

Noise and Vibration Feasibility Study

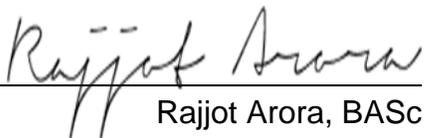
1 and 15 Stevenson St & 8 William St

Guelph, Ontario

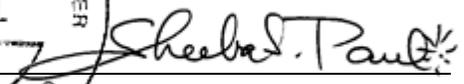
Prepared for:

Jennark Homes
66 Wellington Road 7, Unit #1
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Reviewed by



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July 4, 2016

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1 Introduction & Summary

HGC Engineering was retained by Jennark Homes to conduct a noise and vibration feasibility study for their proposed residential development to be located at 1 Stevenson Street North, 15 Stevenson Street and 8 William Street, in the City of Guelph, Ontario. The surrounding lands are existing residential uses. There is a Canadian National (CN Railway) that runs adjacent to the east of the site. The study is required by the Municipality and CN as part of their planning and approvals process.

The primary noise sources impacting the site were determined to be road traffic on Stevenson Street North and rail traffic on the CN railway line, leased and operated by Godreich-Exeter Railway (GEXR). Relevant road and rail traffic data was obtained from the City of Guelph, GEXR personnel, GO Transit personnel and HGC Engineering past project files for similar projects in the area. The data was used to predict future traffic sound levels at the various locations of the proposed dwelling facades. The predicted sound levels were compared to the guidelines of the Ministry of Environment and Climate Change (MOECC), CN/GEXR/GO Transit railway and the Municipality.

The sound level predictions indicate that the future road and rail traffic sound levels will exceed MOECC and CN/GEXR guidelines. With suitable noise control measures integrated into the design of buildings, it is feasible to achieve the indoor MOECC guideline sound levels. Forced air ventilation with the provision for future installation of air conditioning system by the occupant is required for all the dwellings. Brick exterior wall construction or an acoustical equivalent is required for all the dwellings on the north, east and south facades. Upgraded glazing construction will be required for lots with exposure to railway tracks. A number of warning clauses will need to be included in the Development Agreements registered on titles and in purchase, sale and lease agreements to warn occupants of the transportation noise impacts.

Ground-borne vibration levels were measured at the closest proposed façade, approximately 29 m away from the CN/GEXR railway right of way, and were found to be below the CN guidelines. There are no requirements for vibration mitigation for the proposed dwellings.



2 Site Description & Noise Sources

The site is located on the north side of Stevenson Street North, south of William Street and west of CN railway line, specifically at 1 and 15 Stevenson Street and 8 William Street, Guelph, Ontario.

Figure 1 shows an aerial photo illustrating the location of the proposed site. A general site plan of the development prepared by Van Harten Surveying Inc. dated June 21, 2016, is shown in Figure 2. The proposed development will include 10 single detached units. The closest dwelling façade is proposed at 29 m from the railway right of way.

A site visit was made by HGC Engineering personnel on June 15, 2016 to make observations of the acoustic environment, to identify the significant noise sources in the vicinity, and to perform ground-borne vibration measurements. There are a number of buildings on site which are to be demolished. The surrounding area is considered to be Class I (urban) in terms of its acoustical environment. Road traffic on Stevenson Street North and rail traffic on the CN/GEXR railway line were found to be the dominant sound sources. Most of the surrounding land are existing residential uses.

The CN railway right of way is located to the east of the subject site. There are existing residences to the west, north and south of the site. The railway line is elevated on a berm approximately 8 m above the subject site. The existing topography was used in the analysis.

Since the subject site is located within 75 m of the railway right-of-way, MOECC and CN guidelines require measurements of ground-borne vibration. CN principal mainline guidelines are attached in Appendix A.



3 Noise Level Criteria

3.1 Road and Rail Traffic Noise

Guidelines for acceptable levels of road and rail traffic noise impacting residential developments are given in the MOECC publication NPC-300, “Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning”, Part C release date October 21, 2013, and are listed in Table I below. The values in Table I are energy equivalent (average) sound levels [L_{EQ}] in units of A-weighted decibels [dBA].

Table I: MOECC Road and Rail Traffic Noise Criteria (dBA)

Area	Daytime L _{EQ} (16 hour) Road/Rail	Night-time L _{EQ} (8 hour) Road/Rail
Outside Bedroom Windows	55 dBA / 50 dBA	50 dBA / 45 dBA
Outdoor Living Area	55 dBA	--
Living/Dining Room	45 dBA / 40 dBA	45 dBA / 40 dBA
Bedroom	45 dBA / 40 dBA	40 dBA / 35 dBA

Daytime refers to the period between 07:00 and 23:00, while night-time refers to the period between 23:00 and 07:00. The term "Outdoor Living Area" (OLA) is used in reference to an outdoor patio, a backyard, a terrace or other area where passive recreation is expected to occur. Balconies that are less than 4 m in depth are not considered to be outdoor living areas under MOECC guidelines.

The MOECC guidelines 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 recommended 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 night-time sound levels outside bedroom or living/dining room windows exceed 60 dBA or daytime sound levels outside bedroom or living/dining room windows exceed 65 dBA. Forced-air ventilation with ducts sized to accommodate the future installation of air conditioning by the occupant is required when night-time sound levels at bedroom or living/dining room windows are in the range of 51 to 60 dBA or when daytime sound levels at bedroom or living/dining 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 night-time sound level is greater than 60 dBA or the daytime sound level is greater than 65 dBA due to road and rail traffic noise. Sound attenuating building constructions are required when the night-time sound level is greater than 55 dBA or greater than 60 dBA during the daytime due to road and rail traffic noise.

