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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:

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JULY 4, 2019

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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:

- 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 <u>actual</u> 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 <u>SUMMARY</u>

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

- 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 equipment²) 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/m² (Ξ 4 lb/ft²) 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/m² (Ξ 4 lb/ft²) 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. Air Conditioning

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 dBA³ 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 dBA⁴ 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. <u>Provision for Air Conditioning</u>

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 dBA⁶ 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. <u>Required Sections and Details</u>

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

- 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 CRITERIA⁷

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):

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

Sound Level Limits for Outdoor Living Areas (OLAs)

Indoor Sound Level Limits

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

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 P	eriod) (dBA)
	Road	Rail
General offices, reception areas, retail stores, etc. (Time period-day: 16 hr, 07:00 - 23:00)	LAeq(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.	L _{Aeq(day)} 45	L _{Aeq(day)} 40
(Time period-day: 16 hr, 23:00 - 07:00)		
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	LAeq(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
	<=55	<=50	-	-	-	-
ROAD	>55 & <=65	>50 & <=55	-	Yes	Yes "Type C" 'may'	
NOAD		>55 & <=59			Yes "Type C" 'will'	
	>65	>59	Yes	-	Yes "Type D"	Yes
	<=55	<=50	-	-	-	-
	>55 & <=60	>50 & <=55	-	Yes	Yes "Type C" 'may'	-
RAIL	>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).

Exclusion⁸ Limit Values of One-Hour Equivalent Sound Level (LAeq, 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) <u>Plane of Window of Noise Sensitive Spaces</u>

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 (LLM, 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 <u>Window – Noise Sensitive Spaces(Day/Night)</u>

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	80 km/hr.
-Future Speed Limit (assumed in study as per the Town's Policy)	90 km/hr.
AADT (Year 2019)	18,158 vpd
Ultimate AADT	48,100 vpd
Total Truck Percentage (Day)	6.4%
 Medium Truck Split 	3.3%
 Heavy Truck Split 	3.1%
Total Truck Percentage (Night)	6.0%
 Medium Truck Split 	3.2%
 Heavy Truck Split 	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	MAX. NO. OF	MAX. OPER	MAX. NO. OF
	TRAINS	CARS	SPEED (KM/H)	LOCOMOTIVES
Freight	6	5 to 12	40	2

NIGHTTIME (2300-0700)

TYPE OF TRAIN	MAX. NO. OF	MAX. NO. OF	MAX. OPER	MAX. NO. OF
	TRAINS	CARS	SPEED (KM/H)	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.
- 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 procedures⁹ (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 LAeq day 56-65 dBA and/or LAeq 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:

 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 dBA¹⁰ 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 dBA¹¹ 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 <u>STATIONARY SOURCES OF NOISE EXTERNAL TO THE PROPOSED</u> <u>DEVELOPMENT</u>

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. <u>Description of the Sources of Ambient / Background Noise and</u> <u>Operational Data</u>

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. <u>Measurement Equipment</u>

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 dBAi¹² 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 program¹³ 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	43.5 dBA Day	50dBA Day	Yes
	of Church	40.5 dBA Night	45dBA Night	
POR 2	Future House to East	46.5 dBA Day	50dBA Day	Yes
	of Church	43.5 dBA Night	45dBA Night	
POR 3	Future House on East	71 dBAi Day	60 dBAi Day	No
(Impulse)	end of Development	No Cases - Night	55 dBAi Night	
POR 3	Future House on East	57 dBA Day	60dBA Day	Yes
(1 hr Leq)	end of Development	No Cases - Night	45dBA Night	

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 table¹⁴ 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	35	34	33	32	31	30	29	28	27	26
(AIF) in this report										
Window to room floor area	10%	13%	16%	20%	25%	32%	40%	50%	63%	80%
percentage NOT to be										
exceeded										

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 interpane 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

Time Weighting Characteristics

		F(Fast). S(Slow). I(Impulse).
L _p Sound pressure level	A-Weighted sound pressure level	Laf, Las, Lai
	C-Weighted sound pressure level	LCF, LCS, LCI
	Z-Weighted sound pressure level(Flat)	L _{ZF} , L _{ZS} , L _{ZI}
Leq Equivalent continuous	Equivalent continuous A-weighted sound level	L _{Aeq} , L _{Aleq}
sound level	Equivalent continuous C-weighted sound level	L _{Ceq} , L _{Cleq}
	Equivalent continuous Z-weighted(Flat) sound level	Lzeq, Lzleq
L _E Sound Exposure Level	A-Weighted sound exposure Level	Lae, Laie
	C-Weighted sound exposure Level	L _{CE} , L _{CIE}
	Z-Weighted sound exposure Level(Flat)	Lze, Lzie
L _{max} , L _{min}	Maximum A-weighted sound level	LAFmax, LASmax, LAImax
Maximum Sound Level	Maximum C-weighted sound level	LCFmax, LCSmax, LCImax
	Maximum Z- weighted sound level(Flat)	LzFmax, LzSmax, LzImax
L _N Percentile Sound Level	Percentile A-weighted sound level	Lafnn, Lasn, Lain
	Percentile C-weighted sound level	LCFNn, LCSN, LCIN
	Percentile Z-weighted sound level(Flat)	Lzfnn, Lzsn, Lzin
Lpeak	A-Weighted peak sound level	LApeak
Peak Sound Level	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 (WILSC	N AS	SOCIA	TES				
12/04/2019 10:13		Leq-AlF	CALCUL	ATIONS				LAZING	REQUIR	EMENTS	(Using NRC/	MOE Pocedure
File Number:					0	UTDOO	RS					
Project Name :						Table 2						
WA16-040								-8	Any Hea	vy Rail Lin	e?	Yes
											vill be applied t	
2650 Mayfield Rd W, Bramptor			<u> </u>					<u> </u>			or to account f	ortheir
Record Number Consider Record	1 Y	2 Y	3 Y	4 Y	5 Y	6 ¥	7 N	8 N	9 N	10 N	11 N	12 N
	1 169	170	175	181	190	I B1-200	IN	IN	IN	IN	IN	IN
LOT NO.						P ark						
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 Traf	fic	OUTDOOR	DAYTIMELE	VELS	OUTDOOR I	DAYTIMELE	VELS	OUTDOOR	DAYTIMELE	VELS	
Leg Outdoors	58.00	67.00	69.00	58.00	46.00	42.00		-				T
Partial angle of exposure, degrees	180	180	180	180	180	180				+		+
	100	100	100	100	100	100	<u> </u>	+		1	+	+
Partial exposure adjust., dB	2.00	0.00	10.00	0.00			<u> </u>	+		+	+	+
Additional Adjustment, dB	-2.00	-8.00	-10.00	-2.00				+		-	+	+
Additional Adjustment, dB	FA A A	FO 0	FO 0	F0.00	40.00	40.00	<u> </u>			+	-	+
Sub-Total Leq, dBA	56.00	59.00	59.00	-	-							
Source 2: O.R.D.C.	Rail Traffi	C	OUTDOOR	DAYTIMELE	VELS	OUTDOOR	DAYTIMELE	VELS	OUTDOOR	DAYTIMELE	VELS	
Leq Daytime			44.00		50.00			1				
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						-	
Sub-Total Led, UBA			r									
Source 3:	Road Traf	fic	OUTDOOR	DAYTIMELE	VELS	OUTDOOR I	DAYTIMELE	VELS	OUTDOOR	DAYTIMELE	VELS	
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 Traf	tic .	OUTDOOR	DAYTIMELE	VELS		DAYTIMELE	VELS	OUIDOOR	DAYTIMELE	VELS	
Leq Daytime												
Partial angle of exposure, degrees	180	180	180	180	180	180		<u> </u>				<u> </u>
Partial exposure adjust., dB												
Additional Adjustment, dB								1				
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												T
Adjust.1				1		t	t	1		1	1	1
Adjust.1 Adjust.2						ł	t	1		1	1	+
Adjusted NEF/NEP		1				1	1	1		1	1	1
Approx. Overall Combined Leg	56	59	59	56	51	42		1				T
Overall Road and/or Rail				~~		- Citer	t	1		1	1	+
and/or Stationary Sources,	56	59	59	56	51	42		1				
	50	33	33	50	51	72		1				
Leq (dBA)							<u> </u>	+		+	+	+
Aircraft Noise Only, NEF							ļ	l		1	+	┥───
NOTES	Attenuation from Barrier on	3.0m High Sound Barrier	3.6m High Barrier + Berm	Attenuation from Barrier on	No Barrier Required	No Barrier Required						
	Lot 168		Combinatio	Lot 178								

SS WILSON ASSOCIATES Proceed Leq- AIF CALCULATIONS AND TYPICAL WINDOW GLAZING REQUIREMENTS

N6 Leq-AIF Master-January 2007 05/04/2019 15:23 File Proje WA1

Combined AIF Openable or Fixed windows?

Other Adjustment

Final Adjusted AIF

Minimum STC (Approx)

Regular or Laminated Glass

Typical Minimum Double Glazing Altematives

NOTES

05/04/2019 15:23		Leq-AlF	CALCUL	ATIONS				LAZING	REQUIRE	MENTS		
File Number:						DAYTIM			(Using N	RC/MOE Poc	edures)	
Project Name :						Table 3						
WA16-040								Caution:,	the AIF Rep	orted for he	avy Rail No	ise is the
2650 Mayfield Rd, Brampton		-			-	-	_		day and nig			
Record Number Consider Record	1	2	3	4	5	6	7 N	8 N	9 N	10 N	11 N	12 N
	157	168	169	175	190	197			IN	IN	IN .	IN
LOT NO.	South-East	West	West	South	East	East						
FACE/DIRECTION												
LOCATION	Building Façade	Building Façade	Building Façade	Building Façade	Building Façade	Building Façade						
ROOM CLASSIFICATION	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 Traf		DAYTIME			DAYTIME	LEVELS	1	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 Leg, dBA	63.00	57.00	58.00	69.00	50.00							
Angular range of incidence (0,1,2,3)	03.00	57.00	58.00	09.00	50.00							
Adjusted AIF	25	19	20	31	12	-38	-38	-38	-38	-38	-38	-38
Source 2: O.R.D.C.	Rail Traffie	;	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 Traf	fic	DAYTIME	LEVELS		DAYTIME	LEVELS		DAYTIME	LEVELS		
Leq Daytime												
Partial angle of exposure, degrees Partial exposure adjust., dB	180	180	180	180	180	180						
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Angular range of incidence (0,1,2,3) Adjusted AIF	-38	-38	-38	-38	-38	-38	-38	3 -38	-38	-38	-38	-38
Source 4:	Road Traf	lic	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												
Adjusted NEF/NEP												
Approx. Overall Combined Leg	63	57	58	69	61	61						
Assumed Window/ Floor Area %	32.0	32.0	32.0	32.0	32.0	32.0		1				
Assumed Total # of Components	3	3	3	3	3	3		1				
(Road, Rail, and Other Sources) Assumed Total # of Components	3	3	3	3	3	3						
Aircraft ONLY												
AIF of 4 Sources	27	19	20	32	32	32						
Aircraft AIF	07		00	20	ļ							

