



Road and Rail and Vibration Noise Impact Study Valeriote Subdivision, Guelph, Ontario

Prepared for:

Attn: Nancy Shoemaker Black, Shoemaker, Robinson & Donaldson Limited 351 Speedvale Ave. West Guelph, Ontario N1H 1C6

S. FAUL Prepared by Sheeba Paul, MEng, PEng

March 28, 2013







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1 Introduction and Summary

HGC Engineering was retained by Black, Shoemaker, Robinson & Donaldson Limited (BSRD) to conduct a noise and vibration impact study for their proposed residential development, to be located north of the Goderich Exeter Railway (GEXR) and York Road (King's Highway No. 7), east of Elizabeth Street and west of Watson Parkway, in the Geographical Township of Guelph, Ontario. The surrounding area is existing residential and proposed residential. The study is required by the municipality and as part of their planning and approvals process. The GEXR has adopted the noise and vibration guidelines of the Canadian National Rail (CNR) for this railway line because it is leased from the CNR.

This report has been updated to incorporate the latest comments from CN in their e-mailed dated June 5, 2012, provided in Appendix A. The latest draft plan prepared by Black, Shoemaker, Robinson & Donaldson Limited dated March 19, 2013 is also used in the analysis. In the latest plan, the park has been moved from the south to the north of the site.

Road traffic information for York Road (King's Highway No. 7) between Watson Parkway and Elizabeth Street was obtained from City of Guelph personnel and rail traffic data was obtained from the Goderich-Exeter Railway (GEXR) and GO Transit. Traffic noise predictions were used to find the future worst case zones of impact. The data was used to investigate the general type and extent of noise mitigation required for the proposed dwelling facades and backyard outdoor living areas (OLA's). The predicted sound levels were compared to the guidelines of the Ministry of Environment (MOE) and the Canadian National Railway (CN).

Future nighttime sound levels will exceed MOE guideline limits at the bedroom windows of many of the proposed dwelling units. Upgraded ventilation in the form of forced air ventilation with ducts sized to accommodate the future installation of central air conditioning by the occupant is required for many of the dwelling units. Physical mitigation in the form of acoustic barriers is required for Lot 129 and Lots 132 - 137 on the west side of Cityview Drive. The MOE and CN guidelines recommend that warning clauses be used to inform future residents of the traffic noise impacts and to address residual sound level excesses.







Vibration measurements were conducted by HGC Engineering in February, 2003. The measured vibration levels were well within the CNR limits and therefore no vibration mitigation measures are required for this development. The results are summarized in this report.

2 Site Description and Noise Sources

Figure 1 is a key plan of the subdivision. The proposed property is to be located north of the Canadian National Railway and York Road, east of Elizabeth Street and west of Watson Parkway, in Guelph, Ontario. Figure 2 represents a draft plan, prepared by Black, Shoemaker, Robinson & Donaldson Limited (BSRD) and dated March 19, 2013.

The surrounding area is existing residential lands and proposed residential lands. The CN railway line which is leased by the GEXR is located to south of the subject site. York Road is located to the further south of the subject site. The subject lands are elevated by approximately 10 m above the railway and approximately 20 m above York Road. The railway is in a deep cut which provides a natural barrier and acts as a safety berm. In the south-east and south-west of the proposed development the elevation change is more gradual.

The primary noise sources are road traffic on York Road and rail traffic from the GEXR railway line. Cityview Drive is a low volume residential street and it has not been considered in this analysis. There are no significant sources of stationary noise within 500 m of the proposed development.

3 Noise Level Criteria

3.1 Traffic Noise Sources

Guidelines for acceptable levels of road and 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 $[L_{EQ}]$ in units of A-weighted decibels [dBA].







	RO	AD	RAIL	
Location	Daytime $L_{EQ(16)}$ (07:00 to 23:00)	Nighttime L _{EQ (8)} (23:00 to 07:00)	Daytime $L_{EQ(16)}$ (07:00 to 23:00)	Nighttime L _{EQ (8)} (23:00 to 07:00)
Outdoor Living Area (OLA)	55 dBA		55 dBA	
Outside Bedroom Windows		50 dBA		50 dBA
Inside Bedrooms		40 dBA		35 dBA
Inside Living /Dining Areas	45 dBA		40 dBA	

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

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.

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.

3.2 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 (Lv) 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.

4 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 89 km/h (55 mph) for freight trains and 113 km/h (70 mph) for commuter 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 2023. The number of rail cars for the freight traffic was grown using a 7.5% per year growth rate for the first 3 years and freight traffic was grown using a 2.5% per year growth rate for the remaining 8 years. It is expected that in 2012 commuter rail service will add an additional 3 trains during daytime hours and 1 train during nighttime hours. Commuter rail traffic was grown at a rate of 2.5% for 10 years to the year 2023. Passenger rail traffic is expected to double over the next three years and the passenger data was grown at a 2.5% per year growth rate for the remaining 8 years. Table II summarises the rail traffic data used in the analysis.

Type of Train	Number of locomotives Day/Night	Number of cars Day/Night	Max Speed (km/h)	Existing Volumes Day/Night	Predicted Daytime (07:00- 23:00) trains	Predicted Nightime (23:00- 07:00) trains	Total
Freight	2/2	73/73	89	2/0	3	0	3
Commuter	1/1	10/10	113	0/0	4	2	6
Passenger	1/1	5/5	113	5/1	12	3	15
Total					19	5	24

Table II: 2023 Projected Rail Traffic Data*







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 2023. Table III summarises the rail traffic data used in the analysis.

Type of	Number of Trains	Maximum	Average	Max Speed
Train	Day/Night	Number of locomotives	Number of cars	(KPH)
GO	6/2	1	12	113

Table III: GO Transit Rail Traffic Data Projected to Year 2023

4.2 Road Traffic Data

Road traffic data for York Road, between Elizabeth Street and Watson Parkway, was obtained from City of Guelph personnel in the form of turning movement counts and is included in Appendix C. The Annual Average Daily Traffic (AADT) from 2008 was used in the analysis and a growth rate of 2.5% for 14 years was applied, as a conservative worst case estimate. Additionally, a day/night split of 85%/15% was used, in conjunction with commercial vehicle percentages of 3.6%/5.3% medium and heavy trucks. Finally, a posted speed limit of 60 km/h was used for the analysis. Table IV summarizes the traffic volume data.

