eastbound passenger train with one (1) engine and usually five (5) coaches at approximately 0655hrs.

Current maximum speed on this line in this area is ten (10) miles per hour for passenger trains and ten (10) miles per hour for freight trains.

Based on current forecasts and announcements the Sunday to Friday 2328hrs and Monday to Friday 0655hrs eastbound passenger trains will be curtailed in October 2012 by VIA rail Canada. Freight service is not currently expected to change subject to paragraph two.

If you have any further questions please feel free to contact me at 519 271-4441 Extension 2.

Yours truly,

Adam Smith
Operations
Goderich-Exeter Railway
Hello Sheeba – Sorry for the delay on this. Yes, you may use the 10 mph speed limit.

Adam

Hi Adam

GEXR in the area of Edinburgh Street in Guelph indicates that the maximum speed is 16 kph (10 mph). Please see GEXR data attached. For the future GO train data shall I use the same speed of 10 mph instead of the usual 113 kph?

Thanks,

Ms. Sheeba Paul, MEng, PEng
HGC Engineering  NOISE | VIBRATION | ACOUSTICS
Howe Gastmeier Chapnik Limited
t: 905.826.4044

Hello Sheeba – Yes the data you have remains valid.

Thanks,

Adam
Hello Adam,

HGC Engineering is performing a noise study for a proposed development along Inkerman Street in Guelph, ON. The site is located to the south of the railway line.

http://maps.google.ca/maps?q=inkerman+street+and+meadowview+ave,+guelph,+on&hl=en&ll=43.536774,-80.258839&spn=0.009178,0.020664&sll=43.53649,-80.259638&sspn=0.002294,0.00721&t=h&gl=ca&hnear=Inkerman+St+%26+Meadowview+Ave,+Guelph,+Wellington+County,+Ontario&z=16

Typically we need daytime volumes, night-time volumes, number of locomotives, number of cars, speed of trains, speed and whistle information.

We have some rail data for this line, which is attached. Please let me know if this data is still valid.

Thank you.

Ms. Sheeba Paul, MEng, PEng
Senior Engineer, Associate

HGC Engineering  NOISE | VIBRATION | ACOUSTICS
Howe Gastmeier Chapnik Limited
2000 Argenta Road, Plaza One, Suite 203, Mississauga, Ontario, Canada  L5N 1P7
t:  905.826.4044  e: spaul@hgcengineering.com
Visit our new website! www.hgcengineering.com  Follow Us – LinkedIn | Twitter | YouTube

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Hello Sheeba - Further to your request, preliminary midterm (2021 +/-) weekday commuter train volumes at this location are in the order of 8 trains (6 day, 2 night). I note that these numbers are subject to change and may be influenced by passenger demand and funding availability.

Trains will be comprised of a single locomotive and up to 12 passenger cars.

In terms of train speeds, I understand that they will be in the 32 kph (20 mph) range in this area due to various slow orders in effect.

Please feel free to contact me should you have any additional questions.

Adam

Adam Snow MCIP, RPP
Transportation Planner
Metrolinx - Strategic Policy and Systems Planning
20 Bay Street, Suite 600 I Toronto, ON, CA I M5J 2W3
Adam.Snow@gotransit.com

Hello Adam

We are performing a road and rail noise impact study for a development in Guelph near the Goderich Exeter Railway (GEXR). The site is located to the north of the railway and on the east side of Cityview Drive. A Google map link is attached for your reference.

http://maps.google.ca/maps?q=cityview+drive,+guelph,+on&hl=en&ll=43.562015,-80.215816&spn=0.019218,0.055575&t=m&z=15&vpsrc=6

We have rail traffic data from the GEXR which is attached. The data mentions passenger and commuter train service. Can you verify that this data includes the future GO Transit service into Guelph? If the data does not include GO, can you provide the future projections for GO in this area?

Thank you.

Sheeba Paul, MEng. PEng.
HGC Engineering
From: Mackenzie, Douglas (GEXR) [mailto:Douglas.MacKenzie@railamerica.com]
Sent: September-06-11 3:50 PM
To: Megan Munro
Cc: Sheeba Paul; Watters, Amber (CBNS); Johanne Anstey
Subject: Rail Data Request - Guelph Ontario

As per your request, please find attached updated information for the GEXR Guelph subdivision in the vicinity of Cityview Drive in Guelph ON.

From: Megan Munro [mailto:mmunro@hgcengineering.com]
Sent: Tuesday, September 06, 2011 2:32 PM
To: Mackenzie, Douglas (GEXR)
Cc: Sheeba Paul; Watters, Amber (CBNS); Johanne Anstey
Subject: RE: Rail Data Request - Guelph Ontario

Hi Douglas,

We will arrange to have a cheque prepared and sent to your facility. We can fax a copy of the cheque to Amber in order to expedite the release of the data (this has been sufficient in the past).

