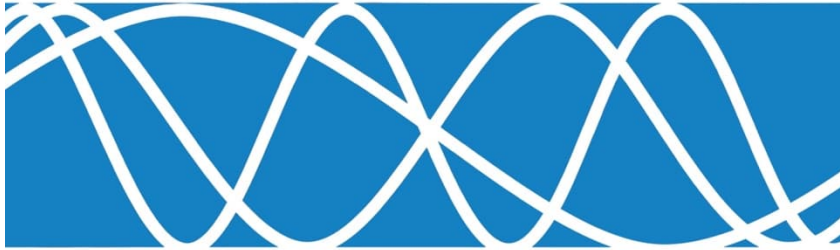


Noise and Vibration Feasibility Study

Proposed Residential Development, Mitchell Ridge Subdivision, Mitchell, Ontario

November 12, 2025
HGC Project #: 02500388



Prepared for:


Parkwood Developments (Kitchener)
Limited
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Version Control

Noise and Vibration Feasibility Study, Proposed Residential Development, Mitchell Ridge Subdivision, Mitchell, Ontario

Ver.	Date	Version Description	Prepared By
1.0	November 12, 2025	Noise and Vibration Feasibility Study in support of the planning and approvals process	V. Garcia

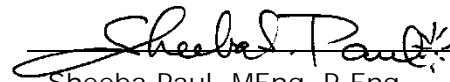
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1 INTRODUCTION AND SUMMARY

HGC Noise Vibration Acoustics (HGC) was retained Parkwood Developments (Kitchener) Limited to conduct a noise and vibration feasibility study for a proposed residential development located to the west of Dungey Lane in Mitchell, Municipality of West Perth, Ontario. The development will consist of 26 lots and associated roadways. The study is required as part of the approvals process by the municipality and the Goderich Exeter Railway (GEXR).

The primary source of noise is rail traffic on the GEXR railway located northeast of the site. The railway is located within 75 m of the proposed development; therefore ground-borne vibration measurements are required. This noise and vibration study was based on a site visit and aerial photography. Rail traffic data for the GEXR railway was obtained from GEXR personnel and from an automatic monitor. Rail traffic data was used to predict future traffic sound levels at the façade of the proposed dwellings and in the rear yard outdoor living areas. The predicted sound levels were evaluated with respect to the guidelines of the GEXR and the Ministry of the Environment, Conservation and Parks (MECP) and the railway.

The study finds that rail traffic noise exceeds the MECP sound level criteria during the daytime at the proposed dwellings closest to the railway. Air conditioning is required for dwellings closest to the railway. The provision for the future installation of air conditioning at the occupant's discretion is required for dwellings further from the railway. Brick exterior wall construction is required for the future dwellings in the first row from the railway. The measured levels of ground-borne vibration were within MECP and GEXR/CN vibration limits at the furthest measured location and marginally in excess of the limits at the closest façade of the proposed dwellings. 300 mm thick foundations are required for the dwelling closest to the railway, vibration mitigation is not required for the remaining dwellings. Warning clauses are recommended in order to inform future owners/tenants of the sound excesses.



2 SITE DESCRIPTION AND NOISE SOURCES

A key plan of the proposed site is included in as Figure 1. The proposed Mitchell development will include single detached dwellings. The site is located to the west of Dungey Lane and south of the GEXR railway in Mitchell, Municipality of West Perth, Ontario. Figure 2 includes the draft plan dated November 12, 2025 and prepared by GSP Group, showing the sound level prediction locations. To the northeast of the site is the Goderich Subdivision, a secondary mainline of the Goderich-Exeter Railway Limited (GEXR).

HGC personnel visited the site on June 13 and 18, 2025 to investigate the acoustic environment of the site and perform ground-borne vibration measurements. The primary source of noise is rail traffic on the GEXR railway. The subject site is relatively flat with the railway located at approximately the same grade as the subject lands. Lands to the north, are vacant/agricultural. To the east of the site are future and existing residential lands. There are no significant sources of stationary noise within 500 m of the proposed site.

3 RAIL TRAFFIC NOISE ASSESSMENT

3.1 Rail Traffic Noise Criteria

Guidelines for acceptable levels of rail traffic noise impacting residential developments are given in the MECP publication NPC-300, "Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning", Part C release date October 21, 2013 and are listed in Table 1 below. The values in Table 1 are energy equivalent (average) sound levels [LEQ] in units of A weighted decibels [dBA]. The Federation of Canadian Municipalities (FCM) and Railway Association of Canada (RAC) "Guidelines for New Development in Proximity to Railway Operations", dated May 2013 (RAC/FCM guidelines were also reviewed dated November 2006).



Table 1: Rail Traffic Noise Criteria

Space	Daytime $L_{EQ}(16 \text{ hour})$ Rail	Nighttime $L_{EQ}(8 \text{ hour})$ Rail
Outdoor Living Areas	55 dBA	--
Inside Living/Dining Rooms	40 dBA	40 dBA
Inside Bedrooms	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 used in reference to an outdoor patio, a backyard, a terrace or other area where passive recreation is expected to occur. Balconies that are less than 4 m in depth are not considered to be outdoor living areas under MECP guidelines.

MECP guidelines allow the daytime sound level criteria in an OLA to be exceeded by up to 5 dBA, without mitigation, provided that a clause warning future occupants of the potential noise excess is included in the Development Agreements, offers of purchase and sale, and rental agreements. Where OLA sound levels exceed 60 dBA, physical mitigation is recommended to reduce the OLA sound level to 60 dBA or less.

MECP guidelines require central air conditioning or other ventilation system be installed prior to occupancy as an alternative means of ventilation to open windows for dwellings where nighttime sound levels at the façade exceed 60 dBA or daytime sound levels exceed 65 dBA. Provision for the future installation of air conditioning at the occupants discretion is required when nighttime sound levels at the façade are in the range of 51 to 60 dBA or daytime sound levels are in the range of 56 dBA to 65 dBA. Sound attenuating building constructions are required when daytime sound levels exceed 60 dBA or nighttime sound levels exceed 55 dBA at the façade due to rail noise.

Warning clauses to notify future residents of possible sound level excesses are also required when daytime sound levels exceed 55 dBA and/or nighttime sound levels exceed 50 dBA at the façade.

MECP and railway policies stipulate brick veneer or masonry equivalent construction, from the foundation to the rafters when the rail traffic L_{eq} (24-

hour), estimated at a location of a nighttime receptor, is greater than 60 dBA, and when the first row of dwellings is within 100 metres of the tracks. The railways also provide minimum requirements for safety as well as sound and vibration for proposed residential developments located adjacent to their rights-of-way. These include minimum required setbacks, berms, fencing and warning clauses.

The reader is referred to a copy of CN requirements for a new development adjacent to a secondary mainline, which is located in Appendix A.

