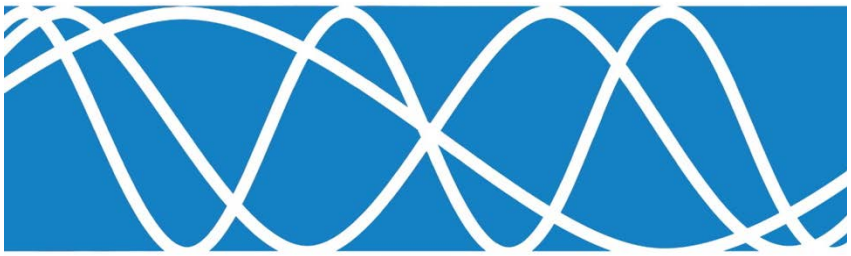
Noise and Vibration Feasibility Study

Proposed Residential Development

Upper Mill Pond, 52 Mill Street, Norwood, Ontario

March 31, 2025
HGC Project #: 02100994



Prepared for:

CAP Norwood Developments Inc.
75 Valleyview Drive
Ancaster, Ontario
L9G 2A6

HGC
NOISE | VIBRATION | ACOUSTICS

HGC Noise Vibration Acoustics
2000 Argentia Road, Plaza One, Suite 203
Mississauga, Ontario, L5N 1P7
t: 905.826.4044

Version Control
Project Name / Address

Ver.	Date	Version Description	Prepared By
1.0	March 31, 2025	Noise and Vibration Feasibility Study in support of the planning and approvals process (addresses peer review comments)	S. Paul

Prepared by:

Sheeba Paul, MEng, P.Eng

Howe Gastmeier Chapnik Limited

Limitations

This document was prepared solely for the addressed party and titled project or named part thereof and should not be relied upon or used for any other project without obtaining prior written authorization from HGC Noise Vibration Acoustics (HGC). Further, the input of content from any document produced by HGC or related HGC intellectual property into any Artificial Intelligence tool is expressly prohibited. HGC accepts no responsibility or liability for any consequence of this document being used for a purpose other than for which it was commissioned. Any person or party using or relying on the document for such other purpose agrees and will by such use or reliance be taken to confirm their agreement to indemnify HGC for all loss or damage resulting therefrom. HGC accepts no responsibility or liability for this document to any person or party other than the party by whom it was commissioned.

Any conclusions and/or recommendations herein reflect the judgment of HGC based on information available at the time of preparation and were developed in good faith on information provided by others, as noted in the report, which has been assumed to be factual and accurate. Changed conditions or information occurring or becoming known after the date of this report could affect the results and conclusions presented.

Table of Contents

1 INTRODUCTION AND SUMMARY

HGC Engineering was retained by CAP Norwood Developments Inc. to conduct a noise and vibration feasibility study for a proposed residential development located at 52 Mill Street in Norwood, Ontario. The residential development will consist of single detached dwellings, medium density dwellings, parkland, stormwater management lands, and interior roadways. The study is required by the Municipality as part of the planning and approvals process.

This report has been updated to reflect the latest development site plan prepared by RFA Planning Consultants dated December 22, 2023 and incorporates the peer review comments included in Appendix E.

The primary source of noise is vehicular traffic on Highway 7. A secondary source of noise is rail traffic on the CP Havelock Subdivision railway line adjacent to the north of the site. Rail traffic data was obtained from published rail traffic data by Transport Canada and from site monitoring, and road traffic data was obtained from published traffic data from the Ontario Ministry of Transportation (MTO). 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) 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. An acoustical barrier is required along the railway to mitigate sound level excesses in rear yards adjacent to the railway due to rail traffic noise. Central air conditioning and upgraded building constructions are required for the dwellings adjacent to the railway. Some dwellings further from the railway should be designed with a provision for the installation of central air conditioning in the future, at the occupant’s discretion. Noise warning clauses are also required to inform future occupants of the traffic noise impacts, to address sound level excesses, and proximity to existing industrial uses. Brick veneer or masonry equivalent

exterior wall construction is required for those dwellings in the first row adjacent to the railway line. For all other dwelling units, building constructions meeting the minimum requirements of the Ontario Building Code will provide sufficient acoustical insulation for indoor spaces.

A computational model was created using acoustical modelling software to assess the potential sound impact of the nearby industry, located the north of the railway tracks and on either side of Asphodel 10th Line, on the proposed development. The modelling results indicate that, with the recommended 5.5 m high acoustical barrier along the railway, the predicted sound levels from nearby stationary sources can be reduced to within the MECP guideline levels. A 70 m setback distance from the nearby sawmill is also required for any proposed 3-storey. Alternatively, a shorter 30 m setback distance from the CP right-of-way is required for any proposed 2-storey or single storey dwellings.

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

As the project progresses, the analysis should be updated and should reflect the detailed design and site grading. Mitigation recommendations should be updated as more details become available.

2 SITE DESCRIPTION AND NOISE SOURCES

Figure 1 is a key plan indicating the location of the proposed site. The site is located north of Mill Street, West of Asphodel 10th Line, and south of Highway 7. Figure 2 shows the concept draft plan by RFA Planning Consultants dated December 22, 2023. The legal description of the subject property is described as Part of Block H, Registered Plan 6, Formerly Village of Norwood and Part of Lots 17, 18, and 19, Concession 9, Township of Asphodel-Norwood, County of Peterborough.

HGC Engineering personnel visited the site on March 15, 2022 to make observations of the acoustical environment and to take sound measurements. During the site visit, it was noted that the primary source of noise impacting the site was road traffic on Highway 7, with some contribution from the CP Havelock Subdivision railway line immediately north of the site. Negligible impact from road traffic was observed on Mill Street and Asphodel 10th Line. The site is currently occupied by agricultural lands, and contains a detached agricultural/residential building, which will be demolished for the construction of the proposed dwellings. The area around the site is mostly flat and residential. There are existing single detached dwellings immediately to the east, south, and west. There are two at-grade rail crossings near the site, with a crossing at County Road 40 approximately 700 m to the west, and another one immediate northeast of the site at Asphodel 10th Line.

The site is bounded to the north by the CP Rail right-of-way and Richard Lutes Cedar Inc., a wood processing shop and lumber yard; to the south by single-detached dwellings and a draft approved plan of subdivision; to the east by single-detached dwellings and rural land outside the settlement area and to the west by low density residential dwellings, CP Rail right-of-way and Mill Pond. An assessment of the separation distances between the site and the adjacent industries is described in Section 6. The assessment of noise emissions from the wood processing shop is contained in Section 7.

Zoning

The draft plan of subdivision is envisioned within the Settlement Area designation of the Peterborough County Official Plan. The Local Component of the County Official Plan for the Township of Asphodel-Norwood designates the land as Hamlet, Rural and Residential. To permit the subdivision, an Official Plan Amendment is necessary to redesignate the entire property Residential. Zoning By-Law Number 2009-08 zones the site RU-Rural zone and R2-H-Residential Two zone with a holding provision. A Zoning By-Law amendment is also required and an application will be submitted at a later date.

3 TRAFFIC NOISE ASSESSMENT

3.1 Traffic Noise Criteria

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 1 below. The Railway Association of Canada/Federation of Canadian Municipalities (RAC/FCM) "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 were also reviewed.

The values in Table 1 are energy equivalent (average) sound levels [L_{EQ}] in units of A-weighted decibels [dBA].

Table 1: MECP Traffic Noise Criteria [dBA]

Space	Daytime $L_{EQ\ (16\ hour)}$ Road / Rail	Nighttime $L_{EQ\ (8\ hour)}$ Road / Rail
Outdoor Living Areas	55 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, while nighttime refers to the period between 23:00 and 07:00. The term "Outdoor Living Area" (OLA) is a noise sensitive space intended for the quiet enjoyment of the outdoor environment and is readily accessible from the building. OLAs include backyard and side yard areas of single family, semi-detached and townhouse dwellings, gardens, terraces and patios, balconies and elevated terraces (e.g. rooftops) that are not enclosed with a minimum depth of 4 meters.

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. If the sound level in the plane of a bedroom or living/dining room window is greater than 55 dBA and less than or equal to 65 dBA, the dwelling should be designed with a provision for the installation of central air conditioning in the future, at the occupant's discretion.

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 traffic noise.

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

In addition, in accordance with MECP guidelines, the exterior walls of the first row of dwellings next to railway tracks are to be built to a minimum of brick veneer or masonry equivalent construction, from the foundation to the rafters when the rail traffic Leq (24-hour), estimated at a location of a nighttime receptor is greater than 60 dBA and the first row of dwellings is within 100 metres of the tracks.

The railways (RAC/FCM) also provides minimum requirements for safety as well as sound and vibration for proposed residential developments located adjacent to their rights-of-way. These refer to minimum required setbacks, berms, fencing, and warning clauses. The reader is referred to a copy of the CPKC requirements for a new development adjacent to a principal main line, which is included in Appendix B.

3.2 Ground-borne Vibration from Rail Traffic

MECP and RAC/FCM guidelines require measurements of ground-borne vibration when residential dwelling units are to be located within 75 m of a rail line such as the CPKC Havelock Subdivision.

Vibration is typically measured in terms of oscillatory velocity or acceleration. The guidelines are given in terms of ground-borne velocity. In this report, vibration levels are quoted in terms of RMS velocity levels (L_V) in units of decibels [dB] relative to 1 mm/s (i.e., 1 mm/s = 0 dB). The guideline limit is 0.14 mm/s, which is equivalent to -17 dB re 1 mm/s. For ease of reference, this limit of -17 dB re 1 mm/s is identified on velocity plots in this report. Measurement equipment must be capable of measuring between 4 Hz and 200 Hz +/- 3 dB with an RMS averaging time constant of 1 second.

CPKC 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. The spectral criteria have been overlaid on the graphs of measured vibration for easy reference in Figures 4 to 8.

4 TRAFFIC NOISE ASSESSMENT

4.1 Rail Traffic Data

Rail traffic data for the CP Havelock Subdivision was obtained from current published rail traffic data from Transport Canada and is attached in Appendix B. This line is used for freight operations only and is classified as a principal main line. The maximum permissible train speed in the area of the site is 16 km/h (10 mi/h). In conformance with CP 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 current data was projected to the year 2035 using a 2.5% per year growth rate.

Based on site observations and vibration monitoring data, the actual rail traffic in this area matches with the published rail data, at up to 1 train pass-by per day. It was also observed that the train can pass-by during daytime and nighttime hours. Thus, one train was assumed in the day and night. Table 2 summarises the CP rail traffic data used in the analysis.

Table 2: 2035 Projected Rail Traffic Data

Type of Train	Number of Trains Day/Night	Number of Locomotives	Number of Cars	Max Speed (KPH)
CPKC Havelock (Freight)	1.3 / 1.3	2	200	16

4.2 Road Traffic Data

Traffic data for Highway 7 was obtained from MTO personnel and published road traffic data from the MTO in the form of Summer Annual Daily Traffic (SADT) for the year 2021 traffic values, and is provided in Appendix C. The traffic volume for the year 2021 at Highway 7 and Peterborough Road 45 (SADT 13,000) was projected to the year 2035 at an annual growth rate of 2.5 %. A projected volume of 18 369 vehicles per day at a posted speed limit of 70 km/h was applied for the analysis. A commercial vehicle percentage of 5 % for medium

trucks and 8 % for heavy trucks was applied, as per MTO guidelines. A day/night split of 85 % / 15 % was used.

Table 3 summarizes the traffic volume data used in this study.

Table 3: Projected Road Traffic Data to Year 2035

Roadway	SADT	Day / Night Split [%]	Trucks Percentage (%)		Speed Limit [km/h]
			Medium	Heavy	
Highway 7	18 369	85 / 15	5	8	70

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. The dwellings were assumed to be 3-storey in height as a conservative estimate since the number of storeys has not yet been determined. While not heard on site, train whistle noise was included in the assessment at the at-grade crossings near the site area as a conservative approach.

Predictions of the traffic sound levels were chosen around the proposed development site to obtain an appropriate representation of future sound levels at various façades. Sound levels were predicted at the plane of the top 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 concept draft plan with prediction locations. The results of these predictions are summarized in Table 4 and 5.

Table 4: Daytime Predicted Traffic Sound Levels [dBA], Without Mitigation

Prediction Location	Description	Daytime $L_{EQ\ (16\ hour)}$ At Facade Road / Rail / Total	Daytime in the OLA $L_{EQ\ (16\ hour)}$ Road / Rail / Total
A	Single detached dwelling backing onto railway	<55 / 63 / 64	61
B	Single detached dwelling fronting interior roadway	<55 / 57 / 58	<55
C	3-Storey apartment adjacent to Mill Street	<55 / <55 / 56	<55
D	4-plex bungalow adjacent to railway	<55 / 61 / 61	60
E	3-storey building fronting Asphodel 10th Line	<55 / <55 / 52	<55

Note: façade sound levels include whistle noise

Table 5: Nighttime Predicted Traffic Sound Levels [dBA], Without Mitigation

Prediction Location	Description	Nighttime $L_{EQ\ (8\ hour)}$ At Facade Road / Rail / Total	24 hour L_{EQ}
A	Single detached dwelling backing onto railway	<50 / 67 / 67	62
B	Single detached dwelling fronting interior roadway	<50 / 60 / 60	56
C	3-Storey apartment adjacent to Mill Street	<50 / 57 / 58	56
D	4-plex bungalow adjacent to railway	<50 / 64 / 64	59
E	3-storey building fronting Asphodel 10th Line	<50 / 55 / 55	50

Note: façade sound levels include whistle noise

5 TRAFFIC NOISE 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 1.

5.1 Outdoor Living Areas

General Recommendations

As a general recommendation for residential developments adjacent to a principal mainline, CP Railway recommends a minimum 5.5 m barrier (2.5 m berm and 3.0 m acoustic wall on top above the top of the property line) as indicated in Appendix A. A combination of a crash wall with an acoustic wall on top may also be used. The safety berm is generally required in the event of a derailment. A safety berm is typically not required next to the SWM facility. The concept draft plan shows a proposed safety berm and acoustic fence buffer area along the railway.

Dwellings Adjacent to the Railway

The predicted daytime sound levels in the potential OLA's of the dwellings adjacent to the railway will be in the range of 60 to 61 dBA if the dwellings back onto the railway. These levels are in excess of the MECP's limit of 55 dBA. Physical mitigation in the form of an acoustic barrier is required to address these excesses.

