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Noise and Vibration Feasibility Study
Proposed Residential Development
Fenton Farm Subdivision
Long Sault, ON

Prepared for:

Newell & Grant Brown Ltd.
17751 South Branch Rd, RR #2
South Stormont, Ontario
K6H 0C8

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HGC Project No: 02000112

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1 Introduction and Summary

HGC Engineering was retained by Newell & Grant Brown Ltd. to conduct a noise and vibration feasibility study for a proposed residential development (Fenton Farm Subdivision) located north of County Road 36 and south of a Canadian National (CN) railway line in Long Sault, Ontario. The residential development will consist of single detached residential dwellings and associated roadways. The study is required as part of the planning and approvals process.

The primary source of noise is rail traffic on the CN railway line to the north of the site area. A secondary source of noise is road traffic on County Road 36. Rail traffic data was obtained from CN personnel, and road traffic data was obtained from the United Counties of Stormont, Dundas and Glengarry. Rail and road traffic data was used to predict future traffic sound levels at the proposed building façades and in outdoor living areas. The predicted sound levels were compared to the guidelines of the Ministry of Environment, Conservation and Parks (MECP) and CN to develop noise control recommendations.

The results of the study indicate that the proposed development is feasible with the noise control measures described in this report. Future daytime and nighttime sound levels at the proposed dwellings will exceed MECP and CN guideline sound levels and will require noise control measures. An acoustic barrier is required adjacent and in parallel to the CN railway line returning back for some distance to shield rear yard outdoor living areas. Air conditioning is required for the dwellings closest to and with exposure to the railway. Forced air ventilation with ducts sized for the future installation of air conditioning by the occupant will be required for the remaining dwellings. Brick exterior construction is required for dwellings in the first row from the railway. Upgraded glazing construction are required for the majority of the dwellings closest to and with exposure to the railway.

Ground-borne vibration levels from rail pass-bys were measured at the location of the closest proposed dwelling façade approximately 30 m from the CN railway right of way and were found to be below CN limits. Vibration mitigation is not required for the development.

2 Site Description and Noise Sources

Figure 1 is a key plan indicating the location of the proposed site. The site is located at the north side of County Road 36 and south of a CN railway line in Long Sault, Ontario. Figure 2 shows the draft site plan by EVB Engineering, dated February 13, 2019. The proposed development will consist of single detached dwellings and associated roadways.

HGC Engineering personnel visited the site on March 20, 2020 to make observations of the acoustical environment and to leave an automatic vibration monitor on the site to measure ground-borne vibration during rail pass-bys. During the site visit, it was noted that the primary source of noise impacting the site was rail traffic noise on the CN railway to the north. The secondary source of noise impacting the site was road traffic on County Road 36 to the south. The site is currently vacant. The lands are elevated at the center of the site. The railway line is elevated by approximately 2 m. There are existing rural residences to the east and west of the site. An electronics distribution warehouse (Napa Warehouse) exists approximately 500 m east of the site area. Sounds from this facility were not audible during the site visit. There are also numerous existing residences closer to the existing warehouse facility than the subject site. There are no significant sources of noise within 500 m of the subject site.

3 Criteria Governing Road and Rail Noise

Guidelines for acceptable levels of road and rail traffic noise impacting residential developments are given in the MECP publication NPC-300, “Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning”, 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: MECP Road and Rail Traffic Noise Criteria (dBA)

Area	Daytime $L_{EQ\ (16\ hour)}$ Road / Rail	Nighttime $L_{EQ(8\ hour)}$ Road / Rail
Outdoor Living Area	55 dBA / 50 dBA	--
Inside Living/Dining Rooms	45 dBA / 40 dBA	45 dBA / 40 dBA
Inside Bedrooms	45 dBA / 40 dBA	40 dBA / 35 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, a backyard, a terrace, or other area where passive recreation is expected to occur. Small balconies are not considered OLAs for the purposes of assessment. Terraces greater than 4 m in depth (measured perpendicular to the building façade) are considered to be OLAs.

The guidelines in the MECP 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 practical.

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

A central air conditioning system as an alternative means of ventilation to open windows is required for dwellings where nighttime sound levels outside bedroom 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 is required when nighttime 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 nighttime sound level is greater than 60 dBA or the daytime sound level is greater than 65 dBA due to road traffic noise, or when the nighttime sound level is greater than 55 dBA or the daytime sound level is greater than 60 dBA due to rail traffic noise.

Warning clauses to notify future residents of possible noise excesses are also required when nighttime sound levels exceed 50 dBA at the plane of a bedroom window and when daytime sound levels exceed 55 dBA at the plane of a living/dining room window due to road and rail traffic.

MECP guidelines recommend exterior walls built with a brick or masonry veneer 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 mainline requirements for residential developments adjacent to a railway right of way.

4 Traffic Sound Level Assessment

4.1 Rail Traffic Data

Rail traffic data for the CN Kingston Subdivision was obtained from CN railway personnel and is attached in Appendix A. This line is used for freight, way freight, and passenger operations and is classified as a principal main line. The railway is continuously welded. The maximum permissible train speed in the area of the site is 97 km/h (60 mi/h) for the freight and way freight trains, and 145 km/h (90 mi/h) for passenger trains. In conformance with CN assessment requirements, the maximum speeds, maximum number of cars and locomotives per train were used in the traffic noise analysis to yield a worst-case estimate of train noise. The data was projected to the year 2030 using a 2.5% per year growth rate. Table II summarises the CN rail traffic data used in the analysis.

Table II: Rail Traffic Data Projected to Year 2030

Type of Train	Number of Trains Day/ Night	Number of locomotives	Number of cars	Max Speed (KPH)
Freight	8 / 13	140	4	97
Way Freight	1 / 0	25	4	97
Passenger	15 / 1	10	2	145

4.2 Road Traffic Data

Traffic data for County Road 36 was obtained from the United Counties of Stormont, Dundas and Glengarry personnel in the form of Average Annual Daily Traffic (AADT) traffic values, and is provided in Appendix B. The data was projected to the year 2030 with an annual growth rate of 2.5%. A projected volume of 1 911 vehicles per day at an operating speed limit of 60 km/h was applied for the analysis. A commercial vehicle percentage of 3 % for medium trucks and 5 % for heavy trucks was applied. A day/night split of 72 % / 28 % was used. Table III summarizes the traffic volume data used in this study.

Table III: Road Traffic Data Projected to Year 2030

Road Name		Cars	Medium Trucks	Heavy Trucks	Total
County Road 36	Daytime	1 266	41	69	1 376
	Nighttime	492	16	27	57
	Total	**1 758**	**57**	**96**	**1 911**

4.3 Road and Rail Traffic Noise Predictions

To assess the levels of road and rail traffic noise which will impact the study area in the future, sound level predictions were made using STAMSON version 5.04, a computer algorithm developed by the MECP. Sample STAMSON output is included in Appendix D. There is an at-grade crossing at Avonmore Road, approximately 800 m to the east of the subject site. Whistle noise has been included in the sound level prediction at the façade of the proposed dwellings.

Predictions of the traffic sound levels were chosen around the proposed residential buildings to obtain an appropriate representation of future sound levels at various façades. Sound levels were predicted at the plane of the 2nd storey bedroom and/or living/dining room windows during daytime and nighttime hours to investigate ventilation and façade construction requirements. Sound levels were also predicted in possible OLA's to investigate the need for noise barriers. Figure 2 shows the draft plan of the site with prediction locations. The results of these predictions are summarized in Table IV and Table V.

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

Prediction Location	Description	Daytime – at the Façade $L_{EQ-16\ hr}$		Daytime at Façade Total $L_{EQ-16\ hr}$	Daytime in the OLA Total $L_{EQ-16\ hr}$
		Road	Rail		
[A]	Lot 24	<55	66	66	64
[B]	Lot 25	<55	63	63	62
[C]	Block 53	<55	60	60	60
[D]	Lot 27	<55	57	57	58
[E]	Lot 38	<55	<55	<55	<55
[F]	Block 47	57	<55	57	57

Note: Whistle noise has been included for the façade calculations.

Table V: Nighttime Predicted Road Traffic Sound Levels [dBA], Without Mitigation

Prediction Location	Description	Nighttime – at the Façade $L_{EQ-8\ hr}$		Nighttime at Façade Total $L_{EQ-8\ hr}$
		Road	Rail	
[A]	Lot 24	<50	69	69
[B]	Lot 25	<50	66	66
[C]	Block 53	<50	63	63
[D]	Lot 27	<50	60	60
[E]	Lot 38	<50	55	55
[F]	Block 47	56	55	58

Note: Whistle noise has been included for the façade calculations.

5 Discussions and Recommendations

The sound level predictions indicate that the future traffic sound levels will exceed MECP guidelines at the proposed development. The following discussion outlines the recommendations for acoustic

barrier requirements, ventilation requirements, upgraded building façade construction, and warning clauses to achieve the noise criteria stated in Table I.

5.1 Outdoor Living Areas

As a general recommendation for residential developments adjacent to a principal mainline, CN recommends a minimum 5.5 m barrier (2.5 m berm – above the property line and with 3.0 m acoustic wall on top) as indicated in Appendix C. The total height of the barrier (5.5 m in height) is above the top of rail in the area.

The predicted daytime sound levels in the OLA's of Lots 24 and 25 will be up to 64 and 62 dBA, respectively, which are in excess of MECP's limit of 55 dBA. Physical mitigation in the form of an acoustic barrier is required to address these excesses. The various table heights required to achieve MECP's OLA requirements are provided below in Table VI.

Table VI: Required Barrier Heights to Achieve Various Sound Levels

	Prediction Location	Lots	Sound Level in OLA [dBA]					
			55	56	57	58	59	60
Barrier Height [m]	[A]	23, 24	9.0	8.0	7.0	6.5	6.0	5.5
	[B]*	22, 25	6.5	6.0	4.0	3.0	2.5	2.0

Note: * Barrier heights for Lots 22 and 25 were calculated assuming a minimum of a 5.5 m barrier for Lots 23 and 24.