32

Openable

.aminate

29 30

3(6)6 6(6)5

32

Openable

.aminate

29

30

3(6)6 6(6)5

32

Openable

aminate

29 30

3(6)6 6(6)5

19

Openable

Regular

19

20

3(6)3

20

Openable

Regular

20

21

3(6)3

27

Openable

Regular

27

28

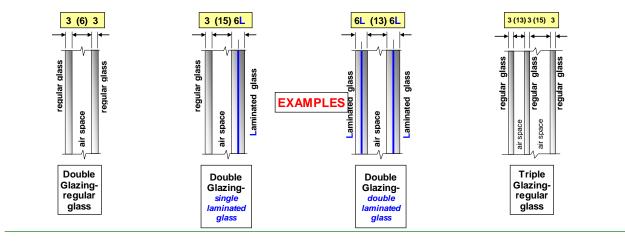
3(6)3

SS WILSON ASSOCIATES Leq- AIF CALCULATIONS AND TYPICAL WINDOW GLAZING REQUIREMENTS

SUMMARY TABLE OF

1

					Table 3					
Windows must be well-fitted weat	therstripped units.		- The interpa	ine spacing s	shown in the t	ables are the	minimum ac	ceptable.		
Larger spacing for a given glazing	g thickness norma	ally improves	the performar	ice.						
LOT NO.	FACE/DIR ECTION	ROOM CLASSIFIC ATION	LOCATION	Openable or Fixed Window	Regular Strength or Laminated Glass	Combined AIF	Approx. Overall Combined Leq	Double Glazing Alternatives , mm	Triple Glazing Altematives , mm	Minimum STC (Approx)
57	South-East	Living/Dining	Building Façad	Openable	Regular	27	63	3(6)3		28
68	West	Living/Dining	Building Façad	Openable	Regular	19	57	3(6)3		20
59	West	Living/Dining	Building Façad	Openable	Regular	20	58	3(6)3		21
75	South	Living/Dining	Building Façad	Openable	Laminated	32	69	3(6)6 6(6)5		30
90	East	Living/Dining	Building Façad	Openable	Laminated	32	61	3(6)6 6(6)5		30
97	East	Living/Dining	Building Façaq	Openable	Laminated	32	61	3(6)6 6(6)5		30
BBREVIATIONS SPECIFIC TO THE	S PROJECT : FF(F	ront Face), R	F(Rear Face),	RS(Right Sid	e face), LS(Le	eft Side face)	1			



N6 Leq-AIF Master-January 2007 05/04/2019 15:26 File Number:

Proceed SS WILSON ASSOCIATES Leq-AIF CALCULATIONS AND TYPICAL WINDOW GLAZING REQUIREMENTS (Using NRC/MOE Pocedures) NIGHT TIME

Project Name : WA16-040						Table 4						
2650 Mayfield Road, Bramptor									he AIF Rep lay and nig	orted for hea	avy Rail No	ise is the
Record Number	1	2	3	4	5	6	7	8	9	10	11	12
Consider Record	Y 157	Y 168	169	Y 175	190	197	N	N	N	N	N	N
LOT NO.		108										
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 Traff	fic	NIGHT TI	ME LEVEL	S	NIGHT TIM	IE LEVEL	S	NIGHT TIN	IE LEVELS		
Leq Night Time	62.00	57.00	58.00	62.00	45.00			Ĩ		T		
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
Source 2: O.R.D.C.	Rail Traffic	-	NIGHT TI	ME LEVEL		NIGHT TIM	IE LEVEL	S	NIGHT TIN	IE LEVELS		
Leq Night Time	49.00			50.00	61.00	61.00						
Partial angle of exposure, degrees	180	180	180	180	180	180				\vdash		
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
•												-20
Source 3:	Road Traff	fic	NIGHT TI	ME LEVEL	S	NIGHT TIM	IE LEVEL	S	NIGHT TIN	IE 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 Traff	fic	NIGHT TI	ME LEVEL	S	NIGHT TIM	AE LEVEL	S	NIGHT TIN	IE LEVELS		
Leq Night Time												
Partial angle of exposure, degrees	180	180	180	180	180	180						
Partial exposure adjust., dB	100	100	100	100	100	100						
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	<u> </u>					_				┝──┤		
Aircraft ONLY	3	3	3	3	3	3						
AIF of 4 Sources	29	24	25	30	33	33						
Aircraft AIF										\vdash		
Combined AIF	29	24	25	30	33	33				\vdash		
Openable or Fixed windows?	Openable	Openable	Openable	Openable	Openable	Openable						
Regular or Laminated Glass	Regular	Regular	Regular	Regular	Laminated	Laminated				\vdash		
Other Adjustment Final Adjusted AIF	29	24	25	30	30	30				├		
Minimum STC (Approx)	29	24	25	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	······	······	······		······							

SS WILSON ASSOCIATES Leq- AIF CALCULATIONS AND TYPICAL WINDOW GLAZING REQUIREMENTS

SUMMARY TABLE OF

Double Glazing-regular glass

Double Glazing-

single laminated glass

NIGHT TIME	
Table 4	

					Table 4					
- Windows must be well-fitted weather	stripped units		- The interpa	ine spacing s	shown in the t	ables are the	minimum ac	ceptable.		
- Larger spacing for a given glazing thi	ckness norm	ally improves	the performar	ice.					Triple	
LOT NO.	FACE/DIR ECTION	ROOM CLASSIFIC ATION	LOCATION	Openable or Fixed Window	Regular Strength or Laminated Glass	Combined AIF	Approx. Overall Combined Leq	Double Glazing Alternatives , mm	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 PI		Front Eaco) R	E(Poor Eaco)	PS/Pight Sid	o faco) I S(L)	oft Sido faco)				
3 (6) 3	100201.111		(15) 6L]	0 1200), 20(2)		(13) 6L		3 (13) 3 (15) 3	
air space		regular glass		Laminated glass	(AMPL	glass		Laminated glass	air space regular glass	

Double Glazing-double laminated glass

Triple Glazing-regular glass

TABLE 5

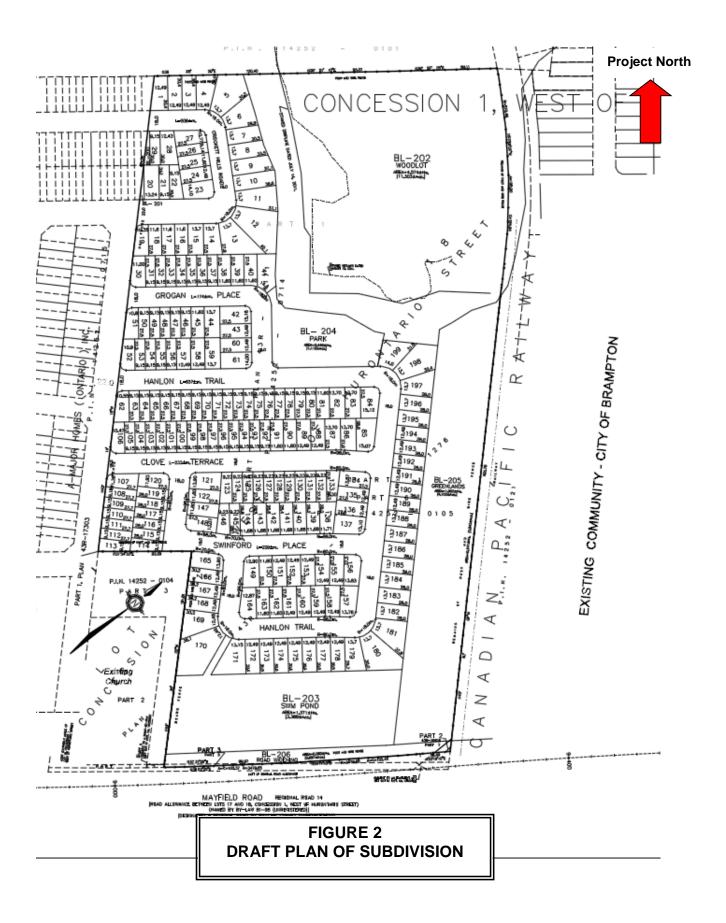
BARRIER HEIGHTS TO ACHIEVE LAeq 55 dBA IN OLAS

RECEPTOR	OLA Sound Level Without Barrier,) ACHIE _{I(day)} , dE	
	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



