SS WILSON ASSOCIATES
Consulting Engineers

REPORT NO. WA16-040
REVISION 4

NOISE CONTROL FEASIBILITY STUDY
PROPOSED RESIDENTIAL DEVELOPMENT
PART OF MAYFIELD WEST- PHASE 2
2650 MAYFIELD ROAD
TOWN OF CALEDON

SUBMITTED TO:

LORMEL JOINT VENTURE INC.
145 REYNOLDS STREET, SUITE 400
OAKVILLE, ON
L6J 0A7

PREPARED BY:

AMIRA RAHAL, BAS., B.COM.
ASSOCIATE PRINCIPAL

ASAD RIZWAN
PROJECT MANAGER

BRENT MILLER, B.ENG., E.I.T.
ACOUSTICS ANALYST

REVIEWED BY:

HAZEM GIDAMY, M.ENG., P.ENG.
PRINCIPAL

JULY 4, 2019

NOISE CONTROL FEASIBILITY STUDY – REVISION 4
PROPOSED RESIDENTIAL DEVELOPMENT
PART OF MAYFIELD WEST- PHASE 2
2650 MAYFIELD ROAD
TOWN OF CALEDON

INDEX PAGE

1.0 INTRODUCTION

1.1 The services of SS Wilson Associates (SSWA) were retained to prepare a Noise Control Feasibility Study for Lormel Joint Venture Inc. for the proposed residential development located at 2650 Mayfield Road in the Town of Caledon.

The objective of this report is to support an application for Draft Plan Approval of the proposed development.

1.2 The site is bounded by the following land uses:

- to the north by a future secondary school as well as vacant lands
- to the south by Mayfield Road and furthermore, by a residential development
- to the east by the Orangeville Railway Development Corporation (O.R.D.C.) Railway Line
- to the west by the Immanuel Christian Reformed Church (Peel Adventist Elementary school) as well as vacant lands

The location of the site is shown in Figure 1. Project north is as illustrated in Figures 2 to 4.

1.3 Major features of the development are defined by the Draft Plan of Subdivision drawing prepared by KLM Planning Partners Inc., Project No. P-2569, Drawing No. 19:2 dated March 13, 2019.

Figure 2 illustrates the general layout of the proposed development.

1.4 Major surface transportation noise sources (current and future) of concern to the development are:

1. Mayfield Road
2. The O.R.D.C Railway Line

1.5 Major stationary noise sources (current and future) of concern to the development are:

1. The Immanuel Christian Reformed Church and School
2. Certain activities on the O.R.D.C. main railway line as well as the Spur Line

1.6 The proposed development is located outside the 25 NEF/NEP contour lines prepared by Transport Canada; therefore aircraft noise is not considered a problem. For reference the Town of Caledon's Noise exposure forecast for The Brampton Flying Club has been provided in Figure 8.

1.7 The scope of this report is to define the minimum noise attenuation requirements for the control of outdoor and indoor environmental sound levels.

1.8 The subject development is also located within the influence zone of ground-borne vibration due to the railway of concern. The potential impact due to ground-borne railway vibration is also addressed in a report under separate cover titled “Railway Vibration Measurements and Assessment, Report No. WA16-040-V” prepared by SS Wilson Associates.

1.9 This Revision 1 is based on comments received from the Region of Peel dated February 7, 2017 and from the Town of Caledon, comments dated April 20, 2017.

1.10 This Revision 2 is based on changes to the acoustic barrier alignments for the development. Specifically, the noise barrier for Lots 181 to 196 has been deleted and replaced with a longer and taller barrier berm combination on Block 201 (Greenspace). This change was made so that the greenspace would not be physically separated from the development, while also providing equivalent acoustic protection from the rail shunting activities that occur on the ORBY rail line.

Additionally, a correction was made to the reported Stationary Impulsive Noise Criteria reported in Section 4.6.10 to be consistent with the written assumption noted in Section 4.6.2 of 5 to 6 impulses per hour.

1.11 Revision 3 was based on the updated Draft Plan of Subdivision drawing referenced in Section 1.3 above, and addresses Jade Acoustic Peer Review comments dated March 12th, 2019. A summary of the revisions is as follows:

- Traffic data for Mayfield Road has been updated
- The posted speeds have been increased by an additional 10 km/hr. (over and above the speed increases received in the updated traffic data) as per the Town’s policy.
- Traffic data for the ORDC rail line has been verified. Verification email added to Appendix A. Minor changes as requested by Jade acoustics have been made.
- The NEF/NEP Contour Map for the Brampton Airport was included as a Figure to justify that aircraft noise is not an issue for the proposed development.
- The written criterion has been updated throughout the report to account for the Town and the Region’s policies. The required mitigation measures were reassessed accordingly.
- The wording in the warning clauses have been revised to incorporate the Region’s wording.
- A note regarding the maximum acoustic barrier height for the Town of Caledon has been added to Section 4.2. The required berm components and berm allowance has also been addressed.

- An inconsistency in the reported barrier height for the spur line activity has been corrected (5.0m)

1.12 This Revision 4 is based on comments from the Region of Peel in their May 6th 2019 letter, and comments from Jade Acoustics in their June 7th 2019 Peer Review Letter. A summary of the revisions is as follows:

The numbered points below correspond to the numbered comments provided.

Region of Peel Comments:

1. The Region noted that the noise warning clause on page 6 of the previous version should be updated to be consistent with the Region of Peel's noise clause (Section 2.6.5). SSWA has revised the warning clause in this submission.
2. The Region noted that Section 4.2 of the study should be revised to note that the OLA receiver location is 1.5m off of the ground, 3m from the rear of the building, in accordance with the Region's Guidelines. SSWA has added a note to this effect at the outset of this section. However, as this report is a feasibility report and the exact locations of the dwellings is not known, the calculations are based on estimates of the future locations. Future changes to the exact dwelling footprints are unlikely to have an impact on the predicted noise levels.

Jade Acoustics Comments:

1. Jade noted that the rail traffic data provided by ORDC is not consistent with the data provided for other developments in the Mayfield West study area. Specifically, the future speed of the rail line was questioned. Confirmation was requested. SSWA obtained confirmation from the Town of Orangeville that the traffic is still valid. This confirmation letter has been provided alongside the rail traffic data in Appendix A.
2. Jade noted that the NEF/NEP contours for the Brampton Airport were updated in May 2018 and that the updated map should be used. They also noted that the results of the report would not be impacted. At the time of the release of this report, the updated NEF/NEP contours for the Brampton Airport were not available publically on the Town of Caledon Website via the Official Plan. As the results are noted to not be impacted, the NEF/NEP contours will only be updated for future reports where the updated contours are available from the Town of Caledon.
3. Jade noted that a few criteria, especially with respect to Peel and Caledon additions to the MECP regulations were misreported. Updates have been made to the text of the report in Sections 2, 3, and 4 to address these concerns.
4. Jade's comment #4 was addressed to the Municipality. No action required by SSWA.
5. Jade noted that SSWA uses 5 to 6 impulses to assess the impact of the stationary noise from train shunting activities adjacent to the proposed

development. The 5 to 6 impulse per worst case hour assessment was based on **actual** observations of the train activities over a period of several days. There are no written railway policies that require Acoustic Consultants to assess shunting activities above the existing activities at the Site. Accordingly, SSWA used as a standard for the railway 60 dBAi for noise assessment.

6. In response to comment #5, Jade noted that the barrier heights should be adjusted to suit the additional impulses requested to be assessed. As a revised assessment will not be conducted as per SSWA's response above, this concern does not need to be addressed. SSWA verified with the developer that it is acceptable to show the Block 205 sound barrier within the Greenlands Block. It should be noted that the full barrier berm combination is proposed to be located within the Greenlands Block 205. The responsibility for berm and barrier maintenance is to be agreed upon by the Town and the developer.
7. Jade noted that as Mayfield Road is proposed to be a six-lane road, the analysis should be split into two segments. SSWA acknowledges that this is technically true, however the results of the calculations are essentially identical. SSWA has updated the analysis.
8. Jade noted that the sample calculation for the OLA in Appendix B accounts for 80% density of housing as screening. However, as the entry for the number of rows of houses is 0, the effect of this entry is nullified. 80% is simply the default entry for this value and only has any impact if the number of rows of houses is a non-zero number.
9. Jade noted that in Appendix D the attenuated sound level is higher than the unattenuated sound level. This is a typo; the headings are reversed. This error has been corrected.

2.0 SUMMARY AND RECOMMENDATIONS

2.1 SUMMARY

Based on the analysis conducted in this investigation it is concluded that:

1. The unattenuated daytime sound levels at some of the Outdoor Living Areas (OLAs)[1] of some of the residential dwellings will exceed the recommended objective sound level. For these dwellings, outdoor noise control measures are required along with relevant warning clauses. All other dwellings and the Common Outdoor Living Area (COLA) for the development (referred to as "Park" on the drawings) will have acceptable outdoor sound levels and therefore, no further outdoor noise control measures need be considered.

2. The unattenuated sound levels at the outside walls of some of the dwellings will exceed the recommended objective sound levels. Indoor noise controls are required for these dwellings along with relevant warning clauses. All other dwellings on the development will have acceptable indoor sound levels. Therefore, noise control measures are not required.

3. Although the projected sound levels are predicted to be above the sound level criteria outlined in Section 3, it is feasible to control sound levels within the outdoor and indoor areas of the proposed development to meet the stated criteria.

4. The results of the investigation of the stationary sources of noise (HVAC equipment serving the Immanuel Christian Reformed Church, and idling of rail equipment[2]) indicate that the unattenuated sound levels at the Points of Reception of concern (summary list: POR1, POR2, and POR3) are predicted to comply with the applicable sound level criteria for stationary sources. Accordingly, noise control measures are not required for these Points of Reception on account of these stationary noise sources.

5. The results of the investigation of the stationary sources of noise (summary list: coupling and shunting activity on spur line) indicate that the unattenuated sound levels at the Points of Reception of concern (summary list: POR3) are predicted to exceed the applicable sound level criteria for stationary sources. Accordingly, noise control measures are warranted for these Points of Reception. In summary, the recommended mitigation measure/action as per the procedures

[1] At times, it may also be referred to as Outdoor Amenity Areas. The size of an OLA is subject to municipal standards and other project requirements (except when classified as a balcony along with other applicable MECP rules).

[2] Site visits to the ORBY spur line showed that 5 pieces of rail repair/construction equipment are stored on site.

is the construction of a barrier-berm combination of 4.4 m in total height. The acoustic barrier portion of the 4.4m barrier-berm combination is recommended to match the other the barriers in the development (2.4m). With this implementation, SSWA is satisfied that the applicable sound level criteria will be met.

2.2 RECOMMENDATIONS

A summary of the minimum noise attenuation requirements is presented in Table 1. Detailed description is as follows:

1. Outdoor Noise Control Measures

- **Lots: 170 to 182 (For Road Traffic Noise)**

a. Acoustical barriers should be constructed to shield the above noted Outdoor Living Areas (OLAs) with the following details:

(i) Barriers should be constructed along the alignments shown schematically in Figure 3.
(ii) The required barrier heights as shown in Figure 3 could be as high as 3.6 m.
(iii) As per the Town of Caledon's guidelines, the sound barriers are to be located 0.3 meters on the private side of the property line.
(iv) As per the Town of Caledon's guidelines, the barrier component of any barrier berm combination shall be no higher than 2.4m
(v) Barriers may consist of an earth berm, a fence or a combination thereof. The fence component to be constructed of a durable material having approximately 20 kg/m^2 (Ξ 4 lb/ft^2) of surface area and be in a continuous line without openings or gaps.

- **Block 205 (Greenspace) for Lots 181 to 199 (For Rail Stationary Noise)**

b. Acoustical barriers should be constructed to shield the above noted Outdoor Living Areas (OLAs) with the following details:

(vi) Barriers should be constructed along the alignments shown schematically in Figure 3.
(vii) The required barrier heights as shown in Figure 3 could be as high as 4.4 m.
(viii) As per the Town of Caledon's guidelines, the barrier component of any barrier berm combination shall be no higher than 2.4m
(ix) Barriers may consist of an earth berm, a fence or a combination thereof. The fence component to be constructed of a durable material having approximately 20 kg/m^2 (Ξ 4 lb/ft^2) of surface area and be in a continuous line without openings or gaps.

c. Since final grading plans are not available at this stage, the barrier height is based on the assumption that the ground elevations at the road, the base of the barrier and the receiver are all equal. The ground elevations are all assumed to be 0m in this case until such time as the grading plans become available.

   Accordingly, a Detailed Noise Control Study should be undertaken prior to final approval of the specified locations requiring a barrier to define specific barrier alignments and heights based on the final grading plans.

   It is also the responsibility of the developer/builder responsible for final design and construction of the sound barriers to ensure that the correct barrier elevation details are secured from the Acoustical Engineer prior to planning and construction of the specified barriers.

2. <u>Air Conditioning</u>

Lots: 157 to 164, 168 to 199

The above noted properties should be equipped with central air conditioning systems with their condensing units to be located in noise insensitive locations. The sound levels of the outdoor condensing units should meet the MECP's the maximum sound level, L_{AS} of 50 dBA[3] at the neighbour's closest point(s) of reception, i.e. at their ground-based outdoor areas as well as the closest window on any floor level as outlined in MECP publication NPC-216 and other levels specified by the municipality. The following warning clause should be registered in all Development Agreement(s) and Offers of Sale and Purchase or Lease of these properties:

"*This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks*".

It is also our recommendation that the necessary detailed technical analysis be performed prior to submitting an application for Building Permit to optimize the required air conditioning unit noise rating number/specification in order to meet the Provincial sound level standards at the closest receptors (i.e., a maximum sound level **L_{AS}** of 50 dBA[4] at the neighbour's closest point(s) of reception within their ground-based outdoor areas as well as at the closest window on any floor level) **after taking into consideration the specific property design and proposed A/C unit location. Other A/C noise control measures, where required to meet the**

[3] Or the lowest hourly ambient Leq due to road traffic projected at the receptor location(s)
[4] Or the lowest hourly ambient Leq due to road traffic projected at the receptor location(s)

sound level criteria at the point(s) of reception, should also be identified and shown on the applicable permit drawings/specifications.

The Analysis Section in this study provides additional important details on the application of air conditioners.

3. Provision for Air Conditioning

Lots: 84, 85, 113, 114, 134 to 137, 156, and 165 to 167

The above noted properties should be equipped with a ducted forced air heating system: furnace/fan, supply air plenum, and duct work. The components are to be appropriately situated and sized to accommodate future installation of central air conditioning systems. The provision for future air conditioning should also include the installation of the necessary rough-in work such as a floor drain for the condensate, appropriate electrical power supply, thermostat control wiring and a capped sleeve in the exterior wall for future refrigeration tubing in an approved location (Installation cost of the air conditioning system is an option to the developer/builder as they see fit).

If the purchaser/occupant does not take the central air conditioning option, the following clause should be registered in all Development Agreement(s) and Offers of Sale and Purchase or Lease of these properties:

"*This dwelling unit has been fitted with provisions, which include a fan forced heating system, suitably sized ducts, plenum, electrical power wiring, thermostatic control wiring, a nearby floor drain, etc. sized to accommodate the future addition of central air conditioning by the occupant at their expense and discretion. Installation of central air conditioning by the occupant will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks. Future installation of the air conditioning system should meet the Ministry of the Environment, Conservation and Parks criteria in Publication NPC-216 (a maximum sound level* L_{AS} *of 50 dBA at the neighbour's closest point(s) of reception, i.e. at their ground-based outdoor areas as well as at the closest window on any floor level) and other applicable levels specified by the municipality.*"

4. Warning Clause *5

Lots: 157 to 164, 168 to 199

"*Purchasers/tenants are advised that despite the inclusion of noise control*

*5 Reference should be made to Bulletin No. 91003, Environmental Warnings/Restrictions, Ontario Ministry of Consumer and Commercial Relations.

features within this development area and within the dwellings, sound levels from increasing road traffic will continue to be of concern, occasionally interfering with some activities of the dwelling occupants as the sound level exceeds the Municipality's and the Ministry of the Environment, Conservation and Parks noise criteria. This dwelling unit was fitted with a central air conditioning system in order to permit closing of the windows for noise control, (Note: locate air cooled condenser unit in a noise insensitive area and ensure that unit has a maximum ARI rating of 7.6 Bels for 3.5 tons or less.)"

Notwithstanding the above warning clause, it should be noted that the sound levels of the outdoor condensing units should meet the MECP's maximum sound level, L_{AS} of 50 dBA[6] at the neighbour's closest point(s) of reception. A detailed assessment should be conducted (by an Acoustic Consultant) during the Building Permit stage, prior to the selection of the AC units to ensure that the correct AC specifications (including the maximum allowable sound level rating for each dwelling unit) are determined.

Warning for Developers/Builders:

The Region of Peel's required warning clause text: "ensure that unit has a maximum ARI rating of 7.6 Bels for 3.5 tons or less" misleads many developers and builders to believe installing 7.6 Bel units throughout their development is acceptable. The MECP standard of 50 dBA at the neighbour's closest point(s) of reception is the most appropriate sound level specification for outdoor condensing units, irrespective of the actual Bel rating of a given unit. Therefore, an Acoustic Consultant must be contacted prior to the selection and installation of AC units to ensure that the AC units installed can be certified as in compliance with all relevant acoustic requirements (i.e. proper locations and Bel ratings are determined for each dwelling unit). This is typically done during the Building Permit stage.

Lots: 84, 85, and 134 to 137

The following warning clause should be registered in all Development Agreement(s) and Offers of Sale and Purchase or Lease of the above properties:

"*Purchasers/tenants are advised that despite the inclusion of noise control features within this development area and within the dwellings, sound levels from increasing road and/or rail traffic may continue to be of concern, occasionally interfering with some activities of the dwelling occupants as the sound level exceeds the Municipality's and the Ministry of the Environment, Conservation and Parks noise criteria,*"

[6] Or the lowest hourly ambient Leq due to road traffic projected at the receptor location(s)

Lots: 113, 114, 156 and 165 to 167

The following warning clause should be registered in all Development Agreements and Offers of Sale and Purchase or Lease of the above properties:

"*Purchasers/tenants are advised that despite the inclusion of noise control features within this development area and within the dwellings, sound levels from increasing road traffic will continue to be of concern, occasionally interfering with some activities of the dwelling occupants as the sound level exceeds the Municipality's and the Ministry of the Environment, Conservation and Parks noise criteria.*"

Due to the proximity of the proposed development to the noted railway tracks, reference should also be made to the previously noted railway vibration study report referred to in Section 1.

