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Noise and Vibration Feasibility Study
Proposed Residential Development
Beck and Charles Street
Baden, ON

Prepared for:

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1 Introduction and Summary

HGC Engineering was retained by Schnurr Home Buildings Inc. to conduct a noise and vibration feasibility study for a proposed residential development located at Beck and Charles Street in Baden, Township of Wilmot, Ontario. The residential development will consist of 4 townhouse blocks. The study is required by the Regional Municipality of Waterloo (RMOW) and Canadian National Railway (CN) as part of the planning and approvals process.

This study is an update of the previous study, dated March 10, 2025, to include an updated site plan and to address peer review comments received from the Township of Wilmot, which are attached as Appendix G with HGC responses.

The primary source of noise is rail traffic on the CN railway line. Secondary sources of noise are road traffic on Synder's Road and Foundry Street. Rail traffic data was obtained from CN personnel and vibration monitoring data. Road traffic data was obtained from the RMOW. Rail and road traffic data was used to predict future traffic sound levels at the proposed building façades and outdoor living areas. The predicted sound levels were compared to the guidelines of the RMOW, CN Railway, and the Ministry of Environment, Conservation and Parks (MECP) 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. Central air conditioning is required for all proposed blocks. Upgraded building construction will also be required for the north/east/west facades of Blocks 1 and 2 that have exposure to the railway. A minimum of 300 mm thick foundation walls are also recommended for the north/east/west façades of Blocks 1 and 2. Noise warning clauses are also required for those units to inform future occupants of the traffic noise impacts and proximity to existing commercial/industrial uses.

2 Site Description and Noise Sources

Figure 1 is a key plan indicating the location of the proposed site. The site is located south of Beck Street and west of Mill Street. Figure 2 shows the site plan by MHBC dated December 15, 2025. The proposed development will consist of 3 blocks of townhouses with ground-level parking.

HGC Engineering personnel visited the site on July 7, 2023 to make observations of the acoustical environment and to conduct vibration measurements. During the site visit, it was noted that the primary source of noise impacting the site was rail traffic on the CN Guelph subdivision line to the north. Traffic volume and sound emissions from local roads, such as Beck Street, Charles Street, and Mill Street, were observed to be negligible.

Nearby Area

The site is currently vacant. It is noted that the site was previously used as part of a feed mill operation and contained a grain silo structure. The silo has since then been demolished, and the feed mill operation has been reduced to a separate area southeast of the site. The area around the site is mostly flat. There are existing single detached dwellings immediately east and west of the site. To the immediate north of the site is a warehousing building used for feed storage and shop (72 Beck Street, owned by Pestell Pet Products) and a single detached dwelling. To the south of the site are single detached dwellings and a feed packaging facility (Turtle Mountain Seed, formally as Baden Grain).

Nearby Storage Facility to the North

The facility, located at 72 Beck Street, is operated by Pestell Pet Products as a storage facility, occasionally accessed once or twice a month during daytime hours only. Due to the proximity of this facility to the proposed development, a stationary source assessment was conducted and detailed in Section 6 to assess the worst-case scenario of noise emissions from this facility.

Nearby Feed Packaging Facility to the South

Sound emissions of the feed packaging facility were found to be negligible at the site area. Based on information from Turtle Mountain Seed personnel and a tour of the facility, the facility operates during daytime hours only (8:00 to 15:00), taking loose feed as input and outputs packaged bird feed. The facility receives up to 4 trucks a day, arriving from Charles Street to an area south of the facility and away from the proposed development, where loading and unloading occurs. The facility features forklifts and indoor tanker blowers that primarily operate in the loading/unloading area, and indoor dust collectors venting outwards on the south façade.

It is noted that the multi-storey industrial structure directly south of the proposed townhouse Block 3

is vacant and no longer used for feed facility operations. A letter confirming the vacancy of this structure is included in Appendix E from the facility owner. The westernmost portion of the feed facility that is in use, and closest to the proposed development, is a storage room for packaged feed products with two overhead doors facing north that can be kept open for ventilation in summer weather. Sound emissions from the doors were not observed to be significant due to lack of indoor activities. There are existing dwellings adjacent to the feed facility on Charles Street and Mill Street. Nevertheless, it is recommended that a noise warning clause to identify that such commercial/industrial uses may be audible at times be included in the property and tenancy agreements.

3 Traffic Noise and Vibration Level Criteria

3.1 Road and Rail Traffic Noise

Guidelines for acceptable levels of road and rail traffic noise impacting residential developments are given in the 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 Railway Association of Canada/Federation of Canadian Municipalities (FCM/RAC) "Report Research Phase 3: Proximity Guidelines and Best Practices" dated November 2006 and Guidelines for New Development in Proximity to Railway Operations dated May 2013 and the RMOW Implementation Guideline for Noise Policies dated October 2019 were also reviewed.

The values in Table I are energy equivalent (average) sound levels [L_{EQ}] in units of A-weighted decibels [dBA].

Table I: MECP Traffic Noise Criteria (dBA)

Area	Daytime L_{EQ} (16 hour) Road / Rail	Nighttime L_{EQ}(8 hour) Road / Rail
Outdoor Living Area	55 dBA	--
Inside Living/Dining Rooms	45 dBA / 40 dBA	45 dBA / 45 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.

A central air conditioning system as an alternative means of ventilation to open windows is required for dwellings where nighttime sound levels outside bedroom/living/dining room windows exceed 60 dBA or daytime sound levels outside bedroom/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 are in the range of 51 to 60 dBA or when daytime sound levels 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. The indoor sound level limits for rail noise sources are 5 dB more stringent than for road sources, to account for the additional low-frequency (rumble) components of locomotives, hence the façade insulation requirements are calculated separately and then combined. The indoor criteria in Table 1 for rail traffic include sounds from train whistles.

MECP guidelines recommend exterior walls built with a brick veneer or a masonry equivalent construction from foundation to rafters as a minimum construction for any first row of dwellings adjacent to the CN right-of-way when the rail traffic Leq (24-hour), estimated at a location of a

nighttime receptor, is greater than 60 dBA, and when the first row of dwellings is within 100 metres of the tracks. 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.

3.2 Ground-borne Vibration from Rail Traffic

CN guidelines require measurements of ground-borne vibration when residential dwelling units are to be located within 75 metres of a principal mainline such as the CN Guelph Subdivision.

Vibration is typically measured in terms of oscillatory velocity or acceleration. The limits for acceptable ground-borne vibration are an RMS velocity of 0.14 mm/s (-17 dB re 1 mm/s) between frequencies of 4 and 200 Hz.

CN limits for acceptable ground-borne vibration are also presented as a curve of maximum allowable vibratory acceleration levels, in units of decibels relative to the acceleration due to gravity (dB re 1g), versus one-third octave band frequency.

4 Traffic Noise Assessment

4.1 Rail Traffic Data

Rail traffic data for the CN Guelph Subdivision was obtained from previous HGC Engineering project files, existing data from CN personnel for Guelph Subdivision in another location in Baden, and vibration monitoring data. The higher volume and speed values for the above sources were used as a conservative approach. In addition, one way freight train and one passenger train were also included during the night as a worst-case scenario, to assess nighttime sound levels in the rare case of late trains. This line is used for way freight and passenger operations and is classified as a principal mainline track. The railway is continuously welded. The maximum permissible train speed in the area of the site is 88 km/h (55 mi/h) for the 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 2036 using a 2.5% per year growth rate. Table II summarises the rail traffic data used in the analysis.

Table II: Rail Traffic Data Projected to Year 2036

Type of Train	Number of Trains Day/ Night	Number of locomotives	Number of cars	Max Speed (KPH)
Way Freight	5.9 / 1.5	4	25	88
Passenger	4.5 / 1.5	2	10	88

4.2 Road Traffic Data

Traffic data for Synder's Road and Foundry Street was obtained from the Regional Municipality of Waterloo in the form of forecasted Average Annual Daily Traffic (AADT) traffic values, and is provided in Appendix C. Forecasted volumes of 8 100 and 7 347 vehicles per day were applied for Synder's Road and Foundry Street, respectively, both at an operating speed limit of 50 km/h. For Synder's Road, commercial vehicle percentages of 1.3 % for medium trucks and 2.4 % for heavy trucks were applied. For Foundry Street, a commercial vehicle percentage of 3.9 % for medium trucks and 1.4 % for heavy trucks were applied. A day/night split of 90 % / 10 % was used.

Table III summarizes the traffic volume data used in this study.

Table III: Forecasted Road Traffic Data

Road Name		Cars	Medium Trucks	Heavy Trucks	Total
Synder's Road	Daytime	7 020	95	175	7 290
	Nighttime	780	11	19	810
	Total	**7 800**	**105**	**194**	**8 100**
Foundry Street	Daytime	6 262	258	93	6 612
	Nighttime	696	29	10	735
	Total	**6 968**	**287**	**103**	**7 347**

4.3 Traffic Noise Predictions

To assess the levels of 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 B. Train whistle noise was included in the predictions at the building facades to determine indoor sound levels.

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 or 3rd 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 site plan prediction locations. The results of these predictions are summarized in Tables IV and V.

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

Prediction Location	Description	Daytime at Facade $L_{EQ-16\ hr}$		Daytime at Façade Total $L_{EQ-16\ hr}$	Daytime in the OLA Total $L_{EQ-16\ hr}$
		Road	Rail		
[A]	Block 2, façade facing railway	<55	62	62	--
[B]	Block 1, façade facing railway	<55	62	62	
[C]	Block 2, façade flanking railway	<55	59	60	--
[D]	Block 3, façade facing Mill St	<55	57	57	<55

Note: Train whistle noise included in façade sound levels

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

Prediction Location	Description	Nighttime at Facade $L_{EQ-8\ hr}$		Nighttime at Façade Total $L_{EQ-8\ hr}$
		Road	Rail	
[A]	Block 2, façade facing railway	<50	60	60
[B]	Block 1, façade facing railway	<50	60	60
[C]	Block 2, façade flanking railway	<50	57	57
[D]	Block 3, façade facing Mill St	<50	54	54

Note: Train whistle noise included in façade sound levels

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

The back-to-back units in Blocks 1 and 2 do not include rear yards.

The predicted daytime sound level in the rear yards of Block 3 townhouses is within the MECP guideline limit of 55 dBA. No physical mitigation is required.

There are no other common outdoor amenity areas indicated on the site plan. Rooftop terraces are not proposed for this development. The proposed balconies will be less than 4 m in depth, and thus are excluded from noise traffic assessment as per the MECP guidelines.

5.2 Minimum Setback Distance

CN guidelines stipulate a minimum setback distance of 30 m between new dwellings and the principal line right of way. The proposed development plans conform to the setback requirement as the nearest proposed dwelling façade is located more than 30 m way from the rail right-of-way.

5.3 Indoor Living Areas and Ventilation Requirements

Central Air Conditioning

Based on proximity and exposure to the rail line, mandatory central air conditioning is recommended for all dwellings. 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 north/east/west façades of Blocks 1 and 2 facing the railway will exceed 60 dBA during daytime and 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.

Exterior Wall Construction

According to CN guidelines, for proposed dwellings in the first row and with exposure to the railway line, a minimum of brick veneer or masonry equivalent construction for the exterior walls from the foundation to rafters is required. The proposed dwellings can be considered as the first row of

dwellings relative to the rail line. As such, the proposed dwellings require brick veneer or masonry equivalent exterior wall construction on the north/east/west façades of Blocks 1 and 2.

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

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 (windows and walls) and the floor area of the adjacent room.

Table VI: Preliminary Glazing STC Requirements

Block No.	Description	Space	Preliminary STC Glazing Requirements
1 & 2	North/east/west façades	+Living/Dining	STC-30
		+Bedroom	STC-30
1 & 2	South façade	+Living/Dining	OBC
		+Bedroom	OBC
3	All façades	+Living/Dining	OBC
		+Bedroom	OBC

Notes: OBC – Ontario Building Code
+ 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.

Sample window assemblies which may achieve the STC requirements are summarized in Table VII 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 VI 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 VII: Glazing Assemblies for STC Requirements

STC Requirement	Glazing Configuration (STC)
28 – 29	Any double-glazed unit
30 – 31	3(13)3

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

Further Analysis

When detailed floor plans and building elevations are available for the dwelling units in Blocks 1 & 2, window glazing construction should be refined based on actual window to floor area ratios.

5.5 Assessment of Ground-borne Vibration from Rail Traffic

Measurements were performed on the site at grade, at approximately 70 m from the railway right-of-way (at the footprint of Block 2 that is close to the at-grade crossing at Mill Street). Unattended vibration measurements using a Svantek 977 Sound Level Meter with a Wilcoxon Research type 793V velocity transducer was left at the site from July 7 to July 10, 2023. The equipment specifications meet the FCM/RAC vibration equipment requirements. Technical specifications of the transducers are included in Appendix E.

