Landfill Expansion Noise Impact Assessment

St. Marys Future Solid Waste Disposal Needs Environmental Assessment

Town of St. Marys

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April 7, 2016 (Updated July 2021)
300032339.0000

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Record of Revisions

Revision	Date	Description
0	April 2016	Initial Submission by Burnside to Town of St. Marys
1	July 2016	Revisions based on Noise Review Comments
2	July 2021	Issued to accompany July 2021 EAR Submission

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Executive Summary

The Town of St. Marys (the Town) is conducting an Individual Environmental Assessment (EA) under the *Environmental Assessment Act* to review alternative means to manage solid waste disposal in the Town over a 40-year planning period. The existing St. Marys Landfill Site (the Site), Environmental Compliance Approval (ECA) Number A150203, is located at 1221 Water Street South, St. Marys, Ontario. The 37 ha Site was part of a former clay borrow pit that was used by St. Marys Cement in cement manufacturing and contains an approved fill area of 8 ha. The landfill is nearing its approved fill capacity and a new means to manage disposal of post-diversion solid waste is required.

All of the sound level limits at all Points of Reception (PORs) for each Alternative Method are below the Ministry criteria; therefore, all methods are acceptable potential expansion options for the St. Marys Landfill.

Vibration is typically not felt further than 75 m from the source. The closest sensitive receptor is located 148.5 m from the landfill operations so vibration from delivery, placement, compaction and covering the waste within the expanded landfill was considered negligible.

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1.0 Project Description

1.1 Introduction

The Town of St. Marys (the Town) is conducting an Individual Environmental Assessment (EA) under the *Environmental Assessment Act* to review alternative means to manage solid waste disposal in the Town over a 40-year planning period. The existing St. Marys Landfill Site (the Site), Environmental Compliance Approval (ECA) Number A150203, is located at 1221 Water Street South, St. Marys, Ontario. The 37 ha Site was part of a former clay borrow pit that was used by St. Marys Cement in cement manufacturing and contains an approved fill area of 8 ha. The landfill is nearing its approved fill capacity and a new means to manage disposal of post-diversion solid waste is required. The location of the existing landfill is illustrated on Figure 1.

Terms of Reference (TOR) were prepared and were approved by the Ministry of Environment and Climate Change on December 29, 2014. The TOR laid out a strategy for completing the EA. Phase 1 of the EA Methodology evaluated *Alternatives to the Undertaking*, specifically, undertaking a qualitative screening of:

- Alternative 4: Exporting waste to another jurisdiction; and
- Alternative 6: Expanding the existing landfill.

Phase 1, now completed and documented elsewhere, determined that expanding the existing landfill was preferred. This Landfill Expansion Noise Impact Assessment report therefore looks at the Alternative Methods for expanding the St. Marys Landfill. The Alternative Methods are listed in the table below.

Table 1-1: Alternative Methods

Alternative Methods		Description
1	Vertical expansion of the existing landfill	This Method involves an expansion in the vertical direction within the existing footprint of the landfill.
2	Horizontal expansion of the existing landfill	This involves an expansion outside of the existing landfill footprint.
3	A combination of vertical and horizontal expansion	This Method would involve partial vertical expansion along with some horizontal expansion of the landfill footprint, basically a mixture of Methods 1 and 2.
4	Development of a new landfill footprint	This Method involves closure of the existing 8 ha footprint and development of a new landfill footprint elsewhere on the 37 ha Site.
5	Vertical expansion plus a new footprint	This Method is a combination of Methods 1 and 4.

Each of the Alternative Methods are compared against existing conditions and regulatory requirements in this report.

The Current situation and five Alternative Methods of landfill expansion are assessed in this report. For each, the worst-case impact was selected for investigation. This choice means that there are substantial periods of time when the activity will be substantially less than modelled and/or that activity will be further from the receptors than modelled so the impacts will be less than predicted.

The Current situation and Alternative Method 1 have the same worst-case scenario so the modelling and results indicated as “Current” are the same as “Alternative Method 1”.

Similarly, “Alternative Method 5” has the same worst-case scenario as “Alternative Method 3” and so was not modelled separately.

1.2 Area of Study

The identified Study Area will be used as the basis for defining and characterizing the natural environment which may be affected by the expansion.

The Study Areas for this Landfill Expansion Noise Impact Assessment report are defined as follows:

- All lands associated with the existing St. Marys Landfill, the 37 ha Site located at 1221 Water Street South, St. Marys, ON.
- All lands 500 m from the noise sources unless modelling indicates impacts exceeding criteria beyond that distance in which case the area will be expanded to show all impacts exceeding criteria.
- Study Area Vicinity – All lands within a 1,000 m radius of the on-site Study Area. Since all sources are expected to be ground level, the significant impacts will all be close to the property line, so the EA is only expected to discuss impacts on sensitive receptors within 1 km. Should modelling show impacts outside the 1 km radius, they will be discussed appropriately.

1.3 Study Overview

The approach to this assessment was to satisfy the requirements of the Ontario Environmental Assessment Act (R.S.O. 1990, c. E, October 25, 2010). The Site will be submitting an Environmental Compliance Approval in the future, and as such, this assessment was also done to meet the criteria of the Environmental Protection Act (R.S.O. 1990, c. E, February 1, 2016). This Noise and Vibration Impact Assessment is being conducted in support of this process and hence has been prepared based on Ontario Ministry of the Environment and Climate Change (MOECC) requirements.

The landfill currently operates Tuesday, Wednesday, Friday, and Saturday between the hours of 8:00 a.m. and 4:30 p.m. Most of the noise generating activities at the Site, including receiving of waste trucks occurs between those hours. The Site ECA allows for operations between 7:00 a.m. and 7:00 p.m.; therefore, this assessment is for daytime (7:00 a.m. to 7:00 p.m.) noise impact only.

The noise impact considerations for the landfill site, including sound level limits and the potential noise sources considered in the assessment are in accordance with the Ministry publication "Noise Guidelines for Landfill Sites"[1].

[1] Noise Guidelines for Landfill Sites (DRAFT). October 1998. Ontario Ministry of the Environment.

2.0 Noise Assessment

The noise impact assessment completed for the proposed expansion consists of:

1. Identification of all dominant noise sources at the Site.

2. Determination of worst-case noise emission scenarios associated with the above-mentioned Alternative Methods.

3. Acoustic modelling of the Site under the defined worst-case operating scenario in order to predict worst-case noise impact at all of the nearby receptor locations.

4. Comparison of the predicted maximum receptor sound levels with the applicable criterion for landfills to determine compliance.

5. Determine noise mitigation measures in case of non-compliance for various options.

6. Comparison of the various options to assess relative impacts of each option at the sensitive receptors.

2.1 Applicable Criteria

2.1.1 MOECC Noise Limits

The Ministry's publication Noise Guideline for Landfills – DRAFT (MOE, 1998) applies to the operations at the St. Marys Landfill. The guidelines specified a daytime (7:00 to 19:00) receptor noise criterion of 55 dBA and a nighttime (19:00 to 7:00) receptor noise criterion of 45 dBA. These sound exposure limits apply to any receptor, in any worst-case hour of operation at the landfill. These limits can be replaced with existing background values if it is established that the background levels are consistently higher due to other noise sources in the area, such as road traffic and/or other industries.

2.2 Sensitive Receptors

Receptors of interest for this assessment are consistent with MOE document NPC-300 (MOE, 2013) and include the following noise sensitive land uses:

- Residences;
- Hotels, motels and campgrounds;
- Schools, universities, libraries and daycare centers;
- Hospitals and clinics, nursing/retirement homes; and
- Churches and places of worship.

Receptors of interest within the Study Area are residential houses located along Perth Road 123 and Water Street South. Residences have different setback distances and various degrees of visual screening from the road. Residences closest to the road are anticipated to have the greatest potential impact from the traffic and operation of the landfill. As the separation distance increases between the road and receptors, the impact from sound related to traffic and landfill operation will be reduced.

For the modelling portion of this assessment, points of reception (POR) are chosen to be representative of the receptors of interest with the highest impacts from the Site. The PORs that are representative of worst-case potential noise impacts have been identified and used in the analysis. Receptors are placed in the plane of a window where sound originating from the Site is received, assumed to be at a height of 1.5 m and 4.5 m unless otherwise stated. Six residential locations have been identified as being the most impact sensitive points of reception along Water Street South (Hwy 123). Sound levels at all other receptors will be at or below the sound levels of the representative receptors next to them. The PORs are shown in Figure 3 and summarized in Table 2.

2.3 Evaluation of Noise Sources

St. Marys Landfill contains several significant sources of noise. These sources include on-site traffic, a compactor, and a loader (see Section 2.3.2). All noise sources associated with road traffic travelling to/from St. Marys Landfill, as well as all traffic in the Study Area have been included in this assessment. Passenger vehicles[2] are generally considered to have negligible noise emissions when travelling at 20 km/h or less. All vehicles are restricted to 20 km/h while on-site so any noise associate with passenger vehicles has been excluded.

See Table 1: Noise Source Summary Table for a complete list of sources, sound power, source location, existing noise control measures, and required noise control measures.

2.3.1 On-Site Traffic

It is likely that only one or two trucks per hour will be entering the Site. All trucks entering the Site will follow OnSiteTrk1 truck path. Once on-site, the trucks will only follow one of OnSiteTrk2, OnSiteTrk3, or OnSiteTrk4 truck paths.

Eight trucks per day are expected to enter the Site following truck path OnSiteTrk1, with a maximum of four trucks following OnSiteTrk2, a maximum of four trucks following OnSiteTrk3, and a maximum of two trucks following OnSiteTrk4. The noise model assumes that in one hour, the maximum number of trucks per day will travel each of the truck paths. Therefore, the noise model is very conservative.

[2] Passenger vehicles include cars, mini-vans, SUV's, and pick-up trucks. See the definition of Automobiles provided in Section 2.4.2.

2.3.1.1 OnSiteTrk1

The moving source labelled OnSiteTrk1 shown in Figure 3 represents the truck traffic entering the Site and driving to the weigh scale and driving from weigh scale and exiting the Site. It is expected that a maximum of eight trucks per day will enter the Site. They are all assumed to travel this path in the same hour.