Warning Clause - Rail

Lots: 1 to 199

The following clause should be included in all offers of purchase Agreement(s) of sale and purchase or lease and in the title deed or lease of each of the above dwellings:

"*Warning: The O.R.D.C. and its assigns and successors in interest has or have right-of-way within 300 m from the subject land hereof. There may be alternations to or expansions of the rail facilities on such right-of-way in the future, including the possibility that they or any railway company entering into an agreement with this railway company to use the right-of-way or their assigns or successors as aforesaid may expand their operations. The 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. The O.R.D.C. will not be responsible for any complaints or claims arising from the use of such facilities and/or operations on, over or under the aforesaid right-of-way*."

"*All persons intending to acquire an interest in the real property by purchase or lease are advised of the proximity of the O.R.D.C. lands, which could operate on a 24-hour basis. It is possible that the marshalling/shunting yard operations may cause disturbance and may be altered or expanded, which could affect the living environment of the residents despite the inclusion of any noise and vibration attenuating measures in the design of the outdoor amenity areas and individual dwellings. Residents are advised that further mitigation cannot be expected and the railway company will not be responsible for any complaints or claims arising from use of such facilities and/or operations.*"

Warning Clause – Nearby School

Lots: 1 to 5

The following warning clause shall be included in all Development Agreements and Offers of Sale and Purchase or the above-noted properties:

"Purchasers/tenants are advised that the dwelling unit is in proximity to a proposed school. Sounds from the school building and property may be audible at times".

Typical Acoustic Insulation Factors (AIF) are shown in Tables 3 and 4. It should be noted that these sample lots included in the tables were selected to inclusively represent all other lots within the development. The conclusions drawn from these calculations provide sufficient information by which the recommendations within this study have been determined.

The Detailed Noise Control Study should provide complete and specific tabulations of AIF's for all properties affected.

It is also the responsibility of the developer/builder responsible for final design and construction of the subject dwellings to ensure that the correct windows, walls and doors acoustic specifications are secured from the Acoustical Engineer prior to planning and construction of the noted dwellings.

5. Building Acoustic Insulation

Lots: 157 to 164 and 168 to 199

All exterior building components (walls, windows and doors) should meet the minimum Acoustic Insulation Factors (AIF) shown in Tables 3 and 4. All windows should be well fitted and weather-stripped.

It is also the responsibility of the developer/builder responsible for final design and construction of the subject dwellings to ensure that the correct windows, walls and doors acoustic specifications are secured from the Acoustical Engineer prior to planning and construction of the noted dwellings.

6. Required Sections and Details

Typical cross sections should be prepared and submitted in due course by the Consulting Engineers responsible for preparation of the site grading and drainage plans based on the final approved elevations. The sections should typically include existing and proposed future building grade elevations, source, receiver and barrier/berm ground elevations, berm slopes, drainage provisions, etc.

7. Implementation Procedures

a) Prior to final approval of this development, a Detailed Noise Control Study, or an upgraded noise study should be required to take into consideration the following:
   - The proposed detailed grading plans
   - Final lot layout, lot/block numbers, etc.
   - Possible proposed building locations
   - The exact distances to all sources of concern
   - Final/approved sound barrier locations as well as barrier height-sound level alternatives

b) The necessary Development Agreement(s) should include the details of all the necessary noise control measures and procedures as outlined herein in this noise study to the satisfaction of all concerned parties.

c) Prior to the issuance of building permits, the Builder's plans, with respect to the units requiring noise control measures as referred to earlier, should be certified by an Acoustical Engineer as being in conformance with the recommendations of the Detailed Noise Control Study as approved and/or amended by the authorities having jurisdiction.

d) Prior to their final inspection and release for occupancy, these dwellings should be certified by an Acoustical Engineer as being in compliance with the recommendations of the Detailed Noise Control Study.

In view of the fact that municipal implementation procedures of the noise control measures recommended herein may differ, it is the responsibility of the developer/builder responsible for final design and construction of the subject structures/dwellings to ensure that the correct details related to the noise control measures referred in this report, such as sound barriers, building shell component specifications (windows, walls, doors, and others), air conditioning noise control technical requirements, etc. are secured from the Acoustical Engineer prior to planning and construction of the noted dwellings.

3.0 SOUND LEVEL CRITERIA

3.1 SURFACE TRANSPORTATION CRITERIA[7]

The surface transportation noise is based on the objective sound levels recommended by the Ministry of the Environment, Conservation and Parks (Ref: MECP Publication NPC-300 "Environmental Noise Guideline, Noise Assessment Criteria for Stationary Sources and for Land Use Planning, 2013") and applicable Regional/Municipal sound level standards and procedures for different land uses and spaces.

The following is a summary of the applicable sound level criteria for surface transportation sources for the shown time periods (day=d & night=n):

Sound Level Limits for Outdoor Living Areas (OLAs)

AREA & TIME PERIOD	$L_{Aeq(day)}$ ROAD AND RAIL (dBA)
Designated (Individual or common) Outdoor Living Areas (16 hr day(d), 07:00 - 23:00)	$L_{Aeq(day)}$ 55

Indoor Sound Level Limits

Type of Space	L_{Aeq} (Time Period) (dBA)	
	Road	Rail
Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc. (Time period-day: 16 hr(d), 07:00 - 23:00)	$L_{Aeq(day)}$ 45	$L_{Aeq(day)}$ 40
Living/dining, den areas of residences, hospitals. nursing homes, etc. (except schools or daycare centres) (Time period-night: 8 hr(n), 23:00 - 07:00)	$L_{Aeq(night)}$ 45	$L_{Aeq(night)}$ 40
Sleeping quarters (Time period-day: 16 hr, 07:00 - 23:00)	$L_{Aeq(day)}$ 45	$L_{Aeq(day)}$ 40
Sleeping quarters (Time period-night: 8 hr, 23:00 - 07:00)	$L_{Aeq(night)}$ 40	$L_{Aeq(night)}$ 35

[7] Road, rail and rolling stock traffic.

Additional Supplementary (Best Management Practices) Sound Level Criteria Recommended for Other Uses

Type of Space	L_{Aeq} (Time Period) (dBA)	
	Road	Rail
General offices, reception areas, retail stores, etc. (Time period-day: 16 hr, 07:00 - 23:00)	$L_{Aeq(day)}$ 50	$L_{Aeq(day)}$ 45
Living/dining areas of residences, hospitals, schools, nursing/retirement homes, daycare centres, theatres, places of worship, libraries, individual or semiprivate offices, conference rooms, reading rooms, etc. (Time period-day: 16 hr, 23:00 - 07:00)	$L_{Aeq(day)}$ 45	$L_{Aeq(day)}$ 40
Sleeping quarters of hotels/motels (Time period-night: 8 hr, 23:00 - 07:00)	$L_{Aeq(night)}$ 45	$L_{Aeq(night)}$ 40
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc. (Time period-night: 8 hr, 23:00 - 07:00)	$L_{Aeq(night)}$ 40	$L_{Aeq(night)}$ 35

The criteria for acceptable outdoor and indoor sound levels are based on "free-field" predicted and/or measured sound levels at the applicable receiver locations, thus the effects of sound reflections and reverberant sound fields are not considered.

If the sound level is less than or equal to the sound level criteria, no control measures will be required.

The outdoor sound levels ***may*** exceed the outdoor sound level criterion by up to 5 decibels, provided that it can be demonstrated that it is not technically, economically or administratively feasible to achieve the criterion and that the occupants are informed of a potential disturbance due to the excess noise by means of a warning clause or cautionary note to be registered in all Development Agreement(s) and Offers of Sale and Purchase or Lease.

Central air conditioning is required when the daytime sound level at the outside wall of any habitable room containing windows exceeds an $L_{Aeq(day)}$ 16 hrs of 65 dBA or when the nighttime sound level at the outside wall of any habitable room containing windows exceeds an $L_{Aeq(night)}$ 8hrs of 60 dBA.

Forced air ventilation (with provision for future installation of a central air conditioning system) is required when the daytime sound level at the outside wall of any habitable room containing windows an exceeds $L_{Aeq(day)}$ 16 hrs of 55 dBA

but is less than or equal to 65 dBA or when the nighttime sound level at the outside wall of any habitable room containing windows exceeds an $L_{Aeq(night)}$ 8hrs of 50 dBA but is less than or equal to 60 dBA.

Notwithstanding the above, the Region of Peel requires that for those dwellings with a nighttime building façade sound level of 60dBA, air conditioning be installed, as opposed to the MECP's requirement for provision for air conditioning for these dwellings.

Application of Criteria

The following table summarizes the requirements for noise control measures for the various sound level ranges:

SOURCE OF NOISE	DAYTIME SOUND LEVEL $L_{Aeq(day)}$	NIGHTTIME SOUND LEVEL $L_{Aeq(night)}$	AIR CONDITIONING	FORCED AIR VENTILATION WITH PROVISION FOR FUTURE AIR COND.	WARNING CLAUSE	ACOUSTIC INSULATION
ROAD	<=55	<=50	-	-	-	-
	>55 & <=65	>50 & <=55	-	Yes	Yes "Type C" 'may'	
		>55 & <=59			Yes "Type C" 'will'	
	>65	>59	Yes	-	Yes "Type D"	Yes
RAIL	<=55	<=50	-	-	-	-
	>55 & <=60	>50 & <=55	-	Yes	Yes "Type C" 'may'	-
	>60 & <=65	>55 & <=59	-	Yes	Yes "Type C" 'will'	Yes
	>65	>59	Yes	-	Yes "Type D"	Yes

3.2 CRITERIA FOR STATIONARY NOISE SOURCES

The following criteria apply to the impact of Stationary Sources of noise as defined by the MECP to include industrial and commercial facilities. The criteria apply to the impact of Stationary Sources external to the development on the proposed development or to the impact of any proposed Stationary Sources internal to the development on the development itself.

The criteria used in this study are based on the objective sound levels recommended by the Ministry of the Environment, Conservation and Parks (Ref.:

MECP Publication NPC-300 “Environmental Noise Guideline, Noise Assessment Criteria for Stationary Sources and for Land Use Planning, 2013) and other relevant publications.

For sound from a stationary source, including Quasi-Steady Impulsive Sound but not including other impulsive sound, the predicted and/or measured “predictable worst case” 1-hour equivalent sound levels (L_{Aeq1hr}) of the stationary source(s) at a point of reception is the higher of the applicable exclusion limit value (given in the following tables) or the background sound level for that point of reception. The outdoor sound level limits for stationary sources apply only to daytime and evening (07:00 – 23:00 hours).

Exclusion[8] Limit Values of One-Hour Equivalent Sound Level (L_{Aeq}, dBA) Outdoor Points of Reception

Time of Day	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 19:00	50	50	45	55
19:00 – 23:00	50	45	40	55

Exclusion Limit Values of One-Hour Equivalent Sound Level (L_{Aeq}, dBA) Plane of Window of Noise Sensitive Spaces

Time of Day	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 19:00	50	50	45	60
19:00 – 23:00	50	50	40	60
23:00 – 07:00	45	45	40	55

Impulse Noise

For impulsive sound, other than Quasi-Steady Impulsive Sound from a stationary source, the sound level limit at a point of reception expressed in terms of Logarithmic Mean Impulse Sound Level (L_{LM}) is the higher of the applicable exclusion limit value given in the following tables or the background sound level for that point of reception. The outdoor sound level limits for stationary sources apply only to daytime and evening (07:00 – 23:00 hours).

[8] or the minimum hourly background (ambient) sound level $LAeq_{1hr}$, whichever is higher

Exclusion Limit Values for Impulsive Sound Level (L_{LM}, dBAI)
Outdoor Points of Reception

Time of Day	Actual Number of Impulses in Period of One-Hour	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 23:00	**9 or more**	50	50	45	55
07:00 – 23:00	**7 to 8**	55	55	50	60
07:00 – 23:00	**5 to 6**	60	60	55	65
07:00 – 23:00	**4**	65	65	60	70
07:00 – 23:00	**3**	70	70	65	75
07:00 – 23:00	**2**	75	75	70	80
07:00 – 23:00	**1**	80	80	75	85

Exclusion Limit Values for Impulsive Sound Level (L_{LM}, dBAI) Plane of Window – Noise Sensitive Spaces(Day/Night)

Actual Number of Impulses in Period of One-Hour	Class 1 Area (07:00-23:00)/ (23:00-07:00)	Class 2 Area (07:00-23:00)/ (23:00-07:00)	Class 3 Area (07:00-19:00)/ (19:00-07:00)	Class 4 Area (07:00-23:00)/ (23:00-07:00)
9 or more	50/45	50/45	45/40	60/55
7 to 8	55/50	55/50	50/45	65/60
5 to 6	60/55	60/55	55/50	70/65
4	65/60	65/60	60/55	75/70
3	70/65	70/65	65/60	80/75
2	75/70	75/70	70/65	85/80
1	80/75	80/75	75/70	90/85

4.0 ANALYSIS

4.1 TRANSPORTATION SOURCES OF NOISE

The relevant road and traffic data were obtained from the Region of Peel and are summarized below:

- Mayfield Road

Current No. of Lanes	2
Future No. of Lanes	6
Posted Speed Limit	60 km/hr.
-Future Speed Limit -Future Speed Limit (assumed in study as per the Town's Policy)	80 km/hr. 90 km/hr.
AADT (Year 2019)	18,158 vpd
Ultimate AADT	48,100 vpd
Total Truck Percentage (Day) – Medium Truck Split – Heavy Truck Split	6.4% 3.3% 3.1%
Total Truck Percentage (Night) – Medium Truck Split – Heavy Truck Split	6.0% 3.2% 2.8%
Day(16 hrs.)/Night(8 hrs.) Split	89%/11%
Directional Traffic Split (assumed)	50%/50%
Road Gradient (assumed)	0%

Appendix A contains the relevant road traffic data used in this study.

RAIL TRAFFIC DATA (O.R.D.C. Railway Line)

DAYTIME (0700-2300)

TYPE OF TRAIN	MAX. NO. OF TRAINS	MAX. NO. OF CARS	MAX. OPER SPEED (KM/H)	MAX. NO. OF LOCOMOTIVES
Freight	6	5 to 12	40	2

NIGHTTIME (2300-0700)

TYPE OF TRAIN	MAX. NO. OF TRAINS	MAX. NO. OF CARS	MAX. OPER SPEED (KM/H)	MAX. NO. OF LOCOMOTIVES
Freight	1	5 to 12	40	2

ADDITIONAL COMMENTS

1. The above traffic is for present day conditions. To allow for future increases in rail traffic volumes we have increased the above data by 2.5% per year for 10 years.
2. The measures recommended in this report are strictly related to environmental noise due to train pass-bys. Reference to other measures for safety including distance setbacks, berming, and specific warning clauses can be found in the relevant policies published by the railway company.

SOURCE OF INFORMATION:

Appendix A contains the relevant rail traffic data used in this study.

4.2 OUTDOOR NOISE ENVIRONMENT

Sound level predictions were carried out based on MECP's ORNAMENT and STEAM sound level prediction modeling procedures[9] (Ontario Road Noise Analysis Method for Environment and Transportation, Technical Document, 1989 and STEAM, Sound from Trains Environmental Analysis Method, 1990). As per the MECP And Region of Peel Policies all OLA calculations are performed 1.5m above the ground, at locations assumed to be 3m from the rear of the future dwellings.

Overall sound levels at the OLAs of the selected representative receptor locations are shown in Tables 3. Sample sound level calculations at representative receptor locations are presented in Appendix B.

In consideration of the calculations, it is concluded that for Lots 170 to 182, the unattenuated daytime sound levels in the designated OLAs will exceed 60 dBA, the maximum criteria levels allowed. Therefore, outdoor noise control measures are required for these properties.

It should be noted that for Lots 170 to 182, the recommended sound barrier heights will attenuate the sound levels to 59 dBA. In order to attenuate the sound levels to 55 dBA as per the Town of Caledon's Policy, barrier heights of 4.6m to 5.6m will be required, which is not technically feasible. As this study still in the feasibility stage, the barrier heights will be revisited once the Grading Plan becomes available. Table 5 includes the details of the barrier heights required to achieve L_{Aeq} 55 dBA.

[9] The MECP's noise prediction models ORNAMENT and STEAM have a limitation as to the minimum AADT value for 24 hour traffic volume (calculated for the daytime and nighttime hourly volume). When the AADT value is less that 40 vph, there is a neutral mathematical manipulation that can be used as long as the hourly traffic volume is not very low. The manipulation is implemented by multiplying the traffic volume by any reasonable factor (for example a factor of 10) and then by deducting 10 x log "factor" from the results (in this case, 10 x log 10=10).

In consideration of the calculations, it is concluded that for all other lots within the development, the unattenuated daytime sound levels in the designated OLAs will not exceed the objective level of L_{Aeq} 55dBA, therefore outdoor noise control measures are not required for these properties.

Notwithstanding the above, although the unattenuated daytime sound levels for Lots 183 to 199 do not exceed the objective sound level, a barrier berm combination of 4.4m high sound barrier is recommended due to the noise from the neighbouring rail yard activities. This barrier will be located on Block 201 but will protect Lots 181-199.

The conventional approach by which excess noise in the rear yard OLAs may be mitigated is through construction of acoustical barriers. Barrier height calculations for the receptors of concern are included in Appendix B. The barrier alignments are as shown in Figure 3. At this time, as house footprints are not yet available, OLA locations are approximate and as such, cannot be indicated on the figures.

It should be noted that the maximum barrier height permissible in the Town of Caledon is 2.4m. To meet the required acoustic barrier heights of this report barrier berm combinations will be required. This requires that a sufficient berm allowance is provided for in Blocks 203 and 205.

4.3 INDOOR NOISE ENVIRONMENT

The criteria for indoor L_{Aeq} sound levels are based on projected L_{Aeq} levels at the outside face of the dwellings with appropriate assumptions for the differences between the outdoor and indoor sound levels. If the outside L_{Aeq} levels do not exceed the recommended objective sound levels, then the indoor L_{Aeq} levels will not be exceeded, assuming standard building construction and operable windows.

Overall daytime sound levels at the building facades are shown in Table 3 and the overall nighttime sound levels at the building facades are shown in Table 4.

In consideration of the estimated sound levels and by comparison to the acceptable indoor sound level criteria (Section 3) the following is concluded:

- The sound levels at the outside walls of the following receptors (within any habitable room on any floor) is predicted to exceed $L_{Aeq(day)}$ 65 and/or $L_{Aeq(night)}$ 59 dBA respectively:

  Lots: 157 to 164, and 168 to 199

  Therefore, central air conditioning is required.

- The daytime/nighttime noise environment at the outside walls of the following receptors (within any habitable room on any floor) is predicted to be in the range

of $L_{Aeq\ day}$ 56-65 dBA and/or $L_{Aeq\ night}$ 51-59 dBA:

Lots: 84, 85, 113, 114, 134 to 137, 156, and 165 to 167

Forced-air heating system with provision for central air conditioning is therefore required.