Lots 23 and 24 Backing Exposure to the Railway

A 5.5 m high acoustic barrier would reduce the sound levels in the OLAs of Lots 23 and 24 to 60 dBA. The barrier can be a combination of berm and acoustic wall, with a minimum berm height of 2.5 m as per CN guidelines. CN has accepted sound levels up to 60 dBA in outdoor living areas with the use of an acoustic barrier in past projects.

Lots 22 and 25 with Some Flanking Exposure to the Railway

A 2.0 m high acoustic barrier in the rear yards would reduce the sound levels in the OLA's of Lots 22 and 25 to 60 dBA. CN has accepted sound levels up to 60 dBA in outdoor living areas with the use of an acoustic barrier in past projects.

Acoustic barriers can be any combination of an earth berm with an acoustic wall on top. The wall component of the barrier should be of a solid construction with a surface density of no less than 20 kg/m^2. 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 within or below its extent. The heights and extents of the barriers should be chosen to reduce the sound levels in the OLA's to below 60 dBA and as close to 55 dBA as is technically, administratively, and economically feasible, subject to approval of the municipality respecting any applicable fence height by-laws.

Further Analysis

Final grading information for the proposed development should be reviewed to refine acoustic barrier requirements when available.

5.2 Minimum Setback Distance

CN guidelines stipulates a minimum setback distance of 30 m between the façade of a new dwelling and the right of way of a principal mainline. The proposed development draft plan conforms to the setback requirement as the nearest proposed dwelling façade is located more than 30 m way from the rail right-of-way, since Block 52 is reserved for a barrier.

5.3 Indoor Living Areas and Ventilation Requirements

Air Conditioning

The predicted future sound levels outside the 2nd storey windows of Lots 21 through 26, Block 51, and Block 53, designated by prediction location [A], [B], and [C], will be greater than 60 dBA during nighttime hours and/or 65 dBA during daytime hours. To address these excesses, these units need to be equipped with central air conditioning systems so that windows may remain closed. These units are show in Figure 3. 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 location, installation and sound ratings of the outdoor air conditioning devices should minimize noise impacts and comply with criteria of MECP publication NPC-300, as applicable.

Provision for Air Conditioning

The predicted future sound levels outside the 2nd storey windows of all other Lots/Blocks, designated by prediction location [D], [E], and [F], will be between 56 and 65 dBA during the daytime hours and/or between 51 to 60 dBA during the nighttime hours. To address these excesses, these dwelling units require provisions for the future installation of central air conditioning systems so that windows may be kept closed. This requirement is typically satisfied through the installation of forced air ventilation systems with ductwork sized for the future installation of central air conditioning by the occupant. These units are indicated in Figure 3. The location, installation and sound ratings of the outdoor air conditioning devices should minimize noise impacts and comply with criteria of MECP publication NPC-300.

5.4 Building Façade Constructions

The predicted sound levels at the facades of dwellings on Lot 11 to 38, Block 51, and Block 53 will exceed 60 dBA during daytime and/or 55 dBA during nighttime due to rail traffic noise. MECP guidelines stipulate that in such cases, building components including windows, walls, and doors be designed so that the indoor sound levels comply with the noise criteria in Table I.

Calculations were performed to determine the acoustical insulation factors to maintain indoor sound levels within MECP guidelines. The calculation methods were developed by the National Research Council (NRC). They are based on the predicted future sound levels at the building facades, and the anticipated area ratios of the facade components (walls, windows and doors) and the floor area of the adjacent room.

Exterior Wall Construction

According to MECP and CN guidelines, the dwellings directly adjacent to the CN railway will have sound levels exceeding 60 dBA during both nighttime and daytime hours. These dwellings will require brick or masonry exterior walls from foundation to rafters for all façades. This applies to dwellings in the first row from the CN railway (Lots 22 through 25).

Exterior Doors

There may be glazed exterior doors (sliding or swing) for entry onto the balconies from living/dining rooms and some bedrooms. The glazing areas of the doors should be counted as part of the total window glazing area. All exterior doors should include good weather seals to reduce air infiltration to the minimum achievable levels.

Acoustical Requirements for Glazing

A summary of the STC requirements is given in Table VII for the townhouse façades, based on the possibility of sound entering the building through windows for the first row of dwellings adjacent to the CN railway, and through walls and windows for all other dwellings. Detailed floor plans and building elevations were not available for review at the time of this report. A window to floor ratio of 50% (40% fixed, 10% operable) for living/dining/family room and 40% (30% fixed, 10% operable) for bedrooms were assumed to determine preliminary window STC ratings required to mitigate rail traffic noise levels.

Table VII: Minimum STC Requirements

Prediction Location	Description	Space	STC Glazing Requirements
[A]	Lots 23 and 24	*Living/Dining	STC-32
		*Bedroom	STC-39
[B]	Lots 22 and 25	*Living/Dining	STC-30
		*Bedroom	STC-36
[C]	Lots 21 and 26, Blocks 51 and 53	+Living/Dining	OBC
		+Bedroom	STC-39
[D]	Lots 11 through 20, 27 through 37	+Living/Dining	OBC
		+Bedroom	STC-33
[E]	Lots 2 through 10, 38 through 46	+Living/Dining	OBC
		+Bedroom	OBC
[F]	Lot 1 and Block 47	+Living/Dining	OBC
		+Bedroom	OBC

Notes: OBC – Ontario Building Code
* Sound entering through windows only since the exterior wall is required to be brick.
+ Sound entering through windows and walls

The glazing requirements can be met using fairly standard sealed units. Operable sections, including doors and operable windows, must be well-fitted and weather-stripped in order to achieve the upper range of target STC values. Acoustical criteria for different blocks and facades can be optimized as part of the detail design of the development, when floor plans and elevations for the buildings are available. If window areas are kept small, glazing STC may also be reduced. When designing the floor plans, exterior doors should open into foyers or hallways. Sliding patio doors may be used as long as the window area is counted towards the overall glazing area in the room.

Sample window assemblies which may achieve the STC requirements are summarized in Table VIII below. Note that acoustic performance varies with manufacture's construction details, and these are only guidelines to provide some indication of the type of glazing likely to be required; the STC requirements in Table VII are provided as a guideline based on the preliminary drawings. Acoustical test data for the selected assemblies should be requested from the supplier, to ensure that the stated acoustic performance levels will be achieved by their assemblies.

Table VIII: Glazing Assemblies for STC Requirements

STC Requirement	Glazing Configuration (STC)
28 – 29	Any double glazed unit
30 – 31	3(13)3
32 – 33	4(10)4
34	4(19)4
35 – 36	6(10)4, 5(16)4
37	6(13)6, 6(20)5, 5(25)6
38	6(25)5, 6L(13)6
39	6(30)6

In Table VIII, the number outside parentheses indicate minimum pane thicknesses in millimeters and the number in parentheses indicates the minimum inter-pane gap in millimeters.

Alternative assemblies may be required for operable windows and doors to achieve the required performance values, depending on the nature of seals.

Further Analysis

When detailed floor plans and building elevations are available for the dwelling units, window glazing construction should be refined based on actual window to floor area ratios and the exterior wall construction should be verified.

5.5 Assessment of Ground-borne Vibration from Rail Traffic

Measurements were performed on the site at grade, at approximately 30 m from the railway right-of-way. Unattended vibration measurements using a Svantek 977 Sound Level Meter with a Wilcoxon Research type 793V velocity transducer was left at the site from March 20, 2020 to March 22, 2020. During the automatic measurement period, six rail pass-bys were recorded. The results of the measurements are presented in Table IX showing the maximum vibration level measurements during each of the six train pass-bys. Figures 4 to 9 show the pass-bys of six of the pass-bys.

Table IX: Maximum RMS Vibration Velocity Measurements of Train Pass-bys

Train Pass-by	Maximum Vibration Velocity (mm/s)	Criteria (mm/s)
1	0.06	0.14
2	0.05	
3	0.06	
4	0.06	
5	0.05	
6	0.06	

The results indicate that vibration levels are below the CN criteria of 0.14 mm/s and vibration mitigation measures are not required for this proposed development.

6 Warning Clauses

The MECP guidelines recommend that warning clauses be included in the property and tenancy agreements and offers of purchase and sale for all dwellings with anticipated traffic sound level excesses. The following noise warning clauses are required for specific dwellings as indicated in Table X.

Suggested wording for future dwellings which have minor sound levels excess over the MECP criteria 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 occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks.

Suggested wording for future dwellings with daytime OLA sound levels exceeding the MECP criteria by 6 dBA or more, for which physical mitigation has been provided but is unable to reduce the sound level to below 55 dBA 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 Municipality's and the Ministry of the Environment, Conservation and Parks noise criteria.

Suggested wording for future dwellings which have physical noise mitigation provided on site is given below.

Type C:

That the acoustical berm and/or barrier as installed, shall be maintained, repaired or repaired by the owner. Any maintenance, repair or replacement shall be with the same material, or to the same standards, and having the same colour and appearance of the original.

Suggest wording for future dwellings which will have central air conditioning units to be installed is given below.

Type D:

This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks.

Suggested wording for future dwellings which have provisions for central air conditioning to be installed is given below.

Type E:

This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks.

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

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

Type F:

> Warning: Canadian National Railways Company or its assigns or successors in interest has or have a right-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.

7 Summary and Recommendations

The following list and Table X summarize the recommendations made in this report. The reader is referred to Figure 3 and previous sections of the report where these recommendations are applied and discussed in more detail.

1. An acoustic barrier, which may consist of a combination of berm and acoustical wall, is required for the proposed development totaling 5.5 m above the top of rail in parallel to the railway line for Lots 23 and 24. The acoustic barriers may be lowered in height to 2.0 m and should return in a southerly direction along the rear yards of Lots 22 and 25. When grading information is available, the acoustic barrier requirements should be refined.