3.2 Traffic Sound Level Assessment

3.2.1 Rail Traffic Data

Rail traffic data for the GEXR Goderich Subdivision was obtained from GEXR railway personnel and is attached in Appendix B. Automatic monitored data was also used to gather the number of train passbys. This line is used for freight operations only and is classified as a secondary main line. The maximum permissible train speed in the area of the site is 40 kph (25 mph) for passenger trains and freight trains. In conformance with GEXR assessment requirements, the maximum speeds, maximum number of cars and locomotives per train were used in the traffic noise analysis to yield a worst-case estimate of train noise. The data was projected to the year 2035 using a 2.5% growth rate. Table 2 summarises the GEXR rail traffic data used in the Typically, a noise barrier of 4.5 m (comprised of 2.0 m safety berm with a 2.5 m acoustic fence on top) is required if sound levels exceed 60 dBA in the rear yard OLAs. GEXR should be contacted if a safety berm is required.



Table 2: Rail Traffic Data Projected to 2035

Type of Train	Number of Trains Day/Night	Number of Locomotives	Number of Cars	Maximum Speed [km/h]
Freight	2.6 / 0.0	3	80	40

3.2.2 Rail Traffic Noise Predictions

To assess the levels of rail traffic noise which will impact the site in the future, predictions were made using STAMSON version 5.04, a computer algorithm developed by the MECP. Sample STAMSON output is included in Appendix C. Train whistle noise was included in the predictions at the dwelling facades to determine indoor sound levels.

Predictions of the traffic sound levels were made at the proposed residential dwellings and in outdoor living areas. The results of these predictions are summarized in Table 3. The acoustic requirements may be subject to modifications if the site plan is changed significantly.

Table 3: Future Traffic Sound Levels, [dBA], Without Mitigation

Prediction Location	Description	Daytime in OLA L _{EQ} (16 hour)	Daytime at Façade L _{EQ} (16 hour)	Nighttime at Façade L _{EQ} (8 hour)
[A]	Dwelling with flanking exposure to railway	58	67	<50
[B]	Dwelling further from the railway	<55	<55	<50

Note: Train whistle noise has been included for the final calculations

3.3 Traffic Noise Recommendations

The predictions indicate that traffic sound levels exceed MECP limits during the daytime hours at the lots closest to the railway line in the proposed Mitchell Subdivision. The following recommendations are provided.

3.3.1 Outdoor Living Areas

Typically, a noise barrier of 4.5 m (comprised of 2.0 m safety berm with a 2.5 m acoustic fence on top) is required if sound levels exceed 60 dBA in the rear yard OLAs. GEXR should be contacted if a safety berm is required.

The predicted sound level in the rear yards of the dwellings flanking onto the railway will be 58 dBA, 3 dBA in excess of the MECP limit of 55 dBA. The 3 dBA sound level excess is acceptable to the MECP if it is acceptable to the municipality and GEXR.

3.3.2 Indoor Living Areas

Air Conditioning

The predicted nighttime sound levels at the façade of the future dwelling flanking onto the railway (prediction location [A]) will be greater than 65 dBA during the daytime hours. To address these excesses, the MECP guidelines recommend that these dwellings be equipped with air conditioning systems, so that the windows can be closed to rail traffic noise.

Provision for the Future Installation of Air Conditioning

The predicted future sound levels of the proposed dwellings further from the railway are predicted to have sound levels between 56 and 65 dBA during the daytime hours. To address these excesses, these dwellings require the provision for the future installation of air conditioning at the occupant's discretion is required.

Ventilation requirements are indicated on 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.

3.3.3 Building Façade Constructions

Future sound levels in the proposed development will exceed 60 dBA during the daytime due to rail noise. MECP guidelines recommend that the windows, walls and doors be designed so that the indoor sound levels comply with MECP noise criteria.

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

Exterior Wall Construction

Brick veneer or a masonry equivalent construction from foundation to rafters as a minimum construction for any dwellings that are in the first row of dwellings with exposure to the CN rail. This is applicable to the semi-detached dwelling (Lots 1 and 2) on the west, north, and eastern façades.

Acoustical Requirements for Glazing

Detailed drawings were not available at the time of this report. Window to floor area ratios of 60% for living/dining rooms and bedrooms have been assumed to determine preliminary glazing requirements. The minimum acoustical requirement for the basic window glazing, including glass in fixed sections, sliding doors, and operable windows, is shown in Table 4 for the townhouses.

Table 4: Preliminary Glazing Requirements

Lot	¹ Minimum STC Requirements for Glazing
1, 2	STC-34*
Remaining Dwellings	OBC

Note:

¹ STC requirement refers to installed performance, including sound transmitted through mullions in window-wall systems and seals on operable windows and doors. Test data should be provided where available. STC values may be decreased by reducing the window areas.

*Including required brick veneer or a masonry equivalent exterior façade construction

Note that acoustic performance varies with manufacturer's construction details, and these are only guidelines to provide some indication of the type of glazing likely to be required. Acoustical test data for the selected assemblies should be requested from the suppliers, to ensure that the stated acoustic performance will be achieved by their assemblies.

Further Work

When final floor plans and building elevations are available for Lots 1 and 2, the glazing requirements will be refined. Larger windows in small rooms will result in large window to floor area ratios and thus higher STC ratings.

4 VIBRATION ASSESSMENT

4.1 Criteria for Ground-borne Vibration from Rail Traffic

The GEXR follows MECP and Canadian National (CN) guidelines which require measurements of ground-borne vibration when residential dwelling units are to be located within 75 metres of a secondary mainline such as the Goderich Subdivision

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

CN limits for acceptable ground-borne vibration are also presented as a curve of maximum allowable vibratory acceleration levels, in units of decibels relative to the acceleration due to gravity (dB re 1g), versus one-third octave band frequency. The CN criteria have been overlaid on the graphs of measured vibration for easy reference (Appendix D).



4.2 Rail Vibration Assessment

GEXR/CN requires an assessment of ground-borne vibration through measurement if building foundations are to be located within 75 metres of the right-of-way.

Measurements of ground-borne rail vibration were conducted at 15 m from the railway right of way. This is dwelling unit setback from the railway right of way. Ground-borne vibration was measured for four freight train pass-bys at 15 m from the railway right of way on June 13 to June 18, 2025. The plots are attached in Appendix E. Measurements were conducted using a Svantek 977 Sound Level Meters with Wilcoxon Research type 793V velocity transducers correctly field calibrated before and after the measurements. Table 5 shows the maximum vibration levels measured during each of the train pass-bys.

Table 5: Maximum RMS Vibration Measurements of Train Pass-bys

Measurement Location	Train Pass-by	Measured Vibration Level (mm/s)	Criteria (mm/s)
M – 15 m from Right-of-Way	1	0.11	0.14
	2	0.14	0.14
	3	0.15	0.14
	4	0.13	0.14

Vibration levels are below the GEXR/CN limit of 0.14 mm/s at measurement location M1 during three of the four train pass-bys. Vibration levels did exceed the applicable criteria at during pass-by 3. However, as shown in the acceleration plots, the measured acceleration levels are at or below the criteria curve with the dominant frequencies between 16 to 40 Hz.

Additional vibration mitigation is recommended for the closest semi-detached dwelling in the form of thicker foundation walls. Foundation walls with a minimum thickness of 300 mm thick are recommended for the dwellings in the first row (Lots 1 and 2). A vibration warning clause should also be included in the property and tenancy agreements of the closest dwelling units to inform the

future owners and tenants of these possible vibration excesses during rail pass-bys.

