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Noise Feasibility Study
Proposed Dementia Care Centre
2250 Speers Road
Oakville, Ontario

Prepared for:

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Table of Contents

1 Introduction and Summary

HGC Engineering was retained by PGL Environmental to conduct a noise impact study for a proposed 1-storey Dementia Care Centre to be located at 2250 Speers Road in Oakville, Ontario. The surrounding area includes a mix of existing commercial, industrial and residential land uses. A noise study is required by the municipality as part of the planning and approvals process.

The original noise study was completed on February 14, 2019 and has been updated in response to peer review comments by Dillon Consulting Limited dated June 21, 2019. Our responses to the peer review comments are also provided in Appendix D.

The primary noise sources which require analysis are: road traffic on Speers Road and rail traffic on CN Oakville Subdivision and its potential impact on the proposed building; the existing commercial/industrial uses and their potential impact on the proposed facility and noise sources which are associated with the proposed facility, such as rooftop mechanical equipment, and their potential impact on existing residential uses. Since the railway line is located more than 75 m from the proposed site, an assessment of ground-borne vibration is not required in accordance with Ministry of the Environment, Conservation and Parks (MECP) and CN guidelines.

Road traffic information for Speers Road was obtained from the Town of Oakville. The CN Oakville Subdivision is located greater than 370 m to the north of the site and has been included in the traffic noise assessment based on traffic volumes obtained from our files for projects along the same railway line. The latest GO Train data was obtained from Metrolinx The road and rail traffic volumes were used to predict future traffic sound levels at the proposed building façades. Rail traffic noise was found to have minimal noise impact on the proposed development due to intervening uses and distance setback. The predicted sound levels were compared to the guidelines of the MECP.

Site visits were conducted in January and August 2019 to identify significant transportation and commercial/industrial noise sources in the vicinity of the subject site. The analysis is based on criteria contained in the noise guidelines of the MECP NPC-300; the latest proposed site plan and preliminary floor plan of by MMMC Architects Inc.; information regarding rooftop equipment from manufacturers' data, road and rail traffic data, aerial photos and site visits.

The results of this study indicate that with suitable noise control measures integrated into the design

of building, it is feasible to achieve the indoor MECP guideline sound levels from traffic and stationary noise sources.

Daytime and nighttime road traffic sound levels are in excess of the MECP guideline limits at the façades of the proposed building with exposure to Speers Road and railway. Feasible means exist to mitigate noise levels in accordance with MECP noise guidelines. It is understood that central air conditioning system will be provided for the building which meets the MECP ventilation requirement. Upgraded glazing constructions are recommended for the north, east and west façades of the building.

A computer model of the area was created in order to predict the sound levels at the proposed building due to existing commercial and industrial noise sources and predict the sound levels due to the proposed rooftop mechanical equipment of the building at neighbouring residential uses. The building is designed with inoperable windows which is considered an acceptable noise control measure per NPC-300 to control noise from stationary sources at windows associated with noise sensitive spaces in an institutional purpose building. Results also indicate that the potential noise from the rooftop mechanical equipment associated with the proposed dementia centre can be within MECP sound level criteria without additional mitigation at existing residential uses. The results are summarized in the report.

2 Site Description and Noise Sources

Figure 1 is a key plan of the site. Figure 2 is the latest site plan for the site prepared by MMMC Architects Inc. dated July 18, 2019 and shows the road traffic noise prediction locations [A] to [G]. True north arrow as shown on Figure 2 is the direction referenced in the study. The proposed development will consist of the conversion of an existing 1-storey building plus associated parking areas. Appendix A includes the preliminary floor plan.

Site visits were made by HGC Engineering personnel in January and August 2019 to make observations of the acoustical environment and to identify the significant noise sources in the vicinity. The acoustical environment surrounding the site is urban in nature. The existing building on site will be converted for use. Figure 3 provides an aerial photo showing the proposed site and the surrounding land uses.

There are commercial and industrial facilities located to the east and west of the subject site. Noise from these facilities was generally not audible during the site visits, nonetheless, an assessment of stationary noise sources at the development was conducted and can be found in Section 4.

3 Traffic Noise Assessment

3.1 Traffic Noise Criteria

Guidelines for acceptable levels of road and rail traffic noise impacting new residential type developments are given in the MECP publication NPC-300, “Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning”, release date October 21, 2013, and are listed in Table I below. The values in Table I are energy equivalent (average) sound levels [L_{EQ}] in units of A-weighted decibels [dBA].

Table I: MECP Traffic Noise Criteria (dBA)

Area	Daytime L_{EQ} (16 hour) Road / Rail	Nighttime L_{EQ}(8 hour) Road /Rail
Outdoor Living Area	55 dBA	--
Individual or semi-private offices, conference rooms, reading rooms	45 dBA / 40 dBA	--
Inside Living/Dining Room	45 dBA / 40 dBA	45 dBA / 40 dBA
Inside Bedrooms, sleeping quarters	45 dBA / 40 dBA	40 dBA / 35 dBA

Daytime refers to the period between 07:00 and 23:00. Nighttime refers to the time period between 23:00 and 07:00. The term "outdoor living area" (OLA) is used in reference to an outdoor patio, a backyard, a terrace, or other area where passive recreation is expected to occur.

The MECP guidelines allow the daytime sound levels in an Outdoor Living Area to be exceeded by up to 5 dBA, without mitigation. Where OLA sound levels exceed 60 dBA, physical 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.

MECP guidelines require a 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 outside bedroom or living/dining room windows exceed 60 dBA or daytime sound levels outside bedroom or living/dining room or office windows exceed 65 dBA. Forced-air ventilation with ducts sized to accommodate the future installation of air conditioning or an alternative means of ventilation to open windows is required when nighttime sound levels at bedroom or living/dining room windows are in the range of 51 to 60 dBA or when daytime sound levels at bedroom or living/dining room or office windows are in the range of 56 to 65 dBA.

Where applicable, warning clauses to notify future purchasers of the building of possible excesses are also required when nighttime sound levels exceed 50 dBA at the plane of the bedroom windows or when daytime sound levels exceed 55 dBA at the plane of the bedroom or living/dining room or office windows due to road traffic.

Building components such as walls, windows and doors must be designed to achieve indoor sound level criteria when the plane of window nighttime sound level is greater than 60 dBA or the daytime sound level is greater than 65 dBA due to road traffic noise.

3.2 Traffic Noise Predictions

3.2.1 Road Traffic Data

Road traffic data for Speers Road was obtained from Town of Oakville in the form of Annual Average Daily Traffic (AADT) volume and is provided in Appendix B. The traffic volume was projected to the year 2029 using a growth rate of 2.5%. An assumed commercial vehicle percentage of 13% was split into 5% medium trucks and 8% heavy trucks in the analysis per Ministry of Transportation guideline. The posted speed limit is 60 kph. A day-night split of 90%/10% was used for the roadway. Table III summarizes the traffic volume data used in the assessment.

Table II: Projected Road Traffic Data

Road Name		Cars	Medium Trucks	Heavy Trucks	Total
Speers Road *(projected)*	Daytime	19 269	1 107	1 772	**22 149**
	Nighttime	2 141	123	197	**2 461**
	Total	**21 410**	**1 230**	**1 969**	**24 610**

3.2.2 Rail Traffic

The CN Oakville Subdivision is located 370 m to the north of the site. Rail traffic data for typical operations of the CN Oakville Subdivision was obtained from our files for sites to the east and west of the subject site which were originally obtained from CN and is provided in Appendix B. The higher volumes shown between the two sets of CN data were used in the analysis. GO Train data was obtained from Metrolinx. The CN Oakville Subdivision is classified as a principle main line. There are no at-grade crossings in the vicinity of the site thus whistle noise was not included in the analysis. The maximum speeds and number of cars and locomotives per train were used. The train volumes on the CN Oakville Subdivision was projected to the year 2029 using a 2.5% per year growth rate and is summarized in Table III.

Table III: Projected Rail Traffic Data

Type of Train	Number of Trains Day/Night	Number of locomotives	Maximum Number of cars	Average Speed (KPH)
Way Freight	9 / 3	4	25	97
Passenger	18 / 0	2	10	150
GO Trains*	192 / 46	1	12	150

Note: *All GO Trains modeled as diesel trains per Metrolinx requirement

3.2.3 Traffic Noise Predictions

To assess the levels of 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.

Prediction locations were chosen around the centre, as shown in Figure 2, to obtain a good representation of the future sound levels at various facades with exposure to the roadways. The sound levels were predicted at the plane of the windows to determine the requirements for ventilation and façade construction. The acoustic requirements may be subject to modifications if the site plan is changed significantly. The results of these predictions are summarized in Table IV.

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

Prediction Location	Location	ROAD Day / Night	RAIL Day / Night	TOTAL Day / Night
[A]	North façade, Workstations	70 / --	64 / --	71 / --
[B]	West facade, Lobby	65 / --	59 / --	67 / --
[C]	West façade, Respite Bedroom	57 / 51	57 / 56	60 / 57
[D]	East façade, Program Room	63 / --	59 / --	64 / --
[E]	East façade, Respite Bedroom	55 / 48	57 / 54	59 / 55
[F]	Day Program Garden	57 / --	57 / --	60 / --
[G]	South façade, Living room	<50 / <40	<45 / <40	<45 / <40

3.3 Discussion and Recommendations

The sound level predictions indicate that traffic sound levels exceed MECP criteria during the daytime and/or nighttime at the north, east and west facades of the proposed building. Recommendations for traffic noise are provided below.