Amber,

Please provide your fax number and the address we should mail the cheque.

Thanks,

Megan Munro, BASc, EIT
HGC Engineering (Howe Gastmeier Chapnik Limited)
Phone: 905.826.4044
Fax: 905.826.4940

From: Mackenzie, Douglas (GEXR) [mailto:Douglas.MacKenzie@railamerica.com]
Sent: September-06-11 2:21 PM
To: Megan Munro
Cc: Sheeba Paul; Watters, Amber (CBNS)
Subject: RE: Rail Data Request - Guelph Ontario

Megan

I would caution, while the information has not changed significantly, there has been some changes. If you require an up to date GEXR train activity report, you should arrange to provide a PO or cheque number in the amount of $290.00 plus HST to Amber Watters who will then make the necessary arrangements to release the information you have requested.
Megan Munro, BASc, EIT
HGC Engineering (Howe Gastmeier Chapnik Limited)
Phone: 905.826.4044
Fax: 905.826.4940

Megan Munro, BASc, EIT
HGC Engineering
2000 Argentia Road
Plaza One, Suite 203
Mississauga, Ontario, Canada  L5N 1P7
Phone 905.826.4044
Fax 905.826.4940

mmunro@hgengineering.com
www.hgengineering.com

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APPENDIX C

Sample Stamson Output
STAMSON 5.0        NORMAL REPORT  Date: 02-11-2012 10:33:21
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 1f.te                Time Period: Day/Night 16/8 hours
Description: Daytime and nighttime sound levels at the future dwelling façade of Unit 1, Some exposure to railway

Rail data, segment # 1: GEXR (day/night)
---------------------------------------------------------------
Train ! Trains ! Speed !# loc !# Cars! Eng !Cont
Type ! ! !(km/h) !/Train!/Train! type !weld
-----------------+-------------+-------+------+------+------+----
1. Freight       !   3.0/0.0  !  16.0  ! 2.0  ! 75.0 !Diesel!  No
2. switcher      !   3.0/1.0  !  16.0  ! 2.0  ! 20.0 !Diesel!  No
3. Passenger     !   9.0/4.0  !  16.0  ! 1.0  !  6.0 !Diesel!  No
4. go            !   6.0/2.0  !  16.0  ! 1.0  ! 12.0 !Diesel!  No

Data for Segment # 1: GEXR (day/night)
---------------------------------------------------------------
Angle1 Angle2 : -90.00 deg   -10.00 deg
Wood depth : 0       (No woods.)
No of house rows : 0 / 0
Surface : 1       (Absorptive ground surface)
Receiver source distance : 57.00 / 57.00  m
Receiver height : 1.50 / 4.50   m
Topography : 1       (Flat/gentle slope; no barrier)
No Whistle
Reference angle : 0.00

Results segment # 1: GEXR (day)
---------------------------------------------------------------
LOCOMOTIVE (0.00 + 51.55 + 0.00) = 51.55 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
---------------------------------------------------------------
-90 -10  0.58  65.78  -9.19  -5.05   0.00   0.00   0.00  51.55

WHEEL (0.00 + 38.48 + 0.00) = 38.48 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
---------------------------------------------------------------
-90 -10  0.66  53.31  -9.62  -5.20   0.00   0.00   0.00  38.48

Segment Leq : 51.76 dBA
Total Leq All Segments: 51.76 dBA

Results segment # 1: GEXR (night)
---------------------------------------------------------------
LOCOMOTIVE (0.00 + 49.00 + 0.00) = 49.00 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
---------------------------------------------------------------
-90 -10  0.66  53.31  -9.62  -5.20   0.00   0.00   0.00  38.48

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<table>
<thead>
<tr>
<th>Angle1</th>
<th>Angle2</th>
<th>Alpha</th>
<th>RefLeq</th>
<th>D.Adj</th>
<th>F.Adj</th>
<th>W.Adj</th>
<th>H.Adj</th>
<th>B.Adj</th>
<th>SubLeq</th>
</tr>
</thead>
<tbody>
<tr>
<td>-90</td>
<td>-10</td>
<td>0.50</td>
<td>62.52</td>
<td>-8.67</td>
<td>-4.86</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>49.00</td>
</tr>
</tbody>
</table>

