


Noise and Vibration Feasibility Study Proposed 401 Canal Bank Street Development Welland, Ontario

Prepared for:

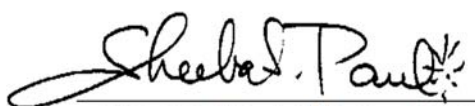
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VERSION CONTROL

Version	Date	Version Description
1	June 4, 2019	Original Report
2	March 10, 2020	Updated report to address change of John Deere Lands to Residential
3	May 14, 2020	Updated report to address change to Class 4 criteria for first row of lots



EXECUTIVE SUMMARY

555 Canal Bank Developments GP Inc. retained HGC Engineering to conduct a noise and vibration feasibility study for a proposed residential development in the Dain City neighbourhood of Welland, Ontario. The study utilizes guidelines for acceptable levels of road and rail traffic noise impacting residential developments in the MECP publication NPC-300, “Environmental Noise Guidelines Stationary and Transportation Sources – Approval and Planning”.

The results of the assessment indicate that it is feasible to achieve the MECP/CN sound level guidelines at the proposed residential development. The following recommendations are provided for noise control purposes:

- a) The dwelling units closest to the rail lines at the north and west will require forced air ventilation systems with the provision for the future installation of central air conditioning systems by the occupant.
- b) Warning clauses should be placed on property and tenancy agreements and offers of purchase and sale for all residential units within 300 m of the rail lines identifying the presence of the rail lines and that sound from railway operations may at times be audible and that railway operations may change in the future.
- c) A detailed traffic noise study should be conducted prior to the registration of the northern portions of the draft approved subdivision for the lands adjacent to the Highway 58A/CN rail corridor to determine the noise impact based on road and rail traffic information, grading information and lotting and phasing information available at that time.
- d) The first row of lots adjacent to the CN Rail Canal Subdivision, operated by GIO Rail Holdings Inc, are assessed based on Class 4 designation and sound level criteria.
- e) The berm/barrier as shown in Figures 6a and 6b, should be constructed to shield two-storey homes along the western portion of the development.
- f) Warning clauses should be placed on tenancy and property agreements and offers of purchase and sale for all residential lots with exposure to Verbio Diesel Canada informing the future residents of the presence of the industrial operations and that those operations could change in the future.

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1 INTRODUCTION

HGC Engineering was retained by 555 Canal Bank Developments GP Inc. to conduct a noise and vibration feasibility study for a proposed residential development in the Dain City neighbourhood of Welland, Ontario. The site is located to the west of the Welland Ship Canal, to the south of a Canadian National (“CN”) Railway principal main line and Townline Tunnel Road (Highway 58A), to the east of an industrial operation (Verbio Diesel Canada) and another CN Railway secondary main line operated by GIO Rail Holdings Corp, and to the north of Forks Road.

The study is part of the planning and approvals process with regard to the proposed residential development and has been prepared to assist removing the redline restrictions from the draft plan, now that the John Deere Facility has ceased operations and the buildings have been demolished to grade. The John Deere lands (Dain West) have also been purchased by 555 Canal Bank Developments GP Inc. The original draft plan design was the subject of an earlier noise and vibration feasibility study conducted by HGC Engineering dated April 17, 2006. An earlier version of this report, dated June 4, 2019 was prepared assuming some industrial operations on the Dain West lands. This report has been updated to reflect the proposed residential uses on the Dain West lands and the implementation of Class 4 sound level criteria to assess stationary noise sources for the first row of dwellings adjacent to the Canal Subdivision rail line.

The lands are presently zoned as Open Space and Multiple Dwelling – Third Density Zone. The study follows the Ontario Ministry of the Environment, Conservation and Parks (“MECP”) and CN guidelines with regard to the impact of noise and vibration.

Various site visits were performed during the fall of 2005, in January 2018 and in November 2019, in order to identify potentially significant transportation and industrial noise sources in the vicinity of the development, to investigate the site topography, and to conduct noise and vibration measurements. This report considers noise and vibration from rail traffic, noise from road traffic (Highway 58A) and noise from the neighbouring industry (Verbio Diesel Canada’s biodiesel plant).

2 SITE DESCRIPTION AND SOURCES OF SOUND

Figure 1 is a key plan of the proposed subdivision. The site is located to the west of the Welland Ship Canal, to the south of a Canadian National (CN) Railway principal main line and Townline Tunnel Road (Highway 58A), to the east of Canal Bank Street (the vacant John Deere Welland Works and Verbio Diesel Canada's biodiesel plant) and a CN secondary main line operated by the GIO Rail Holdings Corp, and to the north of Forks Road. Further to the south and west are existing residential land uses in Dain City, a suburb of Welland, Ontario. A hydro right-of-way is located along the east portion of the northern boundary of the site.

The proposed development lands will include a number of Phases of residential development including fully detached, semi-detached and multiple residential units, parks, open space areas, stormwater ponds and associated roadways. A concept plan prepared by Armstrong Planning, dated February 13, 2020 is shown in Figure 2a.

The former John Deere Welland Works was a large industrial manufacturing operation located across the GIO Rail Holdings rail line to the west of the northern portion of the site. The structures have been demolished to grade and these lands are now being considered for residential development. No future industrial operations are assumed on these lands. A preliminary concept plan prepared by MBTW Group dated October 21, 2019 is provided as Figure 2b. Verbio Diesel Canada operates a biodiesel production facility with some yard activity, west of the south-central portion of the proposed residential site. The sound levels of the biodiesel facility are discussed in a following section of this report.

HGC Engineering personnel visited the site on numerous occasions to investigate the acoustic and topographic environment of the site. The acoustical environment surrounding the site is semi-urban comprised primarily of road traffic and industrial noise during most hours. Occasional rail traffic on the adjacent rail lines is audible from time to time. The internal roadways were not considered in the analysis due to their anticipated low volumes.

3 SOUND LEVEL CRITERIA

3.1 CRITERIA GOVERNING ROAD AND RAIL TRAFFIC NOISE

Guidelines for acceptable levels of road and rail traffic noise impacting residential developments are given in the MECP publication NPC-300, “Environmental Noise Guidelines Stationary and Transportation Sources – Approval and Planning”, release date October 2013. These criteria are listed in Table I below, as energy equivalent average sound levels [L_{EQ}] in units of A-weighted decibels [dBA]. As well, a copy of the CN rail line requirements for a principal mainline and a secondary line are included as Appendix A.

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

Area	Daytime L _{EQ} (16 hour) Road/Rail	Nighttime L _{EQ} (8 hour) Road/Rail
Inside Living/Dining Rooms	45 dBA / 40 dBA	45 dBA / 40 dBA
Inside Bedrooms	45 dBA / 40 dBA	40 dBA / 35 dBA
Outdoor Living Areas	55 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, a children's playground or other area designated for passive recreation.

The guidelines in the MECP publication allow the sound level 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 noise control measures, such as an acoustical barrier or berm, are required. Mitigation is recommended to reduce the OLA sound level to below 60 dBA and as close to 55 dBA as technically, economically and administratively feasible. Where OLA's are adjacent to a CN rail line, CN requires the rail component of the sound level be mitigated to 55 dBA or less.

The indoor noise level criteria for rail noise are 5 dBA more stringent than for road noise. The more stringent criteria was applied to those dwellings exposed to appreciable rail noise. A central air conditioning system as an alternative means of ventilation to open windows is recommended

for dwellings where nighttime sound levels outside bedroom or living/dining room windows exceed 60 dBA or daytime sound levels outside bedroom or living/dining room windows exceed 65 dBA. Forced air ventilation system with ducts sized for the future provision of central air conditioning, or some other alternative form of mechanical ventilation, is required where nighttime sound levels at bedroom or living/dining room windows are in the range of 51 to 60 dBA or when daytime sound levels at bedroom or living/dining room windows are in the range of 56 to 65 dBA.

Sound attenuating building constructions and the use of warning clauses to notify future residents of possible excesses are also required when nighttime sound levels exceed 55 dBA at the plane of the bedroom window due to rail traffic and when nighttime sound levels exceed 60 dBA at the plane of the bedroom window due to road traffic. Warning clauses to notify future residents of possible excesses are also required when daytime sound levels exceed 55 dBA in the outdoor living area.

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 refer to minimum required setbacks, berms, fencing and warning clauses. The reader is referred to copies of CN requirements for new developments adjacent to their principal main lines and secondary main lines, which are located in Appendix A.

3.2 GROUND-BORNE VIBRATION FROM RAIL TRAFFIC

MECP and CN guidelines require measurements of ground-borne vibration when residential dwelling units are to be located within 75 metres of a principal main line or secondary main line such as the CN Stamford Subdivision or the CN Canal Subdivision.

Vibration is typically measured in terms of oscillatory velocity or acceleration. The CN guidelines are given in terms of ground-borne velocity. In this report, vibration levels are quoted in terms of RMS velocity levels (LV) in units of decibels [dB] relative to 1 mm/s (i.e., 1 mm/s = 0 dB). The CN guideline limit is 0.14 mm/s, which is equivalent to -17 dB re 1 mm/s. For ease of reference, this limit of -17 dB re 1 mm/s is identified on velocity plots in this report.

3.3 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. The mitigation can be provided at the source, or can be incorporated on the development lands where the industrial facility is operating in compliance with legislated Ministry requirements.

For planning purposes the potential zone of influence is 70 m for a Class I industrial use, 300 m for Class II industrial use and 1000 m for Class III industrial use. In addition, these guidelines recommend minimum distance setbacks within which noise sensitive uses should not be allowed. These minimum distance setbacks are 20 m, 70 m, and 300 m respectively.

The classifications are general, leaving some room for interpretation on a specific basis. For example, a Class I industry is categorized as a small scale plant with no outside storage, sound not audible off property, with daytime only operations and infrequent movement of products and/or heavy trucks. A Class II industry is categorized as a medium level of production with outside storage permitted. Sound may occasionally be audible off property, shift operations are permitted and there are frequent movement of products and/or heavy trucks. A Class III industry is categorized as the wide range of heavy industrial uses with a significant potential for fugitive emissions.

Generally, these setbacks apply to the distance between the property lines of the industrial and sensitive land uses, unless a portion of the industrial lands is clearly identified or zoned to be of a non-noise producing nature, such as an employee parking lot, or storm water management pond for example.

The noise sensitive portions of the subject lands are the facades of the residential buildings and any useable outdoor space associated with a dwelling unit. Commercial buildings, parking lots,

playing fields etc. are generally not considered to be noise sensitive and could be considered to be part of the distance setback.

The guidelines do allow for reductions in the minimum setback distances, based on the results of supporting technical studies such as this for infill developments or “Lands in Transition” with the implementation of noise mitigation features.

3.4 CRITERIA GOVERNING STATIONARY (INDUSTRIAL) NOISE SOURCES

Industrial or commercial facilities or activities are referred to as stationary sources. Noise impacts from such sources may also be assessed under MECP Guideline NPC-300. The proposed development is considered to be a noise sensitive land use.

In general, for assessments performed under NPC-300, sound level limits for stationary sources of sound are specified to be equal to the background sound from road traffic during the same time of day (or night) that the source may operate, subject to certain minimum exclusionary values which depend on the nature of the acoustic environment in the area of the site. In terms of background sound, the development is located in a semi-urban (Class 2) acoustical environment which is characterized by an acoustical environment dominated by road traffic and industrial noise (the urban hum). Portions of the site are proposed to be designated as a Class 4 acoustical environment; specifically, the first row of dwellings east of the Canal Subdivision rail line. The definition for a Class 4 area is reproduced below:

“Class 4 area” means an area or specific site that would otherwise be defined as Class 1 or 2 and which:

- is an area intended for development with new noise sensitive land use(s) that are not yet built;
- is in proximity to existing, lawfully established stationary source(s); and
- has formal confirmation from the land use planning authority with the Class 4 area classification which is determined during the land use planning process.