3.3.1 Outdoor Living Areas

The predicted sound level at the Day Program Garden will be 60 dBA. Physical mitigation is not required.

3.3.2 Ventilation Requirements

It is understood that central air conditioning will be provide, thus meeting the minimum ventilation requirement.

3.3.3 Building Facade Constructions

Future sound levels at the north, east and west façades of the proposed building will exceed the applicable sound level limits. MECP guidelines recommend that the windows, walls, and doors be designed so that the indoor sound levels comply with MECP noise criteria. The existing exterior wall construction consists of brick veneer which will provide sufficient sound insulation for the indoor spaces.

Predicted sound levels at the building facades were used to determine sound insulation requirements of the building envelope. The required acoustic insulation of the window components was determined using methods developed by the National Research Council (NRC).

Acoustical Requirements for Glazing

The minimum sound transmission class ("STC") rating of window glazing required to achieve the target indoor sound level criteria considers the highest predicted sound levels on the north façade of the proposed building.

The minimum acoustical requirement for the basic window glazing for the north façade is AIF-33, AIF-27 for the west and east façades at the north end of the building and AIF-24 for the east and west facades at the south end based on the sound entering through windows and walls. Preliminary calculations indicate that glazing construction with a minimum STC Rating of 30 will provide

sufficient indoor insulation, as attached in Appendix C.

3.3.4 Warning Clauses

The MECP guidelines recommend that the following warning clauses be included in the property agreements for the centre with anticipated traffic sound level excesses.

(a) The owner is advised that noise levels due to increasing road and rail traffic may on occasion interfere with some activities of the occupants as the sound levels limits of the Municipality and the Ministry of the Environment, Conservation and Parks.

(b) This building has been supplied with central air conditioning 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 Environment, Conservation and Parks.

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

4 Assessment of Stationary Sources of Sound

Industrial and commercial sources of sound are assessed separately from traffic sources under MECP Guidelines. There are existing commercial/industrial uses located to the east and west of the subject site. HGC Engineering visited the proposed site to observe the nearby commercial/industrial operations and to identify significant sources of sound during the month of January and August 2019.

4.1 Criteria for Stationary Sources of Sound

In Ontario, the guidelines of the Ontario Ministry of the Environment, Conservation and Parks (MECP) form the basis of environmental noise assessment. MECP publication NPC-300, Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning", release date October 21, 2013 provides criteria for assessing the noise impact of the commercial/industrial facilities. The term Stationary Source is used to designate all noise sources at the site including mechanical equipment, conveyances, such as trucks when they are moving within the site boundaries. The MECP guidelines assess the noise impact of fluctuating sounds on an hourly energy equivalent (average) sound level basis, rather than on short-duration maximum sound levels. Hourly equivalent sound levels are denoted as the $L_{EQ\text{-}1hr}$.

Stationary Source (Steady Sound)

NPC-300 is intended for use in the planning of both residential and commercial/industrial land uses and provides the acceptability limits for sound due to commercial operations in that regard. The facade of a residence or a noise sensitive space (i.e., in the plane of a window), or any associated usable outdoor area is considered a sensitive point of reception at 1.5 m above grade (within 30 m of a dwelling façade). NPC-300 stipulates that the exclusionary sound level limit for a stationary noise source in an urban Class 1 area is taken to be 50 dBA during daytime hours (07:00 to 23:00), and 45 dBA during nighttime hours (23:00 to 07:00). If the background sound levels due to road traffic exceed the exclusionary limits, then that background sound level becomes the criterion. The background sound level is defined as the sound level that occurs when the source under consideration is not operating, and may include traffic noise and natural sounds.

Commercial activities such as the occasional movement of customer/employee vehicles, deliveries to conveniences stores and restaurants and garbage collection are not of themselves considered to be significant noise sources in the MECP guidelines. Accordingly, these sources have not been considered in this study. Truck movements at a warehouse or busy shipping/receiving docks at an industry must generally be assessed.

The MECP guidelines stipulate that the sound level impact during a “predicable worst case hour” be considered. This is defined to be an hour when a typically busy “planned and predictable mode of operation” occurs at the subject facility coincident with a period of minimal background sound.

The decision to include the sound from trucks in an assessment under MECP noise guidelines depends on the volume of trucking, and the nature of the facility. Occasional deliveries to retail stores and convenience stores are exempt, for example, but heavy trucking at a warehouse or busy shipping/receiving docks at an industry must generally be assessed. The likely activities at the existing and proposed commercial/office buildings include the occasional movement of customer vehicles on the property, the infrequent delivery of goods to convenience stores, fast food restaurants etc. and garbage collection and are not of themselves considered to be significant noise sources in the MECP guidelines.

4.2 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 minimize adverse effects caused by sources regulated by the Environmental Protection Act (EPA) on existing land uses or in relation to land use approvals under the Planning Act. They recommend separation distances or other mitigation measures based on the results of investigative studies. The recommended minimum separation distances are 20 m for Class I (light) industrial uses, 70 m for Class II (medium) industrial uses and 300 m for Class III (heavy) industrial uses. The classifications are general, leaving some room for interpretation on a specific basis. For example, a Class 1 industry is categorized as a small scale plant with no outside storage, sound not audible off property, typically 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.

The minimum separation distances generally apply between the property line of the industrial and sensitive uses, but portions of the industrial land can be considered as some or all of the setback if the specific use of that portion of the industrial land is controlled in a site specific zoning bylaw. For example, parking lots and planting strips are not considered to be noise producing and could be included in the distance setback in that case.

4.3 Assessment of Existing Stationary Sources of Sound at the Development

4.3.1 Description Of Significant Nearby Commercial/Industrial Facilities

There are existing industrial and commercial uses to the east and west of the subject site. Site visits were made by HGC Engineering personnel in January and August 2019 to make observations of the acoustical environment and to identify the significant noise sources in the vicinity. Where significant noise sources were observed and found to have the potential to impact the subject site, further investigation was conducted and provided below. Additional noise sources within 300 m of the site were included into the analysis per Peer Review comments and those noise sources were not found to have a significant noise impact at the subject site due to distance and intervening uses.

North American Hard Chrome (2230 Speers Road)

North American Hard Chrome (Chrome) is a manufacturer of coating for various industrial parts and is considered a Class II type industry. The facility is located east of the site, approximately 40 m in distance from property line to property line. The Chrome facility operates during the daytime hours only. One loading bay is located on the south side of the facility. During the site visit, it was observed that the truck at the loading bay do not idle. Impulsive noise was also not observed and thus not expected to be a significant noise source. There is a stack located on the roof at the southeast corner of the building associated with a multi-stage mist eliminator. The top of stack is 2.44 m above the roof of the building.

At the southwest corner of the building is an exhaust fan located at grade. At the south end of their property is also an outdoor storage yard. Two tractor trailers were assumed to access the loading area during a worst-case busiest daytime hour. One forklift was assumed to operate in the outdoor area for 45 minutes out of an hour.

Mechanical equipment at the Chrome facility is generally shielded from the subject site by the building at 2240 Speers Road. A short-term sound level measurement was conducted at the rear side of the Chrome property in August 2019 where the noise from mechanical units was found to be dominant. The resultant level was 50 dBA (Leq_{20min}) at approximately 30 m from the rear of the Chrome building. An additional short-term measurement was also conducted at the subject building façade at the location of the future respite beds and the measured sound level was 45 dBA (L90, as

background road traffic was found to be dominant).

Jelinek Cork Ltd. (2260 Speers Road)

Jelinek Cord is a manufacturer of bottling corks and is located immediately to the west of the site and operates during daytime hours only. Significant noise sources associated with this facility was not observed. One medium truck was assumed to access the rear side of the building during a worst-case busiest hour. It was observed that there are obstructions at the loading area and thus the loading bays are not used. During the site visits in August 2019, it was observed that products were loaded onto commercial vans. Impulsive sources associated with trucking activities at this facility is not expected.

Former HPG Inc. (2240 Speers Road)

HPG has vacated the facility. The existing rooftop equipment was included in the noise impact assessment as a conservative analysis. It is understood that the future use of the facility at 2240 Speers Road is likely to be commercial.

Commercial Office/Retail Facilities (2180, 2201, 2210, 2220, 2245, 2270, 2278 & 2284 Speers Road)

These commercial facilities generally operate during daytime hours only. Existing rooftop equipment associated with these facilities was included in the noise impact assessment based on locations shown on the aerial photograph. 2270 Speers Road is an indoor baseball practice facility, and as such no trucking activities are associated with this facility.

M&G Steel Holdings & Monarch Plastics (2285 & 2335 Speers Road)

Both manufacturer facilities are considered to be Class III industries and are located greater than 160 and 210 m from the subject site respectively. Trucking areas associated with these facilities are shielded from the subject site by the buildings themselves and as such unloading and loading activities are not expected to have a significant noise impact at the subject site. Mechanical units (rooftop HVAC and two at-grade cooling towers as observed during the site visit) and trucks entering and exiting the facilities were included in assessment.