Road Name		Cars	Medium Trucks	Heavy Trucks	Total
Vork Dood	Daytime	13 874	542	812	15 228
YOFK ROAD	Nighttime	2 448	96	143	2 687
	Total	16 322	638	955	17 915

Table IV: 2023 Projected Road Traffic Data for York Road (King's Highway No. 7)

4.3 Road and Rail Traffic Noise Predictions

To assess the levels of road and rail traffic noise which will impact the site in the future, predictions were made using STAMSON version 5.0, a computer algorithm developed by the MOE. Sample STAMSON output is included in Appendix D. As required by the MOE, train whistle noise has been included in the calculation of the night-time sound levels since whistles are sounded when





approaching a public grade crossing, east of Watson Road. Whistle noise has not been included for the OLA sound level calculation as per MOE guidelines.

Predictions of the traffic sound levels were made at various locations. The results of these predictions are summarized in Tables V, VI and VII. 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 yard setback and 6.6 m rear yard setback, a 4.5 m exterior side yard setback for lots flanking major roadways and a 1.5 m setback for interior side yards setbacks were used in the analysis.

	Road Traffic, [dBA]	Rail Traffic, [dBA]	Desting of Frede
Lot/Block	Daytime, at Façade	Daytime, at Façade	Daytime, at Façade
	L _{EQ(16)}	L _{EQ(16)}	
1	55	62	63
5	49	53	55
10	48	50	52
40	44	54	54
56	51	59	59
65	49	49	52
71	56	63	64
74	56	63	64
87	56	63	64
90	50	53	54
92	51	54	55
97	56	63	64
100	49	48	51
101	50	50	53
127	51	54	55
129	53	62	63
138	48	51	53

Table V: Future Daytime Traffic Sound Levels, Road and Rail Traffic, at First Story Living/Dining Room Windows, [dBA]







	Road Traffic, [dBA]	Rail Traffic, [dBA]	Nighttime of Fooda
Lot/Block	Nighttime, at Façade	Nighttime, at Façade	Totel L nom
LOUDIOCK	$L_{EQ(8)}$	$L_{EO(8)}$	
1	51	59	60
5	45	50	51
10	45	47	49
40	40	51	52
56	47	56	56
65	45	49	51
71	53	60	61
87	53	60	61
74	53	60	61
90	46	49	51
92	47	50	52
97	53	60	60
100	46	44	48
101	51	46	53
127	47	50	52
129	50	59	59
138	45	48	50

Table VI: Future Nighttime Traffic Sound Levels, Road and Rail Traffic, at Second Story Bedroom Windows, [dBA]

Table VII: Future Daytime Traffic Sound Levels,

Road and Rail Traffic, in Outdoor Living Area (OLA), [dBA]

	Road Traffic, [dBA]	Rail Traffic, [dBA]	Deutime at OLA
Lot/Block	Daytime, at OLA	Daytime, at OLA	Total Land
	L _{EQ(16)}	$L_{EQ(16)}$	10tai L _{EQ(16)}
129, 132-137	53	62	63

4.4 Assessment of Ground-borne Vibration from Rail Traffic

Ground-borne vibration generated by passing trains was measured during site visits on February 7, 9 and 14, 2003 at locations V1 and V2 as shown in Figure 2.

The results of the measurements are presented as plots of the overall measured vibration velocity levels versus time in Figures 4 to 17 in Appendix E. Each figure also shows the criteria for comparison. The vibration measurements were conducted using a Hewlett Packard 3569A Real Time Frequency Analyzer outfitted with Wilcoxon Research Type 793V velocity transducers correctly field calibrated before and after the measurements.







For all train pass-bys and at all locations, the measured vibration was well within the limits of the CNR. The site has not changed since 2003 and the vibration measurement results remain valid. Railway vibration is not anticipated to be a concern for this site, and no special vibration control measures are warranted.

5 Discussion and Recommendations

The predictions indicate that the future traffic sound levels will exceed MOE guidelines at the majority of the proposed dwellings. Recommendations to address these excesses are discussed below.

5.1 Outdoor Living Areas

The predicted daytime sound levels in the OLA of Lots 129 and Lots 132 through 137 will be up to 8 dBA in excess of the MOE's limit of 55 dBA, due to road and rail traffic combined. Physical mitigation in the form of acoustic barriers will be requires for these lots. An acoustic barrier 2.2 m in height will achieve a sound level of 56 dBA. The 1 dBA sound level excess is acceptable to the MOE, with the use of a noise warning clause, if it is acceptable to the municipality and CN.

All noise barriers must return back to the dwelling units so that the rear yards are entirely shielded from the roadways. The acoustic barrier can be an acoustic wall or an earth berm or a combination of both. The wall component should be of a solid construction with a surface density of no less than 20 kg/m². The walls may be constructed from a variety of materials such as wood, brick, pre-cast concrete or other concrete/wood composite systems provided that it is free of gaps or cracks. All barrier heights are stated relative to the grade 3 m from the rear façade of the dwellings. The heights and extents of the barriers should be chosen to reduce the sound levels in the OLA's to as close to 55 dBA as is technically, administratively and economically feasible.

The predicted daytime sound levels in the OLA's of the remainder of the lots included in the analysis are less than or equal to 59 dBA. Any excesses between 55 dBA and 59 dBA are considered to be minor, are within the discretionary range acceptable to the MOE.







5.2 Indoor Living Areas

Forced Air Ventilation

Lots 1 - 5, 41 - 56, 66, 67, 68 - 87, 90 - 94, 127 - 129, 132 - 138, Blocks 97 - 98 and Blocks 102 - 105 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. Figure 3 indicates the lots which require forced air ventilation systems (single hatching).

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.

The remaining lots and blocks have no specific ventilation requirements.

5.3 Building Facade Constructions

All lots in the development will have nighttime sound levels at the 2nd storey façade that are less than 60 dBA and daytime sound levels at the 1st floor façade that are less than 65 dBA. For these lots, any exterior wall, and 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 Warning Clauses

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







Suggested wording for future dwelling units which have sound level excesses but do not require mitigation measures is given below.