WHEEL \((0.00 + 34.91 + 0.00)\) = 34.91 dBA

Segment Leq : 49.17 dBA

Total Leq All Segments: 49.17 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 51.76
  (NIGHT): 49.17
STAMSON 5.0 NORMAL REPORT Date: 02-11-2012 10:33:43
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 6f.te Time Period: Day/Night 16/8 hours
Description: Daytime and nighttime sound levels at the future dwelling façade of Unit 6, North façade with exposure to the railway

Rail data, segment # 1: GEXR (day/night)

<table>
<thead>
<tr>
<th>Train Type</th>
<th>Trains ! (km/h) !/# loc !/# Cars! Eng !Cont</th>
<th>Speed</th>
<th># loc</th>
<th># Cars</th>
<th>!/# Cars !Eng !Cont</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freight</td>
<td>3.0/0.0</td>
<td>16.0</td>
<td>2.0</td>
<td>75.0</td>
<td>!Diesel! No</td>
</tr>
<tr>
<td>Switcher</td>
<td>3.0/1.0</td>
<td>16.0</td>
<td>2.0</td>
<td>20.0</td>
<td>!Diesel! No</td>
</tr>
<tr>
<td>Passenger</td>
<td>9.0/4.0</td>
<td>16.0</td>
<td>1.0</td>
<td>6.0</td>
<td>!Diesel! No</td>
</tr>
<tr>
<td>Go</td>
<td>6.0/2.0</td>
<td>16.0</td>
<td>1.0</td>
<td>12.0</td>
<td>!Diesel! No</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Angle1 Angle2</th>
<th>-10.00 deg</th>
<th>90.00 deg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wood depth</td>
<td>0 (No woods.)</td>
<td></td>
</tr>
<tr>
<td>No of house rows</td>
<td>0 / 0</td>
<td></td>
</tr>
<tr>
<td>Surface</td>
<td>1 (Absorptive ground surface)</td>
<td></td>
</tr>
<tr>
<td>Receiver source distance</td>
<td>54.00 / 54.00 m</td>
<td></td>
</tr>
<tr>
<td>Receiver height</td>
<td>1.50 / 4.50 m</td>
<td></td>
</tr>
<tr>
<td>Topography</td>
<td>1 (Flat/gentle slope; no barrier)</td>
<td></td>
</tr>
<tr>
<td>No Whistle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference angle</td>
<td>0.00</td>
<td></td>
</tr>
</tbody>
</table>

Results segment # 1: GEXR (day)

LOCOMOTIVE (0.00 + 53.24 + 0.00) = 53.24 dBA

<table>
<thead>
<tr>
<th>Angle1 Angle2</th>
<th>Alpha RefLeq</th>
<th>D.Adj</th>
<th>F.Adj</th>
<th>W.Adj</th>
<th>H.Adj</th>
<th>B.Adj</th>
<th>SubLeq</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10 90</td>
<td>0.58</td>
<td>65.78</td>
<td>-8.82</td>
<td>-3.73</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

WHEEL (0.00 + 40.23 + 0.00) = 40.23 dBA

<table>
<thead>
<tr>
<th>Angle1 Angle2</th>
<th>Alpha RefLeq</th>
<th>D.Adj</th>
<th>F.Adj</th>
<th>W.Adj</th>
<th>H.Adj</th>
<th>B.Adj</th>
<th>SubLeq</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10 90</td>
<td>0.66</td>
<td>53.31</td>
<td>-9.23</td>
<td>-3.84</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Segment Leq : 53.45 dBA
Total Leq All Segments: 53.45 dBA

Results segment # 1: GEXR (night)

LOCOMOTIVE (0.00 + 50.62 + 0.00) = 50.62 dBA

<table>
<thead>
<tr>
<th>Angle1 Angle2</th>
<th>Alpha RefLeq</th>
<th>D.Adj</th>
<th>F.Adj</th>
<th>W.Adj</th>
<th>H.Adj</th>
<th>B.Adj</th>
<th>SubLeq</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10 90</td>
<td>0.66</td>
<td>53.31</td>
<td>-9.23</td>
<td>-3.84</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Angle1</td>
<td>Angle2</td>
<td>Alpha</td>
<td>RefLeq</td>
<td>D.Adj</td>
<td>F.Adj</td>
<td>W.Adj</td>
<td>H.Adj</td>
</tr>
<tr>
<td>--------</td>
<td>--------</td>
<td>-------</td>
<td>--------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>-10</td>
<td>90</td>
<td>0.50</td>
<td>62.52</td>
<td>-8.32</td>
<td>-3.59</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