All other lots will have a sound level equal to or less than $L_{Aeq(day)}$ 55 dBA and/or $L_{Aeq(night)}$ 50 dBA and therefore no noise control measures need be considered.

Typical Acoustic Insulation Factors (A.I.F.) are summarized in Tables 3 and 4.

4.4 TYPICAL WINDOW / WALL CONSTRUCTION

As the detailed architectural plans for Building Permit submission are not available at this time, it is not possible to specify the window and wall details to meet the AIF requirements presented in Tables 3 and 4. Further detailed analysis should be undertaken based on the data presented in this Report to take into consideration the final room location, floor area, window type (operable or fixed), window size and orientation, etc. Such analysis is required by the MECP and the municipality prior to submission for building permits as part of their Certification process.

Wall construction using concrete block, brick veneer, precast concrete panels or acoustically equivalent light frame construction will be adequate to meet the indoor sound level criteria.

It must be pointed out that there are several factors affecting the final glass selection including:

1. Size of window.
2. Room dimensions.
3. Floor level and direction room faces.
4. Fixed or operable glass.
5. The number of building components.
6. Type of wall to be used.
7. Projected sound levels outside the window

For the calculation of type of windows required for each dwelling, a detailed description of each unit is required.

As an example, for a typical unit with daytime outdoor sound level of 69 dBA, the AIF value for the Living Room will be 28 assuming 3 components. If the window to floor ratio is 32%, then the window requirements in terms of glass thickness, mm (air space thickness, mm) glass thickness, mm are any of the following:

Double Glazed: 3mm (6mm) 6mm; 6mm (6mm) 5mm laminated

As an example, for a typical unit with nighttime outdoor sound level of 61 dBA, the AIF value for the bedrooms will be 30 assuming 3 components. If the window to floor ratio is 20%, then the window requirements in terms of glass thickness, mm (air space thickness, mm) glass thickness, mm are any of the following:

Double Glazed: 3mm (6mm) 6mm; 6mm (6mm) 4mm laminated

The above window glazing construction is typical examples only. It is recommended that prior to the submission of the building plans for Building Permit that the detailed architectural drawings of the units requiring noise control measures, as referred to earlier, be examined by the Acoustical Engineer in order to advise the design consultant on the ***specific*** building components for noise control to suite the actual window construction details.

4.5 CONTROL OF AIR CONDITIONING UNITS NOISE

To control the environmental noise emitted by air conditioning or heat pump units it is essential that the following procedures and specifications be considered to by the parties responsible for the selection, design and installation of the air conditioning systems:

1. Control of air conditioning noise is governed by Provincial and/or municipal standards which specify acceptable sound emission levels for the air conditioning devices and/or acceptable sound levels at the point(s) of reception.

   The Ministry of the Environment, Conservation and Parks criteria for control of air conditioning noise is outlined in several technical publications including publications NPC-300 and NPC-216 (a maximum sound level of 50 dBA[10] at the neighbour's closest point(s) of reception, i.e. at their outdoor areas as well as at the closest window on any floor level). The applicable sound level criteria for new residential development where air conditioning is a mandatory requirement for noise control inside habitable rooms are: 1) a maximum ARI* Sound Rating to suit the site specific installation for the air conditioning device, and 2) hourly L_{Aeq} sound level limits of 50 dBA at the point(s) of reception (or the prevailing hourly L_{Aeq} due to vehicular traffic ambient noise if higher than 50 dBA).

   Municipal standards for air conditioning noise may also include specific or maximum Sound Rating numbers (in bels) and/or point-of-reception sound level limits in reference to specific municipal By-Laws and/or standards as applicable.

[10] Or the lowest hourly ambient Leq due to road traffic projected at the receptor location(s)
* When tested in accordance with ARI Standard 270-84

Therefore, it is essential that the final selection, location, design, and specifications of the air conditioning devices ensure compliance with the applicable sound level criteria prior to making any commitment.

The following are examples of the preferred approach when dealing with the issue of air conditioning noise.

a) If the A/C condensing unit is to be installed in backyards in urban areas, then units having lower bels rating may be required. The use of units with lower sound rating of 6.8bel or lower may give the builder the flexibility of locating the unit as close as 3 metres from the joint property lines without exceeding the MECP 50 dBA standard for houses in urban areas.
b) If the unit is to be located in the front or in the side yard areas (closer to the front and provided that there are no windows to habitable rooms on the side walls), then units having less stringent sound level rating requirements may result in complying with sound criteria.
c) Through the building permit process of the specific properties, additional calculations should be performed to optimize the unit sound ratings depending on the house model and the installation location.

2. The resulting sound levels due to residential air conditioners at the nearest points-of-reception should not exceed the levels in MECP Publication NPC-216 (a maximum sound level of 50 dBA[11] at the neighbour's closest point(s) of reception, i.e. at their outdoor areas as well as at the closest window on any floor level).

3. The siting of the split-system central air conditioning units and other systems should follow good planning principles.

4. Should location of the outdoor air conditioner unit be in the back or side yard areas where noise is likely to interfere with the outdoor and indoor activities of any occupant and/or neighbor, then it is necessary to design and install noise control measures. Noise control measures include any or a combination of the following:

   a. Distance setback away from the receptor(s).
   b. Sound barrier wall(s) or ultimately an acoustic enclosure.
   c. Sealing selected windows, i.e. installation of non-operable windows.
   d. Deleting selected windows.

   It is also our recommendation that the necessary detailed technical analysis be performed prior to submitting an application for Building Permit to optimize the required air conditioning unit Sound Rating number in order to meet the Provincial sound level standards at the

[11] Or the lowest hourly ambient Leq due to road traffic projected at the receptor location(s)

closest receptors after taking into consideration the specific property design and proposed A/C unit location. Other A/C noise control measures, where required to meet the sound level criteria at the point(s) of reception, should also be identified and shown on the applicable permit drawings/specifications.

Indoor Sound Levels

While the control of the indoor noise created by the air conditioning equipment is not the direct subject of this study, it is important that the selected and designed air conditioning systems achieve indoor sound levels that meet the OBC/ASHRAE criteria and be at least 5dB lower than the Ministry of the Environment, Conservation and Parks recommended indoor sound level criteria included in Section 3.0 of this study.

4.6 STATIONARY SOURCES OF NOISE EXTERNAL TO THE PROPOSED DEVELOPMENT

1. Introduction

Church HVAC:

The proposed development is located to the north and the east of the existing Immanuel Christian Reformed Church. This facility doubles as an elementary school on weekdays.

The primary concern is the potential impact of the HVAC equipment (air conditioners, exhaust fans, etc.) located on the roof of the Church on the future development.

Railway Coupling Activity:

The proposed development is directly west of the existing O.R.D.C. railway line. At this location there is one main track and two spur lines.

A primary concern is the potential impact of coupling and decoupling noise from trains leaving, retrieving, or reordering cars by using the spur lines. These actions create impulse noises.

Railway Engine Idling Activity:

Another primary concern with the O.R.D.C. railway line is the potential impact of locomotives or track repair equipment idling. Several pieces of track repair equipment are stored on the most easterly spur line.

2. Description of the Sources of Stationary Noise

Church HVAC:

For the purpose of this study, the HVAC noise sources have been divided into two groups. The first group is comprised of 3 HVAC machines located on the north roof of the building. The second group is comprised of 4 HVAC machines located on the south roof of the building. It is worth noting that the south roof features an existing 2m acoustic barrier.

Figure 4 shows the location of the subject stationary sources of noise. The photographs in Appendix C show the HVAC equipment as well as the acoustic barrier located on the south roof.

Railway Coupling Activity:

To assess the frequency of impulse events from coupling activity on the O.R.D.C. tracks SSWA performed a continuous video monitoring session (using 2 independent video recording devices) which was a week in duration. From the video produced from this session SSWA has determined that the maximum number of couplings that occurs in any given hour is 2. During these coupling events several impulses may be produced. In order to be conservative the possibility of 5 or 6 impulses in an hour is considered as the worst case scenario.

Railway Engine Idling Activity:

During the video monitoring session several instances of engine idling were observed. These events included the idling of locomotives during track switches and reordering of cars as well as idling of the track repair equipment which covered a period of several hours.

3. Points of Reception

Figure 5 shows the location of the subject receptors.

Church HVAC:

For the purposes of this study the noise impact was considered at the future face of the proposed residential structures of the development. The north roof group of HVAC equipment was evaluated at POR 1 (a future low density residential unit north of the church). The south roof group of HVAC equipment was evaluated at POR 2 (a future low density residential unit east of the church).

Railway Coupling Activity & Railway Engine Idling Activity:

For the purposes of this study the noise impact was evaluated at the future façade of the proposed residential structures of the development. Both coupling activity and idling activity were evaluated at POR 3 (a future residential unit in the center of the east edge of the proposed development).

4. Description of the Sources of Ambient / Background Noise and Operational Data

Equally important for stationary noise assessment is to consider the existing prevailing ambient due to traffic at the receptor of concern in accordance with the requirements in MECP NPC-300.

Figure 5 shows the relative location of the receptors with respect to the sources of ambient noise. Appendix C contains the relevant traffic data of the roads and other sources of noise which establish the ambient noise in the subject area.

5. Measurement Equipment

The attended sound level measurements were performed using the following equipment:

- Rion NA-28, Type 1 Precision Integrating Sound Level Meter and Real Time Frequency Analyzer fitted with 1/1 & 1/3 Octave Bands filters and a 1/2" condenser microphones c/w windscreen.
- Rion NL-22, Type 1 and Type 2 Integrating Sound Level Meter fitted with 1/2" condenser microphone, a preamplifier and a windscreen.
- NTi XL2 Precision Integrating Sound and Vibration Level Meter and Real Time Frequency Analyzer fitted with Narrow Bands, 1/1 & 1/3 Octave Bands filters and a 1/2" condenser microphones c/w windscreen.
- Piccolo Integrating Sound Level Meter & Data Logger, Type 2. SoftdB.
- Bruel & Kjaer Precision Calibrator Model B&K 4231.

The unattended sound level measurements were performed using the following equipment:

- Rion NA-28, Type 1 Precision Integrating Sound Level Meter and Real Time Frequency Analyzer fitted with 1/1 & 1/3 Octave Bands filters and a 1/2" condenser microphones c/w windscreen.
- Rion NL-22, Type 1 and Type 2 Integrating Sound Level Meter fitted with 1/2" condenser microphone, a preamplifier and a windscreen.
- NTi XL2 Precision Integrating Sound and Vibration Level Meter and Real Time Frequency Analyzer fitted with Narrow Bands, 1/1 & 1/3 Octave Bands filters and a 1/2" condenser microphones c/w windscreen.
- Piccolo Integrating Sound Level Meter & Data Logger, Type 2. SoftdB.

The equipment was contained in weather-protected environmental casings with

the microphones mounted on extension booms.

The sound level measurement procedures were primarily based on the Ministry of Environment procedures in their Publication NPC-103 “Procedures” included in the Model Municipal Noise Control by-Law, the recommendations of the instrument manufactures and the best engineering practices to suit site specific conditions. The sound level meters were checked and calibrated before, during and following completion of the measurement sessions without any appreciable change in the sound levels.

The weather conditions during the measurement sessions were favourable for measurements as the local wind speed did not exceed 30 km/hr and there was no precipitation.

Appendix D contains sample stationary sound level measurements.

6. Established Stationary Source Sound Levels

Church HVAC:

Based on the foregoing measured sound levels, and using the sound calculation model outlined in the following sub-section, it is our finding that the following sound levels exist at the Points of Reception:

- POR 1: 44 dBA day, 41dBA night
- POR 2: 47 dBA day, 44 dBA night

Railway Coupling Activity:

During the video monitoring session, simultaneous sound level measurements were conducted at an equivalent location to POR3. It is our finding that the following level exists at the relevant Point of Reception:

- POR 3: 71 dBAi[12] day, no events during night

A frequency spectrum model of railway coupling activity, developed from previous measurements by SSWA was used to produce a typical sound level pattern for railway coupling activity at 71 dBAi. This frequency noise model was used in the sound level prediction model to determine compliance with the impulse noise regulations and for barrier height predictions.

Railway Engine Idling Activity:

[12] This figure includes a 3dBA adjustment penalty to ensure a conservative conversion from dBA to dBAi

During the video monitoring session simultaneous sound level measurements were conducted at an equivalent location to POR3. It is our finding that the following level exists at the relevant Point of Reception:

- POR 3: 57 dBA day, N/A night – Maximum Hourly Leq Measured

7. Sound Level Calculations Model

A 3-D computer program[13] for multiple point and line sources and multiple receivers developed by SS Wilson Associates was used to calculate the sound levels. The program takes into account:

- Reference sound levels and reference distances for the equipment working in each area of the subject development, i.e. sound emission levels.
- The Cartesian co-ordinates (x, y & z) of all sources and receivers.
- The number of events or occurrences of the noise in a given time period and the time period of each event.
- Spherical divergence factor.
- Additional attenuation due to sound barriers; natural or man-made types.
- Additional attenuation due to ground (as modified by sources/receiver elevations, the presence of intervening barriers and the type of ground).
- Atmospheric attenuation due to air molecular absorption.

8. Established Ambient Sound Levels

The established sound levels at the points of reception were below the MECP exclusion limits for noise sensitivity. Therefore, it was unnecessary to determine the established ambient sound level at POR1 and POR2 as the HVAC noise sources being evaluated at these locations are compliant based on these exclusion limits.

9. Impact Assessment and Findings

The acoustic assessment of the stationary noise at the points of receptions can be summarized as follows:

[13] The model used by SSWA to predict the sound levels due to Stationary Sources in this report is a proprietary prediction spreadsheet program developed by SSWA and is primarily based on the ISO 9613-2 publication recognized by the MECP as an acceptable method for sound level predictions.

Points of Reception ID	Points of Reception Description	Sound Level at POR Leq(1h)	Noise Requirement at POR Leq(1h)	Compliance with Noise Requirement
POR 1	*Future House to North of Church*	43.5 dBA Day 40.5 dBA Night	50dBA Day 45dBA Night	***Yes***
POR 2	*Future House to East of Church*	46.5 dBA Day 43.5 dBA Night	50dBA Day 45dBA Night	***Yes***
POR 3 (Impulse)	*Future House on East end of Development*	71 dBAi Day No Cases - Night	60 dBAi Day 55 dBAi Night	***No***
POR 3 (1 hr Leq)	*Future House on East end of Development*	57 dBA Day No Cases - Night	60dBA Day 45dBA Night	***Yes***

Appendix D includes sample calculation sheets of impact assessment.

Figure 6 shows the hourly and daily sound level measurements for the entire measurement period. In this figure the times of rail activity events, as determined from the video monitoring, have been highlighted.

10. Mitigation Measures

Points of Reception ID	Barrier Height (m)	Sound Level at POR 3 Leq(1h) with barrier	Exclusion Limit at POR 3 Leq(1h)	Compliance with Exclusion Limits
POR3 (Impulse)	4.4m (2.4m barrier, 2.0m berm)	60dBAi No Cases - Night	60 dBAi Day 55 dBAi Night	***Yes***

Figure 3 shows the schematic barrier alignment.

4.7 Important Notes for the Residential Builder Regarding Windows

The results in this report provide information on the calculated Acoustic Insulation Factors (AIF) for windows based on typical assumed window and room dimensions.

To assist the Builder in appreciating the fact of whether the results presented herein require typical commercially available residential type windows, or special type windows, the following table[14] provides reasonably accurate information on whether such window(s) are standard industry window or not:

[14] Based on a typical commercially available glazing: 3mm inside pane, 16mm inter-pane air space & 3mm exterior pane.

Acoustic Insulation Factor (AIF) in this report	35	34	33	32	31	30	29	28	27	26
Window to room floor area percentage NOT to be exceeded	10%	13%	16%	20%	25%	32%	40%	50%	63%	80%

If the above ratios are exceeded, several options are available to the builder including one or more of: reducing the size of the window, increasing the inter-pane air spacing, the use of thicker glazing, the use of "laminated" glazing (1 or 2 panes), etc.

WORKED EXAMPLE 1:

- AIF shown in this study: 31
- Actual room floor area: 250 sq.ft.
- You selected a window area of: 45 sq.ft
- Your window/floor ratio: (45 divided by 250, then times 100) =18%
- Your result is less than above table value 25%; i.e. standard glazing unit

WORKED EXAMPLE 2:

- AIF shown in this study: 34
- Actual room floor area: 200 sq.ft.
- You selected a window area of: 50 sq.ft
- Your window/floor ratio: (50 divided by 200, then times 100) =25%
- Your result is more than above table value 13%; i.e. Non-standard (special) glazing unit

4.8 Abbreviations

Basic Descriptor	Measurement Weighting	Time Weighting Characteristics **F**(Fast). **S**(Slow). **I**(Impulse).
L_p Sound pressure level	A-Weighted sound pressure level	L_{AF}, L_{AS}, L_{AI}
	C-Weighted sound pressure level	L_{CF}, L_{CS}, L_{CI}
	Z-Weighted sound pressure level(Flat)	L_{ZF}, L_{ZS}, L_{ZI}
L_{eq} Equivalent continuous sound level	Equivalent continuous A-weighted sound level	L_{Aeq}, L_{AIeq}
	Equivalent continuous C-weighted sound level	L_{Ceq}, L_{CIeq}
	Equivalent continuous Z-weighted(Flat) sound level	L_{Zeq}, L_{ZIeq}
L_E Sound Exposure Level	A-Weighted sound exposure Level	L_{AE}, L_{AIE}
	C-Weighted sound exposure Level	L_{CE}, L_{CIE}
	Z-Weighted sound exposure Level(Flat)	L_{ZE}, L_{ZIE}
L_{max}, L_{min} Maximum Sound Level	Maximum A-weighted sound level	L_{AFmax}, L_{ASmax}, L_{AImax}
	Maximum C-weighted sound level	L_{CFmax}, L_{CSmax}, L_{CImax}
	Maximum Z- weighted sound level(Flat)	L_{ZFmax}, L_{ZSmax}, L_{ZImax}
L_N Percentile Sound Level	Percentile A-weighted sound level	L_{AFNn}, L_{ASN}, L_{AIN}
	Percentile C-weighted sound level	L_{CFNn}, L_{CSN}, L_{CIN}
	Percentile Z-weighted sound level(Flat)	L_{ZFNn}, L_{ZSN}, L_{ZIN}
L_{peak} Peak Sound Level	A-Weighted peak sound level	L_{Apeak}
	C-Weighted peak sound level	L_{Cpeak}
	Z-Weighted peak sound level(Flat)	L_{Zpeak}