5 WARNING CLAUSES

The MECP guidelines recommend that warning clauses be included in the property and tenancy agreements for all the dwellings with anticipated traffic noise sound level excesses. The following noise warning clauses are required.

A suggested wording for future dwellings with sound level excesses of the MECP criteria but do not require physical mitigation measures is given below.

Type A:

Purchasers/tenants are advised that sound levels due to increasing 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.

Suitable wording for future dwellings requiring the provision for adding central air conditioning at the occupant's discretion is given below.

Type C:

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 limits of the Municipality and the Ministry of the Environment.

A suggested wording for future dwellings requiring central air conditioning systems 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.



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

Suggested wording for future dwellings where there are vibration excesses is given below.

Type I:

Purchasers/tenants are advised that due to the proximity of this dwelling to the nearby railway tracks, vibration from rail pass-bys may occasionally be perceptible within this unit.

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

Type II:

Warning: Goderich Exeter Railway (GEXR) Company or its assigns or successors in interest has or have a rights-of-way within 300 metres from the land subject hereof. There may be alteration to or expansions of the railway facilities on such rights-of-way in the future including the possibility that the railway or its assigns or successors as aforesaid may expand its operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwellings. CNR will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid rights-of-way.

6 SUMMARY

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

1. Air conditioning is required for the dwelling with flanking exposure to the railway. The provision for the future installation of air conditioning at the occupant's discretion is required for dwellings further from the railway. The location, installation and sound ratings of the air conditioning devices should comply with NPC-216 and NPC-300, as applicable.



2. Brick veneer or masonry equivalent exterior wall constructions are required for the dwellings flanking directly on to the railway along with upgraded window glazing requirements. For the remaining dwellings, any exterior wall, and double glazed window construction meeting the minimum requirements of the Ontario Building Code (OBC) will provide adequate sound insulation for the dwelling units.

3. Warning clauses should be used to inform future residents of the rail traffic sound level excesses.

The reader is referred to the previous sections of the report where these recommendations are discussed in more detail.

Table 6: Summary of Noise Control Requirements and Noise Warning Clauses

Lot/Block No.	Acoustic Barrier	*Ventilation Requirements	Type of Warning Clause	Brick Exterior Facade	STC Requirements LR/BR
1	--	A/C	A, D, I, II	✓	+STC-34
2	--	Provision for A/C	A, C, II	--	OBC
Remaining dwellings	--	--	II	--	OBC

Note:

-- no specific requirement

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

OBC – Meeting the minimum requirements of the Ontario Building Code

+ When detailed floor plans and building elevations are available, the drawings should be reviewed to refine the window glazing requirements

6.1 Implementation

To ensure that the sound control recommendations outlined above are properly implemented in the site design, it is recommended that:

1. Prior to the issuance of building 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 and vibration control measures have been properly incorporated.
2. Prior to registration, 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 and vibration control measures have been properly installed and constructed.





Figure 1 - Key Plan

LOT 28 CONCESSION 1
 PART 4 PLAN 44R - 2475
GODERICH EXETER RAILWAY (GEXR)

P.I.N. 53200 - 0004 (LT)

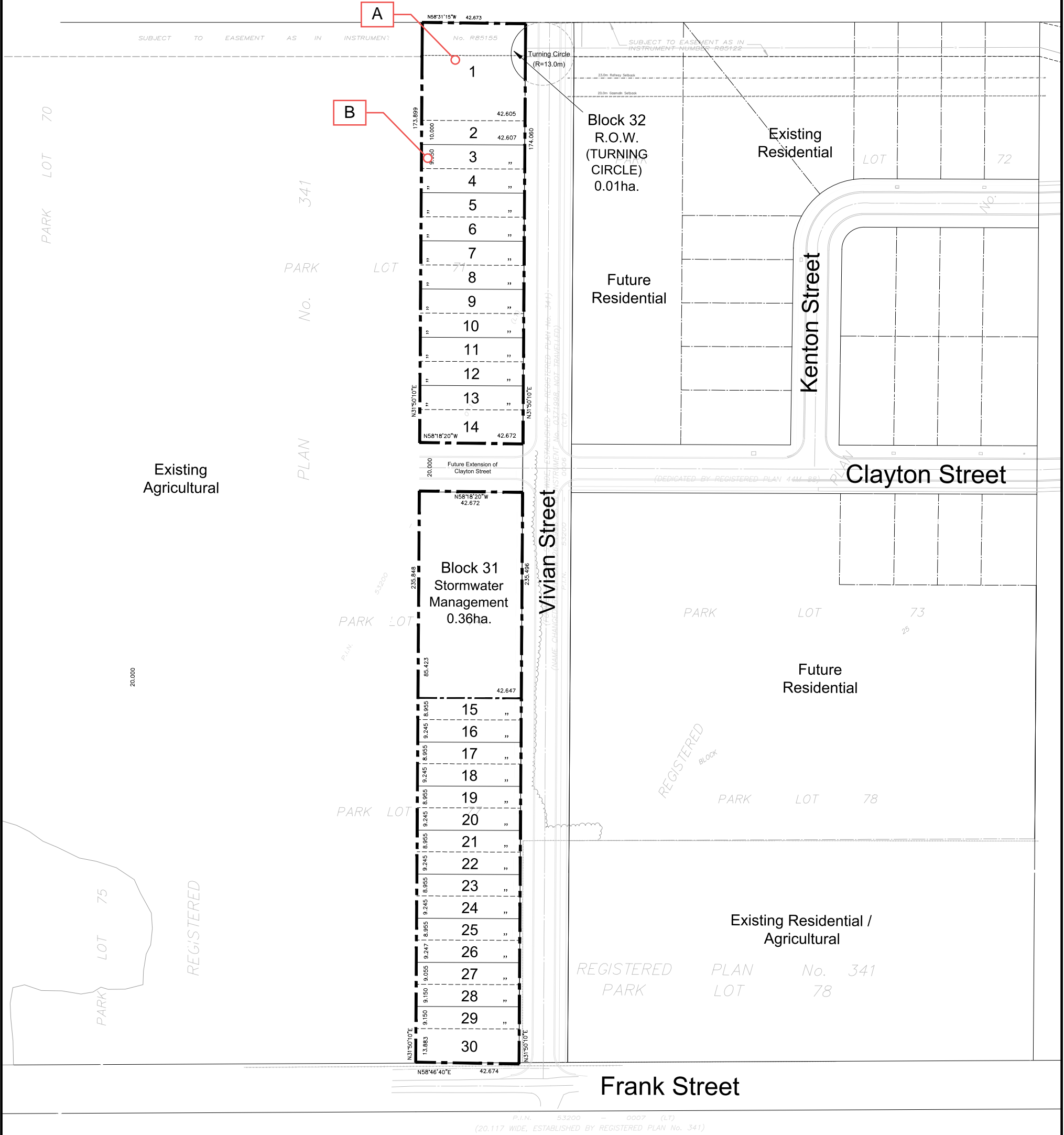
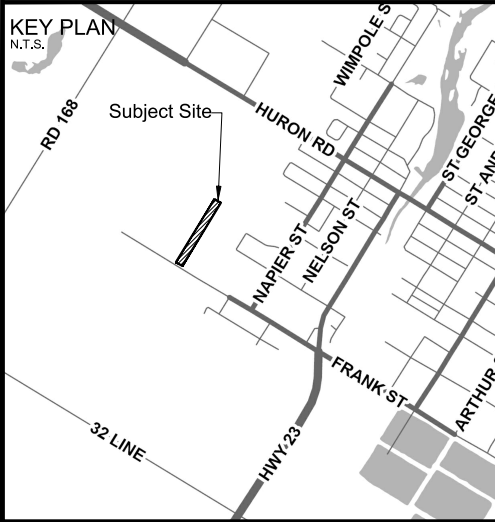