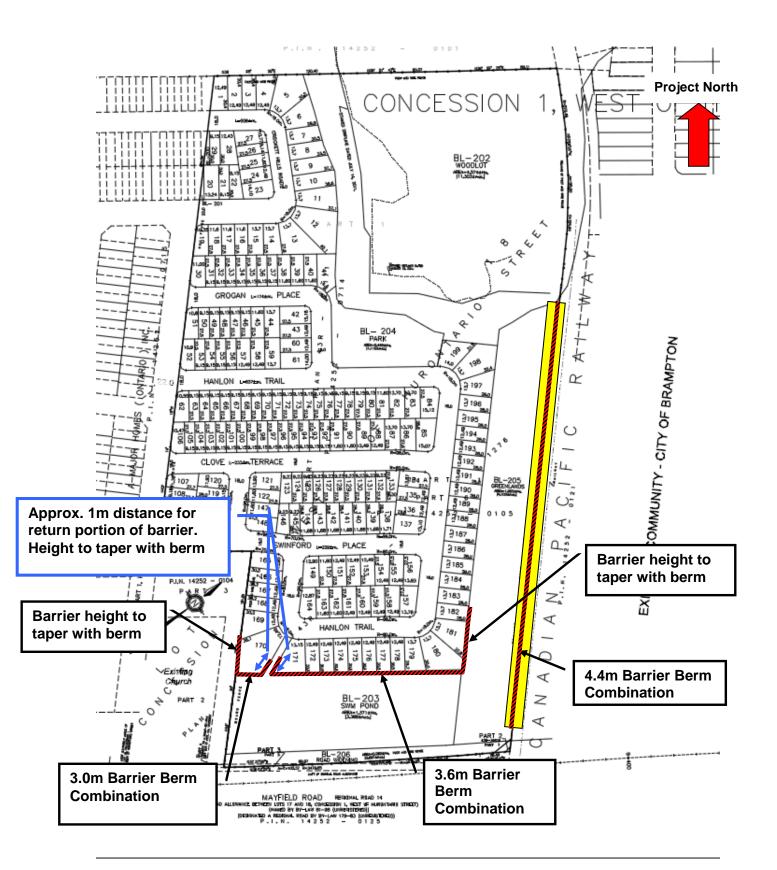


FIGURE 3 SCHEMATIC BARRIER ALIGNMENTS

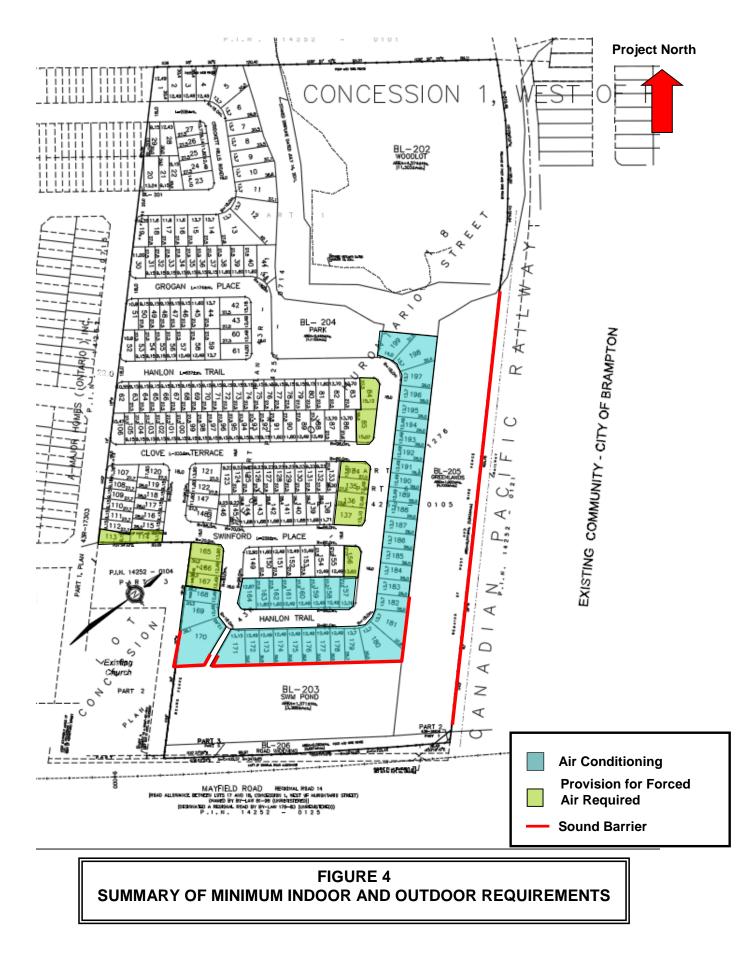
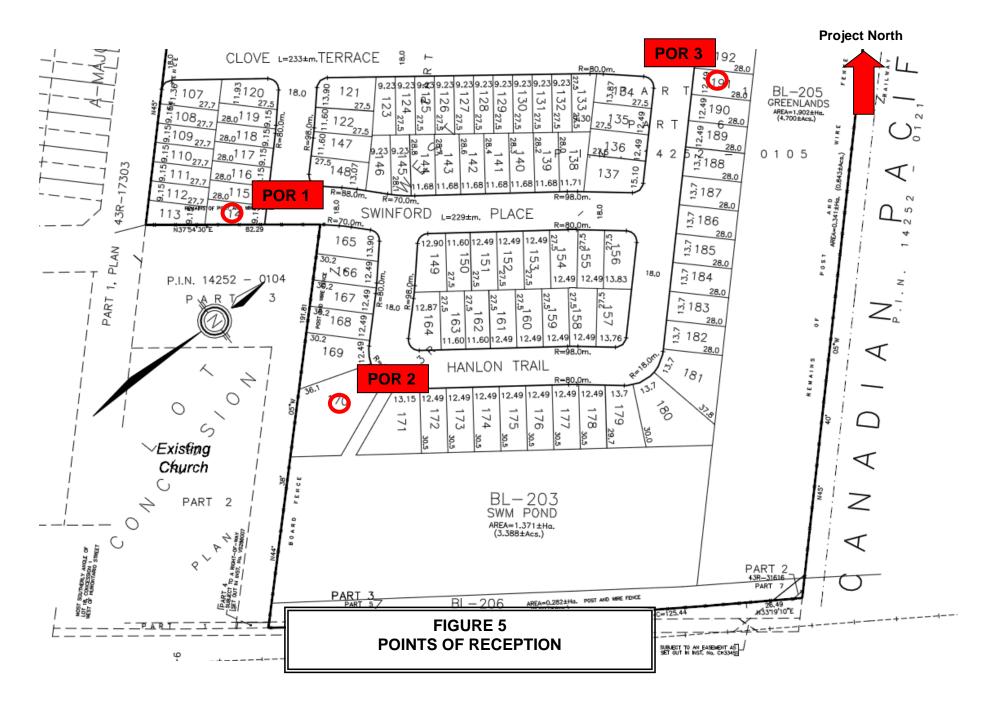




FIGURE 4 HVAC STATIONARY NOISE SOURCES



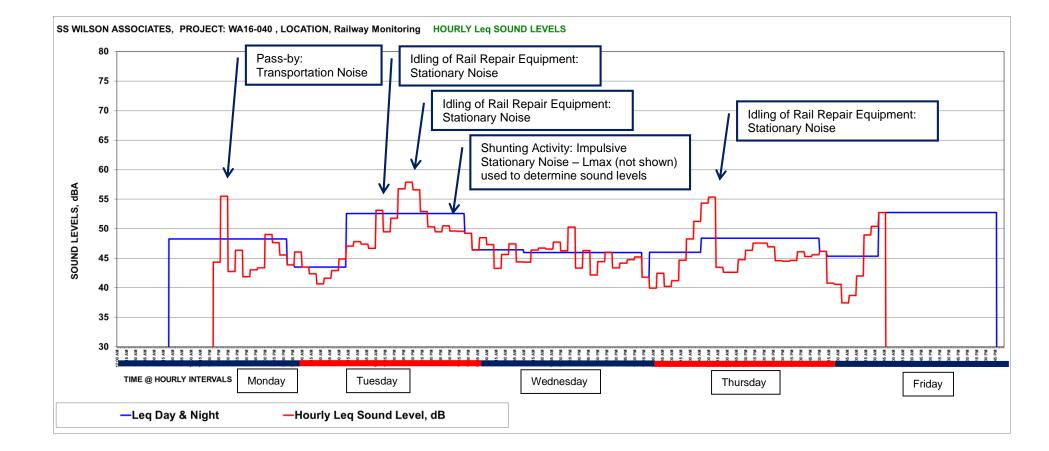
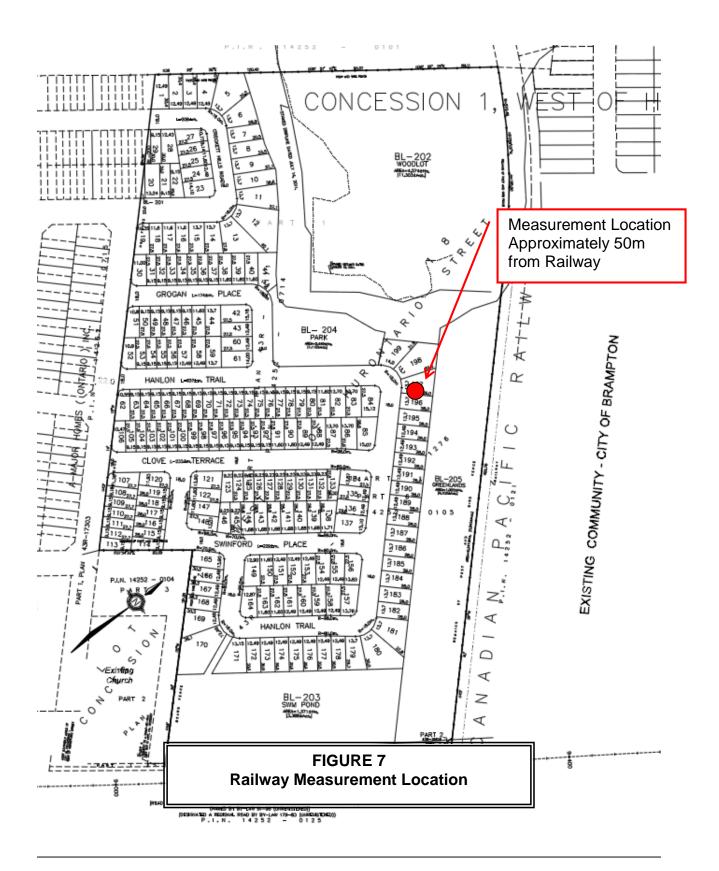
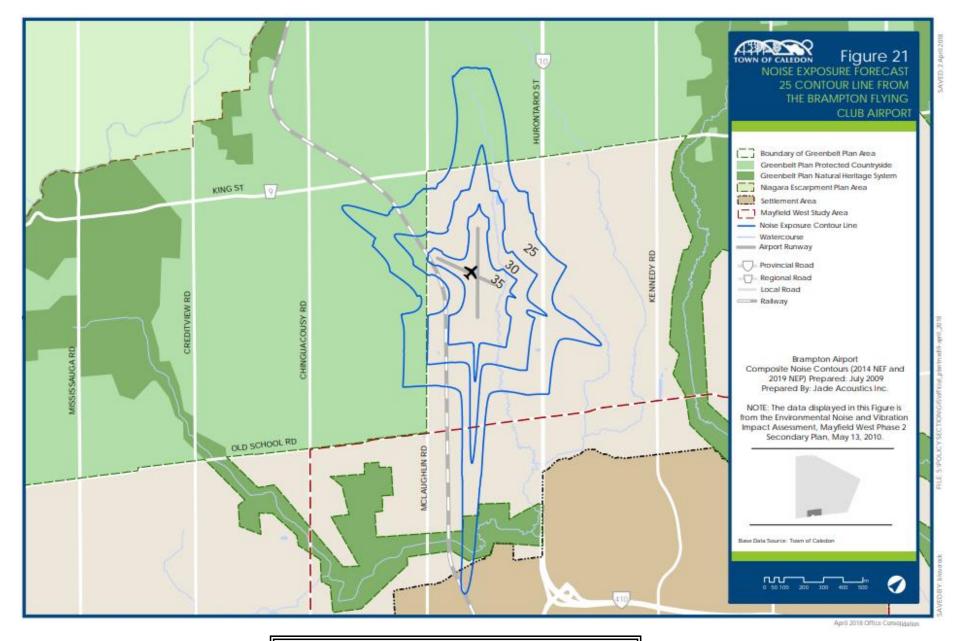


FIGURE 6 Railway Sound Monitoring Results

SS Wilson Associates Consulting Engineers







APPENDIX A

ROAD TRAFFIC DATA



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	8	30 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: <u>viktoriya.zaytseva@peelregion.ca</u> •W: 905-791-7800 x4810

Public Works

10 Peel Centre Dr., Suite B, Brampton, ON L6T 4B9 Tel: 905-791-7800 www.peelregion.ca

Orangeville Railway Development Corp. 87 Broadway

Orangeville, Ontario L9W 1K1

Telephone: Toll-Free:

(519) 941-0440 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:

- 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).