The source emission was estimated from previous measurements taken at another site and are shown in Appendix C, Table C01 next to the “Delivery Truck Medium Speed” label.

2.3.1.2 OnSiteTrk2

The moving source labelled OnSiteTrk2 shown in Figure 3 represents the truck traffic driving from the weigh scale to the open face and returning to the weigh scale. It is expected that a maximum of four trucks per day will travel along this truck path. They are all assumed to travel this path in the same hour.

2.3.1.3 OnSiteTrk3

The moving source labelled OnSiteTrk3 shown in Figure 3 represents the truck traffic driving from the weigh scale to the composting area and returning to the weigh scale. It is expected that a maximum of four trucks per day will travel along this truck path. They are all assumed to travel this path in the same hour.

2.3.1.4 OnSiteTrk4

The moving source labelled OnSiteTrk4 shown in Figure 3 represents the truck traffic driving from the weigh scale to the stockpile and returning to the weigh scale. It is expected that a maximum of two trucks per day will travel along this truck path.

2.3.2 On-Site Equipment

The only equipment that is used in the operations at the Site is one compactor and one loader. As this is a small site, no other equipment is necessary.

There is only one equipment operator at the landfill site. The operator therefore runs either the loader or the compactor. There are no times when both pieces of equipment are operated simultaneously. While the air emission indicates that the compactor does not run more than 20 minutes of any one hour, the noise model assumes that the compactor runs for the entire hour so the noise model is very conservative. Operation of the loader instead of the compactor would result in less noise.

2.3.2.1 Loader (LDR)

The Loader (LDR) used on-site is a 2013 CAT 938K Loader. It was confirmed by on-site employees that the noise from this equipment is minimal. They indicate that while standing in the garage next to the machine, “It is difficult to tell that it is running” while it is idling. This source has been considered to have negligible noise emissions. As above, to be conservative in our assessment we have assumed noise emissions from the Compactor (CMPTR) to represent operation of the Loader (LDR).

2.3.2.2 Compactor (CMPTR)

The Compactor (CMPTR) used on site is a 1986 CAT 816D Compactor. The source is 2.8 m above the ground. The sound power levels for the loader were established through On-Site measurements on Wednesday March 16, 2016. The sound power levels are in Appendix C, Table C02. See Appendix D for a photograph.

2.3.2.3 Pest Control Devices

No pest control devices are employed in the operation of the landfill.

2.3.2.4 Ancillary Facilities

The only other ancillary facilities at the Site are bins into which the public sorts their recyclable materials. The passenger vehicles mentioned elsewhere in the report (Section 2.3) are not considered to have significant noise emissions. The trucks picking up the recycled materials drive a shorter path than other similar vehicles on-site and so the other vehicles were used in the noise assessment. Those trucks were included in the total truck count for the Site.

Garbage is dumped on the edge of the working face and dealt with at that point. The noise from those operations is addressed below.

2.3.3 Off-Site Road Traffic

The 2012 estimate of Annual Average Daily Traffic (AADT) for Perth Road 123 and Water Street South was obtained from Perth County. It has been assumed that the waste quantity will increase 1% annually, thus it has been assumed that traffic generated to and from the Site will increase at a rate of 1% annually. The current and future AADT estimates are included in Appendix A. Noise at the sensitive receptors was calculated using STAMSON. The model outputs are included in Appendix B.

2.3.4 Construction and Rehabilitation

Site construction activities would likely include one or more of each of the following equipment: excavator, wheel tractor scraper, bulldozer, construction truck, and a compactor, along with vehicles arriving for on-site delivery of materials. It is expected that all construction activities will conform to the criteria set out in NPC-115 of 83 dB.

Residents may experience noise levels during the day that are greater than the maximum predicted on-site noise level (50 dB) or the maximum noise from the traffic (50 to 60 dB). However, as the construction will be confined to relatively short periods (likely two to three months at a time) compared to years of landfill operations, the disruption due to construction is considered to be minor.

Alternative Method 1 requires the least construction period, so it is considered “best” from a noise generation perspective. Alternative Method 2, 4, and 5 will require more significant construction efforts and will therefore generate more noise. Alternative Method 3 requires somewhat less construction effort compared to Methods 2, 4 and 5, and would be completed over a somewhat shorter overall construction period. Regardless of the Method selected, construction to prepare for operation and for site closure at the end of life is required by all Methods. Construction activities will involve the same type of work and noise and are therefore considered generally equal.

2.4 Modelling Methodology

Only the Current and three Alternative Methods were modelled because the worst case from the selected Alternative Methods covers all five Alternative Methods discussed in Section 1.1. The Current situation and five Alternative Methods of landfill expansion are assessed in this report. In each case, the worst-case impact was selected for investigation. The choice means that there are substantial periods of time when the activity will be substantially less than modelled and/or that activity will be further from the receptors than modelled so the impacts will be less than predicted.

The Current situation and Alternative Method 1 have the same worst-case scenario so the modelling and results indicated as “Current” are the same as “Alternative Method 1”.

Similarly, “Alternative Method 4” has the same worst-case scenario as “Alternative Method 5” and so was not modelled separately.

2.4.1 On-Site Noise

The Current and five Alternative Method worst-case noise emission scenarios, consisting of all relevant on-site noise sources listed above, operating simultaneously and at their maximum load, were modelled using Predictor software. Because the worst case for some of the Alternative Methods corresponds with other Alternative Methods, only the Current and three Alternative Methods were modelled. The worst-case for

Alternative Method 1 is the same as the Current model and Alternative Method 4 is the same as Alternative Method 5 model.

Predictor is a computer modelling program from Bruel and Kjaer, which follows the procedure specified by ISO Standard 9613-2. As such, the prediction model takes into account the sound level attenuation of the entered sound power data with distance as well as any attenuation provided by building shielding and ground absorption.

2.4.1.1 Assumptions and Considerations

Operations may change with the seasons and staging of the landfill. To be conservative, worst-case scenarios have been modelled. Key assumptions are presented below:

- Peak activity (e.g., peak haul route traffic and all heavy equipment in use at the same time) was modelled for all scenarios.
- A ground absorption coefficient of 1.0 was used, as most of the ground between the sources and receptors is absorptive ground (i.e., grass).
- Default atmospheric conditions were used (i.e., temperature of 10°C and relative humidity of 70%).
- Site topography (elevation contours) was incorporated into the noise model.
- For On-Site Truck Routes, the maximum hourly truck counts were used, and a travel speed of 20 km/hr.

2.4.2 Off-Site Traffic Noise

The MOECC requires the use of the ORNAMENT noise model for predicting roadway traffic noise levels as L_{EQ} (16-hr) Day and L_{EQ} (8-hr) Night values. The MOECC developed the STAMSON computer program to implement the ORNAMENT methodology in 1990. The methodology detailed within the MOECC NPC-300 guideline was followed for the roadway traffic modelling.

The Study Area was modelled for the existing conditions, as well as for the future noise levels for three landfill expansion scenarios. The road traffic data was projected to year 2025, using a 1% annual growth rate. In order to predict sound levels from road traffic STAMSON requires:

- Source to receiver distance – between 15 m and 500 m.
- Minimum traffic volume – 40 vehicles per hour.
- Minimum vehicle speed – 80 km/h (as posted on Perth Road 123).

Definitions of vehicle classes used in the model are as follows[3]:

- Automobiles: All vehicles having two axles and four wheels designed primarily for the transportation of nine or fewer passengers or the transportation of cargo (e.g., vans and light trucks). Generally, the gross vehicle weight is less than 4,500 kg.
- Medium Trucks: All vehicles having two axles and six wheels designed for the transportation of cargo. Generally, the gross vehicle weight is greater than 4,500 kg but less than 12,000 kg. Public Works vehicles fall into this category, though few dedicated waste collection vehicles are Medium Trucks.
- Heavy Trucks: All vehicles having three or more axles and designed for the transportation of cargo. Generally, the gross vehicle weight is greater than 12,000 kg. Most waste collection vehicles – front, side or rear loaded trucks and roll-off bin trucks – fall into this category.

A number of assumptions were used in the noise model:

- The road gradient was assumed to be 0%.
- Flat/gentle slope topography was selected.
- Road pavement was assumed as a standard asphalt surface.
- Intermediate surface was assumed to be absorptive (grass).
- A minimum 15 m separation distance was assumed to the POR when the actual separation distance was less than 15 m.

Stamson requires that the sum of the road traffic data be >= 40 vehicles per hour. To meet the minimum 40 vehicles per hour criteria that STAMSON requires, the AADT provided by Perth County had to be increased. Perth County provided 2189 AADT for 2015 (Appendix A). The Perth County AADT was doubled to allow Stamson to do calculation, to 4378 (shown in Appendix B). The reported impact was the calculated results minus 3 dB to get the actual sound level for 2189 AADT 2015.

The speed limit is reduced to 50 km/h north of the landfill. Incorporating this change of speed limit into the model would reduce the impact at the sensitive receptors but would not change the resulting criterion. The exclusionary limit would still be used.

The gradient of the road near where Perth Road 123 becomes Water Street is not level. If this information had been used, the impact of road noise on the local receptors would be higher which could potentially allow a higher impact at the PORs. This information was not used so the most conservative assessment was used.

[3] Ornament – Ontario Road Noise Analysis Method for Environment and Transportation. Technical Document. Ministry of the Environment, October 1989, page 5.

Road Traffic could have been assessed further into the future, but it would have been more likely to increase the limit that the Landfill would have to meet (i.e., more landfill noise would be allowed). To be conservative, only a 10-year horizon was assessed. This choice is the most conservative treatment.

The off-site vehicle traffic is expected to be the same regardless of which Alternative Methods is selected.

2.4.3 Existing Noise Barriers

Berms were constructed as noise barriers when the facility was built. Those berms were imported into the noise model from elevation contours. From publicly available aerial photography, street-level imagery and a site visit, no other noise barriers exist within the Study Area.

2.5 Results

The landfill only operates during the day and has no noise emissions during the night. As a result, the daytime is the only time period assessed. The scenario used to model each option is very conservative. The scenario assumes that all the trucks expected at the facility in one day complete their deliveries in the same hour. In that same hour, the compactor operates for its operating period.