Warning clauses to notify future residents of possible excesses are also required when night-time sound levels exceed 50 dBA at the plane of the bedroom or living/dining room window and daytime sound levels exceed 55 dBA in the outdoor living area and at the plane of the bedroom or living/dining room window due to road and rail traffic.

MOECC guidelines recommend exterior walls built with a masonry veneer or its acoustical equivalent from foundation to rafters as a minimum construction for any dwellings with a 24 hour L_{EQ} that is greater than 60 dBA, and which are within 100 m of the right of way of the railway. This generally applies only to single family residences; multi-family buildings are typically designed to ensure that noise transmitted through walls is negligible in comparison with the windows. 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. These include minimum required setbacks, berms, fencing and warning clauses. Appendix A provides the CN principal main line requirements for residential developments adjacent to a railway right of way.



3.2 Ground-borne Vibration from Rail Traffic

MOECC and CN guidelines require measurements of ground-borne vibration when residential dwelling units are to be located within 75 metres of a principal main line such as the CN/GEXR line.

Vibration is typically measured in terms of oscillatory velocity or acceleration. The CN guidelines are given in terms of ground-borne velocity. In this report, vibration levels are quoted in terms of RMS velocity levels (LV) in units of decibels [dB] relative to 1 mm/s (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. For ease of reference, this limit of -17 dB re 1 mm/s is identified on velocity plots in this report.

4 Traffic Noise Predictions

4.1 Road Traffic

Road traffic data for Stevenson Street North was obtained from the City of Guelph in the form of Turning Movement Counts (TMC), and is provided in Appendix B. An annual average daily traffic (AADT) was determined from the afternoon peak information, and 6 660 vehicles per day was applied for Stevenson Street in conjunction with a 90/10 day/night volume split. A commercial vehicle percentage of 3% was used in the analysis and was further split into 1.2 % for medium trucks and 1.8% for heavy trucks in accordance with MOECC recommendations. A posted speed limit of 50 km/h was used. Traffic volumes were conservatively assumed to grow at a typical rate of 2.5% per year to the year of 2026. The resulting future traffic volumes are listed in Table II.

Table II: Projected Road Traffic Data for 2026

Road Name		Cars	Medium Trucks	Heavy Trucks	Total
Stevenson Street	Daytime	9 792	121	182	10 095
	Night-time	1 088	13	20	1 122
	Total	10 880	135	202	11 216

4.2 Rail Traffic

Rail traffic data for the GEXR Guelph Subdivision was originally obtained from GEXR railway personnel for other projects along the railway line and is attached in Appendix B. This line is used for passenger and freight operations and is classified as a principal main track. The maximum permissible train speed in the area of the site is 16 kph (10 mph). In conformance with CN/GEXR assessment requirements, the maximum speeds, maximum number of cars and locomotives per train were used in the traffic noise analysis to yield worse case estimate of train noise. The data was projected to the year 2026 using projections provided by GEXR personnel. Rail traffic data for GO transit operations was obtained from GO Transit personnel and is provided in Appendix B. Table III summarises the GEXR and GO Transit rail traffic data used in the analysis.

Table III: GEXR and GO Rail Traffic Data Projected to Year 2026

Type of Train	Maximum Number of Cars	Maximum Speed (km/h)	Maximum Number of Locomotives	Volume Day/Night
Freight	75	16	2	3/0
Way Freight	20	16	2	3/1
GO Transit	12	16	1	7/5
Passenger (VIA)	6	16	1	3/1

4.3 Road and Rail Traffic Noise Prediction

To assess the levels of road and rail traffic noise which will impact the site in the future, predictions were made using STAMSON version 5.04, a computer algorithm developed by the MOECC. Sample STAMSON output is included in Appendix C. Whistles are not sounded in the area and therefore have not been included in the analysis.

Prediction locations were chosen around the proposed residential development to obtain a representation of the future sound levels. The results of these predictions are summarized in Table IV. The acoustic requirements may be subject to modifications if the site plan is changed significantly.

Table IV: Predicted Road & Rail Traffic Sound Levels [dBA], Without Mitigation

Prediction Location	Description	OLA LEQ (16 Hour)	Daytime LEQ (16 Hour)			Night-time LEQ (8 Hour)		
			Road	Rail	Total	Road	Rail	Total
[A]	Lot 1 facing Stevenson Street with exposure to Rail	58	61	58	63	55	56	59
[B]	Lot 2 facing Stevenson Street with some exposure to Rail	55	61	55	62	55	53	57
[C]	Lots 3-9 with some exposure to Stevenson Street North and facing the railway tracks	<55	<55	58	59	<50	56	57
[D]	Lot 10 with exposure to Rail	56	--	57	57	--	56	56

4.4 Assessment of Ground-borne Vibration from Rail Traffic

Measurements of ground-borne rail vibration were conducted at the location of the nearest proposed residential façade, approximately 29 m from the railway right-of-way. Ground-borne vibration was measured for two freight trains pass-by on June 15, 2016.

The vibration measurements were conducted using a Hewlett Packard 3569A Real Time Frequency Analyzer outfitted with a Wilcoxon Research type 793V velocity transducer correctly field calibrated before and after the measurements.

Ground-borne vibration levels measured during the pass-by were plotted along with the CN limit of 0.14 mm/s (-17 dB). The acceleration spectrum at the peak level is also plotted versus the CN frequency-dependent limits. The results are plotted as Figures 3 and 4.