4.3.2 Stationary Source Assessment

Predictive noise modelling was used to assess the potential noise impact at the proposed building due to rooftop mechanical equipment and storage yard activities at nearby industrial and commercial facilities.

The noise prediction model was based on sound emission levels for various noise sources, assumed operational profiles (during the daytime and nighttime), and established engineering methods for the prediction of outdoor sound propagation. These methods include the effects of distance, air absorption, and acoustical screening by barrier obstacles. The sound power levels measured from other facilities similar the ones observed were used in the analysis and are summarized in Table V.

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

Source	Octave Band Centre Frequency [Hz]							
	63	125	250	500	1k	2k	4k	8k
10 tonne HVAC	64	67	72	77	76	73	68	61
25 tonne HVAC	--	94	91	90	87	83	79	72
Medium Truck Passby	98	90	92	90	94	91	84	77
Tractor Trailer Passby	101	100	94	96	97	95	91	86
Forklift	97	93	89	91	90	86	81	76
Stack	101	99	94	94	88	83	80	77
Exhaust Fan	98	97	92	91	88	83	79	72
Cooling Tower	104	103	100	97	93	90	89	89

The above outlined sound levels and various features of the site were used as input to a predictive computer model. The software used for this purpose (*Cadna/A version 2019*), is a computer implementation of ISO Standard 9613-2.2 "Acoustics - Attenuation of Sound During Propagation Outdoors." The ISO method accounts for reduction in sound level with distance due to geometrical spreading, air absorption, ground attenuation and acoustical shielding by intervening structures such as building or barriers.

The following information and assumptions were used in the analysis:

- The existing industrial buildings to the east and west have building heights ranging from 4 to 7 m.
- Using an aerial photo of the buildings, the location of rooftop units was determined and were assumed to include (smaller units were assumed to be 10 tonne HVAC units and larger units

assumed to be 25 tonne units)

- Receptor height of 2.0 m

Assumed daytime worst-case busiest hour scenario (steady sources):

- All rooftop equipment operates continuously at full capacity during the daytime hours.
- Two tractor trailers were assumed to access the loading area at North American Chrome
- One forklift was assumed to operate in the outdoor area at North American Chrome for 45 minutes out of an hour
- One medium truck was assumed to access the rear building delivery area at Jelinek Cork
- Ten tractor trailers were assumed to access the M&G Steel facility
- Ten tractor trailers were assumed to access the Monarch Plastics facility

Assumed nighttime worst-case busiest hour scenario (steady sources):

- All rooftop equipment operates continuously at 50% duty cycle during the nighttime hours.
- Five tractor trailers were assumed to access the M&G Steel facility
- Five tractor trailers were assumed to access the Monarch Plastics facility

The operating times outlined were assumed in determining the one-hour equivalent sound level, L_{EQ}, for a predictable worst-case daytime and nighttime hour. The prediction results are listed in Table VI.

4.3.3 Results

Steady Sound Levels

The calculations consider the acoustical effects of distance and shielding by the buildings. The predicted sound levels due to the mechanical equipment and trucking activities during a typical busy hour operating scenario are summarized in Table VI and as shown on Figures 4 and 5. The revised analysis uses a receptor height of 2.0 m which is more representative of the window locations based on preliminary building elevations.

Table VI: Predicted Sound Levels due to the Existing Commercial/Industrial Uses at the Proposed Building [dBA], Without Mitigation

Location	Criteria Day/Night	Daytime	Nighttime
East Façade	50 / 45	51	46
North Façade	50 / 45	45	41
West Façade	50 / 45	<50	<40
South Façade	50 / 45	42	<35

The results of this analysis indicate that the predicted steady source sound levels due to the existing stationary noise sources in the vicinity may exceed MECP's minimum exclusionary limits by 1 dBA at the east facade of the proposed building during a conservative worst-case operating scenario. The building is designed with inoperable windows for all spaces (as required due to the intended institutional use) which is considered an acceptable noise control measure per NPC-300 to control noise from stationary sources at windows associated with noise sensitive spaces in an institutional purpose building. Fixed and sealed glazing units with a minimum STC Rating of 30 as recommended in Section 3.3.3 would be adequate.

4.4 Assessment of Proposed Stationary Noise Sources

Predictive noise modelling was also used to assess the potential noise impact at existing residences to the south due to rooftop mechanical equipment associated with the proposed development.

4.4.1 Receptors

There are residential uses to the south of the site. Three representative residences are considered the sensitive noise receptors in the assessment (R1 to R3). The receptor locations on shown on Figure 6. R1 to R3 are two storey residences. The exclusionary sound level limits apply to all receptors.

4.4.2 Assessment

Rooftop mechanical equipment information is currently not available. The sound power levels measured from other facilities similar to this one were used in the analysis and are summarized in Table V.

The following information and assumptions were used in the analysis:

- The height of the building is approximately 5 m.
- Five 10-tonne HVAC units located on the rooftop, each 1.5 m high.

Assumed daytime/nighttime worst-case busiest hour scenario (steady sources):

- All rooftop equipment operates continuously at full capacity during the daytime hours and at 50% duty cycle during the nighttime hours.

The predicted sound levels due to the mechanical equipment during a typical busy hour operating scenario meet the applicable limits at neighbouring residences as shown on Figure 6 and on Table VII.

Table VII: Predicted Sound Levels due to the Propose Centre at Receptors [dBA], Without Mitigation

Location	Criteria Day/Night	Daytime At OLA	Daytime At Façade	Nighttime At Facade
R1	50 / 45	<40	40	37
R2	50 / 45	<40	40	37
R3	50 / 45	<40	40	37

The results of this analysis indicate that the predicted steady source sound levels due to the proposed stationary noise sources on the roof of the proposed building will be less than the MECP's minimum exclusionary limits at all receptors to the south. No mitigation is required. The predicted sound levels from the proposed rooftop units is provided in Figure 6.

The results of this analysis also indicate that the impact of the rooftop units at the window locations of the respite beds will be less than 40 dBA during the day and less than 35 during the night, thus meeting the MECP limits.

4.5 Discussion and Recommendations With Regard to Stationary Sources

Commercial activities maybe audible on the development site upon occasion during periods of low traffic. For this reason, MECP Guidelines recommend the use of the following clause to identify the proximity of the commercial/industrial facilities. This clause should be provided in the building and property agreements, where applicable.

Type (c) Warning Clause is reproduced below:

> "The owner is advised that due to the proximity of nearby commercial/industrial land uses, sound levels from these facilities may at times be audible."

This sample clause is provided by the MECP as an example and can be modified by the Municipality as required.

5 Conclusions & Summary of Noise Control Recommendations

The results of this study indicate that with suitable noise control measures integrated into the design of the building, it is feasible to achieve the limits of MECP guideline for traffic and stationary noise sources. The proposed use for the site (1-storey dementia care facility with short-stay overnight respite beds) is found to be compatible with the surrounding land uses from a noise perspective.

The following recommendations are provided in regard to noise mitigation for the proposed building.

Transportation Noise

1. Air conditioning will be provided for the building, meeting MECP ventilation requirements.

2. Glazing constructions with a minimum STC Rating of 30 will provide sufficient sound insulation from traffic noise. When detailed floor plans and building elevations are available, the glazing constructions shall be reviewed and confirmed.

3. Where applicable, warning clauses should be included in the building and property agreements to inform the future owner(s) of the proposed building and property of the noise issues and the presence of the roadway/railway and the nearby commercial/industrial facilities.

Stationary Noise

4. The building is designed with inoperable windows for all spaces which is considered an acceptable noise control measure to control noise from stationary sources at windows associated with noise sensitive spaces in an institutional purpose building. The windows will remain fixed and sealed for the duration of the Dementia Care Centre at this location.

5. When final building plans are available, glazing constructions shall be reviewed and confirmed to ensure that the indoor environment of noise sensitive indoor areas such as the respite rooms will be suitable. Preliminary calculations indicate that STC-30 glazing construction (as recommended in item #2) would be adequate.

The reader is referred to the previous sections of this report where these recommendations are discussed in more detail. The following table summarizes the recommendations made in this report.