The purpose of these tables is to present the predicted daytime impact at sensitive PORs at both 1.5 m and 4.5 m that the applicable noise sources, identified as significant in the Noise Source Summary Table (Table 1-Exist), have on the identified points of reception (Table 2).

The off-site vehicle traffic is expected to be the same regardless of which Alternative Method is selected so all PORs will experience 0 dB difference (insignificant) as a result of changes in off-site traffic.

2.5.1 On-Site Noise

2.5.1.1 Existing Conditions

Table -Exist: Point of Reception Noise Impact Table (Un-Mitigated Current) shows the Source ID, Source Type, Distance from the Source to Receptor, and the Sound Pressure Level predicted at each POR. The results are summarized in Table 4-Exist: Acoustic Assessment Summary Table: Daytime (Un-Mitigated Current).

2.5.1.2 Alternative Method 2: Horizontal Expansion

Table 3-M2: Point of Reception Noise Impact Table (Un-Mitigated Method 2) shows the Source ID, Source Type, Distance from the Source to Receptor, and the Sound Pressure Level predicted at each POR. The results are summarized in Table 4-M2: Acoustic Assessment Summary Table: Daytime (Un-Mitigated Method 2).

2.5.1.3 Alternative Method 3: Vertical and Horizontal Expansion

Table 3-M3: Point of Reception Noise Impact Table (Un-Mitigated Method 3) shows the Source ID, Source Type, Distance from the Source to Receptor, and the Sound Pressure Level predicted at each POR. The results are summarized in Table 4-M3: Acoustic Assessment Summary Table: Daytime (Un-Mitigated Method 3).

2.5.1.4 Alternative Method 5: Combination of Vertical Expansion and Development of a New Landfill Footprint

Table 3-M5: Point of Reception Noise Impact Table (Un-Mitigated Method 5) shows the Source ID, Source Type, Distance from the Source to Receptor, and the Sound Pressure Level predicted at each POR. The results are summarized in Table 4-M5: Acoustic Assessment Summary Table: Daytime (Un-Mitigated Method 5).

2.5.2 Off-Site Noise

Based on the STAMSON calculations, the daytime impact of the off-site road traffic at each POR is above the exclusionary limit of 55 dBA during the day. PORs 1, 2, 4, 5, and 6 also exceed the exclusionary limit of 50 dBA during the nighttime.

The noise impact experienced at the PORs due to the landfill operations are less than the exclusionary limit of 55 dBA during the day (no night operation). The noise experienced by the PORs from landfill operations is much less than from the road traffic. Because the road traffic impact is greater, the residents will not notice any change in the sound levels due to the expansion of the landfill.

The results are summarized in Table 5.

2.6 Investigation of Noise Mitigation

2.6.1 Noise Mitigation Measures

Based on the completed noise assessment, the predicted noise impacts for the existing landfill, as well as all Alternative Methods are within the guidelines specified by the MOECC, and as a result, mitigation measures for noise are not required.

3.0 Comparison of Alternative Methods

The existing noise levels experienced at each POR are compared to the predicted noise levels in each Alternative Method. Table 6: Comparison of the Change in Sound Levels at Each POR, shows the existing noise level, and the change in noise level experienced at each POR for the three different Alternative Methods.

The MOECC, in their document "Ontario Ministry of Environment and Energy (MOEE), 1994, *MOEE/GO Transit Noise and Vibration Protocol – December 1994 (Draft #9)*" characterize the difference in sound impacts as shown in the following table.

Table 3-1: Noise Impact Objectives

Difference in Sound Level	Impact Rating
0 to 2.99 dB	Insignificant
3.0 to 4.99 dB	Noticeable
5.0 to 9.99 dB	Significant
10+ dB	Very Significant

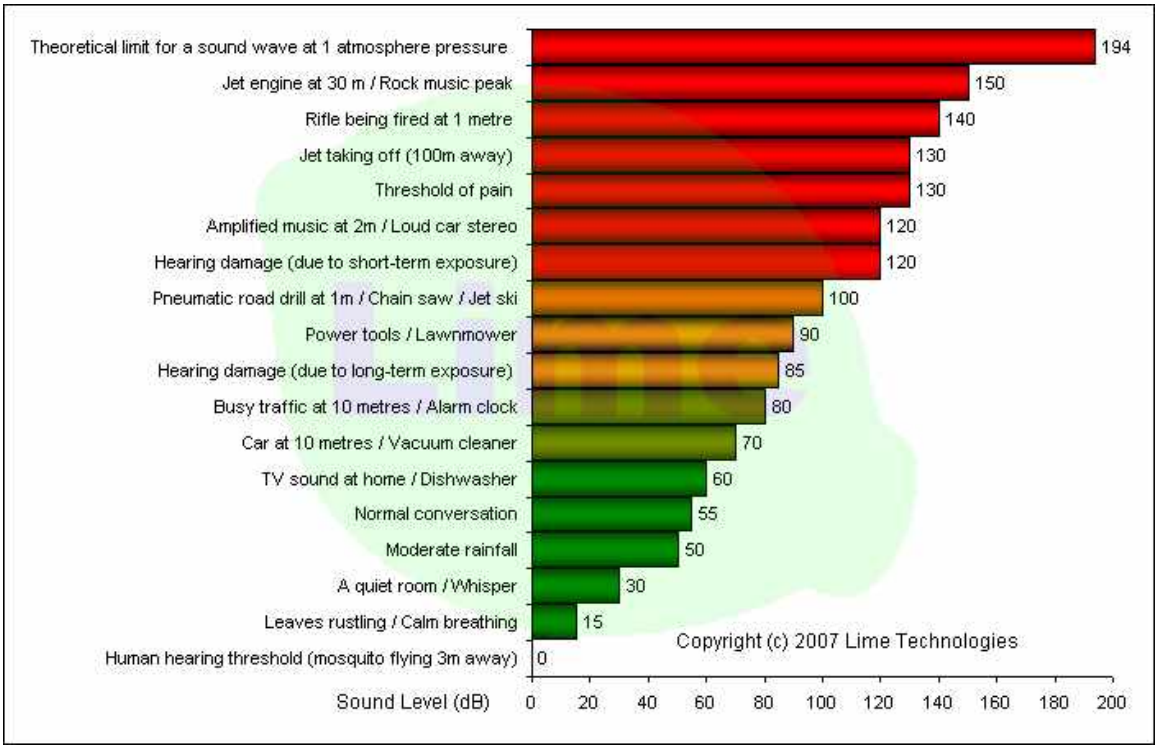
These levels were used to characterize the difference in sound level impact at the PORs as shown in Table 6: Comparison of the Change in Sound Levels at Each POR.

Table 6 shows that at OPOR_03_A for all three Alternative Methods that the change in sound levels is Very Significant; however, the resultant sound level for each method is below the exclusionary limit of 55 dB and is expected to be below the traffic noise experienced at that location as well.

This table does not include the impact from off-site road traffic. If the off-site road traffic was included in this comparison, then the net change in sound levels at all PORs would be insignificant.

For reference, the following table is provided to understand the level of noise typical at various measured values.

Table 3-2: Typical Noise Levels



4.0 Vibration

Roads on-site are well graded and maintained. Vibration is not expected to be an issue from road traffic.

The compactor does not vibrate so vibration is not expected to be an issue from the compactor.

Ground-borne vibration generated by equipment expected at this facility is not detectable beyond 75 m. The closest receptor is located 148.5 m from the facility so even if there were significant sources of vibration at the facility, they would not likely be detectable at the nearest sensitive receptors.

Other sources of vibration in the area include existing operations at St. Marys Cement including quarrying and clay borrow pit operations. Existing vibrations are minimal at the POR's. Landfill expansion is not anticipated to change these existing conditions.

Road traffic on Perth Road 123/Water Street does not typically cause noticeable vibration as the road surface is in good condition and, with continued good maintenance, is unlikely to cause vibrations at the PORs.

The Site access road is greater than 75 m from the nearest POR, so vibrations are likely to be minimal. Also, the Town maintains the access road (annually) to remove ruts and potholes so, with continued good maintenance, vibration should not be a concern.

The landfill tip face is greater than 140 m from the nearest POR so tipping, spreading, compacting, and covering operations will not affect PORs due to distance.

The FTA Noise and Vibration Manual suggests that vibration can be screened out of projects where the source of vibration is rubber wheeled vehicles, and the nearest foundation is farther than 50 ft (15 m) (Table 9.2). Since the distances above are much greater than this distance, vibration is not expected to be an issue. The only vehicle that does not have rubber tires is the compactor.

Finally, add a statement that maintenance of the site road (and transition from Perth Road 123 into/out-of the site) must continue to minimize potholes and ruts.

5.0 Conclusion and Recommendations

The conclusions and recommendations based on the above analysis for the noise and vibration assessments are discussed below.

5.1 Conclusions

The first observation about these results is that the Current operation, assuming the worst noise emissions possible, shows compliance with the MOECC criteria of 55 dBA during the day. In fact, the highest modelled impact is 51 dBA at POR_04_B which is noticeably below the criterion.

The next observation is that under all five Alternative Methods, the noise impact at all receptors is also less than the MOECC criterion of 55 dBA. Some receptors show an increase in noise while others show a decrease but, in general, the increases are largest at locations that show an impact substantially below the criterion while the most impacted locations see a decrease. The most impacted receptor under Alternative Method 3, and 5 is POR_03_B at 50 dBA, unchanged from the Current impact; however, the previously most impacted location (POR_04_B) shows a reduction of 2 to 3 dBA.

Since all receptors meet the MOECC criterion, mitigation measures for noise are not required.

Vibration is typically not felt further than 75 m from the source. The closest sensitive receptor is located 148.5 m from the landfill operations so vibration from delivery, placement, compaction and covering the waste within the expanded landfill was considered negligible.

5.2 Recommendations

Each Alternative Method meets the Ministry daytime criteria of 55 dB at all sensitive points of reception; therefore, all five Methods are acceptable potential expansion options for the St. Marys Landfill.

All five Alternative Methods will result in a reduction of noise at the most impacted receptors and the only significant increases are at receptors that currently show fairly low impacts. The increase will, at worst, result in an impact that is well below criterion.

None of the Alternative Methods is significantly better or worse than the others from a noise impact point of view.