2. Brick construction is required for dwellings in the first row from the railway (Lots 22 through 25).

3. Upgraded glazing construction are required for dwellings with significant exposure to the railway (Lots 11 through 38, Block 51, and Block 53). When detailed floor plans and building elevations are available for the dwelling units with exposure to the roadways, window glazing construction should be refined on actual window to floor ratios and the exterior wall construction should be verified.

4. Central air conditioning will be required for dwellings close to the railway (Lots 21 through 26, Block 51, and Block 53). Forced air ventilation systems with ductwork sized for future installation of central air conditioning systems will be required for the remaining dwellings.

5. The use of warning clauses in the property and tenancy agreements is recommended to inform future residents of traffic noise issues.

6. A detailed noise study is recommended when grading information is available and detailed floor plans and building elevations are available for review.

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

Prediction Location	Block No./Lot No.	Acoustic Barrier+	Ventilation Requirements*	Type of Warning Clause	Brick Exterior Wall Construction	Upgraded Glazing Constructions ++
[A]	23 and 24	✓	Central A/C	B, C, D, F	✓	LR/DR: STC-32 BR: STC-39
[B]	22 and 25	✓	Central A/C	B, C, D, F	✓	LR/DR: STC-30 BR: STC-36
[C]	21, 26, 51, and 53	--	Central A/C	B, D, F	--	LR/DR: OBC BR: STC-39
[D]	11 through 20, 27 through 37	--	Forced Air	A, E, F,	--	LR/DR: OBC BR: STC-33
[E]	2 through 10, 38 through 46	--	Forced Air	A, E, F	--	OBC
[F]	1 and 47	--	Forced Air	A, E, F	--	OBC

Notes:
* The location, installation and sound rating of the air conditioning condensers must be compliant with MECP Guideline NPC-300, as applicable.
✓ Outdoor living areas require acoustic barriers. Refer to Section 5.1
-- No specific requirements
OBC – Ontario Building Code
LR/DR – Living Room/Dining Room
BR – Bedroom
+ Table VI provides the heights of the required acoustic barriers. When grading information is available, the acoustic barrier height should be refined.
++ When detailed floor plans and building elevations are available for the dwelling units with exposure to the roadways, window glazing construction should be refined on actual window to floor ratios and the exterior wall construction should be verified.

7.1 Implementation

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

1. Prior to the issuance of building permits for this development, a Professional Engineer qualified to perform acoustical engineering services in the Province of Ontario should review the detailed architectural plans and building elevations to refine glazing requirements based on actual window to floor areas ratios.

2. 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.

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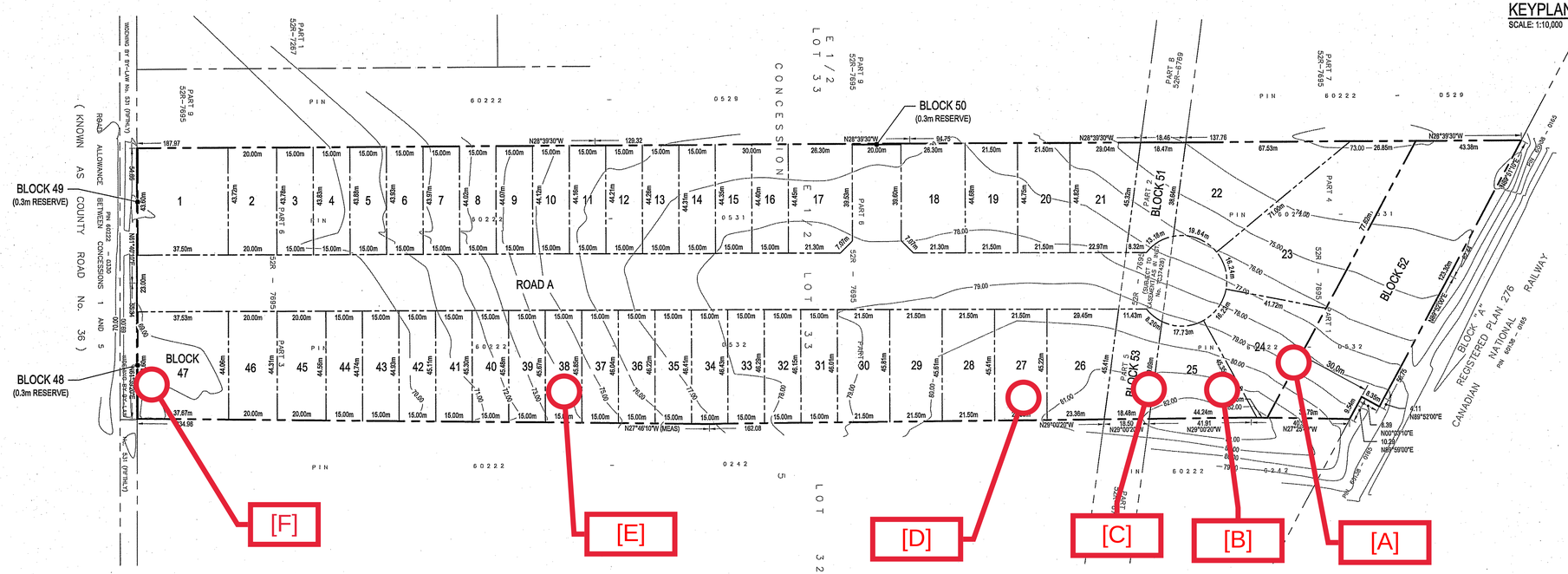
PROJECT:
FENTON FARM SUBDIVISION

TITLE:
REQUEST FOR QUOTATION
NOISE AND VIBRATION STUDY

SCALE: N.T.S.
JOB NO: 19018
DATE: 2020/02/10
DRAWING NO. SK.1

M:\2019\19018 - Fenton Farm Subdivision\6.0 Dwg\6.2 Civil\3.0 Non-production\3.2 SKS\19018-SK-1.dwg Feb 10, 2020-11:48am BY:(Rebecca.Luck)

Figure 1: Key Plan



KEYPLAN
SCALE: 1:10,000

Figure 2: Draft Plan showing Prediction Locations

SCHEDULE OF LAND USE

DWELLING TYPE OR LAND USE	NUMBER OF LOTS	NUMBER OF DWELLINGS
SINGLE	32	32
SEMI-DETACHED	14	28
STREET		
BLOCK	7	
OTHER		

DRAFT PLAN OF SUBDIVISION
OF PART OF

PART OF E ½ LOT 33
CONCESSION 5

GEOGRAPHIC TOWNSHIP OF CORNWALL,
TOWNSHIP OF SOUTH STORMONT
COUNTY OF STORMONT, ONTARIO

ADDITIONAL INFORMATION AS REQUIRED UNDER SECTION 51, PLANNING ACT

A) AS SHOWN ON DRAFT PLAN
B) AS SHOWN ON DRAFT PLAN
C) AS SHOWN ON DRAFT PLAN
D) REFER TO SCHEDULE OF LAND USE E) AS SHOWN ON DRAFT PLAN
F) AS SHOWN ON DRAFT PLAN
G) AS SHOWN ON DRAFT PLAN
H) MUNICIPAL WATER SERVICE
I) CLAY/BOULDERS
J) AS SHOWN ON THE DRAFT PLAN
K) HYDRO, BELL, CABLE, NATURAL GAS, SANITARY SEWER, WATERMAIN.
L) REFER TO SCHEDULE OF LAND USE

OWNER'S CERTIFICATE

I HEREBY AUTHORIZE THIS DRAFT PLAN OF SUBDIVISION TO BE SUBMITTED TO THE MINISTER OF MUNICIPAL AFFAIRS FOR APPROVAL.

28 Jan 2020
DATED — NEWELL & GRANT BROWN LTD.

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO THE ADJOINING LANDS ARE CORRECTLY SHOWN.

Ja 27 2020
DATED — KIM C. ADAMS, ONTARIO LAND SURVEYOR

DATE	No.	REVISION
2020/01/27	1	ISSUED FOR DRAFT PLAN APPROVAL

EVB ENGINEERING
800 SECOND STREET WEST
CORNWALL, ONTARIO CANADA, K6J 1H8
TEL: 613-935-3775 | FAX: 613-935-6450
WEBSITE: EVBengineering.com

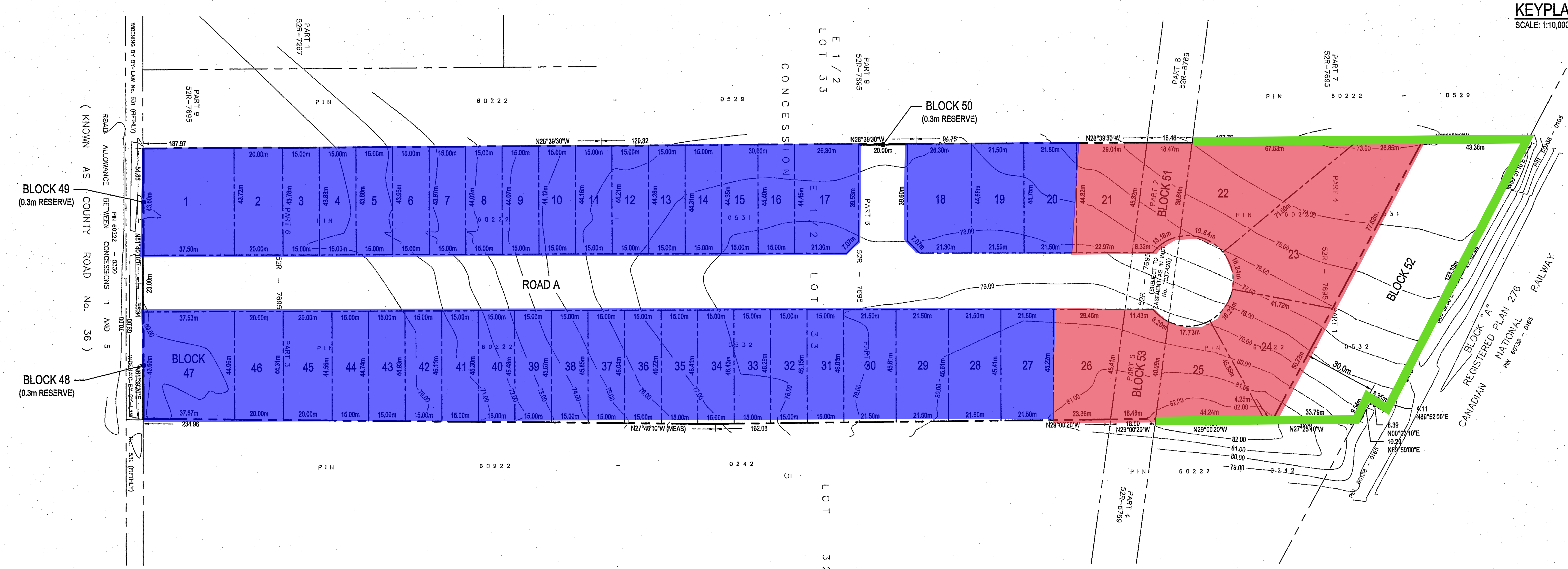
CLIENT:
NEWELL AND GRANT BROWN LTD.