5 Traffic Noise Recommendations

The predictions indicate that the future traffic sound levels will exceed MOECC and CN guidelines at the proposed residential dwellings with exposure to Stevenson Street North and the railway. The following discussion outlines preliminary recommendations for ventilation requirements, building façade constructions, and warning clauses to achieve the noise criteria stated in Table I.

5.1 Outdoor Living Areas

Lot 1 and 10 will have rear yard outdoor amenity areas exposed to the railway tracks. The predicted sound level at the rear yards of Lot 1 and 10 will be 58 dBA and 56 dBA. The 3 dBA and 1 dBA excess is within the discretionary range acceptable to the MOECC, with the use of a noise warning clause. Further physical mitigation in the form of additional acoustic barriers is not required.

The remaining lots will have rear yards with sound levels equal to 55 dBA or less. Further, physical mitigation is not required.

5.2 Indoor Living Areas and Ventilation Requirements

Provision for Central Air Conditioning

The predicted future daytime sound levels outside the living/dining windows at all the dwelling units within the proposed development will be 56 dBA and 65 dBA and between 51 dBA and 60 dBA at the plane of bedroom window during night-time. To address these excesses, the MOECC 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. In general, window or through-the-wall air conditioning units are not recommended because of the noise they produce and because the units penetrate through the exterior wall which degrades the overall sound insulating properties of the envelope. The outdoor air conditioning unit should be located, installed, and selected with an appropriate sound emission rating to comply with MOECC guideline NPC-300.

5.3 Building Facade Constructions

The predicted sound levels at the east façade of Lots 1 and 3-10 with exposure to the railway tracks will be greater than 55 dBA during nighttime from rail traffic. Sound attenuating building constructions (windows, doors, and walls) need to be specified.

In order to develop requirements for dwelling façade design, the architectural plans (detail floor plans and elevations) need to be reviewed. These were not available at the time of this study. Calculations have been performed to determine options for building envelope constrictions required to maintain indoor sound levels within MOECC guidelines. The calculation methods were developed by the National Research Council (NRC), and are based on the predicted outdoor sound levels and



the anticipated area of the exposed façade components (walls, windows and doors) relative to the floor area of the adjacent room.

Exterior Wall Construction

MOECC and CN guidelines require brick or masonry exterior walls or an acoustically equivalent construction as a minimum construction for any residential dwellings that are within 100 m from the CN right of way. This construction applies to north, east and south facades of all the detached dwellings.

Acoustical Requirements for Glazing

The minimum necessary specification for the building envelope is Acoustical Insulation Factor, AIF-23 for bedrooms and AIF-20 for living/dining rooms for dwellings with exposure to railway tracks (Lots 1 and 3-10), based on the possibility of sound entering the dwellings through windows only. Any double glazed window construction meeting the minimum Ontario Building Code will provide adequate sound insulations for bedroom and living/dining room windows.

An acoustical consultant should review the building elevations and floor plans for the dwellings when they are available to ensure the exterior wall is brick and glazing constructions are refined based on actual window to floor area ratios.

Lot 2 will have predicted sound levels less than 60 dBA during daytime and less than 55 dBA during nighttime due to rail traffic, and less than 65 dBA during daytime and 60 dBA during nighttime due to road traffic. Thus, any double glazed window construction meeting the minimum requirements of the OBC will provide adequate sound insulation.

5.4 Assessment of Ground-borne Vibration from Rail Traffic

CN requires an assessment of ground-borne vibration through measurement if residential building foundations are to be located within 75 metres of the right-of-way. The closest dwelling façade of the proposed residences will be located at approximately 29 m from the railway right-of-way.

Measurements of ground-borne rail vibration were performed on the site at grade, at approximately 29 m from the railway right of way. Table V shows the peak vibration measurements during each of the train pass-by. The results are attached as Figures 3 and 4.



Table V: Peak Vibration Measurements of Train Pass-bys

Train Pass-by	Approximately 29 m from the CN railway right of way (mm/s)	Criteria (mm/s)
1 – Eastbound CN Freight Train	0.05	0.14
2 – Westbound CN Freight Train	0.06	

Measured ground-borne vibration levels were below the CN limit of 0.14 mm/s (-17 dB) at the location of the closest proposed residential building façades for all measured pass-bys. The acceleration spectrum at the peak level is also plotted versus the CN limit. In all cases, the levels are significantly lower than the CN criteria on a frequency basis. Therefore, vibration mitigation measures are not required for the proposed detached houses at a 29 m setback distance from the railway right of way.

5.5 Warning Clauses

The MOECC guidelines recommend that warning clauses be included in the property and tenancy agreements for all proposed dwelling units in the residential development with anticipated traffic sound level excesses.

A suitable wording for future dwellings with minor sound level excesses 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 road and rail traffic may on occasion 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.

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

Type B:

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 criteria of the Municipality and the Ministry of the Environment and Climate Change. (Note: The location and installation of the outdoor air conditioning device should be done so as to minimize the noise impacts and comply with criteria of MOECC publication NPC-300 as applicable.)

CN's standard warning clause developments is located near a principal main line. The following sample clause is typical of those included in agreements of purchase and sale or lease on the Lands that are within 300 meters of the railway right-of-way.

Type C:

Warning: Canadian National Railways Company or its assigns or successors in interest has or have a rights-of-way within 300 meters 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.