6.0 References

Ontario Ministry of the Environment (MOE), 1995, Publication NPC-205, *Sound Level Limits for Stationary Sources in Class 1&2 Areas (Urban).*

Ontario Ministry of Environment and Energy (MOEE), 1994, *MOEE/GO Transit Noise and Vibration Protocol – December 1994 (Draft #9).*

Ontario Ministry of Environment (MOE), 2013, *Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning, Publication NPC-300.*

Ontario Ministry of the Environment (MOE), 1998, Noise Guidelines for Landfill Sites (DRAFT).

Ornament – Ontario Road Noise Analysis Method for Environment and Transportation. Technical Document. Ministry of the Environment, October 1989, page 5.

7.0 Project Limitations and Caveats

The location of the on-site roads, open face and compactor that have been assessed for Alternative Methods 2, 3, and 5 are the worst-case option for each method expansion.

Alternative Methods 2, 3, and 5 are proposed landfill expansion options, and conceptual site plans outlining the location of the scale house, on-site roads, open face, and the compactor, have been used. The on-site roads, tipping face and compactor locations that have been assessed for each method are the worst-case scenario for each proposed expansion alternative. It is recognized that the on-site road routes and the location of the open face and the compactor may change from the modelled scenario; however, the impact at the PORs should remain the same, or have a decreased impact from the modelled result.

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Tables

Source ID	Source Description	Note[A]	Source Location[B]	Coordinates		Unmitigated Sound Power Level				
				X	Y	Lw	Day	Characteristic Penalty	Sound Char[C]	Noise Control Measures[D]
				(m)	(m)	(dBA)	(%)			
Area Sources										
CMPTR	1986 CAT 816D Compactor	2*	O	487259.5	4787100	106.3	100.0	0	S	U

Moving Sources	Source Description	Note[A]	Source Location[B]	Length	Avg. Speed	Lw	Trips/h	Characteristic Penalty	Sound Char[C]	Noise Control Measures[D]
				(m)	(km/h)	(dBA)	(Day)			
OnSiteTrk1	Entrance to Scale	2*	O	327.6	20.0	105.1	192.0	0	S	U
OnSiteTrk2	Scale to Open Face	2*	O	81.1	20.0	105.1	96.0	0	S	U
OnSiteTrk3	Travelling to Compost Area	2*	O	725.1	20.0	105.1	96.0	0	S	U
OnSiteTrk4	Travelling to Stock Pile	2*	O	400.2	20.0	105.1	48.0	0	S	U

[A]Notes:

1 - established from manufacturer's data

2 - established through on-Site measurements

3- established through correlations (see App. C)

2*- established through measurements of similar sources at other Sites

[B]Source Location: O: Outside the building, I: Inside the building envelope

[C]Sound Characteristics: S: Steady, Q: Quasi Steady Impulsive, I: Impulsive, B: Buzzing, T: Tonal, C: Cyclic

[D]Noise Control Measures: S: Silencer, A: Acoustic Lining, plenum, B: Barrier, berm, screening, L: Lagging, E: Acoustic Enclosure, O: Other, U: Uncontrolled

Source ID	Source Description	Note[A]	Source Location[B]	Coordinates		Unmitigated Sound Power Level		Characteristic Penalty	Sound Char[C]	Noise Control Measures[D]
				X (m)	Y (m)	Lw (dBA)	Day (%)			
Area Sources										
CMPTR	1986 CAT 816D Compactor		O	487360	4787284.4	106.3	100.0	0	S	U

Moving Sources	Source Description		Source Location[B]	Length (m)	Avg. Speed (km/h)	Lw (dBA)	Trips/h (Day)	Characteristic Penalty	Sound Char[C]	Noise Control Measures[D]
OnSiteTrk1	Entrance to Scale	2*	O	327.6	20.0	105.1	192.0	0	S	U
OnSiteTrk2	Scale to Open Face	2*	O	230.1	20.0	105.1	96.0	0	S	U
OnSiteTrk3	Scale to Composte	2*	O	667.5	20.0	105.1	96.0	0	S	U
OnSiteTrk4	Scale to Stock Pile	2*	O	594.6	20.0	105.1	48.0	0	S	U

[A]Notes:

1 - established from manufacturer's data

2 - established through on-Site measurements

3- established through correlations (see App. C)

2*- established through measurements of similar sources at other Sites

[B]Source Location: O: Outside the building, I: Inside the building envelope

[C]Sound Characteristics: S: Steady, Q: Quasi Steady Impulsive, I: Impulsive, B: Buzzing, T: Tonal, C: Cyclic

[D]Noise Control Measures: S: Silencer, A: Acoustic Lining, plenum, B: Barrier, berm, screening, L: Lagging, E: Acoustic Enclosure, O: Other, U: Uncontrolled

Source ID	Source Description	Note[A]	Source Location[B]	Coordinates		Unmitigated Sound Power Level				
				X	Y	Lw	Day	Characteristic Penalty	Sound Char[C]	Noise Control Measures[D]
				(m)	(m)	(dBA)	(%)			
Area Sources										
CMPTR	1986 CAT 816D Compactor		O	487228.7	4787206.8	106.3	100.0	0	S	U

Moving Sources			Source Location[B]	Length	Avg. Speed	Lw	Trips/h	Characteristic Penalty	Sound Char[C]	Noise Control Measures[D]
				(m)	(km/h)	(dBA)	(Day)			
OnSiteTrk1	Entrance to Scale	2*	O	271.1	20.0	105.1	192.0	0	S	U
OnSiteTrk2	Scale to Open Face	2*	O	68.3	20.0	105.1	96.0	0	S	U
OnSiteTrk3	Scale to Compost	2*	O	534.6	20.0	105.1	96.0	0	S	U
OnSiteTrk4	Scale to Stock Pile	2*	O	515.5	20.0	105.1	48.0	0	S	U

[A]Notes:

1 - established from manufacturer's data

2 - established through on-Site measurements

3- established through correlations (see App. C)

2*- established through measurements of similar sources at other Sites

[B]Source Location: O: Outside the building, I: Inside the building envelope

[C]Sound Characteristics: S: Steady, Q: Quasi Steady Impulsive, I: Impulsive, B: Buzzing, T: Tonal, C: Cyclic

[D]Noise Control Measures: S: Silencer, A: Acoustic Lining, plenum, B: Barrier, berm, screening, L: Lagging, E: Acoustic Enclosure, O: Other, U: Uncontrolled

Source ID	Source Description	Note[A]	Source Location[B]	Coordinates		Unmitigated Sound Power Level				
				X	Y	Lw	Day	Characteristic Penalty	Sound Char[C]	Noise Control Measures[D]
				(m)	(m)	(dBA)	(%)			
Area Sources										
CMPTR	1986 CAT 816D Compactor		O	487228.7	4787206.8	106.3	100.0	0	S	U

Moving Sources	Source Description		Source Location[B]	Length	Avg. Speed	Lw	Trips/h	Characteristic Penalty	Sound Char[C]	Noise Control Measures[D]
				(m)	(km/h)	(dBA)	(Day)			
OnSiteTrk1	Entrance to Scale	2*	O	252.3	20.0	105.1	192.0	0	S	U
OnSiteTrk2	Scale to Open Face	2*	O	50.2	20.0	105.1	96.0	0	S	U
OnSiteTrk3	Scale to Composte	2*	O	662.9	20.0	105.1	96.0	0	S	U
OnSiteTrk4	Scale to Stock Pile	2*	O	630.6	20.0	105.1	48.0	0	S	U

[A]Notes:

1 - established from manufacturer's data

2 - established through on-Site measurements

3- established through correlations (see App. C)

2*- established through measurements of similar sources at other Sites

[B]Source Location: O: Outside the building, I: Inside the building envelope

[C]Sound Characteristics: S: Steady, Q: Quasi Steady Impulsive, I: Impulsive, B: Buzzing, T: Tonal, C: Cyclic

[D]Noise Control Measures: S: Silencer, A: Acoustic Lining, plenum, B: Barrier, berm, screening, L: Lagging, E: Acoustic Enclosure, O: Other, U: Uncontrolled

POR	POR Description	POR Location	UTM X Coordinate	UTM Y Coordinate	Height (m)	Basis of Criteria	Day 0700 - 1900	Evening 1900 - 2300	Night 2300 - 0700	Receptor Type (OLA/POW)
POR_01_A	Two Storey Residential House	1025 Water Street South	487219	4787431	1.5	MOE Noise Guidelines for Landfill	55	45	45	POW
POR_01_B	Two Storey Residential House	1025 Water Street South	487219	4787431	4.5	MOE Noise Guidelines for Landfill	55	45	45	POW
OPOR_01_A	Outdoor Receptor for	1025 Water Street South	487244	4787406	1.5	MOE Class 2	50	45	--	OLA
POR_02_A	Two Storey Residential House	1774 Water Street South	487091	4787405	1.5	MOE Noise Guidelines for Landfill	55	45	45	POW
POR_02_B	Two Storey Residential House	1774 Water Street South	487091	4787405	4.5	MOE Noise Guidelines for Landfill	55	45	45	POW
OPOR_02_A	Outdoor Receptor for	1774 Water Street South	487053	4787428	1.5	MOE Class 2	50	45	--	OLA
POR_03_A	One Storey Residential House	1827 Water Street South	487096	4787112	1.5	MOE Noise Guidelines for Landfill	55	45	45	POW
POR_03_B	One Storey Residential House	1827 Water Street South	487096	4787112	4.5	MOE Noise Guidelines for Landfill	55	45	45	POW
OPOR_03_A	Outdoor Receptor for	1827 Water Street South	487053	4787104	1.5	MOE Class 2	50	45	--	OLA
POR_04_A	Two Storey Residential House	4461 3 Line	487144	4786945	1.5	MOE Noise Guidelines for Landfill	55	45	45	POW
POR_04_B	Two Storey Residential House	4461 3 Line	487144	4786945	4.5	MOE Noise Guidelines for Landfill	55	45	45	POW
OPOR_04_A	Outdoor Receptor for	4461 3 Line	487143	4786895	1.5	MOE Class 2	50	45	--	OLA
POR_05_A	Two Storey Residential House	1646 Perth Road 123	487185	4786617	1.5	MOE Noise Guidelines for Landfill	55	45	45	POW
POR_05_B	Two Storey Residential House	1646 Perth Road 123	487185	4786617	4.5	MOE Noise Guidelines for Landfill	55	45	45	POW
OPOR_05_A	Outdoor Receptor for	1646 Perth Road 123	487149	4786613	1.5	MOE Class 2	50	45	--	OLA
POR_06_A	Two Storey Residential House	1579 Perth Road 123	487326	4786203	1.5	MOE Noise Guidelines for Landfill	55	45	45	POW
POR_06_B	Two Storey Residential House	1579 Perth Road 123	487326	4786203	4.5	MOE Noise Guidelines for Landfill	55	45	45	POW
OPOR_06_A	Outdoor Receptor for	1579 Perth Road 123	487366	4786204	4.5	MOE Class 2	50	45	--	OLA