Vibration was measured in the vertical axis and is the dominant component in the transmission of ground-borne vibration in buildings. The results of the measurements are presented in Table VIII showing the maximum vibration level measurements during six representative train pass-bys, including the worst-case measured pass-by. Figures 4 to 9 show the pass-bys of the trains.

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

Train Pass-by	Train Type	70 m from right of way (mm/s)	Criteria (mm/s)
1	Passenger	0.06	0.14
2	Way Freight	0.14	
3	Passenger	0.08	
4	Passenger	0.07	
5	Way Freight	0.12	
6	Way Freight	0.13	

The results indicate that vibration levels are generally below the CN criteria of 0.14 mm/s, with the exception of one measured pass-by. A marginal exceedance of the CN limits by 0.003 mm/s occurred, as shown in Figure 5a and 5b. The excess is noted to be brief and uncommon among the other measured pass-bys.

Nevertheless, it is recommended that the thickness of the foundation walls be increased to 300 mm for the north/east/west façades of Blocks 1 and 2. Additionally, a resilient layer is recommended to be incorporated in the vibration isolation design consistent with Section 3.5.2.1 of the FCM/RAC guidelines[1], to line the outside of the foundation walls, as discussed in Town of Wilmot's comments.

6 Stationary Noise Impact of Industry to the North

Noise sources associated with industrial and commercial/industrial facilities, such as the storage facility at 72 Beck Street, are assessed separately from traffic sources under MECP guidelines. These facilities are considered to be Stationary Sources of Sound and criteria for their assessment are contained in the following sections.

6.1 Criteria Governing Stationary Sources

The proposed development is located in an urban acoustical environment classified as Class 2 according to MECP guidelines, which can be characterized by the background sound level being dominated by traffic and human activity during daytime hours.

1 The Railway Association of Canada/Federation of Canadian Municipalities (FCM/RAC), Guidelines for New Development in Proximity to Railway Operations dated May 2013

The façade of a residence, or any associated usable outdoor area, is considered a sensitive point of reception. NPC-300 stipulates that the exclusionary minimum sound level limit for a stationary noise source in an urban Class 2 area is 50 dBA during daytime hours (07:00 to 19:00) and evening hours (19:00 to 23:00), and 45 dBA during nighttime hours (23:00 to 07:00) at a plane of window, and is 50 dBA during daytime hours and 45 dBA evening hours . If the background sound levels due to road traffic exceed the exclusionary minimum limits, then the background sound level becomes the criterion. The background sound level is defined as the sound level that is present when the stationary source under consideration is not operating, and may include traffic noise and natural sounds. Based on site observations, the background sound levels at the proposed building and surrounding residences can be as low as the exclusionary minimum levels. As such, the exclusionary minimum criteria at all receptors will be adopted.

Commercial activities such as the occasional movement of customer vehicles, occasional deliveries, and garbage collection are not of themselves considered to be significant noise sources in the MECP guidelines. Accordingly, these sources have not been considered in this study. Noise from safety equipment (e.g. back-up beepers) are also exempt from consideration.

The MECP guidelines stipulate that the sound level impact during a “predicable worst case hour” be considered. This is defined to be an hour when a typically busy “planned and predictable mode of operation” occurs at the subject facility, coincident with a period of minimal background sound. Compliance with MECP criteria generally results in acceptable levels of sound at residential receptors although there may still be residual audibility during periods of low background sound.

6.2 Stationary Source Noise Predictions

Predictive noise modelling was used to assess the sound impact of the storage facility at 72 Beck Street at the most critically impacted façades of the proposed development in accordance with MECP guidelines. The prediction model was constructed based on a review of the proposed site plan, site visit observations, correspondence with the facility owner, satellite aerial photos, and estimates of sound emission levels of stationary sources taken from similar past HGC Engineering project files. Correspondence with the facility owner is included in Appendix E.

This assessment considers the sound emissions from trucking and loading activities at storage facility

at 72 Beck Street.

Table IX: Source Sound Power Levels of 72 Beck Street [dB re 10-12 W]

Source	Octave Band Centre Frequency [Hz]								Overall [dBA]
	63	125	250	500	1k	2k	4k	8k	
Straight truck accelerating	108	90	92	90	94	91	84	77	97
Idling straight truck	91	87	89	84	91	88	79	71	94
Forklift	99	95	91	91	91	88	82	76	95

The above data were inputted into a predictive computer model. The software used for this purpose (*Cadna-A version 2025*) is a computer implementation of ISO Standard 9613-2.2 "Acoustics - Attenuation of Sound During Propagation Outdoors." The ISO method accounts for reduction in sound level with distance due to geometrical spreading, air absorption, ground attenuation and acoustical shielding by intervening structures such as buildings and barriers. Details of the CADNA/A modelling process and sample calculations are provided in Appendix F.

In this impact assessment, we have considered typical worst-case (busiest hour) scenarios for each time period to be as follows:

- Based on information from the facility owner, trucks visit the facility once or twice a month. As such, one straight (box) truck was assumed to enter and exit the facility, idling for 15 minutes at the loading doors during daytime and evening hours.
- While all products are stored indoors, an outdoor forklift was assumed to operate around the building for 15 minutes during daytime and evening hours as a conservative approach.
- Locations of the stationary sources of noise are shown on Figure 10.

6.3 Results

The unmitigated sound levels due to stationary noise sources associated with the nearby commercial/industrial facilities at the proposed buildings are summarized in Table X and presented graphically in Figure 11, showing the maximum sound levels across all floors on the façades.

Table X: Predicted Sound Levels on the Proposed Residential Building [dBA]

	Daytime/Evening (07:00 – 23:00)	Criteria
Blocks 1 & 2, north façades facing railway	48	50
Blocks 1 & 2, east and west facades flanking railway	46	
Blocks 1 & 2, south facades	<30	
Block 3, all façades	37	
Block 3 rear yard OLA	33	45*

Note: Sound level criteria during evening hours of OLA's is shown, since criteria for evening hours are more stringent than those for daytime hours.

The results of the calculations indicate that the predicted sound levels due to the operation of the storage facility are within MECP limits at the proposed residential buildings during a worst-case operational scenario. Mitigation is not required.

7 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 units with anticipated traffic sound level excesses. The following noise warning clauses are required for specific dwellings as indicated in Table IX.

Suggested wording for future dwellings which have sound levels in excess of MECP criteria is given below.

A):
Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road and rail traffic may 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 central air conditioning to be installed is given below.

B):
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 dwelling units in close proximity to commercial buildings is given below.

C):

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

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.

D):

Warning: Canadian National Railway 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.

8 Summary and Recommendations

The results of the study indicate that the proposed development is feasible with the noise control measures described in this report. The following list and Table XI 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. Central air conditioning systems are required for all blocks.

2. Upgraded exterior wall and glazing constructions are required for the north/east/west façades of Blocks 1 and 2, as noted in Section 5.4. When detailed floor plans and building elevations

are available for the dwelling units in Blocks 1 and 2, window glazing construction should be refined on actual window to floor ratios.

3. A minimum of 300 mm thick foundation walls are required for the north/east/west façades of Blocks 1 and 2. A resilient layer lining the outside of the foundation walls is recommended.

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

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

Description	Acoustic Barrier	Ventilation Requirements*	Type of Warning Clause	Minimum 300mm Thick Foundation	Brick Veneer or Masonry Equivalent Exterior Wall	Upgraded Glazing Constructions
Block 1 & 2, north/east/west façade	--	Central A/C	A, B, C, D	✓	✓	LR/DR: STC-30 BR: STC-30
Block 1 & 2, south facade	--			--	--	OBC
Block 3	--	Central A/C	A, B, C, D	--	--	OBC

Notes:
* The location, installation and sound rating of the air conditioning condensers must be compliant with MECP Guideline NPC-300, as applicable.
-- No specific requirements
OBC – Ontario Building Code
LR/DR – Living Room/Dining Room, BR – Bedroom

8.1 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 for Blocks 1 and 2.

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 installed and constructed.