A Class 4 area is based on the principle of formal confirmation of the classification by the land use planning authority. Such confirmation would be issued at the discretion of the land use planning authority and under the procedures developed by the land use planning authority, in the exercise of its responsibility and authority under the Planning Act.

Appendix A includes correspondence from the City of Welland with regards to support for a Class 4 designation.

Publication NPC-300 stipulates that the sound level limit for a stationary source which operates continuously, 24 hours per day, in a Class 2 environment is the greater of the minimum one-hour energy-equivalent (L_{EQ}) background sound level, or the following exclusionary minimum limits:

Table II: Exclusion Limits, Non-Impulsive Sounds, Class 2 & 4 Areas, L_{EQ} [dBA]

Area Classification	Location	Daytime (07:00 – 19:00)	Evening (19:00 – 23:00)	Nighttime (23:00 – 07:00)
Class 2	Outdoor Points of Reception	50	45	--
	Plane of Window of Noise Sensitive Spaces/Vacant Lots	50	50	45
Class 4	Outdoor Points of Reception	55	55	--
	Plane of Window of Noise Sensitive Spaces/Vacant Lots	60	60	55

Based on our site visits and acoustic measurements in the area, background sound levels from road traffic fall below the minima, and thus the associated criteria are the exclusionary minima above.

The MECP guideline also stipulates that the noise assessment shall consider a *predictable worst-case hour*, which is defined as an hour when typically busy operation of the stationary sources under consideration could coincide with an hour of low background sound.

For impulsive noise, such as that generated by rail shunting activities, the criteria provided by the MECP guidelines are similar but are expressed in terms of the Logarithmic Mean Impulse Sound Level (L_{LM}) in dBAI. Under guideline NPC-300, the limits for impulsive sounds differ depending on how frequently the impulses occur, as summarized in the following tables:

Table III: Exclusion Limit, Impulsive Sounds, Class 2 and 4 Areas, L_{LM} [dBAI]

Number of Impulses per Hour	Class 2		Class 4		
	Daytime & Evening ¹ (07:00 – 23:00)	Nighttime ² (23:00 – 07:00)	Daytime & Evening ² (07:00 – 23:00)	Nighttime ² (23:00 – 07:00)	Outdoor (07:00-23:00)
9 or more	50	45	60	55	55
7 to 8	55	50	65	60	60
5 to 6	60	55	70	65	65
4	65	60	75	70	70
3	70	65	80	75	75
2	75	70	85	80	80
1	80	75	90	85	85

¹ Applicable at both planes of windows to noise sensitive spaces and outdoor points of reception.

² Applicable at planes of windows to noise sensitive spaces only.

The assessment of the biodiesel facility assumes during a predictable worst-case hour, one rail delivery could occur, consisting of a locomotive arriving at the site to drop off empty rail cars and/or retrieving full cars (infrequent impulses). For GIO Rail Holdings Corp impulsive sound from rail activity are considered to be frequent (more than 9 per hour). The applicable sound level limits are as indicated in Tables IV and V, below:

Table IV: Applicable Sound Level Limits at Selected Points of Reception, Class 2

Type of Sound	Point of Reception	Daytime (07:00 – 19:00)	Evening (19:00 – 23:00)	Nighttime (23:00 – 07:00)
All Sources Non-Impulsive, dBA	Façade	50	50	45
	OLA	50	45	--
Biodiesel Facility Impulsive, dBAI	Façade	80	80	75
	OLA	80	75	--
GIO Rail Railways Impulsive, dBAI	Façade	50	50	45
	OLA	50	45	--

Table V: Applicable Sound Level Limits at Selected Points of Reception, Class 4

Type of Sound	Point of Reception	Daytime (07:00 – 19:00)	Evening (19:00 – 23:00)	Nighttime (23:00 – 07:00)
All Sources Non-Impulsive, dBA	Façade	60	60	55
	OLA	55	55	--
Biodiesel Facility Impulsive, dBAI	Façade	90	90	85
	OLA	85	85	--
GIO Rail Railways Impulsive, dBAI	Façade	60	60	55
	OLA	55	55	--

It is a responsibility of industrial noise generators under the Environmental Protection Act, to ensure that sound levels emitted by their operations comply with MECP limits at existing residences and at residentially zoned lands, such as those presently located in Dain City. Since a portion of the lands in question are presently not zoned residential (open space), the industries are not constrained to control their emissions on those lands to a further extent than they are presently constrained by the existing residential land uses. This process is generally regulated through the Environmental Compliance Approval (formerly Certificate of Approval) process.

4 TRAFFIC NOISE PREDICTIONS

4.1 HIGHWAY 58A ROAD TRAFFIC DATA

Traffic data was obtained from the Ontario Ministry of Transportation (“MTO”) in the form of annual average daily traffic (“AADT”). Commercial vehicle percentages of 5%/8% for medium/heavy trucks were used, per MTO standard. A day/night split of 85%/15% was used as is typical for regional roads and Provincial Highways. The posted speed limit is 80 km/h. Table VI summarizes the traffic volume data used in this study. As per MTO guidelines the traffic data has been grown at 2.5% for ten years.

Table VI: Projected Road Traffic Data (AADT for the year 2030)

Road Name		Cars	Medium Trucks	Heavy Trucks	Total
Highway 58 A	Daytime	8099	465	744	9308
	Nighttime	1429	82	131	1642
	Total	9528	547	875	10,950

4.2 RAIL TRAFFIC DATA

There are two railway lines in the vicinity of the proposed development, the CN Stamford subdivision line to the north and the CN Canal subdivision line to the west, a secondary main line presently operated by GIO Rail Holdings Corp. Rail traffic data for the CN Stamford subdivision line and the CN Canal subdivision line were obtained from CN Rail and GIO Rail, respectively.

In conformance with CN assessment requirements, the maximum speed, maximum number of cars and locomotives per train were used in the traffic noise analysis to yield a worst case estimate of

train noise. Tables VII and VIII summarise the rail traffic data used in the analysis grown at 2.5% for 10 years in accordance with CN requirements.

Table VII: 2030 Projected Rail Traffic Data, CN Stamford Subdivision

Type of Train (No. of Trains Day/Night)	Number of locomotives (maximum)	Number of cars (maximum)	Maximum Speed (KPH)	Daytime (07:00-23:00) trains	Night-time (23:00-07:00) trains
Freight – (2/0)	4	140	64	2.7	0
Way Freight – (9/3)	4	25	64	12.1	4.0
Passenger – (0/0)	2	10	64	0	0

Table VIII: 2030 Projected Rail Traffic Data, CN Canal Subdivision

Type of Train (No. of Trains Day/Night)	Number of locomotives (maximum)	Number of cars (maximum)	Maximum Speed (KPH)	Daytime (07:00-23:00) trains	Night-time (23:00-07:00) trains
Freight – (4/0)	1	15	16	5.3	0

Whistles are blown at the public at-grade crossings along the CN Canal Subdivision and train whistle noise was included in the predictions at the dwelling facades to determine indoor sound levels. There are no at grade crossings for the Stamford Subdivision in the vicinity of the project.

4.3 TRAFFIC NOISE PREDICTIONS

Future road and rail traffic sound levels were predicted using STAMSON version 5.04, a computer algorithm developed by the MECP. Sound level predictions were made at a worst-case location (see Figure 4), the residence at the north-west corner of the site, which is potentially exposed to the sound of both the CN Canal subdivision and CN Stamford subdivision rail lines and Highway 58A. The results of these predictions are summarized in Table IX.

Sound levels were predicted at ground level in the rear outdoor amenity area during daytime hours to determine acoustical requirements. Sound levels were also predicted at the plane of second floor bedroom windows during nighttime hours to investigate ventilation requirements.

Table IX: Predicted Traffic Sound Levels, [dBA]

Location	Daytime – OLA, (LEQ-16 hr)	Daytime – at façade, (LEQ-16 hr)	Nighttime – at façade, (LEQ-8 hr)
Worst Case Location (Exposure to Highway 58A and CN Canal and Stamford Subdivision Railway Lines)	57	61	57

With no mitigation, future sound levels are expected to exceed MECP guideline limits by a minor amount at the worst-case location, at the receptors backing onto Highway 58A. Since it could be some years before the subject lands adjacent to the road/rail corridor are developed, a detailed noise impact study should be conducted prior to the registration of the northern portions of the draft approved subdivision for these lands, to determine the noise impacts based on traffic/rail information available at the time and any mitigation requirements.

4.4 OUTDOOR LIVING AREA REQUIREMENTS

The general policies of CN rail for new residential development adjacent to a secondary main line stipulate the provision of a safety berm and sound wall totaling a minimum of 4.5 m in height (with respect to the top of rail, see Appendix B) subject to the review of a noise report.

The predicted daytime OLA sound levels, 10 years hence, may exceed MECP guidelines. It is expected that the excess will be minor and that physical mitigation will not be required, but noise warning clauses may be required to inform the future occupants of the noise issues and the proximity of the railway yard and railway lines. A safety berm is typically required regardless of sound level. These requirements should also be considered in the future detailed noise impact study conducted prior to registration of the northern portions of the draft approved subdivision.

4.5 MINIMUM DISTANCE SETBACKS

For noise control and safety reasons, the CN policies stipulate that the minimum required setback between a new dwelling and principal main lines or secondary main lines is 30 meters. The nearest dwelling units in the proposed development will be located further than 30 metres from the railway rights-of-way, meeting this requirement.

4.6 INDOOR LIVING AREAS AND VENTILATION REQUIREMENTS

The predicted future night-time sound levels outside the second storey bedroom windows are between 51 and 60 dBA for those dwellings closest to the rail lines. The dwelling units will require forced air ventilation systems with the provision for the future installation of central air conditioning systems by the occupant. The future location, installation and sound ratings of the outdoor air conditioning devices should minimize noise impacts and comply with criteria of MECP publication NPC-216, Residential Air Conditioning Devices.

4.7 BUILDING FACADE CONSTRUCTIONS

Future nighttime sound levels due to road and rail traffic noise are expected to be less than 55 dBA at night, and any double-glazed window construction meeting the minimum requirements of the Ontario Building Code (“OBC”) will provide adequate sound insulation for the dwelling units.

CN guidelines require brick veneer or masonry equivalent construction for exterior walls from foundation to rafters as a minimum construction for any dwellings that are in the first row of dwellings adjacent to an active rail line.

4.8 WARNING CLAUSES

MECP and CN guidelines recommend that appropriate warning clauses be used in the Development Agreements and in purchase, sale and lease agreements (typically by reference to the Development Agreements), to inform future owners and occupants about noise concerns from transportation sources, commercial facilities/industrial facilities and nearby rail activities in the area. The following clauses are recommended:

Suggested wording for future dwellings sound level excesses is given below.

Type A:

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

Type B:

Purchasers and 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/rail traffic may on occasion 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 forced air ventilation systems is given below.

Type C:

This dwelling unit has been fitted with a forced air heating system and the ducting etc., was sized to accommodate central air conditioning. Installation of central air conditioning will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the criteria of the Municipality and the Ministry of the Environment.

CN's standard warning clause for residential developments located near a principal main line is provided below. The following sample clause is typical of those included in agreements of purchase and sale or lease on the Lands that are within 300 meters of the railway right-of-way.

Type D:

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

These are sample clauses obtained from MECP and CN guidelines and can be modified by the municipality or the owner's legal representative as needed subject to CN's approval.