Type A:

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

Suggested wording for future dwellings with sound levels exceeding the MOE criteria, by 6 dBA or more, for which physical mitigation has been provided is given below.

Type B:

Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road and rail traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the criteria of the Municipality and the Ministry of the Environment.

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

Type C:

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 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.

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







Type D:

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.

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 VIII summarizes the recommendations made in this report. Please refer to Figure 3 for more information regarding the locations to which these recommendations apply.

- 1. An acoustic barrier is required for Lot 129 and Lots 132 through 137.
- Forced air ventilation systems with ductwork sized for the future installation of central air conditioning system will be required for dwelling Lots 1 5, 41 56, 66, 67, 68 87, 90 94, 127 129, 132 138, Blocks 97 98 and Blocks 102 105.
- 3. Noise warning clauses should be placed in the property and tenancy agreements and offers of purchase and sale for the specified dwelling units.







Lot/Block	Acoustic Barrier	Ventilation Requirements *	Type of Warning Clause
1 – 5		Forced Air	A, C, D
41 - 56		Forced Air	A, C, D
66, 67		Forced Air	A, C, D
68 - 87		Forced Air	A, C, D
90 - 94		Forced Air	A, C, D
Blocks 97, 98, 102, 103, 104, 105		Forced Air	A, C, D
127, 128		Forced Air	A, C, D
129, 132 – 137	\checkmark	Forced Air	B, C, D
138		Forced Air	A, C, D
All lots within 300 m of the railway right of way			D

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

Notes:

-- no specific requirement

* The location, installation and sound rating of the air conditioning condensers must be compliant with MOE Guideline NPC-216.

6.1 Implementation

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

- Prior to the issuance of building permits for this development, it is recommended that the Town's building department or a Professional Engineer qualified to perform acoustical engineering services in the Province of Ontario shall review the builder's plans to certify that the noise control measures as approved have been incorporated, and
- Prior to assumption of the subdivision, 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.











Figure 2 - Draft Plan

	KEY PLAN N.T.S. CARSON RED HOMES LTD.
14 MAT	ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51 (17) OF THE PLANNING ACT
,c,	51 (17) (a) - (c) AS SHOWN (d) SEE SCHEDULE (e) - (g) AS SHOWN (h) MUNICIPAL WATER SUPPLY (l) BURFORD AND GUELPH LOAM (j) AS SHOWN (k) MUNICIPAL STORM AND SANITARY SEWERS (l) STORM SEWER EASEMENT AS SHOWN
ANT OS	OWNERS CERTIFICATE WE HEREBY AUTHORIZE BLACK, SHOEMAKER, ROBINSON, AND DONALDSON LIMITED, ONTARIO LAND SURVEYORS, URBAIN AND RURAL PLANNERS TO SUBMIT THIS
م •	CITYVIEW RIDGE DEVELOPMENTS INC.
61R-794	and Carson Reid Homes Ltd.
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E T A	SURVEYOR'S CERTIFICATE I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.
1 1 1 1 1 1	KERRY F. HILLIS ONTARIO LAND SURVEYOR
NE	CITYVIEW RIDGE
	DRAFT PLAN OF SUBDIVISION
	OF PART OF
	LOT 4, CONCESSION 3, DIVISION 'C'
	AND PART OF LOTS 30, 32^&^33
	AND ALL OF LOT 34, REGISTERED PLAN 53
	CITY OF GUFIPH
	COUNTY OF WELLINGTON
	SCALE 1 : 1500
	METRIC distances shown on this plan are in metres and can be converted to feet by dividing by 0.3048
	BLACK, SHOEMAKER, ROBINSON & DONALDSON DATE: LIMITED MARCH 19, 2013
	BSR Ontario Land Surveyors Urban and Rural Planners TEL: (519) 822-4031 PROJECT NO:
	FAX: (519) 763-9081 05-6590-41



Figure 3 - Draft Plan Showing Acoustic Barrier and Ventilation Requirements

	KEY PLAN N.T.S. LANDS OF CARSON RED HOMES LTD.
MAT	ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51 (17) OF THE PLANNING ACT
*	51 (17) (a) – (c) AS SHOWN (d) SEE SCHEDULE
	(e) - (g) AS SHOWN (h) MUNICIPAL WATER SUPPLY (i) BURFORD AND GUELPH LOAM (i) AS SHOWN
Ç.	(K) MUNICIPAL STORM AND SANITARY SEMERS (I) STORM SEWER EASEMENT AS SHOWN
	OWNERS CERTIFICATE WE HEREBY AUTHORIZE BLACK, SHOEMAKER, ROBINSON, AND DONALDSON LIMITED,
2011NIA	ONTARIO LAND SURVEYORS, URBAN AND RURAL PLANNERS TO SUBMIT THIS DRAFT PLAN OF PROPOSED SUBDIVISION. CITYVIEW RIDGE DEVELOPMENTS INC.
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SSION	CARSON REID
ER IONO	
5	CORRECTLY SHOWN.
101	KERRY F. HILLIS ONTARIO LAND SURVEYOR
NE	
r	DDAFT DIAN OF SUDDIVISION
	OF PART OF
	LOT 4, CONCESSION 3, DIVISION 'C'
	AND PART OF LOTS 30, 32 [*] 33
	AND ALL OF LOT 34, REGISTERED PLAN 53
	CITY OF GUELPH
	COUNTY OF WELLINGTON
	METRIC
	DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048
	BLACK, SHOEMAKER, ROBINSON & DONALDSON
	BSR Ontario Land Surveyors Urban and Rural Planners Guleph, Ontario NHH 106 TEL: (519) 822-4031 FAX: (519) 763-9081 Order No:

APPENDIX A

Rail Traffic Data







GODERICH-EXETER RAILWAY LIMITED



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

Megan Munro, BASc HGC Engineering Howe Gastmeier Chapnik Limited 2000 Argentia Road Plaza One, Suite 203 Mississauga, Ontario L5N 1P7 (via email only)

September 6, 2011

Re: Rail Traffic – Guelph Subdivision – Guelph ON

As per your request, the following information is provided for the area in the vicinity of Cityview Drive in Guelph Ontario.