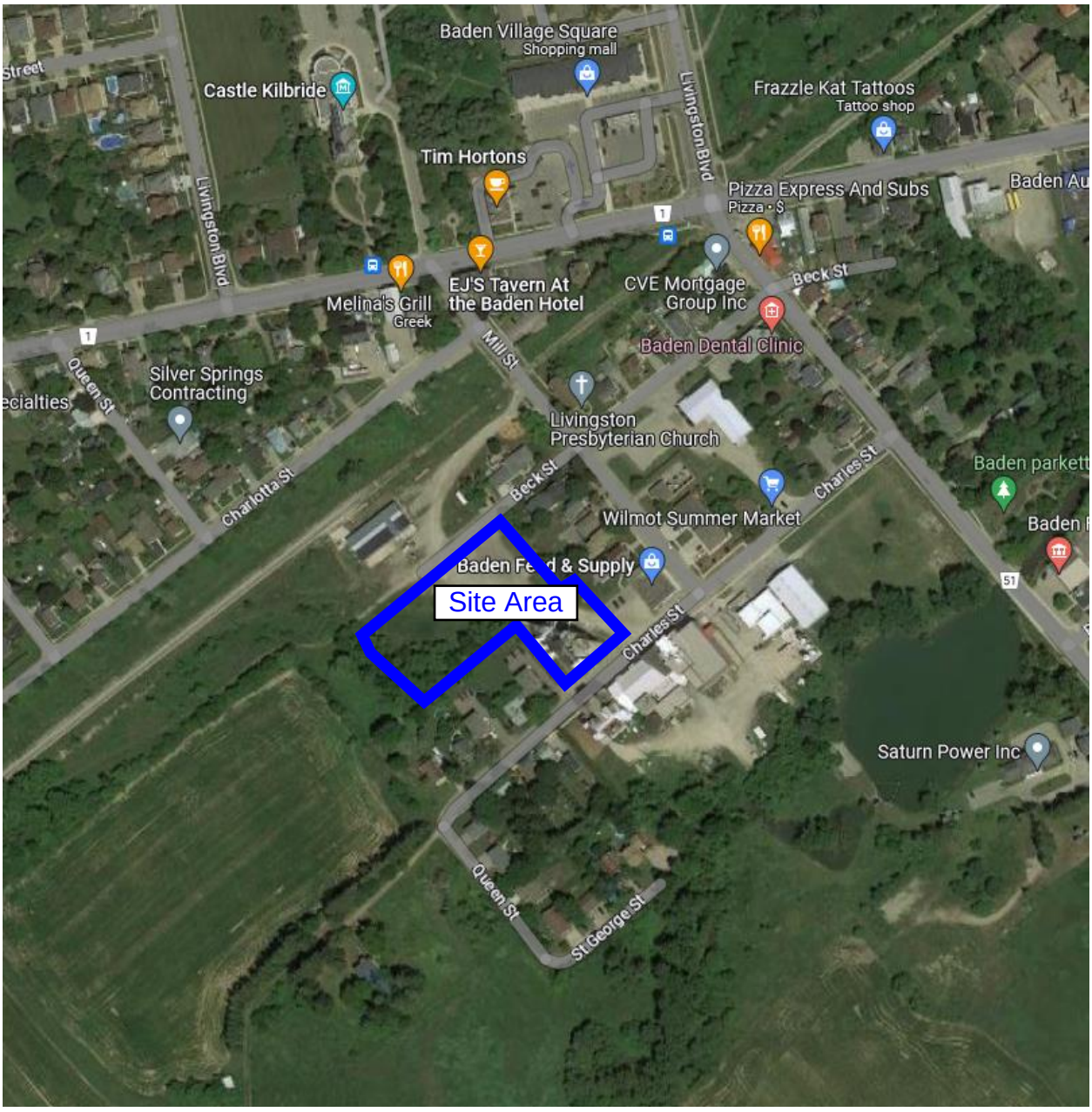


Figure 1: Key Plan

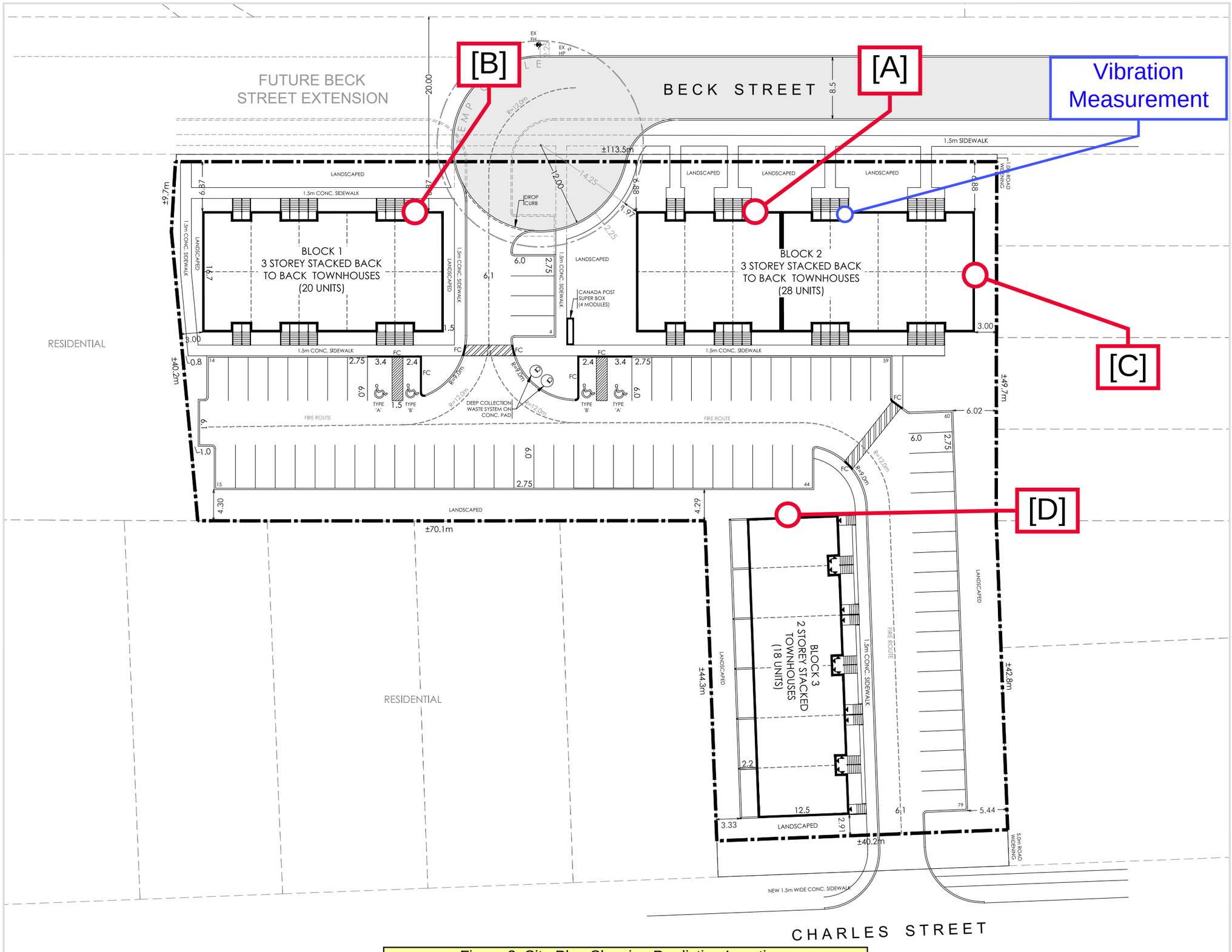


Figure 2: Site Plan Showing Prediction Locations

Concept Plan

67 Beck Street
Baden, ON
Township of Wilmot

LEGEND

Subject Lands

Zoning Summary (Z4-xx) ***Stacked Townhouses*** Township of Wilmot Zoning By-law		
	Required (min)	Provided
Lot Area	6,720m²	±7,341.2m²
Density (max.)	n/a	*90 upha = 66 units
Lot Width	30.0m	113.5m
Front Yard (Beck Street)	7.6m	*6.8m
Int. Side Yard	1/2 Height Building = 6.0m	*1.0m
Rear Side Yard (Charles St)	6.0m	*2.9m
Lot Coverage(max.)	30% (2,202.4 m²)	26.6% (1,956m²)
Building Height (max.)	10.5m	*12.0m
Off Street Parking	2.5 spaces/unit (165 spaces)	79 spaces (1.2 spaces/unit)
Barrier Free Parking	4% of Required Parking 79x4% = 4 spaces	4 spaces
TOTAL UNITS - 66		

*Requires special provisions

DATE Dec. 15, 2025

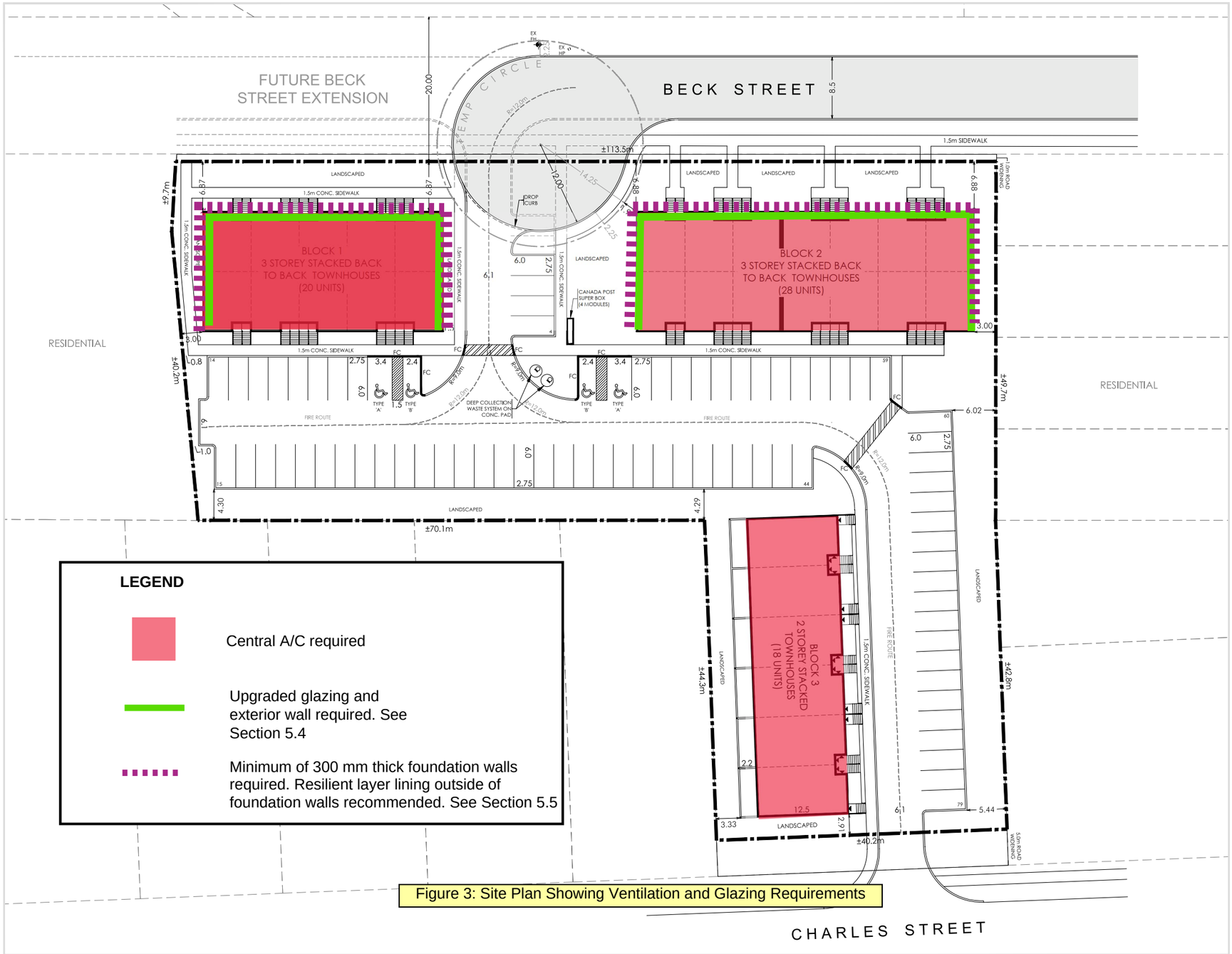
SCALE 1:500

DRAWN LC/CAC

FILE 21294B

K:\21294B-76 MILL ST-BADEN\CP\CP4_15DEC2025.DWG

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE
200-540 BINGEMANS CENTRE DR. KITCHENER, ON, N2B 3X9
P: 519.576.3650 F: 519.576.0121 | WWW.MHBCPLAN.COM



LEGEND

Central A/C required

Upgraded glazing and exterior wall required. See Section 5.4

Minimum of 300 mm thick foundation walls required. Resilient layer lining outside of foundation walls recommended. See Section 5.5

Figure 3: Site Plan Showing Ventilation and Glazing Requirements

Concept Plan

67 Beck Street
Baden, ON
Township of Wilmot

LEGEND

Subject Lands

Zoning Summary (Z4-xx) ***Stacked Townhouses***
Township of Wilmot Zoning By-law

	Required (min)	Provided
Lot Area	6,720m²	±7,341.2m²
Density (max.)	n/a	*90 upha = 66 units
Lot Width	30.0m	113.5m
Front Yard (Beck Street)	7.6m	*6.8m
Int. Side Yard	1/2 Height Building = 6.0m	*1.0m
Rear Side Yard (Charles St)	6.0m	*2.9m
Lot Coverage(max.)	30% (2,202.4 m²)	26.6% (1,956m²)
Building Height (max.)	10.5m	*12.0m
Off Street Parking	2.5 spaces/unit (165 spaces)	79 spaces (1.2 spaces/unit)
Barrier Free Parking	4% of Required Parking 79x4% = 4 spaces	4 spaces
TOTAL UNITS - 66		

*Requires special provisions

DATE Dec. 15, 2025

SCALE 1:500

DRAWN LC/CAC

FILE 21294B

north

K:\21294B-76 MILL ST-BADEN\CP\CP4_15DEC2025.DWG

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE
200-540 BINGEMANS CENTRE DR. KITCHENER, ON, N2B 3X9
P: 519.576.3650 F: 519.576.0121 | WWW.MHBCPLAN.COM

Figure 4a: Pass-by 1 at Closest Building Footprint
Measured Vibratory Velocity Level

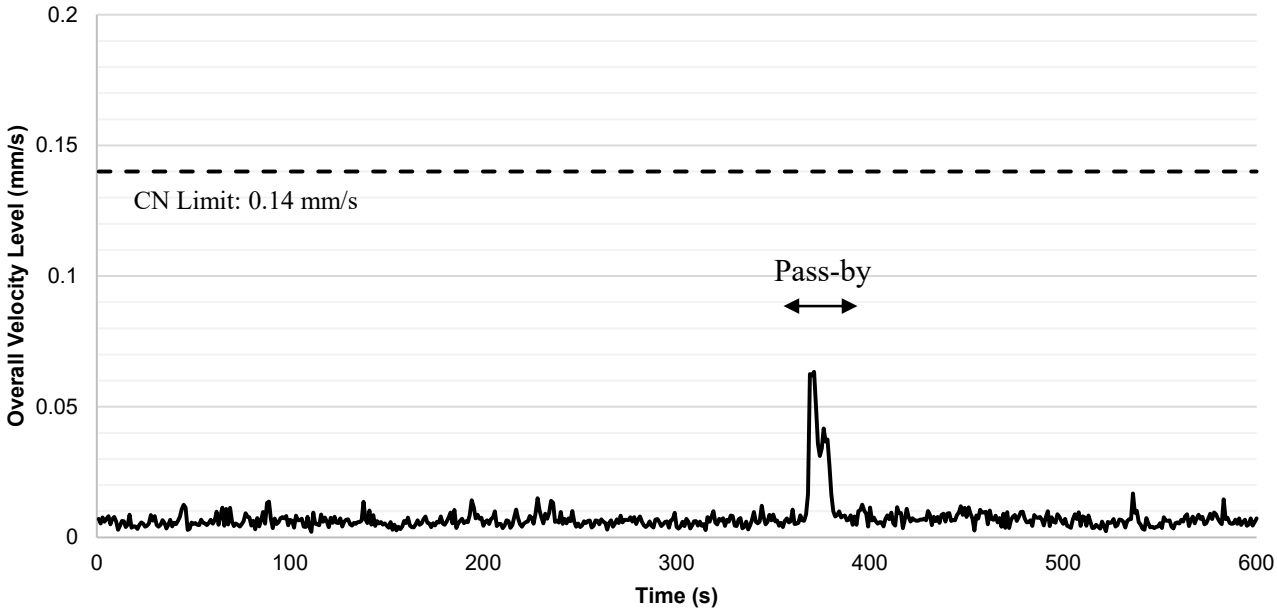


Figure 4b: Pass-by 1
Acceleration Spectrum @ Peak Level (1 sec. Duration)