4.9 GROUND-BORNE VIBRATION ASSESSMENT

Measurements of ground-borne vibration are required by the railways if residential units are to be constructed within 75 m of their rights of way. Measurements were therefore conducted at a distance of 30 m from the right of way of the CN Canal Subdivision operated by GIO Rail Holdings Corp. Ground-borne measurement locations are provided on Figure 4. The results are provided in Figure 5 along with the applicable MOE/CNR criteria. The measured levels are below the perceptibility limits and vibration isolation measures or warning clauses are not required.

Measurements were not conducted adjacent to the CN line to the north due to the large distance setback (approximately 200 m) and large grade separation.

4.10 SUMMARY OF RECOMMENDATIONS FOR ROAD AND RAIL TRAFFIC NOISE CONTROL

Ground-borne vibration levels and future rail traffic sound levels are within CN and MECP guidelines in lands adjacent to the GIO Rail Canal Subdivision railway line. Future road and rail sound levels are predicted to exceed the MECP guidelines at the lots adjacent to Highway 58A and the CN Stamford Subdivision railway line. Analysis based on the current plans indicates that the excesses are minor and physical mitigation will not be required for OLAs. A detailed noise study should be conducted prior to the registration of the northern portions of the draft approved subdivision for the lands adjacent to the road/rail corridor when detailed lotting information or phasing information is available to determine the noise impacts based on traffic/rail information available at the time. Recommendations are provided in Section 6. The reader is referred to the above sections of the report where these recommendations are discussed in more detail.

5 INDUSTRIAL (STATIONARY SOURCE) NOISE ASSESSMENT

This section contains a discussion of the industries located near the site and identifies significant industrial noise sources. The site was visited on numerous occasions and sound level measurements were conducted using a Norsonic type N140 sound level meter using methods contained in MECP Guideline NPC-103 “Procedures”. The equipment was field calibrated before and after the measurements using a Bruel & Kjaer model 4231 acoustical calibrator.

5.1 VERBIO DIESEL CANADA BIODIESEL FACILITY

This is a smaller facility located across the railway right-of-way along the southwest of the development lands. The site is comprised of a larger building enclosing most of the process equipment and a number of large storage tanks. Many of the noise sources at the facility are contained within the main building. Materials are shipped to and from the facility via transport truck, accessing the site from St. Clair Drive, and by rail. Rail activity on the site is limited to pick up and drop off by GIO Rail Holdings Corp. Additional activity by GIO Rail Holdings occurs on the tracks adjacent to the biodiesel facility and is not considered part of the predictable worst-case hour at Verbio Diesel Canada. Rail activity typically occurs during daytime hours only.

Discussions with former Atlantic Biodiesel personnel indicate that the existing Environmental Compliance Approval (Number 5717-ADLQ9D), dated September 21, 2016 and the supporting Acoustic Assessment Report (“AAR”), prepared by CH2M Hill, dated January 2011 include details regarding the noise producing aspects of their operations.

A review of the Environmental Compliance Approval (“ECA”), the AAR and subsequent audit report, dated February 24, 2014, indicate the facility is operating in compliance with the MECP’s sound level limits at the closest noise sensitive receptors, including several receptors at the closest proposed homes on the subject development lands.

Based on our site observations, and the Industrial Categorization Criteria contained in Appendix A of the D-6 Guideline, the Verbio Diesel Canada facility could be categorized as a Class II industrial operation. The minimum recommended setback distance from a Class II industry is 70 m and the actual influence area can be more. To investigate the actual zone of influence more fully, a predictive acoustic model was generated to assist with predicting sound levels from the operations at the facility. Noise source locations and sound levels were taken from the AAR and HGC Engineering files. Table X summarizes the modelling scenarios for biodiesel facility.

Table X: Summary of Verbio Diesel Canada Operations

Source Type/Name	Operating Status/Time or Quantity per Hour	
	Day	Night
Trucks Product/Feedstock	2 @ 15km/h	2 @ 15km/h
Trucks Process Chemical Terminal	1 @ 15km/h	1 @ 15km/h
Rail Delivery	1 @ 10km/h	-
All Else (Pumps, Cooling towers, etc.)	Continuous	Continuous
Rail Delivery Impulse	Infrequent (1)	-

Figures 6a and 6b show the proposed acoustic berm/barrier heights proposed along the western portion of the development. The proposed berm/barrier will provide beneficial acoustical shielding for the future dwellings from industrial operations at Verbio Diesel Canada west of the rail line.

The sound level predictions indicate that with the proposed berm/barrier, sound levels from operations at Verbio Diesel Canada will be well within the MECP’s sound level criteria during

daytime and nighttime hours. Figures 7 and 8 show the sound level predictions of the steady and impulsive sources, respectively.

5.2 GIO RAIL HOLDINGS CORP

GIO Rail Holdings Corp operates the rail line immediately to the west of the proposed development. Activity on this section of line includes through trains west to north, deliveries/pickups from Verbio Diesel Canada and switching services for local customers. Switching services can be provided for up to 12 hours each day and typically only during daytime hours. Switching activities and movements to Verbio Diesel Canada include sorting of rail cars and building up of train segments which includes the coupling and decoupling of rail cars. Drop-off and pickup of rail cars by freight trains, as well as classification and sorting in the area typically occurs during daytime hours only.

The through operations of trains on CN railways is federally regulated and not considered under a stationary noise assessment. Where designated rail yards are specifically identified for shunting, some form of stationary assessment is typically completed for neighbouring noise sensitive uses. In this instance, the adjacent rail activities by GIO Rail Holdings are not in a designated switching yard, however, it is understood that these operations occur consistently during daytime hours and to consider a worst-case scenario from an assessment perspective, they have been treated as yard activities even though they occur primarily on main line trackage.

A predictive acoustic model was employed to determine the potential impact from rail yard operations. The model includes the operations summarized in Table XI.

Table XI: Summary of Operations for GIO Rail Holdings

Source Type/Name	Operating Status/Time or Quantity per Hour	
	Day	Night
Locomotive – Slow Acceleration	Continuously for 30 min	-
Locomotive Idling	30 minutes	-
Rail Shunting Impulses	Frequent	-

An acoustic barrier (berm and barrier combination) is proposed along the east side of the railway line (Figure 6a and 6b). The sound level predictions indicate that with the proposed berm/barrier

and Class 4 designation for the first row of dwellings, the impulsive rail activities (shunting) will meet the daytime sound level criteria. Additionally, the sound level predictions indicate that the non-impulsive (steady) rail operations are well within the daytime sound level criteria. Figures 9 and 10 show the sound level prediction results.

6 RECOMMENDATIONS FOR NOISE CONTROL

The following recommendations are provided for noise control purposes. The reader is referred to the previous sections of this report where these recommendations are discussed in more detail.

Transportation Noise

1. The following recommendations are provided in regard to through road traffic and rail noise mitigation:
 - a. The dwelling units closest to the rail lines will require forced air ventilation systems with the provision for the future installation of central air conditioning systems by the occupant.
 - b. Warning clauses should be placed on tenancy and property agreements and offers of purchase and sale for all residential units within 300 m of the rail lines identifying the presence of the rail lines and that sound from railway operations may at times be audible and that railway operations may change in the future.
2. A detailed traffic noise study should be conducted prior to the registration of the northern portions of the draft approved subdivision for the lands adjacent to the Highway 58A/CN rail corridor to determine the noise impact based on road and rail traffic information, grading information and lotting and phasing information available at that time, recommending any noise mitigation requirements and warning clauses which may be appropriate based on that information. The area indicated as Phase 3 in Figure 11 should be included in a detailed traffic noise study.
3. Warning clauses should be placed on tenancy and property agreements and offers of purchase and sale for all residential lots with exposure to the roadway and railway line to inform the future residents of the presence of these transportation sources.

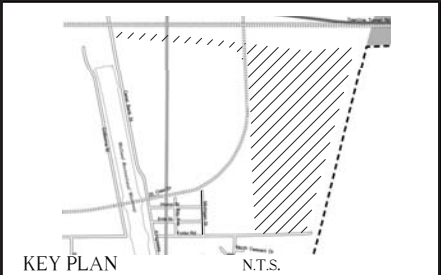
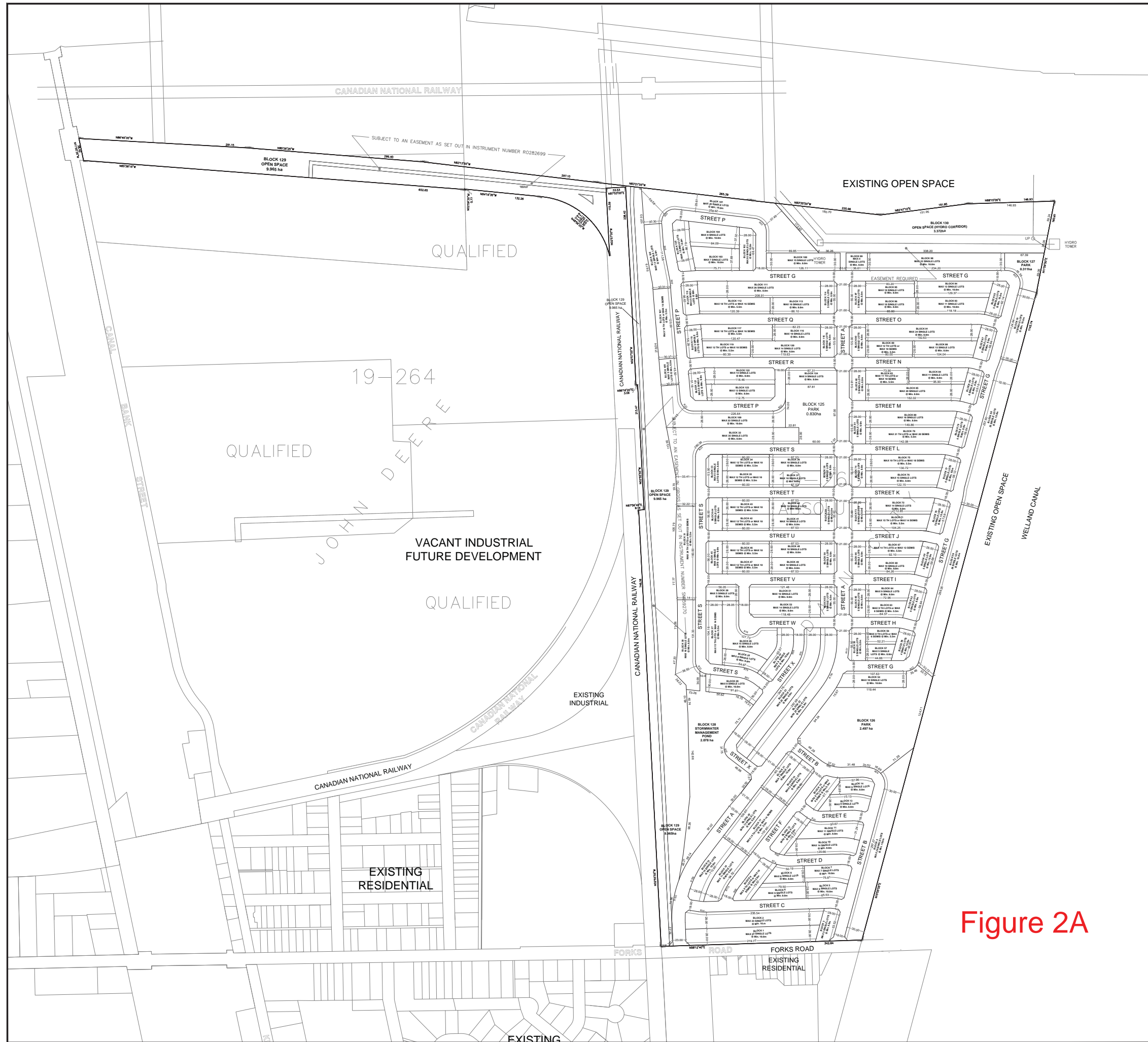
Stationary Noise

The following recommendations are provided in regard to stationary noise mitigation:

4. An acoustic barrier (earth berm and noise barrier) with minimum heights, as shown in Figures 6a and 6b should be constructed to provide beneficial acoustic shielding to residential lots on the western portion of the development. The first row of dwellings adjacent to the rail line are assumed to have a Class 4 designation and should be two storeys or less (no rear walkouts).
5. Warning clauses should be placed on tenancy and property agreements and offers of purchase and sale for all residential lots with exposure to Verbio Diesel Canada informing the future residents of the presence of the industrial operations and that those operations could change in the future.
6. Warning clause for properties with a Class 4 designation should include the following:
“Purchasers/tenants are advised that sound levels due to the adjacent industry and rail operations are required to comply with sound level limits that are protective of indoor areas and are based on the assumption that windows and exterior doors are closed. This dwelling unit has been supplied with a ventilation/air conditioning system which will allow windows and exterior doors to remain closed.”