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

6 Summary of Recommendations

The following list and Table VI summarize the recommendations made in this report. The reader is referred to the previous sections of the report where these recommendations are discussed in more detail.

1. Forced air ventilation systems with ductwork sized for the future installation of central air conditioning by the occupant will be required for all dwellings. The location, installation and sound ratings of the air conditioning devices should comply with NPC-300, as applicable.

2. Brick or masonry veneer exterior walls or an equivalent construction is required at the north, east and south facades for all of the proposed dwellings. Upgraded glazing construction is required for Lots 1 and 3-10. When elevations and floor plans are available, an acoustical consultant should verify the incorporation of brick exterior wall construction and refine the glazing construction based on actual window to floor area ratios.

3. Warning clauses should be included in the Development Agreements registered on titles, and in purchase, sale and lease agreements, to inform future owners and occupants about noise concerns from the road and railway.

Table VI: Summary of Noise Control Requirements and Noise Warning Clauses

Prediction Location	Acoustic Barrier	Ventilation Requirements *	Type of Warning Clause	Acoustical Insulation Factor	Upgraded Building Façade Constructions
[A]	--	Forced Air	A, B, C	LRDR: AIF-20 BR: AIF-23	Brick Exterior Wall Construction on north, east and south facades
[B]	--	Forced Air	A, B, C	OBC	Brick Exterior Wall Construction on north, east and south facades
[C]	--	Forced Air	A, B, C	LRDR: AIF-20 BR: AIF-23	Brick Exterior Wall Construction on north, east and south facades
[D]	--	Forced Air	A, B, C	LRDR: AIF-20 BR: AIF-23	Brick Exterior Wall Construction on north, east and south facades

Notes:

-- no specific requirement

* The location, installation and sound rating of the air conditioning condensers must be compliant with MOECC Guideline NPC-300.

OBC-Ontario Building Code

LRDR – Living Room/Dining Room, BR – Bedroom

6.1 Implementation

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

- 1) Prior to the issuance of occupancy permits for this development, the Municipality's building inspector or a Professional Engineer qualified to perform acoustical engineering services in the Province of Ontario should certify that the noise control measures have been properly incorporated, installed and constructed.