Table VIII: Summary of Noise Control Requirements for the Proposed Centre

Façade	Acoustic Barrier	Ventilation	Type of Warning Clause	Required Glazing Constructions for Specific Facades STC Ratings	Mitigation for Stationary Noise Sources
North	--	A/C	a, b, c	STC-30 (Workstation & Caregiver Program)	--
West	--	A/C	a, b, c	STC-30 (Respite beds)	--
East	--	A/C	a, b, c	STC-30 (Program Rooms, Living Room, Respite beds)	Inoperable Windows
South	--	A/C	a, b, c	OBC	--

Notes: -- no specific requirement
OBC – Ontario Building Code Requirements

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

6 Recommendations for Implementation

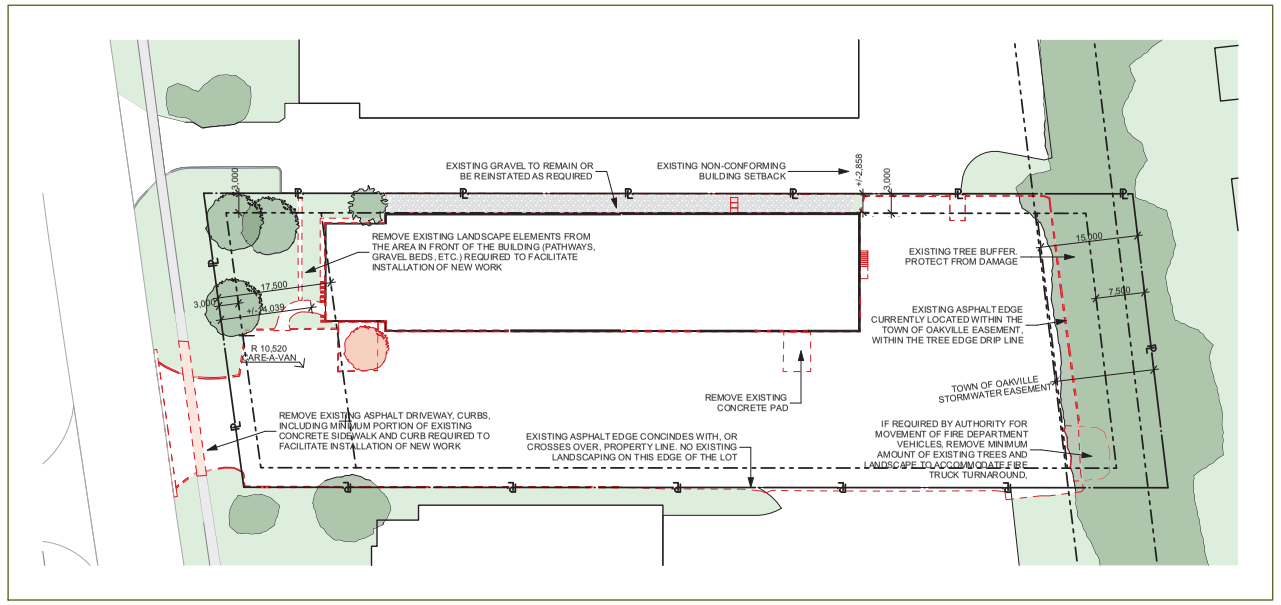
To ensure that noise control recommendations outlined above are fully implemented, it is recommended that:

1) The installed mechanical roof top units should be similar to those assumed in the current analysis. If alternate rooftop units are chosen or the location of the mechanical units are modified, an acoustical engineer should confirm whether the source sound level are within MECP limits, and the locations for the HVAC units conform to the assumptions made in this report. Use of louder rooftop equipment may result in the need for acoustic screens.

2) Before the issuance of a building permit, the Municipal building inspector or a Professional Engineer qualified to perform acoustical engineering services in the Province of Ontario shall review the building plans to ensure that the above noise control recommendations have been implemented in their entirety.

3) After construction, the municipal building inspector or a Professional Engineer qualified to perform acoustical engineering services in the Province of Ontario should certify that the noise control measures have been implemented and constructed in accordance with the approved noise study.

Figure 1: Key Plan

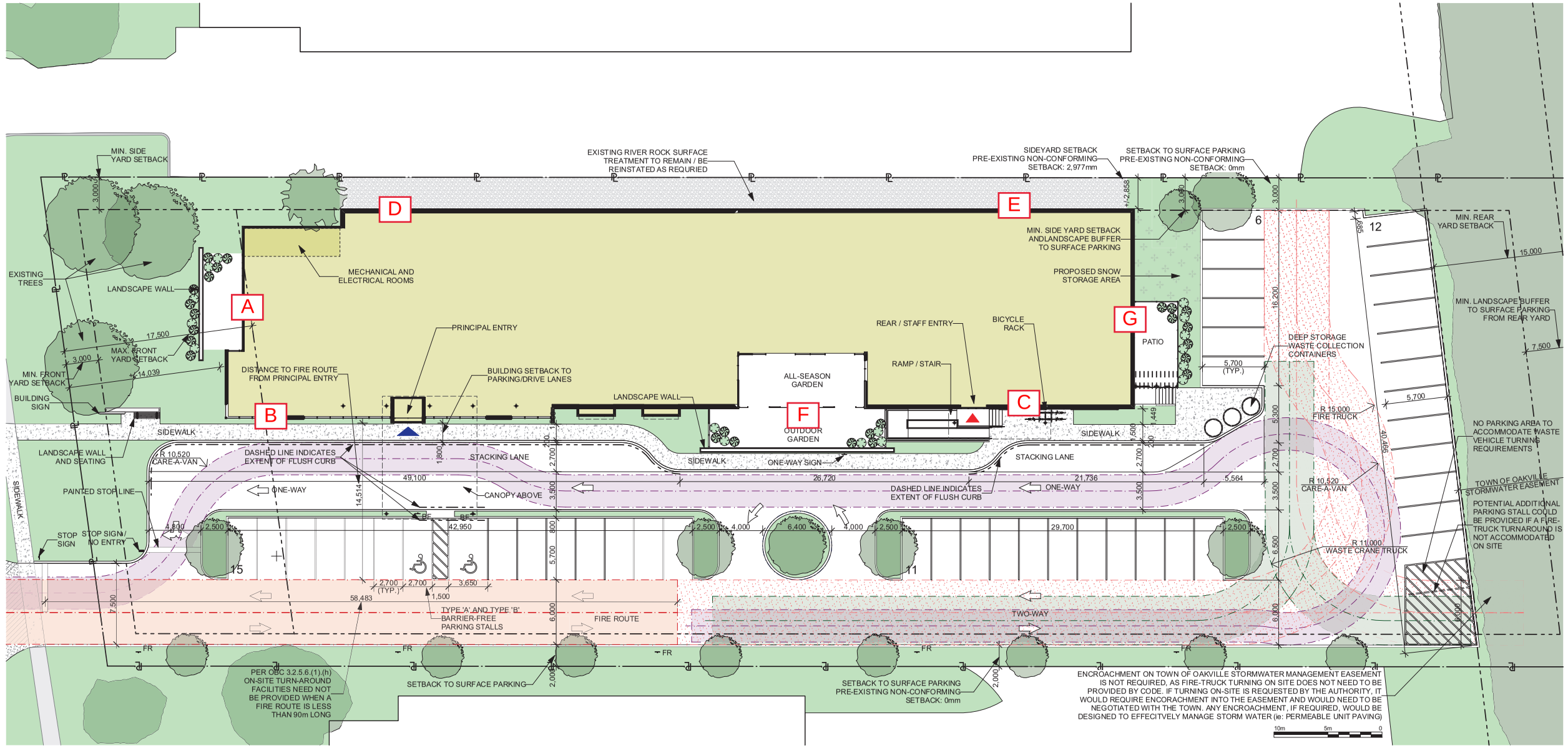


2 SITE DEMOLITION PLAN

A101 1:533.3

SITE PLAN LEGEND

- NEW BUILDING
- LIGHT DUTY ASPHALT
- HEAVY DUTY ASPHALT
- PROPERTY LINE
- CHAIN LINK FENCE
- MAIN ENTRANCE / PRINCIPAL ENTRANCE
- SECONDARY BUILDING ENTRANCE
- BUILDING EXIT
- BARRIER FREE PARKING STALL
- CONCRETE SIDEWALK OR PAD
- 1 IN 12 SLOPE DOWN TO DROP CURB
- SNOW STORAGE LOCATION
- XFH EXISTING FIRE HYDRANT
- RWL RAIN WATER LEADER
- FLUSH CURB
- XCB EXISTING CATCH BASIN
- XMH EXISTING MANHOLE
- PROPOSED SOFFIT MOUNTED LIGHT FIXTURE
- W PROPOSED WALL MOUNT LIGHT FIXTURE
- B PROPOSED BOLLARD LIGHT FIXTURE
- LP PROPOSED LIGHT POLE
- BF BARRIER-FREE PARKING STALL SIGN
- FR FIRE ROUTE, NO PARKING SIGN
- HP HYDRO POLE
- HBP HYDRO BRACING POLE
- PAINTED LINES AT PEDESTRIAN CROSSWALK
- 0 BORE HOLE LOCATION AND NUMBER
- FIRE ROUTE - CENTERLINE AND WIDTH
- FIRE ROUTE - ALTERNATE
- CARE-A-VAN ROUTE - CENTERLINE AND WIDTH
- WASTE VEHICLE ROUTE - CENTERLINE AND WIDTH



1 ENLARGED SITE PLAN

Axxx A101 1:200

Figure 2: Site Plan Showing Traffic Noise Prediction Locations

Acclaim Health

Prints issued to

Particulars	No.	Date	By
TOWN FOR ZBL APPLICATION	1	19.02.26	AB
CONSULTANT FOR CLASS C COST ESTIMATE	2	19.04.10	AB
TOWN PER ZBL COMMENTS	3	19.05.28	AB
TOWN FOR SPA PRE-CONSULTATION	4	19.07.18	AB

Particulars	No.	Date	By

Revisions to drawing — All previous issues of this drawing are superseded.