- 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 <u>tdulisse@orangeville.ca</u>.

Yours truly,

Many Richart

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

/td

Copy: P. Gorski,OBRAG

O. R. D. C.

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): 24050Percentage of Annual Growth: 0.00Number of Years of Growth: 0.00Medium Truck % of Total Volume: 3.30Heavy Truck % of Total Volume: 3.10Day (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 dis	stance : 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 Wood depth	: -90.00 deg 90.00 deg : 0 (No woods.)
No of house rows	: 0/0
Surface :	2 (Reflective ground surface)
Receiver source dista	ance : 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

BASED ON MOE STEAM/ORNAMENT	DDEL							
PROJECT NAME: 2650 Mayfield Rd W	Ι.							
City of Brampton								
Name(s) of Rail Lines:	Spur Lin	е						
Receptor Name:	Lot 173	_		_				
SSWA Project Number: Purpose of Calculation	WA16-04	0 LA	Comment	SText				
DO NOT COPY AND PASTE		-				- 011		
CELLS UNLESS YOU PASTE "VALUES" ONLY	ä 1				 			
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		
		1			1			
MOE Topographic Case (1-11)-See Instructions	8 8]	apography 1	®r					
	Sand R on f	lat ground		Sand R on f	lat ground			
Traffic Data Calculation Period		Day/Night			Day/Night			
(24Hrs or 16/8 d/n or 1 Hr) Intermediate Surface; Absorptive or Reflective		Absorptive		<u> </u>	Absorptive			
Absorptive Alpha Override; Manual or Auto		Manual	•		Automatic			
Manual Alpha (if Cell is Blank, do not change,	Input Alp	oha α from 0.	0 to 0.66					
otherwise, input your choice for α) Measured Angle Case Number		0.33	•		1			
Angle description	-01	Left & +02 F	light	-01	Left & +θ2 R	ight		
Angle Theta θ1		-10			-90			
Angle Theta 02 Angle Theta Error Detection Flag		60			90			
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 Future Number of Trains in 24 Hrs.		10			0			
Future Hourly Number of Trains in 1 Hour								
Future Number of Daytime Trains 07:00 to 23:0		8			16			
		1			8			
Posted Speed (Km/Hr) [S]		40			80			
Future Number of Nighttime Trains 23:00 to 07: Posted Speed (Km/Hr) [S] Wood Depth (m) Day time Receiver Height,m [RH]		40 0			80 0			
Posted Speed (Km/Hr) [S] Wood Depth (m) Day time Receiver Height,m [RH] (Fir 24 Hr.s. & Hourty also)		40 0 1.5			80 0 1.5			
Posted Speed (Km/Hr) [S] Wood Depth (m) Day time Receiver Height,m [RH] (Fir 24 Hr.s. & Hourty also)		40 0	· · · · · · · · · · · · · · · · · · ·		80 0			
Posted Speed (Km/Hr) [S] Wood Depth (m) Day time Receiver Height,m [RH] [for 24 Hrs. & Horty steo) Nighttime Reciever Height (m) [NRH]		40 0 1.5 4.5			80 0 1.5 4.5			
Posted Speed (Km/Hr) [S] Wood Depth (m) Day time Receiver Height,m [RH] (fer 24 hes, a knowly also) Nighttime Receiver Height (m) [NRH] Source-Receiver Distance [SRD] Nighttime Source-Receiver Distance [NSRD] Barrier Height (m) [BH]		40 0 1.5 4.5 145 145 0			80 0 1.5 4.5 15 15 0			
Posted Speed (Km/Hr) [S] Wood Depth (m) Day time Receiver Height,m [RH] (for 24 He. 8 Hearly also) Mightime Receiver Height (m) [NRH] Source-Receiver Distance [SRD] Nightime Source-Receiver Distance [NSRD] Barrier Height (m) [BH] Barrier-Receiver Distance (m)		40 0 1.5 4.5 145 145			80 0 1.5 4.5 15 15			
Posted Speed (Km/Hr) [S] Wood Depth (m) Day time Receiver Height,m [RH] (52 24 Fea. 8 tearty also) Mightime Source-Receiver Distance [NRD] Nightime Source-Receiver Distance [NSRD] Barrier Height (m) [BH] Barrier-Receiver Distance (m) Barrier Receiver Distance Error Flag		40 0 1.5 4.5 145 145 0 1			80 0 1.5 4.5 15 15 0 1			
Posted Speed (Km/Hr) [S] Wood Depth (m) Day time Receiver Height,m [RH] (fre 24 Hes, 8 Hearly also) Nighttime Receiver Height (m) [NRH] Source-Receiver Distance [SRD] Nighttime Source-Receiver Distance [NSRD] Barrier Receiver Distance (m) Barrier Receiver Distance Error Flag Ground Elevation Difference (m) [e]		40 0 1.5 4.5 145 0 1 1 0			80 0 1.5 4.5 15 15 0 1 1			
Posted Speed (Km/Hr) [S] Wood Depth (m) Day time Receiver Height,m [RH] (fer 24 tes, a tearly also) Mighttime Receiver Distance [SRD] Nighttime Source-Receiver Distance [NSRD] Barrier Height (m) [BH] Barrier Height (m) [BH] Barrier Receiver Distance Error Flag Ground Elevation Difference (m) [e] Source Ground Elevation (m)		40 0 1.5 4.5 145 145 0 1			80 0 1.5 4.5 15 15 0 1			
Posted Speed (Km/Hr) [S] Wood Depth (m) Day time Receiver Height,m [RH] (%2 24 Hes, a Hearkyatea) Mightime Receiver Height (m) [NRH] Source-Receiver Distance [SRD] Nightime Source-Receiver Distance [NSRD] Barrier Height (m) [BH] Barrier Receiver Distance Error Flag Ground Elevation (m) Receiver Ground Elevation (m) Barrier Ground Elevation (m)		40 0 1.5 145 145 0 1 1 0 0 0 0 0			80 0 1.5 4.5 15 15 0 1 1 0 0 0 0 0			
Posted Speed (Km/Hr) [S] Wood Depth (m) Boy time Receiver Height,m [RH] Gr 24 tes, A tearly also Mightime Receiver Height (m) [NRH] Source-Receiver Distance [SRD] Nightime Source-Receiver Distance [NSRD] Barrier Height (m) [BH] Barrier Height (m) [BH] Barrier Receiver Distance Error Flag Ground Elevation CM) Receiver Ground Elevation (m) Barrier Ground Elevation (m) Barrier Ground Elevation (m) Include Effect of Dense Woods?		40 0 1.5 145 145 0 1 1 0 0 0 0 0 0 0 0 0 0 0			80 0 1.5 4.5 15 15 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0			
Posted Speed (Km/Hr) [S] Wood Depth (m) Day time Receiver Height,m [RH] (fer 24 Ires, & Hearty also) Nighttime Source-Receiver Distance [NSRD] Barrier Height (m) [BH] Barrier Height (m) [BH] Barrier Height (m) [BH] Barrier Height (m) [BH] Ground Elevation Difference (m) [e] Source Ground Elevation (m) Barrier Ground Elevation (m) Barrier Ground Elevation (m) Include Elfect of Dense Woods? Number of Rows of Houses		40 0 1.5 145 145 0 1 1 0 0 0 0 0			80 0 1.5 4.5 15 15 0 1 1 0 0 0 0 0			
Posted Speed (KmHr) [S] Wood Depth (m) Day time Receiver Height,m [RH] (for 24 tres, a treaty also) Mightime Source-Receiver Distance [NSRD] Barrier Height (m) [BH] Barrier Height (m) [BH] Barrier Height (m) [BH] Barrier Height (m) [BH] Barrier Receiver Distance Error Flag Ground Elevation Difference (m) [e] Source Ground Elevation (m) Receiver Ground Elevation (m) Barrier Ground Elevation (m) Include Effect of Dense Woods? Number of Rows of Houses Nightime Number of Rows of Houses Percentage of Row Occupied by Houses (??%)		40 0 1.5 145 145 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	•		80 0 1.5 15 15 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0			
Posted Speed (Km/Hr) [S] Wood Depth (m) Day time Receiver Height,m [RH] (fre 24 Hes, & Hearty also) Nighttime Source-Receiver Distance [NSRD] Barrier Height (m) [NH] Barrier Aceiver Distance (m) Barrier Height (m) [BH] Barrier Receiver Distance Error Flag Ground Elevation Difference (m) [e] Source Ground Elevation (m) Barrier Ground Elevation (m) Barrier Ground Elevation (m) Barrier Ground Elevation (m) Include Effect of Dense Woods? Number of Rows of Houses Nightime Number of Rows of Houses Percentage of Row Occupied by Houses (??%) Height of Row of House [Hi]		40 0 1.5 145 145 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	•		80 0 1.5 15 15 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0			
Posted Speed (Km/Hr) [S] Wood Depth (m) Day time Receiver Height,m [RH] (fer 24 hes, a knowly also) Mighttime Receiver Height (m) [NRH] Source-Receiver Distance [SRD] Nighttime Source-Receiver Distance [NSRD] Barrier Height (m) [BH] Barrier-Receiver Distance (m) Barrier Receiver Distance (m) Barrier Receiver Distance (m) [e] Source Ground Elevation (m) Receiver Ground Elevation (m) Include Effect of Dense Woods? Number of Rows of Houses Nighttime Number of Rows of Houses Percentage of Row Occupied by Houses (??%) Height of Row to House [HH] Do you want to change the model frequency?		40 0 1.5 145 145 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			80 0 1.5 15 15 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0			
Posted Speed (Km/Hr) [S] Wood Depth (m) Day time Receiver Height,m [RH] (fer 24 tes, 8 tearly also) Mightime Source-Receiver Distance [SRD] Barrier Height (m) [NH] Barrier Acceiver Distance (SRD] Barrier Height (m) [BH] Barrier Receiver Distance Error Flag Ground Elevation Difference (m) [e] Source Ground Elevation (m) Barrier Receiver Distance Im) Barrier Receiver Distance Im) Barrier Receiver Distance (m) [e] Source Ground Elevation (m) Barrier Receiver Mouse Elevation (m) Barrier Round Elevation (m) Barrier Ground Elevation (m) Include Elfect of Dense Woods? Number of Rows of Houses Nightime Number of Rows of Houses Percentage of Row Occupied by Houses (??%) Height of Row of House [HH] Do you want to change the model frequency? Input your Choice of frequency Bominant Octave Frequency Band (Hz) [F]	500	40 0 1.5 145 145 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	500	500	80 0 1.5 15 15 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	500		
Posted Speed (Km/Hr) [S] Wood Depth (m) Bay time Receiver Height,m [RH] for 24 hts. A tearly also Mightime Rociever Height (m) [NRH] Source-Receiver Distance [SND] Nightime Source-Receiver Distance [NSRD] Barrier Height (m) [BH] Barrier-Receiver Distance (m) Barrier Receiver Distance (m) Barrier Receiver Distance (m) Barrier Receiver Distance (m) Barrier Ground Elevation (m) Receiver Ground Elevation (m) Barrier Ground Elevation (m) Receiver Ground Elevation (m) Barrier Ground Elevation (m) Barrier Ground Elevation (m) Receiver Ground Elevation (m) Receiver Ground Elevation (m) Barrier Ground Elevation (m) Barrier Ground Elevation (m) Barrier Ground Elevation (m) Domogen (m) Domogen (m) Percentage of Row Occupied by Houses (??%) Height of Row of Houses Percentage of Row Occupied by Houses (??%) Height of Row of Houses Down (m) to change the model frequency? Dominant Octave Frequency Bod (Hz) [F] For Wheel noise ONLY: Enter a factor of - 548 for G	Continously V	40 0 1.5 1.45 145 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(CWR) and +	5 dB for Tres	80 0 1.5 15 15 15 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	cable		
Posted Speed (Km/Hr) [S] Wood Depth (m) Day time Receiver Height,m [RH] (for 24 tres, a treaty also) Mightime Source-Receiver Distance [NRD] Nightime Source-Receiver Distance [NRD] Barrier Height (m) [BH] Barrier Height (m) [BH] Barrier Height (m) [BH] Barrier Receiver Distance Error Flag Ground Elevation Difference (m) [e] Source Ground Elevation (m) Receiver Ground Elevation (m) Barrier Ground Elevation (m) Receiver Ground Elevation (m) Percentage of Dense Woods? Number of Rows of Houses Nightime Number of Rows of Houses Percentage of Row Occupied by Houses (??%) Height of Row of Houses [HH] Do you want to change the model frequency? Input your Choice of frequency Dominant Octave Frequency Band (Hz) [F] For Wheel noise ONLY : Enter a factor of -5 dB for (D	Continously V	40 0 1.5 145 145 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0			80 0 1.5 15 15 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0			
Postad Speed (Km/Hr) [S] Wood Depth (m) Bay time Receiver Height,m [RH] (fre 24 tex, a texty also) Mightime Rociever Height (m) [NRH] Source-Receiver Distance [SRD] Nightime Source-Receiver Distance [NSRD] Barrier Height (m) [BH] Barrier Height (m) [BH] Barrier Receiver Distance Error Flag Ground Elevation Cm) Receiver Ground Elevation (m) Barrier Ground Elevation (m) Barrier Ground Elevation (m) Barrier Ground Elevation (m) Receiver Ground Elevation (m) Percentage of Row of Houses Nightime Number of Rows of Houses Nightime Number of Rows of Houses Nightime Number of Rows of Houses Percentage of Row Occupied by Houses (??%) Height of Row of Houses (PH) Dominant Octave Frequency Band (Hz) [F] For Wheel noise ONLY: Enter Stator of -5 dB for Day Time [16 hours] Additional dBA Correction Specify [Mith Time [hours] Additional dBA Correction	Ontinously N 0 Text 0	40 0 1.5 145 145 145 0 0 0 0 0 0 0 0 0 0 0 0 0	(CWR) and + 0 Text 0	5 dB for Tres 0 Text 0	80 0 1.5 4.5 15 15 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	0 Text 0		
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Postad Speed (Km/Hr) [S] Wood Depth (m) Day time Receiver Height,m [RH] Gr 24 hea, A leady aleg Mightime Receiver Height (m) [NRH] Source-Receiver Distance [SND] Nightime Receiver Distance [SND] Barrier Height (m) [BH] Barrier-Receiver Distance (m) Barrier Receiver Distance (m) Barrier Receiver Distance (m) [e] Source Ground Elevation (m) Receiver Ground Elevation (m) Include Effect of Dense Woods? Number of Rows of Houses Nightime Number of Rows of Houses Percentage of Row Occupied by Houses (??%) Height of Rows of Houses Percentage of Row Occupied by Houses (??%) Height of Rows of Houses Percentage of Row Occupied by Houses (??%) Height of Rows of Houses Percentage of Row Occupied by Houses (??%) Height of Rows of Houses Percentage of Row Occupied By Houses (??%) Height of Rows A Houses Percentage of Row Occupied By Houses (??%) Height of Rows Flequency Dominant Octave Frequency Dominant Octave Frequency NVA NVA RESULTS FOR SEGMENTS Daytime [16 hours] Additional dBA Correction Factor-Specify NVA NVA NVA RESULTS FOR SEGMENTS Daytime [16 hours] Segment Leq ₁₆ Nighttime [8 hours] Segment Leq ₂₄ 1 Hour Segment Leq ₁	Continously N 0 Text 0 Text 0 Text 0	40 0 1.5 1.45 145 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	(CWR) and + 0 Text 0 Text 0 Text 0	5 dB for Tres 0 Text 0 Text 0 Text 0 Text 0	80 0 1.5 15 15 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	Cable 0 Text 0 Text 0 Text 0		
Posted Speed (KmHr) [S] Wood Depth (m) Day time Receiver Height,m [RH] (for 24 tres, A truery also) Mightime Source-Receiver Distance [SRD] Nightime Source-Receiver Distance [SRD] Nightime Source-Receiver Distance [SRD] Barrier Height (m) [BH] Barrier Height (m) [BH] Barrier Height (m) [BH] Barrier Receiver Distance Error Flag Ground Elevation Difference (m) [e] Source Ground Elevation (m) Receiver Ground Elevation (m) Receiver Ground Elevation (m) Percentage of Dones Woods? Number of Rows of Houses Nightime Number of Rows of Houses Percentage of Row Occupied by Houses (??%) Height of Row of House [HI] Do you want to change the model frequency? Dominant Octave Frequency Band (Hz) [F] For Wheel noise ONLY : Enter a factor of -5 dB for (D) Spartine [16 hours] Additional dBA Correction Factor-Specify N/A RESULTS FOR SEGMENTS Daytime [16 hours] Segment Leq ₁₆ NightTime [8 hours] Segment Leq ₁₆ Night Line [16 hours] Segment Leq ₂₄ 14 hour Daily Segment Leq ₂₄	Continously N 0 Text 0 Text 0 Text 0	40 0 1.5 1.45 1.45 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	(CWR) and + 0 Text 0 Text 0 Text 0	5 dB for Tres 0 Text 0 Text 0 Text 0 Text 0	80 0 1.5 15 15 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	Cable 0 Text 0 Text 0 Text 0		
Postad Speed (Km/Hr) [S] Wood Depth (m) Day time Receiver Height,m [RH] Gr 24 hea, A leady aleg Mightime Receiver Height (m) [NRH] Source-Receiver Distance [SND] Nightime Receiver Distance [SND] Barrier Height (m) [BH] Barrier-Receiver Distance (m) Barrier Receiver Distance (m) Barrier Receiver Distance (m) [e] Source Ground Elevation (m) Receiver Ground Elevation (m) Include Effect of Dense Woods? Number of Rows of Houses Nightime Number of Rows of Houses Percentage of Row Occupied by Houses (??%) Height of Rows of Houses Percentage of Row Occupied by Houses (??%) Height of Rows of Houses Percentage of Row Occupied by Houses (??%) Height of Rows of Houses Percentage of Row Occupied by Houses (??%) Height of Rows of Houses Percentage of Row Occupied By Houses (??%) Height of Rows A Houses Percentage of Row Occupied By Houses (??%) Height of Rows Flequency Dominant Octave Frequency Dominant Octave Frequency NVA NVA RESULTS FOR SEGMENTS Daytime [16 hours] Additional dBA Correction Factor-Specify NVA NVA NVA RESULTS FOR SEGMENTS Daytime [16 hours] Segment Leq ₁₆ Nighttime [8 hours] Segment Leq ₂₄ 1 Hour Segment Leq ₁	Continously N 0 Text 0 Text 0 Text 0	40 0 1.5 1.45 145 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	(CWR) and + 0 Text 0 Text 0 Text 0	5 dB for Tres 0 Text 0 Text 0 Text 0 Text 0	80 0 1.5 15 15 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	Cable 0 Text 0 Text 0 Text 0		