Figure 1: Key Site Plan



ADDITIONAL INFORMATION
 Required Under Section 51(7) Of The Planning Act R.S.O. 1990 c.P.13

a. SHOWN ON DRAFT PLAN
 b. SHOWN ON DRAFT PLAN AND KEY PLAN
 c. SHOWN ON KEY PLAN
 d. LAND TO BE USED IN ACCORDANCE WITH LAND USE SCHEDULE
 e. SHOWN ON DRAFT PLAN
 f. SHOWN ON DRAFT PLAN
 g. SHOWN ON DRAFT PLAN AND KEY PLAN
 h. SHOWN ON DRAFT PLAN AND KEY PLAN
 i. SHOWN ON DRAFT PLAN
 j. SHOWN ON DRAFT PLAN

SCHEDULE OF LAND USE

TOTAL SITE AREA - 72.132 ha

Proposed Land Use	Units	Reference	Area (Ha.)
Residential Singles 10.0m	360	Blocks 1-24,57,19, 21,22,24, 29,34,58,59, 60,69,92-94,98,101-103, 109	12,015
Residential Singles 8.0m	725	Blocks 36,5,10-14,16,18, 20,23,25,26,28,30,32,33, 36-41,44,45,48-53,55,57, 61,62,64-66,68,70,72-74, 76-78,80-82,84-88,90,91, 93-97,99,100,106,108, 110-111,113-16,118, 120-124	18,864
Residential Townhomes 5.5m	320	Blocks 9,13,17,27,31,34, 35,42-43,46,47,56,63,67, 71,73,79,83,89,107,112, 117,119	6,273
Park		Blocks 125-127	3,629
Stormwater Management Pond		Block 128	2,075
Open Space		Blocks 129-130	13,326
ROADS			
21m - 23m R.O.W. (Street A)			2,665
15m R.O.W. (Streets B-X)			13,260
TOTAL	1405		72.132

Proposed Summary Yield

Proposed Unit Mix	Unit Count with Alternate 5.50m Townhouse Units	Unit Count with Alternate 5.50m Semi-Detached Units
Residential Singles 10.0m	360	360
Residential Singles 8.0m	725	725
Residential Townhomes 5.5m	320	
Residential Semi-Detached 5.5m		284
TOTAL	1405	1369

5		
4		
3		
2		
1		
No.	REVISION	DATE

REVISIONS

OWNER'S CERTIFICATE
 WE, BEING THE REGISTERED OWNER OF THE SUBJECT LANDS HEREBY AUTHORIZE ARMSTRONG PLANNING AND PROJECT MANAGEMENT TO PREPARE AND SUBMIT A DRAFT PLAN OF SUBDIVISION FOR APPROVAL.

SIGNED _____ DATE _____

SURVEYOR'S CERTIFICATE
 I HEREBY CERTIFY THAT THE BOUNDARIES OF THE SUBJECT LANDS AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN ON THIS PLAN.

SIGNED _____ DATE _____

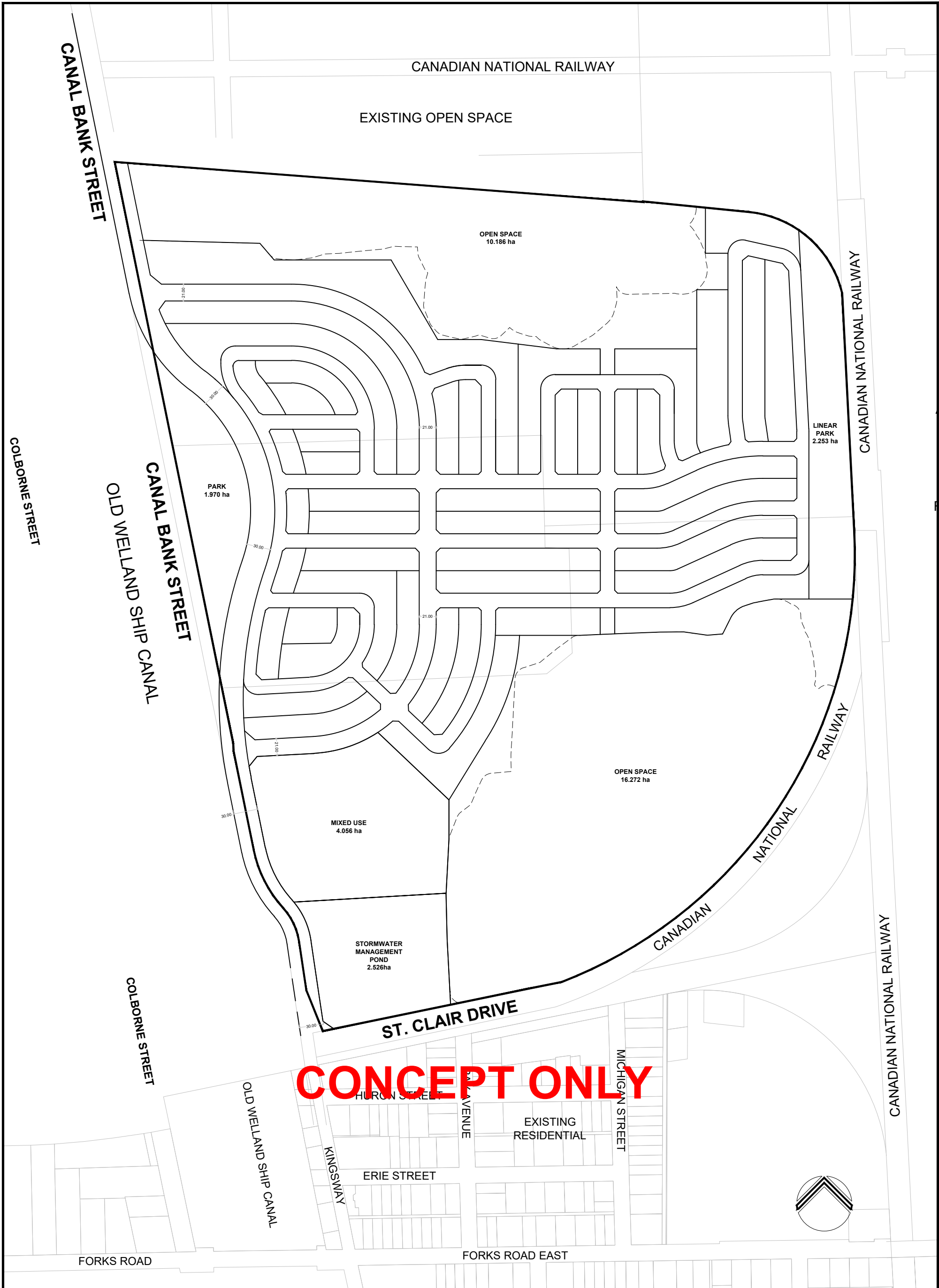
DAIN CITY EAST
DRAFT PLAN OF SUBDIVISION

PART LOTS 20, 21, 22 AND 23, CONCESSION 5, PART OF ROAD ALLOWANCE BETWEEN LOTS 20 AND 21 AND PART OF ROAD ALLOWANCE BETWEEN LOT 22 AND 23, (CLOSED BY BY-LAW 414, CONFIRMED BY BY-LAW 855, INST. 8243), CONCESSION 5, GEOGRAPHIC TOWNSHIP OF HUMBERSTONE, NOW IN THE CITY OF WELLDAND REGIONAL MUNICIPALITY OF NIAGARA



DESIGN:	DRAWN:	SCALE:	1:2000
APPROVED:	DATE: February 13, 2020	PROJECT No.:	19.2681.00
DRAWING No.:		Dain City East Subdivison.dwg	
		PHASES 1-3	