Figure 2 - Proposed Phase 4 Lotting Plan Showing Prediction Locations



DESCRIPTION	LOTS/BLKS.	UNITS	AREA (ha.)
SEMI DETACHED RESIDENTIAL	1-30	30	1.37
STORMWATER MANAGEMENT	31		0.36
R.O.W (TURNING CIRCLE)	32		0.01
TOTAL		30	1.74

ADDITIONAL INFORMATION
 (UNDER SECTION 51(17) OF THE PLANNING ACT)
 INFORMATION REQUIRED BY CLAUSES a,b,c,d,e,f,g,j and I ARE AS SHOWN ON THE DRAFT PLAN.
 h) Municipal water supply
 i)
 k) All sanitary and storm sewers as required

OWNER'S CERTIFICATE
 I AUTHORIZE THE GSP GROUP INC. TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION TO

OWNER _____ DATE _____

SURVEYOR'S CERTIFICATE
 I CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE CORRECTLY SHOWN.

PAUL J. BENEDICT, OLS _____ DATE _____

DRAFT PLAN OF SUBDIVISION

PART OF
 PARK LOTS 71, 74 AND 77
 REGISTERED PLAN NO. 341
 AND PART OF LOT 28
 MUNICIPALITY OF WEST PERTH
 COUNTY OF PERTH



REVISIONS

PLANNING | URBAN DESIGN | LANDSCAPE ARCHITECTURE
 gspgroup.ca
 Date: November 12, 2025 Drawn By: HS Dwg File Name: 62167_001-D1 revisions.dwg
 Scale: 1: 750 Project No.: 21064

LEGEND

- Air conditioning is required
- Provision for the future installation of air conditioning at the occupant's discretion

LOT 28 CONCESSION 1
PART 4 PLAN 44R - 2475
GODERICH EXETER RAILWAY (GEXR)
P.I.N. 53200 - 0004 (LT)

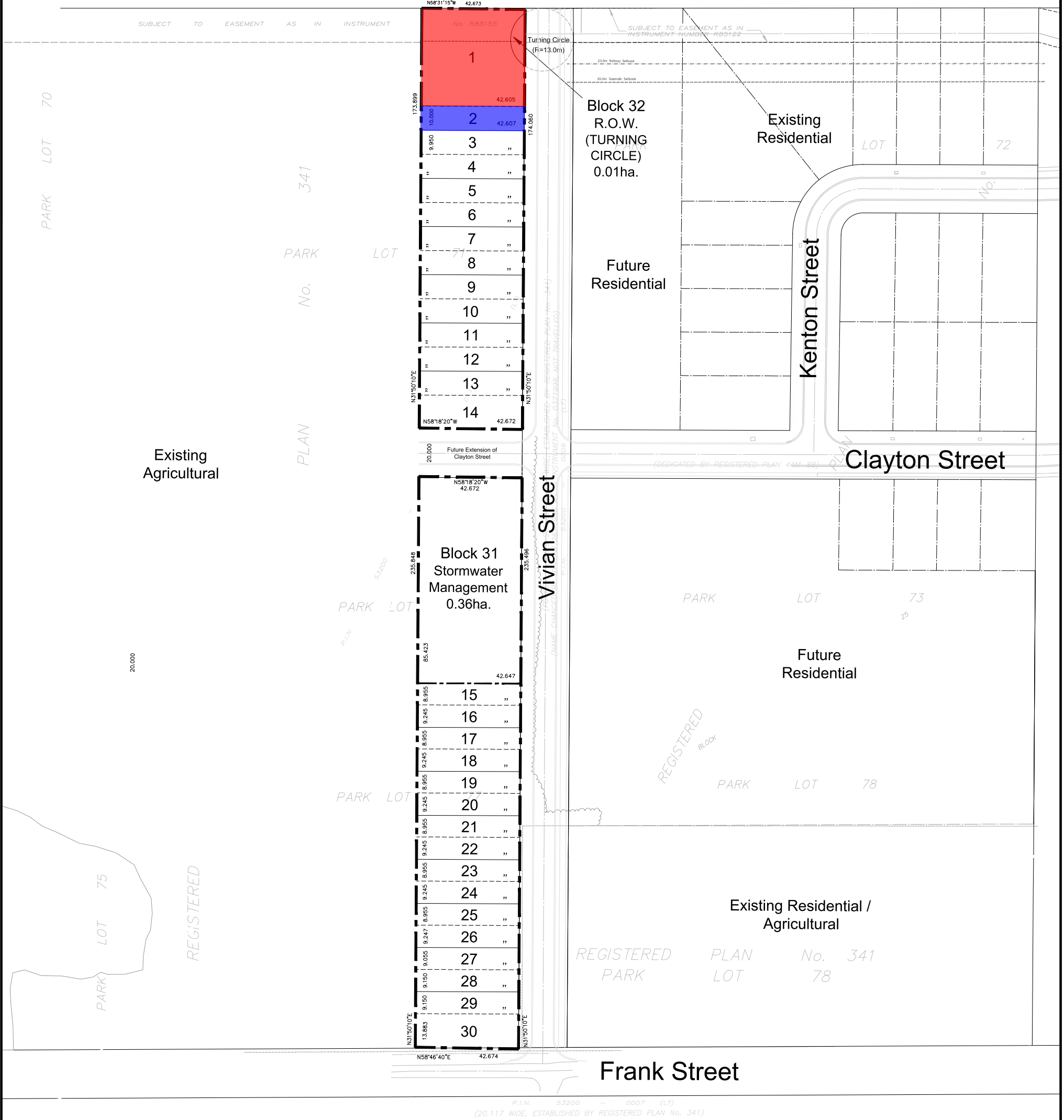
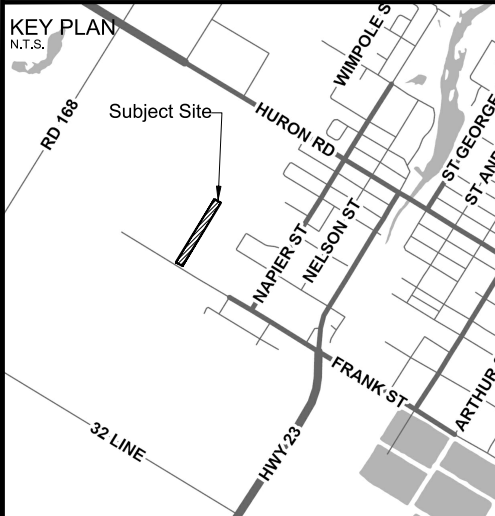


Figure 3 - Proposed Draft Plan Showing Ventilation Requirements



DESCRIPTION	LOTS/BLKS.	UNITS	AREA (ha.)
SEMI DETACHED RESIDENTIAL	1-30	30	1.37
STORMWATER MANAGEMENT	31		0.36
R.O.W (TURNING CIRCLE)	32		0.01
TOTAL		30	1.74

ADDITIONAL INFORMATION
(UNDER SECTION 51(17) OF THE PLANNING ACT)
INFORMATION REQUIRED BY CLAUSES a,b,c,d,e,f,g,j and I ARE AS SHOWN ON THE DRAFT PLAN.
h) Municipal water supply
i) All sanitary and storm sewers as required

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SURVEYOR'S CERTIFICATE
I CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE CORRECTLY SHOWN.