A 5.5 m high barrier along the railway, the location of which is shown on the concept plan, will reduce the sound levels to 56 dBA at potential OLA's of dwellings adjacent to the railway (prediction locations [A] and [D]), which are within the MECP's allowable exceedance range of 5 dBA. CP rail has accepted sound levels up to 60 dBA in the past.

When grading plans are available, the acoustic barrier heights should be refined.

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.

5.2 Minimum Setback Distance

CP guidelines stipulates a minimum setback distance of 30 m between new dwellings and the railway 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

Air Conditioning

The predicted future sound levels outside the top storey windows of the dwellings adjacent to the railway will be greater than 60 dBA during nighttime hours and/ 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 indicated 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 top storey windows of the dwellings with some exposure to the railway 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, the MECP guidelines recommend that these dwellings should be designed with a provision for the installation of central air conditioning in the future, at the occupant's discretion. 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. The installation of central air conditioning for these units will meet and exceed ventilation requirements.

5.4 Building Façade Constructions

The predicted sound levels at the dwellings adjacent to 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 1.

Calculations were performed to determine the acoustical insulation factors (AIF) 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 CP guidelines, the proposed dwellings directly adjacent to the railway line with a 24 hour L_{EQ} greater than 60 dBA will require a minimum of brick veneer or masonry equivalent construction for the exterior walls from the foundation to rafters.

Acoustical Requirements for Glazing

The required building components are selected based on the combined sound level for road and rail traffic. A summary of the STC requirements is given in Table 6 for the dwelling façades, based on the possibility of sound entering the

building through walls, windows and doors for all of the 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 room and 40% (30% fixed, 10% operable) for bedrooms were assumed to determine preliminary window STC ratings required to mitigate road and rail traffic noise levels.

Table 6: Required Minimum Glazing STC for Specific Building Façades

Prediction Location	Description	Space	Minimum Glazing STC
A, D	Low density dwelling adjacent to railway All Other Rooms	*Living/Dining	STC-29
		*Bedroom	STC-36
--	Other dwellings	+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.

Sample window assemblies which may achieve the STC requirements are summarized in Table 7 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 6 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 7: Sample Glazing Assemblies for STC Requirements

STC Requirements	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

In Table 7, the number outside parentheses indicate minimum pane thicknesses in millimetres and the number in parentheses indicates the minimum inter-pane gap in millimetres.

Further Analysis

When detailed floor plans and building elevations are available for the dwelling units adjacent to the railway, window glazing construction should be refined based on actual window to floor area ratios and the exterior wall construction should be verified to be brick veneer or a masonry equivalent.

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, as indicated on Figure 2. 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 15, 2022 to March 22, 2022. Vibration measurements were obtained for 5 trains operating on the CP railway. The results of the measurements are presented in Table 8, showing the maximum vibration level measurements during each of the train pass-bys. Figures 4 to 9 show the pass-bys of 5 trains.

Table 8: Maximum RMS Vibration Velocity Measurements of Train Pass-bys

Train Pass-by	Measured Vibration Level (mm/s)	Criteria (mm/s)
1	0.08	0.14
2	0.08	
3	0.06	
4	0.08	
5	0.09	

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

6 MECP GUIDELINES FOR LAND USE COMPATIBILITY AND DISTANCE SEPARATION

MECP Guidelines D-1, 'Land Use Compatibility' and D-6 'Compatibility Between Industrial Facilities and Sensitive Land Uses' were prepared to address the potential incompatibility of industrial land uses and noise sensitive land uses in relation to land use approvals under the Planning Act. They recommend that studies be conducted to investigate the feasibility of providing sufficient mitigation when noise sensitive land uses are proposed within the potential zone of influence of an existing industry/commercial facility. The mitigation can be provided at the source, or can be incorporated on the development lands where the industrial/commercial facility is operating in compliance with legislated Ministry requirements.

In planning a sensitive land use near an existing industrial/commercial area, guideline D-6 suggests certain potential zones of influence for the industry, depending on the characterization of that industry. Three classes of industry are defined, as follows:

Class I Industrial Facility

A place of business for a small scale, self-contained plant or building which produces/stores a product which is contained in a package and has a low probability of fugitive emissions. Outputs are infrequent, and could be point source or fugitive emissions for any of the following: noise, odour, dust and/or vibration. There are daytime operations only, with infrequent movement of products and/or heavy trucks and no outside storage.

Class II Industrial Facility

A place of business for medium scale processing and manufacturing with outdoor storage of wastes or materials (i.e. it has an open process) and/or there are periodic outputs of minor annoyance. There are occasional outputs of either point source or fugitive emissions for any of the following: noise, odour, dust and/or vibration, and low probability of fugitive emissions. Shift operations are permitted and there is frequent movement of products and/or heavy trucks during daytime hours.

Class III Industrial Facility

A place of business for large scale manufacturing or processing, characterized by: large physical size, outside storage of raw and finished products, large production volumes and continuous movement of products and employees during daily shift operation. It has frequent outputs of major annoyance and there is high probability of fugitive emissions.

For screening purposes, guideline D-6 outlines some potential influence areas for the different classes of industry, as follows. Outside these potential influence areas, it is unlikely that an industry which has been appropriately classified will have significant impact.

Class I – 70 metres
Class II – 300 metres
Class III – 1000 metres

Guideline D-6 acknowledges that the actual influence areas may be less, subject to site specific studies performed in accordance with guideline NPC-300, "Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning". Notwithstanding the actual influence area of an industry, in order to minimize the potential for future land use conflicts, the MECP recommends that certain minimum separation distances be respected, as follows:

Class I – 20 metres
Class II – 70 metres
Class III – 300 metres

The MECP recognizes that these minimum separation distances may not always be viable in certain cases, particularly in those cases of redevelopment, infilling and mixed-use areas, where the zoning or official plan has left no available land buffer. In those instances, the overall feasibility of the proposal is based on the anticipated adverse effects from the industrial/commercial use, including any mitigative measures that might be applied to address anticipated impacts.

6.1 Separation Distances to Adjacent Industries

To the north of the site area is a wood processing shop/sawmill (Richard Lutes Cedar Inc), located approximately 20 m away from the northerly development site property line and across the railway line. Figure 9 shows the setback distances of 20 m and 70 m from the sawmill property. Further north of the site is a car parts store (Norwood Auto Wreckers) located approximately 300 m away. To the northwest of the site is a wood product store (Smart Log), located approximately 250 m away. These industries may be classified as Class II industries, as they have some outdoor storage of goods with some open processes.

Accordingly, the proposed development site falls outside of the minimum separation distance of 70 m to the adjacent industries, with the exception of the wood processing shop north of the site located 20 m away from the site's northerly property line. The proposed development site is within the potential

influence area of the wood processing shop and the wood product store. While on site, HGC Engineering observed the acoustical environment and have identified that sound emissions from the wood processing shop may impact the proposed development. Sounds from the wood product store were not audible and are not expected to impact the proposed development. An assessment of stationary noise of the wood processing shop is contained in the following Section to determine the noise impact on the development site.

7 STATIONARY SOURCE ASSESSMENT

Noise sources associated with industrial and commercial facilities, such as the wood processing shop, 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 below.

7.1 Criteria Governing Stationary (Industrial) Noise Sources

An industrial or commercial facility is classified in MECP guidelines as a stationary source of sound (as opposed to sources such as traffic or construction, for example) for noise assessment purposes. 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 the daytime, and natural sounds during the nighttime.

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 (07:00 to 19:00) and evening (19:00 to 23:00) hours, and 45 dBA during nighttime hours (23:00 to 07:00) at the plane of window. For outdoor points of reception, the exclusionary minimum sound levels are 50 dBA during daytime hours (07:00 to 19:00) and 45 dBA during evening hours (19:00 – 23:00). 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. To ensure a conservative analysis, 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. Trucking activities have not been included in this assessment since they will occur on an infrequent basis.

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.

7.2 Stationary Source Noise Predictions

Predictive noise modelling was used to assess the sound impact of the nearby wood processing facility at the most critically impacted façades of the proposed development in accordance with MECP guidelines. The noise prediction model was constructed based sound measurements of wood-cutting saws conducted during the site visit, site observations, review of satellite aerial photos, and estimates of sound emission levels of front-end loaders taken from similar past HGC Engineering project files.

Table 9: Source Sound Power Levels [dB re 10-12 W]

Source	Octave Band Centre Frequency [Hz]								Overall [dBA]
	63	125	250	500	1k	2k	4k	8k	
Wood Saw*	95	99	97	103	102	97	90	86	110
Front-end Loader	113	108	104	102	103	100	95	90	107

Note: *a 5 dB tonal penalty has been applied, and included in the shown sound power levels

The above data were inputted into a predictive computer model. The software used for this purpose (*Cadna-A version 2023, build: 197.5343*) 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.

The following information and assumptions were used in the analysis.

- The wood processing facility includes areas west and east of Asphodel 10th Line and north of the railway line.
- As per Richard Lutes Cedar Inc. personnel, up to 3 saws and 2 front-end loaders may operate in the facility.
- Closest proposed dwelling façade to the wood processing facility are assumed to be located at the 70 m setback distance line and is shown as R1 in Figure 9. R2 shows the closest façade at 30 m from the railway right-of-way. As a conservative approach, R1 and R2 are assessed as 3-storey buildings.
- Location of the noise sources are shown in Figure 9, with green crosses showing the wood saws, and the green area showing the front-end-loader.

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

Assumed daytime worst-case scenario:

- 3 saws each operating for 20 minutes out of an hour.
- 2 front-end loaders operate for up to 20 minutes out of an hour.

Assumed evening/nighttime worst-case scenario:

- Facility not in operation, as per Richard Lutes Cedar personnel.

7.3 Results

The unmitigated sound levels due to stationary noise sources associated with the wood processing shop at the most critical receptor of the proposed development (locations R1 and R2, as described above) are summarized in Table 10 and presented graphically in Figure 10.

Table 10: Predicted Sound Levels from the Nearby Wood Processing Shop on the Proposed Residential Development [dBA], <u>without</u> mitigation

	Daytime at Façade (07:00 – 19:00)	Daytime at OLA (07:00 – 19:00)	Criteria (Daytime)
R1 at 1st storey	**51**	**51**	50
R1 at 2nd storey	**52**		
R1 at 3rd storey	**52**		
R2 at 1st storey	**53**	**54**	
R2 at 2nd storey	**54**		
R2 at 3rd storey	**54**		

Note: **Bold** numbers indicate excess over the applicable criteria.

The results of the calculations indicate that the predicted sound levels due to the operation of the wood processing shop has the potential to exceed the MECP limits at the façades of the proposed dwellings south of the railway line (at R1) during a worst-case operational scenario. Mitigation is required.

7.4 Mitigation

As discussed in Section 5.1, a 5.5 m high acoustic barrier adjacent to the railway line is required to mitigate railway noise in the outdoor living area (OLAs). To address the sound level excesses due to the operation of the wood processing shop, this 5.5 m high acoustic barrier adjacent to the railway line and a 70 m setback distance from the sawmill will also reduce the sound levels at the proposed 3-storey dwellings and OLA's at the development site to within MECP limits.

Alternatively, if the proposed dwellings in the medium-density block closest to the sawmill are 2-storeys or 1-storey in height, the 5.5 m high acoustic barrier and a 30 m setback from the CP railway will reduce sound levels at the proposed dwellings to within MECP limits. Figure 11 shows the mitigated sound levels of the wood processing shop at the proposed development. The mitigated sound levels are also shown below in Table 11.

Table 11: Predicted Sound Levels from the Nearby Wood Processing Shop on the Proposed Residential Development [dBA], <u>with</u> mitigation

	Daytime at Façade (07:00 – 19:00)	Daytime at OLA (07:00 –19:00)	Criteria (Daytime)
R1 at 1st storey	45	45	50
R1 at 2nd storey	48		
R1 at 3rd storey	50		
R2 at 1st storey	46	46	
R2 at 2nd storey	50		
R2 at 3rd storey	**52**		

Note: **Bold** numbers indicate excess over the applicable criteria.

8 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 11.

Suggested wording for future dwellings which have sound levels in excess of MECP criteria and will required central air conditioning 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 which have minor sound level excesses 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 replaced 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.

Suggested wording for future dwelling units in close proximity to institutional and commercial buildings is given below.

Type F):

> Purchasers are advised that due to the proximity of the existing commercial 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.

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

Type G):

> Warning: Canadian Pacific 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. CPR 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.

9 SUMMARY AND RECOMMENDATIONS

The following list and Table 12 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.

For Traffic Noise

1. A 5.5 m high acoustic barrier (2.5 m safety berm and 3.0 m acoustic fence) is required along the railway, as shown on Figure 3. When grading plans are available, acoustic barrier heights should be refined.

2. Central air conditioning will be required for dwellings adjacent to the railway.

3. Forced air ventilation systems with ductwork sized for future installation of central air conditioning systems will be required for the dwellings with some exposure to the railway.

4. Upgraded building constructions are required for the dwellings adjacent to the railway, as detailed in Section 5.3. 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.

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

For Stationary Noise

6. If the medium-density dwellings (specifically, the 29 4-plex bungalow units) closest to the sawmill are 3-storeys in height, the 5.5 m high acoustic barrier (2.5 m safety berm and 3.0 m acoustic fence), same as the one mentioned above and in Section 5.1, and a 70 m setback distance from the sawmill will be required to mitigate the noise from the nearby wood processing shop to the north. When grading plans are available, acoustic barrier heights should be refined.

7. Alternatively, if those dwellings closest to the sawmill are 2-storeys or 1-storey in height, a reduced distance setback is feasible. In this case, a 5.5 high acoustic barrier, same as the one mentioned in Section 5.1, and a 30 m setback distance from the CP railway right-of-way will be required to mitigate the noise from the sawmill. When grading plans are available, acoustic barrier heights should be refined.

Table 12: Summary of Noise Control Requirements and Noise Warning Clauses

Building	Location	Acoustic Barrier	Ventilation Requirements*	Type of Warning Clause	Upgraded Glazing Constructions**
A, D	Dwellings adjacent to railway	✓	Central A/C	A, C, D, F, G	LR/DR: STC-29 BR: STC-36
B, C	Dwellings with some exposure to the railway	--	Forced Air	B, E, F, G	OBC
E, F	Other dwellings	--	--	F, G	OBC

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

** Units adjacent to the railway will also require exterior wall construction of brick veneer or masonry equivalent.

✓ Outdoor living areas require acoustic barriers. Refer to Section 5.1

OBC – Ontario Building Code LR/DR – Living Room/Dining Room BR – Bedroom

9.1 Implementation

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

1. When grading information is available, the acoustic barrier heights should be refined.

2. 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.