The typical daily rail traffic volumes are representative of a twenty four (24) hour period, 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 a single track main line, considered as principal main track where within the city limits of Guelph, whistling except to prevent accident, warn persons on or about tracks is prohibited. Trains are required to whistle for crossings east of Watson Road.

At present the number of trains which are scheduled to operate between 0700 and 2300 there are five (5) passenger trains and two (2) freight trains.

Between the hours of 2300 to 0700, there is currently one (1) passenger train.

Passenger trains normally operate on average with one (1) locomotive and five (5) coaches, freight trains are normally operated with two (2) locomotives and fifty nine (59) rail cars.

Passenger trains may operate at up to a maximum speed of seventy (70) miles per hour while freight train speeds are a maximum of fifty five (55) miles per hour.

Based on current forecasts, passenger traffic may increase by six (6) trains, times of operation are unknown at this time, while freight traffic is expected to grow between five (5%) and ten (10%) per cent annually over the next three (3) years without any additional freight trains.



GODERICH-EXETER RAILWAY LIMITED

101 Shakespeare Street • 2nd • Stratford Ontario • N5A 3W5 • Phone: 519 271-4441 • Fax: 519 271-1337 In addition, it is anticipated that commuter rail service will begin operating as early as the first quarter of 2012, in which three (3) commuter train consists would operate between the hours of 0700 and 2300 hrs and one (1) commuter train would operate between the hours of 2300 and 0700 hrs. Consists of these trains would be one (1) locomotive and ten (10) high density commuter coaches.

In view of the increased use of this line, it is still anticipated that additional infrastructure improvements will be completed to allow for faster train speeds over this portion of the Guelph Subdivision.

If you have any further questions please feel free to contact me at 519 271-4441 Extension 3.

Yours truly,

Doug MacKenzie General Manager Goderich-Exeter Railway



Sheeba Paul

From:	Adam Snow <adam.snow@gotransit.com></adam.snow@gotransit.com>
Sent:	September-30-11 2:40 PM
То:	Sheeba Paul
Subject:	RE: Rail Data Request - Guelph Ontario

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 (T): 416-869-3600, ext. 5408 (C): 416-528-4864 (F): 416-869-1794 Adam.Snow@gotransit.com

From: Sheeba Paul [mailto:spaul@hgcengineering.com] Sent: Thursday, September 22, 2011 2:58 PM To: Adam Snow Subject: FW: Rail Data Request - Guelph Ontario

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 Howe Gastmeier Chapnik Limited 2000 Argentia Road Plaza One, Suite 203 Mississauga, Ontario, Canada L5N 1P7 Phone (905) 826-4044 Fax (905) 826-4940

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,

2

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.

From: Megan Munro [mailto:mmunro@hgcengineering.com]
Sent: Tuesday, September 06, 2011 2:13 PM
To: Mackenzie, Douglas (GEXR)
Cc: Sheeba Paul
Subject: RE: Rail Data Request - Guelph Ontario

Hi Douglas,

As per my voicemail, we need to update the noise study for a proposed development hear Cityview Drive in Guelph fairly quickly. I will try to call you again tomorrow but if we do not hear back from you by the end of this week we will proceed with the original rail data you provided to us in August, 2008 (attached).

Thanks,

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

From: Megan Munro
Sent: August-30-11 9:53 AM
To: 'Douglas.MacKenzie@railamerica.com'
Subject: Rail Data Request - Guelph Ontario

Hi Douglas,

In 2008 you forwarded me data for Guelph, Ontario near Cityview Drive just West of Watson Parkway.

I was wondering if the data has been updated since then as we are updating our noise feasibility study.

If so, please provide me with the cost for rail data and the mailing address where we should send the payment cheque.

The information I am looking for includes: Number of trains during the daytime (7:00am – 11:00pm) Number of trains during the nighttime (11:00pm – 7:00am) Number of locomotives per train Number of cars per train Train speed Are there any rail crossings in the area where the trains whistle?

Thank you in advance for your assistance,

Megan Munro, BASc, EIT

HGC Engineering Howe Gastmeier Chapnik Limited 2000 Argentia Road Plaza One, Suite 203 Mississauga, Ontario, Canada L5N 1P7

Phone 905.826.4044

4 Fax 905.826.4940

mmunro@hgcengineering.com www.hgcengineering.com

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APPENDIX B

Road Traffic Data







York Rd. @ Elizabeth St.							
Morning Peak Diagram	Specified Period One Hour Peak From: 7:00:00 From: 8:00:00 To: 9:00:00 To: 9:00:00						
Municipality:GuelphSite #:000000005Intersection:York Rd. & Elizabeth St.TFR File #:2Count date:13-Apr-2004	Weather conditions: Overcast Person(s) who counted: Zibi						
** Non-Signalized Intersection **	Major Road: York Rd. runs W/E						
North Leg Total: 343 Cyclists 0 0 0 North Entering: 148 Trucks 0 16 16 16 North Peds: 0 Cars 2 130 13 Peds Cross: ⋈ Totals 2 146	Cyclists 0 Trucks 13 Cars 182 Totals 195 East Leg Total: 1038 East Entering: 576 East Peds: 0 Peds Cross: X						
Cyclists Trucks Cars Totals 2 42 341 385 York Rd.	Cars Trucks Cyclists Totals 180 13 0 339 42 2 519 55 2						
W	E						
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Cars Trucks Cyclists Totals 403 58 1 462						
Peds Cross: X West Peds: 1 West Entering: 318 West Leg Total: 703	nents						