PAUL J. BENEDICT, OLS _____ DATE _____

DRAFT PLAN OF SUBDIVISION

PART OF
PARK LOTS 71, 74 AND 77
REGISTERED PLAN NO. 341
AND PART OF LOT 28
MUNICIPALITY OF WEST PERTH
COUNTY OF PERTH

PLANNING | URBAN DESIGN | LANDSCAPE ARCHITECTURE
gspgroup.ca

REVISIONS

Date: November 12, 2025 Drawn By: HS Project No.: 21064
Scale: 1: 750 Dwg File Name: 62167_001-D1 revisions.dwg

Appendix A

CN Secondary Mainline Requirements



NOISE



VIBRATION



ACOUSTICS



SECONDARY MAIN LINE REQUIREMENTS

- A. Safety setback of dwellings from the railway rights-of-way to be a minimum of 30 metres in conjunction with a safety berm. The safety berm shall be adjoining and parallel to the railway rights-of-way with returns at the ends, 2.0 metres above grade at the property line, with side slopes not steeper than 2.5 to 1.
- B. The Owner shall engage a consultant to undertake an analysis of noise. At a minimum, a noise attenuation barrier shall be adjoining and parallel to the railway rights-of-way, having returns at the ends, and a minimum total height of 4.5 metres above top-of-rail. Acoustic fence to be constructed without openings and of a durable material weighing not less than 20 kg. per square metre of surface area. Subject to the review of the noise report, the Railway may consider other measures recommended by an approved Noise Consultant.
- C. Ground-borne vibration transmission to be evaluated in a report through site testing to determine if dwellings within 75 metres of the railway rights-of-way will be impacted by vibration conditions in excess of 0.14 mm/sec RMS between 4 Hz and 200 Hz. The monitoring system should be capable of measuring frequencies between 4 Hz and 200 Hz, ± 3 dB with an RMS averaging time constant of 1 second. If in excess, isolation measures will be required to ensure living areas do not exceed 0.14 mm/sec RMS on and above the first floor of the dwelling.
- D. The Owner shall install and maintain a chain link fence of minimum 1.83 metre height along the mutual property line.
- E. The following clause should be inserted in all development agreements, offers to purchase, and agreements of Purchase and Sale or Lease of each dwelling unit within 300m of the railway right-of-way: "Warning: Canadian National Railway Company or its assigns or successors in interest has or have a rights-of-way within 300 metres from the land the subject hereof. There may be alterations to or expansions of the railway facilities on such rights-of-way in the future including the possibility that the railway or its assigns or successors as aforesaid may expand its operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwelling(s). CNR will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid rights-of-way."
- F. Any proposed alterations to the existing drainage pattern affecting railway property must receive prior concurrence from the Railway and be substantiated by a drainage report to the satisfaction of the Railway.
- G. The Owner shall through restrictive covenants to be registered on title and all agreements of purchase and sale or lease provide notice to the public that the safety berm, fencing and vibration isolation measures implemented are not to be tampered with or altered and further that the Owner shall have sole responsibility for and shall maintain these measures to the satisfaction of CN.
- H. The Owner enter into an Agreement stipulating how CN's concerns will be resolved and will pay CN's reasonable costs in preparing and negotiating the agreement.
- I. The Owner may be required to grant CN an environmental easement for operational noise and vibration emissions, registered against the subject property in favour of CN.

March 2002

Appendix B

Rail Traffic Data



NOISE



VIBRATION



ACOUSTICS



Victor Garcia, P.Eng
HGC Engineering NOISE | VIBRATION | ACOUSTICS
Howe Gastmeier Chapnik Limited

June 12, 2017 (via email only)

Re: Rail Traffic – Goderich Subdivision – Mitchell, ON

As per your request, the following information is provided for the area in the vicinity of Mile 13.64 of GEXR's Goderich Subdivision and Napier St in Mitchell, Ontario.

The typical daily rail traffic volumes are representative of a twenty four (24) hour period, however volumes are subject to overall economic conditions and will fluctuate with varying traffic demands, weather conditions, track maintenance programs and statutory holidays.

At the specified location, the track, owned and maintained by the Goderich Exeter Railway, is a single track secondary main line constructed using sectional bolted rail. The grade crossing of Napier St. is protected by automatic warning devices consisting of lights and bells. There is no whistling restriction for trains at this location.

At present the number of trains which are scheduled to operate at the specified location Monday to Friday between 0700 and 2300 are two (2) freight trains. There are no trains scheduled on Saturday or Sunday.

Freight trains are normally operated with one to three (1-3) locomotives and up to 80 cars.

At this location, freight trains may operate at up to a maximum speed of twenty five (25) miles per hour.

NOTE: Unscheduled train movements may occur at any time, any speed and in any direction. For your safety, do not enter railway property at any time without permission and an escort from GEXR.

If you have any further questions or are unclear about any of this information, please contact us for assistance.

Sincerely,

David Warne
Director Marketing & Sales
Genesee & Wyoming Canada

Rank	TC Number	Railway Co	Region	Province	Access	Jurisdiction	Mile	Subdivision	Spur Mile	P Spur Name	Location	Latitude	Longitude	Road Auth	Protection	Accidents	Fatality	Injury	Trains Daily	Vehicles D	Train Max S	Road Speed	Lanes	Tracks	IsUrban
7842	6313	Goderich	EONT	ON	Public	F	13.64	Goderich - I-	-	Napier St (I	43.4663	-81.2075	West Perth	Active - FLE	0	0	0	0	2	1000	25	50	2	1	N

Appendix C

Sample STAMSON 5.04 Output



NOISE



VIBRATION



ACOUSTICS

85 88 0.50 66.78 0.00 -23.34 0.00 0.00 0.00 43.44

Segment Leq : 66.81 dBA

Total Leq All Segments: 66.81 dBA

Results segment # 1: GEXR (night)

LOCOMOTIVE (0.00 + -1.17 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.50	0.00	0.00	-1.17	0.00	0.00	0.00	-1.17

WHEEL (0.00 + -1.35 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.60	0.00	0.00	-1.35	0.00	0.00	0.00	-1.35