TABLES

TABLE 1

SUMMARY OF MINIMUM REQUIRED NOISE CONTROL MEASURES

LOTS	SOUND BARRIER	CENTRAL AIR CONDITIONING	PROVISION FOR CENTRAL AIR CONDITIONING	WARNING CLAUSE
84 and 85	No	No	Yes	Yes
113 and 114	No	No	Yes	Yes
134 to 137	No	No	Yes	Yes
156	No	No	Yes	Yes
157 to 164	No	Yes	--	Yes
165 to 167	No	No	Yes	Yes
168 and 169	No	Yes	--	Yes
170 to 182	Yes	Yes	--	Yes
183 to 199	No	Yes	--	Yes
BL-204 (Park)	No	--	--	--
BL-205	Yes	--	--	--
All Other Lots	No	No	No	No

N6 Leq-AIF Master-January 2007 Proceed

SS WILSON ASSOCIATES

12/04/2019 10:13

Leq- AIF CALCULATIONS AND TYPICAL WINDOW GLAZING REQUIREMENTS (Using NRC/MOE Pocedure)

File Number :

Project Name :

WA16-040

2650 Mayfield Rd W, Brampton

OUTDOORS

Table 2

Any Heavy Rail Line ?	Yes
Appropriate adjustment will be applied to the Acoustic Insulation Factor to account for their	

Record Number	1	2	3	4	5	6	7	8	9	10	11	12
Consider Record	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N
LOT NO.	169	170	175	181	190	Bl-200 Park						
FACE/ DIRECTION	West	South-West	South	East	East	Centre						
LOCATION	Outdoor Living Area	Outdoor Living Area	Outdoor Living Area	Outdoor Living Area	Outdoor Living Area	Common OLA						
Source 1: Mayfield Road	**Road Traffic**		**OUTDOOR DAYTIME LEVELS**			OUTDOOR DAYTIME LEVELS			OUTDOOR DAYTIME LEVELS			
Leq Outdoors	58.00	67.00	69.00	58.00	46.00	42.00						
Partial angle of exposure, degrees	180	180	180	180	180	180						
Partial exposure adjust., dB												
Additional Adjustment, dB	-2.00	-8.00	-10.00	-2.00								
Additional Adjustment, dB												
Sub-Total Leq, dBA	**56.00**	**59.00**	**59.00**	**56.00**	**46.00**	**42.00**						
Source 2: O.R.D.C.	**Rail Traffic**		**OUTDOOR DAYTIME LEVELS**			OUTDOOR DAYTIME LEVELS			OUTDOOR DAYTIME LEVELS			
Leq Daytime			44.00		50.00							
Partial angle of exposure, degrees	180	180	180	180	180	180						
Partial exposure adjust., dB												
Additional Adjustment, dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA			**44.00**		**50.00**							
Source 3:	**Road Traffic**		**OUTDOOR DAYTIME LEVELS**			OUTDOOR DAYTIME LEVELS			OUTDOOR DAYTIME LEVELS			
Leq Daytime												
Partial angle of exposure, degrees	180	180	180	180	180	180						
Partial exposure adjust., dB												
Additional Adjustment, dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Source 4:	**Road Traffic**		**OUTDOOR DAYTIME LEVELS**			OUTDOOR DAYTIME LEVELS			OUTDOOR DAYTIME LEVELS			
Leq Daytime												
Partial angle of exposure, degrees	180	180	180	180	180	180						
Partial exposure adjust., dB												
Additional Adjustment, dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Sub-Tot. 4 Sources Leq, dBA	**56.00**	**59.00**	**59.14**	**56.00**	**51.46**	**42.00**						
Aircraft noise NEF/NEP												
Adjust.1												
Adjust.2												
Adjusted NEF/NEP												
Approx. Overall Combined Leq	*56*	*59*	*59*	*56*	*51*	*42*						
Overall Road and/or Rail and/or Stationary Sources, Leq (dBA)	***56***	***59***	***59***	***56***	***51***	***42***						
Aircraft Noise Only, NEF												
NOTES	Attenuation from Barrier on Lot 168	3.0m High Sound Barrier	3.6m High Barrier + Berm Combinatio	Attenuation from Barrier on Lot 178	No Barrier Required	No Barrier Required						

N6 Leq-AIF Master-January 2007 Proceed

05/04/2019 15:23

File Number :

Project Name :

WA16-040

2650 Mayfield Rd, Brampton

SS WILSON ASSOCIATES

Leq- AIF CALCULATIONS AND TYPICAL WINDOW GLAZING REQUIREMENTS

DAYTIME

Table 3

(Using NRC/MOE Pocedures)

Caution: , the AIF Reported for heavy Rail Noise is the Higher of day and night

Record Number	1	2	3	4	5	6	7	8	9	10	11	12
Consider Record	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N
LOT NO.	157	168	169	175	190	197						
FACE/ DIRECTION	South-East	West	West	South	East	East						
LOCATION	Building Façade	Building Façade	Building Façade	Building Façade	Building Façade	Building Façade						
ROOM CLASSIFICATION	Living / Dining	Living / Dining	Living / Dining	Living / Dining	Living / Dining	Living / Dining						
Adjustm. to Criterion, dBA												
MOE Transportation Sources Daytime Leq Indoor Criteria, dBA	45	45	45	45	45	45						
Aircraft Indoor Criteria, NEF	5	5	5	5	5	5						
Source 1: Mayfield Road	**Road Traffic**		**DAYTIME LEVELS**			DAYTIME LEVELS			DAYTIME LEVELS			
Leq Daytime	63.00	57.00	58.00	69.00	50.00							
Partial angle of exposure, degrees	180	180	180	180	180	180						
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA	**63.00**	**57.00**	**58.00**	**69.00**	**50.00**							
Angular range of incidence (0,1,2,3)												
Adjusted AIF	25	19	20	31	12	-38	-38	-38	-38	-38	-38	-38
Source 2: O.R.D.C.	**Rail Traffic**		**DAYTIME LEVELS**			DAYTIME LEVELS			DAYTIME LEVELS			
Leq Daytime	52.00			54.00	61.00	61.00						
Partial angle of exposure, degrees	180	180	180	180	180	180						
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA	**52.00**			**54.00**	**61.00**	**61.00**						
Angular range of incidence (0,1,2,3)												
Adjusted AIF	23	-28	-28	26	32	32	-28	-28	-28	-28	-28	-28
Source 3:	**Road Traffic**		**DAYTIME LEVELS**			DAYTIME LEVELS			DAYTIME LEVELS			
Leq Daytime												
Partial angle of exposure, degrees	180	180	180	180	180	180						
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Angular range of incidence (0,1,2,3)												
Adjusted AIF	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38
Source 4:	**Road Traffic**		**DAYTIME LEVELS**			DAYTIME LEVELS			DAYTIME LEVELS			
Leq Daytime												
Partial angle of exposure, degrees	180	180	180	180	180	180						
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Angular range of incidence (0,1,2,3)												
Adjusted AIF	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38
Sub-Tot. 4 Sources Leq, dBA	**63.33**	**57.00**	**58.00**	**69.14**	**61.33**	**61.00**						
Aircraft noise NEF/NEP												
Adjust.1												
Adjust.2												
Adjusted NEF/NEP												
Approx. Overall Combined Leq	*63*	*57*	*58*	*69*	*61*	*61*						
Assumed Window/ Floor Area %	32.0	32.0	32.0	32.0	32.0	32.0						
Assumed Total # of Components (Road, Rail, and Other Sources)	3	3	3	3	3	3						
Assumed Total # of Components Aircraft ONLY	3	3	3	3	3	3						
AIF of 4 Sources	*27*	*19*	*20*	*32*	*32*	*32*						
Aircraft AIF												
Combined AIF	27	19	20	32	32	32						
Openable or Fixed windows ?	Openable	Openable	Openable	Openable	Openable	Openable						
Regular or Laminated Glass	Regular	Regular	Regular	Laminated	Laminated	Laminated						
Other Adjustment												
Final Adjusted AIF	27	19	20	29	29	29						
Minimum STC (Approx)	*28*	*20*	*21*	*30*	*30*	*30*						
Typical Minimum Double Glazing Alternatives	3(6)3	3(6)3	3(6)3	3(6)6 6(6)5	3(6)6 6(6)5	3(6)6 6(6)5						
NOTES	.....	.....	.....	.....	.....	.....						

SS WILSON ASSOCIATES

SUMMARY TABLE OF **Leq- AIF CALCULATIONS AND TYPICAL WINDOW GLAZING REQUIREMENTS**

DAYTIME

Table 3

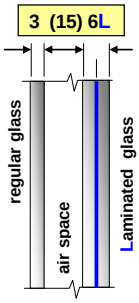
- Windows must be well-fitted weatherstripped units. - The interpane spacing shown in the tables are the minimum acceptable.
- Larger spacing for a given glazing thickness normally improves the performance.

LOT NO.	FACE/ DIRECTION	ROOM CLASSIFICATION	LOCATION	Openable or Fixed Window	Regular Strength or Laminated Glass	Combined AIF	Approx. Overall Combined Leq	Double Glazing Alternatives , mm	Triple Glazing Alternatives , mm	*Minimum STC (Approx)*
157	South-East	Living/Dining	Building Façad	Openable	Regular	27	63	3(6)3		*28*
168	West	Living/Dining	Building Façad	Openable	Regular	19	57	3(6)3		*20*
169	West	Living/Dining	Building Façad	Openable	Regular	20	58	3(6)3		*21*
175	South	Living/Dining	Building Façad	Openable	Laminated	32	69	3(6)6	6(6)5	*30*
190	East	Living/Dining	Building Façad	Openable	Laminated	32	61	3(6)6	6(6)5	*30*
197	East	Living/Dining	Building Façad	Openable	Laminated	32	61	3(6)6	6(6)5	*30*

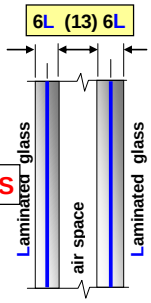
ABBREVIATIONS SPECIFIC TO THIS PROJECT : FF(Front Face), RF(Rear Face), RS(Right Side face), LS(Left Side face)

EXAMPLES

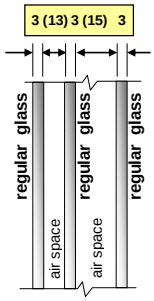
Double Glazing- regular glass



Double Glazing- *single laminated glass*



Double Glazing- *double laminated glass*



Triple Glazing- regular glass

N6 Leq-AIF Master-January 2007 Proceed

SS WILSON ASSOCIATES

05/04/2019 15:26

Leq- AIF CALCULATIONS AND TYPICAL WINDOW GLAZING REQUIREMENTS (Using NRC/MOE Pocedures)

File Number :

Project Name :

WA16-040

NIGHT TIME

Table 4

2650 Mayfield Road, Brampton

Caution: , the AIF Reported for heavy Rail Noise is the Higher of day and night

Record Number	1	2	3	4	5	6	7	8	9	10	11	12
Consider Record	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N
LOT NO.	157	168	169	175	190	197						
FACE/ DIRECTION	South-East	West	West	South	East	East						
LOCATION	Building Façade	Building Façade	Building Façade	Building Façade	Building Façade	Building Façade						
ROOM CLASSIFICATION	Bedroom	Bedroom	Bedroom	Bedroom	Bedroom	Bedroom						
Adjustm. to Criterion, dBA												
MOE Transportation Sources Night Leq Indoor Criteria, dBA	40	40	40	40	40	40						
Aircraft Indoor Criteria, NEF												
Source 1: Mayfield Road	**Road Traffic**		NIGHT TIME LEVELS			NIGHT TIME LEVELS			NIGHT TIME LEVELS			
Leq Night Time	62.00	57.00	58.00	62.00	45.00							
Partial angle of exposure, degrees	180	180	180	180	180	180						
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA	**62.00**	**57.00**	**58.00**	**62.00**	**45.00**							
Angular range of incidence (0,1,2,3)												
Adjusted AIF	29	24	25	29	12	-33	-33	-33	-33	-33	-33	-33
Source 2: O.R.D.C.	**Rail Traffic**		NIGHT TIME LEVELS			NIGHT TIME LEVELS			NIGHT TIME LEVELS			
Leq Night Time	49.00			50.00	61.00	61.00						
Partial angle of exposure, degrees	180	180	180	180	180	180						
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA	**49.00**			**50.00**	**61.00**	**61.00**						
Angular range of incidence (0,1,2,3)												
Adjusted AIF	21	-28	-28	22	33	33	-28	-28	-28	-28	-28	-28
Source 3:	**Road Traffic**		NIGHT TIME LEVELS			NIGHT TIME LEVELS			NIGHT TIME LEVELS			
Leq Night Time												
Partial angle of exposure, degrees	180	180	180	180	180	180						
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Angular range of incidence (0,1,2,3)												
Adjusted AIF	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33
Source 4:	**Road Traffic**		NIGHT TIME LEVELS			NIGHT TIME LEVELS			NIGHT TIME LEVELS			
Leq Night Time												
Partial angle of exposure, degrees	180	180	180	180	180	180						
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Angular range of incidence (0,1,2,3)												
Adjusted AIF	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33
Sub-Tot. 4 Sources Leq, dBA	**62.21**	**57.00**	**58.00**	**62.27**	**61.11**	**61.00**						
Aircraft noise NEF/NEP												
Adjust.1												
Adjust.2												
Adjusted NEF/NEP												
Approx. Overall Combined Leq	*62*	*57*	*58*	*62*	*61*	*61*						
Assumed Window/ Floor Area %	20.0	20.0	20.0	20.0	20.0	20.0						
Assumed Total # of Components (Road, Rail, and Other Sources)	3	3	3	3	3	3						
Assumed Total # of Components Aircraft ONLY	3	3	3	3	3	3						
AIF of 4 Sources	*29*	*24*	*25*	*30*	*33*	*33*						
Aircraft AIF												
Combined AIF	29	24	25	30	33	33						
Openable or Fixed windows ?	Openable	Openable	Openable	Openable	Openable	Openable						
Regular or Laminated Glass	Regular	Regular	Regular	Regular	Laminated	Laminated						
Other Adjustment												
Final Adjusted AIF	29	24	25	30	30	30						
Minimum STC (Approx)	*28*	*23*	*24*	*29*	*29*	*29*						
Typical Minimum Double Glazing Alternatives	3(6)3	3(6)3	3(6)3	3(6)3	3(6)6 6(6)4	3(6)6 6(6)4						
NOTES	....	....	....	....	....	....						

SUMMARY TABLE OF **Leq- AIF CALCULATIONS AND TYPICAL WINDOW GLAZING REQUIREMENTS**

NIGHT TIME

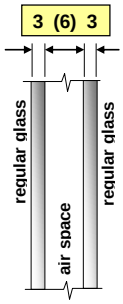
Table 4

- Windows must be well-fitted weatherstripped units. - The interpane spacing shown in the tables are the minimum acceptable.
- Larger spacing for a given glazing thickness normally improves the performance.

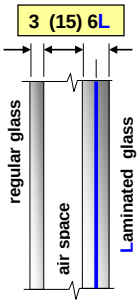
LOT NO.	FACE/ DIRECTION	ROOM CLASSIFICATION	LOCATION	Openable or Fixed Window	Regular Strength or Laminated Glass	Combined AIF	Approx. Overall Combined Leq	Double Glazing Alternatives , mm	Triple Glazing Alternatives , mm	*Minimum STC (Approx)*
157	South-East	Bedroom	Building Façad	Openable	Regular	29	62	3(6)3		*28*
168	West	Bedroom	Building Façad	Openable	Regular	24	57	3(6)3		*23*
169	West	Bedroom	Building Façad	Openable	Regular	25	58	3(6)3		*24*
175	South	Bedroom	Building Façad	Openable	Regular	30	62	3(6)3		*29*
190	East	Bedroom	Building Façad	Openable	Laminated	33	61	3(6)6	6(6)4	*29*
197	East	Bedroom	Building Façad	Openable	Laminated	33	61	3(6)6	6(6)4	*29*

ABBREVIATIONS SPECIFIC TO THIS PROJECT : FF(Front Face), RF(Rear Face), RS(Right Side face), LS(Left Side face)

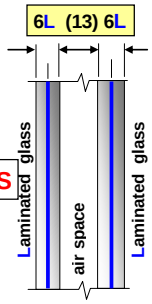
EXAMPLES



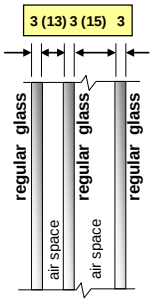
Double Glazing- regular glass



Double Glazing- *single laminated glass*



Double Glazing- *double laminated glass*



Triple Glazing- regular glass

TABLE 5

BARRIER HEIGHTS TO ACHIEVE L_{Aeq} 55 dBA IN OLAs

RECEPTOR	OLA Sound Level Without Barrier, $L_{Aeq(day)}$, dBA	BARRIER HEIGHT, m TO ACHIEVE THE FOLLOWING, $L_{Aeq(day)}$, dBA					
		60	59	58	57	56	55
Lot 170	67	2.8m	3.0m	3.4m	3.8m	4.2m	4.6m
Lot 175	69	3.2m	3.6m	4.0m	4.6m	5.0m	5.6m