York Rd. @ Elizabeth St.							
Mid-day Peak Diagram	Specified Period One Hour Peak From: 11:00:00 From: 12:00:00 To: 14:00:00 To: 13:00:00						
Municipality:GuelphSite #:000000005Intersection:York Rd. & Elizabeth St.TFR File #:2Count date:13-Apr-2004	Weather conditions: Overcast Person(s) who counted: Zibi						
** Non-Signalized Intersection **	Major Road: York Rd. runs W/E						
North Leg Total: 267 Cyclists 0 0 0 North Entering: 129 Trucks 0 13 13 13 North Peds: 0 Cars 6 110 11 Peds Cross: ⋈ Totals 6 123 El	Cyclists 0 Trucks 12 6 Cars 126 Totals 138 East Leg Total: 862 East Entering: 420 East Peds: 0 Peds Cross: X S S S S S S S S S S S S S						
Cyclists Trucks Cars Totals 0 29 264 293 York Rd.	Cars Trucks Cyclists Totals 122 11 0 133 258 29 0 287 380 40 0						
Cyclists Trucks Cars Totals	E Vork Rd						
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Cars Trucks Cyclists Totals 383 59 0 442						
Peds Cross: X West Peds: 0 West Entering: 324 West Leg Total: 617	nents						

York Rd. @ Elizabeth St.							
Afternoon Peak Diagram	Specified Period One Hour Peak From: 15:00:00 From: 16:30:00 To: 18:00:00 To: 17:30:00						
Municipality:GuelphSite #:000000005Intersection:York Rd. & Elizabeth St.TFR File #:2Count date:13-Apr-2004	Weather conditions: Overcast Person(s) who counted: Zibi						
** Non-Signalized Intersection **	Major Road: York Rd. runs W/E						
North Leg Total: 356 Cyclists 0 0 0 North Entering: 147 Trucks 0 9 9 North Peds: 0 Cars 4 134 13 Peds Cross: Image: March Pedia set of the set of	Cyclists 2 Trucks 9 Cars <u>198</u> Totals 209 East Leg Total: 1051 East Entering: 581 East Peds: 0 Peds Cross: X						
Cyclists Trucks Cars Totals	izabeth St. Cars Trucks Cyclists Totals 194 9 2 205 349 27 0 376						
York Rd.	543 36 2						
Cyclists Trucks Cars Totals 0 0 4 0 36 291 0 36 295	York Rd. Cars Trucks Cyclists Totals 425 45 0 470						
Peds Cross: West Peds: 0 West Entering: 331 West Leg Total: 711							
Comments							

York Rd. @ Elizabeth St.						
Total Count Diagram						
Municipality:GuelphSite #:000000005Intersection:York Rd. & Elizabeth St.TFR File #:2Count date:13-Apr-2004	Weather conditions: Overcast Person(s) who counted: Zibi					
** Non-Signalized Intersection **	Major Road: York Rd. runs W/E					
North Leg Total: 2268 Cyclists 0 2 2 North Entering: 1017 Trucks 1 85 86 North Peds: 3 Cars 30 899 92 Peds Cross: Image: Marcine Structure Totals 31 986	9 Cyclists 4 Trucks 98 Cars <u>1149</u> Totals <u>1251</u> East Leg Total: 7229 East Entering: 3778 East Peds: 1 Peds Cross: X					
Cyclists Trucks Cars Totals	Zabeth St. Cars Trucks Cyclists Totals 1121 96 3 1220 2265 291 2 2558					
York Rd. W	3386 387 5					
Cyclists Trucks Cars Totals 1 2 28 31	York Rd. Cars Trucks Cyclists Totals 3049 397 5 3451					
Peds Cross: X West Peds: 3 West Entering: 2496 West Leg Total: 5085						
Comments						

York Rd. @ Elizabeth St.						
Annual Average Daily Traffic Diagram						
Total Factor = Monthly Factor(0.95) x Daily Factor(0.9	98) x 24 Hour Factor(1.91) = 1.778210					
Municipality:GuelphSite #:000000005Intersection:York Rd. & Elizabeth St.TFR File #:2Count date:13-Apr-2004	Weather conditions: Overcast Person(s) who counted: Zibi					
** Non-Signalized Intersection **	Major Road: York Rd. runs W/E					
North Leg Total: 4033 Cyclists 0 4 4 North Entering: 1808 Trucks 2 151 152 North Peds: 5 Cars 53 1599 168 Peds Cross: IM Totals 55 1753	Cyclists 7 Trucks 174 Cars 2043 Totals 2225 Cyclists 7 East Leg Total: 12855 East Entering: 6718 East Peds: 2 Peds Cross: X					
Cyclists Trucks Cars Totals	Zabeth St. Cars Trucks Cyclists Totals 1993 171 5 2169 4028 517 4 4549					
York Rd.	6021 688 9					
Cyclists Trucks Cars Totals 2 4 50 55 5 555 3823 4383 7 558 3873	York Rd. Cars Trucks Cyclists Totals 5422 706 9 6137					
Peds Cross: Image: Signal State West Peds: 5 West Entering: 4438 West Leg Total: 9042						
Comments						



York Rd. @ Watson Pkwy.						
Mid-day Peak Diagram	Specified Period One Hour Peak From: 11:00:00 From: 12:00:00 To: 14:00:00 To: 13:00:00					
Municipality:GuelphSite #:000000010Intersection:York Rd. & Watson Pkwy.TFR File #:1Count date:29-Mar-2004	Weather conditions: Overcast Person(s) who counted: Zibi					
** Signalized Intersection **	Major Road: York Rd. runs W/E					
North Leg Total: 262 Cyclists 0 0 0 0 North Entering: 148 Trucks 2 10 0 12 North Peds: 1 Cars 71 52 13 13 Peds Cross: IM Totals 73 62 13	2 Cyclists 0 East Leg Total: 569 2 Trucks 9 East Entering: 288 36 Cars 105 Totals 114 Peds Cross: X					
Cyclists Trucks Cars Totals 0 63 402 465	Atson Pkwy. Cars Trucks Cyclists Totals 16 2 0 18 237 28 0 265 2 3 0 5					
York Rd. W	255 33 0					
Cyclists Trucks Cars Totals 0 3 63 66 5 0 30 232 262 5 0 13 128 141 5	S York Rd.					
0 46 423 Watson Pkwy.	249 32 0 281					
Peds Cross: Image: Sector Se	ars 94 26 4 124 Peds Cross: ⋈ ks 33 4 2 39 South Peds: 1 sts 0 0 0 South Entering: 163 als 127 30 6 South Leg Total: 371					
Comments						