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

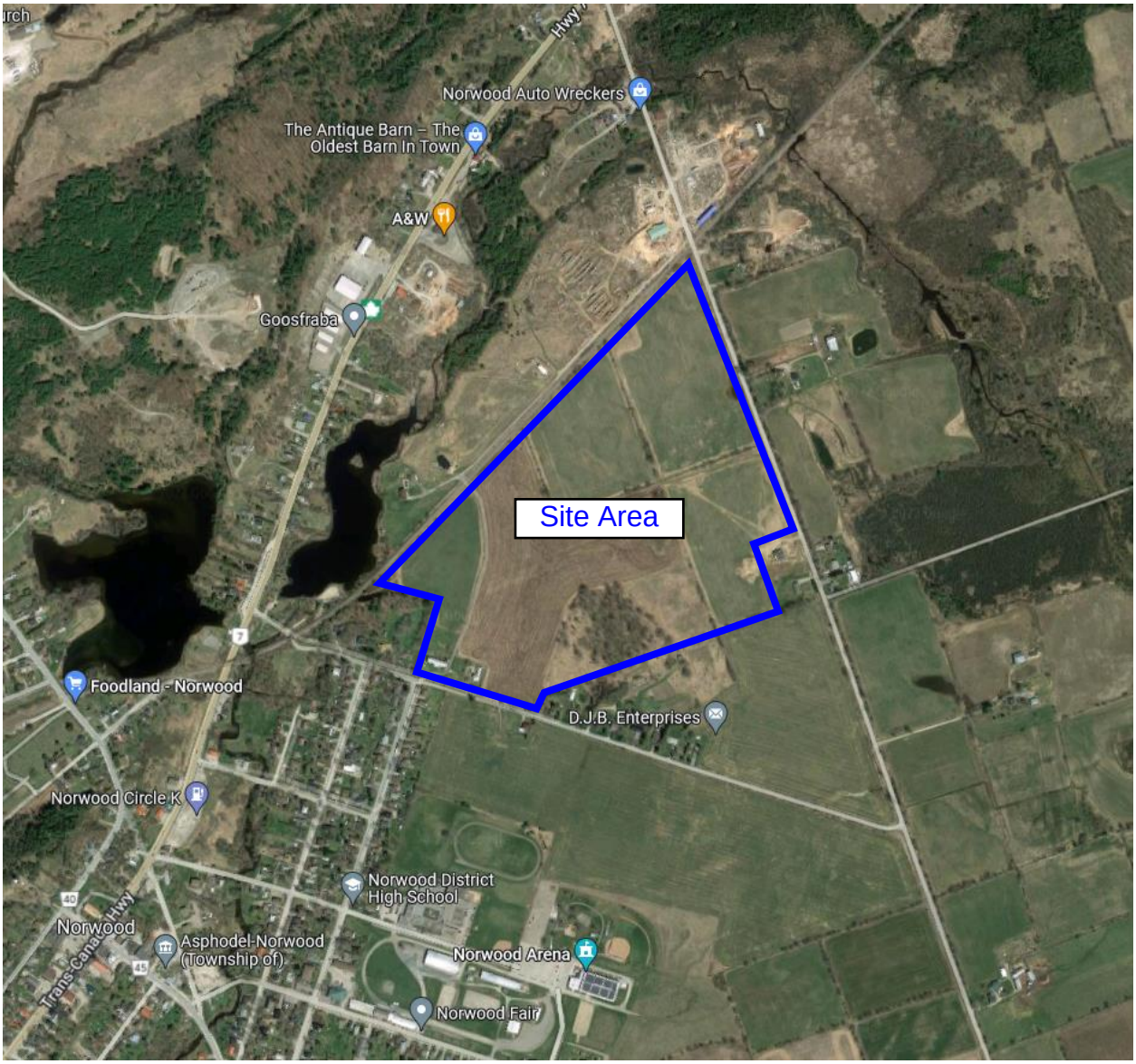


Figure 1: Key Plan

DEVELOPMENT SITE PLAN

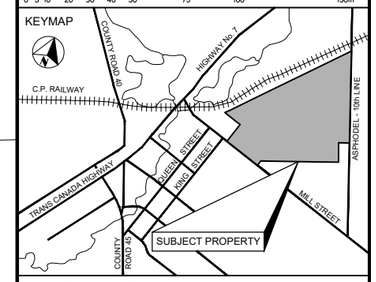
UPPER MILL POND

PART OF BLOCK H, REGISTERED PLAN 6
FORMERLY VILLAGE OF NORWOOD
AND PART OF LOTS 17, 18 AND 19
CONCESSION 9
GEOGRAPHIC TOWNSHIP OF ASPHODEL
TOWNSHIP OF ASPHODEL-NORWOOD
COUNTY OF PETERBOROUGH

SCALE = N.T.S.

0 5 10 20 30 40 50 75 100 150m

KEYMAP



LAND USE SUMMARY

LAND USE	AREA(ha)	AREA%	UNITS	UNITS
12.2m - SINGLE DETACHED LOTS	3.41	9.6	76	
13.7m - SINGLE DETACHED LOTS	3.50	9.9	57	
15.0m - SINGLE DETACHED LOTS	3.79	10.7	66	
6.1m - 2 STOREY TOWNHOUSES (INCLUDING LANES)	3.44	9.7	134	
7.4m - BUNGALOW TOWNHOUSES	2.07	5.8	70	
LOW DENSITY TOTAL - 16.21ha				403
3 STOREY APARTMENT BUILDING WITH COMMERCIAL AT GRADE (SOUTH WEST SIDE) 1842sq.m GFA	1.08	3.0	40	
2 - 12 UNIT, 3 STOREY, STACKED TOWNHOUSE BUILDINGS	0.66	1.9	24	
MEDIUM DENSITY CONDOMINIUM BLOCK 29 - 4 PLEX BUNGALOW UNITS	4.74	13.3	116	
5 - 12 UNIT, 3 STOREY, BUILDINGS	1.21	3.4	60	
MEDIUM DENSITY TOTAL - 7.69ha				240
LANEWAY COMMON ELEMENT FOR TOWNHOUSES	0.82	2.3		
PRIVATE LANE	0.03	0.1		
PARKLAND, WALKWAYS & SERVICE EASEMENTS	1.84	5.2		
STORM WATER POND	1.75	4.9		
20.0m MUNICIPAL ROAD ALLOWANCE = 3607.0m (STREETS A, B, C, D, E, F, G & H)	7.16	20.2		
TOTAL	35.50ha	100.0%		643

LOW DENSITY RESIDENTIAL
403 UNITS/16.21ha. = 24 UNITS/ha (NET)

MEDIUM DENSITY RESIDENTIAL
240 UNITS/7.69ha. = 31 UNITS/ha (NET)

OVERALL NET DENSITY
643 UNITS/23.90ha. = 27 UNITS/ha (NET)

No.	REVISION	DATE	APP'D

DRAWN BY: L.B. | CHECKED BY: R.F.A. | DATE: DEC. 22, 2023 | SCALE: N.T.S.

METRIC NOTE:
DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO IMPERIAL BY DIVIDING BY 0.3048.

CONTOURS NOTE:
CONTOURS PROVIDED BY CANADIAN LIDAR DATA AND DRAWING AT 5.0m INTERVALS.

DECEMBER 22, 2023

JOB No. 852-DSP

RFA PLANNING CONSULTANT INC
211 Dundas Street East, Suite 202,
Belleville, Ontario, K8N 1E2

Figure 2: Concept Draft Plan Showing Prediction Locations

DEVELOPMENT SITE PLAN

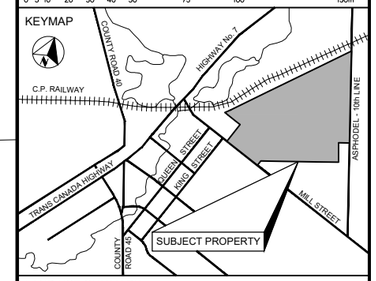
UPPER MILL POND

PART OF BLOCK H, REGISTERED PLAN 6
FORMERLY VILLAGE OF NORWOOD
AND PART OF LOTS 17, 18 AND 19
CONCESSION 9
GEOGRAPHIC TOWNSHIP OF ASPHODEL
TOWNSHIP OF ASPHODEL-NORWOOD
COUNTY OF PETERBOROUGH

SCALE = N.T.S.

0 5 10 20 30 40 50 75 100 150m

KEYMAP



Legend

- 5.5 m high Acoustic Barrier Required. See Section 5.1
- provision of central A/C by the occupant is required
- Central A/C

LAND USE SUMMARY

LAND USE	AREA(ha)	AREA%	UNITS	UNITS
12.2m - SINGLE DETACHED LOTS	3.41	9.6	76	
13.7m - SINGLE DETACHED LOTS	3.50	9.9	57	
15.0m - SINGLE DETACHED LOTS	3.79	10.7	66	
6.1m - 2 STOREY TOWNHOUSES (INCLUDING LANES)	3.44	9.7	134	
7.4m - BUNGALOW TOWNHOUSES	2.07	5.8	70	
LOW DENSITY TOTAL - 16.21ha				403
3 STOREY APARTMENT BUILDING WITH COMMERCIAL AT GRADE (SOUTH WEST SIDE) 1842sq.m GFA	1.08	3.0	40	
2 - 12 UNIT, 3 STOREY, STACKED TOWNHOUSE BUILDINGS	0.66	1.9	24	
MEDIUM DENSITY CONDOMINIUM BLOCK 29 - 4 PLEX BUNGALOW UNITS	4.74	13.3	116	
5 - 12 UNIT, 3 STOREY, BUILDINGS	1.21	3.4	60	
MEDIUM DENSITY TOTAL - 7.69ha				240
LANEWAY COMMON ELEMENT FOR TOWNHOUSES	0.82	2.3		
PRIVATE LANE	0.03	0.1		
PARKLAND, WALKWAYS & SERVICE EASEMENTS	1.84	5.2		
STORM WATER POND	1.75	4.9		
20.0m MUNICIPAL ROAD ALLOWANCE = 3607.0m (STREETS A, B, C, D, E, F, G & H)	7.16	20.2		
TOTAL	35.50ha	100.0%		643

LOW DENSITY RESIDENTIAL
403 UNITS/16.21ha. = 24 UNITS/ha (NET)

MEDIUM DENSITY RESIDENTIAL
240 UNITS/7.69ha. = 31 UNITS/ha (NET)

OVERALL NET DENSITY
643 UNITS/23.90ha. = 27 UNITS/ha (NET)

No.	REVISION	DATE	APP'D

DRAWN BY: L.B. | CHECKED BY: R.F.A. | DATE: DEC. 22, 2023 | SCALE: N.T.S.

METRIC NOTE:
DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO IMPERIAL BY DIVIDING BY 0.3048.

CONTOURS NOTE:
CONTOURS PROVIDED BY CANADIAN LIDAR DATA AND DRAWING AT 5.0m INTERVALS.

DECEMBER 22, 2023

JOB No. 852-DSP

RFA PLANNING CONSULTANT INC
211 Dundas Street East, Suite 202,
Belleville, Ontario, K8N 1E2

Figure 3: Concept Draft Plan Showing Barrier and Ventilation Requirements

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

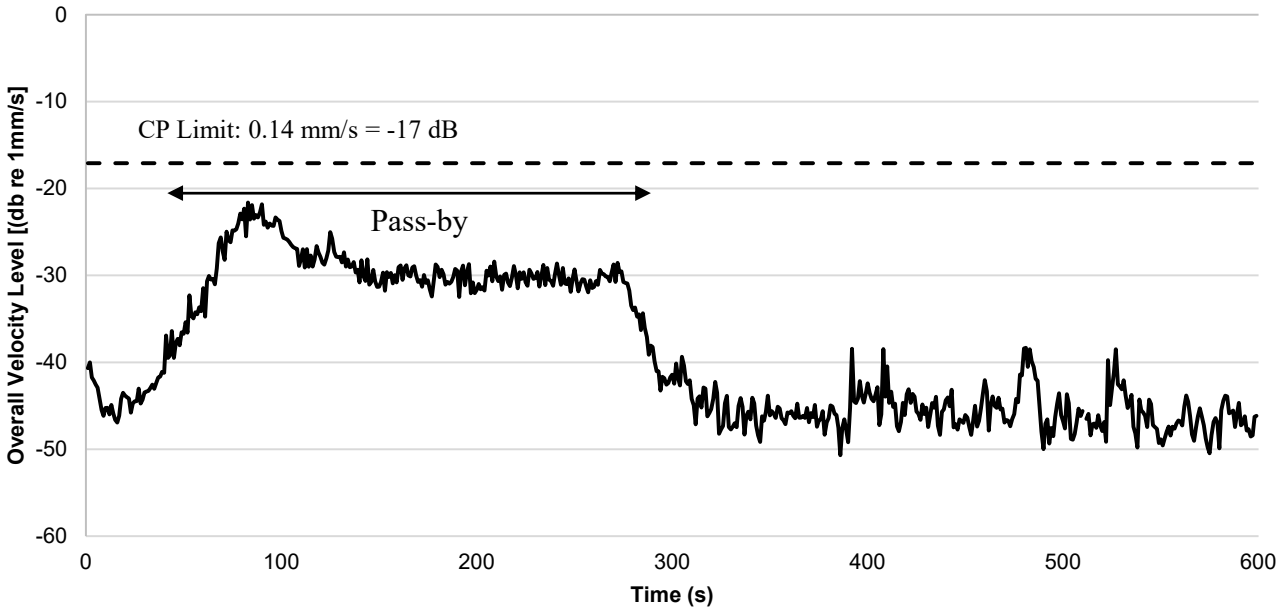


Figure 4b: Pass-by 1
Acceleration Spectrum @ Peak Level (1 sec. Duration)