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 dist	ance :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 dista	Ince: 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: 3.30Heavy Truck % of Total Volume: 3.10Day (16 hrs) % of Total Volume: 89.00

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

Angle1Angle2: -90.00 deg90.00 degWood depth:0(No woods.)No of house rows:0 / 0Surface:2(Reflective ground surface)Receiver source distance:95.00 / 15.00 mReceiver height:1.50 / 4.50 mTopography:2(Flat/gentle slope; with barrier)Barrier angle1:-90.00 degAngle2 : 90.00 degBarrier height:5.00 mBarrier receiver distance :10.00 / 10.00 mSource elevation:0.00 mBarrier elevation:0.00 mReference 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): 24050Percentage of Annual Growth: 0.00Number of Years of Growth: 0.00Medium Truck % of Total Volume: 3.30Heavy Truck % of Total Volume: 3.10Day (16 hrs) % of Total Volume: 89.00

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

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

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): 24050Percentage of Annual Growth: 0.00Number of Years of Growth: 0.00Medium Truck % of Total Volume: 3.30Heavy Truck % of Total Volume: 3.10Day (16 hrs) % of Total Volume: 89.00

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

-----Angle1Angle2: -90.00 deg90.00 degWood depth:0(No woods.)No of house rows:0 / 0Surface:2(Reflective ground surface) Receiver source distance : 98.00 / 15.00 m Receiver height: 1.50 / 4.50 mTopography: 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 _____ $-90 \quad 90 \quad 0.00 \quad 73.95 \quad 0.00 \quad -8.15 \quad 0.00 \quad 0.00 \quad 0.00 \quad 0.00 \quad 65.80$ _____ 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 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): 24050Percentage of Annual Growth: 0.00Number of Years of Growth: 0.00Medium Truck % of Total Volume: 3.20Heavy Truck % of Total Volume: 2.80Day (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 di	stance : 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)

Angle1Angle2: -90.00 deg90.00 degWood depth:0(No woods.)No of house rows:0 / 0Surface:2(Reflective ground surface) Receiver source distance : 98.00 / 98.00 m Receiver height: 1.50 / 4.50 mTopography: 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 Leg 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