MMMC ARCHITECTS

Brantford Studio
127 Brant Ave., Brantford, ON N3T 3H5
519.756.6331 1.877.789.6662

K-W Studio
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Project title
ACCLAIM HEALTH

DEMENTIA CARE DAY PROGRAM

OAKVILLE **ONTARIO**

Project number	Date issued	Scale
1838		1:200
	Drawn by: AB	Date: 2019-07-18

Sheet title: **ENLARGED SITE PLAN**

Drawing no.: **A101**

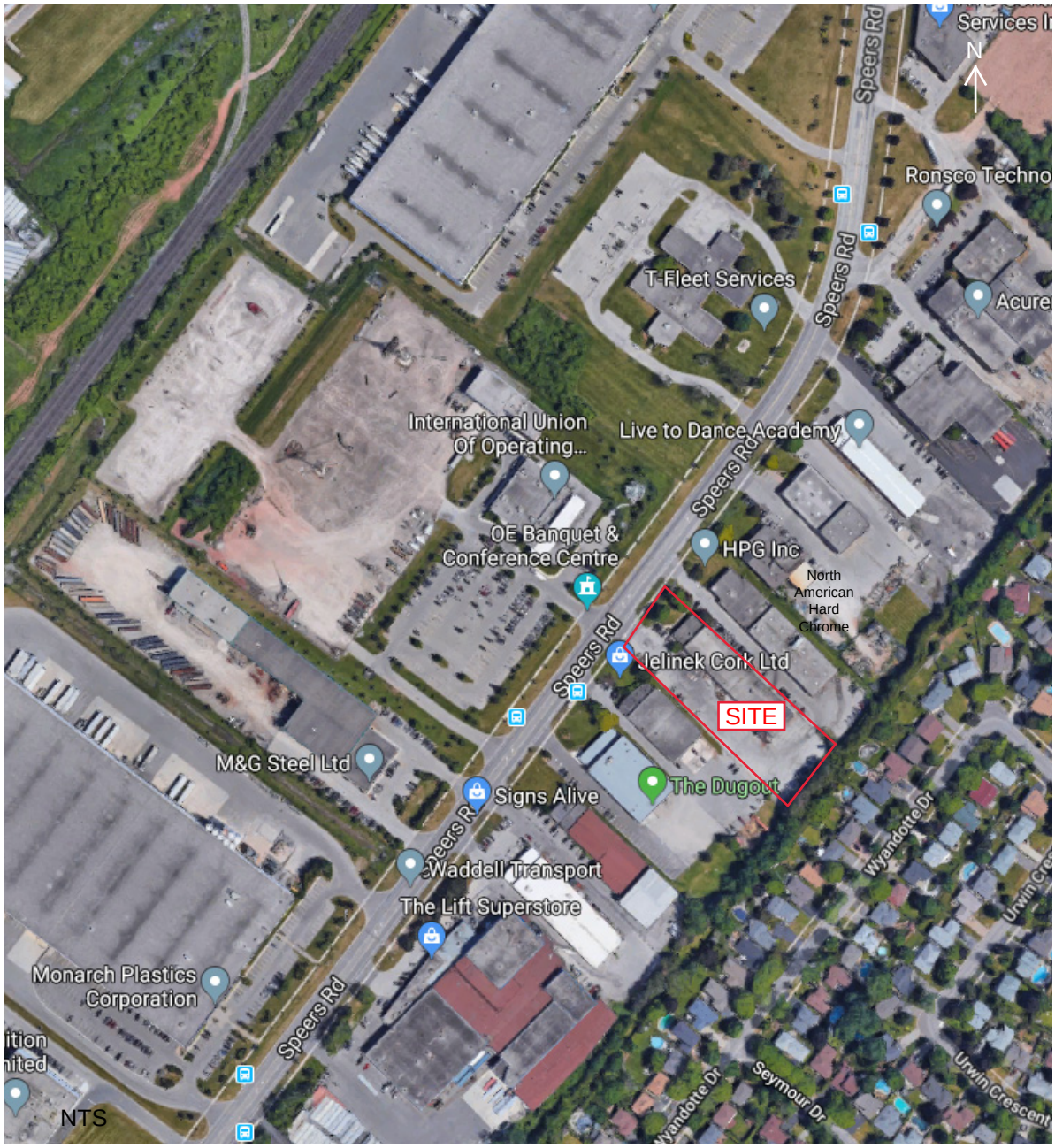


Figure 3: Aerial Photo

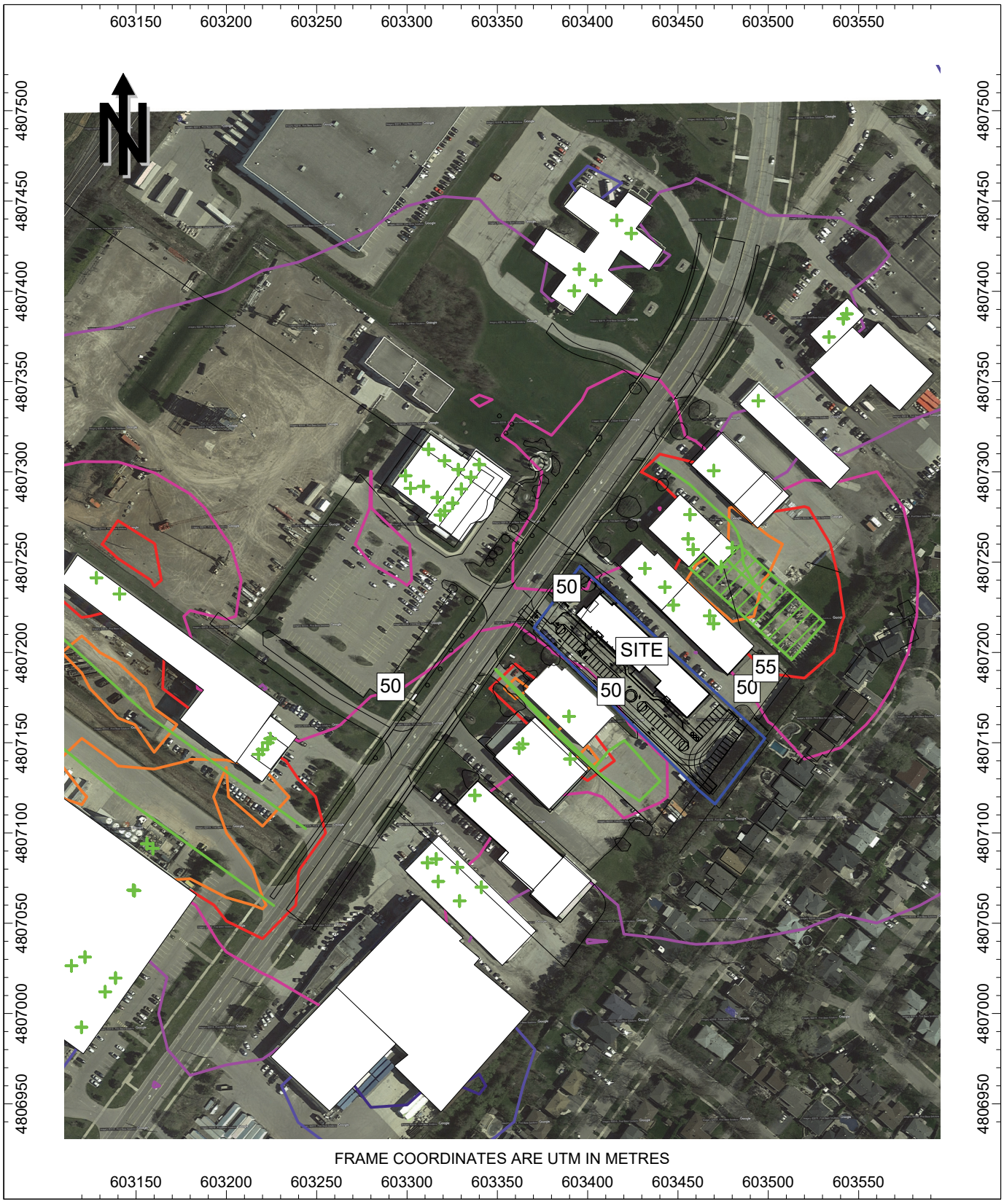


Figure 4: Predicted Daytime Sound Levels at Proposed Centre, Leq1hr [dBA]