Source ID	Source Type	POR_04_A		POR_04_B		POR_03_A		POR_03_B		POR_02_A		POR_02_B	
		Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)
CMPTR	Area	193.3	42.0	193.3	44.9	163.9	41.0	163.9	45.5	348.5	35.3	348.5	38.6
OnSiteTrk1	Moving	197.2	43.1	197.2	44.9	120.9	39.3	120.9	41.1	303.1	29.9	303.2	32.0
OnSiteTrk2	Moving	194.8	25.4	194.8	27.5	122.2	27.2	122.2	28.1	306.9	19.0	306.9	22.9
OnSiteTrk3	Moving	198.5	28.4	198.5	32.1	126.1	29.5	126.1	33.1	306.1	26.1	306.1	29.7
OnSiteTrk4	Moving	197.4	26.2	197.4	29.5	127.5	26.6	127.5	30.0	308.5	22.0	308.5	25.9
TOTAL			45.8		48.1		43.6		47.2		37.0		40.1
Rounded TOTAL			**46**		**48**		**44**		**47**		**37**		**40**

[1]The distance to the POR from non-Point Sources is calculated from the first node in the source.

Source ID	Source Type	POR_05_A		POR_05_B		POR_06_A		POR_06_B		POR_01_A		POR_01_B	
		Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)
CMPTR	Area	488.7	31.4	488.7	35.0	899.4	24.3	899.4	24.8	333.5	40.4	333.5	41.0
OnSiteTrk1	Moving	512.6	29.3	512.6	31.5	932.2	21.3	932.2	23.7	302.3	30.9	302.3	32.2
OnSiteTrk2	Moving	509.4	15.9	509.4	18.1	928.7	9.4	928.7	10.2	305.6	23.7	305.6	25.8
OnSiteTrk3	Moving	512.2	22.8	512.2	24.2	930.9	18.2	930.9	19.1	303.0	29.1	303.1	31.4
OnSiteTrk4	Moving	510.4	18.8	510.4	21.4	928.8	13.0	928.8	14.3	305.0	25.2	305.0	27.3
TOTAL			34.0		37.0		27.0		28.2		41.3		42.2
Rounded TOTAL			**34**		**37**		**27**		**28**		**41**		**42**

[1]The distance to the POR from non-Point Sources is calculated from the first node in the source.

Source ID	Source Type	OPOR_01_A		OPOR_02_A		OPOR_03_A		OPOR_04_A		OPOR_05_A		OPOR_06_A	
		Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)
CMPTR	Area	306.4	39.4	387.6	32.4	206.5	21.5	235.8	38.7	499.3	31.2	902.3	24.3
OnSiteTrk1	Moving	278.8	30.3	340.7	20.5	164.6	20.7	244.7	40.3	520.0	28.4	936.8	21.1
OnSiteTrk2	Moving	281.9	22.6	344.4	14.2	165.8	7.6	242.1	23.2	516.9	15.6	933.3	9.0
OnSiteTrk3	Moving	279.0	29.1	343.9	21.2	169.8	11.0	245.7	27.3	520.0	22.5	935.3	18.3
OnSiteTrk4	Moving	280.8	24.9	346.4	18.1	171.1	7.3	244.4	24.9	518.3	18.4	933.1	13.1
TOTAL			40.5		33.2		24.5		42.8		33.6		26.9
Rounded TOTAL			**41**		**33**		**25**		**43**		**34**		**27**

Source ID	Source Type	POR_04_A		POR_04_B		POR_03_A		POR_03_B		POR_02_A		POR_02_B	
		Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)
CMPTR	Area	402.3	40.3	193.3	41.2	163.9	42.1	163.9	43.4	348.5	43.0	348.5	43.4
OnSiteTrk1	Moving	197.2	45.3	197.2	47.0	120.9	42.8	120.9	44.5	303.1	33.9	303.2	35.6
OnSiteTrk2	Moving	191.7	31.2	194.8	33.5	122.2	33.5	122.2	36.8	306.9	31.3	306.9	33.4
OnSiteTrk3	Moving	211.1	31.2	198.5	33.5	126.1	33.7	126.1	37.8	306.1	35.1	306.1	37.0
OnSiteTrk4	Moving	210.5	28.7	197.4	30.8	127.5	30.9	127.5	34.0	308.5	31.7	308.5	33.8
TOTAL			46.8		48.3		46.2		48.0		44.5		45.5
Rounded TOTAL			**47**		**48**		**46**		**48**		**45**		**46**

[1]The distance to the POR from non-Point Sources is calculated from the first node in the source.

Source ID	Source Type	POR_05_A		POR_05_B		POR_06_A		POR_06_B		POR_01_A		POR_01_B	
		Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)
CMPTR	Area	488.7	32.9	488.7	35.2	899.4	26.6	899.4	28.8	333.5	28.9	333.5	31.5
OnSiteTrk1	Moving	512.6	33.0	512.6	35.0	932.2	25.1	932.2	27.3	302.3	23.2	302.3	26.3
OnSiteTrk2	Moving	509.4	23.2	509.4	25.8	928.7	15.8	928.7	19.9	305.6	21.3	305.6	23.6
OnSiteTrk3	Moving	512.2	24.7	512.2	27.6	930.9	19.4	930.9	22.0	303.0	24.3	303.1	27.1
OnSiteTrk4	Moving	510.4	21.6	510.4	24.7	928.8	16.1	928.8	18.8	305.0	21.0	305.0	23.9
TOTAL			36.6		38.8		29.7		32.1		31.8		34.5
Rounded TOTAL			**37**		**39**		**30**		**32**		**32**		**35**

[1]The distance to the POR from non-Point Sources is calculated from the first node in the source.

Source ID	Source Type	OPOR_01_A		OPOR_02_A		OPOR_03_A		OPOR_04_A		OPOR_05_A		OPOR_06_A	
		Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)
CMPTR	Area	306.4	48.0	387.6	30.7	206.5	35.1	235.8	38.1	499.3	32.7	902.3	26.6
OnSiteTrk1	Moving	278.8	34.1	340.7	24.1	164.6	36.2	244.7	43.8	520.0	32.1	936.8	24.9
OnSiteTrk2	Moving	281.9	35.0	344.4	24.9	165.8	26.5	242.1	28.7	516.9	21.9	933.3	15.8
OnSiteTrk3	Moving	279.0	40.8	343.9	28.8	169.8	31.2	245.7	29.5	520.0	24.0	935.3	19.4
OnSiteTrk4	Moving	280.8	37.3	346.4	25.5	171.1	28.1	244.4	26.2	518.3	20.9	933.1	16.1
TOTAL			49.4		34.5		39.9		45.1		36.0		29.7
Rounded TOTAL			**49**		**35**		**40**		**45**		**36**		**30**

Source ID	Source Type	POR_04_A		POR_04_B		POR_03_A		POR_03_B		POR_02_A		POR_02_B	
		Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)
CMPTR	Area	275.2	43.3	193.3	44.0	163.9	48.0	163.9	48.5	348.5	45.0	348.5	45.6
OnSiteTrk1	Moving	82.4	44.3	197.2	46.2	120.9	39.9	120.9	42.4	303.1	31.4	303.2	34.1
OnSiteTrk2	Moving	213.4	27.6	194.8	29.7	122.2	33.6	122.2	35.5	306.9	27.4	306.9	29.4
OnSiteTrk3	Moving	209.4	29.0	198.5	31.2	126.1	34.8	126.1	36.4	306.1	33.0	306.1	34.5
OnSiteTrk4	Moving	245.2	25.8	197.4	27.9	127.5	28.8	127.5	30.2	308.5	29.3	308.5	30.6
TOTAL			47.0		48.4		49.0		49.9		45.6		46.4
Rounded TOTAL			**47**		**48**		**49**		**50**		**46**		**46**

[1]The distance to the POR from non-Point Sources is calculated from the first node in the source.

Source ID	Source Type	POR_05_A		POR_05_B		POR_06_A		POR_06_B		POR_01_A		POR_01_B	
		Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)
CMPTR	Area	488.7	35.6	488.7	36.4	899.4	29.3	899.4	30.4	333.5	36.9	333.5	38.3
OnSiteTrk1	Moving	512.6	31.7	512.6	33.9	932.2	23.6	932.2	26.3	302.3	20.8	302.3	24.0
OnSiteTrk2	Moving	509.4	19.2	509.4	21.5	928.7	12.6	928.7	15.0	305.6	19.5	305.6	22.8
OnSiteTrk3	Moving	512.2	22.9	512.2	24.1	930.9	18.4	930.9	19.9	303.0	25.0	303.1	28.5
OnSiteTrk4	Moving	510.4	19.8	510.4	21.3	928.8	15.6	928.8	17.4	305.0	21.5	305.0	25.0
TOTAL			37.4		38.7		30.8		32.3		37.4		39.1
Rounded TOTAL			**37**		**39**		**31**		**32**		**37**		**39**

[1]The distance to the POR from non-Point Sources is calculated from the first node in the source.