LEFT WHISTLE (0.00 + 65.56 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-86	85	0.50	0.00	0.00	-1.22	0.00	0.00	0.00	65.56

Segment Leq : 0.00 dBA

Total Leq All Segments: 0.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.81



Filename: aola.te Time Period: 16 hours

Description: OLA of dwellings with flanking exposure to railway

Rail data, segment # 1: GEXR

```

-----
Train          ! Trains      ! Speed !# loc !# Cars! Eng  !Cont
Type          !             ! (km/h) !/Train! /Train! type !weld
-----+-----+-----+-----+-----+-----
  1.          !  2.6/0.0   !  40.0 !  3.0 ! 80.0 !Diesel! No
  
```

Data for Segment # 1: GEXR

```

-----
Angle1  Angle2      : -90.00 deg   45.00 deg
Wood depth      :          0   (No woods.)
No of house rows :          0
Surface         :          1   (Absorptive ground surface)
Receiver source distance : 20.00 m
Receiver height  :   1.50 m
Topography      :          1   (Flat/gentle slope; no barrier)
No Whistle
Reference angle :   0.00
Rail data, segment # 2: GEXR
  
```

```

-----
Train          ! Trains      ! Speed !# loc !# Cars! Eng  !Cont
Type          !             ! (km/h) !/Train! /Train! type !weld
-----+-----+-----+-----+-----+-----
  1.          !  2.6/0.0   !  40.0 !  3.0 ! 80.0 !Diesel! No
  
```

Data for Segment # 2: GEXR

```

-----
Angle1  Angle2      :  45.00 deg   90.00 deg
Wood depth      :          0   (No woods.)
No of house rows :          0
Surface         :          1   (Absorptive ground surface)
Receiver source distance : 20.00 m
Receiver height  :   1.50 m
Topography      :          2   (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1   :  45.00 deg   Angle2 : 90.00 deg
Barrier height   :    7.00 m
Barrier receiver distance :  3.00 m
Source elevation :    0.00 m
Receiver elevation :    0.00 m
Barrier elevation :    0.00 m
Reference angle  :    0.00
  
```

Results segment # 1: GEXR

LOCOMOTIVE (0.00 + 56.33 + 0.00) = 56.33 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	45	0.58	60.51	-1.98	-2.20	0.00	0.00	0.00	56.33

WHEEL (0.00 + 51.99 + 0.00) = 51.99 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	45	0.66	56.35	-2.07	-2.29	0.00	0.00	0.00	51.99

Segment Leq : 57.69 dBA

Results segment # 2: GEXR

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
4.00	1.50	1.88	1.88
0.50	1.50	1.35	1.35

LOCOMOTIVE (0.00 + 36.77 + 0.00) = 36.77 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
45	90	0.17	60.51	-1.46	-6.88	0.00	0.00	-15.40	36.77

WHEEL (0.00 + 31.23 + 0.00) = 31.23 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
45	90	0.27	56.35	-1.59	-7.39	0.00	0.00	-16.15	31.23