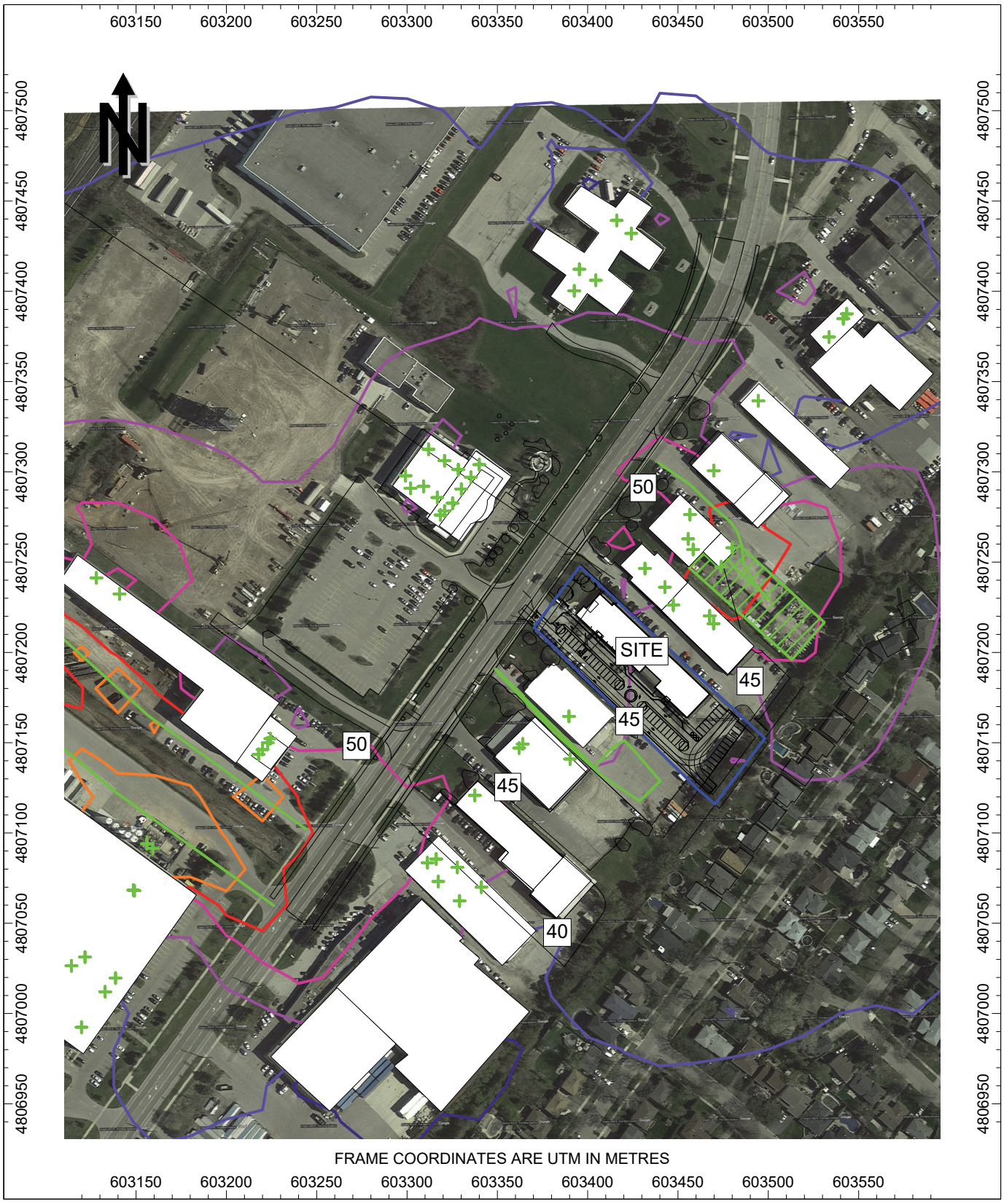


Figure 5: Predicted Nighttime Sound Levels From Existing Commercial/Industrial Uses at Proposed Centre, Leq1hr [dBA]

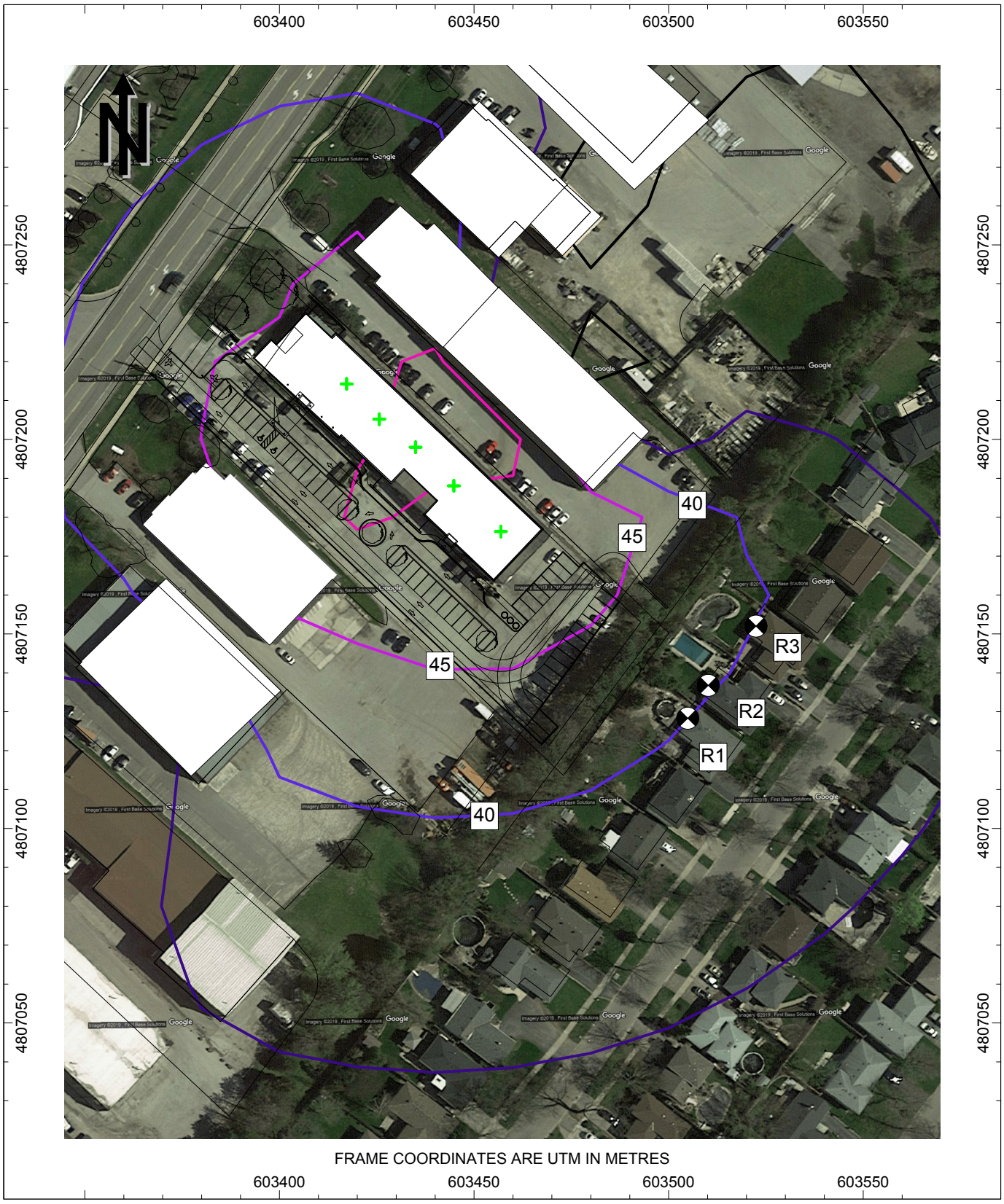
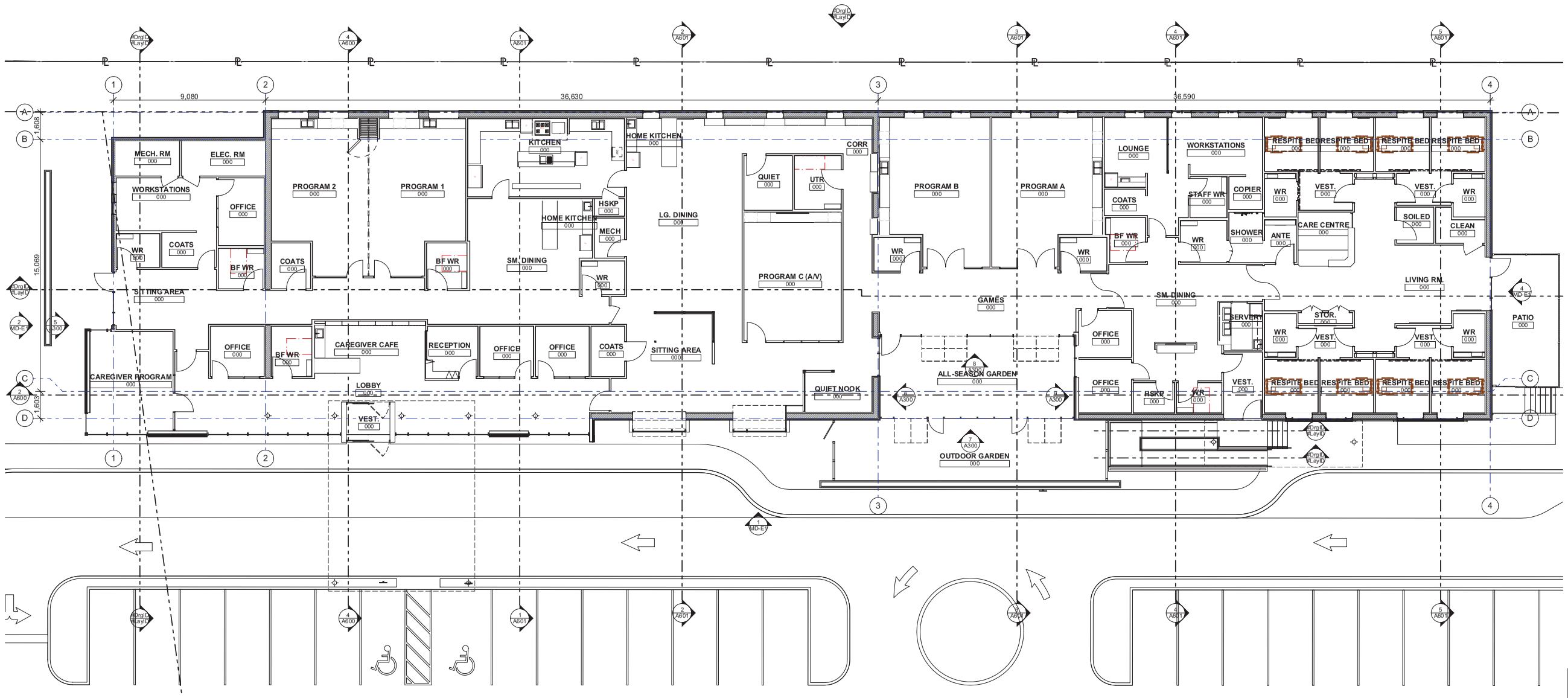