PROJECT:
FENTON FARM SUBDIVISION

TITLE:
DRAFT PLAN

SCALE: 1:1000	JOB NO: 19018
DESIGNED BY: R.L.	DATE: 2019/02/13
DRAWN BY: K.B.W.	DRAWING NO. DP1.1
CHECKED BY: J.E.	

M:\2019\19018 - Fenton Farm Subdivision\06.0 Dwg\6.2 CAD\3.0 New production\3.4 Draft Plan\19018-DP1-1.dwg Jan 28, 2020-1:24pm BY:(Rebecca Lusk)



LEGEND

- Acoustical barrier required
- Central air conditioning required
- Forced air ventilation systems with ductwork sized for future installation of air conditioning by the occupant

Figure 3: Draft Plan showing Barrier and Ventilation Requirements

KEYPLAN
SCALE: 1:10,000

DRAFT PLAN OF SUBDIVISION
OF PART OF
PART OF E 1/2 LOT 33
CONCESSION 5

GEOGRAPHIC TOWNSHIP OF CORNWALL,
TOWNSHIP OF SOUTH STORMONT
COUNTY OF STORMONT, ONTARIO

ADDITIONAL INFORMATION AS REQUIRED UNDER SECTION 51, PLANNING ACT

A) AS SHOWN ON DRAFT PLAN
B) AS SHOWN ON DRAFT PLAN
C) AS SHOWN ON DRAFT PLAN
D) REFER TO SCHEDULE OF LAND USE E) AS SHOWN ON DRAFT PLAN
F) AS SHOWN ON DRAFT PLAN
G) AS SHOWN ON DRAFT PLAN
H) MUNICIPAL WATER SERVICE
I) CLAY/BOULDERS
J) AS SHOWN ON THE DRAFT PLAN
K) HYDRO, BELL, CABLE, NATURAL GAS, SANITARY SEWER, WATERMAIN.
L) REFER TO SCHEDULE OF LAND USE

OWNER'S CERTIFICATE

I HEREBY AUTHORIZE THIS DRAFT PLAN OF SUBDIVISION TO BE SUBMITTED TO THE MINISTER OF MUNICIPAL AFFAIRS FOR APPROVAL.

28 Jan 2020
DATED

NEWELL & GRANT BROWN LTD.

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO THE ADJOINING LANDS ARE CORRECTLY SHOWN.

Jan 27 2020
DATED

KIM C. ADAMS
ONTARIO LAND SURVEYOR

DATE	No.	REVISION
2020/01/27	1	ISSUED FOR DRAFT PLAN APPROVAL

800 SECOND STREET WEST
CORNWALL, ONTARIO CANADA, K6J 1H6
TEL: 613-935-3775 | FAX: 613-935-6450
WEBSITE: EVBengineering.com

CLIENT:
NEWELL AND GRANT BROWN LTD.

PROJECT:
FENTON FARM SUBDIVISION

TITLE:
DRAFT PLAN

SCALE: 1:1000	JOB NO: 19018
DESIGNED BY: R.L.	DATE: 2019/02/13
DRAWN BY: K.B.W.	DRAWING NO. DP1.1
CHECKED BY: J.E.	

SCHEDULE OF LAND USE

DWELLING TYPE OR LAND USE	NUMBER OF LOTS	NUMBER OF DWELLINGS
SINGLE	32	32
SEMI-DETACHED	14	28
STREET		
BLOCK	7	
OTHER		

Figure 4a: Pass-by 1 at 30 m from ROW
Measured Vibratory Velocity Level

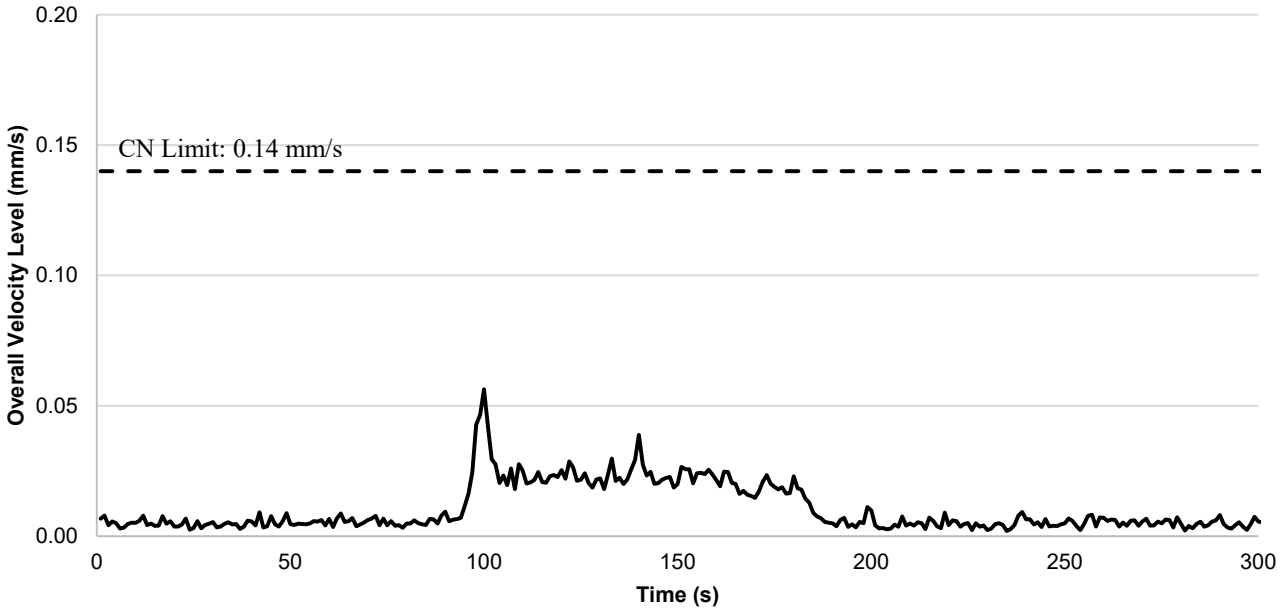


Figure 4b: Pass-by 1
Acceleration Spectrum @ Peak Level (1 sec. Duration)