RAIL TRAFFIC NOISE PREDICTION MC	DEL							
BASED ON MOE STEAM/ORNAMENT PROJECT NAME: 2650 Mayfield Rd W	,							
City of Brampton	•							
Name(s) of Rail Lines:	Spur Li	ne						
Receptor Name:	Lot 173	day/night						
SSWA Project Number:	WA16-0		Comment					
Purpose of Calculation	C	DLA	IMPORT	ANT: TURN		EOFF		
DO NOT COPY AND PASTE CELLS UNLESS YOU PASTE "VALUES" ONLY	8	2		a	~			
Include the following Segments ? (No=0 or Yes=1)		<u> </u>		121	0			
Rail Name & Direction		Spur Lin	e	Rail line	e name, tr	ain type,		
Rail/Segment Number or Other Data		1			etc 1			
	Locomo	Whistle	Wheels	Locomo	Whistle	Wheels		
Segment Source of Noise IMPORTANT: TURN WHISTLE OFF	Yes	Yes	Yes	Yes	No	Yes		
		1	•		1			
MOE Topographic Case (1-11)-See Instructions	8 <mark>67</mark>	Topography 1	9 1	S Transmit (P) S F				
	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	1	Day/Night				
Intermediate Surface; Absorptive or Reflective		Absorptive			Absorptive			
Absorptive Alpha Override; Manual or Auto Manual Alpha (if Cell is Blank, do not change,		Manual			Automatic			
Manual Alpha (if Cell is Blank, do not change, otherwise, input your choice for α)	Input A	lpha α from 0 0.33	.u to 0.66					
Measured Angle Case Number		1	•		1	•		
Angle description	-0	1 Left & +θ2 I	Right	-01	L Left & +02 F	light		
Angle Theta θ1 Angle Theta θ2		-10 60			-90 90			
Angle Theta 62 Angle Theta Error Detection Flag		00			30			
Subtended Angle (Angle of Exposure), *		70	•		180	•		
Number of Locomotives per train Number of cars per train		2	•		1	•		
Number of Trains in 24 Hrs.		12			100			
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 % increase / year		1 2.50%	•		8	•		
Number of years		10	•		0	•		
Future Number of Trains in 24 Hrs.								
Future Hourly Number of Trains in 1 Hour		8			16			
Future Number of Daytime Trains 07:00 to 23:00 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] Source-Receiver Distance [SRD]		4.5			4.5			
Nighttime Source-Receiver Distance [SRD]		145 145			15			
Barrier Height (m) [BH]		0		15				
Barrier-Receiver Distance (m)		1			1			
Barrier Receiver Distance Error Flag								
Ground Elevation Difference (m) [e]		0			0			
Source Ground Elevation (m) Receiver Ground Elevation (m)		0			0			
Barrier Ground Elevation (m)		0			0			
Include Effect of Dense Woods?		No	•	No				
Number of Rows of Houses Nighttime Number of Rows of Houses		0		0				
Percentage of Row Occupied by Houses (??%)		80%			80%			
Height of Row of House [HH]		7 N			7 N			
Do you want to change the model frequency? Input your Choice of frequency		N			IN			
Dominant Octave Frequency Band (Hz) [F]	500	500	500	500	500	500		
For Wheel noise ONLY: Enter a factor of -5 dB for C Day Time [16 hours] Additional dBA Correction Factor		Welded Rail	(CWR) and + 0	5 dB for Tres	stles as appli	cable 0		
Specify	Text	Text	Text	Text	Text	Text		
Night Time [8 hours] Additional dBA Correction Factor- Specify	0 Text	0 Text	0 Text	0 Text	0 Text	0 Text		
	0	0	0	0	0	0		
N/A	Text 0	Text 0	Text 0	Text 0	Text 0	Text 0		
N/A	0 Text	0 Text	0 Text	0 Text	0 Text	0 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 Note: The predicted values may slightly differe than the MOE values		58.7			-50.0			
Day Time Leq (16 Hrs.)		54		1				
Night Time Leq (8 Hrs.)		50						
24 Hour Daily 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

N5 Third Octave Bands Sound Levels & NC June 2014 1

9/14/2016 10:26

SS WILSON ASSOCIATES

Consulting Engineers, Richmond Hill, Ontario MEASURED/PREDICTED 1/3 OCTAVE BANDS SOUND LEVELS

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

 Source Name:
 Church HVAC Equipment

 Source Tag/ID:
 AC4, AC5 - See Chruch HVAC equipment list

 Source Location:
 Immanuel Christian Reformed Church

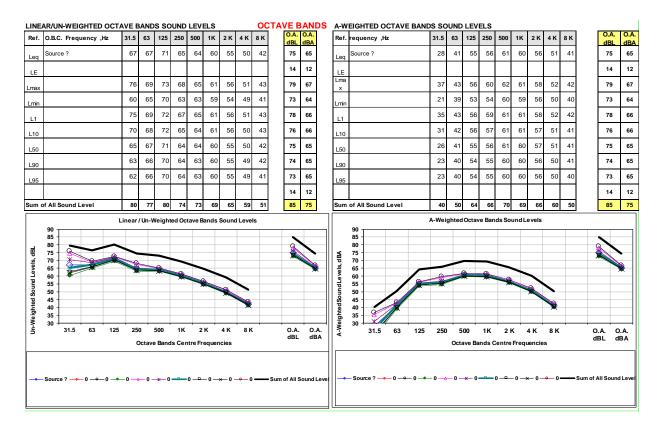


Measurement Date:	September 15 2016
SLM Mem.Code:	M9
Tonality,etc	None

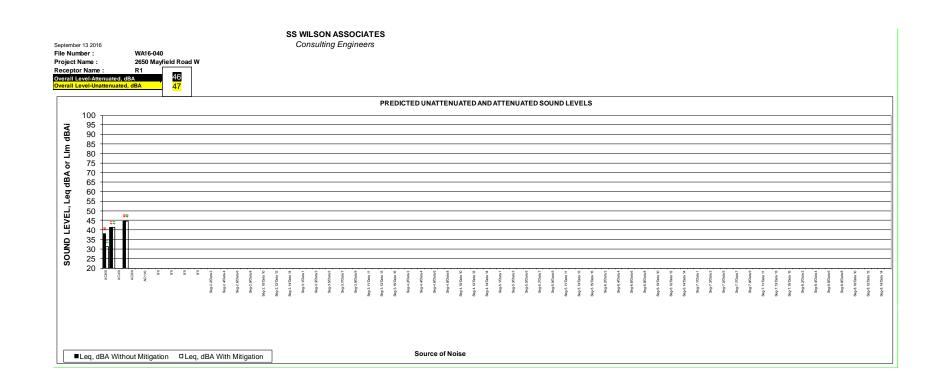
Condition of Source:

Other Data: Leo

Leq = 65.2 dBA @ 4m



TEXT 1.3			т	EXT 1.	1	ATE		N23-120	oources c	
File Number :	WA16-040)	Т	EXT 1.	2		General	(non-imp	oulsive) S	ource
Project Name : Receptor Name :	2650 May R1	field Roa	W							
Source Name	AC8						YN	do not c calc	alc	
Show Emission Data Octave Band Centre Frequency, Hz	Yes 31.5	Source U	nattenuate 125	d Leq dBA 250	38 500	Source A	tenuated 2000	Leq dBA	31 8000	dBL dBA
Use Cartesian Co-Ordinates ? Receptor Xr Co-Ordinates, m	Yes 815.0	Yes 815.0	Yes 815.0	Yes 815.0	Yes 815.0	Yes 815.0	Yes 815.0	Yes 815.0	Yes 815.0	
Receptor Yr Co-Ordinates, m Ground Elevation at Receptor,m	228.0	228.0 0.0	228.0 0.0	228.0 0.0	228.0 0.0	228.0	228.0 0.0	228.0 0.0	228.0 0.0	
Receptor Height above ground, m Receptor Zr Co-Ordinates, m	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0 5.0	
Source Xs Co-Ordinates, m Source Ys Co-Ordinates, m	823.0 165.0	823.0 165.0	823.0 165.0	823.0 165.0	823.0 165.0	823.0 165.0	823.0 165.0	823.0 165.0	823.0 165.0	
Ground Elevation at source, m Source Height above ground, m	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Source Zs Co-Ordinates, m Point or Line Source (P or L) ?	8.0 P	8.0 P	8.0 P	8.0 P	8.0 P	8.0 P	8.0 P	8.0 P	8.0 P	
Spectrum, dBL Adi. Name	80.2	73.3	68.7	59.7	58.7	57.0	54.6 0.0	50.5	41.3	81.3 62.5
Adj. Name Reference Dist. for Lp, m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Adjusted Spectrum, dBL Calculated Source-Receptor Distance,m	80.2 64	73.3 64	68.7 64	59.7 64	58.7 64	57.0 64	54.6 64	50.5 64	41.3 64	81.3 62.5
Geomtrical Spreading										
Consider Distance atten.? Distance Reduction Factor	Y 20	Y 20	Y 20	Y 20	Y 20	Y 20	Y 20	Y 20	Y 20	
Reference Dist. for Lp, m Source-Receptor Distance,m	4	4 64	4 64	4 64	4 64	4 64	4 64	4 64	4 64	
Distance Error Flag Geometrical Spreading, dB	Ok -24.0	-24.0	-24.0 44.7	-24.0	-24.0	-24.0	-24.0	-24.0	-24.0 17.3	
Lp With Geometric Spreading ISO Ground Attenuation	56.2	49.3	3	35.7	34.7	33.0	30.6	26.5	3	57.3 38.4
Model (1=none,2=CMHC,3=ISO) Use a Different Distance For Ground Atten.? Distance used for calculation	3 N	3 N	3 N	3 N	3 N	3 N	3 N	3 N	3 N	
Distance used for calculation Selected Distance For Calculation Source Height above ground, m	64 3.0	64 3.0	64 3.0	64 3.0	64 3.0	64 3.0	64 3.0	64 3.0	64 3.0	
Receptor Height above ground, m Barrier Height Factor(2xbh) (CMHC)	5.0	5.0	5.0 10	5.0	5.0 10	5.0	5.0	5.0	5.0	
P+T Factors (CMHC only) Calculated Ground Attenuation	-1.8	0 -1.8	0 -1.8	0 -1.8	0 -1.8	0 -1.8	0 -1.8	0 -1.8	0 -1.8	
Considered Ground Attenuation, dB Lp With Geometric Spreading & Gnd.Atten.	0.0 56.2	0.0 49.3	0.0 44.7	0.0 35.7	0.0 34.7	0.0 33.0	0.0 30.6	0.0 26.5	0.0 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 Sub-Total Propagation Attenuation,dB	-24.0	0.0 -24.0	0.0 -24.1	-0.1 -24.1	-0.1 -24.2	-0.3 -24.3	-0.6 -24.6	-1.5 -25.5	-2.7 -26.7	
Lp with Geom.Spreading,Gnd.&Atm.Atten. Additional Adjustments (Watch +/- Signs)	56.2	49.3	44.6	35.6	34.6	32.7	30.0	25.0	14.6	57.3 38.1
Tonal Penalty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Adj. 1 Adj. 2 Adj. 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Adj. 4 Sub-Total Adjustments, dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					34.6	32.7	30.0	25.0	14.6	57.3 38.1
Adjusted Lp @ Receptor, dBL Leq Time Base , Mnutes Point Source Data :	56.2 60.0 Yes	49.3 60.0 Yes 1	44.6 60.0 Yes 1	35.6 60.0 Yes 1	34.0 60.0 Yes 1	32.7 60.0 Yes 1	60.0 Yes	23.0 60.0 Yes	60.0 Yes	
Adjusted Lp @ Receptor.dBL Leq Time Base , Mnutes Point Source Data : -No. of Events in Time Base - Each Event Juration, min. - Duration (7 Aff Events, min.	60.0 Yes	60.0 Yes	60.0 Yes	60.0 Yes	60.0 Yes	60.0 Yes	60.0 Yes	60.0 Yes 1 60 60.0	60.0 Yes	57.3 38.1
Adjusted Lp @ Receptor, dBL Leq Time Base , Mnutes Point Source Data : -No. of Events in Time Base - Each Event Duration, min.	60.0 Yes 1 60 60.0 56.2 16.8	60.0 Yes 1 60 60.0 49.3 23.1	60.0 Yes 1 60 60.0 44.6 28.5	60.0 Yes 1 60 60.0 35.6 27.0	60.0 Yes 1 60 60.0 34.6 31.4	60.0 Yes 1 60 60.0 32.7 32.7	60.0 Yes 1 60 60.0 30.0 31.2	60.0 Yes 1 60 60.0 25.0 26.0	60.0 Yes 1 60 60.0 14.6 13.5	
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Adjusted Lp @ Receptor, BL Leg Time Base . Minutes Public Receptor	60.0 Yes 1 60 60.0 56.2 16.8 Y Y Roottop B Y Y S.0 28.0 2.0 5.0	60.0 Yes 1 60 60.0 49.3 23.1 X Y arrier Y 5.0 28.0 28.0 2.0 5.0	60.0 Yes 1 60 60.0 44.6 28.5 Source Y N Y Y 5.0 28.0 2.0 0 5.0	60.0 Yes 1 60 60.0 35.6 27.0 Source Y N Y Y 5.0 28.0 2.0 0 5.0	60.0 Yes 1 60 60.0 34.6 31.4 Source Y N Y S.0 28.0 2.0 0 5.0	60.0 Yes 1 60 60.0 32.7 32.7 X Y Y Y 5.0 28.0 28.0 2.0 5.0	60.0 Yes 1 60 60.0 31.2 Source Y N Y S.0 28.0 28.0 5.0	60.0 Yes 1 60 60.0 25.0 26.0 Y N Y Y 5.0 28.0 28.0 2.0 5.0	60.0 Yes 1 60 60.0 13.5 Y N Y Y 5.0 28.0 2.0 5.0	
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Adjusted Lp @ Receptor, BL. Leg Time Base , Mnutes Point Source Data : Point Source Data : Each Events In Time Base Each Events In Time Base Each Event Duration, min. Durard Ord XH Events, min. Dear Unstemasted Leg dBL. Wrieghted Unstemasted Leg dBL. Neighted Unstemasted Leg dBL. Neighted Unstemasted Leg dBL. Source Barrier Rule for gold Alexn 7 : Description of XH Events, and XH Events, an	60.0 60.0 7 7 7 8 60 7 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9	60.0	60.0 Yes 1 60 60.0 Yes 1 60 60.0 Yes Y Y Y Y Y Y Y Y Y Y Y X X	60.0 Yes 1 60 500 9 Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Sourcee Source <tr< td=""><td>60.0 Yes 1 60 60 60 94.6 31.4 V V Y Y Y Y Y Y Y Y</td><td>60.0 Yes 1 60 60.1 70.2 70.0 70.0 70.0 70.0 70.0 70.0 15.0 8.0 8.0 8.0 9.0 1.5.0 9.0 0.0</td><td>60.0 Yes 1 60.0 30.0 V Y SO 22.0 0.0 35.6 4.5 23.0 1.2 Source Y Y Y Y Y Y Y Y Y SO 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.</td><td>60.0 For the second s</td><td>60.0 Yes 60 60 60 60 60 70 70 50 20 00 20 20 00 20 20 00 20 2</td><td>57.3 38.1 50.8 31.4</td></tr<>	60.0 Yes 1 60 60 60 94.6 31.4 V V Y Y Y Y Y Y Y Y	60.0 Yes 1 60 60.1 70.2 70.0 70.0 70.0 70.0 70.0 70.0 15.0 8.0 8.0 8.0 9.0 1.5.0 9.0 0.0	60.0 Yes 1 60.0 30.0 V Y SO 22.0 0.0 35.6 4.5 23.0 1.2 Source Y Y Y Y Y Y Y Y Y SO 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	60.0 For the second s	60.0 Yes 60 60 60 60 60 70 70 50 20 00 20 20 00 20 20 00 20 2	57.3 38.1 50.8 31.4
Adjusted Lp @ Receptor. BL Lea Time Base , Minutes Point Source Data : No. of Events in Time Base Each Event Duration, min. - Each Event Duration, min. - Each Event Duration, min. - Each Event Duration, min. - Duration (74 Network, min. - Each Event Duration, min. - Duration (74 Network, min. - Duration) (75 Network, min. - Duratio	60.0 60.0 60.0 60.0 60.0 60.0 60.0 7 80.0 7 9 60.0 7 9 7 9 60.0 7 9 7 9 60.0 7 9 7 9 60.0 7 9 60.0 7 9 7 9 60.0	60.0	60.0 Yes 1 60 60.0 60.0 50.0 220 7 7 7 7 7 7 7 7 7 7 7 7 7	60.0 Yes 1 60 60.0 50.0	60.0 Yes 60 60 7 9 7 9 7 7 7 7 7 7 7 7 7	80.0 60.0 Yess 1 1 60 60.0 50.0 7 50.0 7 7 7 7 80.0 20.0 90.0 20.0 35.6 5.2 8.0 20.0 35.6 5.2 8.0 20.0 35.6 5.2 8.0 2.2 9.0 0.0 35.6 5.0 8.0 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 0.0 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	60.0 Yes 10 10 10 10 10 10 10 10 10 10	60.0 For the second s	60.0	57.3 38.1 50.8 31.4
Adjusted Lp @ Receptor. BL. Lea Time Base , Mnutes Point Source Data : No. of Events In Time Base Each Event Duration, min. Each Event Duration, min. Duration CAI & Events, min. Linear Unaternutated Leg dBL. Weighted Unaternutated Leg dBL. Norsk Control Mechanics Isona Source Barter (No. 10.7 Springer ISO Barter Rule for gold Atten? 7 Decision Barter Source Barter All Source, M. Source-Barter Distance Barter They and Atten? 7 Decision Control Mechanics Barter Source Barter All Source, M. Source-Barter Distance Barter They and Atten? 7 Barter Source Barter All Source, M. Source-Barter Distance Barter They and Source, M. Source-Barter Mension, JB. Barter Source Barter Alternustion, JB. Source-Barter Distance Barter J Roductor, B. December Barter, Manualton, JB. Source Barter Alternustion, JB.	60.0	60.0	60.0	60.0 Yes G G G G G G G G G G G G G	60.0 60.0 Yes 1 60 60.0 70.0 7 70.0 7 70.0 20.0 70.0 20.0 70.0 20.0 70.0 20.0 70.0 20.0 70.0 20.0 70.0 20.0 70.0 20.0 20.0 <	80.0 80.0 Yes 1 1 60 60.0 80.0 Y 9 Y 9 Y 9 Y 9 Y 9 Y 9 Y 28.0 Y 20.0 0.0 20.0 3.0 5.0 S.0.0 0.0 S.0.0 0.0 <t< td=""><td>60.0 Yes 1 1 1 5 5 5 5 5 5 5 5 5 5 5 5 5</td><td>60.0</td><td>60.0 Yes 1 60 60 60 60 60 0 0 0 20 0 50 0 20 0 50 0 20 0 50 0 20 0 50 0 20 0 50 0 20 0 20 0 50 0 20 0 0 0 0 0 0 0 0 0 0 0 0 0</td><td>57.3 38.1 50.8 31.4</td></t<>	60.0 Yes 1 1 1 5 5 5 5 5 5 5 5 5 5 5 5 5	60.0	60.0 Yes 1 60 60 60 60 60 0 0 0 20 0 50 0 20 0 50 0 20 0 50 0 20 0 50 0 20 0 50 0 20 0 20 0 50 0 20 0 0 0 0 0 0 0 0 0 0 0 0 0	57.3 38.1 50.8 31.4