WHEEL (0.00 + 36.62 + 0.00) = 36.62 dBA

<table>
<thead>
<tr>
<th>Angle1</th>
<th>Angle2</th>
<th>Alpha</th>
<th>RefLeq</th>
<th>D.Adj</th>
<th>F.Adj</th>
<th>W.Adj</th>
<th>H.Adj</th>
<th>B.Adj</th>
<th>SubLeq</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10</td>
<td>90</td>
<td>0.60</td>
<td>49.27</td>
<td>-8.90</td>
<td>-3.75</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>36.62</td>
</tr>
</tbody>
</table>

Segment Leq : 50.79 dBA

Total Leq All Segments: 50.79 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 53.45
(NIGHT): 50.79
**Description:** Daytime sound level in the OLA of Unit 6, with exposure to the railway, without mitigation

**Rail data, segment # 1: GEXR**

<table>
<thead>
<tr>
<th>Train Type</th>
<th>Trains</th>
<th>Speed (km/h)</th>
<th># loc</th>
<th># Cars</th>
<th>Eng</th>
<th>Cont</th>
<th>Weld</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freight</td>
<td>3.0/0.0</td>
<td>16.0</td>
<td>2.0</td>
<td>75.0</td>
<td>Diesel</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Switcher</td>
<td>3.0/1.0</td>
<td>16.0</td>
<td>2.0</td>
<td>20.0</td>
<td>Diesel</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Passenger</td>
<td>9.0/4.0</td>
<td>16.0</td>
<td>1.0</td>
<td>6.0</td>
<td>Diesel</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Go</td>
<td>6.0/2.0</td>
<td>16.0</td>
<td>1.0</td>
<td>12.0</td>
<td>Diesel</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

**Data for Segment # 1: GEXR**

<table>
<thead>
<tr>
<th>Angle1</th>
<th>Angle2</th>
<th>Receiver source distance</th>
<th>Receiver height</th>
<th>Topography</th>
<th>No of house rows</th>
<th>Surface</th>
<th>Wood depth</th>
<th>No Whistle</th>
<th>Barrier angle1</th>
<th>Barrier receiver distance</th>
<th>Source Height (m)</th>
<th>Receiver Height (m)</th>
<th>Barrier Height (m)</th>
<th>Elevation of Barrier Top (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10.00</td>
<td>90.00</td>
<td>54.00 m</td>
<td>1.50 m</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
<td>-10.00 deg</td>
<td>3.00 m</td>
<td>4.00</td>
<td>1.50</td>
<td>1.64</td>
<td>1.64</td>
</tr>
<tr>
<td>0.50</td>
<td>1.50</td>
<td>3.00 m</td>
<td>0.00 m</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
<td>0.00 m</td>
<td>0.00 m</td>
<td>0.50</td>
<td>1.50</td>
<td>1.44</td>
<td>1.44</td>
</tr>
</tbody>
</table>

**Results segment # 1: GEXR**

<table>
<thead>
<tr>
<th>Angle1</th>
<th>Angle2</th>
<th>Alpha</th>
<th>RefLc</th>
<th>D.Adj</th>
<th>F.Adj</th>
<th>W.Adj</th>
<th>H.Adj</th>
<th>B.Adj</th>
<th>SubLc</th>
<th>Leq</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10</td>
<td>90</td>
<td>0.58</td>
<td>65.78</td>
<td>-8.82</td>
<td>-3.73</td>
<td>0.00</td>
<td>0.00</td>
<td>-0.16</td>
<td>53.07*</td>
<td></td>
</tr>
<tr>
<td>-10</td>
<td>90</td>
<td>0.58</td>
<td>65.78</td>
<td>-8.82</td>
<td>-3.73</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>53.24</td>
<td></td>
</tr>
</tbody>
</table>
* Bright Zone!

WHEEL (0.00 + 40.23 + 0.00) = 40.23 dBA

<table>
<thead>
<tr>
<th>Angle1</th>
<th>Angle2</th>
<th>Alpha</th>
<th>RefLeq</th>
<th>D.Adj</th>
<th>F.Adj</th>
<th>W.Adj</th>
<th>H.Adj</th>
<th>B.Adj</th>
<th>SubLeq</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10</td>
<td>90</td>
<td>0.66</td>
<td>53.31</td>
<td>-9.23</td>
<td>-3.84</td>
<td>0.00</td>
<td>0.00</td>
<td>-0.22</td>
<td>40.01*</td>
</tr>
<tr>
<td>-10</td>
<td>90</td>
<td>0.66</td>
<td>53.31</td>
<td>-9.23</td>
<td>-3.84</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>40.23</td>
</tr>
</tbody>
</table>

* Bright Zone!

Segment Leq : 53.45 dBA

Total Leq All Segments: 53.45 dBA

TOTAL Leq FROM ALL SOURCES: 53.45