Segment Leq : 37.84 dBA

Total Leq All Segments: 57.73 dBA

TOTAL Leq FROM ALL SOURCES: 57.73 dBA



Appendix D

Vibration Plots



NOISE

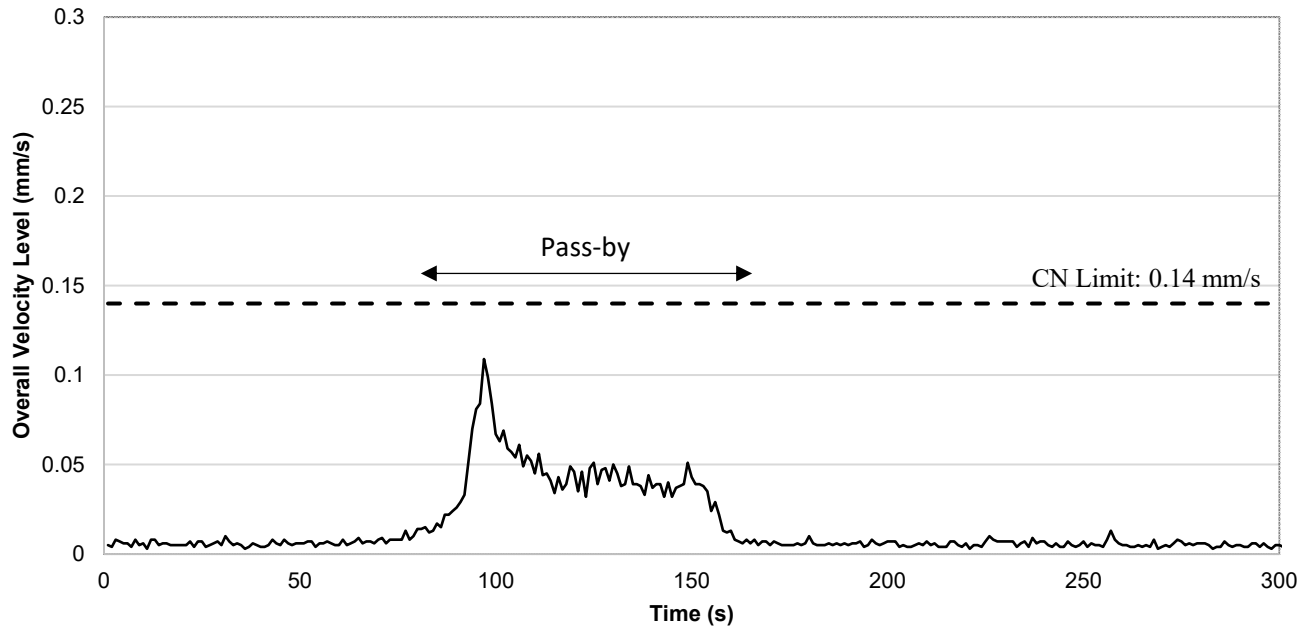


VIBRATION

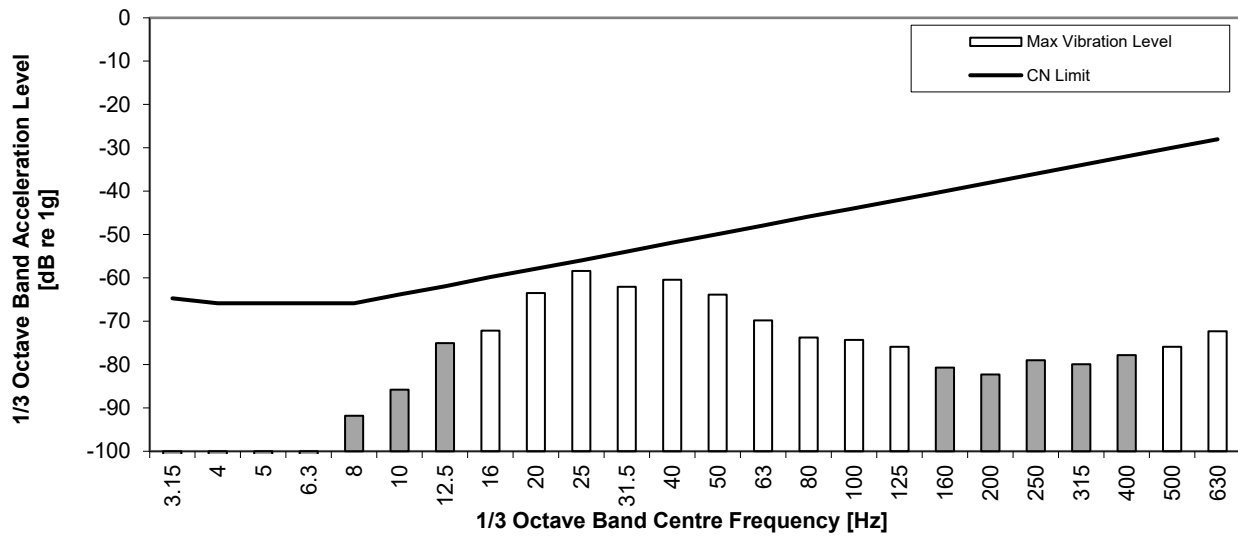


ACOUSTICS

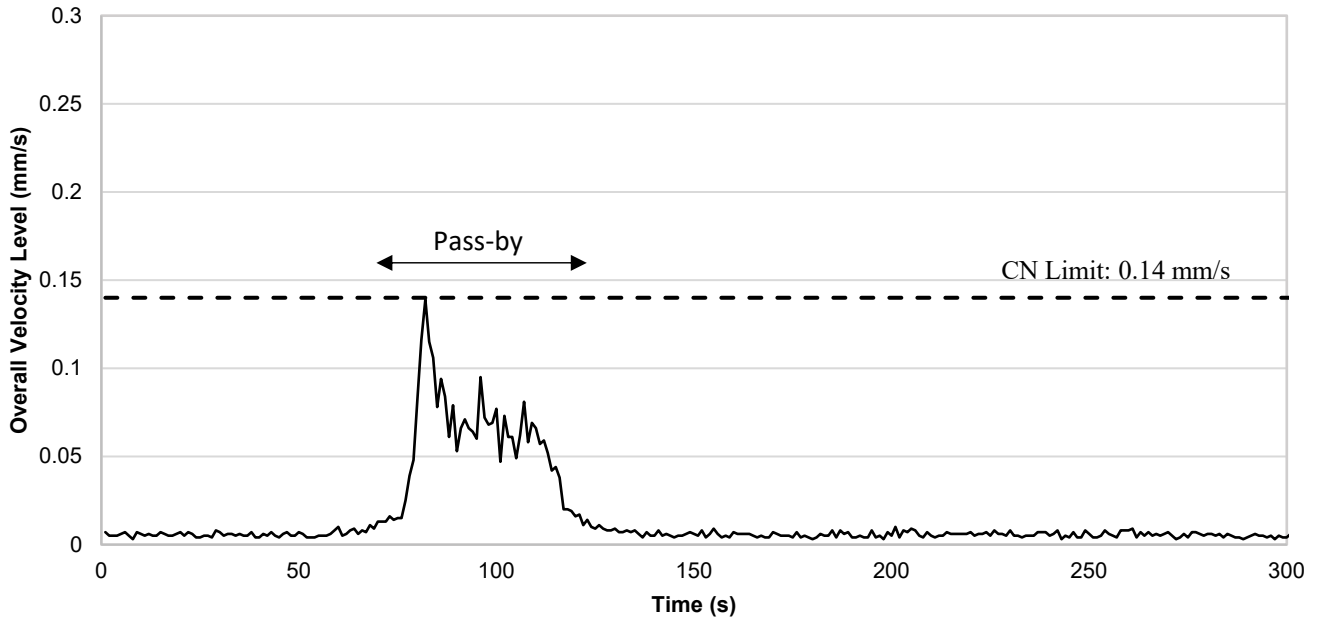
**Pass-by 1 at 15 m from ROW at M1
Measured Vibratory Velocity Level**



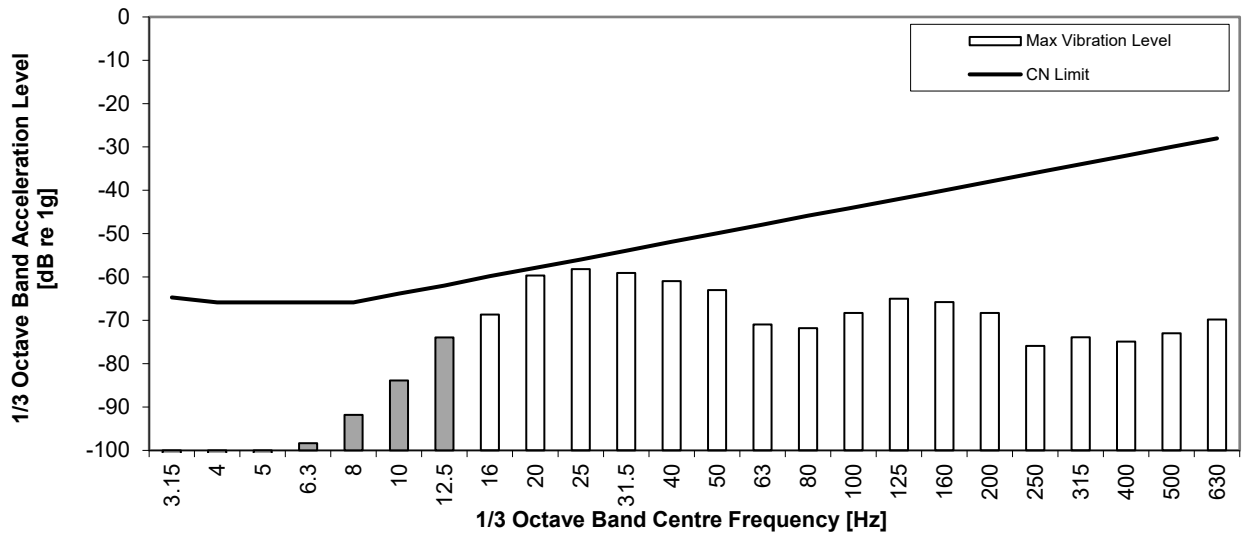
**Pass-by 1 at M1
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