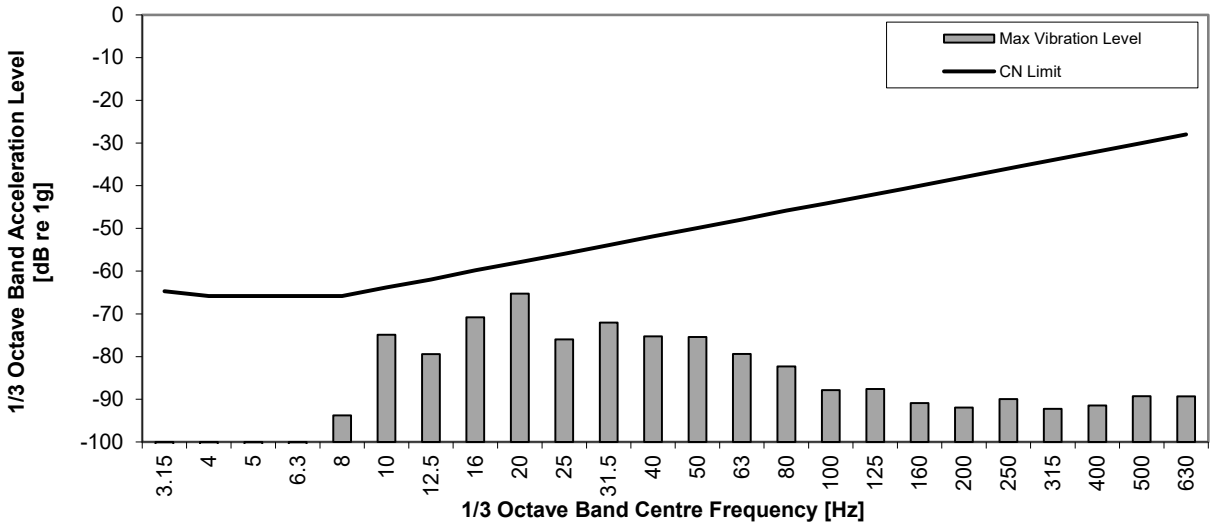


Figure 5a: Pass-by 2 at Closest Building Footprint
Measured Vibratory Velocity Level

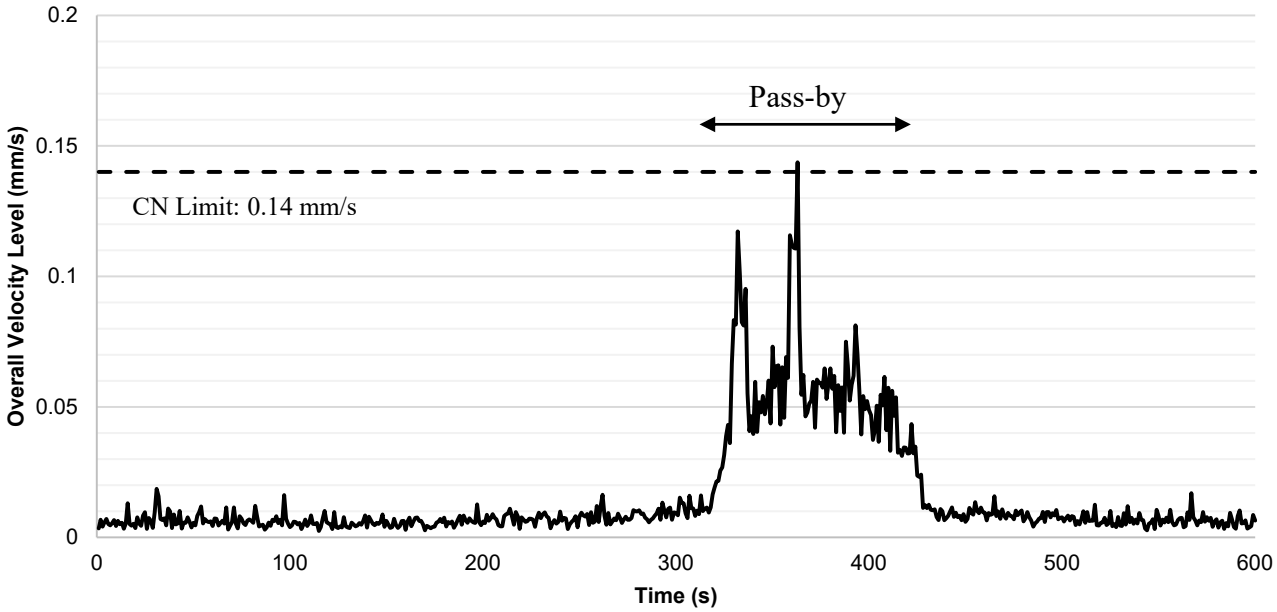


Figure 5b: Pass-by 2
Acceleration Spectrum @ Peak Level (1 sec. Duration)

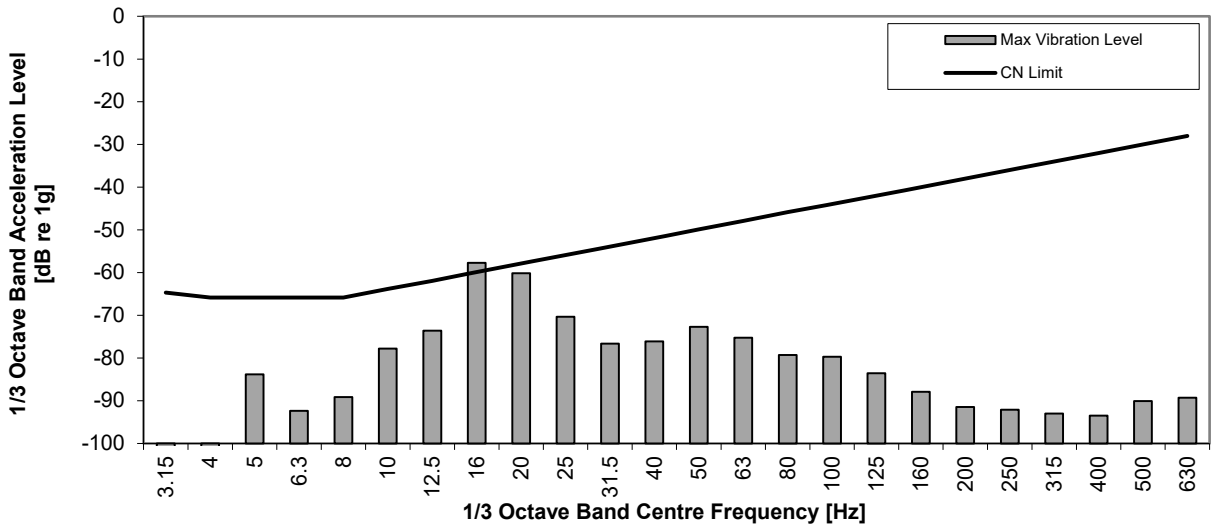


Figure 6a: Pass-by 3 at Closest Building Footprint
Measured Vibratory Velocity Level

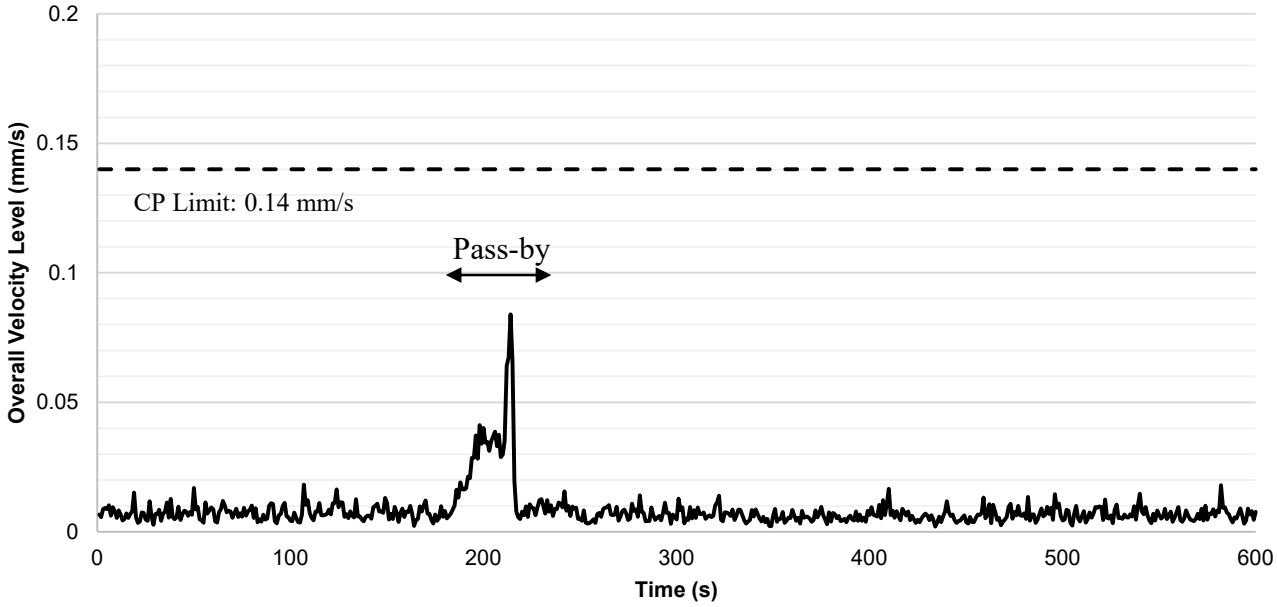


Figure 6b: Pass-by 3
Acceleration Spectrum @ Peak Level (1 sec. Duration)

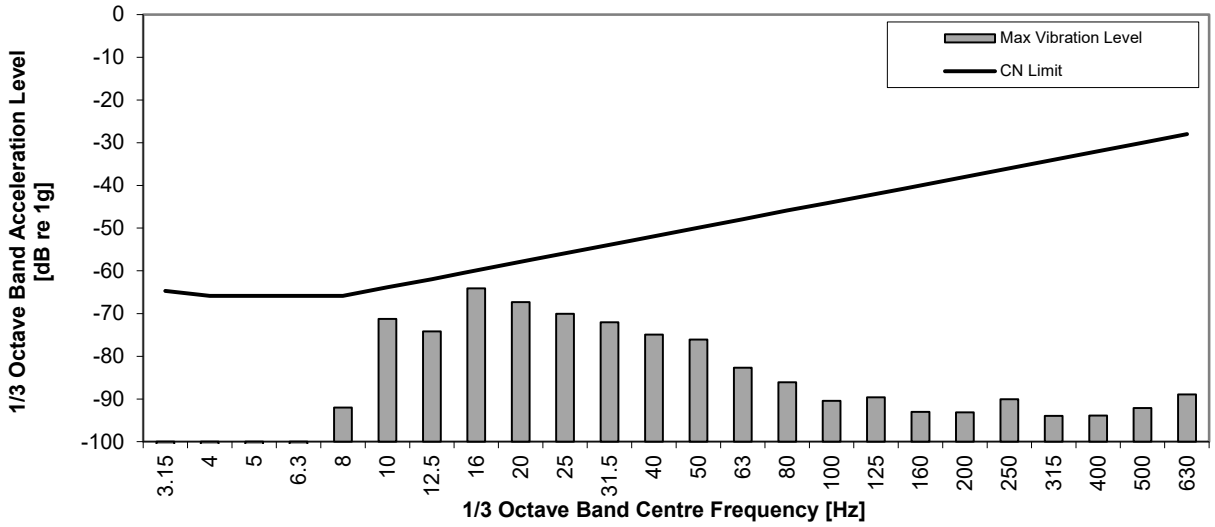


Figure 7a: Pass-by 4 at Closest Building Footprint
Measured Vibratory Velocity Level

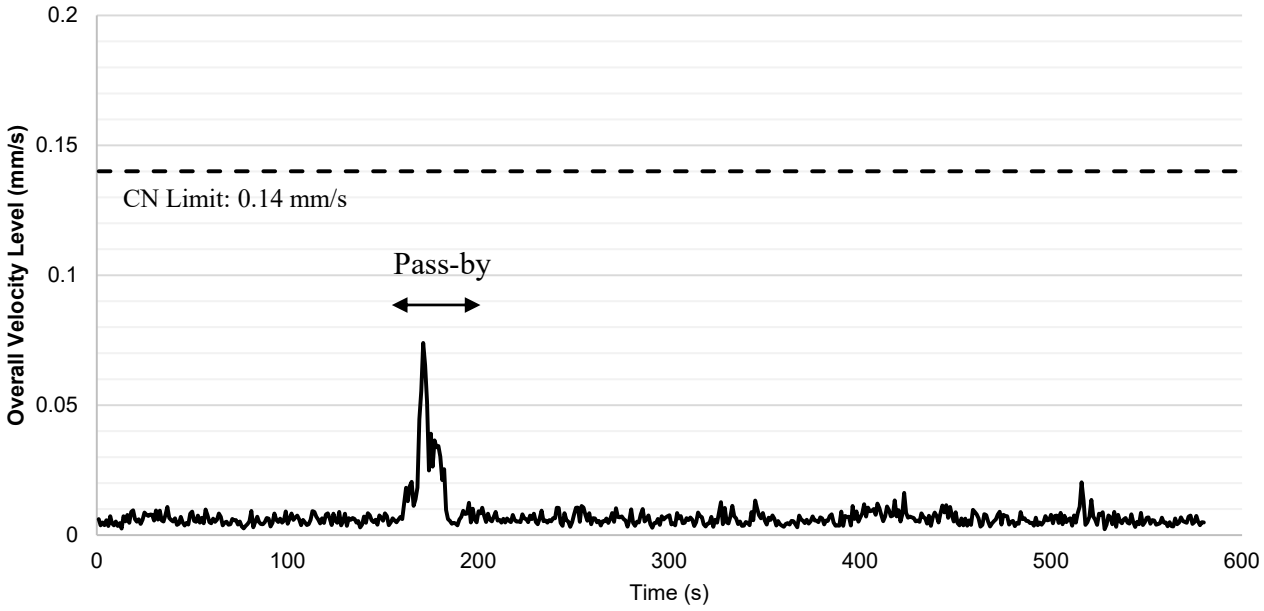


Figure 7b: Pass-by 4
Acceleration Spectrum @ Peak Level (1 sec. Duration)