Figure 2A



CONCEPT ONLY

**FIGURE 2B DAIN CITY WEST
WELLAND, ONTARIO**

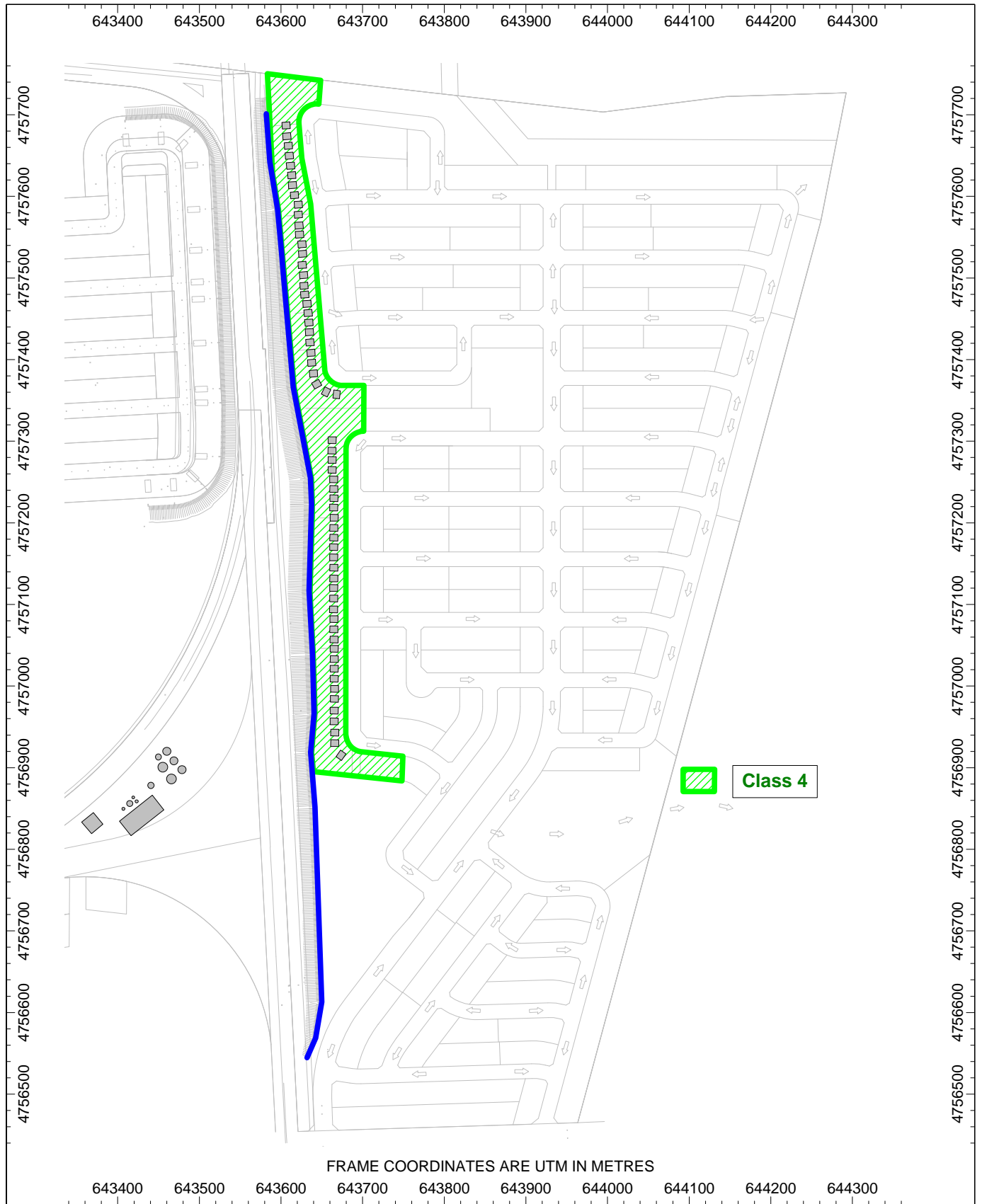


Figure 3: Class 4 Area
401 Canal Bank Street, Welland

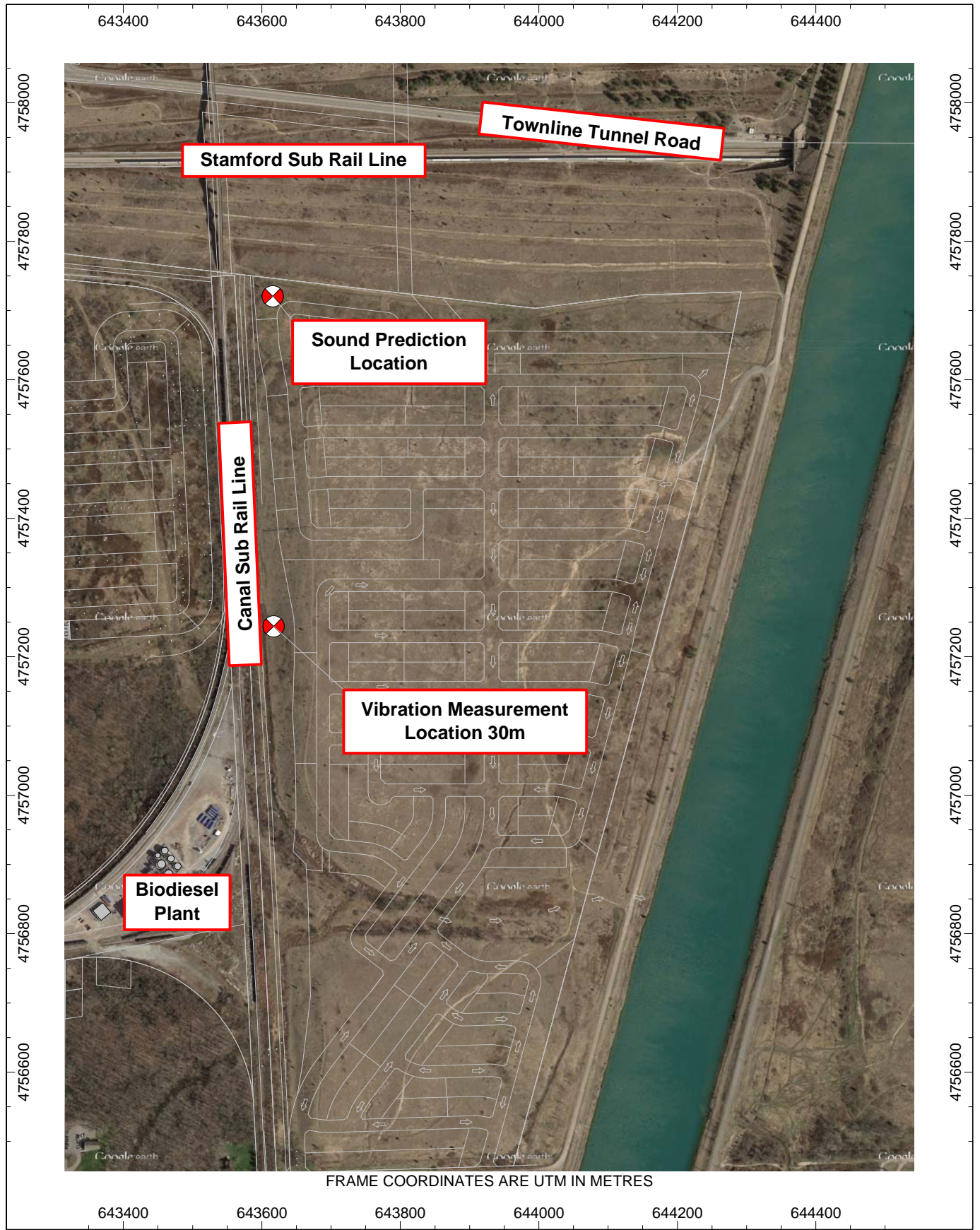
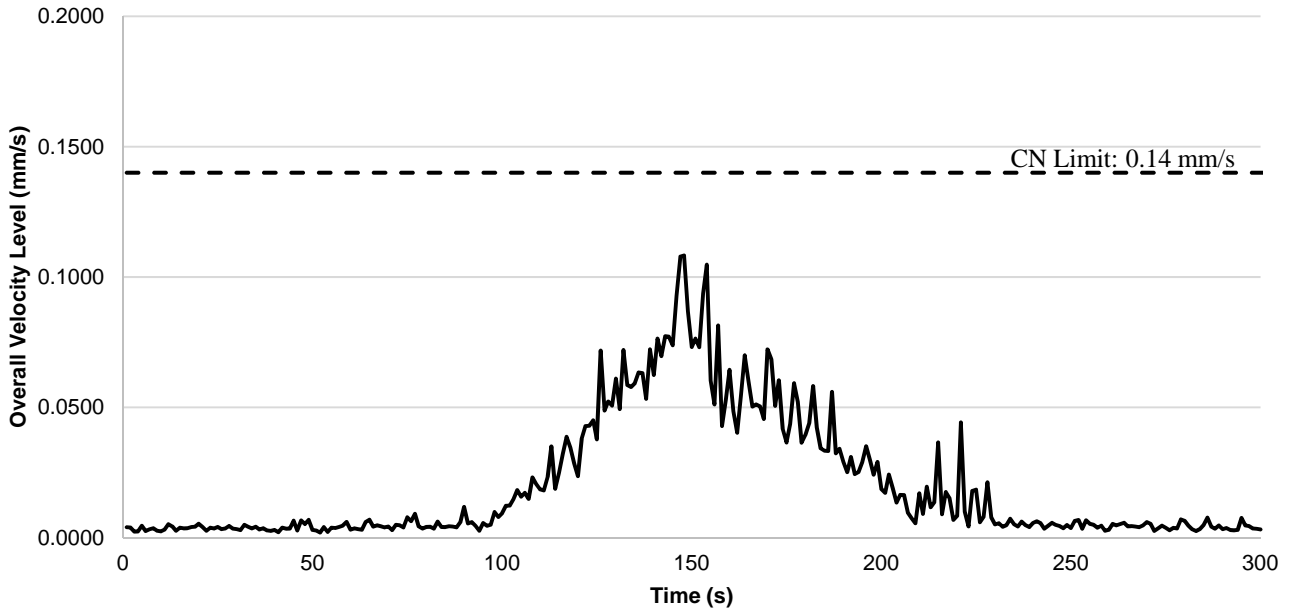
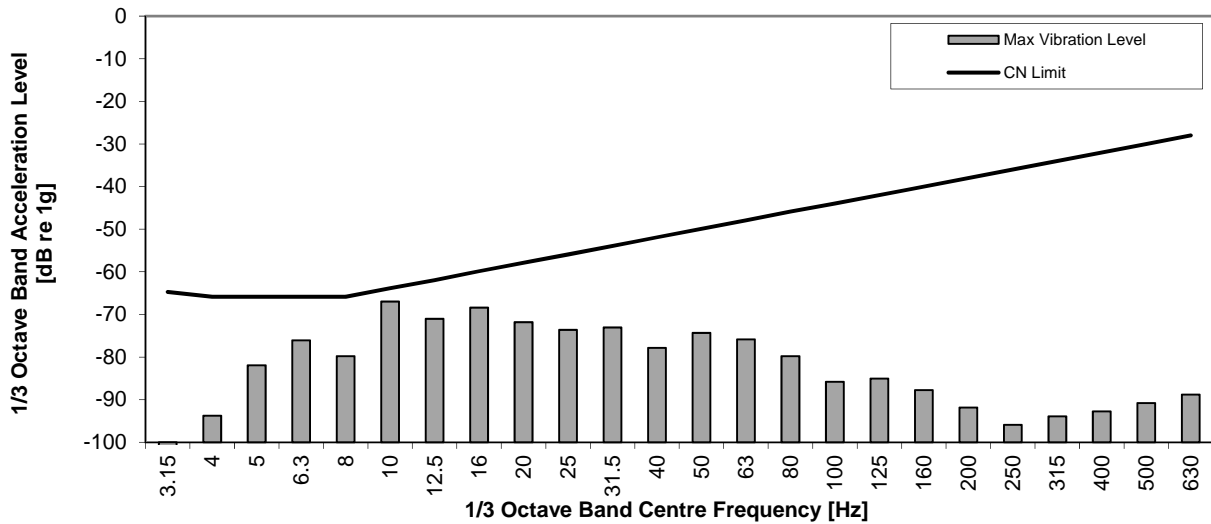


Figure 4: Sound Prediction and Vibration Measurement Locations
401 Canal Bank Street Development

**Figure 5a: Pass-by 1 - 30 m from Rail Line
Measured Vibratory Velocity Level, November 20, 2019**



**Figure 5b: Pass-by 1- 30 m from Rail Line
Acceleration Spectrum @ Peak Level (1 sec. Duration)**



ACOUSTICS



NOISE



VIBRATION

Figure 5c: Pass-by 2 - 30 m from Rail Line
 Measured Vibratory Velocity Level, November 20, 2019