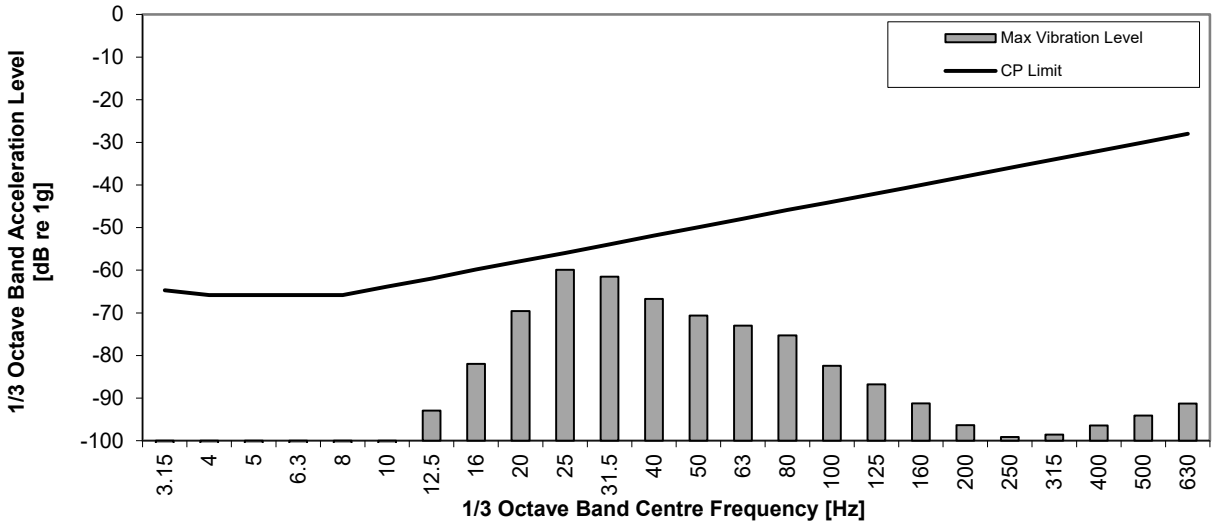


Figure 5a: Pass-by 2 at 30m from railway ROW
Measured Vibratory Velocity Level

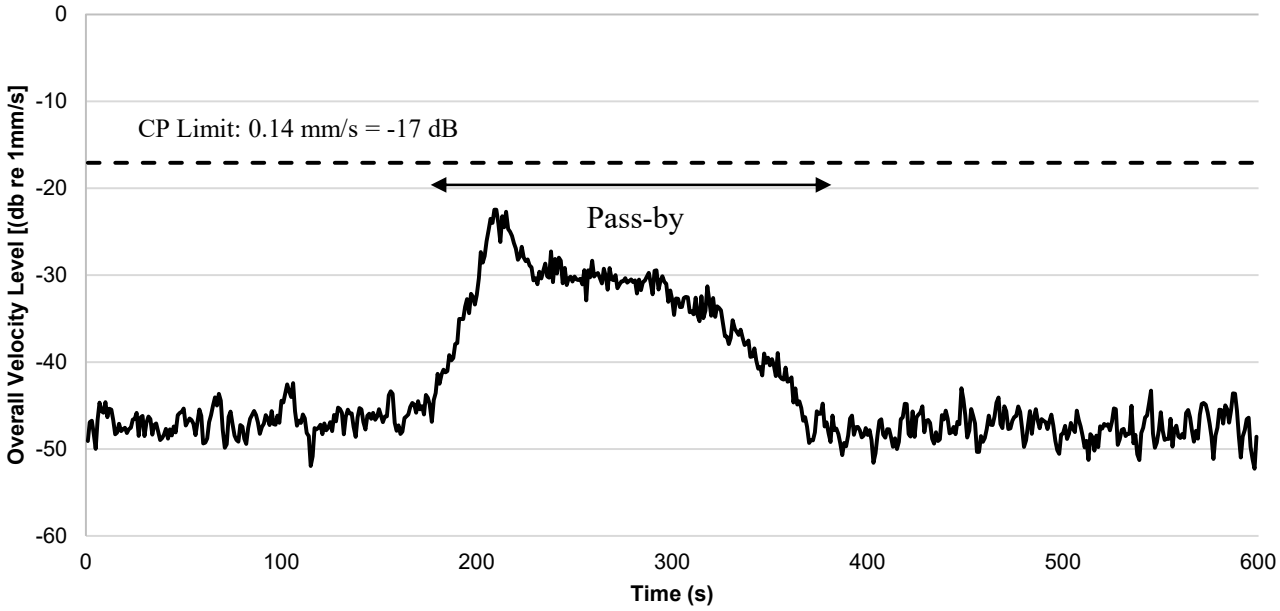


Figure 5b: Pass-by 2
Acceleration Spectrum @ Peak Level (1 sec. Duration)

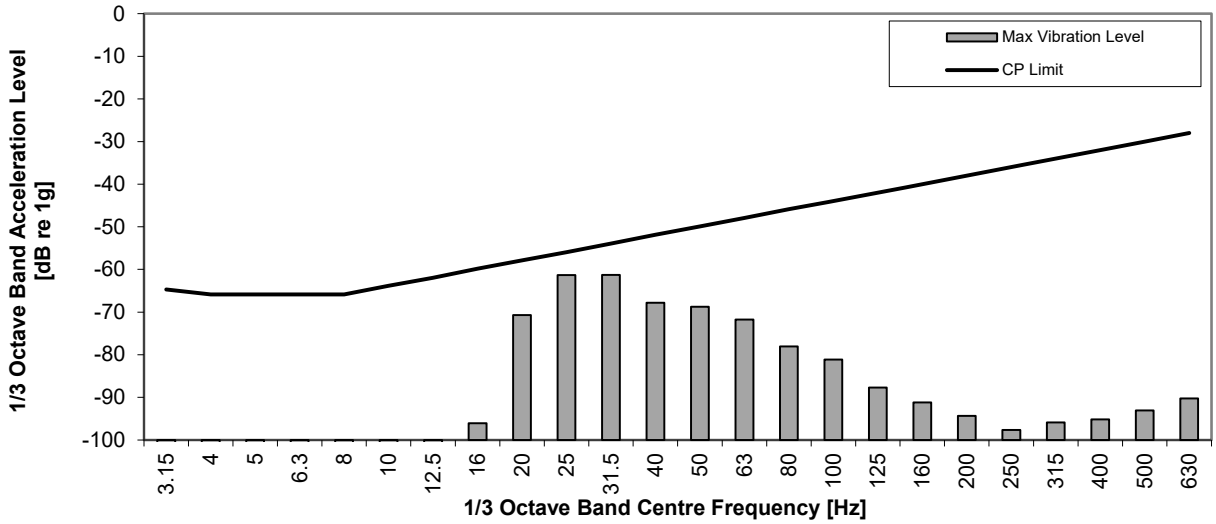


Figure 6a: Pass-by 3 at 30m from railway ROW
Measured Vibratory Velocity Level

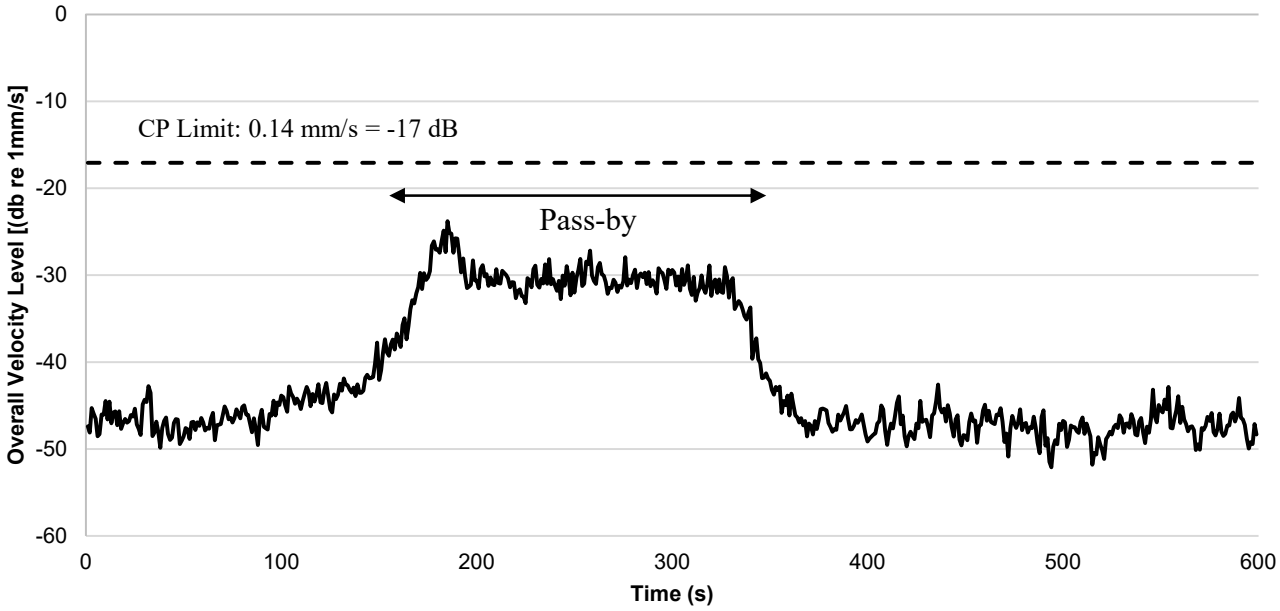


Figure 6b: Pass-by 3
Acceleration Spectrum @ Peak Level (1 sec. Duration)

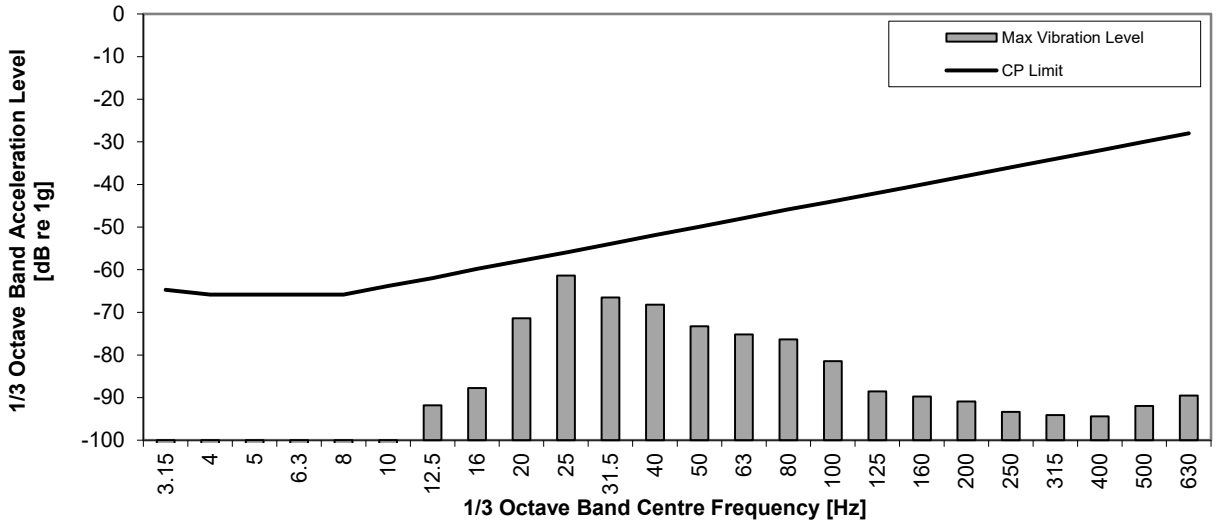


Figure 7a: Pass-by 4 at 30m from railway ROW
Measured Vibratory Velocity Level

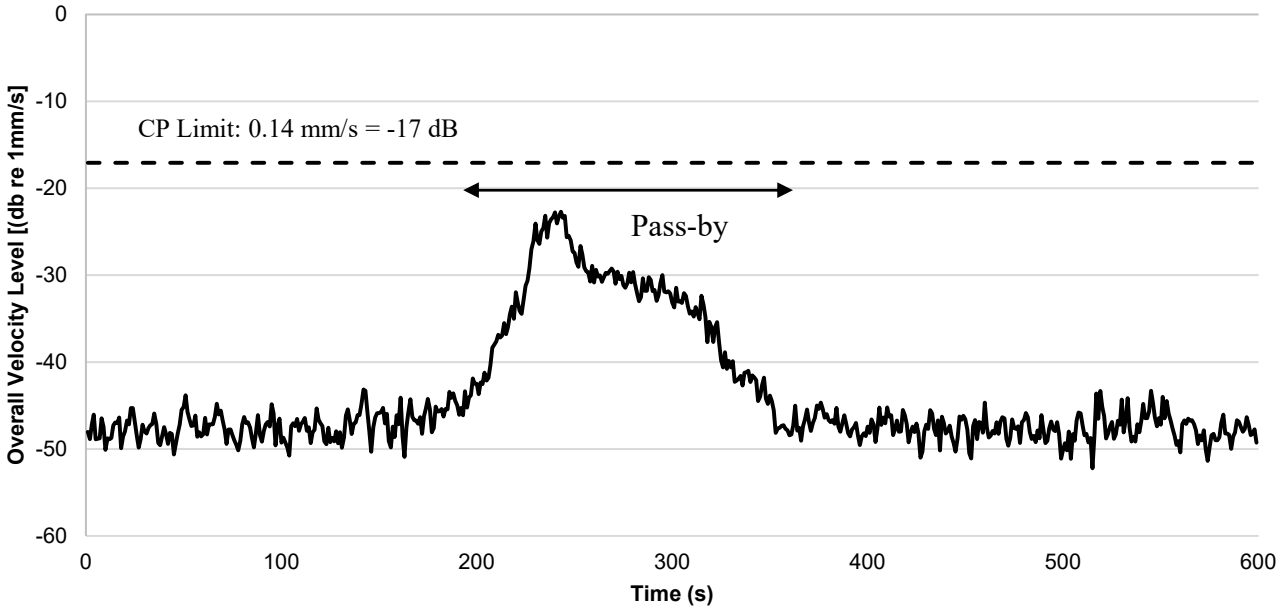


Figure 7b: Pass-by 4
Acceleration Spectrum @ Peak Level (1 sec. Duration)