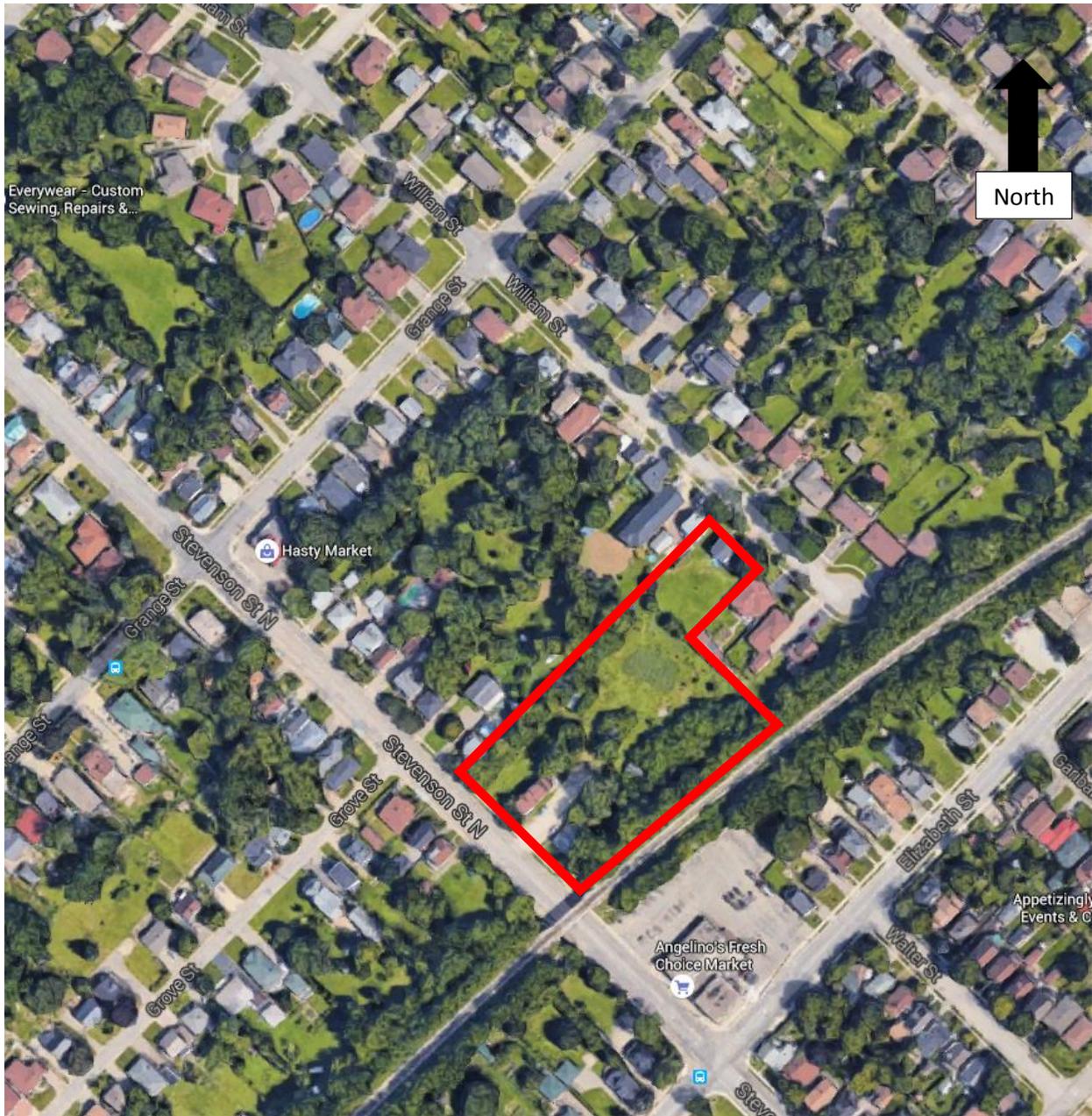
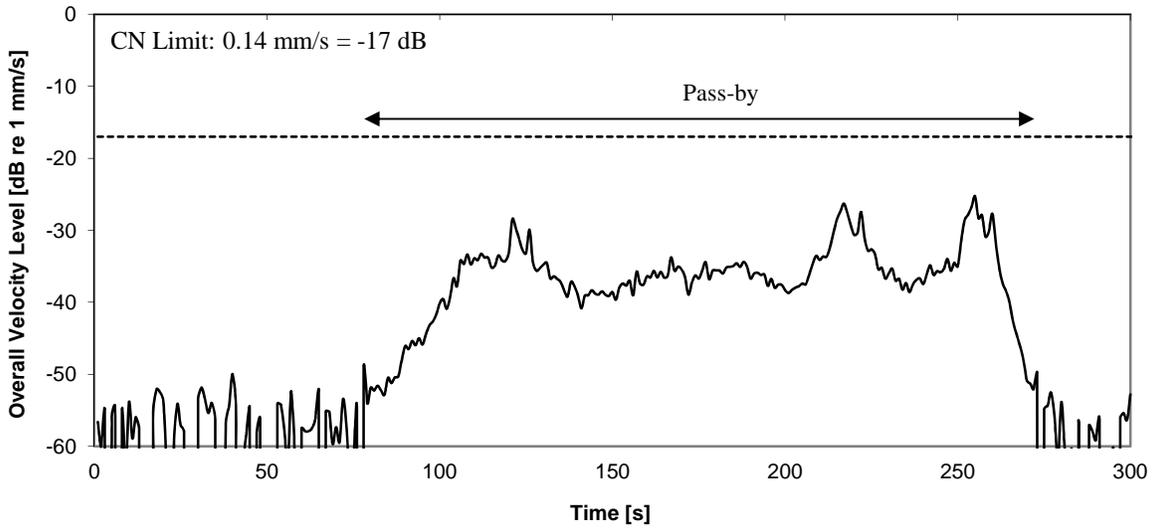
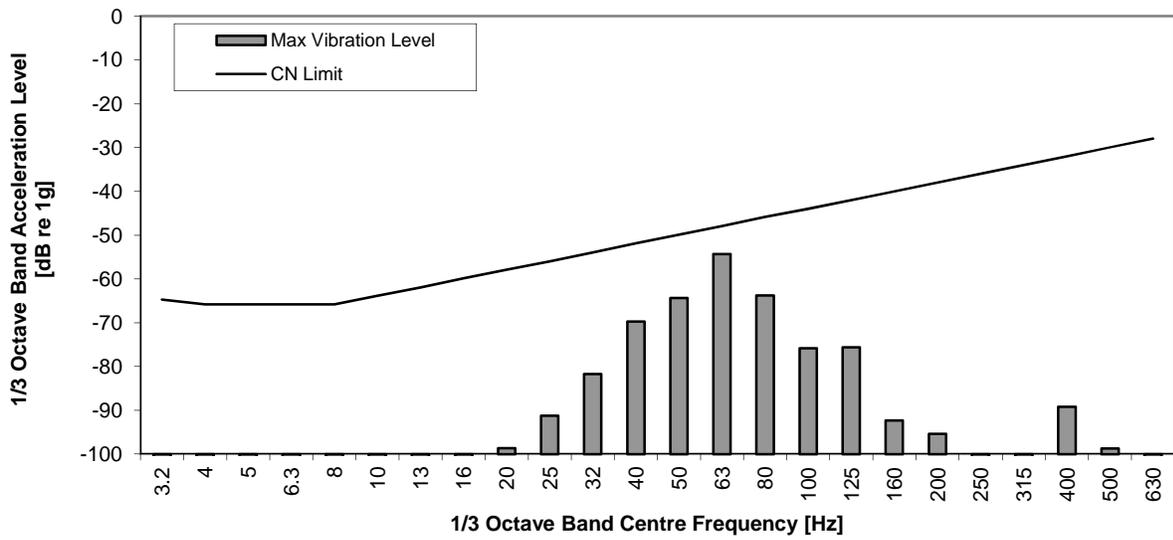