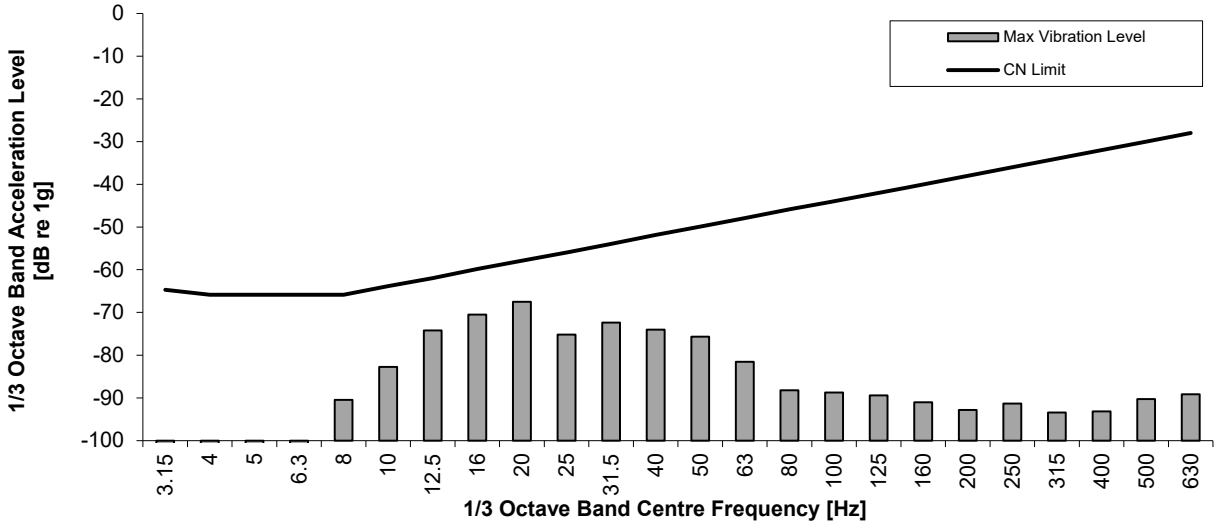


Figure 8a: Pass-by 5 at Property Line
Measured Vibratory Velocity Level

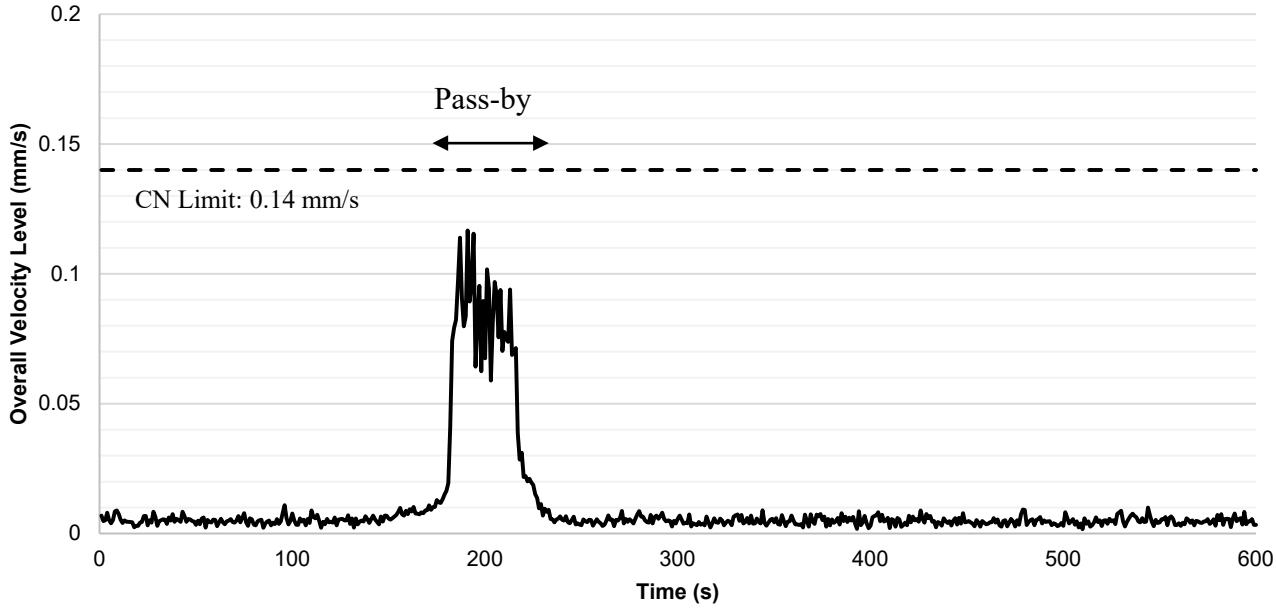


Figure 8b: Pass-by 5
Acceleration Spectrum @ Peak Level (1 sec. Duration)

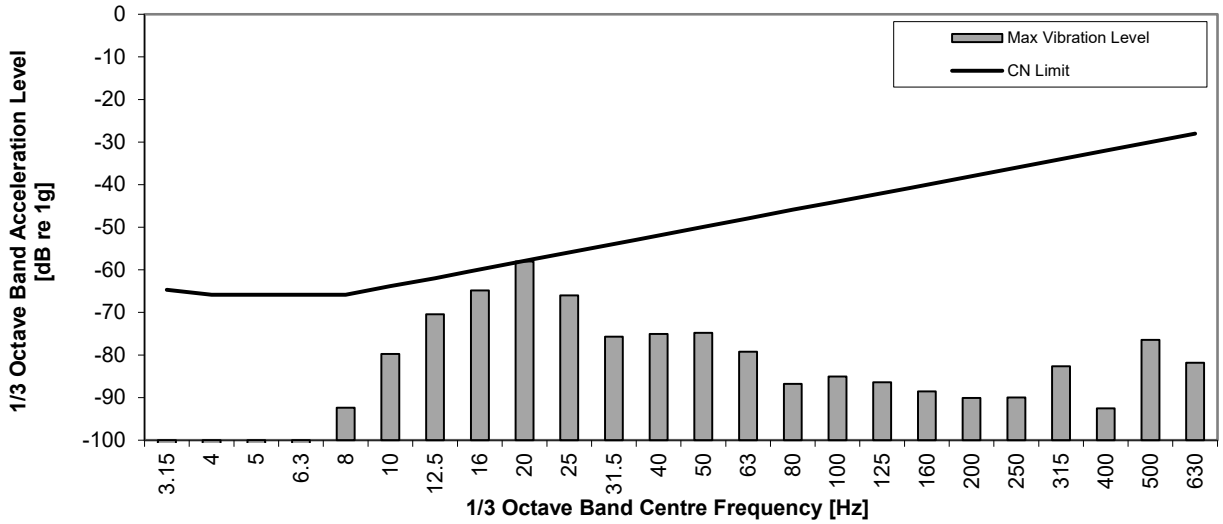


Figure 9a: Pass-by 6 at Property Line
Measured Vibratory Velocity Level

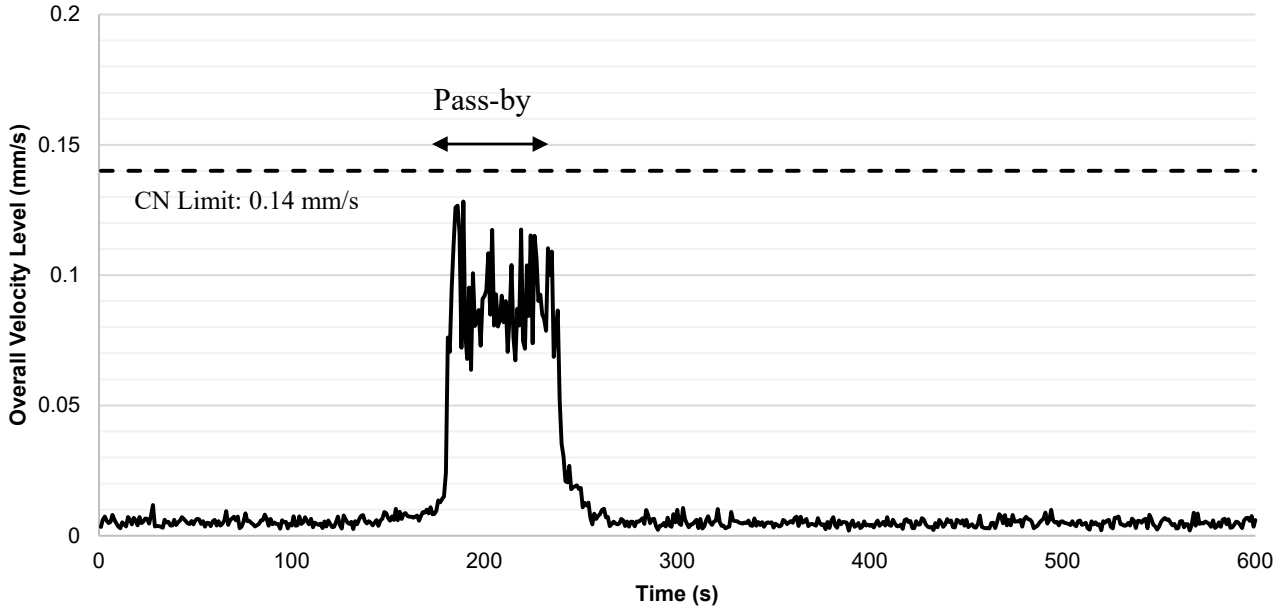


Figure 9b: Pass-by 6
Acceleration Spectrum @ Peak Level (1 sec. Duration)