	8	10 WI	т	EXT 1.	1	IATE	2	N23-120	Sources O	B Model, Modified-1
File Number :	WA16-040		т	EXT 1.	2		General	(non-imp	ulsive) S	ource
Project Name : Receptor Name :	TEXT TEXT									
Source Name Data S1	Seg-1.1 Data 1						Y N	do not c calc		
Show Emission Data Octave Band Centre Frequency, Hz	Yes 31.5	63	125	250	67 500	Source At 1000	2000	4000	60 8000	dBL dBA
Use Cartesian Co-Ordinates ? Receptor Xr Co-Ordinates, m	Yes 0.0	Yes 0.0	Yes 0.0	Yes 0.0	Yes 0.0	Yes 0.0	Yes 0.0	Yes 0.0	Yes 0.0	
Receptor Yr Co-Ordinates, m 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 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 Source Ys Co-Ordinates, m Ground Elevation at source. m	60.0 0.0 1.0	60.0 0.0 1.0	60.0 0.0 1.0	60.0 0.0 1.0	60.0 0.0 1.0	60.0 0.0 1.0	60.0 0.0 1.0	60.0 0.0 1.0	60.0 0.0 1.0	
Source Height above ground, m Source Zs Co-Ordinates, m	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Point or Line Source (P or L) ? Spectrum, dBL	P 0.0	P 71.1	P 72.2	P 65.1	P 60.6	P 61.1	P 63.5	P 62.0	P 56.2	75.9 69.0
Adj. Name Adj. Name	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0 00.0
Reference Dist. for Lp, m Adjusted Spectrum, dBL	50.0 0.0	50.0 71.1	50.0 72.2	50.0 65.1	50.0 60.6	50.0 61.1	50.0 63.5	50.0 62.0	50.0 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 Reference Dist. for Lp, m	20 50 60	20 50 60	20 50 60	20 50 60	20 50 60	20 50 60	20 50 60	20 50 60	20 50 60	
Source-Receptor Distance,m Distance Error Flag Geometrical Spreading, dB	Ok -1.6	-1.6	-1.6	-1.6	-1.6		-1.6	-1.6	-1.6	
Lp With Geometric Spreading ISO Ground Attenuation	0.0	69.5	70.6	63.5	59.1	59.5	61.9	60.4	54.6	74.4 67.4
Model (1=none,2=CMHC,3=ISO) Use a Different Distance For Ground Atten.?	3 N	3 N	3 N	3 N	3 N	3 N	3 N	3 N	3 N	
Distance used for calculation Selected Distance For Calculation	60	60	60	60	60	60	60	60	60	
Source Height above ground, m Receptor Height above ground, m	3.0	3.0 4.5	3.0	3.0	3.0	3.0 4.5	3.0	3.0	3.0 4.5	
Barrier Height Factor(2xbh) (CMHC) P+T Factors (CMHC only) Calculated Ground Attenuation	8.8 0 0.0	8.8 0	8.8 0							
Considered Ground Attenuation Considered Ground Attenuation, dB Lp With Geometric Spreading & Gnd Atten.	0.0	0.0 69.5	0.0 70.6	0.0 63.5	0.0 59.1	0.0	0.0 61.9	0.0 60.4	0.0	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	14.4 01.4
Atmospheric Attenuation, dB Sub-Total Propagation Attenuation, dB	0.0 -1.6	0.0 -1.6	0.0 -1.6	0.0 -1.6	0.0 -1.6	0.0 -1.6	-0.1 -1.7	-0.2	-0.4 -2.0	
Lp with Geom.Spreading,Gnd.&Atm.Atten. Additional Adjustments (Watch +/- Signs)	0.0	69.5	70.6	63.5	59.0	59.4	61.8	60.2	54.1	74.3 67.3
Tonal Penalty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Adj. 1 Adj. 2	0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0	0.0	
Adj. 3 Adj. 4 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 Leq Time Base , Minutes	0.0 60.0	69.5 60.0	70.6 60.0	63.5 60.0	59.0 60.0	59.4 60.0	61.8 60.0	60.2 60.0	54.1 60.0	74.3 67.3
Point Source Data : - No. of Events in Time Base	Yes	Yes	Yes	Yes 1	Yes 1	Yes 1	Yes	Yes	Yes 1	
Each Event Duration, min. Duration Of All Events, min.	60 60.0	60 60.0	60 60.0	60 60.0	60 60.0	60 60.0	60 60.0	60 60.0	60 60.0	
Linear Unattenuated Leq dBL A-Weighted Unattenuated Leq dBA	0.0	69.5 43.3	70.6 54.5	63.5 54.9	59.0 55.8	59.4 59.4	61.8 63.0	60.2 61.2	54.1 53.0	74.3 67.3
Noise Control Measures Sound Barrier(s) Case	Receptor	Receptor	Receptor	Receptor	Receptor	Receptor	Recepto	Receptor	Receptor	
Is there a sound Barrier (Y or N) ? Ignore ISO Barrier Rule for gnd Atten? ?	Y N V	Y N	Y N	Y N	Y N V	Y N	Y N	Y N V	Y N Y	
Decision Source Sound Barrier 1	TracK Gra	Y ges	Y	Y	Y	Y	Y	Y	Y	
Ground Elevation At Source, M	18		1.8	18	1.0	1.0	1.0	1.0	1.0	
	1.0	1.0	1.0	1.0	10.0	10.0			10.0	
Source-Barrier Distance Barrier Height Barrier Gnd. Elev.	1.0 10.0 6.0 0.0	1.0 10.0 6.0 0.0	1.0 10.0 6.0 0.0	1.0 10.0 6.0 0.0	10.0 6.0 0.0	10.0 6.0 0.0	10.0 6.0 0.0	10.0 6.0 0.0	10.0 6.0 0.0	
Source-Barrier Distance Barrier Height Barrier Gnd. Elev. Barrier Thickness Ground Elevation At Receptor.M	1.0 10.0 6.0 0.0 0.0 0.0	1.0 10.0 6.0 0.0 0.0	1.0 10.0 6.0 0.0 0.0	1.0 10.0 6.0 0.0 0.0	10.0 6.0 0.0 0.0	10.0 6.0 0.0 0.0	10.0 6.0 0.0 0.0	10.0 6.0 0.0 0.0	10.0 6.0 0.0 0.0	
Source-Barrier Distance Barrier Height Barrier Ghd. Elev. Barrier Thickness Ground Elevation Af Receptor M Receiver-Barrier Olist. Calc Line Source Barrier Attenuation dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Source-Barrier Distance Barrier Holgh Barrier Tolgh Barrier Tolghones Ground Elevation At Receptor M Receiver-Barrier Dist. Circl: Line Source Barrier Asemuation dB Barrier For Direwton	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	
Source-Barrier Distance Barrier Heght Barrier Heght Barrier Tholones Ground Elevation & Receptor M. Receiver Barrier Monosoft Carlo Line Source Barrier Annuastion 45 Barrier Receives Carrier Barrier Receives Carrier Barrier Te Distantion Line: To Poart Source Barrier Adjust	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	
Source-Branne Distance Barrier Hongh Barrier Mongh Barrier Mongh Barrier Machael Barrier Anderson Barrier Anderson	0.0 0.0 50.0 5hadow 6.0 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	0.0 0.0
Source-Benner Distance Bourse Hength Barnel Code, Tisse Barnel And Tisse Barnel And Tisse Barnel And Barnel Annual Annual Code, Link Bourse Barnel Annual Annual Barnel Ford Descalation Barnel Ford Bourse Barnel Angust Barnel Ford Barnel Barnel Angust Barnel Angust Bar	0.0 0.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0 dBL	0.0 0.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0 0.0 V	0.0 0.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0 dBA	0.0 0.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0 V	0.0 0.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0 V	0.0 0.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0 0.0	0.0 0.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0 V	0.0 0.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0 0.0	0.0 0.0
Consider Barrier Attenuation Ground Elevation At Source, M Source-Barrier Distance	0.0 0.0 50.0 5hadow 6.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0 dBL	0.0	0.0 0.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0	0.0 0.0 50.0 0.0 5hadow 6.0 0.0 0.0 0.0	0.0 0.0 0.0	0.0 0.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0	0.0	0.0 0.0
Consider Barrier Attenuation Ground Elevation Al Source, M Source-Barrier Distance Ground Elevation Al Receptor, M Receiver-Barrier Dist. Barrier Height	0.0 0.0 55.0 0.0 55.0 0.0 0.0 0.0 0.0 0.	0.0 0.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0 dBL Y 1.0 10.0	0.0 0.0 50.0 0.0 5hadow 6.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0 0.0 dBA Y 1.0 10.0 0.0 50.0 4.4	0.0 0.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0 Y 1.0 10.0 0.0 4.4	0.0 0.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0 0.0 V 1.0	0.0 0.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0 0.0 1.0 10.0 0.0 50.0 4.4	0.0 0.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0 0.0 7 1.0	0.0 0.0 50.0 0.0 5hadow 6.0 0.0 0.0 0.0 0.0 1.0 10.0 0.0 4.4	0.0 0.0
Consider Barrier Attenuation Ground Elevation A Source, M Source-Barrier Distance Ground Elevation At Receptor, M Receiver-Barrier Dist. Barrier Tolkt. Barrier Tolkt. Barrier Thickness	0.0 0.0 50.0 50.0 0.0 0.0 0.0 0.0 0.0 0.	0.0 0.0 50.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 50.0 0.0 5hadow, 6.0 0.0 0.0 0.0 0.0 7 1.0 10.0 0.0 50.0 4.4 0.0 0.0	0.0 0.0 50.0 0.0 5hadow, 6.0 0.0 0.0 0.0 dBA Y 1.0 10.0 0.0 50.0 4.4 0.0 0.0	0.0 0.0 50.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 50.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0 Y 1.0 10.0 0.0 50.0 4.4 0.0 0.0	0.0 0.0 50.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 50.0 5hadow 6.0 0.0 0.0 0.0 0.0 0.0 0.0 10.0 50.0 4.4 0.0 0.0	0.0 0.0
Consider Barrier Attenuation Ground Elevation A Source, M Source-Barrier Distance Ground Elevation A Receptor, M Receiver-Barrier Dist. Barrier The Height Barrier Chot. Elev. Barrier Thickness Calc. Line Source Barrier Attenuation, dB Barrier Acousts Zone	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 50.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0 0.0 0.0 0.0 10.0 0.0 10.0 0.0	0.0 0.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 50.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 50.0 50.0 0.0 0.0 0.0 0.0 0.0 0.	0.0 0.0 50.0 0.0 0.0 0.0 0.0 0.0 10.0 10	0.0 0.0 50.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 50.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0
Consider Barrier Atenuation Ground Elexaton A Source, M Source-Barrier Distance Ground Elexaton A Receptor M Receiver-Barrier Dist. Barrier Height Barrier Height Barrier Chol. Elex. Barrier Tholkness Cale. Line Source Barrier Allenuation,dB Barrier Acoustic Zone Barrier Acoustic Zone Barrier Acoustic Zone Barrier Acoustic Source Barrier Adjust.	0.0 0.0 50.0 50.0 50.0 50.0 50.0 0.0 0.0	0.0 0.0 50.0 50.0 0.0 50.0 0.0 0.0 0.0 0	0.0 0.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0 0.0 10.0 50.0 4.4 0.0 50.0 50.0 4.4 -5.0 50.0 -5.0 50.0 -5.0 50.0 -5.0 50.0 -5.0 50.0 -5.0 -5	0.0 0.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0 dBA Y 1.0 10.0 0.0 50.0 4.4 0.0 50.0 50.0 4.4 1.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0	0.0 0.0 50.0 50.0 0.0 0.0 0.0 0.0 0.0 10.0 0.0 50.0 4.4 0.0 0.0 50.0 4.4 4.4 0.0 0.0 50.0 4.4 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 0.0 0	0.0 0.0 50.0 0.0 50.0 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 50.0 50.0 0.0 0.0 0.0 0.0 0.0 10.0 0.0 50.0 4.4 0.0 0.0 50.0 4.4 4.4 0.0 0.0 50.0 4.4 1.0 10.0 10.0 50.0 50.0 10.0 50.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 50.0 50.0 0.0 0.0 0.0 0.0 0.0 0.	0.0 0.0
Consider Barrier Alternuation Gonund Eleadon A Source, M Source-Banrier Otstance Source-Banrier Otstance Marrier Marken Stance Barrier Height Barrier Grad, Elex. Barrier Charl, Lerk. Barrier Alternuster Barrier Johnesen Barrier Alternuster Barrier Alternuster Barrier Alternuster Barrier Johnesen Barrier Alternuster Barrier A	0.0 0.0 50.0 50.0 50.0 50.0 50.0 0.0 0.0	0.0 0.0 50.0 0.0 50.0 0.0 0.0 0.0 0.0 0.	0.0 0.0 50.0 50.0 0.0 6.0 0.0 0.0 0.0 0.0 0.0 10.0 0.0 10.0 0.0	0.0 0.0 50.0 50.0 6.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 50.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0 0.0 10.0 0.0 50.0 4.4 0.0 0.0 5.2 shadow 5.4	0.0 0.0 50.0 50.0 0.0 50.0 0.0 0.0 0.0 0	0.0 0.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0 0.0 10.0 10.0 0.0 50.0 4.4 0.0 0.0 55.0 5.4	0.0 0.0 50.0 50.0 0.0 shadow 6.0 0.0 0.0 0.0 0.0 10.0 0.0 50.0 4.4 0.0 0.0 5.4	0.0 0.0 50.0 50.0 50.0 0.0 0.0 0.0 0.0 0	67.7 60.1
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