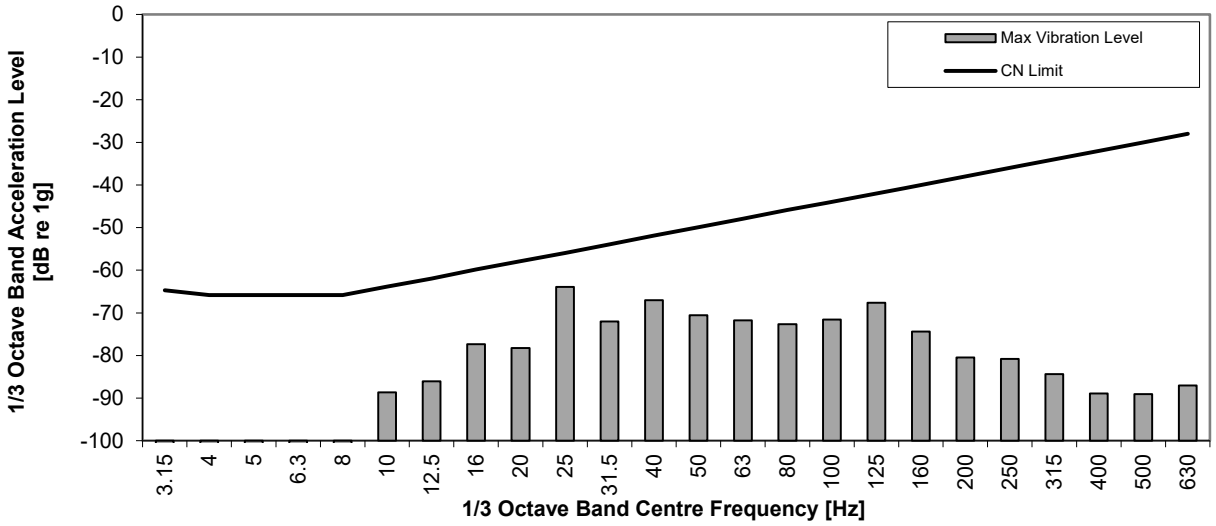


Figure 5a: Pass-by 2 at 30 m from ROW
Measured Vibratory Velocity Level

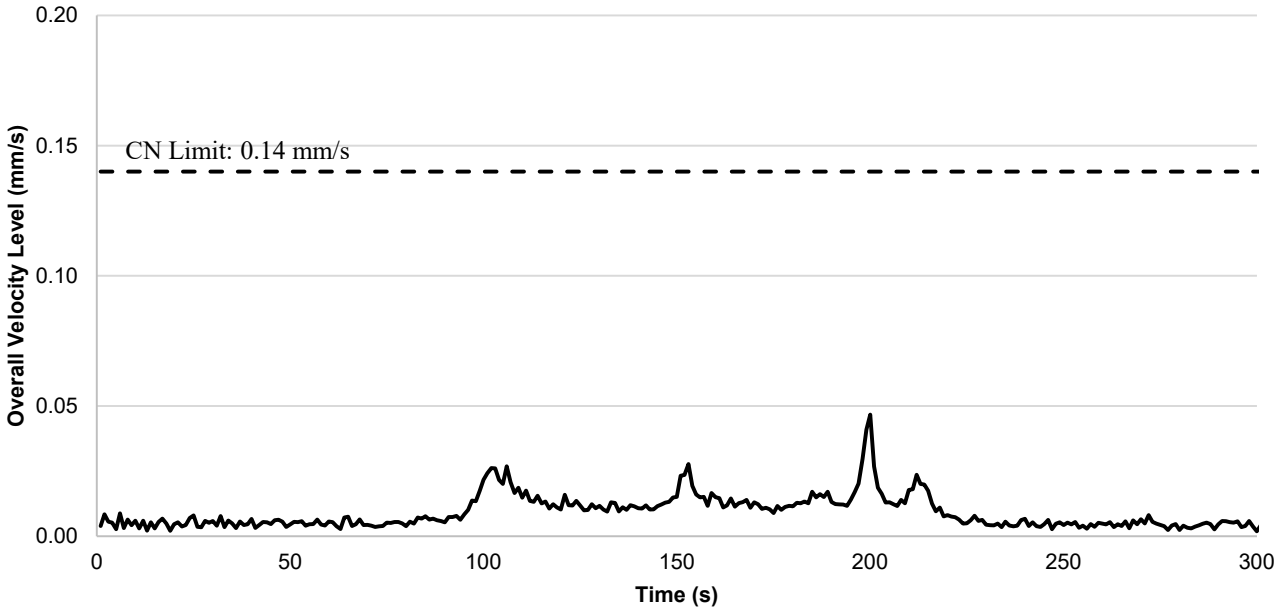


Figure 5b: Pass-by 2
Acceleration Spectrum @ Peak Level (1 sec. Duration)

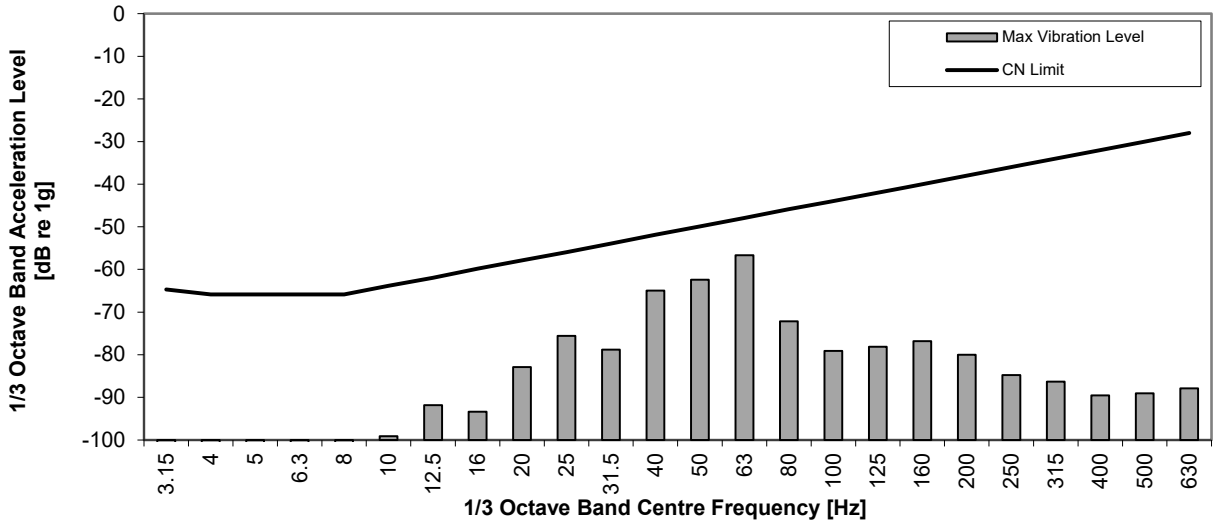


Figure 6a: Pass-by 3 at 30 m from ROW
Measured Vibratory Velocity Level

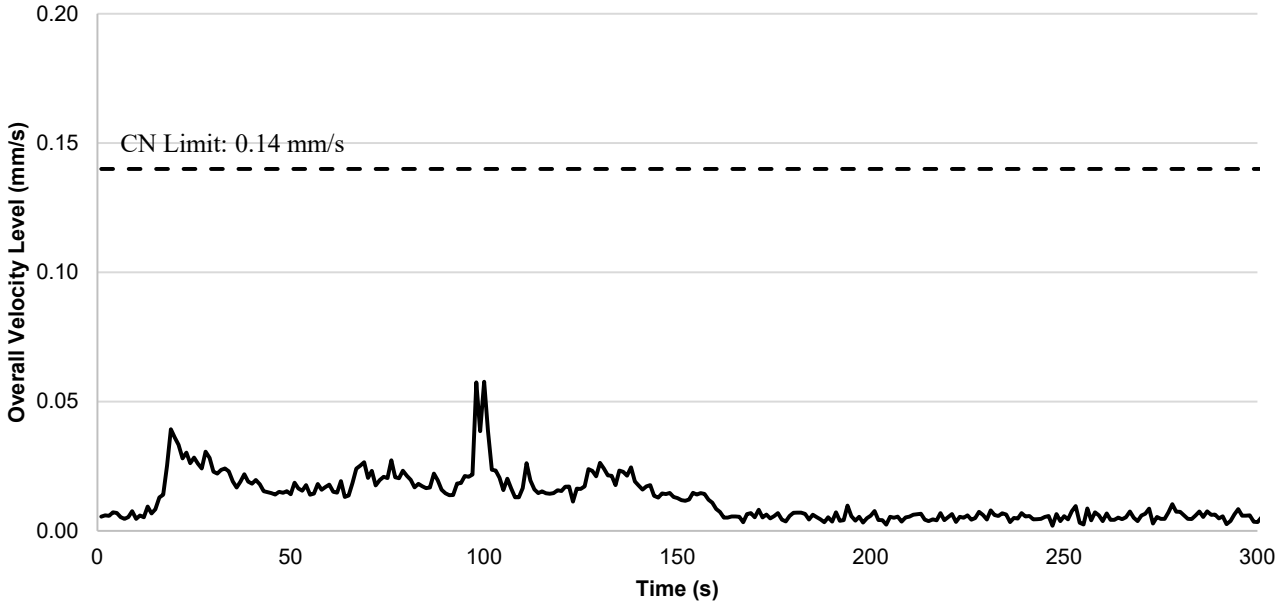


Figure 6b: Pass-by 3
Acceleration Spectrum @ Peak Level (1 sec. Duration)

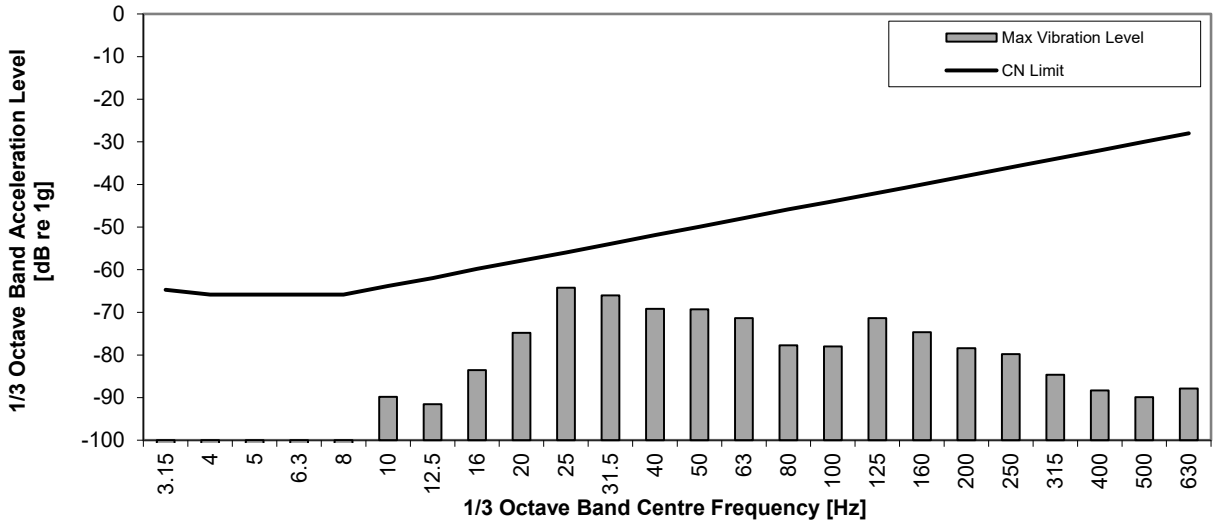


Figure 7a: Pass-by 4 at 30 m from ROW
Measured Vibratory Velocity Level

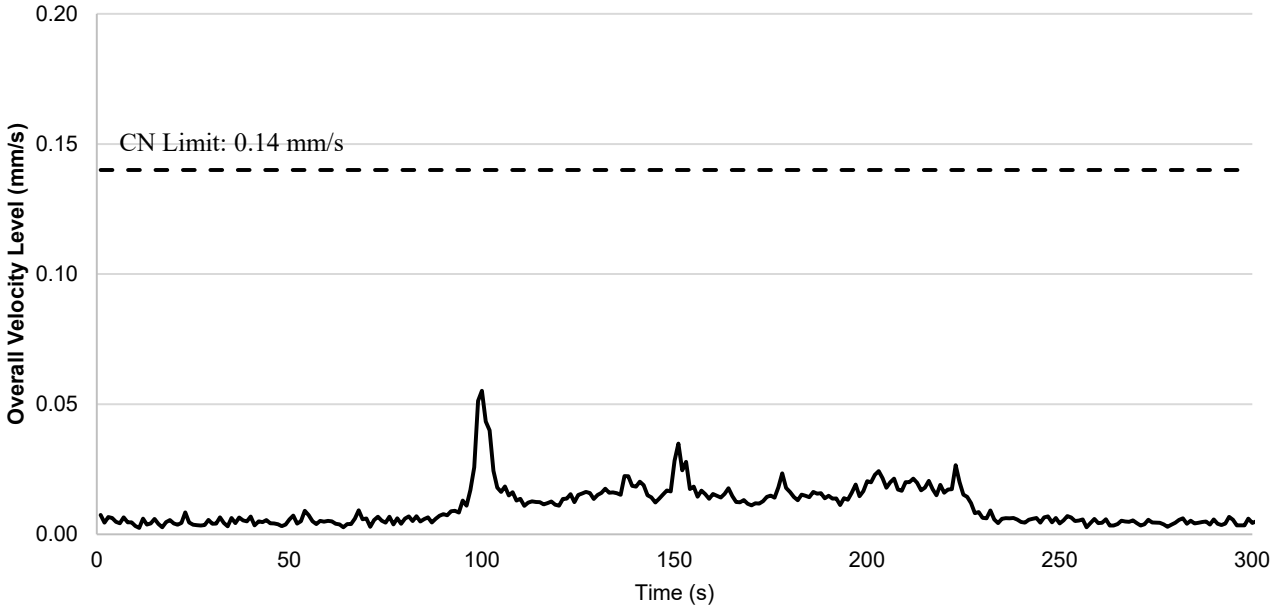


Figure 7b: Pass-by 4
Acceleration Spectrum @ Peak Level (1 sec. Duration)