FIGURES

FIGURE 1
KEY PLAN

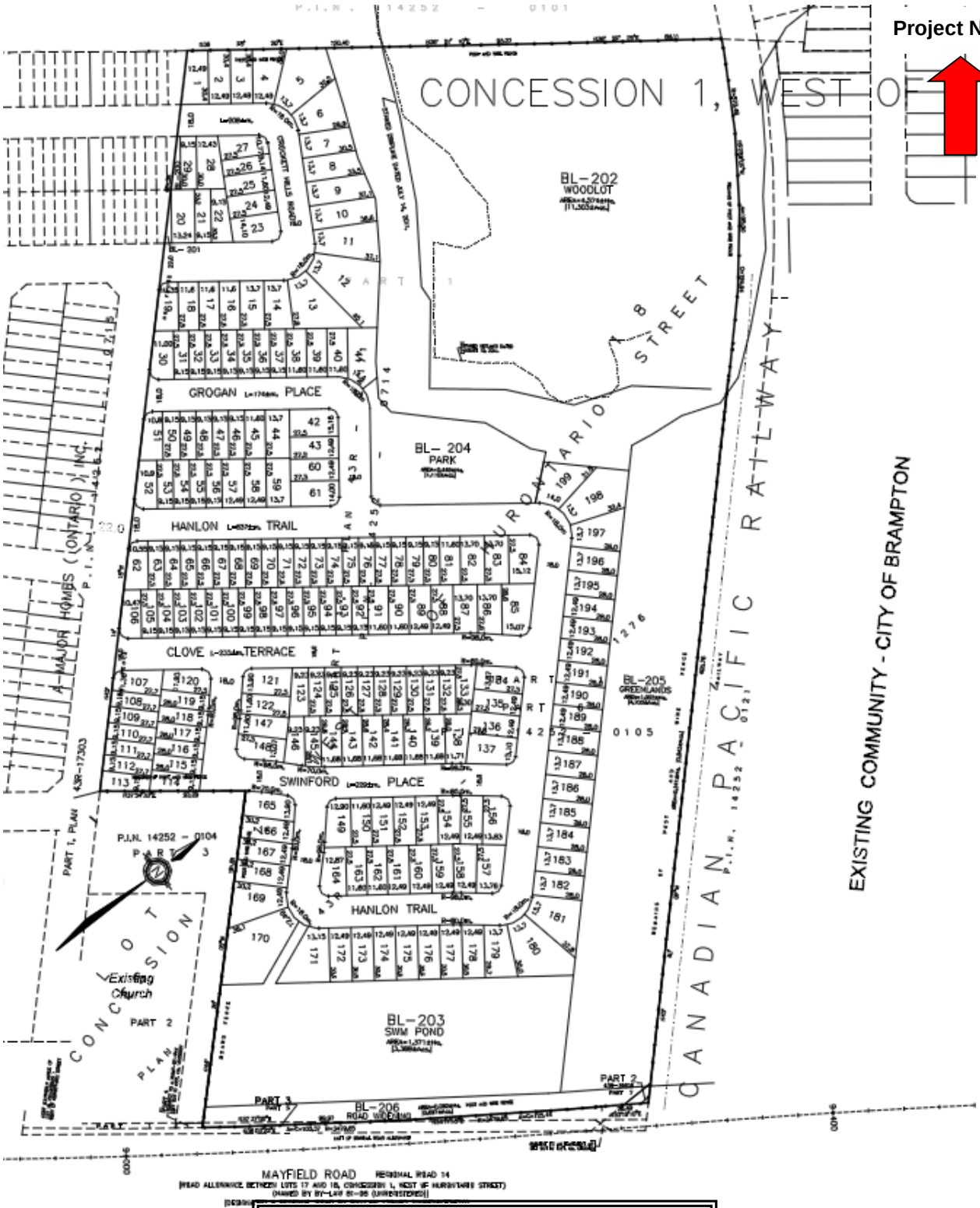


FIGURE 2
DRAFT PLAN OF SUBDIVISION

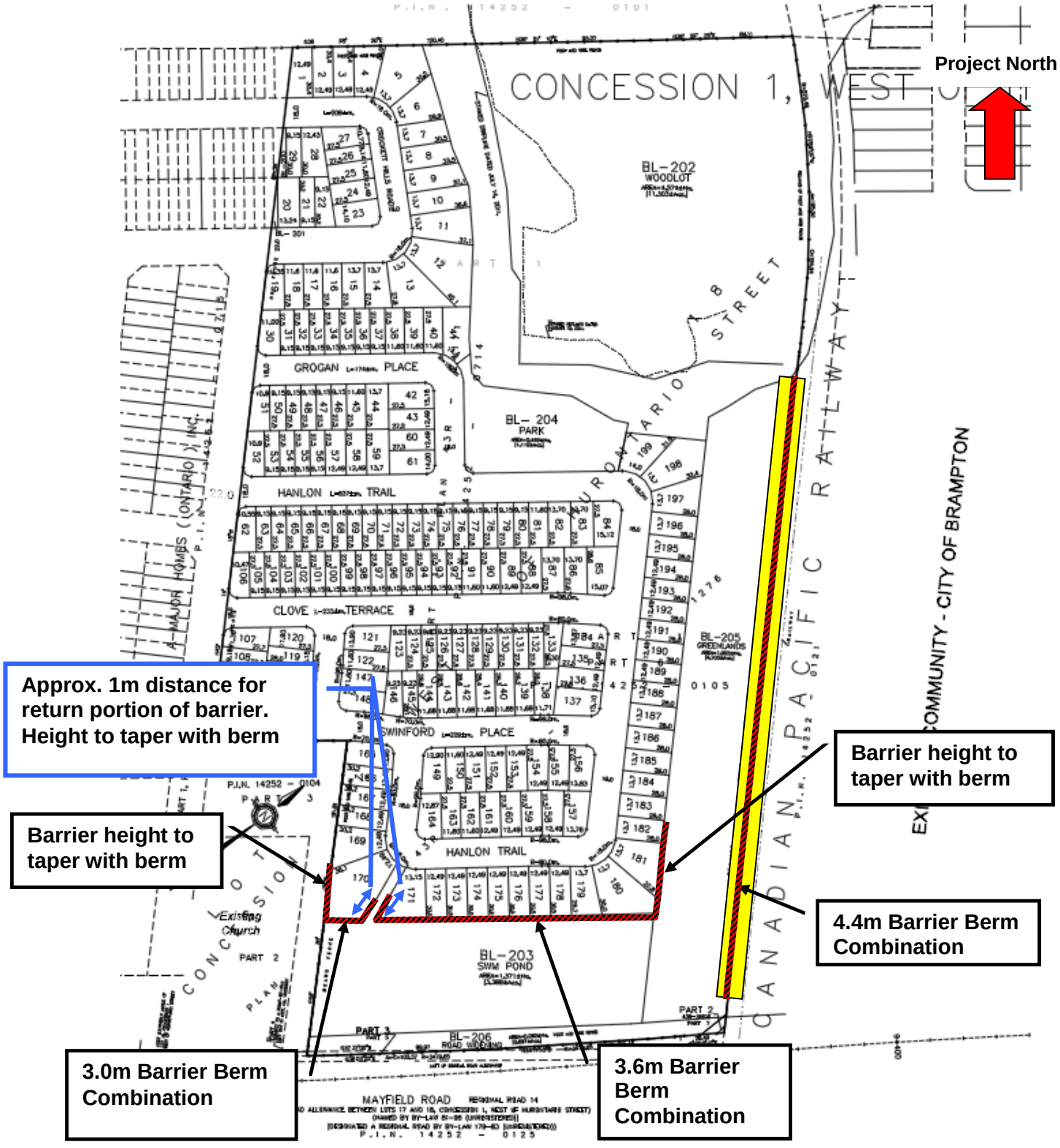


FIGURE 3
SCHEMATIC BARRIER ALIGNMENTS

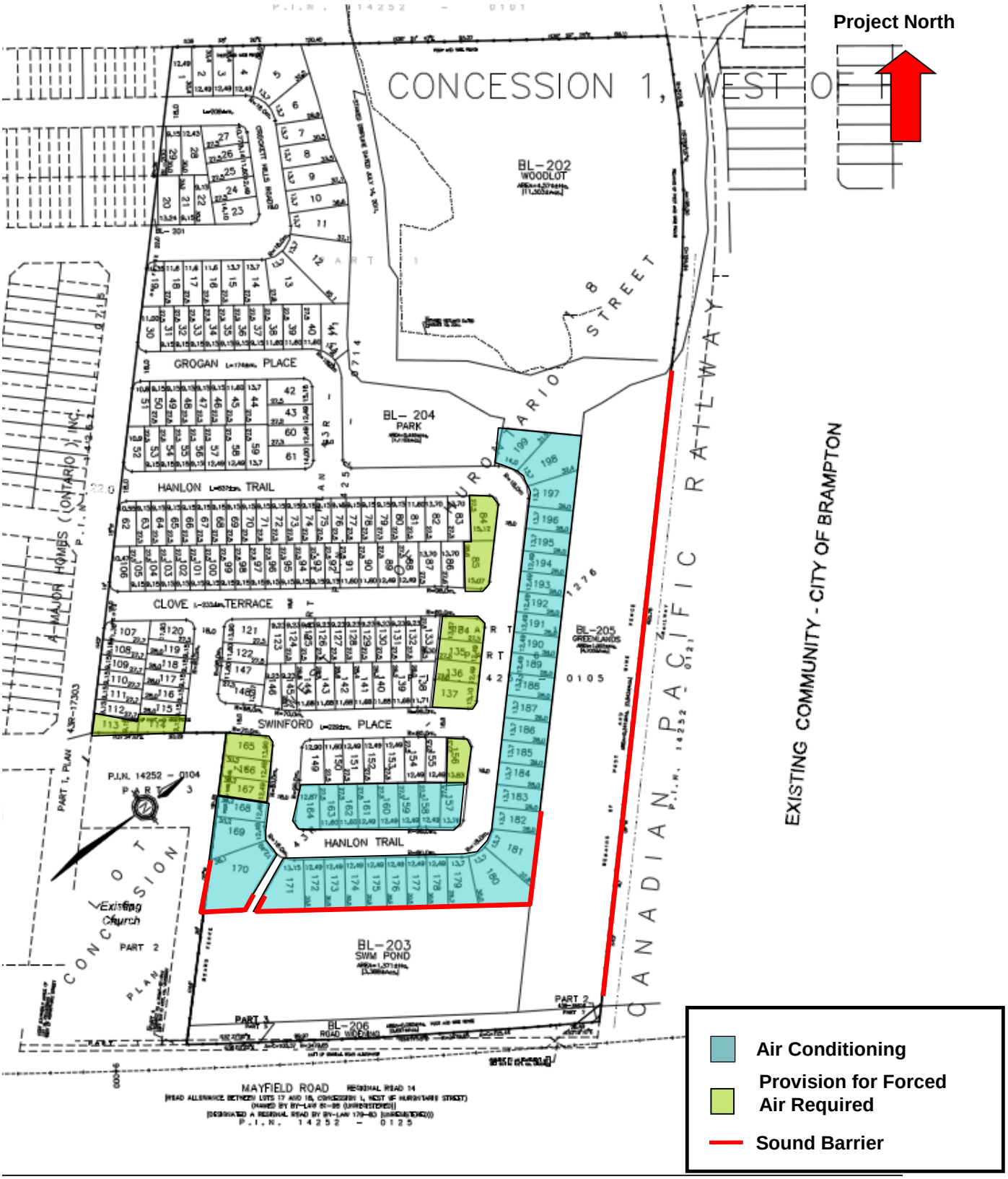


FIGURE 4
SUMMARY OF MINIMUM INDOOR AND OUTDOOR REQUIREMENTS

FIGURE 4
HVAC STATIONARY NOISE SOURCES

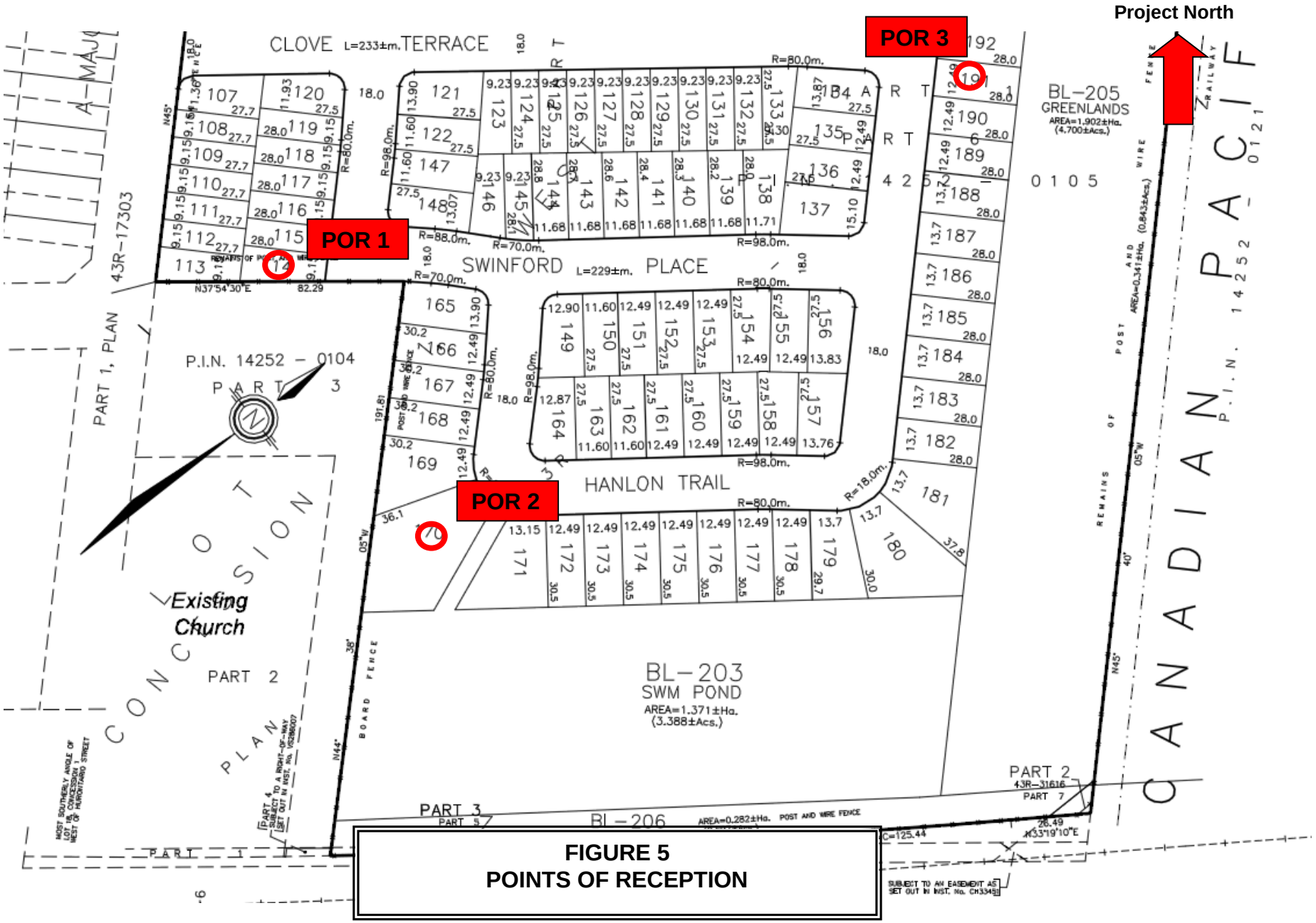


FIGURE 5
POINTS OF RECEPTION

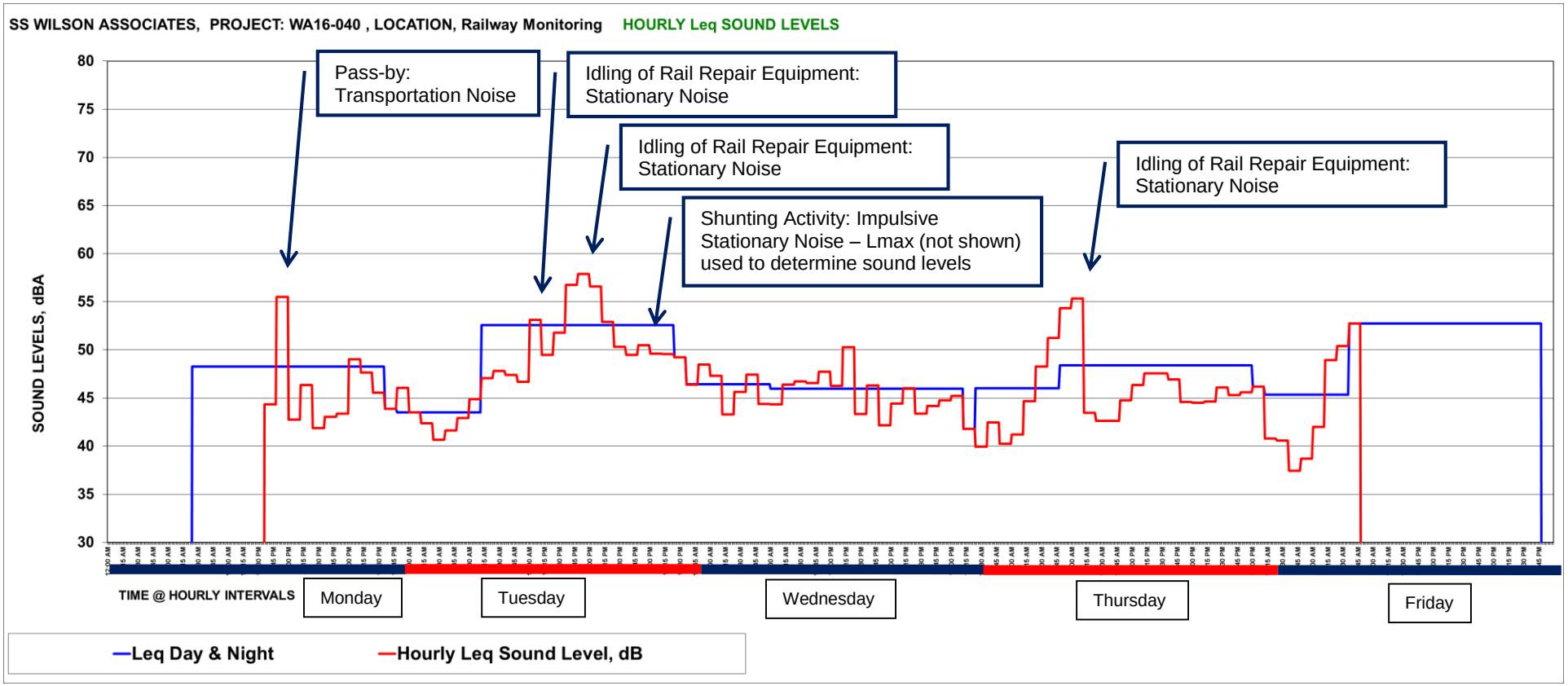


FIGURE 6
Railway Sound Monitoring Results

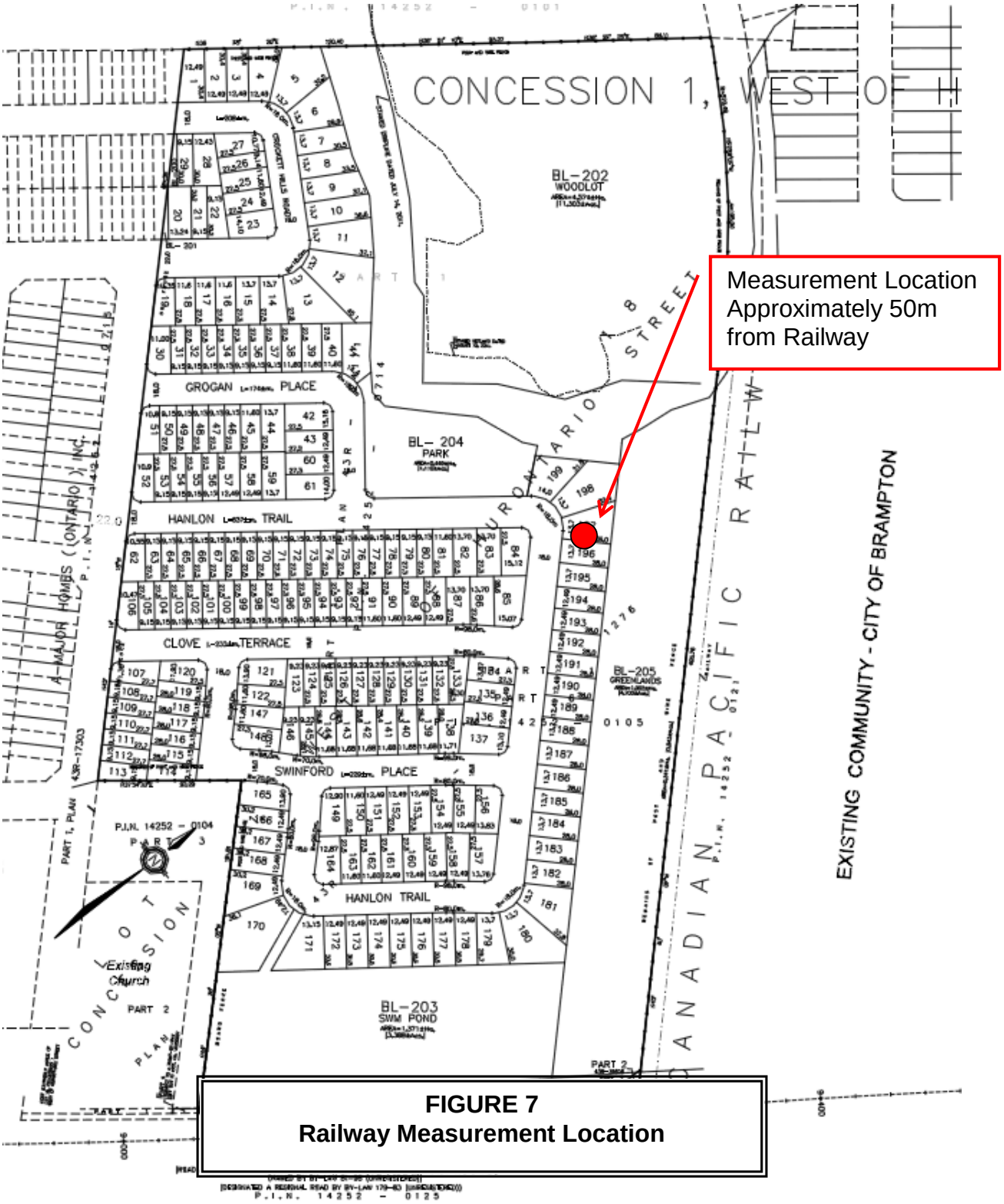


FIGURE 7
Railway Measurement Location

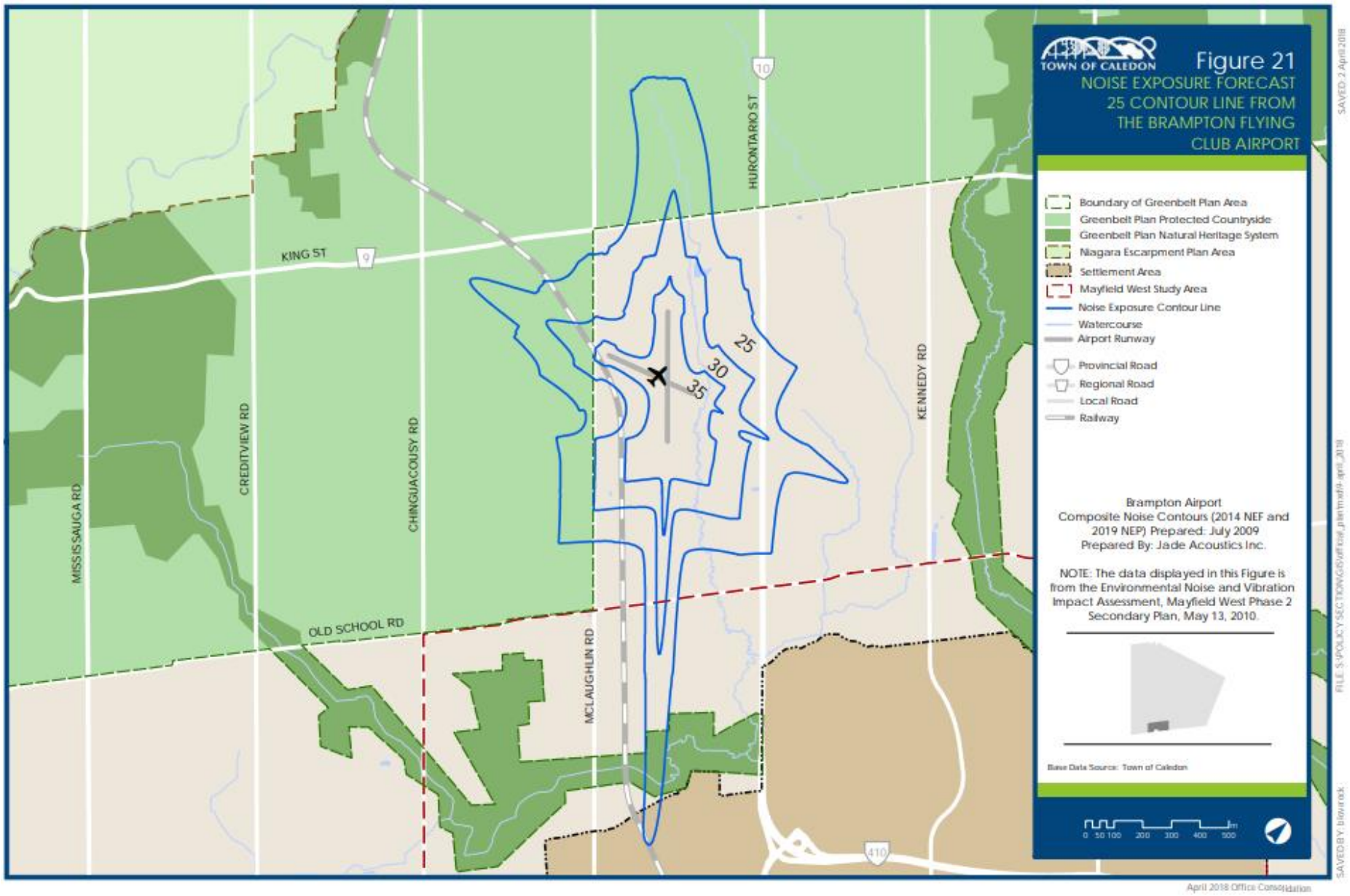


FIGURE 8
The Brampton Flying Club NEF/NEP Noise Contours

APPENDIX A

ROAD TRAFFIC DATA

Region of Peel
Working for you

The Region of Peel is the proud recipient of the National Quality Institute Order of Excellence, Quality; the National Quality Institute Canada Award of Excellence Gold Award, Healthy Workplace; and a 2008 IPAC/Deloitte Public Sector Leadership Gold Award.

March 15, 2019

Cheryl McMurter
SS Wilson Associates

Re: Ultimate Traffic Data Request – 2256 Mayfield Rd

Cheryl:

As per your request, we are providing the following traffic data:

	Existing	Ultimate
24 Hour Traffic Volume	18,158	48,100
# of Lanes	2	6
Day/Night Split	89/11	89/11
Day Trucks (% of Total Volume)	3.3% Medium 3.1% Heavy	3.3% Medium 3.1% Heavy
Night Trucks (% of Total Volume)	3.2% Medium 2.8% Heavy	3.2% Medium 2.8% Heavy
Right-of-Way Width	50 meters	
Posted Speed Limit	80 km/h	

If you require further assistance, please contact me at (905) 791-7800 ext. 8343

Regards,

Viktoriya Zaytseva
Transportation Analyst, Infrastructure Planning & Design
Transportation Division, Public Works, Region of Peel

10 Peel Centre Drive, Suite B, 4th Floor, Brampton, ON, L6T 4B9
E: viktoriya.zaytseva@peelregion.ca • W: 905-791-7800 x4810

Orangeville Railway Development Corp.

87 Broadway
Orangeville, Ontario L9W 1K1

Telephone: (519) 941-0440
Toll-Free: 1-866-941-0440

April 14, 2016

SS Wilson Associates
15 Wertheim Court, Suite 211
Richmond Hill, ON
L4B 3H7

Dear Cheryl McMurter

Re: Confirmation of Rail Traffic Data
Steeles Avenue to Highway 407

The Orangeville Railway Development Corporation is in receipt of your e-mail request for rail traffic information on the Orangeville-Brampton Railway (OBRY). An invoice in the amount of $350.00 (plus HST) will be forwarded to you under separate cover for the administration fee for the information provided.

In response to your request, the following rail traffic data for movements along the OBRY at the above location is being provided to you:

1. The train movements in the vicinity of the location requested comprise entirely of freight movements with an average between 4 and 5 one-way trips per day, to the industries being serviced, during the hours of 07:00 – 23:00; no traffic is scheduled between 23:00 – 07:00 at this time and movements are usually scheduled on Tuesdays and Fridays. However, due to scheduling and testing, night trips and trips on other weekdays have and will occasionally occur. Service could increase to 5 or 6 days per week as efforts are being made to expand OBRY traffic. The Credit Valley Explorer tourist train that originates in Orangeville, operates in off periods, but presently does not travel this far south.

2. The average number of locomotives per trip is one although ORDC may use two on occasion as growth and volumes demand.

3. The average number of cars per train is approximately 8 to 12 per trip.

4. It must be noted that special shunts might be requested by the industries being serviced on days other than those noted above.

5. The maximum speed of each train is 25 mph. There are no welded rails along this stretch of line (jointed track only).

O. R. D. C.

6. Steeles Avenue is a whistle stop.

7. The right-of-way width varies in this location but is typically 20 metres or 66 feet.

8. There is one (1) track in this location located in the centre of the right-of-way.

Should you have any further questions, please call Tony Dulisse toll free at 1-866-941-0440, extension 2248 or by e-mail at tdulisse@orangeville.ca.

Yours truly,

Nancy Tuckett, MSc., Pl., BEd., MCIP, RPP
General Manager

/td

Copy: P. Gorski,OBRAG

SS Wilson Associates

From: Tony Dulisse <tdulisse@orangeville.ca>
Sent: April-05-19 9:51 AM
To: SS Wilson Associates
Cc: Lori Szarmes
Subject: RE: Updated Rail Request - SSWA File No. WA16-040

Good morning Cheryl. Apologies for the delay in responding.

I can confirm that the data from 2016 is still valid. You can proceed with the study on that basis. Please note that the tracks north of Mayfield are paramount for train activities. The tracks are used regularly for freight train/car shunting and the Credit Valley Explorer tourist train operations. Operations at the south end of the runaround track activate and initiate the signals at the Mayfield crossing. Due to the starting/stopping and forward and reverse activities, there may be greater noise levels experienced by the future residents of the homes in that area.

Mayfield Road Crossing is also a whistle stop crossing but will be changed to a gated crossing when the Region widens Mayfield Road to multiple lanes in the near future. Your analysis should reflect that additional traffic. See attached illustrating multiple tracks and shutting activities.

Tony Dulisse, CET | Transportation and Development Technologist | Infrastructure Services-ORDC
Town of Orangeville | 87 Broadway| Orangeville, ON L9W 1K1
Office Number- 519-941-0440 Ext. 2248 | Toll Free 1-866-941-0440 Ext. 2248 | Cell: 519-942-6885
tdulisse@orangeville.ca | www.orangeville.ca

Connect with the Town of Orangeville online!

APPENDIX B

SAMPLE TRANSPORTATION SOUND LEVEL CALCULATIONS

STAMSON 5.0 NORMAL REPORT Date: 03-07-2019 13:59:25
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 175ola.te Time Period: Day/Night 16/8 hours
Description: Lot 175 OLA Calculation

Road data, segment # 1: Mayfield E (day/night)

Car traffic volume : 20035/2476 veh/TimePeriod *
Medium truck volume : 706/87 veh/TimePeriod *
Heavy truck volume : 664/82 veh/TimePeriod *
Posted speed limit : 90 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 24050
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 3.30
Heavy Truck % of Total Volume : 3.10
Day (16 hrs) % of Total Volume : 89.00