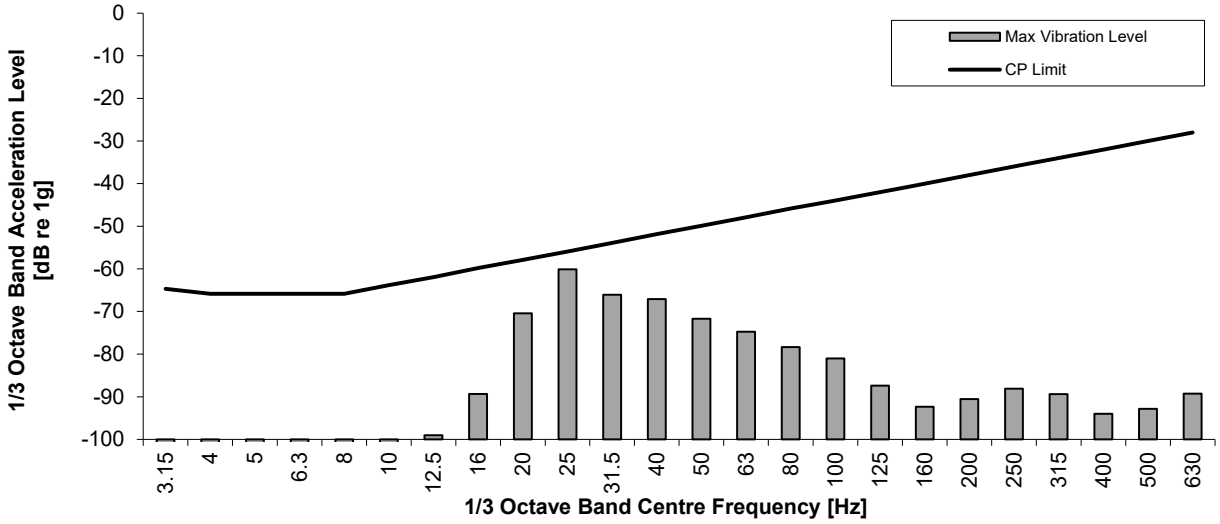


Figure 8a: Pass-by 5 at 30m from railway ROW
Measured Vibratory Velocity Level

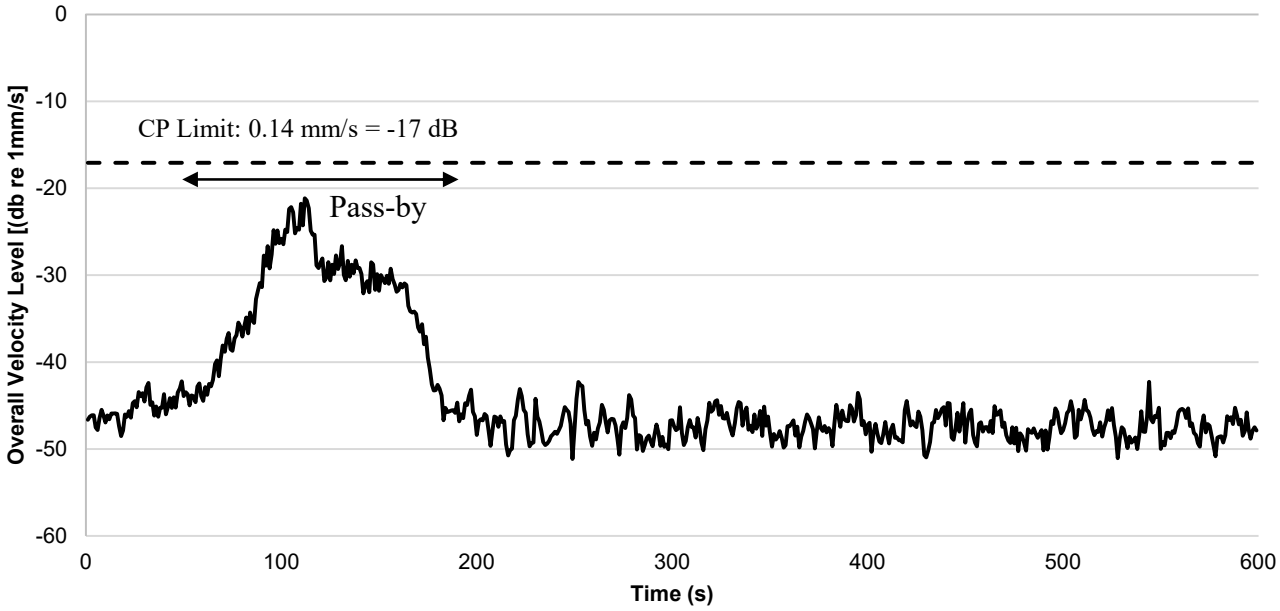
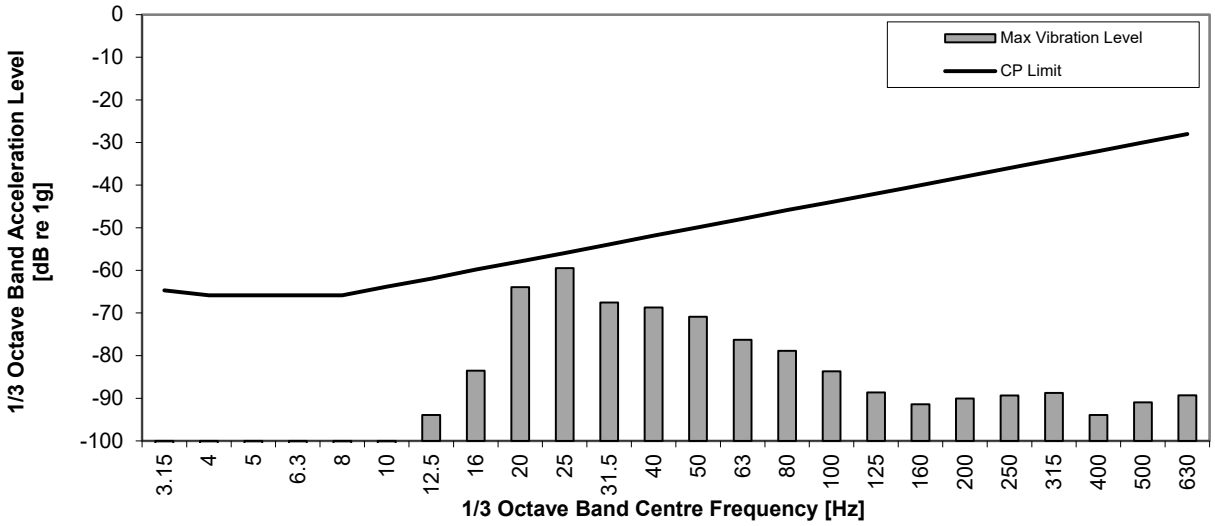


Figure 8b: Pass-by 5
Acceleration Spectrum @ Peak Level (1 sec. Duration)



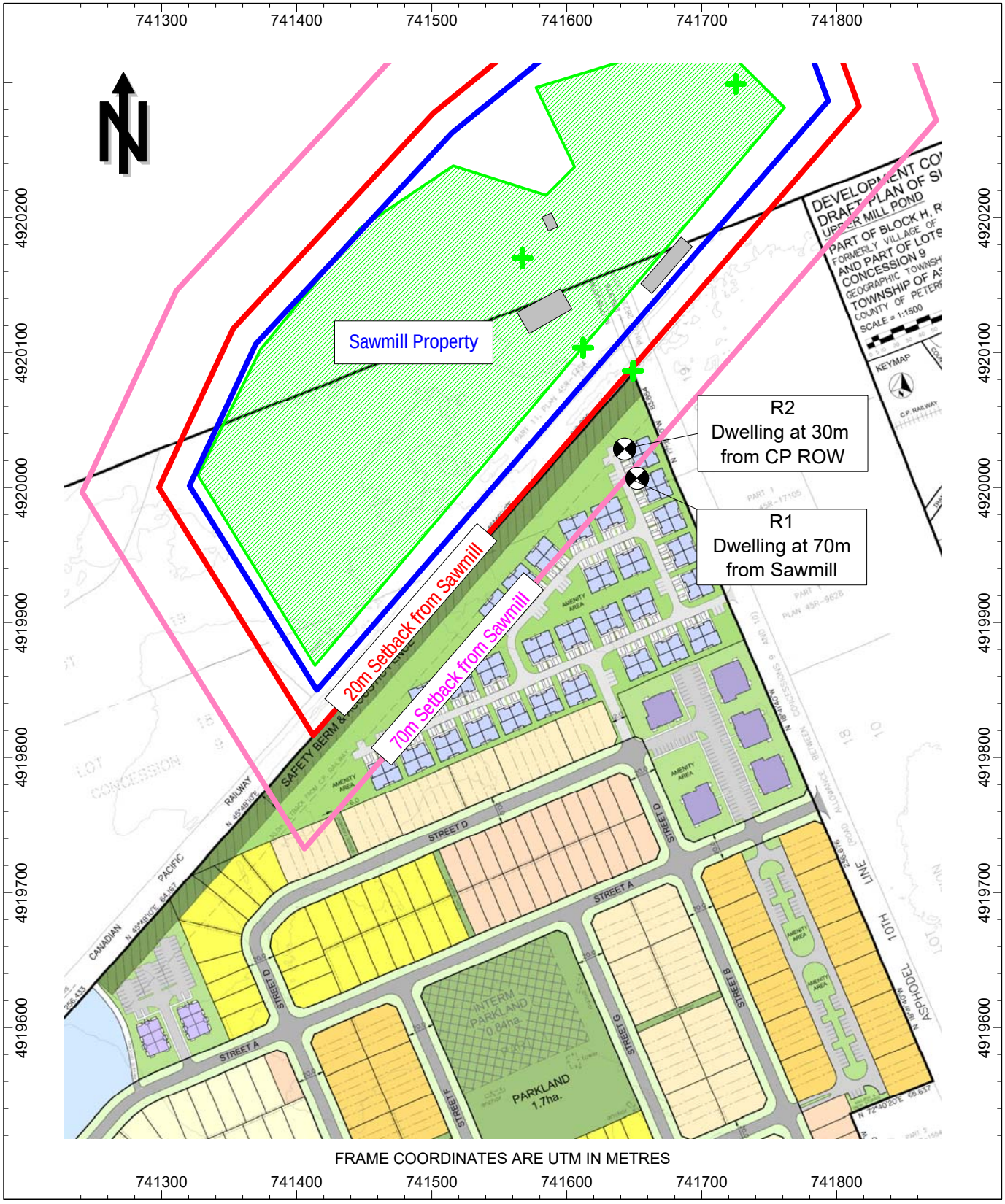


Figure 9: Location of Stationary Noise Sources, Critical Points of Reception and Setback Distances

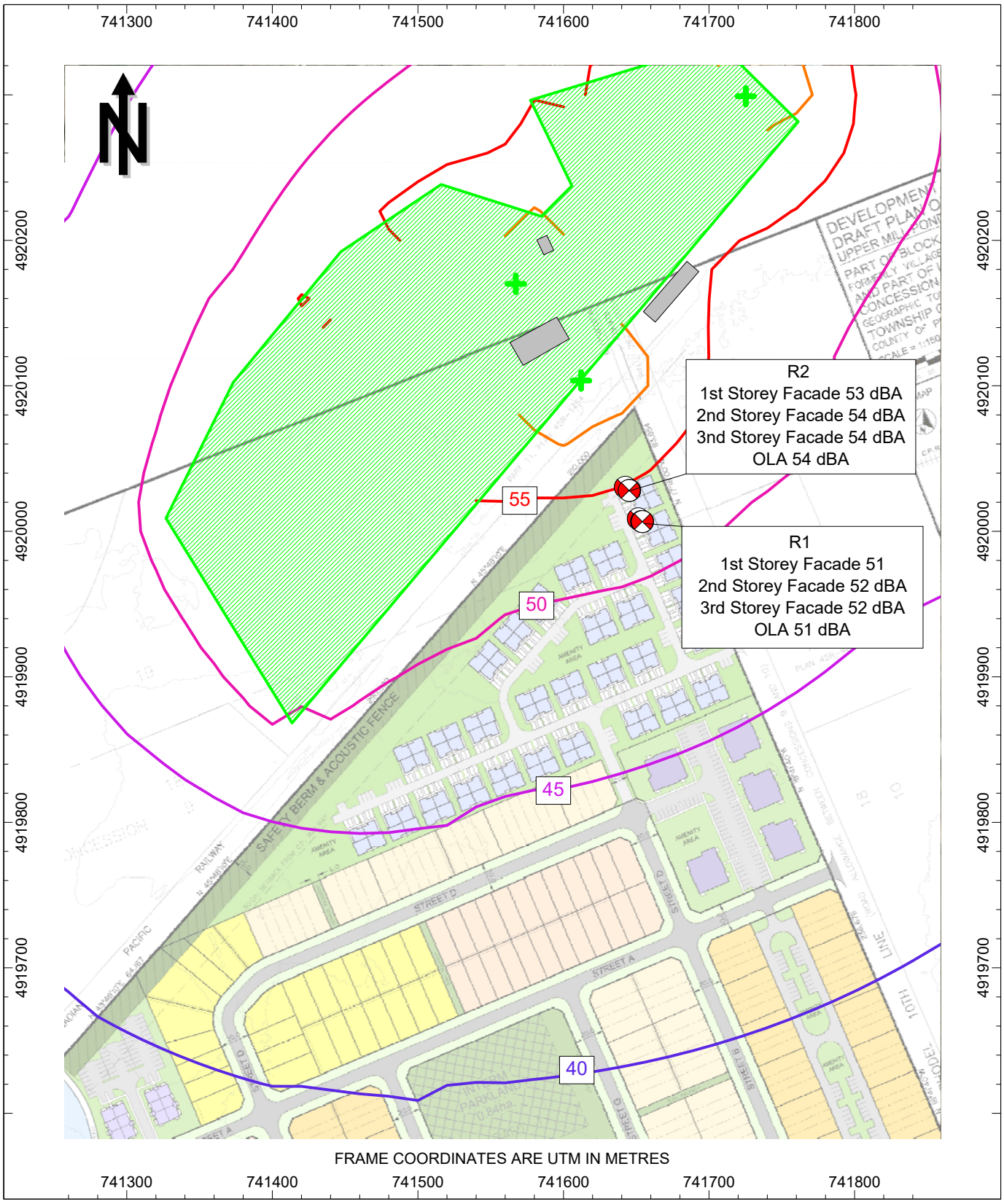


Figure 10: Stationary Noise Impact - Unmitigated
Sound Level Contours Shown for Prediction Height of 7.5m