APPENDIX C

Sample STAMSON 5.0 Output







STAMSON 5.0 NORMAL REPORT Date: 28-03-2013 14:38:47 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT Filename: 56a.te Time Period: Day/Night 16/8 hours Description: Daytime and nighttime sound levels at the future dwelling façade of Lot 56, some exposure to the railway line Rail data, segment # 1: 1 (day/night) _____ ! Trains ! Trains ! Speed !# loc !# Cars! Eng Train !Cont ! (Left) ! (Right) !(km/h) !/Train!/Train! type Type !weld -+---1. Freight ! 1.5/0.0 ! 1.5/0.0 ! 89.0 ! 2.0 ! 73.0 !Diesel! No 2. Commuter ! 2.0/1.0 ! 2.0/1.0 ! 113.0 ! 1.0 ! 10.0 !Diesel! No 3. Passenger ! 6.0/1.5 ! 6.0/1.5 ! 113.0 ! 1.0 ! 5.0 !Diesel! No ! 3.0/1.0 ! 3.0/1.0 ! 32.0 ! 1.0 ! 12.0 4. GO !Diesel! No Data for Segment # 1: 1 (day/night) _____ Angle1 Angle2 : -90.00 deg -20.00 deg Wood depth : 0 (No woods.) 0 / 0 No of house rows : Surface : 1 (Absorptive ground surface) Receiver source distance : 103.00 / 103.00 m Receiver height:1.50 / 4.50 mTopography:4 : 4 (Elevated; with barrier) : 85 deg Track 1 : -90.00 deg Angle2 : -20.00 deg Whistle Angle Barrier angle1 Barrier height : 6.50 m : 10.50 m Elevation Barrier receiver distance : 90.00 / 90.00 m Source elevation : 328.50 m Receiver elevation: 339.00 mBarrier elevation: 328.50 mReference angle: 0.00 : 0.00 Reference angle Rail data, segment # 2: 2 (day/night) -----! Trains ! Trains ! Speed !# loc !# Cars! Eng Train !Cont Туре ! (Left) ! (Right) !(km/h) !/Train!/Train! type !weld -+---1. Freight ! 1.5/0.0 ! 1.5/0.0 ! 89.0 ! 2.0 ! 73.0 !Diesel! No







2. Commuter ! 2.0/1.0 ! 2.0/1.0 ! 113.0 ! 1.0 ! 10.0 !Diesel! No 3. Passenger ! 6.0/1.5 ! 6.0/1.5 ! 113.0 ! 1.0 ! 5.0 !Diesel! No 4. GO ! 3.0/1.0 ! 3.0/1.0 ! 113.0 ! 1.0 ! 12.0 !Diesel! No Data for Segment # 2: 2 (day/night) -----Angle1 Angle2 : -20.00 deg 90.00 deg Wood depth : 0 (No woods.) No of house rows : 0 / 0 : 1 Surface (Absorptive ground surface) Receiver source distance : 103.00 / 103.00 m Receiver height : 1.50 / 4.50 m : 3 (Elevated; no barrier) Topography : 85 deg Track 1 Whistle Angle : 10.50 m Elevation Reference angle : 0.00 Results segment # 1: 1 (day) -----Barrier height for grazing incidence _____ Source ! Receiver ! Barrier ! Elevation of Height (m) ! Height (m) ! Height (m) ! Barrier Top (m) 4.00 !1.50 !5.01 !0.50 !1.50 !1.95 ! 333.51 330.45 LOCOMOTIVE (0.00 + 49.83 + 0.00) = 49.83 dBA Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq _____ -20 0.00 69.35 -8.37 -4.10 0.00 0.00 -7.05 49.83 -90 _____ WHEEL (0.00 + 39.78 + 0.00) = 39.78 dBA Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq _____ -90 -20 0.00 64.59 -8.37 -4.10 0.00 0.00 -12.34 39.78 _____ LEFT WHISTLE (0.00 + 39.48 + 0.00) = 0.00 dBA Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq _____ 82 -20 0.00 74.25 0.00 -20.23 0.00 0.00 0.00 39.48 _____

Segment Leq : 50.24 dBA







Results segment # 2: 2 (day) _____ LOCOMOTIVE (0.00 + 56.81 + 0.00) = 56.81 dBA Anglel Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq _____ -20 90 0.27 70.14 -10.63 -2.71 0.00 0.00 0.00 56.81 _____ WHEEL (0.00 + 51.12 + 0.00) = 51.12 dBA Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq _____ -20 90 0.38 65.52 -11.51 -2.89 0.00 0.00 0.00 51.12 _____ LEFT WHISTLE (0.00 + 40.52 + 0.00) = 40.52 dBA Anglel Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq _____ 85 0.27 72.24 -10.63 -21.09 0.00 0.00 0.00 40.52 82 _____ RIGHT WHISTLE (0.00 + 37.05 + 0.00) = 37.05 dBA Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq _____ 85 86 0.27 72.24 -10.63 -24.56 0.00 0.00 0.00 37.05 _____ Segment Leq : 57.96 dBA





Total Leq All Segments: 58.64 dBA



Results segment # 1: 1 (night) -----Barrier height for grazing incidence _____ Source ! Receiver ! Barrier ! Elevation of Height (m) ! Height (m) ! Height (m) ! Barrier Top (m) _____+ 4.00 !4.50 !5.39 !333.890.50 !4.50 !2.33 !330.83 LOCOMOTIVE (0.00 + 46.36 + 0.00) = 46.36 dBA Anglel Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq _____ -90 -20 0.00 65.10 -8.37 -4.10 0.00 0.00 -6.27 46.36 _____ WHEEL (0.00 + 35.25 + 0.00) = 35.25 dBA Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq _____ -90 -20 0.00 59.50 -8.37 -4.10 0.00 0.00 -11.78 35.25 _____ LEFT WHISTLE (0.00 + 40.52 + 0.00) = 0.00 dBAAngle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq _____ 82 -20 0.00 71.94 0.00 -21.09 0.00 0.00 0.00 40.52 _____