Source ID	Source Type	OPOR_01_A		OPOR_02_A		OPOR_03_A		OPOR_04_A		OPOR_05_A		OPOR_06_A	
		Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)
CMPTR	Area	306.4	44.0	387.6	38.6	206.5	44.7	235.8	41.8	499.3	34.7	902.3	29.3
OnSiteTrk1	Moving	278.8	29.6	340.7	22.4	164.6	34.2	244.7	43.5	520.0	31.2	936.8	23.4
OnSiteTrk2	Moving	281.9	25.6	344.4	21.8	165.8	28.8	242.1	25.8	516.9	16.9	933.3	13.0
OnSiteTrk3	Moving	279.0	38.4	343.9	27.1	169.8	31.3	245.7	27.6	520.0	22.4	935.3	18.4
OnSiteTrk4	Moving	280.8	34.5	346.4	23.1	171.1	27.8	244.4	24.6	518.3	19.6	933.1	15.8
TOTAL			45.6		39.2		45.5		45.9		36.6		30.8
Rounded TOTAL			**46**		**39**		**46**		**46**		**37**		**31**

Source ID	Source Type	POR_04_A		POR_04_B		POR_03_A		POR_03_B		POR_02_A		POR_02_B	
		Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)
CMPTR	Area	275.2	44.1	193.3	44.7	163.9	48.5	163.9	49.0	348.5	44.3	348.5	44.9
OnSiteTrk1	Moving	82.4	44.0	197.2	45.9	120.9	40.6	120.9	43.3	303.1	31.7	303.2	34.1
OnSiteTrk2	Moving	213.4	26.0	194.8	28.0	122.2	32.3	122.2	34.1	306.9	26.1	306.9	28.0
OnSiteTrk3	Moving	209.4	29.0	198.5	31.6	126.1	34.0	126.1	36.4	306.1	34.5	306.1	36.5
OnSiteTrk4	Moving	245.2	28.0	197.4	30.1	127.5	32.2	127.5	34.6	308.5	31.9	308.5	33.9
TOTAL			47.2		48.6		49.4		50.4		45.2		46.1
Rounded TOTAL			**47**		**49**		**49**		**50**		**45**		**46**

[1]The distance to the POR from non-Point Sources is calculated from the first node in the source.

Source ID	Source Type	POR_05_A		POR_05_B		POR_06_A		POR_06_B		POR_01_A		POR_01_B	
		Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)
CMPTR	Area	488.7	36.0	488.7	36.8	899.4	29.6	899.4	30.6	333.5	34.8	333.5	36.2
OnSiteTrk1	Moving	512.6	31.1	512.6	33.3	932.2	23.3	932.2	25.9	302.3	21.5	302.3	24.2
OnSiteTrk2	Moving	509.4	17.5	509.4	19.7	928.7	11.6	928.7	14.2	305.6	17.9	305.6	22.0
OnSiteTrk3	Moving	512.2	23.4	512.2	25.4	930.9	19.4	930.9	20.5	303.0	25.7	303.1	29.3
OnSiteTrk4	Moving	510.4	21.8	510.4	24.0	928.8	17.0	928.8	18.8	305.0	23.1	305.0	26.2
TOTAL			37.5		38.8		31.1		32.4		35.8		37.7
Rounded TOTAL			**38**		**39**		**31**		**32**		**36**		**38**

[1]The distance to the POR from non-Point Sources is calculated from the first node in the source.

Source ID	Source Type	OPOR_01_A		OPOR_02_A		OPOR_03_A		OPOR_04_A		OPOR_05_A		OPOR_06_A	
		Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)	Distance (m)[1]	Sound Pressure Level Leq in dBA (Day)
CMPTR	Area	306.4	46.7	387.6	39.0	206.5	38.4	235.8	42.5	499.3	35.4	902.3	29.6
OnSiteTrk1	Moving	278.8	32.0	340.7	22.4	164.6	33.7	244.7	42.3	520.0	30.3	936.8	22.9
OnSiteTrk2	Moving	281.9	27.4	344.4	20.1	165.8	22.1	242.1	24.2	516.9	15.8	933.3	11.8
OnSiteTrk3	Moving	279.0	39.7	343.9	25.6	169.8	32.0	245.7	27.8	520.0	23.3	935.3	19.5
OnSiteTrk4	Moving	280.8	36.6	346.4	24.0	171.1	28.6	244.4	26.8	518.3	21.5	933.1	17.0
TOTAL			48.0		39.5		40.7		45.6		36.9		31.0
Rounded TOTAL			**48**		**40**		**41**		**46**		**37**		**31**

Table 4-Exist: Acoustic Assessment Summary Table: Daytime (Un-Mitigated Current)

Point of Reception ID	Point of Reception Description	Height (m)	Sound Level at Point of Reception (Leq)(dBA)	Verified by an Acoustic Audit (Yes/No)	Performance Limit (0700h-1900h) (LAeq)	Compliance with Performance Limit (Yes / No)
POR_01_A	Two Storey Residential House (POW)	1.5	41	No	55	Yes
POR_01_B	Two Storey Residential House (POW)	4.5	42	No	55	Yes
OPOR_01_A	Outdoor Receptor for (OLA)	1.5	41	No	50	Yes
POR_02_A	Two Storey Residential House (POW)	1.5	37	No	55	Yes
POR_02_B	Two Storey Residential House (POW)	4.5	40	No	55	Yes
OPOR_02_A	Outdoor Receptor for (OLA)	1.5	33	No	50	Yes
POR_03_A	One Storey Residential House (POW)	1.5	44	No	55	Yes
POR_03_B	One Storey Residential House (POW)	4.5	47	No	55	Yes
OPOR_03_A	Outdoor Receptor for (OLA)	1.5	25	No	50	Yes
POR_04_A	Two Storey Residential House (POW)	1.5	46	No	55	Yes
POR_04_B	Two Storey Residential House (POW)	4.5	48	No	55	Yes
OPOR_04_A	Outdoor Receptor for (OLA)	1.5	43	No	50	Yes
POR_05_A	Two Storey Residential House (POW)	1.5	34	No	55	Yes
POR_05_B	Two Storey Residential House (POW)	4.5	37	No	55	Yes
OPOR_05_A	Outdoor Receptor for (OLA)	1.5	34	No	50	Yes
POR_06_A	Two Storey Residential House (POW)	1.5	27	No	55	Yes
POR_06_B	Two Storey Residential House (POW)	4.5	28	No	55	Yes
OPOR_06_A	Outdoor Receptor for (OLA)	4.5	27	No	50	Yes

Table 4-M2: Acoustic Assessment Summary Table: Daytime (Un-Mitigated Method 2)

Point of Reception ID	Point of Reception Description	Height (m)	Sound Level at Point of Reception (Leq)(dBA)	Verified by an Acoustic Audit (Yes/No)	Performance Limit (0700h-1900h) (LAeq)	Compliance with Performance Limit (Yes / No)
POR_01_A	Two Storey Residential House (POW)	1.5	32	No	55	Yes
POR_01_B	Two Storey Residential House (POW)	4.5	35	No	55	Yes
OPOR_01_A	Outdoor Receptor for (OLA)	1.5	49	No	50	Yes
POR_02_A	Two Storey Residential House (POW)	1.5	45	No	55	Yes
POR_02_B	Two Storey Residential House (POW)	4.5	46	No	55	Yes
OPOR_02_A	Outdoor Receptor for (OLA)	1.5	35	No	50	Yes
POR_03_A	One Storey Residential House (POW)	1.5	46	No	55	Yes
POR_03_B	One Storey Residential House (POW)	4.5	48	No	55	Yes
OPOR_03_A	Outdoor Receptor for (OLA)	1.5	40	No	50	Yes
POR_04_A	Two Storey Residential House (POW)	1.5	47	No	55	Yes
POR_04_B	Two Storey Residential House (POW)	4.5	48	No	55	Yes
OPOR_04_A	Outdoor Receptor for (OLA)	1.5	45	No	50	Yes
POR_05_A	Two Storey Residential House (POW)	1.5	37	No	55	Yes
POR_05_B	Two Storey Residential House (POW)	4.5	39	No	55	Yes
OPOR_05_A	Outdoor Receptor for (OLA)	1.5	36	No	50	Yes
POR_06_A	Two Storey Residential House (POW)	1.5	30	No	55	Yes
POR_06_B	Two Storey Residential House (POW)	4.5	32	No	55	Yes
OPOR_06_A	Outdoor Receptor for (OLA)	4.5	30	No	50	Yes

Table 4-M3: Acoustic Assessment Summary Table: Daytime (Un-Mitigated Method 3)

Point of Reception ID	Point of Reception Description	Height (m)	Sound Level at Point of Reception (Leq)(dBA)	Verified by an Acoustic Audit (Yes/No)	Performance Limit (0700h-1900h) (LAeq)	Compliance with Performance Limit (Yes / No)
POR_01_A	Two Storey Residential House (POW)	1.5	37	No	55	Yes
POR_01_B	Two Storey Residential House (POW)	4.5	39	No	55	Yes
OPOR_01_A	Outdoor Receptor for (OLA)	1.5	46	No	50	Yes
POR_02_A	Two Storey Residential House (POW)	1.5	46	No	55	Yes
POR_02_B	Two Storey Residential House (POW)	4.5	46	No	55	Yes
OPOR_02_A	Outdoor Receptor for (OLA)	1.5	39	No	50	Yes
POR_03_A	One Storey Residential House (POW)	1.5	49	No	55	Yes
POR_03_B	One Storey Residential House (POW)	4.5	50	No	55	Yes
OPOR_03_A	Outdoor Receptor for (OLA)	1.5	46	No	50	Yes
POR_04_A	Two Storey Residential House (POW)	1.5	47	No	55	Yes
POR_04_B	Two Storey Residential House (POW)	4.5	48	No	55	Yes
OPOR_04_A	Outdoor Receptor for (OLA)	1.5	46	No	50	Yes
POR_05_A	Two Storey Residential House (POW)	1.5	37	No	55	Yes
POR_05_B	Two Storey Residential House (POW)	4.5	39	No	55	Yes
OPOR_05_A	Outdoor Receptor for (OLA)	1.5	37	No	50	Yes
POR_06_A	Two Storey Residential House (POW)	1.5	31	No	55	Yes
POR_06_B	Two Storey Residential House (POW)	4.5	32	No	55	Yes
OPOR_06_A	Outdoor Receptor for (OLA)	4.5	31	No	50	Yes

Table 4-M5: Acoustic Assessment Summary Table: Daytime (Un-Mitigated Method 5)