Figure 1: Key Plan

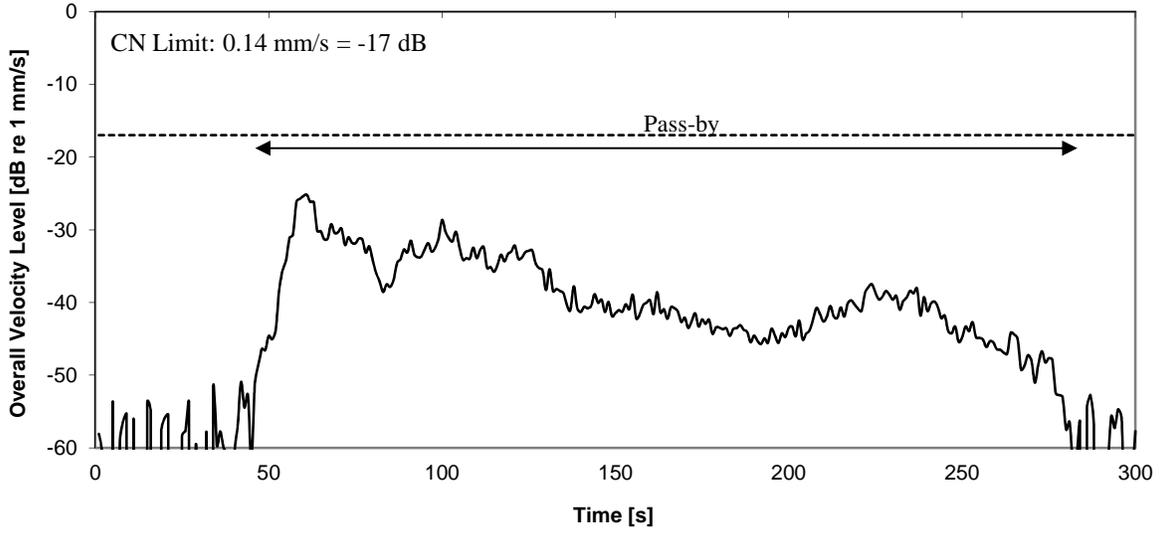
**Figure 3a: Pass-by 1 @ Location M1
Measured Vibratory Velocity Level**



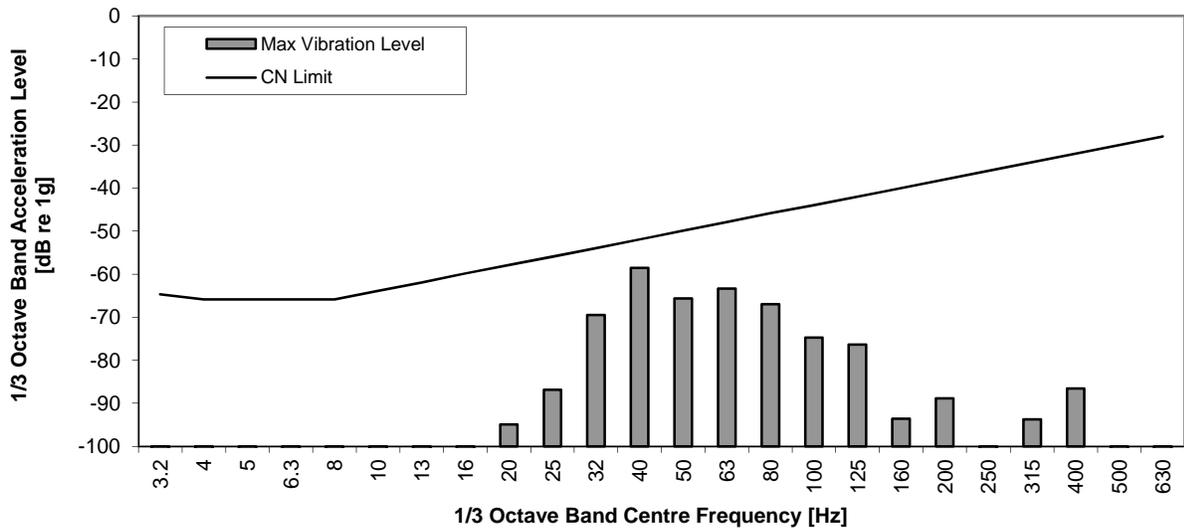
**Figure 3b: Pass-by 1 @ Location M1
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



**Figure 4a: Pass-by 2 @ Location M1
Measured Vibratory Velocity Level**



**Figure 4b: Pass-by 2 @ Location M1
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



APPENDIX A
CN Principal Main Line Requirements

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
Road & Rail Traffic Information

Stevenson Street & Elizabeth Street

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:15:00

To: 17:15:00

Municipality: Guelph
Site #: 0000001357
Intersection: Stevenson Street & Elizabeth Street
TFR File #: 5
Count date: 16-Apr-2013

Weather conditions:
 Cloudy / Rain
Person(s) who counted:

**** Signalized Intersection ****

Major Road: Stevenson Street runs N/S

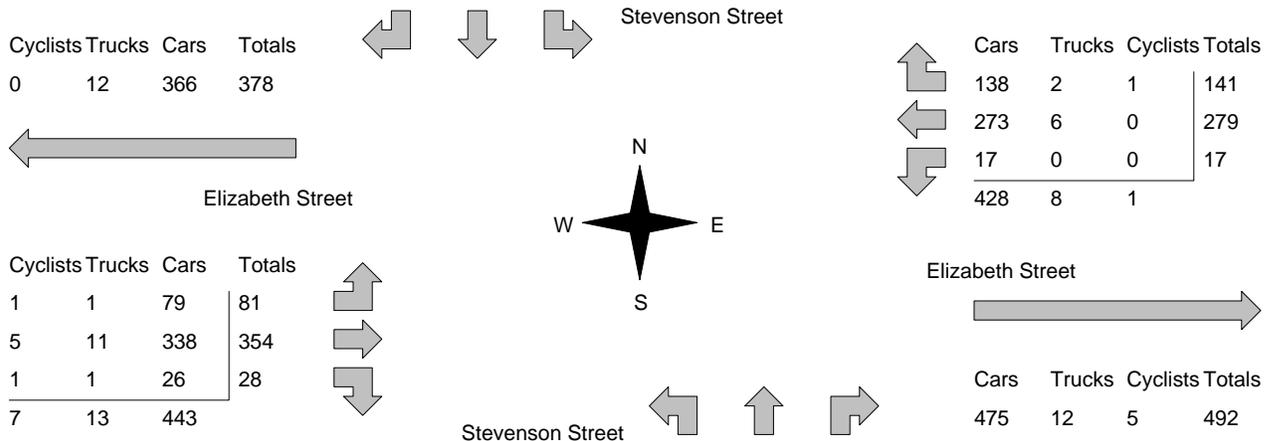
North Leg Total: 666
 North Entering: 333
 North Peds: 12
 Peds Cross: \bowtie