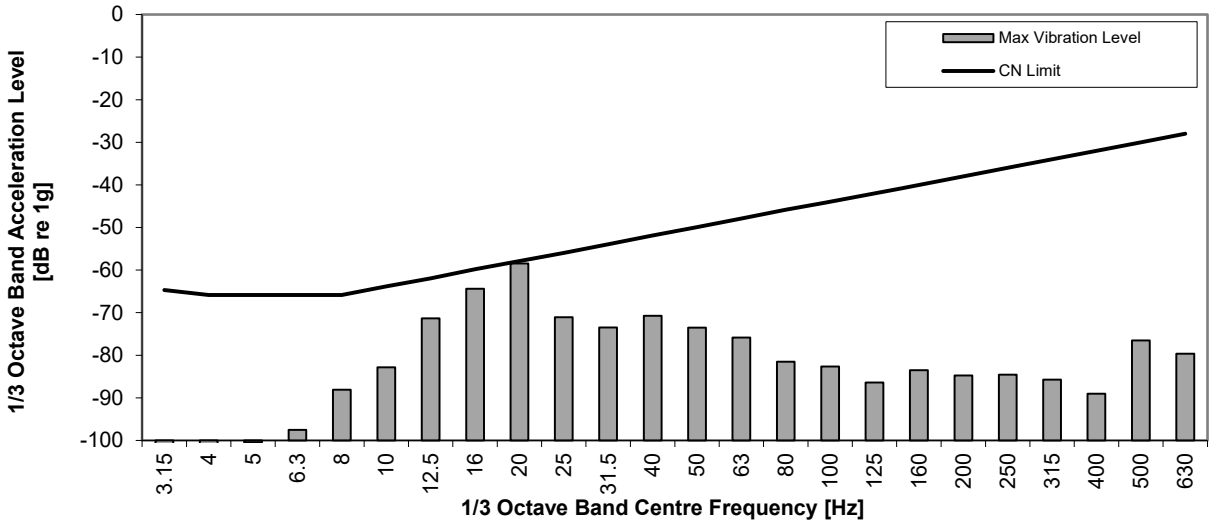




Figure 10: Stationary Source Locations at 72 Beck Street

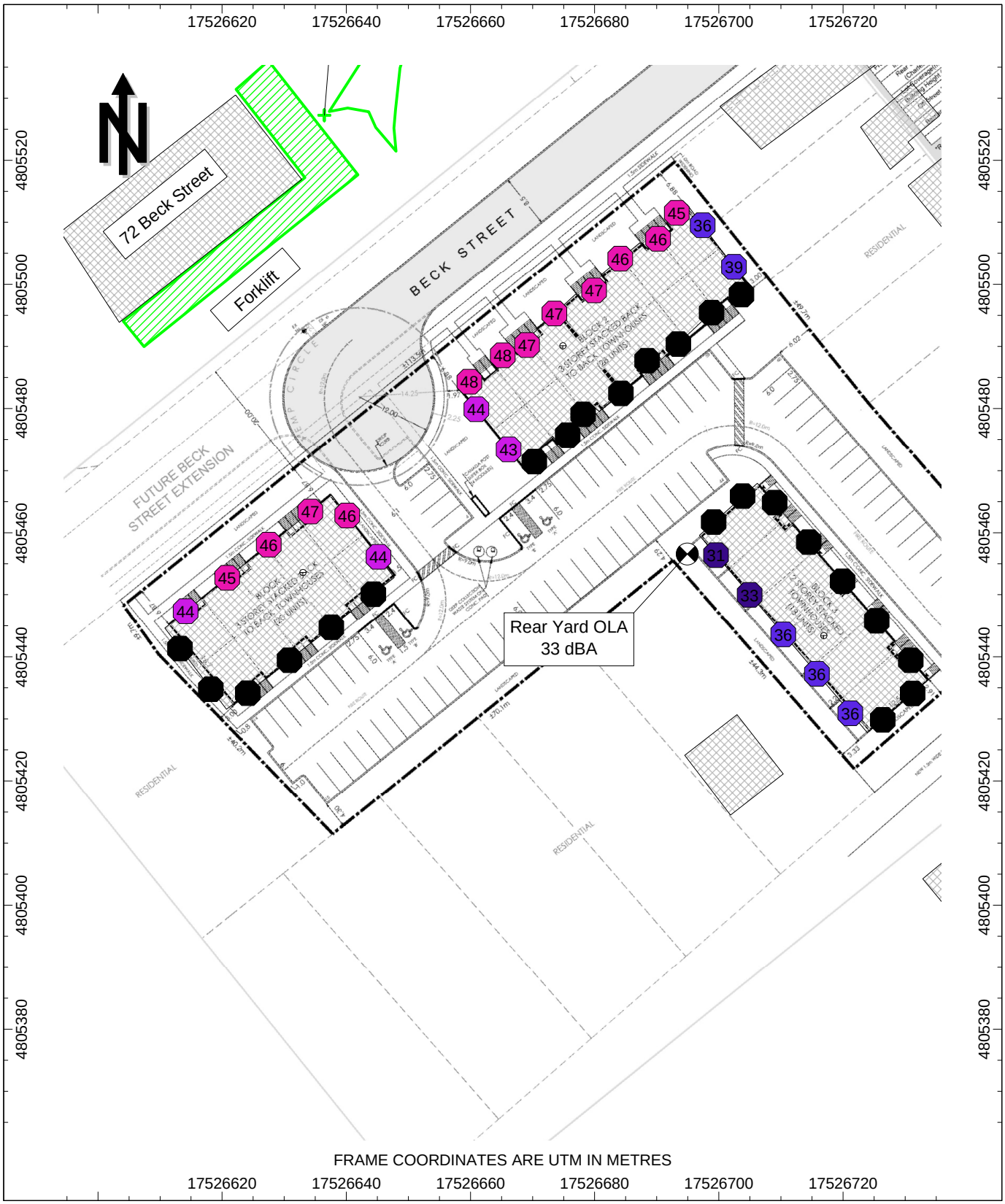


Figure 11: Stationary Source Noise Impact
Daytime & Evening (07:00 - 23:00), Leq [dBA]
Highest Sound Level Across All Floors Shown

Appendix A

CN Railway 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.

A wholly owned subsidiary of Canadian National Railway Company / Une filiale en propriété exclusive de la Compagnie des chemins de fer nationaux du Canada

Appendix B

Rail Traffic Information

System Engineering
Engineering Services

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

Train Count Data

TRANSMITTAL

To: *Destinataire :*	HGC Engineering 2000 Argentia Rd Plaza, Suite 203 Mississauga ON L5N 1P7	*Project :*	GPH-72.03- Brubacher Street, Baden ON
Att'n:	Victor Garcia	*Routing:*	vgarcia@hgcengineering.com
From: *Expéditeur :*	Michael Vallins	*Date:*	2020/07/10
Cc:	Adjacent Development CN via e-mail		

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

Re: Train Traffic Data – CN Guelph Subdivision- Brubacher Street in Baden, ON

Please find attached the requested Train Traffic Data; this data does not reflect GO Metrolinx Traffic. 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 permits.gld@cn.ca.

Sincerely,
CN Design & Construction

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

Date: 2020/07/10 Project Number: GPH-72.03- Brubacher Street, Baden ON

Dear Victor:

Re: Train Traffic Data – – CN Guelph Subdivision- Brubacher Street in Baden, ON

The following is provided in response to Victor's 2020/06/25 request for information regarding rail traffic in the vicinity of Brubacher Street in Baden at approximately Mile 72.03 on CN's Guelph 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	0	140	15	4
Way Freight	4	25	15	4
Passenger	3	10	15	2

	2300-0700			
Type of Train	Volumes	Max.Consist	Max. Speed	Max. Power
Freight	0	140	15	4
Way Freight	0	25	15	4
Passenger	0	10	15	2

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

Except where anti-whistling bylaws are in effect, engine-warning whistles and bells are normally sounded at all at-grade crossings. There are six (6) at-grade crossing in the immediate vicinity of the study area at Mile 72.82 Farm Xing, Mile 72.50 Mill Str., Mile 72.39 Snyders Rd., Mile 71.63 Farm Xing, Mile 71.53 Shantz Rd. and Mile 70.94 Farm Xing. Anti-whistling bylaws are not in effect at these crossings. 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 263,000 lbs.

The single 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

Rank	TC Number	Railway	Region	Province	Access	Regulator	Mile	Subdivision	Spur Mile Point	Spur Name	Location	Latitude	Longitude	Road Authority	Protection	Accident	Fatality	Injury	Trains Daily	Vehicles Daily	Train Max Speed (mph)	Road Max Speed (km/h)	Lanes	Tracks	IsUrban
1303	6489	CN	ONT	ON	Public	F	72.5	Guelph - CN			Mill St	43.4029	-80.6703	Wilmot (ON)	Active - FLBG	0	0	0	8	900	55	50	2	1	Y

Data from Rail Crossing Inventory from Transport Canada

Appendix C

Road Traffic Information

Region of Waterloo AADT Forecast for Noise Studies

1. Development/Location

Snyders Street and Foundry Street (west and south leg)

2. Current AADT 2023

Snyder's Rd W	Foundry Street
6,600	6,027

3. Forecast AADT 7,347

Snyder's Rd W	Foundry Street
8,100	7,347

4. Commercial Vehicle Rates

	Snyder's Rd W	Foundry Street
% Medium Trucks	1.3%	3.9%
% Heavy Trucks	2.4%	1.4%

5. Posted Speed Limit

Snyder's Rd W	Foundry Rd
50 km/h	50 km/h

6. Day/Night Splits

Regional Standard 90/10 Day/Night Split

7. Expiry

Dec 31 2024

8. Notes

This forecast is intended for the purpose of carrying out a noise study only. The above AADT represents the traffic volumes on Snyder's Rd west of Foundry Road and on Snyders Road South of Foundry. This forecast remains valid up to the date indicated above. The Region of Waterloo should be contacted for an updated forecast if there are plans to use this forecast beyond the above validity period.

Appendix D

Sample STAMSON 5.04 Output

STAMSON 5.0 NORMAL REPORT Date: 21-01-2026 10:25:50
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: a.te Time Period: Day/Night 16/8 hours Description: Pred. Loc. [A], Block 2 facade facing railway

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

Train ! Trains ! Trains ! Speed !# loc !# Cars! Eng !Cont Type ! (Left) ! (Right) !(km/h) !/Train!/Train! type !weld ----------+----------+----------+-------+------+------+------+---- 1. Way Freight ! 3.0/0.8 ! 3.0/0.8 ! 88.0 ! 4.0 ! 25.0 !Diesel! Yes 2. Passenger ! 2.2/0.8 ! 2.2/0.8 ! 88.0 ! 2.0 ! 10.0 !Diesel! Yes

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

Angle1 Angle2 : -90.00 deg -45.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0 Surface : 1 (Absorptive ground surface) Receiver source distance : 74.00 / 74.00 m
Receiver height : 7.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier) Whistle Angle : 45 deg Track 1
Reference angle : 0.00

Rail data, segment # 2: CN (day/night)

Train ! Trains ! Trains ! Speed !# loc !# Cars! Eng !Cont Type ! (Left) ! (Right) !(km/h) !/Train!/Train! type !weld ----------+----------+----------+-------+------+------+------+---- 1. Way Freight ! 3.0/0.8 ! 3.0/0.8 ! 88.0 ! 4.0 ! 25.0 !Diesel! Yes 2. Passenger ! 2.2/0.8 ! 2.2/0.8 ! 88.0 ! 2.0 ! 10.0 !Diesel! Yes

Data for Segment # 2: CN (day/night)

Angle1 Angle2 : -45.00 deg 30.00 deg
Wood depth : 0 (No woods.) No of house rows : 0 / 0
Surface : 2 (Reflective ground surface) Receiver source distance : 74.00 / 74.00 m
Receiver height : 7.50 / 7.50 m
Topography : 2 (Flat/gentle slope; with barrier) Whistle Angle : 45 deg Track 1
Barrier angle1 : -45.00 deg Angle2 : -10.00 deg
Barrier height : 5.00 m
Barrier receiver distance : 55.00 / 55.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Rail data, segment # 3: CN (day/night)

```
Train ! Trains ! Trains ! Speed !# loc !# Cars! Eng !Cont Type ! (Left) !
(Right) !(km/h) !/Train!/Train! type !weld ----------------+------------
+-------------+-------+------+------+------+----  1. Way Freight ! 3.0/0.8 !
3.0/0.8 ! 88.0 ! 4.0 ! 25.0 !Diesel! Yes  2. Passenger ! 2.2/0.8 ! 2.2/0.8 !
88.0 ! 2.0 ! 10.0 !Diesel! Yes

Data for Segment # 3: CN (day/night)
------------------------------------
Angle1 Angle2 : 30.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface) Receiver source distance : 74.00 /
74.00 m
Receiver height : 7.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier) Whistle Angle : 45 deg Track 1
Reference angle : 0.00


Results segment # 1: CN (day)
-----------------------------

LOCOMOTIVE (0.00 + 50.49 + 0.00) = 50.49 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
-------------------------------------------------------------------------  -90 -
45 0.41 68.23 -9.74 -8.00 0.00 0.00 0.00 50.49
-------------------------------------------------------------------------

WHEEL (0.00 + 40.00 + 0.00) = 40.00 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
-------------------------------------------------------------------------
 -90 -45 0.51 58.91 -10.47 -8.44 0.00 0.00 0.00 40.00
-------------------------------------------------------------------------

LEFT WHISTLE (0.00 + 50.81 + 0.00) = 50.81 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
-------------------------------------------------------------------------
 -77 -45 0.00 69.38 0.00 -8.83 0.00 0.00 0.00 50.81
-------------------------------------------------------------------------

Segment Leq : 53.85 dBA


Results segment # 2: CN (day)
-----------------------------

Barrier height for grazing incidence
----------------------------------- Source ! Receiver ! Barrier ! Elevation
of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m) ------------
+-------------+-------------+--------------
 4.00 ! 7.50 ! 4.90 ! 4.90
 0.50 ! 7.50 ! 2.30 ! 2.30

LOCOMOTIVE (0.00 + 49.17 + 54.77) = 55.82 dBA
```

```
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
-------------------------------------------------------------------
 -45 -10 0.00 68.23 -6.93 -7.11 0.00 0.00 -5.02 49.17
-------------------------------------------------------------------
 -10 30 0.00 68.23 -6.93 -6.53 0.00 0.00 0.00 54.77
-------------------------------------------------------------------

WHEEL (0.00 + 33.53 + 45.45) = 45.72 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
-------------------------------------------------------------------
 -45 -10 0.00 58.91 -6.93 -7.11 0.00 0.00 -11.34 33.53
-------------------------------------------------------------------
 -10 30 0.00 58.91 -6.93 -6.53 0.00 0.00 0.00 45.45
-------------------------------------------------------------------

LEFT WHISTLE (0.00 + 50.32 + 55.91) = 56.97 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
-------------------------------------------------------------------
 -45 -10 0.00 69.38 0.00 -7.11 0.00 0.00 -5.02 50.32
-------------------------------------------------------------------
 -10 30 0.00 69.38 0.00 -6.53 0.00 0.00 0.00 55.91
-------------------------------------------------------------------

Segment Leq : 59.62 dBA


Results segment # 3: CN (day)
-----------------------------

LOCOMOTIVE (0.00 + 52.24 + 0.00) = 52.24 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
-------------------------------------------------------------------  30 90
0.41 68.28 -9.74 -6.30 0.00 0.00 0.00 52.24
-------------------------------------------------------------------

WHEEL (0.00 + 41.87 + 0.00) = 41.87 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
-------------------------------------------------------------------
 30 90 0.51 58.97 -10.47 -6.64 0.00 0.00 0.00 41.87
-------------------------------------------------------------------

LEFT WHISTLE (0.00 + 48.47 + 0.00) = 48.47 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
-------------------------------------------------------------------
 30 45 0.41 69.42 -9.74 -11.21 0.00 0.00 0.00 48.47
-------------------------------------------------------------------

RIGHT WHISTLE (0.00 + 51.21 + 0.00) = 51.21 dBA
Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
-------------------------------------------------------------------  45 81
0.41 69.42 -9.74 -8.47 0.00 0.00 0.00 51.21
-------------------------------------------------------------------

Segment Leq : 55.86 dBA
```