Data for Segment # 1: Mayfield E (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 105.00 / 100.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 20035/2476 veh/TimePeriod *
Medium truck volume : 706/87 veh/TimePeriod *
Heavy truck volume : 664/82 veh/TimePeriod *
Posted speed limit : 90 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 24050
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 3.30
Heavy Truck % of Total Volume : 3.10
Day (16 hrs) % of Total Volume : 89.00

Data for Segment # 2: Mayfield W (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 95.00 / 15.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Mayfield E (day)

Source height = 1.33 m

ROAD (0.00 + 65.50 + 0.00) = 65.50 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	73.95	0.00	-8.45	0.00	0.00	0.00	0.00	65.50

Segment Leq : 65.50 dBA

Results segment # 2: Mayfield W (day)

Source height = 1.33 m

ROAD (0.00 + 65.93 + 0.00) = 65.93 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	73.95	0.00	-8.02	0.00	0.00	0.00	0.00	65.93

Segment Leq : 65.93 dBA

Total Leq All Segments: 68.73 dBA

Results segment # 1: Mayfield E (night)

Source height = 1.33 m

ROAD (0.00 + 59.63 + 0.00) = 59.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	67.87	0.00	-8.24	0.00	0.00	0.00	0.00	59.63

Segment Leq : 59.63 dBA

Results segment # 2: Mayfield W (night)

Source height = 1.33 m

ROAD (0.00 + 67.87 + 0.00) = 67.87 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	67.87	0.00	0.00	0.00	0.00	0.00	0.00	67.87

Segment Leq : 67.87 dBA

Total Leq All Segments: 68.48 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 68.73
(NIGHT): 68.48

SS WILSON ASSOCIATES -*Consulting Engineers*, Richmond Hill, Ontario Revised June 8

RAIL TRAFFIC NOISE PREDICTION MODEL

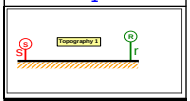
BASED ON MOE STEAM/ORNAMENT

PROJECT NAME: 2650 Mayfield Rd W.

City of Brampton

Name(s) of Rail Lines:	Spur Line	
Receptor Name:	Lot 173	
SSWA Project Number:	WA16-040	Comments Text
Purpose of Calculation	OLA	IMPORTANT: TURN WHISTLE OFF

DO NOT COPY AND PASTE CELLS UNLESS YOU PASTE "VALUES" ONLY

Include the following Segments ? (No=0 or Yes=1)	1			0		
Rail Name & Direction	Spur Line			Rail line name, train type, etc		
Rail/Segment Number or Other Data	1			1		
Segment Source of Noise	Locomo	Whistle	Wheels	Locomo	Whistle	Wheels
IMPORTANT: TURN WHISTLE OFF	Yes	No	Yes	Yes	No	Yes
MOE Topographic Case (1-11)-See Instructions	1			1		
						
	S and R on flat ground			S and R on flat ground		
Traffic Data Calculation Period *(24Hrs or 16/8 d/n or 1 Hr)*	Day/Night			Day/Night		
Intermediate Surface; Absorptive or Reflective	Absorptive			Absorptive		
Absorptive Alpha Override; Manual or Auto	Manual			Automatic		
Manual Alpha (if Cell is Blank, do not change, otherwise, input your choice for α)	Input Alpha α from 0.0 to 0.66: 0.33					
Measured Angle Case Number	1			1		
Angle description	-θ1 Left & +θ2 Right			-θ1 Left & +θ2 Right		
Angle Theta θ1	-10			-90		
Angle Theta θ2	60			90		
Angle Theta Error Detection Flag						
Subtended Angle (Angle of Exposure), °	70			180		
Number of Locomotives per train	2			1		
Number of cars per train	12			100		
Number of Trains in 24 Hrs.						
Hourly Number of Trains in 1 Hour						
Number of Daytime Trains 07:00 to 23:00.	6			16		
Number of Night Trains 23:00 to 07:00	1			8		
% increase / year	2.50%			0.00%		
Number of years	10			0		
Future Number of Trains in 24 Hrs.						
Future Hourly Number of Trains in 1 Hour						
Future Number of Daytime Trains 07:00 to 23:0	8			16		
Future Number of Nighttime Trains 23:00 to 07:	1			8		
Posted Speed (Km/Hr) [S]	40			80		
Wood Depth (m)	0			0		
Day time Receiver Height,m [RH] (For 24 Hrs. & Hourly also)	1.5			1.5		
Nighttime Reciever Height (m) [NRH]	4.5			4.5		
Source-Receiver Distance [SRD]	145			15		
Nighttime Source-Receiver Distance [NSRD]	145			15		
Barrier Height (m) [BH]	0			0		
Barrier-Receiver Distance (m)	1			1		
Barrier Receiver Distance Error Flag						
Ground Elevation Difference (m) [e]	0			0		
Source Ground Elevation (m)	0			0		
Receiver Ground Elevation (m)	0			0		
Barrier Ground Elevation (m)	0			0		
Include Effect of Dense Woods?	No			No		
Number of Rows of Houses	0			0		
Nighttime Number of Rows of Houses	0			0		
Percentage of Row Occupied by Houses (??%)	80%			80%		
Height of Row of House [HH]	7			7		
Do you want to change the model frequency?	N			N		
Input your Choice of frequency						
Dominant Octave Frequency Band (Hz) [F]	500	500	500	500	500	500
For Wheel noise ONLY: Enter a factor of -5 dB for Continously Welded Rail (CWR) and +5 dB for Trestles as applicable						
Day Time [16 hours] Additional dBA Correction Factor- Specify	0 Text	0 Text	0 Text	0 Text	0 Text	0 Text
Night Time [8 hours] Additional dBA Correction Factor- Specify	0 Text	0 Text	0 Text	0 Text	0 Text	0 Text
N/A	0 Text	0 Text	0 Text	0 Text	0 Text	0 Text
N/A	0 Text	0 Text	0 Text	0 Text	0 Text	0 Text

RESULTS FOR SEGMENTS

Daytime [16 hours] Segment Leq_{16}	43.7	-50.0
Nighttime [8 hours] Segment Leq_{8}	38.9	-50.0
24 Hour Daily Segment Leq_{24}	47.9	-50.0
1 Hour Segment Leq_{1}	47.9	-50.0

Note: The predicted values may slightly differe than the MOE values

Day Time Leq (16 Hrs.)	44
Night Time Leq (8 Hrs.)	39
24 Hour Daily Leq	
1 Hour Leq	

STAMSON 5.0 NORMAL REPORT Date: 03-07-2019 13:36:46
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 175b55.te Time Period: Day/Night 16/8 hours
Description: Lot 175 OLA Barrier

Road data, segment # 1: Mayfield E (day/night)

Car traffic volume : 20035/2476 veh/TimePeriod *
Medium truck volume : 706/87 veh/TimePeriod *
Heavy truck volume : 664/82 veh/TimePeriod *
Posted speed limit : 90 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 24050
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 3.30
Heavy Truck % of Total Volume : 3.10
Day (16 hrs) % of Total Volume : 89.00

Data for Segment # 1: Mayfield E (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 105.00 / 100.00 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 5.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

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

Car traffic volume : 20035/2476 veh/TimePeriod *
Medium truck volume : 706/87 veh/TimePeriod *
Heavy truck volume : 664/82 veh/TimePeriod *
Posted speed limit : 90 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 24050
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00