Cyclists	0	2	0	2
Trucks	6	1	1	8
Cars	74	139	110	323
Totals	80	142	111	



Cyclists	3
Trucks	9
Cars	321
Totals	333

East Leg Total: 929
 East Entering: 437
 East Peds: 1
 Peds Cross: \bowtie



Peds Cross: \bowtie
 West Peds: 4
 West Entering: 463
 West Leg Total: 841

Cars	182	Cars	19	104	27	150
Trucks	2	Trucks	0	6	0	6
Cyclists	3	Cyclists	0	1	0	1
Totals	187	Totals	19	111	27	

Peds Cross: \bowtie
 South Peds: 14
 South Entering: 157
 South Leg Total: 344

Comments

Raj Arora

From: Raj Arora
Sent: June-07-16 9:10 AM
To: 'Louis.Wickline@guelph.ca'
Subject: RE: Road Traffic Data Request

Thank you Louis for the quick response.

Rajjot Arora, BAsC
HGC Engineering **NOISE / VIBRATION / ACOUSTICS**
Howe Gastmeier Chapnik Limited
t: 905.826.4044

From: Louis.Wickline@guelph.ca [mailto:Louis.Wickline@guelph.ca]
Sent: June-06-16 4:14 PM
To: Raj Arora
Subject: RE: Road Traffic Data Request

Hi Raj,

If the TMC you have is from 2013, that is still the most current available.

Thanks,

Louis Wickline, C.E.T., Traffic Technologist II
Transportation Services, **Engineering and Capital Infrastructure Services**
City of Guelph
519-822-1260 extension 2043
louis.wickline@guelph.ca

From: Raj Arora [mailto:rarora@hgcengineering.com]
Sent: June 6, 2016 4:12 PM
To: Louis Wickline
Subject: RE: Road Traffic Data Request

Hi Louis,

HGC Engineering is performing another noise study for a proposed development at 1 Stevenson Road in Guelph.

Please find attached a Google link for your reference.

<https://www.google.ca/maps/place/1+Stevenson+St+N,+Guelph,+ON+N1E+5A3/data=!4m2!3m1!1s0x882b9ae32bb78c97:0x2e7c27f8615da6d9?sa=X&ved=0ahUKEwjc6eCjimpTNAhUEL1IKHcMzDMsQ8gEIGjAA>

We have TMC count for Stevenson and Elizabeth provided in 2015 (please see below). Attached is the TMC count.

Please verify if this data is still applicable for our current study.

Rajjot Arora, BAsC
Project Consultant



GODERICH-EXETER RAILWAY LIMITED

101 Shakespeare Street • 2nd • Stratford Ontario • N5A 3W5 • Phone: 519 271-4441 • Fax: 519 271-1337

Sheeba Paul, MEng, PEng.
Senior Engineer, Associate
HGC Engineering
2000 Argentia Road, Plaza One, Suite 203
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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.



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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



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Sheeba Paul

From: Brandon Gaffoor <Brandon.Gaffoor@gotransit.com>
Sent: June-23-16 1:33 PM
To: Sheeba Paul
Subject: RE: rail data verification - Rockwood, ON

Follow Up Flag: Follow up
Flag Status: Flagged

Hello Sheeba,

As per your request on June 23, 2016 please find the updated below,

It's anticipated that GO Service on the adjacent Kitchener Line will be comprised of diesel trains within (at least) a 10 year time horizon. The preliminary midterm (2025) weekday train volume forecast at this location, including both revenue and equipment trips, is in the order of 12 trains (7 day, 5 night).

The maximum design speed on the Kitchener line, adjacent to the subject site, is 16 kph (10 mph).

This information is subject to change and may be influenced by, among other factors, service planning priorities, operational considerations, funding availability and passenger demand.

I trust that this information is useful. Please feel free to contact me should you have any additional questions. Please keep us informed as this process moves forward.

Kind Regards,

Brandon Gaffoor

Co-op Student | Rail Corridor Management Office | Rail Corridors
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From: Sheeba Paul [<mailto:spaul@hgcengineering.com>]
Sent: June-23-16 12:57 PM
To: Brandon Gaffoor
Subject: RE: rail data verification - Rockwood, ON

Hi Brandon,

Please find attached the data we have in our files from September 30, 2011 and was verified in September 12, 2012. Please let me know if this data is still acceptable.

The site is located to the north of the railway line.

<https://www.google.ca/maps/place/27+Christie+St,+Guelph%2FEramosa,+ON+N0B/@43.6209565,-80.1497067,17z/data=!4m5!3m4!1s0x882b9ef0cd666fa1:0xddbe75b713c8fb0f!8m2!3d43.6209526!4d-80.147518>

If the data has changed, please provide projections for the Metrolinx line in this area.

Thank you.