Point of Reception ID	Point of Reception Description	Height (m)	Sound Level at Point of Reception (Leq)(dBA)	Verified by an Acoustic Audit (Yes/No)	Performance Limit (0700h-1900h) (LAeq)	Compliance with Performance Limit (Yes / No)
POR_01_A	Two Storey Residential House (POW)	1.5	36	No	55	Yes
POR_01_B	Two Storey Residential House (POW)	4.5	38	No	55	Yes
OPOR_01_A	Outdoor Receptor for (OLA)	1.5	48	No	50	Yes
POR_02_A	Two Storey Residential House (POW)	1.5	45	No	55	Yes
POR_02_B	Two Storey Residential House (POW)	4.5	46	No	55	Yes
OPOR_02_A	Outdoor Receptor for (OLA)	1.5	40	No	50	Yes
POR_03_A	One Storey Residential House (POW)	1.5	49	No	55	Yes
POR_03_B	One Storey Residential House (POW)	4.5	50	No	55	Yes
OPOR_03_A	Outdoor Receptor for (OLA)	1.5	41	No	50	Yes
POR_04_A	Two Storey Residential House (POW)	1.5	47	No	55	Yes
POR_04_B	Two Storey Residential House (POW)	4.5	49	No	55	Yes
OPOR_04_A	Outdoor Receptor for (OLA)	1.5	46	No	50	Yes
POR_05_A	Two Storey Residential House (POW)	1.5	38	No	55	Yes
POR_05_B	Two Storey Residential House (POW)	4.5	39	No	55	Yes
OPOR_05_A	Outdoor Receptor for (OLA)	1.5	37	No	50	Yes
POR_06_A	Two Storey Residential House (POW)	1.5	31	No	55	Yes
POR_06_B	Two Storey Residential House (POW)	4.5	32	No	55	Yes
OPOR_06_A	Outdoor Receptor for (OLA)	4.5	31	No	50	Yes

Table 5: STAMSON Daytime and Nighttime Sound Levels for Off-Site Road Traffic

POR#	Area	Daytime Sound Level (dB)		Nighttime Sound Level (dB)	
		Calculated with 4378 AADT	Corrected for 2189 AADT*	Calculated with 4378 AADT	Corrected for 2189 AADT*
POR_01	OLA	62.88	59.88	-	-
POR_01	POW	64.03	61.03	57.5	54.5
POR_02	OLA	56.25	53.25	-	-
POR_02	POW	59.76	56.76	53.23	50.23
POR_03	OLA	56.12	53.12	-	-
POR_03	POW	58.06	55.06	51.54	48.54
POR_04	OLA	59.22	56.22	-	-
POR_04	POW	62.91	59.91	56.39	53.39
POR_05	OLA	61.85	58.85	-	-
POR_05	POW	61.42	58.42	55.33	52.33
POR_06	OLA	60.15	57.15	-	-
POR_06	POW	62.77	59.77	56.25	53.25

1. AADT provided by Perth County for 2015 was 2189

2. Correction factor is 3 dB

POR#	Criterion (dBA)	Existing Conditions (dBA)	Alternative Method 2 (dBA)	Increase (+) OR Decrease (-) in dBA	Significant/ Insignificant[1]
POR_01_A	55	41	32	-9	Significant
POR_01_B	55	42	35	-7	Significant
OPOR_01_A	50	41	49	8	Significant
POR_02_A	55	37	45	8	Significant
POR_02_B	55	40	46	6	Significant
OPOR_02_A	50	33	35	2	Negligible
POR_03_A	55	44	46	2	Negligible
POR_03_B	55	47	48	1	Negligible
OPOR_03_A	50	25	40	15	Very Significant
POR_04_A	55	46	47	1	Negligible
POR_04_B	55	48	48	0	Negligible
OPOR_04_A	50	43	45	2	Negligible
POR_05_A	55	34	37	3	Noticeable
POR_05_B	55	37	39	2	Negligible
OPOR_05_A	50	34	36	2	Negligible
POR_06_A	55	27	30	3	Noticeable
POR_06_B	55	28	32	4	Noticeable
OPOR_06_A	50	27	30	3	Noticeable

POR#	Criterion (dBA)	Existing Conditions (dBA)	Alternative Method 3 (dBA)	Increase (+) OR Decrease (-) in dBA	Significant/ Insignificant[1]
POR_01_A	55	41	37	-4	Noticeable
POR_01_B	55	42	39	-3	Negligible
OPOR_01_A	50	41	46	5	Significant
POR_02_A	55	37	46	9	Significant
POR_02_B	55	40	46	6	Significant
OPOR_02_A	50	33	39	6	Significant
POR_03_A	55	44	49	5	Significant
POR_03_B	55	47	50	3	Noticeable
OPOR_03_A	50	25	46	21	Very Significant
POR_04_A	55	46	47	1	Negligible
POR_04_B	55	48	48	0	Negligible
OPOR_04_A	50	43	46	3	Noticeable
POR_05_A	55	34	37	3	Noticeable
POR_05_B	55	37	39	2	Negligible
OPOR_05_A	50	34	37	3	Noticeable
POR_06_A	55	27	31	4	Noticeable
POR_06_B	55	28	32	4	Noticeable
OPOR_06_A	50	27	31	4	Noticeable

POR#	Criterion (dBA)	Existing Conditions (dBA)	Alternative Method 5 (dBA)	Increase (+) OR Decrease (-) in dBA	Significant/ Insignificant[1]
POR_01_A	55	41	36	-5	Noticeable
POR_01_B	55	42	38	-4	Noticeable
OPOR_01_A	50	41	48	7	Significant
POR_02_A	55	37	45	8	Significant
POR_02_B	55	40	46	6	Significant
OPOR_02_A	50	33	40	7	Significant
POR_03_A	55	44	49	5	Significant
POR_03_B	55	47	50	3	Noticeable
OPOR_03_A	50	25	41	16	Very Significant
POR_04_A	55	46	47	1	Negligible
POR_04_B	55	48	49	1	Negligible
OPOR_04_A	50	43	46	3	Noticeable
POR_05_A	55	34	38	4	Noticeable
POR_05_B	55	37	39	2	Negligible
OPOR_05_A	50	34	37	3	Noticeable
POR_06_A	55	27	31	4	Noticeable
POR_06_B	55	28	32	4	Noticeable
OPOR_06_A	50	27	31	4	Noticeable

[1] Ontario Ministry of Environment and Energy (MOEE), 1994, *MOEE/GO Transit Noise and Vibration Protocol - December 1994 (Draft #9)*

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Figures

Map Source:
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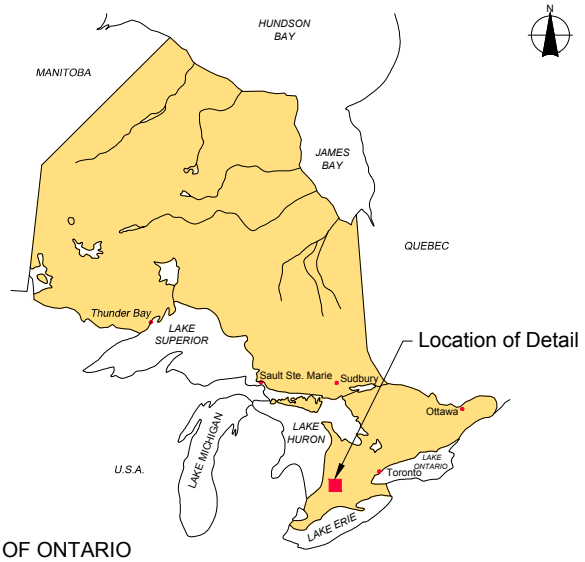

KEY MAP OF ONTARIO

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CORPORATION OF THE TOWN OF ST. MARYS

Figure Title

ENVIRONMENTAL ASSESSMENT

SITE LOCATION MAP

Drawn	Checked	Date	Figure No.
C.S.	H.W.	MARCH 2016	1
Scale		Project No.	
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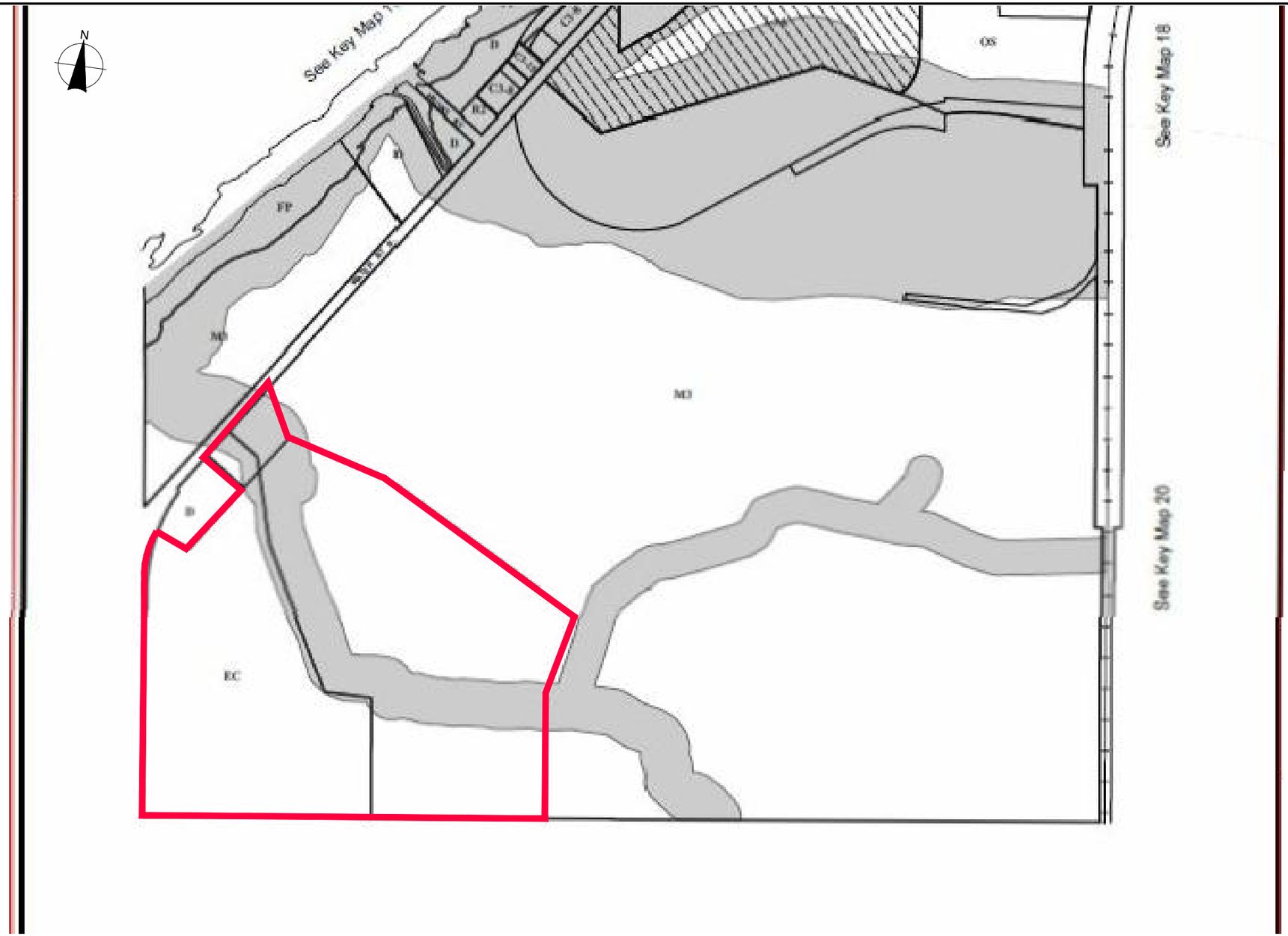