Segment Leq : 46.68 dBA







Results segment # 2: 2 (night) _____ LOCOMOTIVE (0.00 + 54.02 + 0.00) = 54.02 dBAAnglel Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq _____ -20 90 0.18 66.43 -9.87 -2.54 0.00 0.00 0.00 54.02 _____ WHEEL (0.00 + 47.81 + 0.00) = 47.81 dBA Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq _____ -20 90 0.28 61.30 -10.75 -2.74 0.00 0.00 0.00 47.81 _____ LEFT WHISTLE (0.00 + 39.48 + 0.00) = 39.48 dBA Anglel Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq _____ 82 85 0.18 69.58 -9.87 -20.23 0.00 0.00 0.00 39.48 _____ RIGHT WHISTLE (0.00 + 36.16 + 0.00) = 36.16 dBA Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq _____ 85 86 0.18 69.58 -9.87 -23.55 0.00 0.00 0.00 36.16 _____ Segment Leg : 55.13 dBA Total Leq All Segments: 55.71 dBA Road data, segment # 1: York (day/night) _____ Car traffic volume : 13874/2448 veh/TimePeriod * Medium truck volume : 542/96 veh/TimePeriod * Heavy truck volume : 812/143 veh/TimePeriod * Posted speed limit : 60 km/h Road gradient : 0 % Road pavement : 1 (Typical asphalt or concrete) * Refers to calculated road volumes based on the following input: 24 hr Traffic Volume (AADT or SADT): 12679 Percentage of Annual Growth : 2.50 : 14.00 Number of Years of Growth Medium Truck % of Total Volume: 3.56Heavy Truck % of Total Volume: 5.33Day (16 hrs) % of Total Volume: 85.00 Data for Segment # 1: York (day/night) -----Angle1Angle2: -90.00 deg90.00 degWood depth: 0(No woodsNo of house rows: 0 / 0 (No woods.)



NOISE VIBRATION

: 1 (Absorptive ground surface) Surface Receiver source distance : 153.00 / 153.00 m Receiver height : 1.50 / 4.50 m Topography : 4 (Elevated; with barrier) Barrier angle1 : -90.00 deg Angle2 : 90.00 deg Barrier height : 8.50 m : 19.00 m Elevation Barrier receiver distance : 125.00 / 125.00 m Source elevation: 320.00 mReceiver elevation: 339.00 mBarrier elevation: 320.00 mReference angle: 0.00 Results segment # 1: York (day) _____ Source height = 1.52 mBarrier height for grazing incidence -----Source ! Receiver ! Barrier ! Elevation of Height (m) ! Height (m) ! Height (m) ! Barrier Top (m) 1.52 ! 1.50 ! 4.99 ! 324.99 ROAD (0.00 + 50.52 + 0.00) = 50.52 dBA Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLea _____ -90 90 0.00 70.14 0.00 -10.09 0.00 0.00 0.00 -9.53 50.52 _____ Segment Leq : 50.52 dBA Total Leg All Segments: 50.52 dBA Results segment # 1: York (night) ------Source height = 1.52 m Barrier height for grazing incidence -----Source ! Receiver ! Barrier ! Elevation of Height (m) ! Height (m) ! Height (m) ! Barrier Top (m) ______+ 1.52 ! 4.50 ! 5.54 ! 325.54 ROAD (0.00 + 46.85 + 0.00) = 46.85 dBA Anglel Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq







 -90 46.85	90	0.00	65.61	0.00	-10.09	0.00	0.00	0.00	-8.68
Segment Leq : 46.85 dBA									
Total Leq All Segments: 46.85 dBA									
TOTAL Le	q FROM	ALL SO	URCES (D (NIG	AY): HT):	59.26 56.24				





STAMSON 5.0 NORMAL REPORT Date: 28-03-2013 14:39:03 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT Filename: 129.te Time Period: Day/Night 16/8 hours Description: Daytime and nighttime sound level at the future dwelling façade of Lot 129, flanking exposure to the railway Rail data, segment # 1: 1 (day/night) _____ ! Trains ! Trains ! Speed !# loc !# Cars! Eng Train !Cont ! (Left) ! (Right) !(km/h) !/Train!/Train! type Type !weld -+---1. Freight ! 1.5/0.0 ! 1.5/0.0 ! 89.0 ! 2.0 ! 73.0 !Diesel! No 2. Commuter ! 2.0/1.0 ! 2.0/1.0 ! 113.0 ! 1.0 ! 10.0 !Diesel! No 3. Passenger ! 6.0/1.5 ! 6.0/1.5 ! 113.0 ! 1.0 ! 5.0 !Diesel! No ! 3.0/1.0 ! 3.0/1.0 ! 113.0 ! 1.0 ! 12.0 4. qo !Diesel! No Data for Segment # 1: 1 (day/night) _____ Angle1 Angle2 : -90.00 deg 90.00 deg (No woods.) 0 / 0 (Absorptive ground surface) Receiver source distance : 55.00 / 55.00 m Receiver height:1.50 / 4.50 mTopography:3 (Elevitive) Topography 3 (Elevated; no barrier) : 90 deg Track 1 Whistle Angle : 5.00 m Elevation Reference angle : 0.00 Results segment # 1: 1 (day) _____ LOCOMOTIVE (0.00 + 61.00 + 0.00) = 61.00 dBAAngle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq _____ -90 90 0.44 70.14 -8.10 -1.05 0.00 0.00 0.00 61.00 _____ WHEEL (0.00 + 55.58 + 0.00) = 55.58 dBAAngle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq _____ _ _ _ _ _ _ _ -90 90 0.54 65.52 -8.69 -1.25 0.00 0.00 0.00 55.58 _____ LEFT WHISTLE (0.00 + 39.48 + 0.00) = 0.00 dBA Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