Ms. Sheeba Paul, MEng, PEng
Senior Associate

HGC Engineering [NOISE](#) / [VIBRATION](#) / [ACOUSTICS](#)

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APPENDIX C
Sample STAMSON 5.04 Output

STAMSON 5.0 NORMAL REPORT Date: 04-07-2016 11:46:58

MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Description: Lot 1 facing Stevenson Street with exposure to rail (Prediction Location [A])

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

```
-----
Train      ! Trains  ! Speed !# loc !# Cars! Eng !Cont
Type      !        !(km/h) !/Train!/Train! type !weld
-----+-----+-----+-----+-----+-----
* 1. Freight ! 2.8/0.0 ! 16.0 ! 2.0 ! 75.0 !Diesel! No
* 2. Go      ! 7.0/5.0 ! 16.0 ! 1.0 ! 12.0 !Diesel! No
* 3. Via     ! 2.8/1.4 ! 16.0 ! 1.0 ! 6.0 !Diesel! No
* 4. Way Freight ! 2.8/1.4 ! 16.0 ! 2.0 ! 20.0 !Diesel! No
* The identified number of trains have been adjusted for
```

future growth using the following parameters:

```
Train type:      ! Unadj. ! Annual % ! Years of !
No Name         ! Trains ! Increase ! Growth !
```

```
-----+-----+-----+-----+
1. Freight      ! 2.0/0.0 ! 2.50 ! 14.00 !
2. Go           ! 7.0/5.0 ! 2.50 ! 0.00 !
3. Via          ! 2.0/1.0 ! 2.50 ! 14.00 !
4. Way Freight  ! 2.0/1.0 ! 2.50 ! 14.00 !
```

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

```
-----
Angle1 Angle2      : -90.00 deg 90.00 deg
Wood depth      : 0 (No woods.)
No of house rows : 0 / 0
Surface         : 1 (Absorptive ground surface)
Receiver source distance : 35.00 / 35.00 m
Receiver height : 1.50 / 4.50 m
Topography      : 4 (Elevated; with barrier)
No Whistle
Barrier angle1  : -90.00 deg Angle2 : 90.00 deg
Barrier height  : 0.00 m
Elevation      : 0.00 m
Barrier receiver distance : 5.00 / 5.00 m
Source elevation : 320.00 m
Receiver elevation : 312.00 m
Barrier elevation : 312.00 m
Reference angle : 0.00
Results segment # 1: GEXR (day)
```

Barrier height for grazing incidence

```
-----
Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----+
4.00 ! 1.50 ! 3.00 ! 315.00
```

0.50 ! 1.50 ! 2.50 ! 314.50
 LOCOMOTIVE (0.00 + 57.73 + 0.00) = 57.73 dBA
 Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 -90 90 0.58 64.89 -5.83 -1.33 0.00 0.00 -0.08 57.65*
 -90 90 0.58 64.89 -5.83 -1.33 0.00 0.00 0.00 57.73

* Bright Zone !

WHEEL (0.00 + 45.09 + 0.00) = 45.09 dBA
 Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 -90 90 0.66 52.65 -6.11 -1.46 0.00 0.00 -0.12 44.97*
 -90 90 0.66 52.65 -6.11 -1.46 0.00 0.00 0.00 45.09

* Bright Zone !

Segment Leq : 57.96 dBA
 Total Leq All Segments: 57.96 dBA
 Results segment # 1: GEXR (night)

 Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
 Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

-----+-----+-----+-----
 4.00 ! 4.50 ! 5.57 ! 317.57
 0.50 ! 4.50 ! 5.07 ! 317.07

LOCOMOTIVE (0.00 + 56.18 + 0.00) = 56.18 dBA
 Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 -90 90 0.50 62.85 -5.50 -1.17 0.00 0.00 -0.03 56.16*
 -90 90 0.50 62.85 -5.50 -1.17 0.00 0.00 0.00 56.18

* Bright Zone !

WHEEL (0.00 + 42.77 + 0.00) = 42.77 dBA
 Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 -90 90 0.60 50.01 -5.89 -1.35 0.00 0.00 -0.03 42.74*
 -90 90 0.60 50.01 -5.89 -1.35 0.00 0.00 0.00 42.77

* Bright Zone !

Segment Leq : 56.37 dBA
 Total Leq All Segments: 56.37 dBA
 Road data, segment # 1: Stevenson (day/night)

 Car traffic volume : 8015/891 veh/TimePeriod *
 Medium truck volume : 99/11 veh/TimePeriod *
 Heavy truck volume : 149/17 veh/TimePeriod *
 Posted speed limit : 50 km/h

Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 6660
Percentage of Annual Growth : 2.50
Number of Years of Growth : 13.00
Medium Truck % of Total Volume : 1.20
Heavy Truck % of Total Volume : 1.80
Day (16 hrs) % of Total Volume : 90.00

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

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Stevenson (day)

Source height = 1.16 m
ROAD (0.00 + 61.34 + 0.00) = 61.34 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.66 62.80 0.00 0.00 -1.46 0.00 0.00 0.00 61.34

Segment Leq : 61.34 dBA
Total Leq All Segments: 61.34 dBA
Results segment # 1: Stevenson (night)

Source height = 1.17 m
ROAD (0.00 + 55.01 + 0.00) = 55.01 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.58 56.33 0.00 0.00 -1.32 0.00 0.00 0.00 55.01

Segment Leq : 55.01 dBA
Total Leq All Segments: 55.01 dBA
TOTAL Leq FROM ALL SOURCES (DAY): 62.98
(NIGHT): 58.75