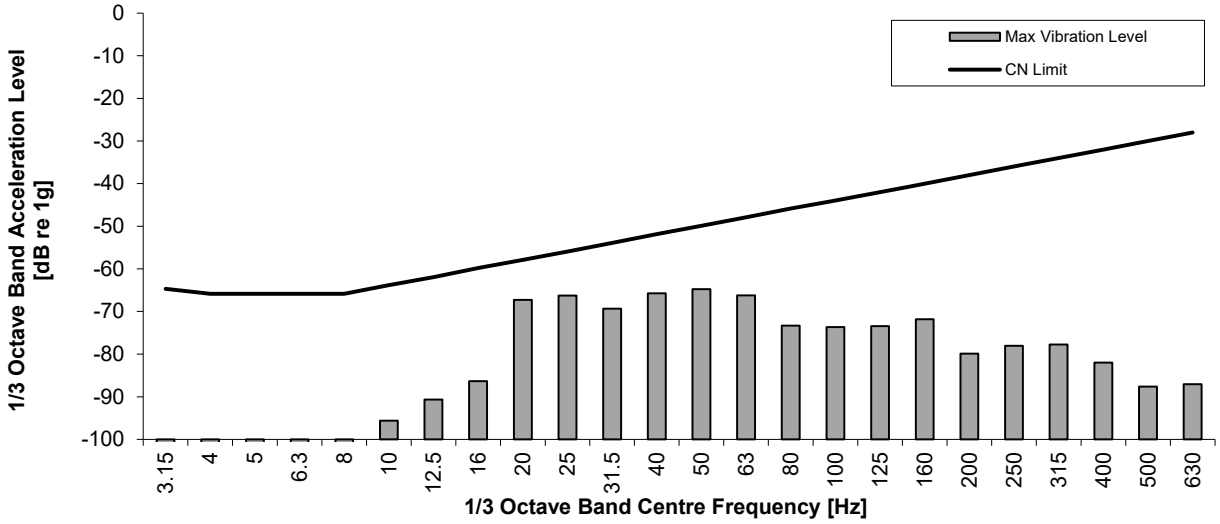


Figure 8a: Pass-by 5 at 30 m from ROW
Measured Vibratory Velocity Level

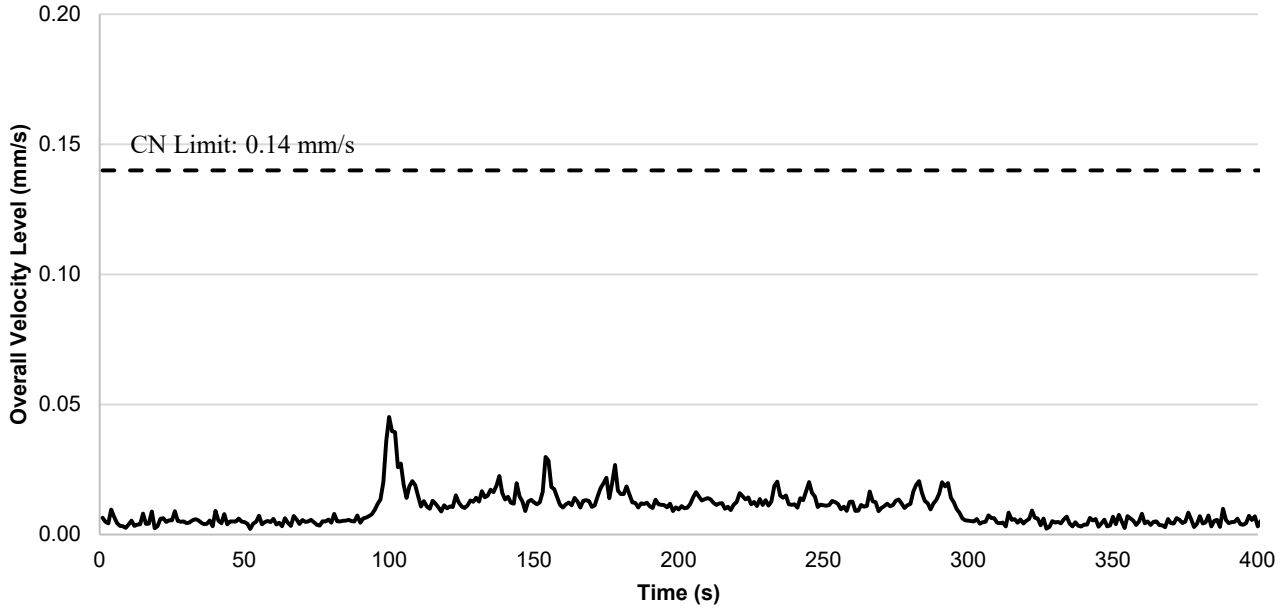


Figure 8b: Pass-by 5
Acceleration Spectrum @ Peak Level (1 sec. Duration)