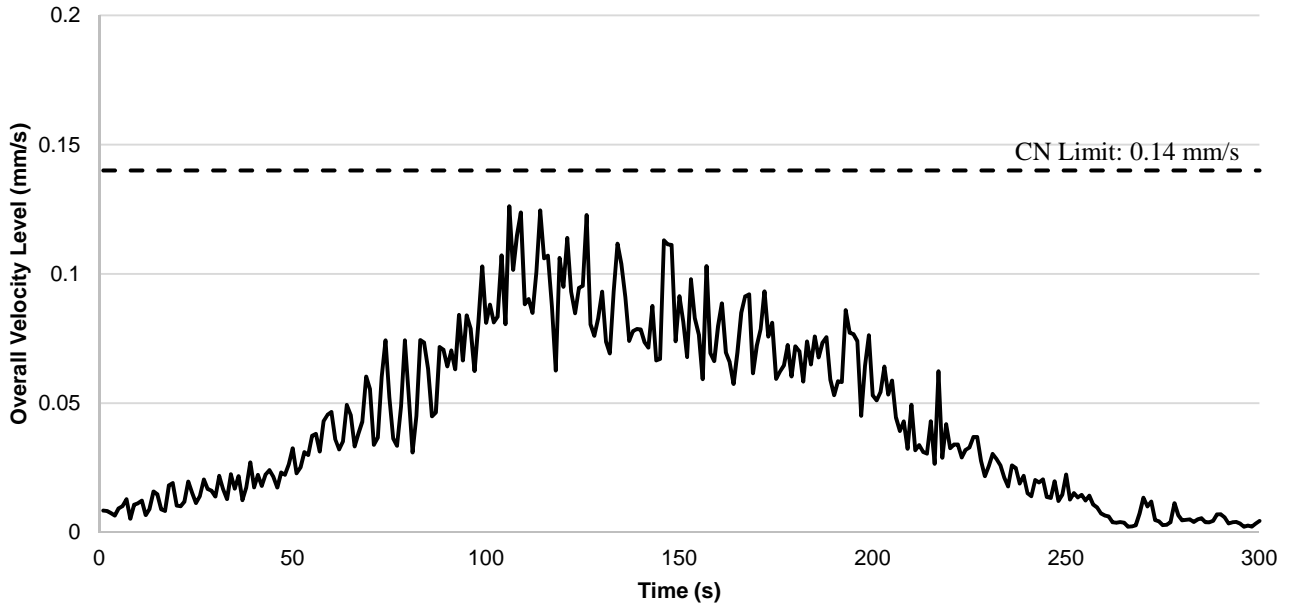
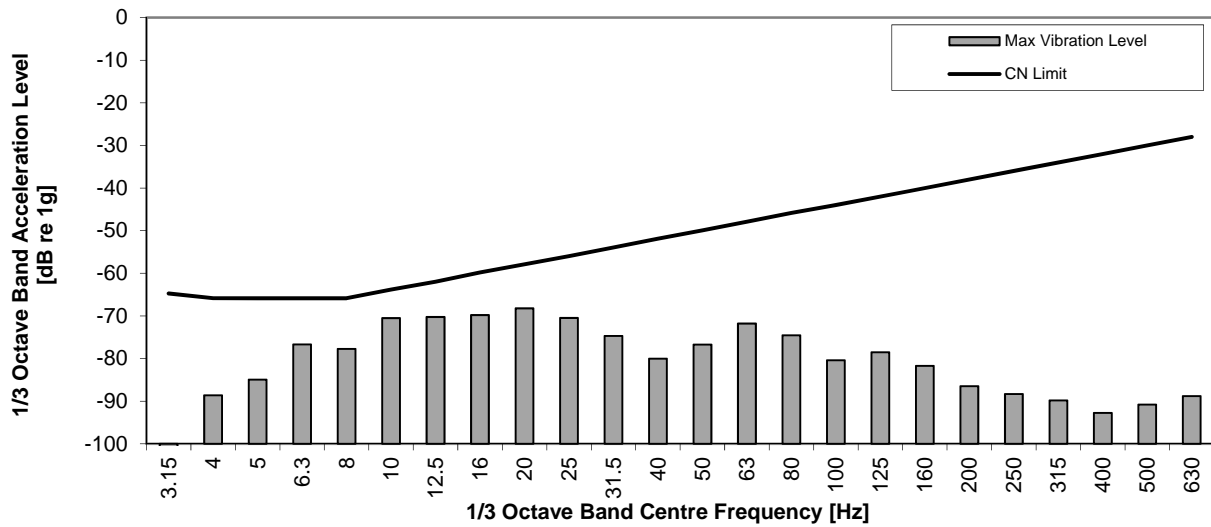


Figure 5d: Pass-by 2 - 30 m from Rail Line
 Acceleration Spectrum @ Peak Level (1 sec. Duration)



ACOUSTICS



NOISE



VIBRATION

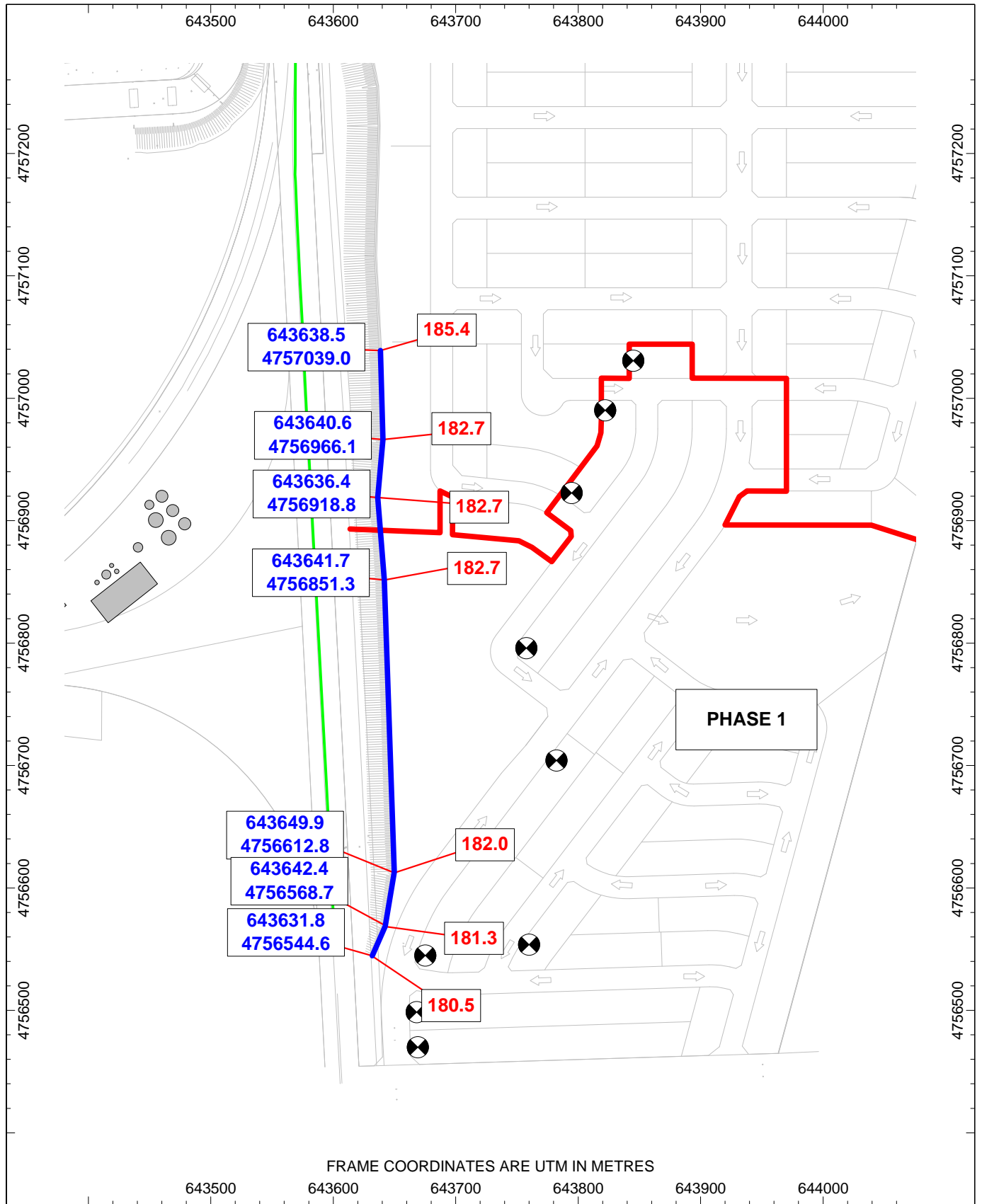


Figure 6a: Barrier/Berm Extents and Heights for Phase 1
401 Canal Bank Street, Welland

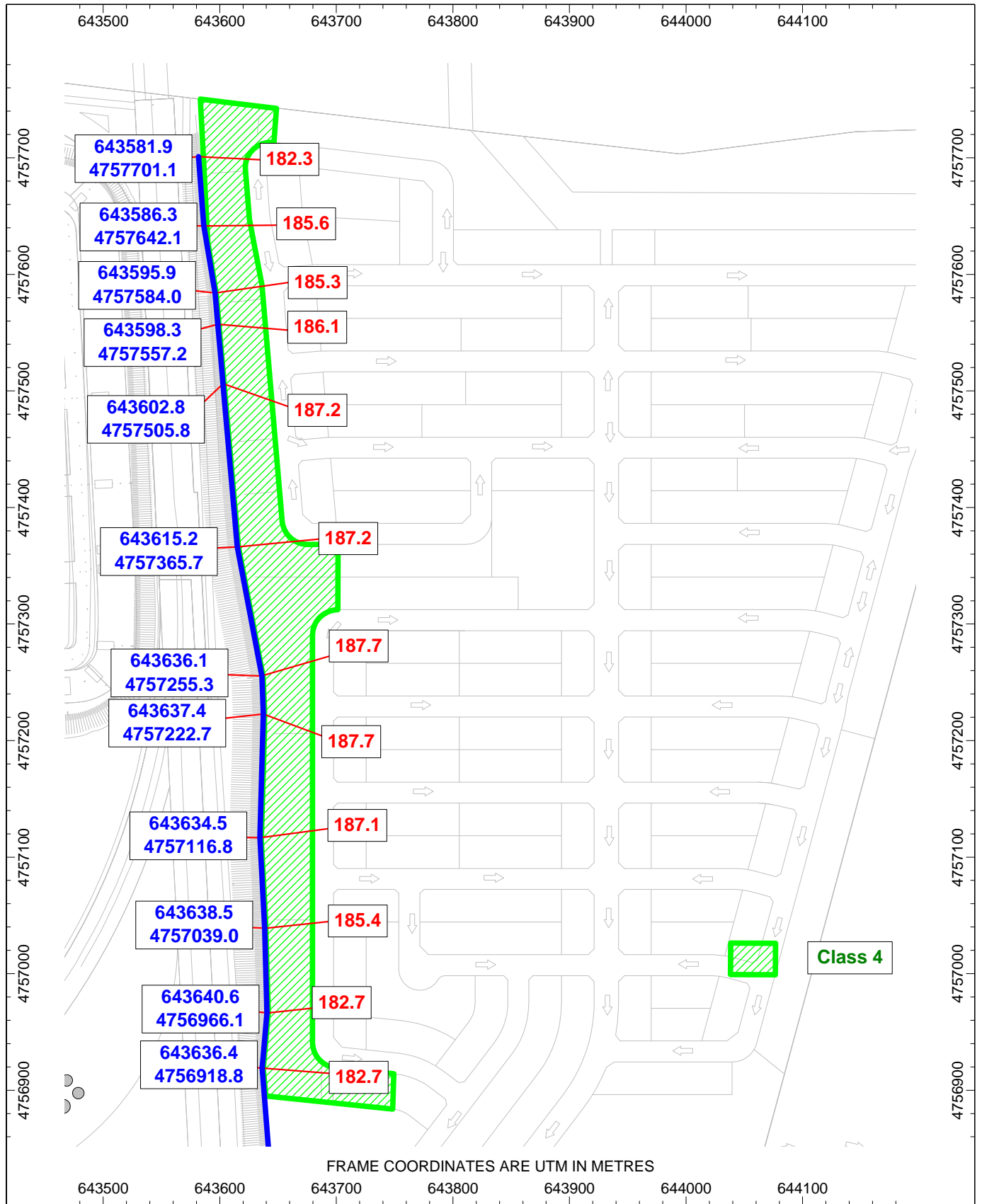


Figure 6b: Barrier/Berm Extents and Heights for Phases 2 and 3
401 Canal Bank Street, Welland