Total Leq All Segments: 61.89 dBA

Results segment # 1: CN (night)

LOCOMOTIVE (0.00 + 47.90 + 0.00) = 47.90 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-45	0.41	65.64	-9.74	-8.00	0.00	0.00	0.00	47.90

WHEEL (0.00 + 37.38 + 0.00) = 37.38 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-45	0.51	56.29	-10.47	-8.44	0.00	0.00	0.00	37.38

LEFT WHISTLE (0.00 + 48.42 + 0.00) = 48.42 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-77	-45	0.00	66.99	0.00	-8.83	0.00	0.00	0.00	48.42

Segment Leq : 51.36 dBA

Results segment # 2: CN (night)

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
4.00	7.50	4.90	4.90
0.50	7.50	2.30	2.30

LOCOMOTIVE (0.00 + 46.58 + 52.18) = 53.23 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	-10	0.00	65.64	-6.93	-7.11	0.00	0.00	-5.02	46.58
-10	30	0.00	65.64	-6.93	-6.53	0.00	0.00	0.00	52.18

WHEEL (0.00 + 30.90 + 42.82) = 43.10 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	-10	0.00	56.29	-6.93	-7.11	0.00	0.00	-11.34	30.90
-10	30	0.00	56.29	-6.93	-6.53	0.00	0.00	0.00	42.82

LEFT WHISTLE (0.00 + 47.93 + 53.52) = 54.58 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	-10	0.00	66.99	0.00	-7.11	0.00	0.00	-5.02	47.93
-10	30	0.00	66.99	0.00	-6.53	0.00	0.00	0.00	53.52

Segment Leq : 57.14 dBA

Results segment # 3: CN (night)

LOCOMOTIVE (0.00 + 49.79 + 0.00) = 49.79 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
30	90	0.41	65.83	-9.74	-6.30	0.00	0.00	0.00	49.79

WHEEL (0.00 + 39.39 + 0.00) = 39.39 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
30	90	0.51	56.49	-10.47	-6.64	0.00	0.00	0.00	39.39

LEFT WHISTLE (0.00 + 46.19 + 0.00) = 46.19 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
30	45	0.41	67.13	-9.74	-11.21	0.00	0.00	0.00	46.19

RIGHT WHISTLE (0.00 + 48.92 + 0.00) = 48.92 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
45	81	0.41	67.13	-9.74	-8.47	0.00	0.00	0.00	48.92

Segment Leq : 53.49 dBA

Total Leq All Segments: 59.43 dBA

Road data, segment # 1: Synder's (day/night)

Car traffic volume : 7020/780 veh/TimePeriod *
Medium truck volume : 95/11 veh/TimePeriod *
Heavy truck volume : 175/19 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 8100

Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 1.30
Heavy Truck % of Total Volume : 2.40
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Synder's (day/night)

Angle1 Angle2 : -90.00 deg 80.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface) Receiver source distance : 180.00 / 180.00 m
Receiver height : 7.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier) Reference angle : 0.00

Road data, segment # 2: Foundry (day/night)

Car traffic volume : 6262/696 veh/TimePeriod *
Medium truck volume : 258/29 veh/TimePeriod *
Heavy truck volume : 93/10 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 7347
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 3.90
Heavy Truck % of Total Volume : 1.40
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Foundry (day/night)

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface) Receiver source distance : 240.00 / 240.00 m
Receiver height : 7.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier) Reference angle : 0.00

Results segment # 1: Synder's (day)

Source height = 1.24 m

ROAD (0.00 + 45.63 + 0.00) = 45.63 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---

-90 80 0.49 62.93 0.00 -16.05 -1.24 0.00 0.00 0.00 45.63

Segment Leq : 45.63 dBA

Results segment # 2: Foundry (day)

Source height = 1.09 m

ROAD (0.00 + 39.92 + 0.00) = 39.92 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 0 0.49 62.07 0.00 -17.97 -4.17 0.00 0.00 0.00 39.92

Segment Leq : 39.92 dBA

Total Leq All Segments: 46.66 dBA

Results segment # 1: Synder's (night)

Source height = 1.24 m

ROAD (0.00 + 39.05 + 0.00) = 39.05 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 80 0.49 56.36 0.00 -16.06 -1.24 0.00 0.00 0.00 39.05

Segment Leq : 39.05 dBA

Results segment # 2: Foundry (night)

Source height = 1.08 m

ROAD (0.00 + 33.35 + 0.00) = 33.35 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 0 0.49 55.49 0.00 -17.97 -4.17 0.00 0.00 0.00 33.35

Segment Leq : 33.35 dBA

Total Leq All Segments: 40.09 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 62.02
(NIGHT): 59.48

Appendix E

Supporting Information

December 19, 2023

The Regional Municipality of Waterloo

C/o Harry Cai
HGC Engineering
2000 Argentia Road, Suite 203, Plaza 1
Mississauga, ON
L5N 1P7

Re: Environmental Noise Assessment of Nearby Lands - Confirmation of Vacant Building

Hi Harry,

In response to your email on November 29, 2023, regarding the vacant building on Turtle Mountain Seed Co. property, shown in red in the attached figure, I confirm that:

1. The building show in red in the attached figure is currently vacant and not used, and is not planned to be used as it was originally designed, utilizing the existing equipment.

2. Should the existing equipment of the vacant building be used in the future as it was originally designed, I understand that Turtle Mountain Seed Co. would be responsible for meeting the applicable noise guidelines (and if required, the design and cost of mitigation measures) at the proposed future dwellings, which in this case, I understand it to be townhouse buildings adjacent to the existing house at 88 Charles St.

We trust this information is sufficient for your present purposes. Please call if you have any questions or require clarification.

Yours truly,

Mike Brignolio
Operations Manager
Turtle Mountain Seed Co.

Attch: Figure 1

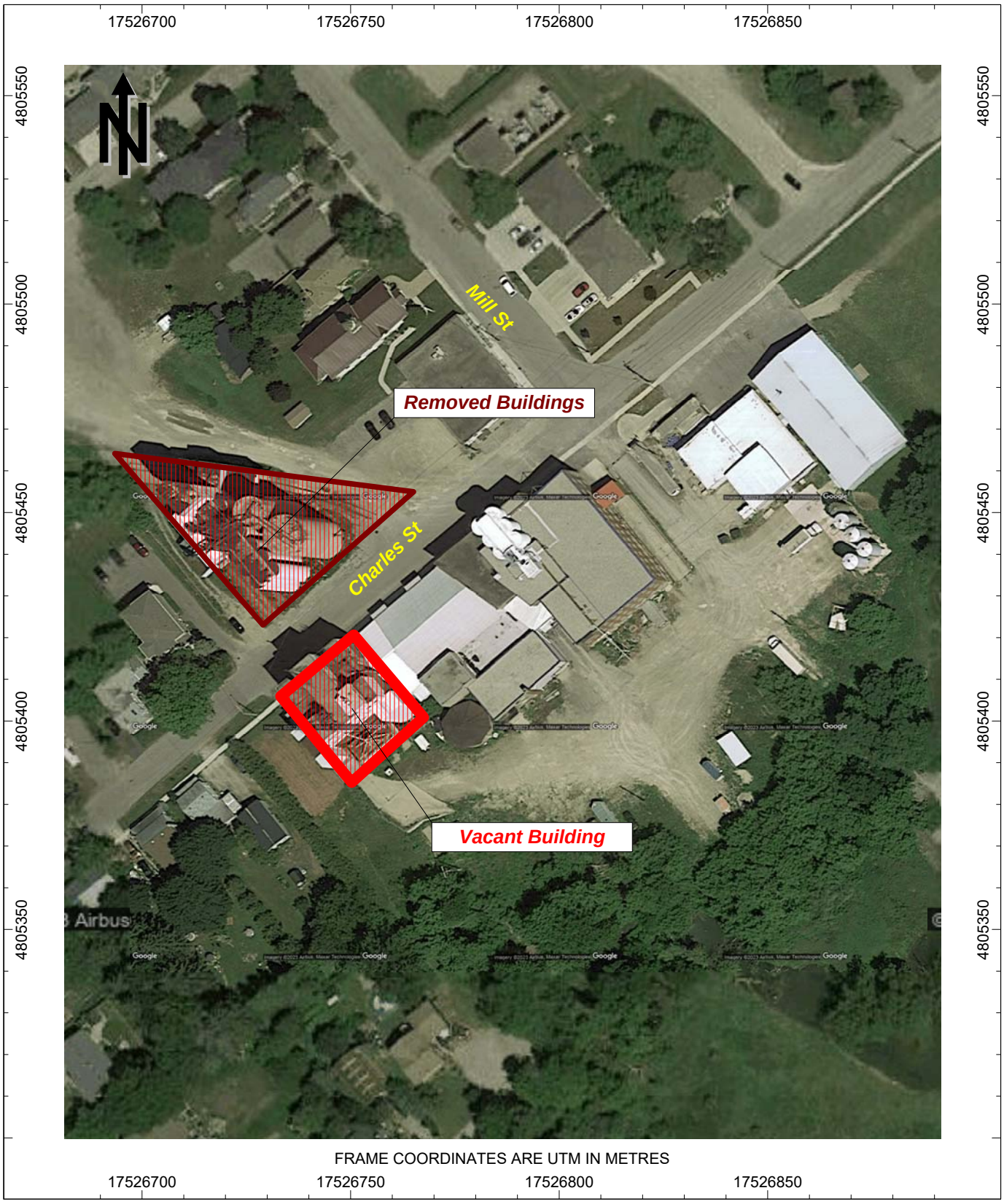


Figure 1: Turtle Mountain Seed Co.
Removed and Vacant Buildings

Harry Cai

From: Christine Hoffman <choffman@pestellpet.com>
Sent: December 5, 2023 12:19 PM
To: Harry Cai
Subject: Re: 72 Beck Street - Facility Info for Environmental Noise Study

Responses below:

Just some quick questions that could use your help:

1. Is the facility typically used during the nighttime (from 11pm to 7am)? No
2. How busy does it typically get (# of trucks a day, or if that info is not available, a ballpark of how often do trucks load/unload there)? Maybe once / twice a week some weeks no activity at all
3. Are all products/goods stored indoors? Yes

Christine Hoffman
Pestell Pet
226-808-1367

From: Harry Cai <hcai@hgcengineering.com>
Sent: Tuesday, December 5, 2023 12:05:57 PM
To: Christine Hoffman <choffman@pestellpet.com>
Subject: RE: 72 Beck Street - Facility Info for Environmental Noise Study

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Hi Christine,

I appreciate the quick reply.

Just some quick questions that could use your help:

1. Is the facility typically used during the nighttime (from 11pm to 7am)?
2. How busy does it typically get (# of trucks a day, or if that info is not available, a ballpark of how often do trucks load/unload there)?
3. Are all products/goods stored indoors?

Feel free to reach out for any questions or concerns.

Thank you.

Harry Cai, PEng
HGC Engineering NOISE | VIBRATION | ACOUSTICS
Howe Gastmeier Chapnik Limited
t: 905.826.4044 x297

Any conclusions or recommendations provided by HGC Engineering in this e-mail or any attachments have limitations.

From: Christine Hoffman <choffman@pestellpet.com>
Sent: Tuesday, December 5, 2023 11:59 AM
To: Harry Cai <hcai@hgcengineering.com>
Subject: RE: 72 Beck Street - Facility Info for Environmental Noise Study

Hello Harry,

We use the facility for warehousing.

Let me know if you need anything else.

Christine Hoffman | Vice President & GM
Cell: **(226) 808-1367**
choffman@pestellpet.com

Pestell Pet Products
141 Hamilton Road, New Hamburg, Ontario, Canada, N3A 2H1
www.pestellpet.com

From: Harry Cai <hcai@hgcengineering.com>
Sent: Tuesday, December 5, 2023 11:57 AM
To: Christine Hoffman <choffman@pestellpet.com>
Subject: 72 Beck Street - Facility Info for Environmental Noise Study

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Hi Christine,

My name is Harry Cai, an acoustical consultant at HGC Engineering. I just left a voicemail – essentially, we're conducting an environmental noise study for the Region of Waterloo near Beck Street and Mill Street. I got your name and number from the receptionist at Barentz. We're currently gathering information on the existing land uses in the area.