Figure 6: Predicted Daytime Sound Levels at Neighbouring Residential Receptors, Leq1hr [dBA]

APPENDIX A

Supporting Drawings



1 FIRST FLOOR
A202 1:125

Acclaim Health

Prints issued to

Particulars	No.	Date	By
CONSULTANT FOR CLASS C COST ESTIMATE	1	19.04.10	AB
TOWN FOR SPA PRE-CONSULTATION	2	19.07.18	AB

Particulars	No.	Date	By

Revisions to drawing — All previous issues of this drawing are superseded.

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Project title
ACCLAIM HEALTH

DEMENTIA CARE DAY PROGRAM

OAKVILLE **ONTARIO**

Project number	Date issued	Scale
1838	Drawn by AB	Date 2019-07-18

Sheet title
FIRST FLOOR PLAN OVERALL

Drawing no.
A202

APPENDIX B

Traffic Data

Mandy Chan

From: Rail Data Requests <RailDataRequests@metrolinx.com>
Sent: July 19, 2019 3:37 PM
To: Mandy Chan
Cc: Brandon Gaffoor
Subject: RE: Rail Data Request - 2250 Speers Road, Oakville

Good Afternoon Mandy,

Further to your request dated July 19, 2019, the subject site (2250 Speers Road, Oakville) is within 300 metres from Metrolinx's Oakville Subdivision which carries Lakeshore West GO Train service.

It's anticipated that GO service on this subdivision will be comprised of a mix of both diesel and electric trains within (at least) a 10-year time horizon. The combined preliminary midterm weekday train volume forecast at this location, including both revenue and equipment trips is in the order of 238 trains – (54 diesel: 45 day, 9 night; 184 electric: 147 day, 37 night). Trains will be comprised of a single locomotive and up to 12 passenger cars.

The track design speed on this corridor at this location is 95 mph (153 km/h).

With respect to future electrified rail service, Metrolinx is committed to finding the most sustainable solution for electrifying the GO and UP Express rail network and we are currently working towards the next phase. Metrolinx has not made a final decision regarding the electric train technology or technologies to be deployed. We can, however, provide the following interim information which may be helpful;

1. At lower speeds, train noise is dominated by the powertrain. At higher speeds, train noise is dominated by the wheel- track interaction. Hence, at higher speeds, the noise level and spectrum of electric trains is expected to be very similar, if not identical, to those of equivalent diesel trains.

2. Along with electrification, Metrolinx will intensify service levels along all of its corridors to deliver the promised GO Expansion service. Everything else being equal, this will likely result in an overall increase in train noise emissions.

Given the above considerations, it would be prudent, for the purposes of acoustical analyses, to assume that the acoustical characteristics of electrified and diesel trains are equivalent. In light of the aforementioned information, acoustical models should employ diesel train parameters as the basis for analyses. We anticipate that additional information regarding specific operational parameters for electrified trains will become available in the future.

Operational information is subject to change and may be influenced by, among other factors, service planning priorities, operational considerations, funding availability, and passenger demand.

It should be noted that VIA operates trains in this area and it would be prudent to contact them directly for rail traffic information.

I trust this information is useful. Should you have any questions or concerns, please feel free to contact me.

Best Regards,

IVAN CHEUNG
Junior Analyst - Utilities & Third Party Projects Review
Metrolinx
20 Bay Street, Suite 600 | Toronto | Ontario | M5J 2W3
C: 647-990-6246 | T: 416-202-5920

Date: 2019/01/16 Project Number: OAK-32.23 - Plains Rd, Burlington, ON

Dear Victor:

Re: Train Traffic Data – CN Oakville Subdivision near Plains Road in Burlington, ON

The following is provided in response to Victor's 2018/12/19 request for information regarding rail traffic in the vicinity of Plains Road in Burlington, ON at approximately Mile 32.23 on CN's Oakville Subdivision.

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

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

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

	0700-2300			
Type of Train	Volumes	Max.Consist	Max. Speed	Max. Power
Freight	0	140	60	4
Way Freight	4	25	60	4
Passenger	13	10	80	2

	2300-0700			
Type of Train	Volumes	Max.Consist	Max. Speed	Max. Power
Freight	0	140	60	4
Way Freight	2	25	60	4
Passenger	0	10	80	2

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

Except where anti-whistling bylaws are in effect, engine-warning whistles and bells are normally sounded at all at-grade crossings. There are no at-grade crossing in the immediate vicinity of the study area at Mile 32.23 (Plains Road). Please note that engine warning whistles may be sounded in cases of emergency, as a safety and or warning precaution at station locations and pedestrian crossings and occasionally for operating requirements.

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

The triple mainline track is considered to be continuously welded rail throughout the study area. The presence of eleven (11) switches located at Mile 32.08, 32.15, 32.17,

32.18, 32.25, 32.33, 32.40, 32.48, 33.18, 33.23 and 33.31 may exacerbate the noise and vibration caused by train movements.

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

I trust the above information will satisfy your current request.

Sincerely,

Michael Vallins P.Eng
Manager of Public Works
public_works_gld@cn.ca

Dear Scott:

Re: Train Traffic Data – CN Oakville Subdivision near 550 Kerr St in Oakville, ON

The following is provided in response to Scott's 2018/04/17 request for information regarding rail traffic in the vicinity of 550 Kerr Street in Oakville at approximately Mile 22.02 on CN's Oakville Subdivision.

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

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

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

	0700-2300			
Type of Train	Volumes	Max.Consist	Max. Speed	Max. Power
Freight	0	140	60	4
Way Freight	7	25	60	4
Passenger	14	10	95	2

	2300-0700			
Type of Train	Volumes	Max.Consist	Max. Speed	Max. Power
Freight	0	140	60	4
Way Freight	0	25	60	4
Passenger	0	10	95	2

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

Except where anti-whistling bylaws are in effect, engine-warning whistles and bells are normally sounded at all at-grade crossings. There is one (1) at-grade crossing in the immediate vicinity of the study area at Mile 21.94. Anti-whistling bylaws are not in effect at this crossing. Please note that engine warning whistles may be sounded in cases of emergency, as a safety and or warning precaution at station locations and pedestrian crossings and occasionally for operating requirements.

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

The (Quadruple) mainline track is considered to be continuously welded rail throughout the study area. The presence of four (4) switches located at Mile

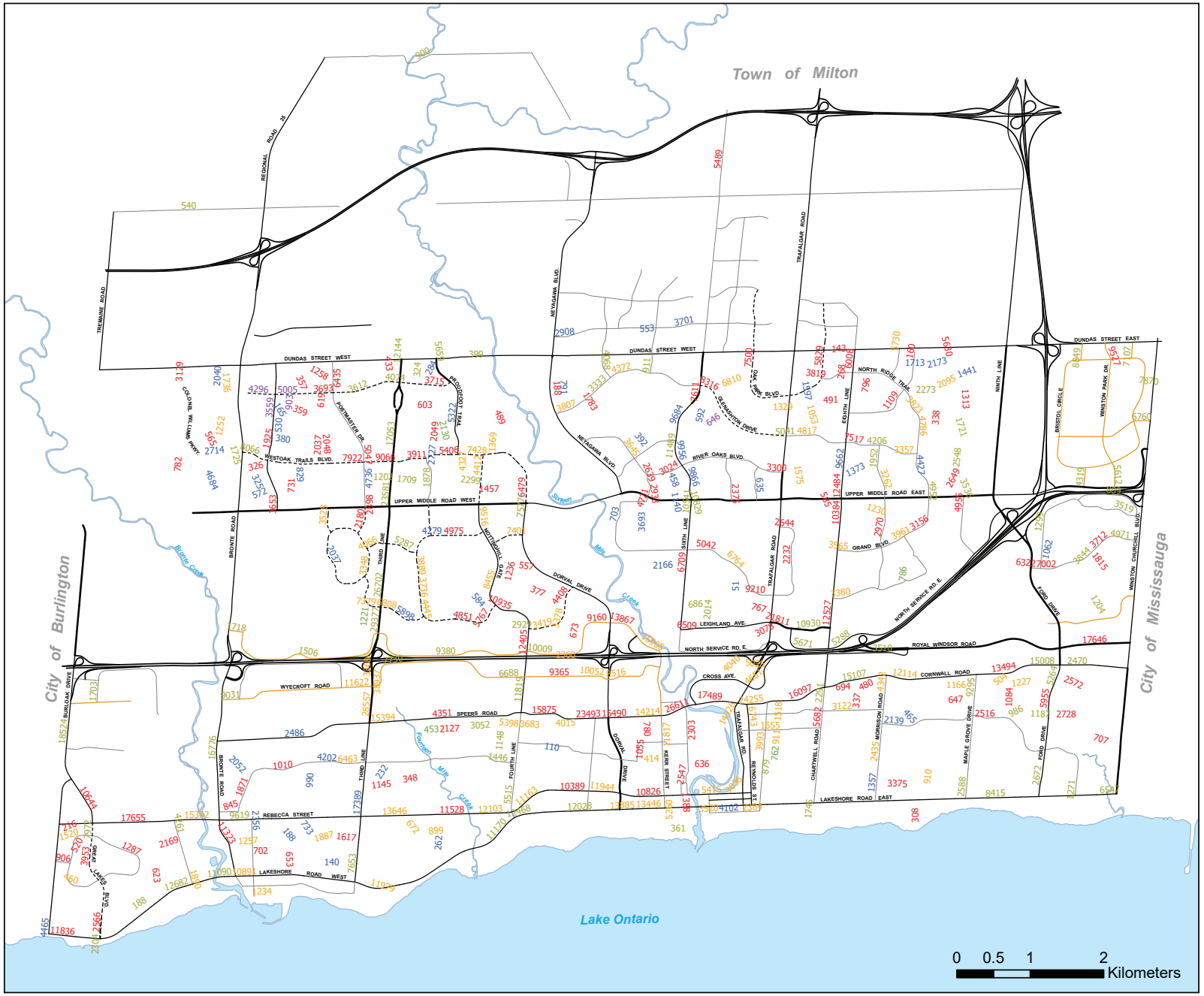
21.92,22.04,22.05 and 22.13 may exacerbate the noise and vibration caused by train movements.