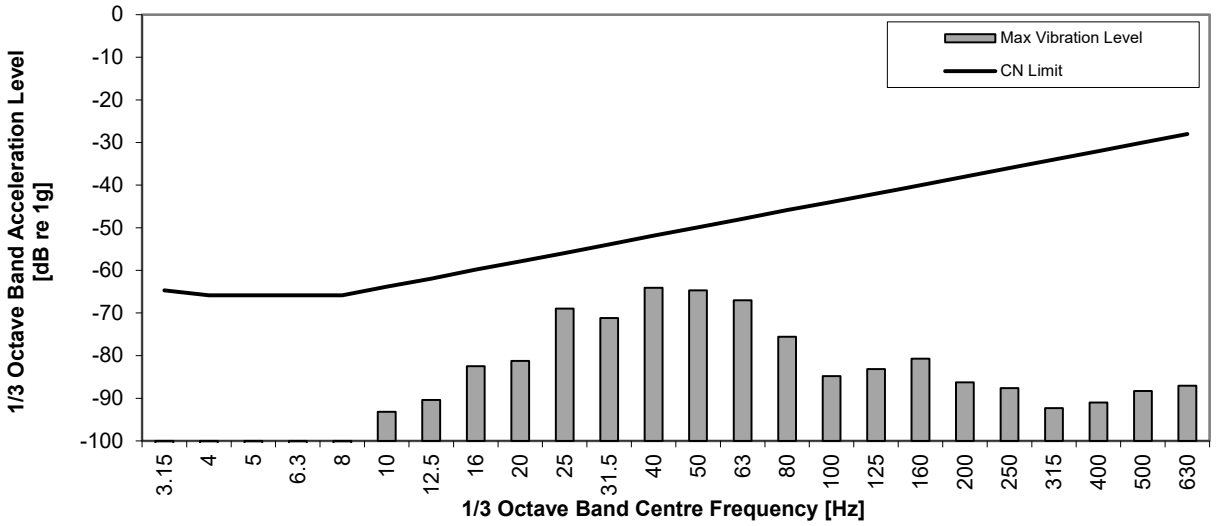


Figure 8a: Pass-by 6
Measured Vibratory Velocity Level

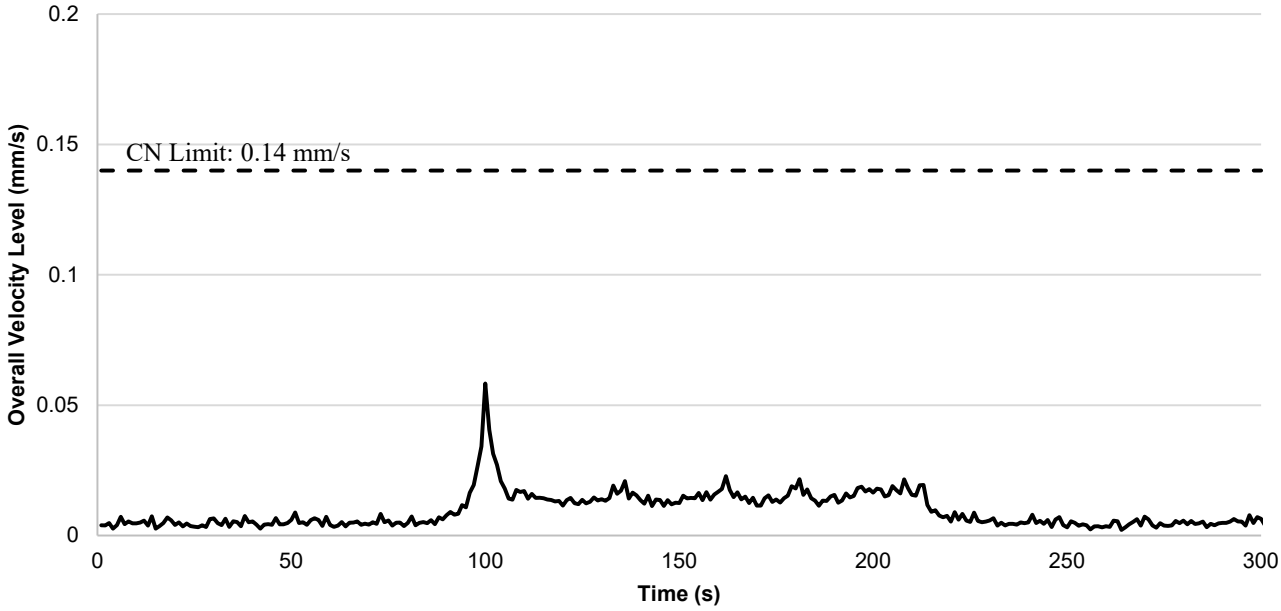
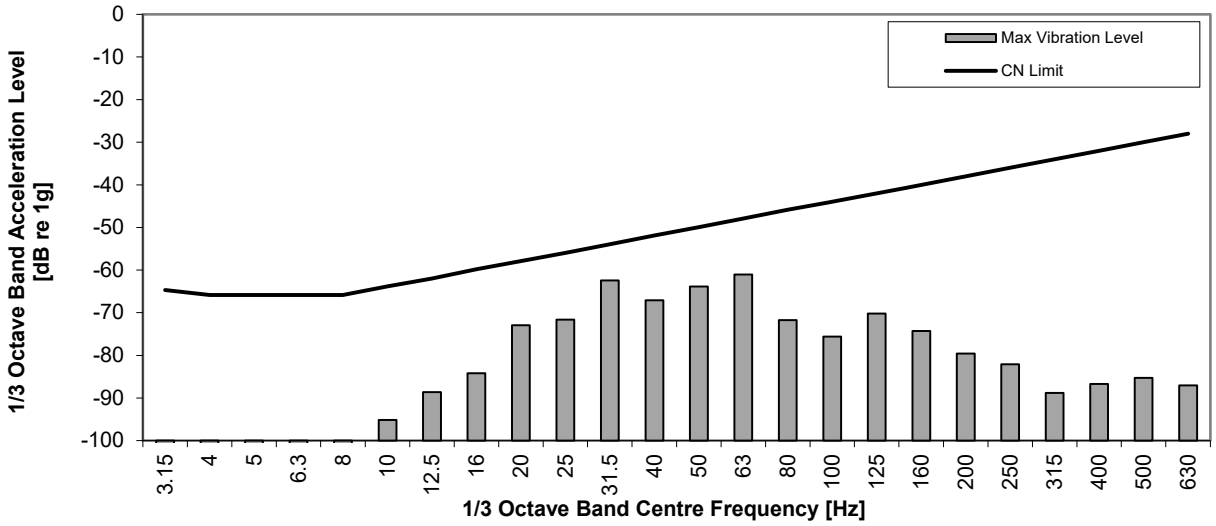


Figure 8b: Pass-by 6
Acceleration Spectrum @ Peak Level (1 sec. Duration)



Appendix A

Rail Traffic Information

Train Count Data

System Engineering
Engineering Services

1 Administration Road
Concord, ON, L4K 1B9
T: 905.669.3264
F: 905.760.3406

TRANSMITTAL

To: *Destinataire :*	HGC Engineering 2000 Argentia Road, Plaza One, Suite 203 Mississauga, ON L5N 1P7	*Project :*	KNG – 73.8– County Rd 36, Long Sault ON
Att'n:	Sheeba Paul	*Routing:*	spaul@hgcengineering.com
From: *Expéditeur :*	Michael Vallins	*Date:*	2020/03/31
Cc:	Adjacent Development CN via e-mail		

☐ Urgent ☐ For Your Use ☐ For Review ☐ For Your Information ☐ Confidential

Re: Train Traffic Data – CN Kingston Subdivision near County Rd 36 in Long Sault, ON

Please find attached the requested Train Traffic Data; The application fee in the amount of **$500.00** +HST will be invoiced.

Should you have any questions, please do not hesitate to contact the undersigned at 905-669-3264.

Sincerely,
CN Design & Construction

Michael Vallins P.Eng
Manager, Public Works- Eastern Canada
Permits.gld@cn.ca

Dear Sheeba:

Re: Train Traffic Data – CN Kingston Subdivision near County Rd 36 in Long Sault, ON

The following is provided in response to Sheeba's 2020/03/12 request for information regarding rail traffic in the vicinity of County Rd 36 in Long Sault at approximately Mile 73.8 on CN's Kingston Subdivision.

Typical daily traffic volumes are recorded below. However, traffic volumes may fluctuate due to overall economic conditions, varying traffic demands, weather conditions, track maintenance programs, statutory holidays and traffic detours that when required may be heavy although temporary. For the purpose of noise and vibration reports, train volumes must be escalated by 2.5% per annum for a 10-year period.

Typical daily traffic volumes at this site location are as follows:

***Maximum train speed is given in Miles per Hour**

	0700-2300			
Type of Train	Volumes	Max.Consist	Max. Speed	Max. Power
Freight	6	140	60	4
Way Freight	1	25	60	4
Passenger	12	10	90	2

	2300-0700			
Type of Train	Volumes	Max.Consist	Max. Speed	Max. Power
Freight	10	140	60	4
Way Freight	0	25	60	4
Passenger	1	10	90	2

The volumes recorded reflect westbound and eastbound freight and passenger operations on CN's Kingston Subdivision.

Except where anti-whistling bylaws are in effect, engine-warning whistles and bells are normally sounded at all at-grade crossings. There is one (1) at–grade crossing within the vicinity of the location at Mile 73.90 Rd 15 Xing. Anti-whistling bylaws are not in effect. Please note that engine-warning whistles may be sounded in cases of emergency, as a safety and or warning precaution at station locations and pedestrian crossings and occasionally for operating requirements.

With respect to equipment restrictions, the gross weight of the heaviest permissible car is 286,000 lbs.

The double mainline track is considered to be continuously welded rail throughout the study area.

The Canadian National Railway continues to be strongly opposed to locating developments near railway facilities and rights-of-way due to potential safety and environmental conflicts. Development adjacent to the Railway Right-of-Way is not appropriate without sound impact mitigation measures to reduce the incompatibility. For confirmation of the applicable rail noise, vibration and safety standards, Adjacent Development, Canadian National Railway Properties at Proximity@cn.ca should be contacted directly.

I trust the above information will satisfy your current request.

Sincerely,

Michael Vallins P.Eng
Manager, Public Works- Eastern Canada
Permits.gld@cn.ca

Appendix B

Road Traffic Information

Harry Cai

From: Lise Bender <lbender@sdgcounties.ca>
Sent: April-07-20 3:54 PM
To: Sheeba Paul
Subject: FW: traffic data request for Long Sault, ON
Attachments: 36-00460 7-6-2020 Speed Statistics.rtf; 36-00460 8-15-2020 Speed Statistics.rtf; 36-00460 7-6-2020 Summary Report.ods; 36-00460 8-15-2020 Summary Report.ods

Good Afternoon,

Attached are speed reports and summaries of the most recent traffic counts on County Road 36 (2018 data). We do not have day/night split reports or an option to produce them, the Day (6:00 am – 6:00 pm) and Night (6:00 pm to 6:00 am) AADT and commercial percentages have been calculated manually:

Overall AADT: 1493 Overall Commercial Percentage: 7.85
Day Time AADT: 775 Day Time Commercial Percentage: 8.15
Night Time AADT: 327 Night Time Commercial Percentage: 6.12

Regards,

Lise Bender
Design Technician
Transportation and Planning Services

United Counties of Stormont, Dundas and Glengarry
26 Pitt Street, Cornwall, ON K6J 3P2
P: (613) 932-1515 x 210
F: (613) 936-2913
E: lbender@sdgcounties.ca
W: www.sdgcounties.ca

From: Benjamin De Haan <b_dehaan@sdgcounties.ca>
Sent: Monday, April 6, 2020 6:28 PM
To: Sheeba Paul <spaul@hgcengineering.com>
Subject: RE: traffic data request for Long Sault, ON

Hi Ms. Paul

We will get this information to you shortly.

Thanks

B

From: Sheeba Paul <spaul@hgcengineering.com>
Sent: April 6, 2020 5:34 PM
To: Benjamin De Haan <b_dehaan@sdgcounties.ca>
Cc: Peter Young <peter@southstormont.ca>
Subject: FW: traffic data request for Long Sault, ON

Hello Benjamin,

Just wondering about the requested road traffic data below.

Please let me know.

Thank you.

Ms. Sheeba Paul, MEng, PEng
Senior Associate

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

From: Sheeba Paul
Sent: April-02-20 1:56 PM
To: b_dehaan@sdgcounties.ca
Subject: re: traffic data request for Long Sault, ON

Hello Benjamin,

HGC Engineering is performing a noise and vibration study a proposed residential development in Long Sault, south of the railway line and north of 36.

https://www.google.com/maps/place/Long+Sault,+South+Stormont,+ON+K0C+1P0/@45.0369114,-74.8752048,1676m/data=!3m1!1e3!4m5!3m4!1s0x4ccc22e03283b571:0xef6a2c6ec9d84332!8m2!3d45.030398!4d-74.890559

We are requesting road traffic data for the following roadway which I understand is a County Road:

-36

Typically an AADT with commercial vehicle percentages, day/night split and a speed are used in noise studies.

Thank you.

Ms. Sheeba Paul, MEng, PEng
Senior Associate

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

---

From: Joe Lilly <joe@southstormont.ca>
Sent: April-02-20 9:03 AM
To: Sheeba Paul <spaul@hgcengineering.com>
Subject: RE: traffic data request for Long Sault, ON

Hello Sheeba.

That is a county road so you could possibly check with SDG or have someone local gather the traffic counts for you.

As far as I am aware we do not have data in that detail.