Medium Truck % of Total Volume : 3.30
Heavy Truck % of Total Volume : 3.10
Day (16 hrs) % of Total Volume : 89.00

Data for Segment # 2: Mayfield W (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 95.00 / 15.00 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 5.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Results segment # 1: Mayfield E (day)

Source height = 1.33 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.33 ! 1.50 ! 1.48 ! 1.48

ROAD (0.00 + 53.23 + 0.00) = 53.23 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.00 73.95 0.00 -8.45 0.00 0.00 0.00 -12.27 53.23

Segment Leq : 53.23 dBA

Results segment # 2: Mayfield W (day)

Source height = 1.33 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.33 ! 1.50 ! 1.48 ! 1.48

ROAD (0.00 + 53.63 + 0.00) = 53.63 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---

```
  -90    90   0.00  73.95   0.00  -8.02   0.00   0.00   0.00 -12.31  53.63
--------------------------------------------------------------------------------

Segment Leq : 53.63 dBA

Total Leq All Segments: 56.44 dBA

Results segment # 1: Mayfield E (night)
---------------------------------------

Source height = 1.33 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
      1.33 !        4.50 !        4.18 !         4.18

ROAD (0.00 + 53.55 + 0.00) = 53.55 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
--------------------------------------------------------------------------------
  -90    90   0.00  67.87   0.00  -8.24   0.00   0.00   0.00  -6.09  53.55
--------------------------------------------------------------------------------

Segment Leq : 53.55 dBA

Results segment # 2: Mayfield W (night)
---------------------------------------

Source height = 1.33 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
      1.33 !        4.50 !        2.38 !         2.38

ROAD (0.00 + 54.69 + 0.00) = 54.69 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
--------------------------------------------------------------------------------
  -90    90   0.00  67.87   0.00   0.00   0.00   0.00   0.00 -13.18  54.69
--------------------------------------------------------------------------------

Segment Leq : 54.69 dBA

Total Leq All Segments: 57.17 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 56.44
                   (NIGHT): 57.17
```

STAMSON 5.0 NORMAL REPORT Date: 03-07-2019 13:56:21
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 175day.te Time Period: Day/Night 16/8 hours
Description: Lot 175 Daytime Facade

Road data, segment # 1: Mayfield E (day/night)

Car traffic volume : 20035/2476 veh/TimePeriod *
Medium truck volume : 706/87 veh/TimePeriod *
Heavy truck volume : 664/82 veh/TimePeriod *
Posted speed limit : 90 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 24050
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 3.30
Heavy Truck % of Total Volume : 3.10
Day (16 hrs) % of Total Volume : 89.00

Data for Segment # 1: Mayfield E (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 108.00 / 100.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 20035/2476 veh/TimePeriod *
Medium truck volume : 706/87 veh/TimePeriod *
Heavy truck volume : 664/82 veh/TimePeriod *
Posted speed limit : 90 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 24050
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 3.30
Heavy Truck % of Total Volume : 3.10
Day (16 hrs) % of Total Volume : 89.00

Data for Segment # 2: Mayfield W (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 98.00 / 15.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Mayfield E (day)

Source height = 1.33 m

ROAD (0.00 + 65.37 + 0.00) = 65.37 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	73.95	0.00	-8.57	0.00	0.00	0.00	0.00	65.37

Segment Leq : 65.37 dBA

Results segment # 2: Mayfield W (day)

Source height = 1.33 m

ROAD (0.00 + 65.80 + 0.00) = 65.80 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	73.95	0.00	-8.15	0.00	0.00	0.00	0.00	65.80

Segment Leq : 65.80 dBA

Total Leq All Segments: 68.60 dBA

Results segment # 1: Mayfield E (night)

Source height = 1.33 m

ROAD (0.00 + 59.63 + 0.00) = 59.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	67.87	0.00	-8.24	0.00	0.00	0.00	0.00	59.63

Segment Leq : 59.63 dBA

Results segment # 2: Mayfield W (night)

Source height = 1.33 m

ROAD (0.00 + 67.87 + 0.00) = 67.87 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	67.87	0.00	0.00	0.00	0.00	0.00	0.00	67.87

Segment Leq : 67.87 dBA

Total Leq All Segments: 68.48 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 68.60
(NIGHT): 68.48

STAMSON 5.0 NORMAL REPORT Date: 03-07-2019 13:57:26
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 175night.te Time Period: Day/Night 16/8 hours
Description: Lot 175 Nighttime Facade

Road data, segment # 1: Mayfield E (day/night)

Car traffic volume : 20120/2487 veh/TimePeriod *
Medium truck volume : 685/85 veh/TimePeriod *
Heavy truck volume : 599/74 veh/TimePeriod *
Posted speed limit : 90 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 24050
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 3.20
Heavy Truck % of Total Volume : 2.80
Day (16 hrs) % of Total Volume : 89.00

Data for Segment # 1: Mayfield E (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 108.00 / 108.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 20120/2487 veh/TimePeriod *
Medium truck volume : 685/85 veh/TimePeriod *
Heavy truck volume : 599/74 veh/TimePeriod *
Posted speed limit : 90 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 24050
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 3.20
Heavy Truck % of Total Volume : 2.80
Day (16 hrs) % of Total Volume : 89.00

Data for Segment # 2: Mayfield W (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 98.00 / 98.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Mayfield E (day)

Source height = 1.29 m

ROAD (0.00 + 65.19 + 0.00) = 65.19 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	73.76	0.00	-8.57	0.00	0.00	0.00	0.00	65.19

Segment Leq : 65.19 dBA

Results segment # 2: Mayfield W (day)

Source height = 1.29 m

ROAD (0.00 + 65.61 + 0.00) = 65.61 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	73.76	0.00	-8.15	0.00	0.00	0.00	0.00	65.61

Segment Leq : 65.61 dBA

Total Leq All Segments: 68.42 dBA

Results segment # 1: Mayfield E (night)

Source height = 1.29 m

ROAD (0.00 + 59.12 + 0.00) = 59.12 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	67.69	0.00	-8.57	0.00	0.00	0.00	0.00	59.12

Segment Leq : 59.12 dBA

Results segment # 2: Mayfield W (night)

Source height = 1.29 m

ROAD (0.00 + 59.54 + 0.00) = 59.54 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	67.69	0.00	-8.15	0.00	0.00	0.00	0.00	59.54

Segment Leq : 59.54 dBA

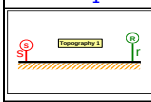
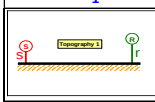
Total Leq All Segments: 62.35 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 68.42
(NIGHT): 62.35

SS WILSON ASSOCIATES -*Consulting Engineers*, Richmond Hill, Ontario Revised June 8
RAIL TRAFFIC NOISE PREDICTION MODEL
BASED ON MOE STEAM/ORNAMENT
PROJECT NAME: 2650 Mayfield Rd W.
City of Brampton

Name(s) of Rail Lines:	Spur Line	
Receptor Name:	Lot 173 day/night	
SSWA Project Number:	WA16-040	Comments Text
Purpose of Calculation	OLA	IMPORTANT: TURN WHISTLE OFF

DO NOT COPY AND PASTE CELLS UNLESS YOU PASTE "VALUES" ONLY

Include the following Segments ? (No=0 or Yes=1)	1			0		
Rail Name & Direction	Spur Line			Rail line name, train type, etc		
Rail/Segment Number or Other Data	1			1		
Segment Source of Noise	Locomo	Whistle	Wheels	Locomo	Whistle	Wheels
IMPORTANT: TURN WHISTLE OFF	Yes	Yes	Yes	Yes	No	Yes
MOE Topographic Case (1-11)-See Instructions	1			1		
						
	S and R on flat ground			S and R on flat ground		
Traffic Data Calculation Period *(24Hrs or 16/8 d/n or 1 Hr)*	Day/Night			Day/Night		
Intermediate Surface; Absorptive or Reflective	Absorptive			Absorptive		
Absorptive Alpha Override; Manual or Auto	Manual			Automatic		
Manual Alpha (if Cell is Blank, do not change, otherwise, input your choice for α)	Input Alpha α from 0.0 to 0.66 0.33					
Measured Angle Case Number	1			1		
Angle description	-θ1 Left & +θ2 Right			-θ1 Left & +θ2 Right		
Angle Theta θ1	-10			-90		
Angle Theta θ2	60			90		
Angle Theta Error Detection Flag						
Subtended Angle (Angle of Exposure), °	70			180		
Number of Locomotives per train	2			1		
Number of cars per train	12			100		
Number of Trains in 24 Hrs.						
Hourly Number of Trains in 1 Hour						
Number of Daytime Trains 07:00 to 23:00.	6			16		
Number of Night Trains 23:00 to 07:00	1			8		
% increase / year	2.50%			0.00%		
Number of years	10			0		
Future Number of Trains in 24 Hrs.						
Future Hourly Number of Trains in 1 Hour						
Future Number of Daytime Trains 07:00 to 23:0	8			16		
Future Number of Nighttime Trains 23:00 to 07:	1			8		
Posted Speed (Km/Hr) [S]	40			80		
Wood Depth (m)	0			0		
Day time Receiver Height,m [RH] (For 24 Hrs. & Hourly also)	1.5			1.5		
Nighttime Reciever Height (m) [NRH]	4.5			4.5		
Source-Receiver Distance [SRD]	145			15		
Nighttime Source-Receiver Distance [NSRD]	145			15		
Barrier Height (m) [BH]	0			0		
Barrier-Receiver Distance (m)	1			1		
Barrier Receiver Distance Error Flag						
Ground Elevation Difference (m) [e]	0			0		
Source Ground Elevation (m)	0			0		
Receiver Ground Elevation (m)	0			0		
Barrier Ground Elevation (m)	0			0		
Include Effect of Dense Woods?	No			No		
Number of Rows of Houses	0			0		
Nighttime Number of Rows of Houses	0			0		
Percentage of Row Occupied by Houses (??%)	80%			80%		
Height of Row of House [HH]	7			7		
Do you want to change the model frequency?	N			N		
Input your Choice of frequency						
Dominant Octave Frequency Band (Hz) [F]	500	500	500	500	500	500

For Wheel noise ONLY: Enter a factor of -5 dB for Continously Welded Rail (CWR) and +5 dB for Trestles as applicable

Day Time [16 hours] Additional dBA Correction Factor- Specify	0	0	0	0	0	0
	Text	Text	Text	Text	Text	Text
Night Time [8 hours] Additional dBA Correction Factor- Specify	0	0	0	0	0	0
	Text	Text	Text	Text	Text	Text
N/A	0	0	0	0	0	0
	Text	Text	Text	Text	Text	Text
N/A	0	0	0	0	0	0
	Text	Text	Text	Text	Text	Text

RESULTS FOR SEGMENTS

Daytime [16 hours] Segment Leq_{16}	54.4	-50.0
Nighttime [8 hours] Segment Leq_{8}	49.7	-50.0
24 Hour Daily Segment Leq_{24}	58.7	-50.0
1 Hour Segment Leq_{1}	58.7	-50.0

Note: The predicted values may slightly differe than the MOE values

Day Time Leq (16 Hrs.)	54
Night Time Leq (8 Hrs.)	50
24 Hour Daily Leq	
1 Hour Leq	

APPENDIX C

PHOTOGRAPHS OF STATIONARY NOISE SOURCES

PHOTOGRAPH 1: AC5 – LEFT, AC8 – RIGHT

PHOTOGRAPH 2: AC4

PHOTOGRAPH 3: AC3 WITH 2M ACOUSTIC BARRIER

PHOTOGRAPH 4: AC9 – RIGHT, AC10 – LEFT

PHOTOGRAPH 5: AC11

PHOTOGRAPH 6: 2M ACOUSTIC BARRIER ALONG SOUTH ROOF

APPENDIX D

SAMPLE STATIONARY SOUND LEVEL CALCULATIONS

SS WILSON ASSOCIATES

***Consulting Engineers* , Richmond Hill, Ontario**

MEASURED/PREDICTED 1/3 OCTAVE BANDS SOUND LEVELS

File No. : WA16-040
Project : 2650 Mayfield Road

Source Name: Church HVAC Equipment
Source Tag/ID: AC4, AC5 - See Chruch HVAC equipment list
Source Location: Immanuel Christian Reformed Church

Measurement Date: September 15 2016
SLM Mem.Code: M9

Tonality,..etc None
Condition of Source:

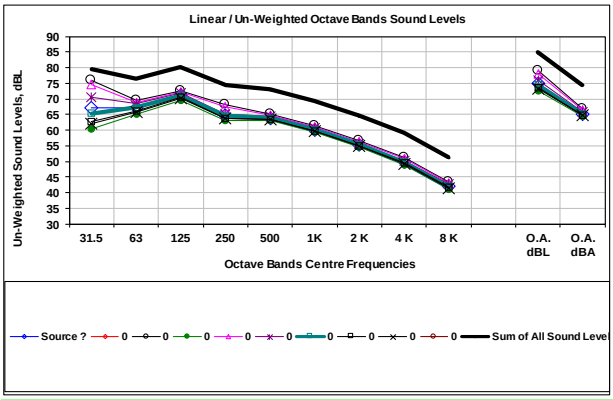
Other Data: Leq = 65.2 dBA @ 4m

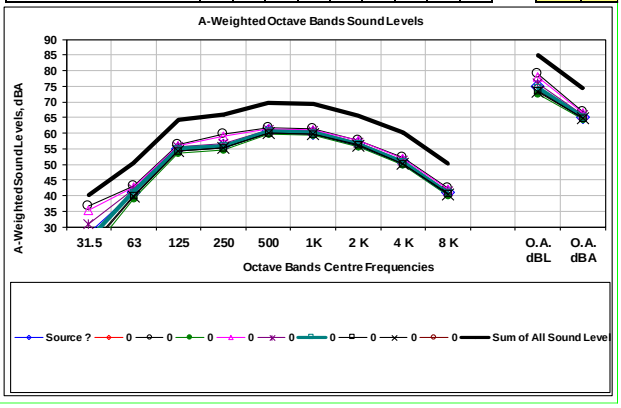
LINEAR/UN-WEIGHTED OCTAVE BANDS SOUND LEVELS — **OCTAVE BANDS**

Ref.	O.B.C. Frequency ,Hz	31.5	63	125	250	500	1K	2 K	4 K	8 K	O.A. dBL	O.A. dBA
Leq	Source ?	67	67	71	65	64	60	55	50	42	75	65
LE											14	12
Lmax		76	69	73	68	65	61	56	51	43	79	67
Lmin		60	65	70	63	63	59	54	49	41	73	64
L1		75	69	72	67	65	61	56	51	43	78	66
L10		70	68	72	65	64	61	56	50	43	76	66
L50		65	67	71	64	64	60	55	50	42	75	65
L90		63	66	70	64	63	60	55	49	42	74	65
L95		62	66	70	64	63	60	55	49	41	73	65
											14	12
Sum of All Sound Level		80	77	80	74	73	69	65	59	51	85	75

A-WEIGHTED OCTAVE BANDS SOUND LEVELS

Ref.	requency ,Hz	31.5	63	125	250	500	1K	2 K	4 K	8 K	O.A. dBL	O.A. dBA
Leq	Source ?	28	41	55	56	61	60	56	51	41	75	65
LE											14	12
Lmax		37	43	56	60	62	61	58	52	42	79	67
Lmin		21	39	53	54	60	59	56	50	40	73	64
L1		35	43	56	59	61	61	58	52	42	78	66
L10		31	42	56	57	61	61	57	51	41	76	66
L50		26	41	55	56	61	60	57	51	41	75	65
L90		23	40	54	55	60	60	56	50	41	74	65
L95		23	40	54	55	60	60	56	50	40	73	65
											14	12
Sum of All Sound Level		40	50	64	66	70	69	66	60	50	85	75