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

I trust the above information will satisfy your current request.

Sincerely,

Michael Vallins P.Eng
Manager of Public Works
public_works_gld@cn.ca



OAKVILLE

Map 3
Traffic Volumes - Midblocks

Traffic Volumes

- 2017 Midblock Volumes
- 2016 Midblock Volumes
- 2015 Midblock Volumes
- 2013 Midblock Volumes
- 2012 Midblock Volumes
- Midblock Volumes prior to 2012

Road Classification

- Major Arterial
- Minor Arterial
- Industrial Arterial
- Major Collector
- Collector
- Highway

Water Features

- Water Features

May 2018

Strategic Business Services
Community Development Commission

S:\DEPARTME\Engineering and Construction
\State of Infrastructure Update

APPENDIX C

Sample STAMSON Output

```
STAMSON 5.0        NORMAL REPORT        Date: 20-08-2019 16:02:54
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: a2.te                Time Period: 16 hours
Description: Predicted daytime sound level at the north façade, at prediction
Location [A]

Rail data, segment # 1: CN
--------------------------
Train            ! Trains      ! Speed !# loc !# Cars! Eng  !Cont
Type             !             !(km/h) !/Train!/Train! type !weld
-----------------+-------------+-------+------+------+------+----
* 1. Freight     !   0.0/0.0   !  97.0 !  4.0 !140.0 !Diesel!  No
* 2. WF          !   9.0/3.0   !  97.0 !  2.0 ! 25.0 !Diesel!  No
* 3. Passenger   !  17.9/0.0   ! 150.0 !  2.0 ! 10.0 !Diesel!  No
* 4. GO          ! 192.0/46    ! 150.0 !  1.0 ! 12.0 !Diesel!  No

* The identified number of trains have been adjusted for
  future growth using the following parameters:

Train type:         ! Unadj. ! Annual % ! Years of !
 No  Name           ! Trains ! Increase !  Growth  !
--------------------+--------+----------+----------+
  1. Freight        !   0.0/0.0   !    2.50  !   10.00  !
  2. WF             !   7.0/2.0   !    2.50  !   10.00  !
  3. Passenger      !  14.0/0.0   !    2.50  !   10.00  !
  4. GO             ! 192.0/46.0  !    2.50  !    0.00  !

Data for Segment # 1: CN
------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1
House density             :     70 %
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 375.00 m
Receiver height           :   2.00 m
Topography                :      1       (Flat/gentle slope; no barrier)
No Whistle
Reference angle           :   0.00

Results segment # 1: CN
-----------------------

LOCOMOTIVE (0.00 + 62.85 + 0.00) = 62.85 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------
   -90     90   0.00  80.76 -13.98   0.00   0.00  -3.93   0.00  62.85
-------------------------------------------------------------------

WHEEL (0.00 + 58.64 + 0.00) = 58.64 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------
   -90     90   0.00  76.55 -13.98   0.00   0.00  -3.93   0.00  58.64
-------------------------------------------------------------------

Segment Leq : 64.25 dBA

Total Leq All Segments: 64.25 dBA
```

```
Road data, segment # 1: Speers
------------------------------
Car traffic volume  : 19269 veh/TimePeriod  *
Medium truck volume :  1107 veh/TimePeriod  *
Heavy truck volume  :  1772 veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: Speers
----------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  31.00 m
Receiver height           :   2.00 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Speers
---------------------------

Source height = 1.68 m

ROAD (0.00 + 69.96 + 0.00) = 69.96 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  73.11   0.00  -3.15   0.00   0.00   0.00   0.00  69.96
-------------------------------------------------------------------------------

Segment Leq : 69.96 dBA

Total Leq All Segments: 69.96 dBA

TOTAL Leq FROM ALL SOURCES:       70.99
```

PRELIMINARY GLAZING AIF/STC REQUIREMENTS
2250 Speers Road

	Road	Rail	
Indoor Criterion Day	45	40	dBA
Indoor Criterion Night	40	35	dBA

Location	Predicted Road Traffic Sound Level (Leq)	AIF[1]	Predicted Rail Traffic Sound Level (Leq)	AIF[1]	Combined AIF (Road + Rail)	Assumed Envelope to Floor Area Ratios (Glazing/Floor)	Preliminary Minimum Glazing STC Requirement
Respite Room Nighttime	51	16	56	26	26	40%	28
Respite Room Daytime	57	17	57	22	23	40%	25
North Façade Workstation Area	70	30	64	29	33	15%	30
East Facade Program Room	63	23	59	24	27	25%	27

Note:

1 - AIF Calculated based on Information Contained in National Research Council, "Acoustic Insulation Factor: A Rating for the Insulation of Buildings Agai Outdoor Noise", June 1990

AIF = Predicted Leq - Indoor Criterion Leq + 2 + 10*log (N) where N = 2

STC = AIF + 10*log (A/0.25)

APPENDIX D

Response to Peer Review Comments

Responses to June 21, 2019 Peer Review by Dillion Consulting Ltd

1. Noted. Section 4.3 has been updated.
2. Latest rail traffic volumes were obtained and attached in Appendix B.
3. Noted. Revised calculations assumed reflective ground surfaces.
4. Noted. Sample calculations are attached in Appendix C.
5. Sound power levels for all sources used in the stationary noise assessment is provided in Table V in Section 4.2.1 on page 12.
6. It is acknowledged that there are numerous industrial and commercial uses within 300 m of the subject site. Based on site observations, distances of these factifies to the subject, the intervening buildings between the facilities and the subject site, noise sources that were found with the potential to impact the subject site were included in the previous noise assessment.

   Additional noise sources were included the revised analysis including additional mechanical equipment at North American Hard Chrome as well as sources at other facilities located further away from the subject site. Noise impact from these additional sources were not found to be significant. Idling of trucks at Chrome and Jelinek Cork facilities were not observed during the August 2019 site visit. Due to intervening uses, trucking activities at other facilities further away are not expected to have significant impact at the subject site.
7. The rooftop stack and additional mechanical equipment associated with North American Hard Chrome have been included in the revised assessment, as outlined in Section 4.2.
8. Assessment parameters used in the modeling is attached in Appendix D.
9. Noted. When floor plans and building elevations have been finalized, the glazing constructions shall be reviewed and confirmed to ensure the indoor environment is suitable. Fixed and sealed glazing constructions with an STC Rating of 30 will be adequate.
10. The resultant daytime sound levels in the Outdoor Living Areas of residential homes to the south are provided in section 4.3 and found to be less than 40 dBA.

Details of Predictive Acoustical Modelling

The predictive model used for this Assessment (*Cadna-A version 2019*) is a software implementation of ISO Standard 9613-2.2 “Acoustics - Attenuation of Sound During Propagation Outdoors”, which accounts for reduction in sound level with distance due to geometrical spreading, air absorption, ground attenuation and acoustical shielding by intervening structures. This modeling technique is acceptable to the MECP.

The subject site and surrounding area were modelled as flat ground, based on observations during the site visit. Ground attenuation was assumed to be spectral for all sources, with a global ground factor (G) assumed to be 0.25 for all areas as a conservative analysis. The temperature and relative humidity were assumed to be 10° C and 70%, respectively.

The computational modelling considered one order of reflection, the sufficiency of which was verified through an iterative convergence analysis, using successively increasing orders of reflection.