I noticed that the building at 72 Beck Street looks fairly vacant, and also saw that the property is for sale online. From speaking to personnel at Turtle Mountain Seed down Mill Street, I was told that the building was used infrequently for storage/warehousing.

Could you advise if the building at 72 Beck Street currently used by Pestell Pet Products, and if so, could you confirm the primary use of the building?

Please let me know if you have any questions or concerns.

Thank you.

Harry Cai, PEng
Project Consultant

HGC Engineering **NOISE | VIBRATION | ACOUSTICS**
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Visit our website: www.hgcengineering.com Follow Us – LinkedIn | Twitter | YouTube

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Piezovelocity transducers

793V series

VIBE KIT #8

Wilcoxon SENSING TECHNOLOGIES

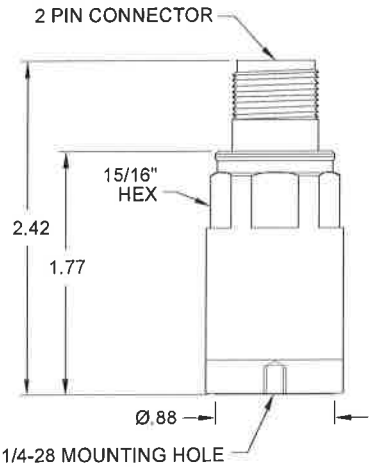
SPECIFICATIONS

		793V	793V-5
Sensitivity, ±10%[1], 25°C		100 mV/in/sec	500 mV/in/sec
Velocity range		50 in/sec peak	10 in/sec peak
Amplitude nonlinearity		2.5%	5%
Frequency response:	**±10%**	3.0 - 3,500 Hz	8.0 - 3,500 Hz
	±3 dB	2.5 - 7,000 Hz	5.0 - 7,000 Hz
Resonance frequency, mounted, nominal		15 kHz	15 kHz
Transverse sensitivity, max		5% of axial	5% of axial
Temperature response:	**–50°C**	–5%	–5%
	+80°C	+3%	+3%
	+120°C	–5%	–5%
Power requirement:	**Voltage source**	18 - 30 VDC	18 - 30 VDC
	Current regulating diode	2 - 10 mA	2 - 10 mA
Electrical noise, equiv. in/sec, nominal:			
Broadband	**2.5 Hz to 25 kHz**	100 µin/sec	40 µin/sec
Spectral	**10 Hz**	10 µin/sec/√Hz	4.0 µin/sec/√Hz
	100 Hz	1.0 µin/sec/√Hz	0.4 µin/sec/√Hz
	1,000 Hz	0.2 µin/sec/√Hz	0.05 µin/sec/√Hz
Output impedance, nominal 4 mA supply		200 Ω	200 Ω
Bias output voltage, nominal		10 VDC	10 VDC
Grounding		case isolated, internally shielded	
Temperature range		–50° to +120°C	–50° to +120°C
Vibration limit		250 g peak	250 g peak
Shock limit		2,500 g peak	2,500 g peak
Electromagnetic sensitivity, equiv. in/sec		25 µin/sec/gauss	25 µin/sec/gauss
Sealing		hermetic	hermetic
Base strain sensitivity		0.0005 in/sec/µstrain	0.0005 in/sec/µstrain
Weight		145 grams	145 grams
Case material		316L stainless steel	316L stainless steel
Mounting		1/4-28 tapped hole	1/4-28 tapped hole
Output connector		2 pin, MIL-C-5015	2 pin, MIL-C-5015
Mating connector		R6	R6
Recommended cabling		J9T2	J9T2



Key features

- Intrinsically safe and radiation resistant options available for model 793V
- Available with ±5% sensitivity tolerance
- Manufactured in an ISO 9001 certified facility



Notes: [1] For a 100 mV/ips sensor with ±5% sensitivity tolerance, order model 793V100-5.
Accessories supplied: SF6 mounting stud (metric mounting available); calibration data (level 3)

Certifications

All 793V models	793VE	793V-33	793V-35
CE	FM APPROVED Class I, II, III, T4 Div 1 Groups A, B, C, D, E, F, G Div 2 Groups A, B, C, D, F, G	CSA Class I, Div 1 Groups A, B, C, D	Ex II 1 G Ex ia IIA T4 Ga Tamb: -50°C to 120°C

Connections	
Function	Connector pin
power/signal	A
common	B

Note: Due to continuous process improvement, specifications are subject to change without notice. This document is cleared for public release.

Wilcoxon Sensing Technologies
An Amphenol Company
98219 Rev.L.4 03/19

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info@wilcoxon.com

buy.wilcoxon.com
www.wilcoxon.com

Wilcoxon
SENSING TECHNOLOGIES

Calibration Data

Piezo Velocity Transducer

Model **793V** Serial Number **20574**

Sensitivity:	**103 mV/in/sec**	**4.1 mV/mm/sec**
Bias Voltage:	**10.9 Vdc**	
Resonance:	**16.3 kHz**	**975.36 kcpm**
Maximum Amplitude Range:	**50 in/sec peak**	**1270 mm/s pk**
Transverse Sensitivity:	**1 %**	
Frequency Response:		
±10%	**2.0 Hz** to **4.4 kHz**	**120 cpm** to **261 kcpm**
±3dB	**1.5 Hz** to **8.2 kHz**	**90 cpm** to **495 kcpm**

Calibrated by: **S.HONGMANIVAN** Date: **03/23/2019**

This calibration is traceable to the National Institute of Standards and Technology, Gaithersburg, MD 20899.
Frequency Response is traceable 5 Hz to 10 kHz.
Sensitivity measured at 100 Hz, 1g, 25°C.
Low end frequency response and amplitude range are nominal values.

Wilcoxon Sensing Technologies is an ISO 9001 Registered Company.

Wilcoxon Sensing Technologies
8435 Progress Drive, Frederick, MD 21701 USA

Tel: +1 (301) 330 8811
Tel: 1 800 WILCOXON
FAX: +1 (301) 330 8873
www.wilcoxon.com

Amphenol (Maryland), Inc. d/b/a Wilcoxon Sensing Technologies

Wilcoxon
SENSING TECHNOLOGIES

Calibration Data

Piezo Velocity Transducer

Model **793V** Serial Number **20575**

Sensitivity:	**97 mV/in/sec**	**3.8 mV/mm/sec**
Bias Voltage:	**10.9 Vdc**	
Resonance:	**16.4 kHz**	**983.04 kcpm**
Maximum Amplitude Range:	**50 in/sec peak**	**1270 mm/s pk**
Transverse Sensitivity:	**0 %**	

Frequency Response:

±10%	**2.0 Hz** to **4.3 kHz**	**120 cpm** to **258 kcpm**
±3dB	**1.5 Hz** to **8.1 kHz**	**90 cpm** to **486 kcpm**

Calibrated by: **R.RITCHIE** Date: **04/01/2019**

This calibration is traceable to the National Institute of Standards and Technology, Gaithersburg, MD 20899.
Frequency Response is traceable 5 Hz to 10 kHz.
Sensitivity measured at 100 Hz, 1g, 25°C.
Low end frequency response and amplitude range are nominal values.

Wilcoxon Sensing Technologies is an ISO 9001 Registered Company.

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Appendix F

CADNA/A Modelling Details and Calculations

The source sound power levels were used as input to a computational acoustical model (*Cadna-A, Version 2025, build: 209.5501*). The model is based on the methods from ISO Standard 9613-2.2 "Acoustics - Attenuation of Sound During Propagation Outdoors", which accounts for reduction in sound level with distance due to geometrical spreading, air absorption, ground attenuation and acoustical shielding by intervening structures (or by topography and foliage where applicable). This modelling technique is acceptable to the MECP.

The subject site and surrounding area were modelled on a flat terrain, based on site visit observations. Ground attenuation was assumed to be spectral for all sources, with the ground factor (G) assumed to be 0.65 to represent a mix of pre-dominantly grassy surface area, mixed with some dirt grounds and asphalt roads. The temperature and relative humidity were assumed to be 10° C and 70%, respectively.

The predictive modelling considered one order of reflection with shielding/reflections afforded by buildings which were assigned spectral absorptive characteristics representative of concrete block, corrugated steel, and unglazed brick, as appropriate.

R1	Block 2 3rd Level North Facade	17526660	4805485	7.5																				
Src ID	Src Name	X	Y	Z	LxD	LxE	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	CmetD	CmetE	CmetN	ReflD	ReflE	ReflN	LrD	LrE	LrN
Forklift	Forklift	17526604	4805508	1.0	89	--	--	44.3	0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	1.5	1.5	1.5	46	--	--
Idling Truck	Idling Truck	17526632	4805528	1.0	88	--	--	44.8	0	0.0	-0.4	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	43	--	--
Straight Trucks	Straight Trucks	17526714	4805555	1.0	78	--	--	47.2	0	0.0	-0.3	0.1	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31	--	--

Where: Lr = Lx - Adiv + K0 + Dc - Agnd - Abar - Aatm - Afol - Ahous + Cmet + Refl

Appendix G

Peer Review Comments and HGC Responses

Peer Review Comments dated 2025-06-25

Received from Town of Wilmont, originally sent from RWDI.

Comments paragraphs below in *italics*. HGC responses shown in blue.

We understand that this recommendation derived from the CN peer reviewer. Based on communication with that peer reviewer, we understand the recommendation comes from historically accepted guidance and anecdotal conversation where it was understood that a thicker foundation wall could be sufficient to deal with minor vibration excesses.

In this context, a thicker foundation wall is often seen to be recommended along with a resilient layer against the foundation and granular backfill between the resilient layer and the ground, like the guidance recommended in the FCM/RAC guidelines, but not necessarily the thicker foundation on its own. No technical rationale or supporting information was provided to support the 300 mm recommendation.

Further, it is understood this proposed solution may have its origins in a southwestern U.S. context, which does not have the same building construction conventions as Ontario or typical designs (i.e., lack of basements) compared to the current proposal. The standard requirements of the Ontario Building Code include foundation walls of solid concrete or unreinforced concrete block that vary between 140 mm and 300 mm depending on the finished ground height above the basement floor and the support at the top of the wall. Hence foundation wall thicknesses of 300 mm appear to be a standard configuration in Ontario.

As a result, it is recommended that a resilient layer be incorporated in the vibration isolation design consistent with Section 3.5.2.1 of the FCM/RAC guidelines which states for low-rise buildings that:

> *Minor vibration control (usually only a 30% reduction) can be achieved by lining the outside of the foundation walls with a resilient layer. This practice takes advantage of the fact that the waves of vibration from surface rail travel mostly on the surface, dying down with depth. To obtain reasonable results, however, the lining must be quite soft and yet be able to withstand the lateral soil pressures present on the foundation wall.*

Alternately, a foundation wall of some minimum thickness could be proposed and accepted with an appropriate technical rationale and accompanying analysis that demonstrates a comparable level of vibration control.

With the above condition, we have no further comments or concerns regarding the proposed development.

Noted. HGC concurs that a resilient layer around the outside of foundation walls can be a form of vibration control for low rise residences, and is recommended as such in Section 5.5 of the updated Noise & Vibration Feasibility Study.

CONSULTANT STATUTORY DECLARATION

CANADA	)	In the Matter of the
	)	Environmental Protection
PROVINCE OF ONTARIO	)	Act and the Planning Act
	)	
	)	And in the Matter of a Residential
	)	Development, Beck and Charles
	)	Street, in Baden,
	)	Regional Municipality of
	)	Waterloo

I, Harry Ao Cai, of the City of Toronto, SOLEMNLY DECLARE THAT:

1. I am a Professional Engineer employed by HGC Engineering which holds a Certificate of Authorization and have personal knowledge of the matters set out below.

2. I was retained or employed as the principal consultant to undertake the assessment of noise impacts and recommendation of noise mitigation measures for the property described as Beck and Charles Street, Baden, Ontario

3. I had the expertise required to perform these services. Any assessment activities or recommendations requiring the application of engineering principles have been undertaken or supervised by an engineer qualified to perform such services.

4. The information used in the study entitled Noise Feasibility Study, Proposed Residential Development, Beck and Charles Street, Baden, Ontario is the best available information as of the date of the study.

5. The sound level calculations, the interpretation of noise attenuation requirements, and the recommended measures are in accordance with Ministry of Environment Guidelines, Region of Waterloo policies, any applicable policy of guidelines or the Area Municipality, and any other applicable policy or guideline.

6. The physical noise attenuation measures proposed in this study are feasible to implement and will provide the level of attenuation indicated in the study.

7. I acknowledge that this study may be subject to a peer review conducted at my cost.

8. I acknowledge that public authorities and future owners, occupants and others may rely on this statement.

AND I make this solemn Declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath.

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HARRT AO CAI

Sworn (or Affirmed or Declared) remotely from the City of Mississauga, Ontario, before me, Kazuki Takahashi, in the City of Markham, Ontario, on January 21, 2026, in accordance with O. Reg 431/20: Administering Oath or Declaration Remotely.