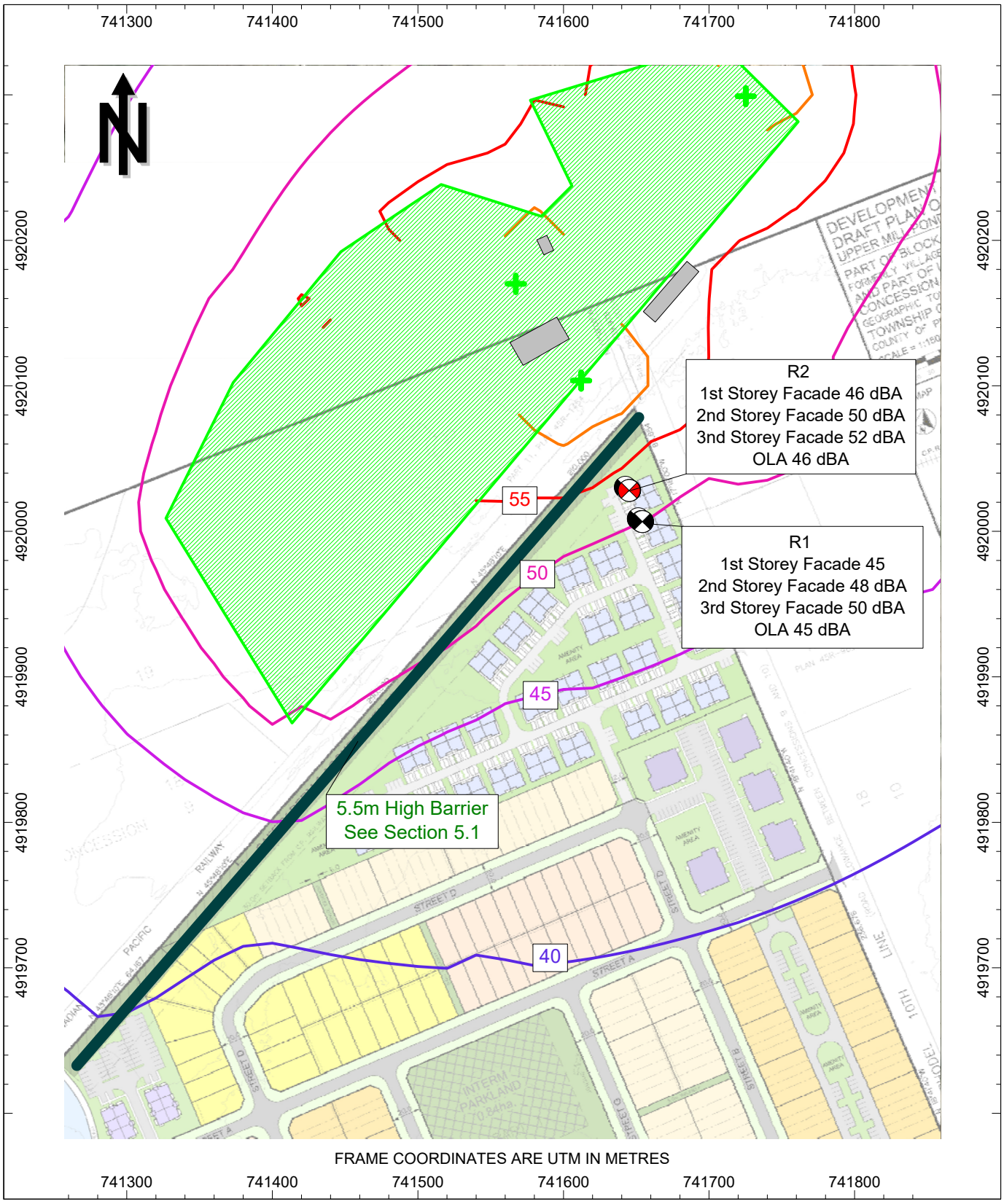


Figure 11: Stationary Noise Impact - Mitigated
Sound Level Contours Shown for Prediction Height of 7.5m

Appendix A
CP Mainline Requirements

CANADIAN PACIFIC RAILWAY

PRINCIPAL MAIN LINE REQUIREMENTS

1. Berm, or combination berm and noise attenuation fence, having extensions or returns at the ends, to be erected on adjoining property, parallel to the railway right-of-way with construction according to the following:

   a) Minimum total height 5.5 metres above top-of-rail;
   b) Berm minimum height 2.5 metres and side slopes not steeper than 2.5 to 1.
   c) Fence, or wall, to be constructed without openings and of a durable material weighing not less than 20 kg. per square metre (4 lb/sq.ft.) of surface area.

   No part of the berm/noise barrier is to be constructed on railway property.

   A clause should be inserted in all offers of purchase and sale or lease, and be registered on title or included in the lease for each dwelling affected by any noise and vibration attenuation measures, advising that any berm, fencing, or vibration isolation features implemented are not to be tampered with or altered, and further that the owner shall have the sole responsibility for and shall maintain these features.

   Dwellings must be constructed such that the interior noise levels meet the criteria of the appropriate Ministry. A noise study should be carried out by a professional noise consultant to determine what impact, if any, railway noise would have on residents of proposed subdivisions and to recommend mitigation measures, if required. The Railway may consider other measures recommended by the study.

2. Setback of dwellings from the railway right-of-way to be a minimum of 30 metres. While no dwelling should be closer to the right-of-way than the specified setback, an unoccupied building, such as a garage, may be built closer. The 2.5 metre high earth berm adjacent to the right-of-way must be provided in all instances.

3. Ground vibration transmission to be estimated through site tests. If in excess of the acceptable levels, all dwellings within 75 metres of the nearest track should be protected. The measures employed may be:

   a) Support the building on rubber pads between the foundation and the occupied structure so that the maximum vertical natural frequency of the structure on the pads is 12 Hz;
   b) Insulate the building from the vibration originating at the railway tracks by an intervening discontinuity or by installing adequate insulation outside the building, protected from the compaction that would reduce its effectiveness so that vibration in the building became unacceptable; or
   c) Other suitable measures that will retain their effectiveness over time.

4. A clause should be inserted in all offers of purchase and sale or lease and in the title deed or lease of each dwelling within 300m of the railway right-of-way, warning prospective purchasers or tenants of the existence of the Railway's operating right-of-way; the possibility of alterations including the possibility that the Railway may expand its operations, which expansion may affect the living environment of the residents notwithstanding the inclusion of noise and vibration attenuating measures in the design of the subdivision and individual units, and that the Railway will not be responsible for complaints or claims arising from the use of its facilities and/or operations.

5. 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 be reviewed by the Railway.

6. A 1.83 metre high chain link security fence be constructed and maintained along the common property line of the Railway and the development by the developer at his expense, and the developer is made aware of the necessity of including a covenant running with the lands, in all deeds, obliging the purchasers of the land to maintain the fence in a satisfactory condition at their expense.

7. Any proposed utilities under or over railway property to serve the development must be approved prior to their installation and be covered by the Railway's standard agreement.

Appendix B
Rail Traffic Data

Rank	TC Number	Railway Company	Region	Province	Access	Jurisdiction	Mile	Subdivision	Spur Mile	Spur Name	Location	Latitude	Longitude	Road Authority	Protection	Accident	Fatality	Injury	Total Trains Daily	Vehicles Daily	Train Max Speed (mph)	Road Speed (km/h)	Lanes	Tracks	IsUrban
15797	22816	CP	ONT	ON	Public	F	98.73	Havelock - CP			10Th Concession Rd	44.3939	-77.9658	Asphodel-Norwood (ON)	Active - FLB	0	0	0	1	200	10	50	2	1	Y

Appendix C
Road Traffic Data

Year	Highway	Location Description	Dist (KM)	Pattern Type	AADT	SADT	SWADT	WADT	Truck AADT	Total Collisions	Total CR	Trucks Collisions	Truck CR
2021	7	MARMORA E LTS MALONEY ST START OF NA	1.3										
1988	7	CROWE R BR (N)	16.3	IR	5,100	6,650	5,600	4,100	460	17	0.6	0	0.0
1989	7			IR	5,350	6,900	5,950	4,400	480	10	0.3	1	0.0
1990	7			IR	5,700	7,250	6,350	4,650	510	19	0.6	3	0.1
1991	7			IR	5,900	7,450	6,550	4,900	530	18	0.5	4	0.1
1992	7			IR	5,900	7,250	6,500	5,000	530	26	0.7	2	0.1
1993	7			IR	5,900	7,250	6,100	4,850	530	22	0.6	1	0.0
1994	7			IR	5,850	7,200	6,450	4,900	530	19	0.5	1	0.0
1995	7			IR	5,500	6,750	6,050	4,700	500	29	0.9	3	0.1
1996	7			LT	5,950	8,400	8,200	4,350	540	14	0.4	3	0.1
1997	7			LT	6,100	8,600	8,400	4,500	550	15	0.4	0	0.0
1998	7			LT	6,200	8,700	8,500	4,550	560	18	0.5	1	0.0
1999	7			LT	5,500	7,650	7,500	4,000	500	20	0.6	3	0.1
2000	7			LT	5,500	7,650	7,500	4,000	500	21	0.6	3	0.1
2001	7			LT	5,350	7,500	7,300	3,900	800	23	0.7	0	0.0
2002	7			LT	5,100	7,150	6,950	3,750	760	19	0.6	4	0.1
2003	7			LT	5,150	7,100	6,950	3,800	770	26	0.8	4	0.1
2004	7			LT	5,050	7,050	6,900	3,700	760	26	0.9	4	0.1
2005	7			LT	4,850	6,650	6,500	3,550	680	22	0.8	2	0.1
2006	7			LT	4,150	5,700	5,550	3,050	580	22	0.9	0	0.0
2007	7			LT	4,450	6,100	6,300	3,250	440	21	0.8	1	0.0
2008	7			IR	4,700	5,700	5,600	4,000	800	16	0.6	1	0.0
2009	7			IR	5,100	6,100	5,550	4,350	870	28	0.9	1	0.0
2010	7			IR	5,300	6,300	5,750	4,500	900	18	0.6	2	0.1
2011	7			IR	5,150	6,150	6,000	4,400	880	9	0.3	0	0.0
2012	7			IR	5,600	6,650	6,500	4,800	950	19	0.6	2	0.1
2013	7			IR	5,700	6,800	7,300	4,850	970	16	0.5	1	0.0
2014	7			CTR	5,600	6,850	6,900	4,750	710	17	0.5	2	0.1
2015	7			CTR	4,950	6,050	6,100	4,200	630	24	0.8	1	0.0
2016	7			CTR	4,900	6,000	6,050	4,150	620	22	0.8	2	0.1
2017	7			CTR	4,900	6,550	6,500	4,000	620	24	0.8	0	0.0
2018	7			CTR	4,850	6,500	6,450	3,950	620	15	0.5	0	0.0
2019	7			CTR	4,800	6,400	6,350	3,900	610	24	0.8	0	0.0
2021	7			CTR	4,750	6,200	6,150	3,900	620	21	0.7	5	0.2
2021	7	HAVELOCK E LT C8 9 MARY ST START OF NA	1.8										
1988	7	RAILWAY CROSSING	9.1	IR	6,750	8,800	7,450	5,400	610	14	0.6	3	0.1
1989	7			IR	7,000	9,050	7,750	5,750	770	17	0.7	5	0.2
1990	7			IR	7,650	9,700	8,500	6,250	840	15	0.6	2	0.1
1991	7			IR	7,900	9,950	8,750	6,550	870	16	0.6	0	0.0
1992	7			IR	7,400	9,100	8,150	6,300	810	22	0.9	5	0.2
1993	7			IR	7,400	9,100	7,650	6,050	810	15	0.6	2	0.1

Year	Highway	Location Description	Dist (KM)	Pattern Type	AADT	SADT	SWADT	WADT	Truck AADT	Total Collisions	Total CR	Trucks Collisions	Truck CR
1994	7			IR	5,850	7,200	6,450	4,900	640	16	0.8	0	0.0
1995	7			IR	5,500	6,750	6,050	4,700	600	16	0.9	2	0.1
1996	7			LT	5,950	8,400	8,200	4,350	650	11	0.6	2	0.1
1997	7			LT	6,100	8,600	8,400	4,500	730	12	0.6	2	0.1
1998	7			LT	6,200	8,700	8,500	4,550	740	11	0.5	0	0.0
1999	7			LT	6,300	8,750	8,550	4,600	760	14	0.7	3	0.1
2000	7			LT	6,450	9,000	8,800	4,700	770	20	0.9	2	0.1
2001	7			LT	6,700	9,400	9,100	4,900	940	18	0.8	1	0.0
2002	7			LT	6,700	9,350	9,100	4,900	670	12	0.5	0	0.0
2003	7			LT	7,000	9,650	9,400	5,150	980	10	0.4	1	0.0
2004	7			LT	7,100	9,950	9,650	5,200	990	13	0.5	0	0.0
2005	7			IR	7,400	8,950	8,100	6,300	1,050	21	0.9	1	0.0
2006	7			IR	7,450	9,000	8,150	6,350	820	10	0.4	1	0.0
2007	7			IR	7,600	9,200	9,200	6,450	840	20	0.8	0	0.0
2008	7			IR	7,750	9,400	9,200	6,600	780	18	0.7	2	0.1
2009	7			IR	7,900	9,500	8,600	6,700	790	14	0.5	0	0.0
2010	7			IR	8,050	9,600	8,750	6,850	800	13	0.5	0	0.0
2011	7			IR	8,200	9,800	9,600	7,000	820	18	0.7	3	0.1
2012	7			IR	8,350	9,950	9,650	7,150	840	11	0.4	4	0.1
2013	7			IR	8,500	10,100	10,900	7,250	850	13	0.5	2	0.1
2014	7			IR	8,650	10,300	10,300	7,350	860	10	0.3	0	0.0
2015	7			IR	8,800	10,500	10,500	7,500	880	15	0.5	4	0.1
2016	7			IR	8,950	10,700	10,700	7,600	900	8	0.3	0	0.0
2017	7			IR	9,000	10,600	10,600	8,050	900	10	0.3	2	0.1
2018	7			IR	9,250	10,900	10,900	8,250	920	5	0.2	0	0.0
2019	7			IR	9,400	11,000	11,000	8,400	940	11	0.4	3	0.1
2021	7			IR	9,700	11,300	11,400	8,650	970	8	0.2	1	0.0
1988	7	PETERBOROUGH RD 45	9.9	IR	6,550	8,500	7,200	5,250	980	21	0.9	0	0.0
1989	7			IR	7,000	9,050	7,750	5,750	1,050	28	1.1	3	0.1
1990	7			IR	7,450	9,450	8,250	6,100	1,100	30	1.1	4	0.1
1991	7			IR	7,700	9,700	8,550	6,400	1,150	27	1.0	5	0.2
1992	7			IR	7,200	8,850	7,900	6,100	860	27	1.0	3	0.1
1993	7			SC	6,800	7,550	8,300	6,050	820	18	0.7	1	0.0
1994	7			SC	7,000	7,300	8,050	6,450	840	19	0.8	4	0.2
1995	7			SC	7,200	7,550	8,350	6,550	860	26	1.0	1	0.0
1996	7			LT	7,400	10,400	10,200	5,450	890	24	0.9	1	0.0
1997	7			LT	7,950	11,200	11,000	5,900	870	19	0.7	4	0.1
1998	7			LT	8,150	11,400	11,200	5,950	900	18	0.6	0	0.0
1999	7			LT	7,600	10,600	10,300	5,550	840	26	0.9	3	0.1
2000	7			LT	7,700	10,700	10,500	5,600	1,100	15	0.5	1	0.0
2001	7			LT	7,700	10,800	10,500	5,650	1,100	20	0.7	3	0.1