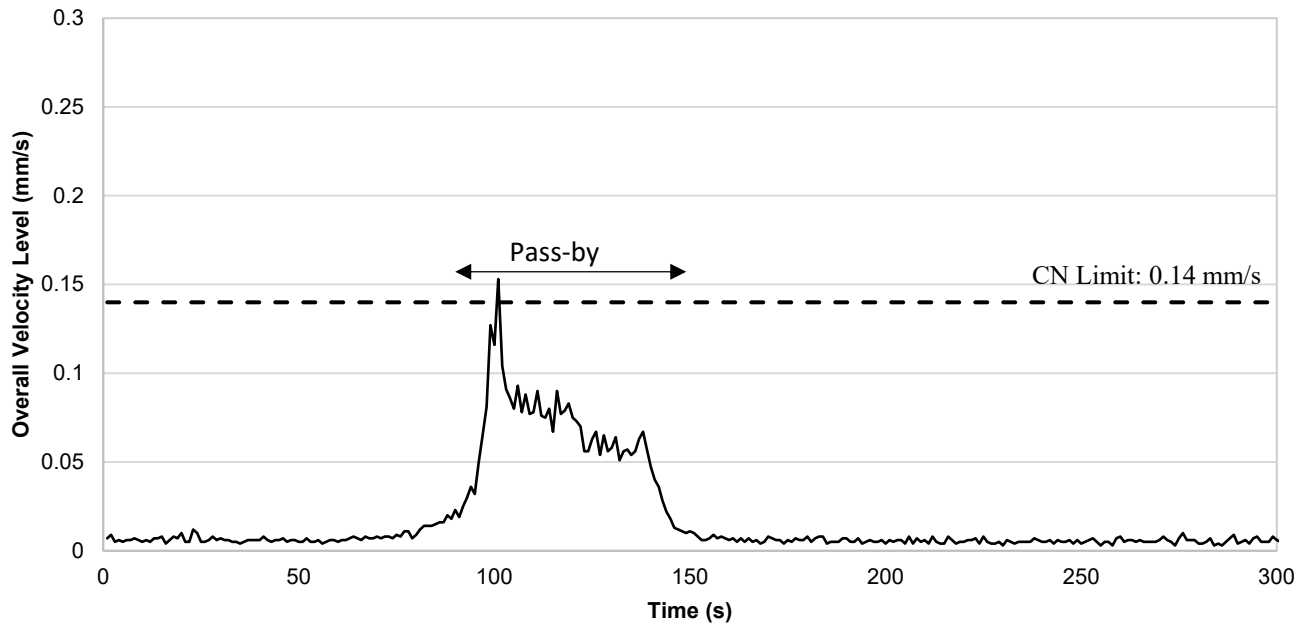
**Pass-by 2 at 15 m from ROW at M1
Measured Vibratory Velocity Level**



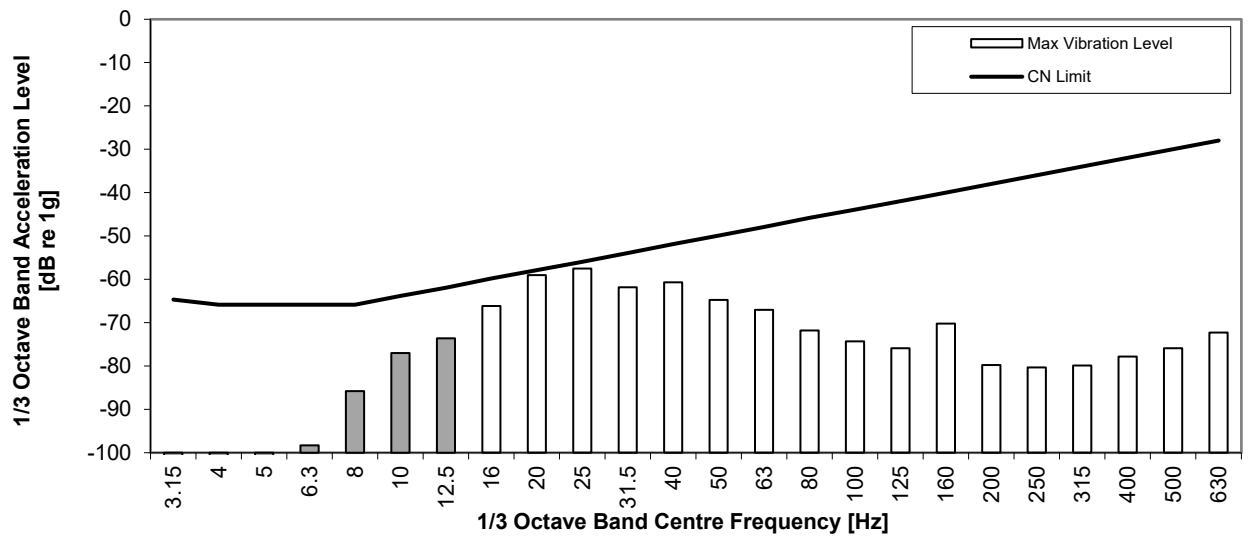
**Pass-by 2 at M1
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



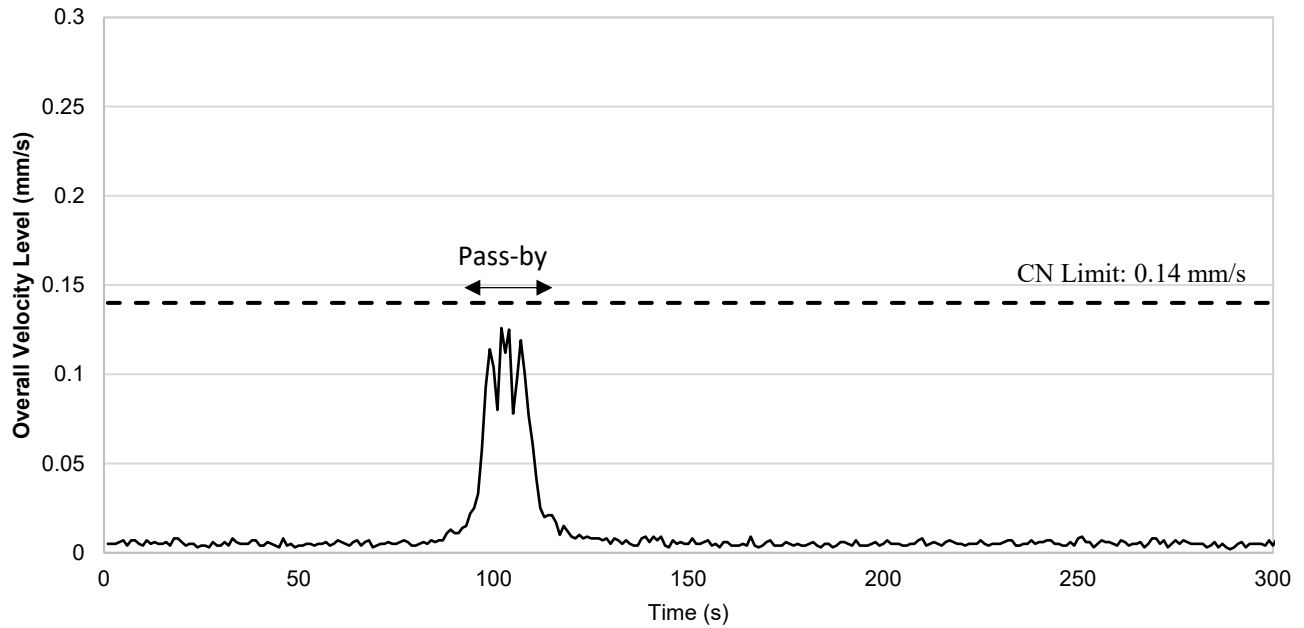
**Pass-by 3 at 15 m from ROW at M1
Measured Vibratory Velocity Level**



**Pass-by 3 at M1
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



**Pass-by 4 at 40 m from ROW at M1
Measured Vibratory Velocity Level**



**Pass-by 4 at M1
Acceleration Spectrum @ Peak Level (1 sec. Duration)**