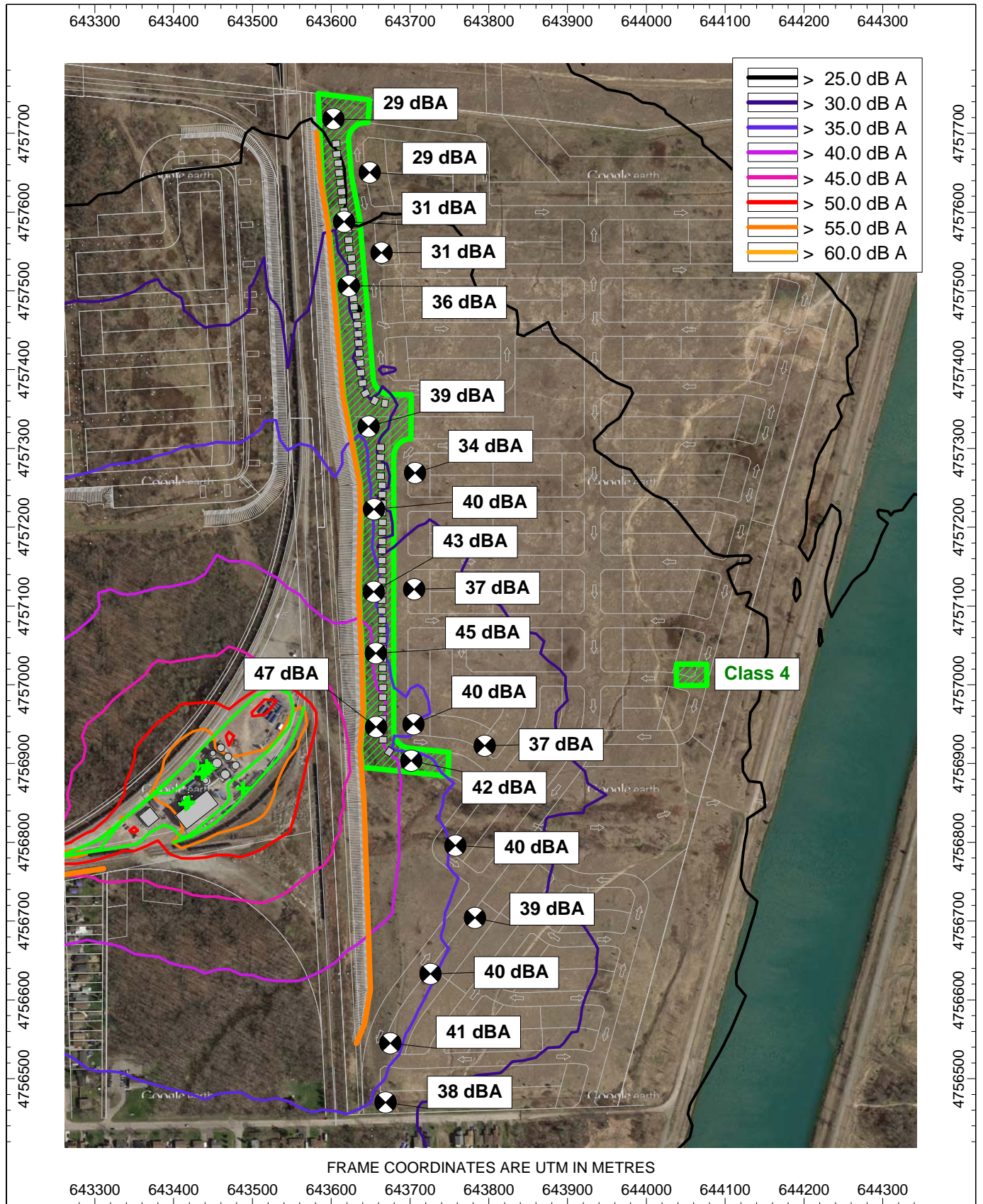


Figure 7: Non-Impulsive Sound Level Predictions, Leq [dBA] at 4.5 metres Above Grade
 Verbio Diesel Canada

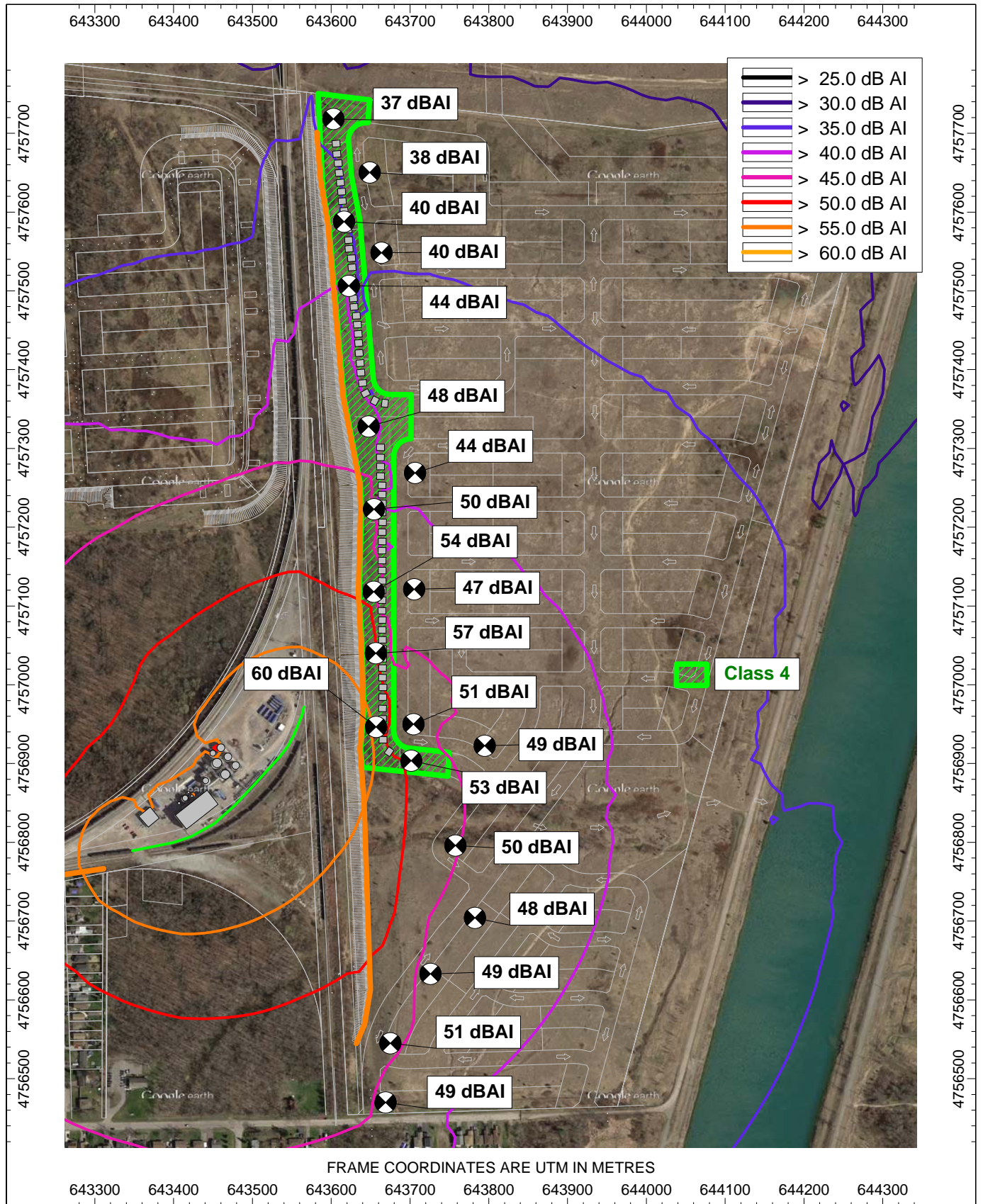


Figure 8: Impulsive Sound Level Predictions, LLM [dBAI] at 4.5 metres Above Grade
 Verbio Diesel Canada

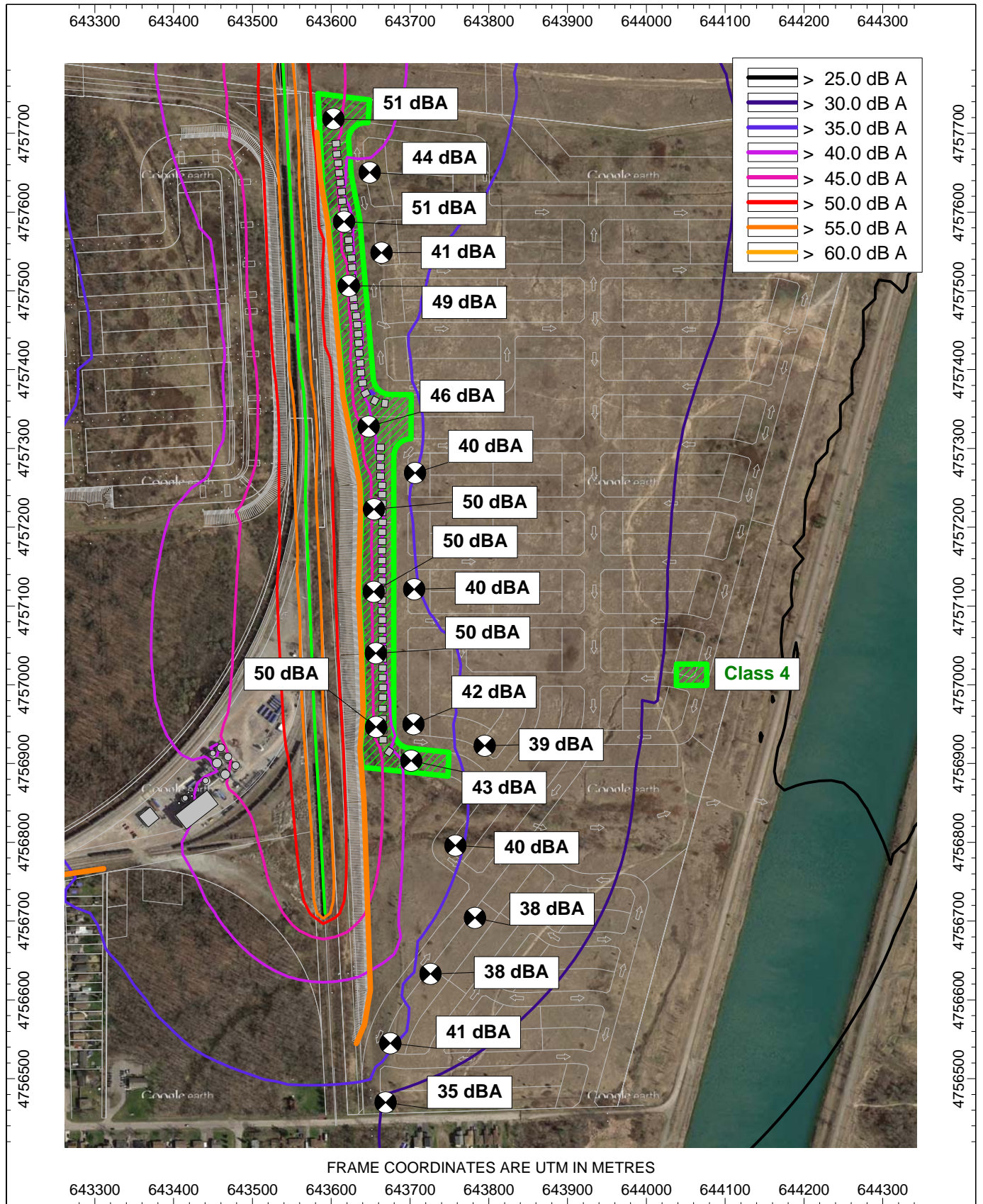


Figure 9: Non-Impulsive Sound Level Predictions, Leq [dBA] at 4.5 metres Above Grade
GIO Rail Holdings Corp