Year	Highway	Location Description	Dist (KM)	Pattern Type	AADT	SADT	SWADT	WADT	Truck AADT	Total Collisions	Total CR	Trucks Collisions	Truck CR
2002	7			LT	7,750	10,800	10,600	5,700	850	25	0.9	3	0.1
2003	7			LT	7,750	10,700	10,400	5,700	1,150	12	0.4	1	0.0
2004	7			LT	7,900	11,100	10,800	5,800	1,200	39	1.4	3	0.1
2005	7			IC	7,800	8,650	8,750	6,900	940	21	0.7	1	0.0
2006	7			IC	8,050	8,950	9,050	7,150	970	14	0.5	2	0.1
2007	7			IC	8,100	9,000	9,300	7,150	1,400	20	0.7	0	0.0
2008	7			CR	8,150	9,850	9,800	6,850	1,400	24	0.8	4	0.1
2009	7			CR	8,200	9,850	9,500	6,950	1,400	15	0.5	1	0.0
2010	7			CR	8,250	9,900	9,550	7,000	1,400	12	0.4	0	0.0
2011	7			CR	8,300	9,650	9,800	7,400	1,400	15	0.5	1	0.0
2012	7			CR	9,700	11,600	11,400	8,200	1,650	12	0.3	1	0.0
2013	7			CR	10,000	12,000	12,300	8,450	1,700	16	0.4	1	0.0
2014	7			CTR	10,000	12,200	12,300	8,500	1,700	19	0.5	0	0.0
2015	7			CTR	9,300	11,300	11,400	7,900	1,600	22	0.7	0	0.0
2016	7			CTR	9,400	11,500	11,600	8,000	1,600	28	0.8	3	0.1
2017	7			CTR	9,550	12,800	12,700	7,800	1,600	17	0.5	1	0.0
2018	7			CTR	9,650	12,900	12,800	7,850	1,650	16	0.5	1	0.0
2019	7			CTR	9,750	13,000	12,900	7,950	1,650	25	0.7	5	0.1
2021	7			CTR	9,950	13,000	12,900	8,100	1,700	20	0.6	2	0.1
1988	7	PETERBOROUGH RD 38 (TO WARSAW)	5.5	CR	7,300	9,350	8,750	6,050	730	8	0.5	0	0.0
1989	7			CR	8,000	10,200	9,500	6,700	800	7	0.4	2	0.1
1990	7			CR	8,600	10,700	9,900	7,750	690	6	0.3	0	0.0
1991	7			CR	8,850	10,900	10,200	7,950	710	3	0.2	0	0.0
1992	7			CR	8,700	10,700	9,900	7,850	700	9	0.5	1	0.1
1993	7			SC	8,700	9,650	10,600	7,750	700	12	0.7	2	0.1
1994	7			SC	8,950	9,300	10,300	8,250	720	9	0.5	1	0.1
1995	7			SC	9,250	9,650	10,700	8,400	740	8	0.4	0	0.0
1996	7			IC	10,000	11,200	11,300	8,900	800	13	0.6	1	0.0
1997	7			IC	10,100	11,300	11,400	8,900	810	10	0.5	3	0.1
1998	7			IC	10,300	11,500	11,500	9,150	820	7	0.3	2	0.1
1999	7			IC	9,450	10,600	10,600	8,400	760	9	0.5	2	0.1
2000	7			IC	9,600	10,800	10,800	8,550	1,350	11	0.6	1	0.1
2001	7			IC	9,600	10,700	10,800	8,500	1,350	16	0.8	3	0.2
2002	7			IC	9,700	10,800	10,900	8,550	1,350	12	0.6	0	0.0
2003	7			IC	9,750	10,900	11,000	8,650	1,050	6	0.3	1	0.1
2004	7			IC	9,900	11,100	11,100	8,750	1,100	4	0.2	0	0.0
2005	7			CR	9,900	12,000	11,500	8,350	1,100	8	0.4	0	0.0
2006	7			CR	9,950	12,100	11,600	8,400	1,100	4	0.2	0	0.0
2007	7			CR	10,000	12,100	12,100	8,450	1,100	9	0.4	0	0.0
2008	7			CR	10,000	12,100	12,000	8,450	600	11	0.5	2	0.1
2009	7			CR	10,100	12,100	11,700	8,600	610	14	0.7	1	0.0

Year	Highway	Location Description	Dist (KM)	Pattern Type	AADT	SADT	SWADT	WADT	Truck AADT	Total Collisions	Total CR	Trucks Collisions	Truck CR
2010	7			CR	10,100	12,100	11,700	8,550	610	5	0.2	2	0.1
2011	7			CR	10,100	11,800	11,900	9,000	610	12	0.6	2	0.1
2012	7			CR	11,200	13,400	13,200	9,450	670	9	0.4	0	0.0
2013	7			CR	12,000	14,400	14,800	10,100	720	10	0.4	1	0.0
2014	7			CTR	11,800	14,400	14,500	10,000	710	11	0.5	3	0.1
2015	7			CTR	11,100	13,500	13,700	9,450	670	8	0.4	0	0.0
2016	7			CTR	11,200	13,700	13,800	9,500	670	9	0.4	0	0.0
2017	7			CTR	11,300	15,100	15,000	9,200	680	10	0.4	0	0.0
2018	7			CTR	11,400	15,200	15,200	9,300	680	11	0.5	1	0.0
2019	7			CTR	11,400	15,200	15,100	9,300	680	12	0.5	0	0.0
2021	7			CTR	11,600	15,100	15,000	9,450	700	10	0.4	0	0.0
1988	7	OTONABEE TWP RD C 3 4 SETTLERS LINE	4.2	CR	7,800	10,000	9,350	6,450	1,100	13	1.1	1	0.1
1989	7			CR	8,600	11,000	10,200	7,200	1,100	14	1.1	0	0.0
1990	7			CR	9,400	11,700	10,800	8,450	1,200	11	0.8	2	0.1
1991	7			CR	9,700	11,900	11,200	8,750	1,250	8	0.5	1	0.1
1992	7			CR	9,700	11,900	11,100	8,750	1,050	12	0.8	1	0.1
1993	7			CR	9,700	11,900	11,200	8,750	1,050	14	1.0	0	0.0
1994	7			CR	10,000	12,300	11,400	9,000	1,100	7	0.5	0	0.0
1995	7			CR	10,300	12,800	12,200	8,850	1,150	11	0.7	2	0.1
1996	7			CR	10,400	12,900	12,200	8,900	1,150	14	0.9	5	0.3
1997	7			CR	11,000	13,600	13,000	9,350	1,550	7	0.4	3	0.2
1998	7			CR	11,400	14,000	13,300	9,700	1,600	11	0.6	2	0.1
1999	7			CR	11,800	14,500	13,800	10,000	1,650	7	0.4	2	0.1
2000	7			CR	12,100	14,900	14,200	10,300	1,450	9	0.5	1	0.1
2001	7			CR	10,900	13,400	12,800	9,200	1,300	9	0.5	2	0.1
2002	7			CR	10,900	13,400	12,800	9,200	1,300	12	0.7	2	0.1
2003	7			CR	10,800	13,200	12,600	9,150	1,300	17	1.0	0	0.0
2004	7			CR	10,300	12,700	12,100	8,700	1,250	14	0.9	3	0.2
2005	7			CR	10,400	12,600	12,100	8,750	1,250	19	1.2	2	0.1
2006	7			CR	10,500	12,700	12,200	8,850	1,250	9	0.6	0	0.0
2007	7			CR	10,500	12,700	12,700	8,850	1,250	12	0.8	2	0.1
2008	7			CR	10,600	12,800	12,700	8,950	1,250	6	0.4	2	0.1
2009	7			CR	10,700	12,800	12,400	9,100	1,300	8	0.5	0	0.0
2010	7			CR	10,700	12,800	12,400	9,050	1,300	13	0.8	2	0.1
2011	7			IR	10,800	12,900	12,600	9,200	1,300	6	0.4	0	0.0
2012	7			IR	11,900	14,200	13,800	10,200	1,450	3	0.2	0	0.0
2013	7			IR	12,400	14,800	15,800	10,600	1,500	5	0.3	0	0.0
2014	7			CTR	12,400	15,100	15,300	10,500	1,500	6	0.3	0	0.0
2015	7			CTR	11,500	14,000	14,100	9,800	1,400	4	0.2	0	0.0
2016	7			CTR	11,500	14,000	14,100	9,800	1,400	15	0.9	1	0.1
2017	7			CTR	11,600	15,500	15,400	9,450	1,400	7	0.4	0	0.0

Appendix D
Sample STAMSON 5.04 Output

```
STAMSON 5.0        NORMAL REPORT        Date: 01-04-2025 11:53:51
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: a.te                 Time Period: Day/Night 16/8 hours
Description:   Daytime and nighttime sound level at façade of location
A,Single detached dwelling backing onto railway

Rail data, segment # 1: Havelock (day/night)
-----------------------------------------------
Train            ! Trains      ! Trains      ! Speed !# loc !# Cars! Eng
!Cont
Type             ! (Left)      ! (Right)     !(km/h) !/Train!/Train! type
!weld
-----------------+-------------+-------------+-------+------+------+-----
-+----
  1.             !   0.6/0.6   !   0.6/0.6   !  16.0 !  2.0 !200.0
!Diesel!  No

Data for Segment # 1: Havelock (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  :  40.00 / 40.00  m
Receiver height           :   7.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Whistle Angle             :     80 deg   Track 1
Reference angle           :   0.00

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

LOCOMOTIVE (0.00 + 60.45 + 0.00) = 60.45 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     90   0.41  67.42  -5.98  -0.99   0.00   0.00   0.00  60.45
-------------------------------------------------------------------------

WHEEL (0.00 + 42.99 + 0.00) = 42.99 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     90   0.51  50.61  -6.43  -1.19   0.00   0.00   0.00  42.99
-------------------------------------------------------------------------

LEFT WHISTLE (0.00 + 60.16 + 0.00) = 60.16 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -77     80   0.41  67.40  -5.98  -1.26   0.00   0.00   0.00  60.16
-------------------------------------------------------------------------

RIGHT WHISTLE (0.00 + 43.10 + 0.00) = 43.10 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
```

```
    80     86   0.41  67.40  -5.98 -18.31   0.00   0.00   0.00  43.10
-------------------------------------------------------------------------

Segment Leq : 63.40 dBA

Total Leq All Segments: 63.40 dBA

Results segment # 1: Havelock (night)
-------------------------------------

LOCOMOTIVE (0.00 + 63.80 + 0.00) = 63.80 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     90   0.41  70.78  -5.98  -0.99   0.00   0.00   0.00  63.80
-------------------------------------------------------------------------

WHEEL (0.00 + 46.34 + 0.00) = 46.34 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     90   0.51  53.97  -6.43  -1.19   0.00   0.00   0.00  46.34
-------------------------------------------------------------------------

LEFT WHISTLE (0.00 + 63.51 + 0.00) = 63.51 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -77     80   0.41  70.76  -5.98  -1.26   0.00   0.00   0.00  63.51
-------------------------------------------------------------------------

RIGHT WHISTLE (0.00 + 46.46 + 0.00) = 46.46 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
    80     86   0.41  70.76  -5.98 -18.31   0.00   0.00   0.00  46.46
-------------------------------------------------------------------------

Segment Leq : 66.75 dBA

Total Leq All Segments: 66.75 dBA

Road data, segment # 1: Hwy 7 (day/night)
-----------------------------------------
Car traffic volume  : 13584/2397  veh/TimePeriod  *
Medium truck volume :   781/138   veh/TimePeriod  *
Heavy truck volume  :  1249/220   veh/TimePeriod  *
Posted speed limit  :    70 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):  13000
    Percentage of Annual Growth         :   2.50
    Number of Years of Growth           :  14.00
    Medium Truck % of Total Volume      :   5.00
    Heavy Truck  % of Total Volume      :   8.00
```

```
    Day (16 hrs) % of Total Volume     :  85.00

Data for Segment # 1: Hwy 7 (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  : 350.00 / 350.00 m
Receiver height           :   7.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Hwy 7 (day)
--------------------------------

Source height = 1.68 m

ROAD (0.00 + 51.51 + 0.00) = 51.51 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.47  72.81   0.00 -20.17  -1.13   0.00   0.00   0.00
51.51
-------------------------------------------------------------------------
---

Segment Leq : 51.51 dBA

Total Leq All Segments: 51.51 dBA

Results segment # 1: Hwy 7 (night)
----------------------------------

Source height = 1.68 m

ROAD (0.00 + 46.98 + 0.00) = 46.98 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.47  68.28   0.00 -20.17  -1.13   0.00   0.00   0.00
46.98
-------------------------------------------------------------------------
---

Segment Leq : 46.98 dBA

Total Leq All Segments: 46.98 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.67
                           (NIGHT): 66.80
```

```
STAMSON 5.0        NORMAL REPORT        Date: 01-04-2025 11:54:17
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: a24.te               Time Period: 24 hours
Description: LEQ 24 hour at location A

Rail data, segment # 1: Havelock
--------------------------------
Train            ! Trains      ! Trains      ! Speed !# loc !# Cars! Eng
!Cont
Type             ! (Left)      ! (Right)     !(km/h) !/Train!/Train! type
!weld
-----------------+-------------+-------------+-------+------+------+-----
-+----
  1.             !   0.6/0.6   !   0.6/0.6   !  16.0 !  2.0 !200.0
!Diesel!  No

Data for Segment # 1: Havelock
------------------------------
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  :  40.00 m
Receiver height           :   7.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Whistle Angle             :     80 deg   Track 1
Reference angle           :   0.00

Results segment # 1: Havelock
------------------------------

LOCOMOTIVE (0.00 + 58.69 + 0.00) = 58.69 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     90   0.41  65.66  -5.98  -0.99   0.00   0.00   0.00  58.69
-------------------------------------------------------------------------

WHEEL (0.00 + 41.22 + 0.00) = 41.22 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     90   0.51  48.85  -6.43  -1.19   0.00   0.00   0.00  41.22
-------------------------------------------------------------------------

LEFT WHISTLE (0.00 + 58.40 + 0.00) = 58.40 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -77     80   0.41  65.64  -5.98  -1.26   0.00   0.00   0.00  58.40
-------------------------------------------------------------------------

RIGHT WHISTLE (0.00 + 41.34 + 0.00) = 41.34 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
    80     86   0.41  65.64  -5.98 -18.31   0.00   0.00   0.00  41.34
```

```
------------------------------------------------------------------------

Segment Leq : 61.64 dBA

Total Leq All Segments: 61.64 dBA

Road data, segment # 1: Hwy 7
------------------------------
Car traffic volume  : 13584 veh/TimePeriod
Medium truck volume :   781 veh/TimePeriod
Heavy truck volume  :  1249 veh/TimePeriod
Posted speed limit  :    70 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: Hwy 7
---------------------------
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  : 350.00 m
Receiver height           :   7.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Hwy 7
--------------------------

Source height = 1.68 m

ROAD (0.00 + 49.75 + 0.00) = 49.75 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
------------------------------------------------------------------------
---
   -90     90   0.47  71.05   0.00 -20.17  -1.13   0.00   0.00   0.00
49.75
------------------------------------------------------------------------
---

Segment Leq : 49.75 dBA

Total Leq All Segments: 49.75 dBA

TOTAL Leq FROM ALL SOURCES:       61.91
```