Joe Lilly
Community Planner

Come see for yourself!
Township of South Stormont
2 Mille Roches Rd., P.O. Box 84
Long Sault, ON K0C 1P0
Email: joe@southstormont.ca
Office: 613-534-8889 ext. 217
Fax: 613-534-2280

Like Us On Facebook

From: Sheeba Paul <spaul@hgcengineering.com>
Sent: April 1, 2020 9:16 PM
To: Joe Lilly <joe@southstormont.ca>
Subject: FW: traffic data request for Long Sault, ON

Hello Joe,

I am forwarding this request to you since Peter is out of the office.

Please let me know if you can assist.

Ms. Sheeba Paul, MEng, PEng
Senior Associate

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

---

From: Sheeba Paul
Sent: April-01-20 9:15 PM
To: peter@southstormont.ca
Subject: RE: traffic data request for Long Sault, ON

Hello Peter

HGC Engineering is performing a noise and vibration study a proposed residential development in Long Sault, south of the railway line and north of 36.

https://www.google.com/maps/place/Long+Sault,+South+Stormont,+ON+K0C+1P0/@45.0369114,-74.8752048,1676m/data=!3m1!1e3!4m5!3m4!1s0x4ccc22e03283b571:0xef6a2c6ec9d84332!8m2!3d45.030398!4d-74.890559

We are requesting road traffic data for the following:
-36

Typically an AADT with commercial vehicle percentages, day/night split and a speed are used in noise studies.

Thank you.

Ms. Sheeba Paul, MEng, PEng
Senior Associate

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

Appendix C

CN Principal Mainline Requirements

Canadian National Railway Properties Inc.
Propriétés ferroviaires du Canadien National Inc.

277 Front Street West
Floor 8
Toronto, Ontario
M5V 2X7

Telephone: (416) 217-6961
Facsimile: (416) 217-6743

277, rue Front ouest
8e étage
Toronto (Ontario)
M5V 2X7

Téléphone: (416) 217-6961
Télécopieur: (416) 217-6743

PRINCIPAL MAIN LINE REQUIREMENTS

A. Safety setback of dwellings 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 enter into an Agreement stipulating how CN's concerns will be resolved and will pay CN's reasonable costs in preparing and negotiating the agreement.

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

March 2002

Appendix D

Sample STAMSON 5.04 Output

STAMSON 5.0 NORMAL REPORT Date: 02-10-2020 14:08:49
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: a.te Time Period: Day/Night 16/8 hours
Description: Pred. Loc. [A], Lot 24

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

Train Type	Trains (Left)	Trains (Right)	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1. Freight	4.0/6.5	4.0/6.5	97.0	4.0	140.0	Diesel	Yes
2. Way Freight	0.5/0.0	0.5/0.0	97.0	4.0	25.0	Diesel	Yes
3. Passenger	7.5/0.5	7.5/0.5	145.0	2.0	10.0	Diesel	Yes

Data for Segment # 1: CN Rail (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 : 70.00 / 70.00 m
Receiver height : 4.50 / 4.50 m
Topography : 3 (Elevated; no barrier)
Whistle Angle : 80 deg Track 1
Elevation : 2.00 m
Reference angle : 0.00

Results segment # 1: CN Rail (day)

LOCOMOTIVE (0.00 + 64.52 + 0.00) = 64.52 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.44	75.18	-9.60	-1.05	0.00	0.00	0.00	64.52

WHEEL (0.00 + 56.32 + 0.00) = 56.32 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.54	67.87	-10.30	-1.25	0.00	0.00	0.00	56.32

LEFT WHISTLE (0.00 + 57.87 + 0.00) = 57.87 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-2	80	0.44	71.58	-9.60	-4.11	0.00	0.00	0.00	57.87

RIGHT WHISTLE (0.00 + 42.53 + 0.00) = 42.53 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq

---

80 -85--0.44-71.58--9.60-19.44--0.00--0.00--0.00-42.53---

Segment Leq : 65.90 dBA

Total Leq All Segments: 65.90 dBA

Results segment # 1: CN Rail (night)

LOCOMOTIVE (0.00 + 67.65 + 0.00) = 67.65 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.44	78.30	-9.60	-1.05	0.00	0.00	0.00	67.65

WHEEL (0.00 + 60.29 + 0.00) = 60.29 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.54	71.84	-10.30	-1.25	0.00	0.00	0.00	60.29

LEFT WHISTLE (0.00 + 59.44 + 0.00) = 59.44 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-2	80	0.44	73.15	-9.60	-4.11	0.00	0.00	0.00	59.44

RIGHT WHISTLE (0.00 + 44.11 + 0.00) = 44.11 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
80	85	0.44	73.15	-9.60	-19.44	0.00	0.00	0.00	44.11

Segment Leq : 68.92 dBA

Total Leq All Segments: 68.92 dBA

Road data, segment # 1: County Rd 36 (day/night)

Car traffic volume : 1266/492 veh/TimePeriod *
Medium truck volume : 41/16 veh/TimePeriod *
Heavy truck volume : 69/27 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): 1911
Percentage of Annual Growth : 0.00

Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 3.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 72.00

Data for Segment # 1: County Rd 36 (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 : 500.00 / 500.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: County Rd 36 (day)

Source height = 1.50 m

ROAD (0.00 + 34.23 + 0.00) = 34.23 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	59.44	0.00	-23.91	-1.30	0.00	0.00	0.00	34.23

Segment Leq : 34.23 dBA

Total Leq All Segments: 34.23 dBA

Results segment # 1: County Rd 36 (night)

Source height = 1.50 m

ROAD (0.00 + 33.16 + 0.00) = 33.16 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	58.37	0.00	-23.91	-1.30	0.00	0.00	0.00	33.16

Segment Leq : 33.16 dBA

Total Leq All Segments: 33.16 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.90
(NIGHT): 68.92

STAMSON 5.0 NORMAL REPORT Date: 02-10-2020 14:10:38
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: aola.te Time Period: 16 hours
Description: OLA of Pred. Loc. [A], Lot 24 backyard unmitigated

Rail data, segment # 1: CN Rail

Train ! Trains ! Speed !# loc !# Cars! Eng !Cont
Type ! !(km/h) !/Train!/Train! type !weld
---+---+---+---+---+---+---
1. Freight ! 8.0/13.0 ! 97.0 ! 4.0 !140.0 !Diesel! Yes
2. Way Freight ! 1.0/0.0 ! 97.0 ! 4.0 ! 25.0 !Diesel! Yes
3. Passenger ! 15.0/1.0 ! 145.0 ! 2.0 ! 10.0 !Diesel! Yes

Data for Segment # 1: CN Rail

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 70.00 m
Receiver height : 1.50 m
Topography : 3 (Elevated; no barrier)
No Whistle
Elevation : 2.00 m
Reference angle : 0.00

Results segment # 1: CN Rail

LOCOMOTIVE (0.00 + 63.75 + 0.00) = 63.75 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.52 75.18 -10.20 -1.22 0.00 0.00 0.00 63.75

WHEEL (0.00 + 55.56 + 0.00) = 55.56 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.63 67.87 -10.90 -1.41 0.00 0.00 0.00 55.56

Segment Leq : 64.36 dBA

Total Leq All Segments: 64.36 dBA

Road data, segment # 1: County Rd 36

Car traffic volume : 1266 veh/TimePeriod *

Medium truck volume : 41 veh/TimePeriod *
Heavy truck volume : 69 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: County Rd 36

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 500.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: County Rd 36

Source height = 1.50 m

ROAD (0.00 + 32.71 + 0.00) = 32.71 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	59.44	0.00	-25.28	-1.46	0.00	0.00	0.00	32.71

Segment Leq : 32.71 dBA

Total Leq All Segments: 32.71 dBA

TOTAL Leq FROM ALL SOURCES: 64.36

STAMSON 5.0 NORMAL REPORT Date: 02-10-2020 14:11:12
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: aola_m.te Time Period: 16 hours
Description: OLA of Pred. Loc. [A], Lot 24 backyard mitigated

Rail data, segment # 1: CN Rail

Train ! Trains ! Speed !# loc !# Cars! Eng !Cont
Type ! !(km/h) !/Train!/Train! type !weld
---+---+---+---+---+---+---
1. Freight ! 8.0/13.0 ! 97.0 ! 4.0 !140.0 !Diesel! Yes
2. Way Freight ! 1.0/0.0 ! 97.0 ! 4.0 ! 25.0 !Diesel! Yes
3. Passenger ! 15.0/1.0 ! 145.0 ! 2.0 ! 10.0 !Diesel! Yes

Data for Segment # 1: CN Rail

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 65.00 m
Receiver height : 1.50 m
Topography : 4 (Elevated; with barrier)
No Whistle
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 5.50 m
Elevation : 2.00 m
Barrier receiver distance : 50.00 m
Source elevation : 2.00 m
Receiver elevation : 0.00 m
Barrier elevation : 1.00 m
Reference angle : 0.00

Results segment # 1: CN Rail

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
4.00 ! 1.50 ! 3.96 ! 4.96
0.50 ! 1.50 ! 1.27 ! 2.27

LOCOMOTIVE (0.00 + 59.58 + 0.00) = 59.58 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.19 75.18 -7.61 -0.52 0.00 0.00 -7.46 59.58

WHEEL (0.00 + 46.11 + 0.00) = 46.11 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.30	67.87	-8.28	-0.77	0.00	0.00	-12.71	46.11

Segment Leq : 59.77 dBA

Total Leq All Segments: 59.77 dBA

Road data, segment # 1: County Rd 36

Car traffic volume : 1266 veh/TimePeriod *
Medium truck volume : 41 veh/TimePeriod *
Heavy truck volume : 69 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: County Rd 36

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 500.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: County Rd 36

Source height = 1.50 m

ROAD (0.00 + 32.71 + 0.00) = 32.71 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	59.44	0.00	-25.28	-1.46	0.00	0.00	0.00	32.71

Segment Leq : 32.71 dBA

Total Leq All Segments: 32.71 dBA

TOTAL Leq FROM ALL SOURCES: 59.78