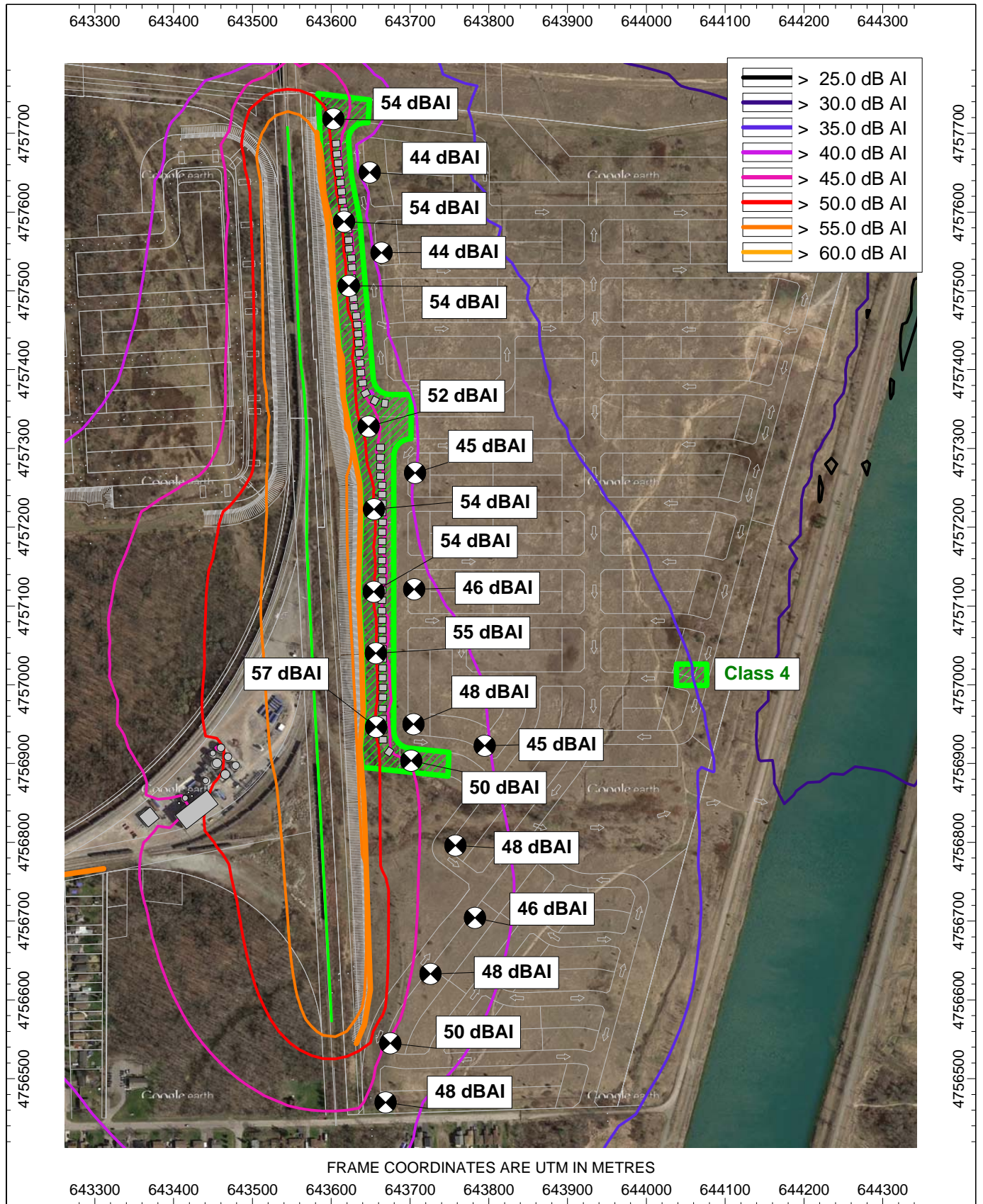


Figure 10: Impulsive Sound Level Predictions, LLM [dBAI] at 4.5 metres Above Grade
GIO Rail Holdings Corp

CONCEPT ONLY - REQUIRES ALL APPROVALS INCLUDING BUT NOT LIMITED TO
PLANNING, ENGINEERING AND ZONING APPROVALS

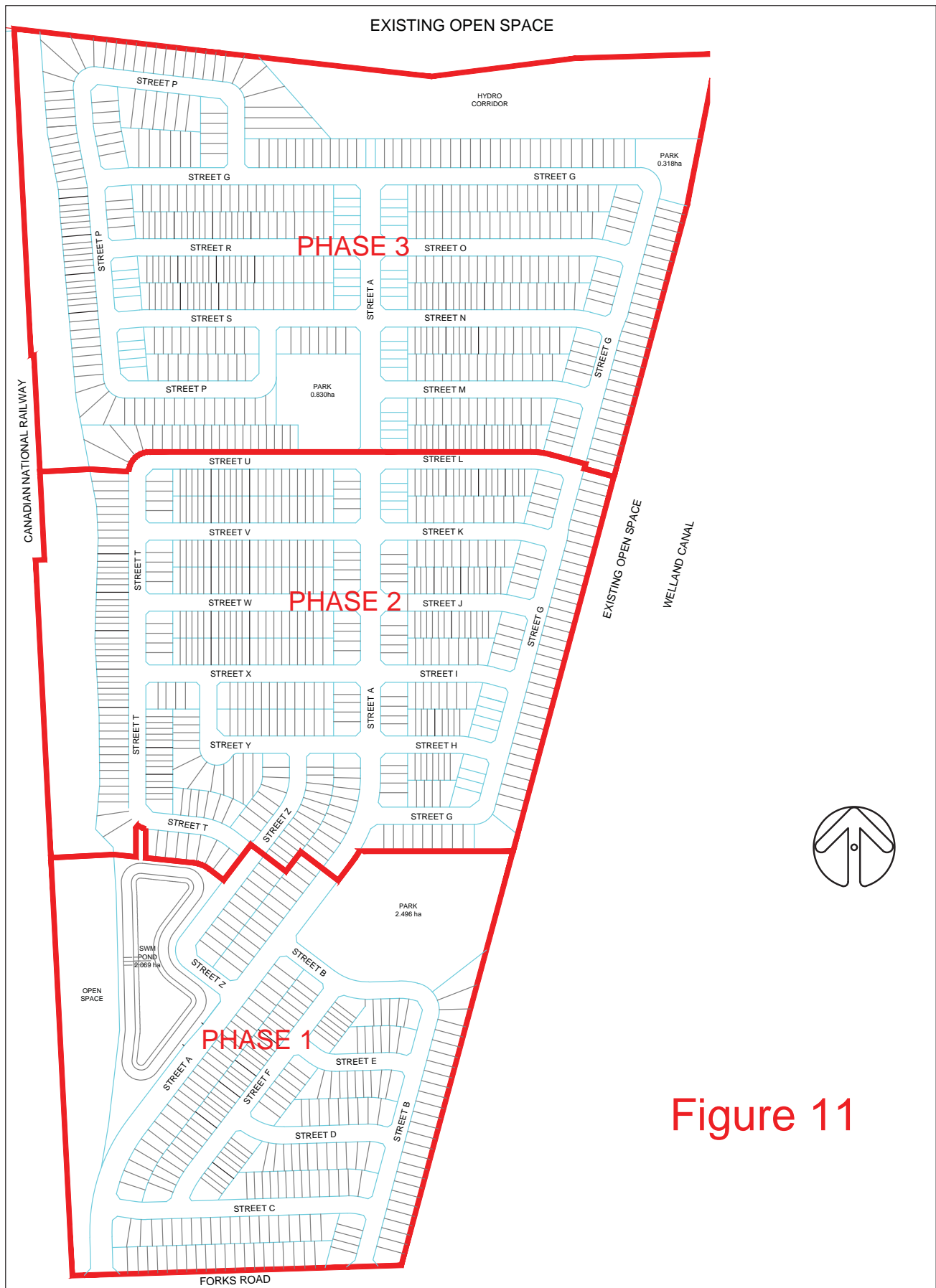


Figure 11

SCALE: NTS
MARCH 4, 2020

PHASING CONCEPT - 401 CANAL BANK STREET, WELLAND

Appendix A

Class 4 Correspondence



ACOUSTICS



NOISE



VIBRATION

Ian Bonsma

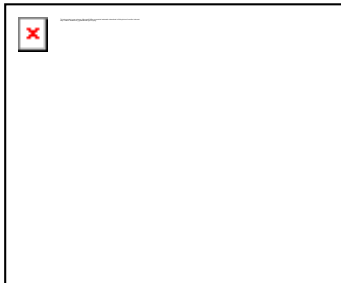
From: Rachelle Larocque <rachelle.larocque@welland.ca>
Sent: April 9, 2020 10:47 AM
To: amanda@armstrongplan.ca
Cc: Grant Munday; Travers Fitzpatrick
Subject: Dain East Subdivision

Good afternoon Amanda,

We have had a chance to review the request for the Class 4 Designation for the Dain East as well as the John Deere lands, and are willing to support this request. We will, however, require that the Noise & Vibration Study that was submitted as part of the Redline Revision, OPA & ZBA be revised to reflect that it is now being considered Class 4 rather than Class 2.

Please let me know if you have any questions.

Take care,



Rachelle Larocque, BES, M.Sc., MCIP, RPP

Planning Supervisor

Planning Division

Infrastructure and Development Services

Corporation of the City of Welland

60 East Main Street, Welland, Ontario L3B 3X4

Hours: 8:30am-4:30PM

Phone: (905)735-1700 Ext. 2310 **Fax:** (905)735-8772

www.welland.ca



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Appendix B

CN Requirements



ACOUSTICS



NOISE



VIBRATION



PRINCIPAL MAIN LINE REQUIREMENTS

- A. Safety setback of dwellings from the railway rights-of-way to be a minimum of 30 metres in conjunction with a safety berm. The safety berm shall be adjoining and parallel to the railway rights-of-way with returns at the ends, 2.5 metres above grade at the property line, with side slopes not steeper than 2.5 to 1.
- B. The Owner shall engage a consultant to undertake an analysis of noise. At a minimum, a noise attenuation barrier shall be adjoining and parallel to the railway rights-of-way, having returns at the ends, and a minimum total height of 5.5 metres above top-of-rail. Acoustic fence to be constructed without openings and of a durable material weighing not less than 20 kg. per square metre of surface area. Subject to the review of the noise report, the Railway may consider other measures recommended by an approved Noise Consultant.
- C. Ground-borne vibration transmission to be evaluated in a report through site testing to determine if dwellings within 75 metres of the railway rights-of-way will be impacted by vibration conditions in excess of 0.14 mm/sec RMS between 4 Hz and 200 Hz. The monitoring system should be capable of measuring frequencies between 4 Hz and 200 Hz, ± 3 dB with an RMS averaging time constant of 1 second. If in excess, isolation measures will be required to ensure living areas do not exceed 0.14 mm/sec RMS on and above the first floor of the dwelling.
- D. The Owner shall install and maintain a chain link fence of minimum 1.83 metre height along the mutual property line.
- E. The following clause should be inserted in all development agreements, offers to purchase, and agreements of Purchase and Sale or Lease of each dwelling unit within 300m of the railway right-of-way: "Warning: Canadian National Railway Company or its assigns or successors in interest has or have a rights-of-way within 300 metres from the land the subject hereof. There may be alterations to or expansions of the railway facilities on such rights-of-way in the future including the possibility that the railway or its assigns or successors as aforesaid may expand its operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwelling(s). CNR will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid rights-of-way."
- F. Any proposed alterations to the existing drainage pattern affecting railway property must receive prior concurrence from the Railway and be substantiated by a drainage report to the satisfaction of the Railway.
- G. The Owner shall through restrictive covenants to be registered on title and all agreements of purchase and sale or lease provide notice to the public that the safety berm, fencing and vibration isolation measures implemented are not to be tampered with or altered and further that the Owner shall have sole responsibility for and shall maintain these measures to the satisfaction of CN.
- H. The Owner enter into an Agreement stipulating how CN's concerns will be resolved and will pay CN's reasonable costs in preparing and negotiating the agreement.
- I. The Owner may be required to grant CN an environmental easement for operational noise and vibration emissions, registered against the subject property in favour of CN.



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