TEXT 1.3 **SS WILSON ASSOCIATES** N23-120 Sources OB Model, Modified-Me

TEXT 1.1

TEXT 1.2

File Number : WA16-040 General (non-impulsive) Source

Project Name : 2650 Mayfield Road W

Receptor Name : R1

Source Name **AC8** Y do not calc

0 **0** N calc

Show Emission Data	Yes	Source Unattenuated Leq dBA		38	Source Attenuated Leq dBA			31			
Octave Band Centre Frequency, Hz	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dBL**	**dBA**
Use Cartesian Co-Ordinates ?	**Yes**	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Receptor Xr Co-Ordinates, m	815.0	815.0	815.0	815.0	815.0	815.0	815.0	815.0	815.0		
Receptor Yr Co-Ordinates, m	228.0	228.0	228.0	228.0	228.0	228.0	228.0	228.0	228.0		
Ground Elevation at Receptor,m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receptor Height above ground, m	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		
Receptor Zr Co-Ordinates, m	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		
Source Xs Co-Ordinates, m	823.0	823.0	823.0	823.0	823.0	823.0	823.0	823.0	823.0		
Source Ys Co-Ordinates, m	165.0	165.0	165.0	165.0	165.0	165.0	165.0	165.0	165.0		
Ground Elevation at source, m	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		
Source Height above ground,,m	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Source Zs Co-Ordinates, m	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0		
Point or Line Source (P or L) ?	P	P	P	P	P	P	P	P	P		
Spectrum, dBL	80.2	73.3	68.7	59.7	58.7	57.0	54.6	50.5	41.3	**81.3**	**62.5**
Adj. Name	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. Name	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Reference Dist. for Lp, m	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		
Adjusted Spectrum, dBL	**80.2**	**73.3**	**68.7**	**59.7**	**58.7**	**57.0**	**54.6**	**50.5**	**41.3**	**81.3**	**62.5**
Calculated Source-Receptor Distance,m	64	64	64	64	64	64	64	64	64		
Geomtrical Spreading	.....										
Consider Distance atten.?	Y	Y	Y	Y	Y	Y	Y	Y	Y		
Distance Reduction Factor	***20***	***20***	***20***	***20***	***20***	***20***	***20***	***20***	***20***		
Reference Dist. for Lp, m	4	4	4	4	4	4	4	4	4		
Source-Receptor Distance,m	64	64	64	64	64	64	64	64	64		
Distance Error Flag	Ok										
Geometrical Spreading, dB	**-24.0**	**-24.0**	**-24.0**	**-24.0**	**-24.0**	**-24.0**	**-24.0**	**-24.0**	**-24.0**		
Lp With Geometric Spreading	56.2	49.3	44.7	35.7	34.7	33.0	30.6	26.5	17.3	**57.3**	**38.4**
ISO Ground Attenuation	.....										
Model (1=none,2=CMHC,3=ISO)	**3**	3	3	3	3	3	3	3	3		
Use a Different Distance For Ground Atten.?	***N***	***N***	***N***	***N***	***N***	***N***	***N***	***N***	***N***		
Distance used for calculation											
Selected Distance For Calculation	64	64	64	64	64	64	64	64	64		
Source Height above ground, m	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Receptor Height above ground, m	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		
Barrier Height Factor(2xbh) (CMHC)	10	10	10	10	10	10	10	10	10		
P+T Factors (CMHC only)	0	0	0	0	0	0	0	0	0		
Calculated Ground Attenuation	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8		
Considered Ground Attenuation, dB	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**		
Lp With Geometric Spreading & Gnd.Atten.	56.2	49.3	44.7	35.7	34.7	33.0	30.6	26.5	17.3	**57.3**	**38.4**
Yes Atmospheric Attenuation	.....										
Consider atm.atten.of a Standard Day(Y or N)	**Y**	Y	Y	Y	Y	Y	Y	Y	Y		
Atmospheric Attenuation, dB	**0.0**	**0.0**	**0.0**	**-0.1**	**-0.1**	**-0.3**	**-0.6**	**-1.5**	**-2.7**		
Sub-Total Propagation Attenuation,dB	-24.0	-24.0	-24.1	-24.1	-24.2	-24.3	-24.6	-25.5	-26.7		
Lp with Geom.Spreading,Gnd.&Atm.Atten.	56.2	49.3	44.6	35.6	34.6	32.7	30.0	25.0	14.6	**57.3**	**38.1**
Additional Adjustments (Watch +/- Signs)	.....										
Tonal Penalty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
.....	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Sub-Total Adjustments, dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjusted Lp @ Receptor, dBL	**56.2**	**49.3**	**44.6**	**35.6**	**34.6**	**32.7**	**30.0**	**25.0**	**14.6**	**57.3**	**38.1**
Leq Time Base , Minutes	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0		
Point Source Data :	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
- No. of Events in Time Base	1	1	1	1	1	1	1	1	1		
- Each Event Duration, min.	60	60	60	60	60	60	60	60	60		
- Duration Of All Events, min.	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0		
Linear Unattenuated Leq dBL	**56.2**	**49.3**	**44.6**	**35.6**	**34.6**	**32.7**	**30.0**	**25.0**	**14.6**	**57.3**	**38.1**
A-Weighted Unattenuated Leq dBA	16.8	23.1	28.5	27.0	31.4	32.7	31.2	26.0	13.5		
Noise Control Measures	.....										
Sound Barrier(s) Case	**Source**	Source	Source	Source	Source	Source	Source	Source	Source		
Is there a sound Barrier (Y or N) ?	Y	Y	Y	Y	Y	Y	Y	Y	Y		
Ignore ISO Barrier Rule for gnd Atten? ?	N	N	N	N	N	N	N	N	N		
Decision	Y	Y	Y	Y	Y	Y	Y	Y	Y		
Source Sound Barrier 1.....	Rooftop Barrier										
Consider Barrier Attenuation	Y	Y	Y	Y	Y	Y	Y	Y	Y		
Ground Elevation At Source, M	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		
Source-Barrier Distance	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0		
Barrier Height	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Barrier Gnd. Elev.	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		
Barrier Thickness	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2		
Ground Elevation At Receptor,M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receiver-Barrier Dist.	35.6	35.6	35.6	35.6	35.6	35.6	35.6	35.6	35.6		
Calc. Line Source Barrier Attenuation,dB	-5.0	-5.0	-5.0	-5.0	-5.1	-5.2	-5.4	-5.9	-6.6		
Barrier Acoustic Zone	shadow	shadow	shadow	shadow	shadow	shadow	shadow	shadow	shadow		
Barrier Top Elevation	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		
Line-To-Point Source Barrier Adjust.	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5		
Source Barrier Attenuation, dB	-6.5	-6.5	-6.5	-6.5	-6.6	-6.7	-6.9	-7.4	-8.1		
Sub-Result Sound Level (Barrier 1)	49.7	42.8	38.1	29.1	28.0	26.0	23.0	17.6	6.5	**50.8**	**31.4**
Barrier 1 Reduction (IL)	**6.5** dBL		**6.7** dBA								
Receptor Sound Barrier 2	Detail ...										
Consider Barrier Attenuation	N	N	N	N	N	N	N	N	N		
Ground Elevation At Source, M	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		
Source-Barrier Distance	38.6	38.6	38.6	38.6	38.6	38.6	38.6	38.6	38.6		
Ground Elevation At Receptor,M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receiver-Barrier Dist.	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0		
Barrier Height	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		
Barrier Gnd. Elev.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Barrier Thickness	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Calc. Line Source Barrier Attenuation,dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Barrier Acoustic Zone	bright	bright	bright	bright	bright	bright	bright	bright	bright		
Barrier Top Elevation	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		
Line-To-Point Source Barrier Adjust.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receiver Barrier Attenuation, dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Sub-Result Sound Level (Barrier 2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
Barrier 2 Reduction (IL)	**0.0** dBL		**0.0** dBA								
Barrier(s) Results											
Source Barrier Attenuation, dB	-6.5	-6.5	-6.5	-6.5	-6.6	-6.7	-6.9	-7.4	-8.1		
Receiver Barrier Attenuation, dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Additional Attenuation Of Double Barrier	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Calculated Overall Double Barrier Attenuation	-6.5	-6.5	-6.5	-6.5	-6.6	-6.7	-6.9	-7.4	-8.1		
Do You Want to Limit The Barrier Reduction ?	N	N	N	N	N	N	N	N	N		
Maximum Allowed Barrier Reduction	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0		
Selected Reduction(s) Due to Barrier(s)	***-6.5***	***-6.5***	***-6.5***	***-6.5***	***-6.6***	***-6.7***	***-6.9***	***-7.4***	***-8.1***		
Resultant Sound Level With Barrier(s)	***49.7***	***42.8***	***38.1***	***29.1***	***28.0***	***26.0***	***23.0***	***17.6***	***6.5***	**50.8**	**31.4**
Barrier(s) Reduction (IL)	**6.5** dBL		**6.7** dBA								
Sound Level Adjust.(Watch +/- Signs)	.....										
Note Re Removal of Tonal Penalty	-	-	-	-	-	-	-	-	-		
Removal of Tonal Penalty	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
ComAdj.1	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
ComAdj.2	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjust 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjust 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjust 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjust 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Reduction, dB	-6.5	-6.5	-6.5	-6.5	-6.6	-6.7	-6.9	-7.4	-8.1		
Linear Attenuated Leq dBL	**49.7**	**42.8**	**38.1**	**29.1**	**28.0**	**26.0**	**23.0**	**17.6**	**6.5**	**50.8**	**31.4**
A-Weighted Attenuated Leq dBA	10.3	16.6	22.0	20.5	24.8	26.0	24.2	18.6	5.4		

Source Unattenuated Leq dBA 38.1 **dBA** **Source Attenuated Leq dBA** 31.4 **dBA**

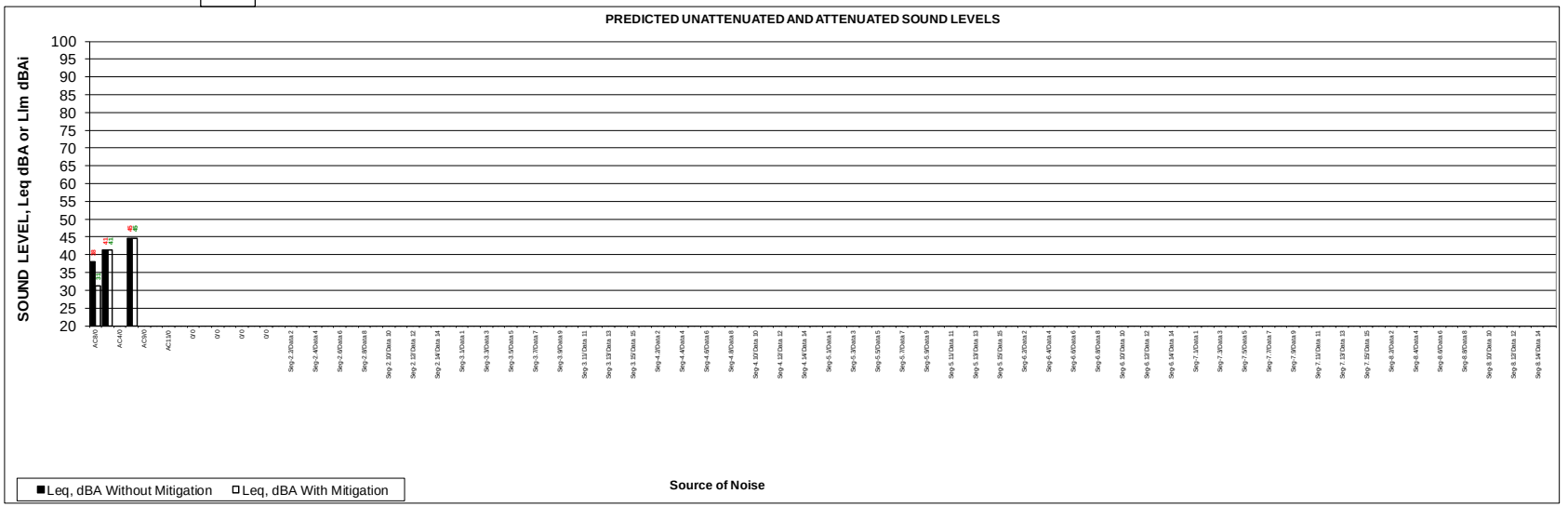
Lmax Lmax **50.8** 31.4

Lmax of this Group **54.2** **44.7**

SS WILSON ASSOCIATES
Consulting Engineers

September 13 2016

File Number :	**WA16-040**
Project Name :	**2650 Mayfield Road W**
Receptor Name :	**R1**
Overall Level-Attenuated, dBA	46
Overall Level-Unattenuated, dBA	47



TEXT 1.3

SS WILSON ASSOCIATES

N23-120 Sources OB Model, Modified-Ma

TEXT 1.1

TEXT 1.2

File Number : WA16-040 — General (non-impulsive) Source

Project Name : TEXT .....

Receptor Name : TEXT .....

Source Name **Seg-1.1** — Y do not calc

Data S1 **Data 1** — N calc

Show Emission Data	Yes	Source Unattenuated Leq dBA		67		Source Attenuated Leq dBA		60			
Octave Band Centre Frequency, Hz	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dBL**	**dBA**
Use Cartesian Co-Ordinates ?	**Yes**	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Receptor Xr Co-Ordinates, m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receptor Yr Co-Ordinates, m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Ground Elevation at Receptor,m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receptor Height above ground, m	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		
Receptor Zr Co-Ordinates, m	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		
Source Xs Co-Ordinates, m	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0		
Source Ys Co-Ordinates, m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Ground Elevation at source, m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		
Source Height above ground, m	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Source Zs Co-Ordinates, m	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		
Point or Line Source (P or L) ?	P	P	P	P	P	P	P	P	P		
Spectrum, dBL	0.0	71.1	72.2	65.1	60.6	61.1	63.5	62.0	56.2	**75.9**	**69.0**
Adj. Name	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. Name	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Reference Dist. for Lp, m	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0		
Adjusted Spectrum, dBL	**0.0**	**71.1**	**72.2**	**65.1**	**60.6**	**61.1**	**63.5**	**62.0**	**56.2**	**75.9**	**69.0**
Calculated Source-Receptor Distance,m	60	60	60	60	60	60	60	60	60		
Geomtrical Spreading	.....										
Consider Distance atten.?	Y	Y	Y	Y	Y	Y	Y	Y	Y		
Distance Reduction Factor	***20***	***20***	***20***	***20***	***20***	***20***	***20***	***20***	***20***		
Reference Dist. for Lp, m	50	50	50	50	50	50	50	50	50		
Source-Receptor Distance,m	60	60	60	60	60	60	60	60	60		
Distance Error Flag	Ok										
Geometrical Spreading, dB	**-1.6**	**-1.6**	**-1.6**	**-1.6**	**-1.6**	**-1.6**	**-1.6**	**-1.6**	**-1.6**		
Lp With Geometric Spreading	0.0	69.5	70.6	63.5	59.1	59.5	61.9	60.4	54.6	**74.4**	**67.4**
ISO Ground Attenuation	.....										
Model (1=none,2=CMHC,3=ISO)	**3**	3	3	3	3	3	3	3	3		
Use a Different Distance For Ground Atten.?	***N***	***N***	***N***	***N***	***N***	***N***	***N***	***N***	***N***		
Distance used for calculation											
Selected Distance For Calculation	60	60	60	60	60	60	60	60	60		
Source Height above ground, m	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Receptor Height above ground, m	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		
Barrier Height Factor(2bht) (CMHC)	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8		
P+T Factors (CMHC only)	0	0	0	0	0	0	0	0	0		
Calculated Ground Attenuation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Considered Ground Attenuation, dB	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**		
Lp With Geometric Spreading & Gnd.Atten.	0.0	69.5	70.6	63.5	59.1	59.5	61.9	60.4	54.6	**74.4**	**67.4**
Yes Atmospheric Attenuation	.....										
Consider atm.atten.of a Standard Day(Y or N)	**Y**	Y	Y	Y	Y	Y	Y	Y	Y		
Atmospheric Attenuation, dB	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**-0.1**	**-0.2**	**-0.4**		
Sub-Total Propagation Attenuation,dB	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.7	-1.8	-2.0		
Lp with Geom.Spreading,Gnd.&Atm.Atten.	0.0	69.5	70.6	63.5	59.0	59.4	61.8	60.2	54.1	**74.3**	**67.3**
Additional Adjustments (Watch +/- Signs)	.....										
Tonal Penalty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
.....	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adj. 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Sub-Total Adjustments, dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjusted Lp @ Receptor, dBL	**0.0**	**69.5**	**70.6**	**63.5**	**59.0**	**59.4**	**61.8**	**60.2**	**54.1**	**74.3**	**67.3**
Leq Time Base , Minutes	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0		
Point Source Data :	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
- No. of Events in Time Base	1	1	1	1	1	1	1	1	1		
- Each Event Duration, min.	60	60	60	60	60	60	60	60	60		
- Duration Of All Events, min.	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0		
Linear Unattenuated Leq dBL	**0.0**	**69.5**	**70.6**	**63.5**	**59.0**	**59.4**	**61.8**	**60.2**	**54.1**	**74.3**	**67.3**
A-Weighted Unattenuated Leq dBA	0.0	43.3	54.5	54.9	55.8	59.4	63.0	61.2	53.0		
Noise Control Measures	.....										
Sound Barrier(s) Case	**Receptor**	Receptor	Receptor	Receptor	Receptor	Receptor	Receptor	Receptor	Receptor		
Is there a sound Barrier (Y or N) ?	Y	Y	Y	Y	Y	Y	Y	Y	Y		
Ignore ISO Barrier Rule for gnd Atten? ?	N	N	N	N	N	N	N	N	N		
Decision	Y	Y	Y	Y	Y	Y	Y	Y	Y		
Source Sound Barrier 1.....	Track Grades										
Consider Barrier Attenuation	N	N	N	N	N	N	N	N	N		
Ground Elevation At Source, M	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		
Source-Barrier Distance	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		
Barrier Height	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Barrier Gnd. Elev.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Barrier Thickness	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Ground Elevation At Receptor,M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receiver-Barrier Dist.	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0		
Calc. Line Source Barrier Attenuation,dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Barrier Acoustic Zone	shadow	shadow	shadow	shadow	shadow	shadow	shadow	shadow	shadow		
Barrier Top Elevation	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Line-To-Point Source Barrier Adjust.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Source Barrier Attenuation, dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Sub-Result Sound Level (Barrier 1)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
Barrier 1 Reduction (IL)	**0.0** dBL		**0.0** dBA								
Receptor Sound Barrier 2.....	Detail ...										
Consider Barrier Attenuation	Y	Y	Y	Y	Y	Y	Y	Y	Y		
Ground Elevation At Source, M	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		
Source-Barrier Distance	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		
Ground Elevation At Receptor,M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receiver-Barrier Dist.	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0		
Barrier Height	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
Barrier Gnd. Elev.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Barrier Thickness	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Calc. Line Source Barrier Attenuation,dB	-5.0	-5.0	-5.0	-5.1	-5.2	-5.4	-5.7	-6.4	-7.4		
Barrier Acoustic Zone	shadow	shadow	shadow	shadow	shadow	shadow	shadow	shadow	shadow		
Barrier Top Elevation	4.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
Line-To-Point Source Barrier Adjust.	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5		
Receiver Barrier Attenuation, dB	-6.5	-6.5	-6.5	-6.6	-6.7	-6.9	-7.2	-7.9	-8.9		
Sub-Result Sound Level (Barrier 2)	0.0	63.0	64.1	56.9	52.4	52.6	54.6	52.3	45.3	**67.7**	**60.1**
Barrier 2 Reduction (IL)	**6.6** dBL		**7.2** dBA								
Barrier(s) Results											
Source Barrier Attenuation, dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Receiver Barrier Attenuation, dB	-6.5	-6.5	-6.5	-6.6	-6.7	-6.9	-7.2	-7.9	-8.9		
Additional Attenuation Of Double Barrier	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Calculated Overall Double Barrier Attenuation	-6.5	-6.5	-6.5	-6.6	-6.7	-6.9	-7.2	-7.9	-8.9		
Do You Want to Limit The Barrier Reduction ?	N	N	N	N	N	N	N	N	N		
Maximum Allowed Barrier Reduction	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0		
Selected Reduction(s) Due to Barrier(s)	***-6.5***	***-6.5***	***-6.5***	***-6.6***	***-6.7***	***-6.9***	***-7.2***	***-7.9***	***-8.9***		
Resultant Sound Level With Barrier(s)	***-6.5***	***63.0***	***64.1***	***56.9***	***52.4***	***52.6***	***54.6***	***52.3***	***45.3***	**67.7**	**60.1**
Barrier(s) Reduction (IL)	**6.6** dBL		**7.2** dBA								
Sound Level Adjust.(Watch +/- Signs)	.....										
Note Re Removal of Tonal Penalty	-	-	-	-	-	-	-	-	-		
Removal of Tonal Penalty	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
ComAdj.1	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
ComAdj.2	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjust 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjust 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjust 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Adjust 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Reduction, dB	-6.5	-6.5	-6.5	-6.6	-6.7	-6.9	-7.2	-7.9	-8.9		
Linear Attenuated Leq dBL	**0.0**	**63.0**	**64.1**	**56.9**	**52.4**	**52.6**	**54.6**	**52.3**	**45.3**	**67.7**	**60.1**
A-Weighted Attenuated Leq dBA	0.0	36.8	48.0	48.3	49.2	52.6	55.8	53.3	44.2		
Source Unattenuated Leq dBA	**67.3**	**dBA**	**Source Attenuated Leq dBA**					**60.1**	**dBA**		
Lmax									Lmax	**67.7**	**60.1**
									Lmax of this Group	**67.7**	**60.1**