STAMSON 5.0 NORMAL REPORT Date: 01-04-2025 11:54:31
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: aola.te Time Period: 16 hours
Description: ***Daytime sound level in the OLA of location A,Single detached dwelling backing onto railway***

Rail data, segment # 1: Havelock

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1.	1.3/0.4	16.0	2.0	200.0	Diesel	No

Data for Segment # 1: Havelock

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	: 35.00 m		
Receiver height	: 1.50 m		
Topography	: 2	(Flat/gentle slope; with barrier)	
No Whistle			
Barrier angle1	: -90.00 deg	Angle2 : 90.00 deg	
Barrier height	: 0.00 m		
Barrier receiver distance	: 10.00 m		
Source elevation	: 0.00 m		
Receiver elevation	: 0.00 m		
Barrier elevation	: 0.00 m		
Reference angle	: 0.00		

Results segment # 1: Havelock

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
4.00	1.50	2.21	2.21
0.50	1.50	1.21	1.21

LOCOMOTIVE (0.00 + 60.61 + 0.00) = 60.61 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	67.77	-5.83	-1.33	0.00	0.00	-0.25	60.36*
-90	90	0.58	67.77	-5.83	-1.33	0.00	0.00	0.00	60.61

* Bright Zone !

WHEEL (0.00 + 43.39 + 0.00) = 43.39 dBA

```
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     90   0.66  50.96  -6.11  -1.46   0.00   0.00  -0.92  42.47*
   -90     90   0.66  50.96  -6.11  -1.46   0.00   0.00   0.00  43.39
-------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 60.69 dBA

Total Leq All Segments: 60.69 dBA

Road data, segment # 1: Hwy 7
------------------------------
Car traffic volume  : 13584 veh/TimePeriod  *
Medium truck volume :   781 veh/TimePeriod  *
Heavy truck volume  :  1249 veh/TimePeriod  *
Posted speed limit  :    70 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: Hwy 7
--------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1
House density             :     60 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 350.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Hwy 7
--------------------------

Source height = 1.68 m

ROAD (0.00 + 45.62 + 0.00) = 45.62 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.65  72.81   0.00 -22.63  -1.45   0.00  -3.11   0.00
45.62
-------------------------------------------------------------------------
---

Segment Leq : 45.62 dBA

Total Leq All Segments: 45.62 dBA

TOTAL Leq FROM ALL SOURCES:       60.82
```

```
STAMSON 5.0        NORMAL REPORT        Date: 01-04-2025 11:55:03
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: aola_m.te            Time Period: 16 hours
Description: Daytime sound level in the OLA of location A,Single detached
dwelling backing onto railway with mitigation

Rail data, segment # 1: Havelock
--------------------------------
Train            ! Trains      ! Speed !# loc !# Cars! Eng  !Cont
Type             !             !(km/h) !/Train!/Train! type !weld
-----------------+-------------+-------+------+------+------+----
  1.             !   1.3/0.4   !  16.0 !  2.0 !200.0 !Diesel!  No

Data for Segment # 1: Havelock
------------------------------
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  :  35.00 m
Receiver height           :   1.50 m
Topography                :      2       (Flat/gentle slope; with
barrier)
No Whistle
Barrier angle1            : -30.00 deg   Angle2 : 90.00 deg
Barrier height            :   5.50 m
Barrier receiver distance :  10.00 m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Results segment # 1: Havelock
-----------------------------

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       4.00 !        1.50 !        2.21 !         2.21
       0.50 !        1.50 !        1.21 !         1.21

LOCOMOTIVE (55.07 + 47.71 + 0.00) = 55.81 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90    -30   0.58  67.77  -5.83  -6.86   0.00   0.00   0.00  55.07
-------------------------------------------------------------------------
   -30     90   0.25  67.77  -4.62  -2.27   0.00   0.00 -13.18  47.71
-------------------------------------------------------------------------

WHEEL (37.77 + 28.49 + 0.00) = 38.25 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
```

```
-------------------------------------------------------------------------
   -90    -30   0.66  50.96  -6.11  -7.08   0.00   0.00   0.00  37.77
-------------------------------------------------------------------------
   -30     90   0.36  50.96  -5.00  -2.44   0.00   0.00 -15.03  28.49
-------------------------------------------------------------------------

Segment Leq : 55.89 dBA

Total Leq All Segments: 55.89 dBA

Road data, segment # 1: Hwy 7
------------------------------
Car traffic volume  : 14628 veh/TimePeriod  *
Medium truck volume :   841 veh/TimePeriod  *
Heavy truck volume  :  1345 veh/TimePeriod  *
Posted speed limit  :    70 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: Hwy 7
---------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1
House density             :     60 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 350.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Hwy 7
--------------------------

Source height = 1.68 m

ROAD (0.00 + 45.94 + 0.00) = 45.94 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.65  73.13   0.00 -22.63  -1.45   0.00  -3.11   0.00
45.94
-------------------------------------------------------------------------
---

Segment Leq : 45.94 dBA

Total Leq All Segments: 45.94 dBA

TOTAL Leq FROM ALL SOURCES:       56.31
```

Appendix E
Peer Review Comments and Responses

HGC
NOISE | VIBRATION | ACOUSTICS

HGC Noise Vibration Acoustics
2000 Argentia Road, Plaza One, Suite 203
Mississauga, Ontario, L5N 1P7
t: 905.826.4044

March 31, 2025

CAP Norwood Developments Inc.
75 Valleyview Drive
Ancaster, Ontario
L9G 2A6

Via Email: **apug@cogeco.ca**

RE : Responses to Peer Review Comments, Noise and Vibration Feasibility Study, Proposed Residential Development, Upper Mill Pond, 52 Mill Street, Norwood, ON
HGC Project #: 02100994

Dear Angelo,

As requested, please see HGC responses to peer review comments prepared by Stantec dated April 4, 2024. The comments are presented below, and our responses follow in *italics*.

Section 1. Introduction and Summary

This introduction and summary section describes project location and study purpose and summarized dominant noise sources including transportation and stationary noise sources with proposed noise mitigations. In addition to the noise, a summary of vibration impact is provided in the section.

Stantec acknowledges that HGC Report include statement of update of report as the project progress in the other sections of the Report. However, Stantec recommends that the statement be amended to state in Section1 of the Report that the analysis must be updated as the project progresses. As this is a feasibility study, it should be updated to reflect the detailed design and site grading, etc. Mitigation recommendations in this feasibility study are based on assumed design and should be updated as more details are available.

Noted. The report has been updated to include this.

Section 2. Site Description and Noise Sources

Section 2 discusses the project site and transportation and stationary noise sources. Figure 1 and Figure 2 show the proposed site location and concept draft plan, respectively.

Section 2 includes discussion of surrounding area of the project. However, there is no zoning discussion in accordance with the zoning bylaw of the County. Stantec recommends including zoning information and discussion of project and neighbouring areas in accordance with the zoning bylaw.

Noted. Zoning information has been included.
The draft plan of subdivision is envisioned within the Settlement Area designation of the Peterborough County Official Plan. The Local Component of the County Official Plan for the Township of Asphodel-Norwood designates the land as Hamlet, Rural and Residential. To permit the subdivision, an Official Plan Amendment is necessary to redesignate the entire property Residential. Zoning By-Law Number 2009-08 zones the site RU-Rural zone and R2-H-Residential Two zone with a holding provision. A Zoning By-Law amendment is also required and an application will be submitted at a later date.

Section 3. Traffic noise and Vibration Level Criteria

Section 3.1 details the road/rail traffic noise criteria as per NPC-300, and Table I summarizes the traffic noise criteria. The traffic noise mitigation requirements are, also, discussed in this section.

Stantec notes that the traffic noise criteria in Table I does not agree with NPC-300 for Inside Living/Dining Rooms. Table I should be updated accordingly.

Noted. Table I has been updated.

Section 3.2 details the railway vibration criteria as per MECP and CP guidelines, and the measured vibrations are provided in Figure 4 to 8.

Stantec notes that this section referenced MECP and CP guidelines. However, the CP guideline in Appendix A does not provide any vibration limits, and there no specific guideline from the MECP is identified in the section. Section 3.1 references RAC/FCM guideline which agrees with the description in Section 3.2. Stantec is in agreement of the vibration criteria and approach but recommends referring to right guidelines.

Noted. This section has been revised.

Section 4. Traffic Noise Assessment

Section 4.1 details the railway traffic data for 10-year projection with 2.5% per year growth rate based on the railway traffic volume from Transport Canada, and Table II summarizes the traffic data used for the prediction.

Stantec is in agreement with the Year 2033 railway traffic volume and assumed number of locomotives and cars.

Noted. The rail data remains current as noted in publicly available rail traffic data. HGC has further projected the data to the year 2035.

Section 4.2 details the road traffic data for 10-year projection with 2.5% per year growth rate. The day/night traffic volume split and vehicle class were based on the MTO guideline. Table III summarizes the road traffic data used for the prediction.

Stantec cannot comment since which SADT was used for the road traffic assessment. The SADT traffic volume used for the assessment need to be identified in the section for review.

Noted. HGC has updated the SADT used (from the year 2021) and projected the data to the year 2035. The SADT has increased slightly, the predicted sound levels remain the same but the overall recommendations remain the same as in the previous noise report.

Section 4.3 details the methodology for transportation noise assessment and determining the receptors used in the assessment of compliance with the NPC-300 guideline limits. Five (5) locations were selected for the assessment. Daytime and nighttime predictions are provided in Table III and Table IV.

Stantec is in agreement with the assessment methodology and STAMSON calculations provided in Appendix D. Assessment locations are conservatively selected for the assessment. There is a discussion regarding 24hr-Leq in Section 3.1 for railway noise. However, an assessment of 24hr-Leq railway noise for building façade is not included in this section or result section. 24hr-Leq railway noise shall be predicted and reported as described in NPC-300.

Noted. HGC has updated and included a 24hr-Leq calculation of railway noise for the building façade.

Section 5. Traffic Noise Recommendations

Section 5 describes mitigation required based on the modelled operation scenario, sources, and assumptions. Section 5.1 describes mitigation for outdoor living area and recommends noise barrier in accordance with CP guide. Section 5.2 provides discussion of minimum setback distance per as CP guide.

Section 5.3 details mitigations for indoor noise levels as per NPC-300. Section 5.4 details the building façade construction in accordance with the AIF estimation based on assumptions.

The purpose of this study is to demonstrate the proposed development's compliance with the applicable NPC-300 guideline. The mitigation options discussed in this section is feasible. However, as commented in Section 4.3, 24hr-Leq for railway noise shall be provided as described in the MECP NPC-300, although CP guide requires improved façade construction.

Noted. HGC has updated and included a 24hr-Leq calculation of railway noise for the building façade.

Section 6. MECP Guidelines for Land Use Compatibility and Distance Separation Agreement.

Section 6 summarizes MECP guideline D-1 and D-6; and Section 6.1 demonstrates the setback distance of the proposed development from the adjacent industries. The adjacent industries were considered as Class II industries and the minimum and influential setbacks are provided in Figure 9.

Stantec is in agreement with the classification of the adjacent industries.

Noted.

Section 7. Stationary Source Assessment

Section 7 details of prediction of stationary noise sources from the adjacent industry. Section 7.1 provides a discussion of stationary noise criteria as per NPC-300. Section 7.2 provides the prediction methodology, sound power levels of noise sources and assumptions for a worst-case scenario. Section 7.2 summarizes the prediction results without mitigation, and Section 7.4 provide mitigation options for stationary noise.

Stantec is in agreement with the prediction approach in Section 7 and feasibility of the recommended mitigation options.

Noted.

Section 8. Warning Clause

Section 8 provides warning clauses in accordance with MECP NPC-300 and CP guide.

Stantec is in agreement with the warning clauses in this section although there is an additional warning clause for the noise wall which is not from neither NPC-300 nor CP guide.

Noted.

Section 9. Summary and Recommendations

Section 9 summarizes the proposed mitigations for transportation and stationary noise and implementations in Section 9.1. It is states that the noise impact assessment must be updated as changes/updates are made, and the detailed plans and mitigations should be reviewed by a qualified professional engineer.

Stantec agrees with requirements to update the report. As this is a feasibility report updates should be required at detailed site plan application and with any other updates.

Noted. This has been included in the revised noise report.

Appendix A: CP Mainline Requirements - No Comments. Noted.

Appendix B: Rail Traffic Information - No Comments. Noted.

Appendix C: Road Traffic Information -Identify which data was used for the study.
Revised.

Appendix D: Sample STAMSON 5.04 Output - No comments, Noted.

Summary of Review Comments

The following is a summary of the comments and suggested updates on the noise feasibility study:

1. Zoning information and discussion in accordance with the County Zoning Bylaw.
Included in revised noise report.
2. Traffic noise criteria in Table I as per MECP NPC-300, and update report accordingly.
Revised.
3. RAC/FCM reference for the vibration criteria
Revised.
4. Identify SADT data used for road traffic volume
Included.
5. 24-hour Leq of railway traffic noise assessment for façade
Included.

We trust the above is sufficient for your current purposes. If we can be of further assistance, please call.

Best regards,
Howe Gastmeier Chapnik Limited

Ms. Sheeba Paul, MEng, P.Eng

Any conclusions and/or recommendations herein reflect the judgment of HGC based on information available at the time of preparation and were developed in good faith on information provided by others, as noted in the report, which has been assumed to be factual and accurate. Changed conditions or information occurring or becoming known after the date of this report could affect the results and conclusions presented