Page 1 of 3



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90 90 0.00 72.24 0.00 -20.23 0.00 0.00 0.00 39.48 _____ Segment Leq : 62.10 dBA Total Leq All Segments: 62.10 dBA Results segment # 1: 1 (night) _____ LOCOMOTIVE (0.00 + 57.97 + 0.00) = 57.97 dBA Anglel Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq _____ -90 90 0.34 66.43 -7.59 -0.87 0.00 0.00 0.00 57.97 _____ WHEEL (0.00 + 52.04 + 0.00) = 52.04 dBAAngle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq _____ -90 90 0.45 61.30 -8.18 -1.08 0.00 0.00 0.00 52.04 _____ LEFT WHISTLE (0.00 + 39.48 + 0.00) = 0.00 dBAAngle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq _____ 90 90 0.00 69.58 0.00 -20.23 0.00 0.00 0.00 39.48 _____ Segment Leq : 58.96 dBA Total Leg All Segments: 58.96 dBA Road data, segment # 1: York (day/night) -----Car traffic volume : 13874/2448 veh/TimePeriod * Medium truck volume : 542/96 veh/TimePeriod * Heavy truck volume : 812/143 veh/TimePeriod * Posted speed limit : 60 km/h Road gradient : 0 % Road pavement : 1 (Typical asphalt or concrete) * Refers to calculated road volumes based on the following input: 24 hr Traffic Volume (AADT or SADT): 12679 Percentage of Annual Growth : 2.50 Number of Years of Growth: 14.00Medium Truck % of Total Volume: 3.56Heavy Truck % of Total Volume: 5.33Day (16 hrs) % of Total Volume: 85.00 Data for Segment # 1: York (day/night) -----Angle1 Angle2 : -90.00 deg 90.00 deg

NOISE VIBRATION

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129 facade

wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface 1 (Absorptive ground surface) Receiver source distance $% 10^{-1}$: 246.50 / 246.50 m Receiver height:1.50 / 4.50 mTopography:3 (Elevent 3 (Elevated; no barrier) : 11.50 m Elevation Reference angle : 0.00 Results segment # 1: York (day) _____ Source height = 1.52 mROAD (0.00 + 53.36 + 0.00) = 53.36 dBA Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq _____ -90 90 0.31 70.14 0.00 -15.98 -0.80 0.00 0.00 0.00 53.36 _____ _ _ _ Segment Leq : 53.36 dBA Total Leg All Segments: 53.36 dBA Results segment # 1: York (night) Source height = 1.52 mROAD (0.00 + 50.13 + 0.00) = 50.13 dBA Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq _____ _ _ _ _ _ _ _ _ _ _ -90 90 0.22 65.61 0.00 -14.89 -0.60 0.00 0.00 0.00 50.13 _____ Segment Leq : 50.13 dBA Total Leg All Segments: 50.13 dBA TOTAL Leg FROM ALL SOURCES (DAY): 62.64 (NIGHT): 59.49





STAMSON 5.0 NORMAL REPORT Date: 28-03-2013 14:39:19 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT Filename: olabar.te Time Period: 16 hours Description: Daytime sound level in the OLA of Lot 133, backing exposure to the railway line, with mitigation Rail data, segment # 1: 1 _____ ! Speed !# loc !# Cars! Eng !Cont ! Trains ! Train !(km/h) !/Train!/Train! type !weld Туре _____+ 1. Freight!3.0/0.0!89.0!2.0!73.0!Diesel!No2. Commuter!4.0/0.0!113.0!1.0!10.0!Diesel!No 3. Passenger ! 12.0/0.0 ! 113.0 ! 1.0 ! 5.0 !Diesel! No 4. go ! 6.0/1.0 ! 113.0 ! 1.0 ! 12.0 !Diesel! No Data for Segment # 1: 1 _____ Angle1 Angle2 : -90.00 deg 90.00 deg : 0 Wood depth (No woods.) 0 No of house rows : Surface : 1 (Absorptive ground surface) Receiver source distance : 55.00 m Receiver height : 1.50 m Topography : 4 : (Elevated; with barrier) Topography 4 No Whistle : -90.00 deg Angle2 : 90.00 deg Barrier angle1 Barrier height : 2.20 m : 5.50 m Elevation Barrier receiver distance : 4.00 m Source elevation: 326.50 mReceiver elevation: 332.00 mBarrier elevation: 332.00 mReference angle: 0.00 Results segment # 1: 1 _____ Barrier height for grazing incidence _____ Source ! Receiver ! Barrier ! Elevation of Height (m) ! Height (m) ! Height (m) ! Barrier Top (m) 1.03 ! 4.00 !1.50 !1.28 !0.50 !1.50 !1.03 ! 333.28 333.03 LOCOMOTIVE (0.00 + 54.63 + 0.00) = 54.63 dBA Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq _____ -90 90 0.29 70.29 -7.27 -0.74 0.00 0.00 -7.65 54.63 _____

WHEEL (0.00 + 48.17 + 0.00) = 48.17 dBA







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Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq _____ -90 90 0.39 65.68 -7.86 -0.97 0.00 0.00 -8.68 48.17 _____ Segment Leq : 55.51 dBA Total Leg All Segments: 55.51 dBA Road data, segment # 1: York _____ Car traffic volume : 13874 veh/TimePeriod * Medium truck volume : 542 veh/TimePeriod * Heavy truck volume : 812 veh/TimePeriod * Posted speed limit : 60 km/h Road gradient : 0 8 Road pavement : 1 (Typical asphalt or concrete) Data for Segment # 1: York -----Angle1Angle2: -90.00 deg90.00 degWood depth: 0(No woods 0 Wood depth (No woods.) No of house rows 0 : (Absorptive ground surface) Surface : 1 Receiver source distance : 250.00 m Receiver height : 1.50 m : 4 (Elevated; with barrier) Topography : -90.00 deg Angle2 : 90.00 deg Barrier angle1 : Barrier height 2.20 m : 12.00 m Elevation Barrier receiver distance : 4.00 m Source elevation: 320.00 mReceiver elevation: 332.00 mBarrier elevation: 332.00 mReference angle: 0.00 Results segment # 1: York _____ Source height = 1.52 mBarrier height for grazing incidence _____ Source ! Receiver ! Barrier ! Elevation of Height (m) ! Height (m) ! Height (m) ! Barrier Top (m) 1.52 ! 1.50 ! 1.31 ! 333.31 ROAD (0.00 + 47.98 + 0.00) = 47.98 dBA Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq _____ _ _ _







-90 90 0.17 70.14 0.00 -14.26 -0.46 0.00 0.00 -7.43 47.98 _____ _ _ _ Segment Leq : 47.98 dBA Total Leq All Segments: 47.98 dBA

TOTAL Leq FROM ALL SOURCES: 56.22

ACOUSTICS





APPENDIX D

Vibration Plots from March 31, 2003 Noise Report















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