Railway

Parcels

Zoning By-law Boundaries

Heritage Classified

UTRCA Regulation Limit

Document Path: S:\Department Shared Folders\GIS\GIS\Projects\ZoningByLawMaps\KeyMap18.mxd

LEGEND

APPROXIMATE SITE BOUNDARY

Zone	Zone Symbol
Agricultural Zone One	A1
Agricultural Zone Two	A2
Residential Zone One	R1
Residential Zone Two	R2
Residential Zone Three	R3
Residential Zone Four	R4
Residential Zone Five	R5
Residential Zone Six	R6
Residential Zone Seven	R7
Central Commercial Zone	C1
Limited Commercial Zone	C2
Highway Commercial Zone	C3
Special Commercial Zone	C4
Light Industrial Zone	M1
General Industrial Zone	M2
Extractive Industrial Zone	M3
Environmental Constraint Zone	EC
Institutional Zone	I
Open Space Zone	OS
Flood Plain Zone	FP
Special Policy Area Constraint Zone	-SPA
Holding Zone	-H
Development Zone	D or RD

0 100 200 400 600

Metres

Zoning Map Source:
Background zoning map obtained from the Corporation of the Town of St. Marys website. Zoning Map 19 from Zoning By-Law Z1-1997 consolidated through to January 15, 2015.

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Figure Title

ENVIRONMENTAL ASSESSMENT

ZONING LAND USE PLAN

Drawn	Checked	Date	Figure No.
C.S.	H.W.	MARCH 2016	2
Scale		Project No.	
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LEGEND

- APPROXIMATE SITE BOUNDARY
- POINT OF NOISE RECEPTION
- POINT OF EMISSION
- BOUNDARY COORDINATES (X,Y = 568472 4829089) — UTM NAD83
- EXISTING ON-SITE ROADS
- A - H — EXISTING ON-SITE ROADS END POINTS

0 100 200 400 600
Metres

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Figure Title
ENVIRONMENTAL ASSESSMENT

SITE PLAN
CURRENT CONDITIONS

Drawn	Checked	Date	Figure No.
C.S.	H.W.	MARCH 2016	**3-Exist**
Scale		Project No.	
1:7,500		300032339	

File: L:_Projects\St Marys EA 300032339.0000\Drawing Set\032339 Environmental Assessment Drawing Set.dwg Date Plotted: April 7, 2016 - 10:46 AM

LEGEND

- APPROXIMATE SITE BOUNDARY
- POINT OF NOISE RECEPTION
- POINT OF EMISSION
- BOUNDARY COORDINATES UTM NAD83 (X,Y = 568472 4829089)
- EXISTING ON-SITE ROADS
- EXISTING ON-SITE ROADS END POINTS
- PROPOSED LANDFILL EXPANSION

0 100 200 400 600

Metres

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Figure Title

ENVIRONMENTAL ASSESSMENT

POTENTIAL WASTE FILL AREA
ALTERNATIVE #2

Drawn	Checked	Date	Figure No.
C.S.	H.W.	MARCH 2016	**3-M2**
Scale		Project No.	
1:7,500		300032339	

File: L:_Projects\St Marys EA 300032339.0000\Drawing Set\032339 Environmental Assessment Drawing Set.dwg Date Plotted: April 7, 2016 - 10:48 AM

LEGEND

- APPROXIMATE SITE BOUNDARY
- POINT OF NOISE RECEPTION
- POINT OF EMISSION
- X,Y = 568472 4829089 — BOUNDARY COORDINATES UTM NAD83
- EXISTING ON-SITE ROADS
- A - G — EXISTING ON-SITE ROADS END POINTS
- PROPOSED LANDFILL EXPANSION

0 100 200 400 600
Metres

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Figure Title
ENVIRONMENTAL ASSESSMENT

POTENTIAL WASTE FILL AREA
ALTERNATIVE #3

Drawn	Checked	Date	Figure No.
C.S.	H.W.	MARCH 2016	**3-M3**
Scale		Project No.	
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File: L:_Projects\St Marys EA 300032339.0000\Drawing Set\032339 Environmental Assessment Drawing Set.dwg Date Plotted: April 7, 2016 - 10:49 AM

LEGEND

- APPROXIMATE SITE BOUNDARY
- POINT OF NOISE RECEPTION
- POINT OF EMISSION
- BOUNDARY COORDINATES UTM NAD83 (X,Y = 568472 4829089)
- EXISTING ON-SITE ROADS
- A - G — EXISTING ON-SITE ROADS END POINTS
- PROPOSED LANDFILL EXPANSION

0 100 200 400 600
Metres

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Figure Title
ENVIRONMENTAL ASSESSMENT

POTENTIAL WASTE FILL AREA
ALTERNATIVE #5

Drawn	Checked	Date	Figure No.
C.S.	H.W.	MARCH 2016	**3-M5**
Scale		Project No.	
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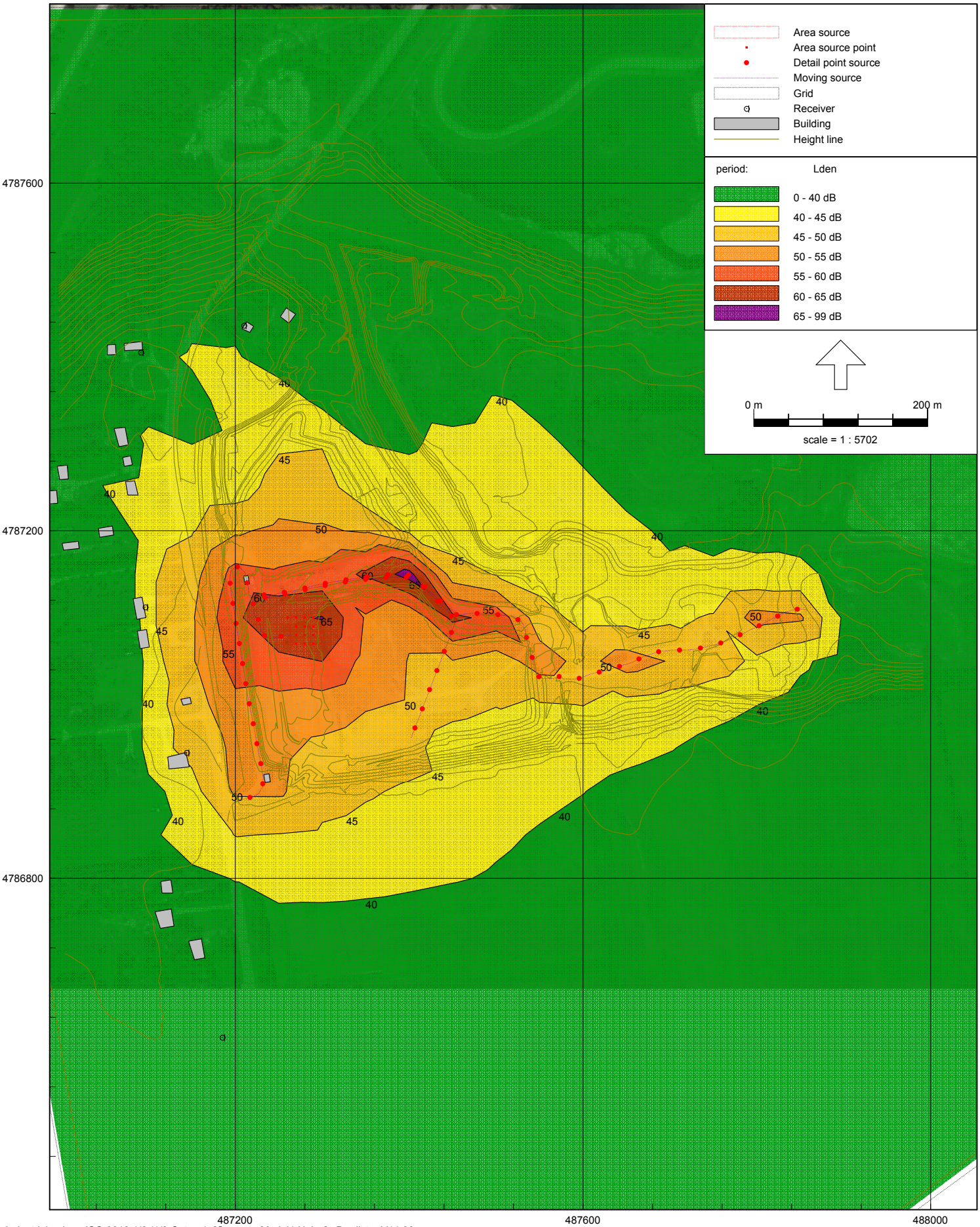
File: L:_Projects\St Marys EA 300032339.0000\Drawing Set\032339 Environmental Assessment Drawing Set.dwg Date Plotted: April 7, 2016 - 10:49 AM

Figure 4-Exist Noise Contour (Current)

RJ Burnside & Associates Ltd., Canada

29 Mar 2016, 14:27

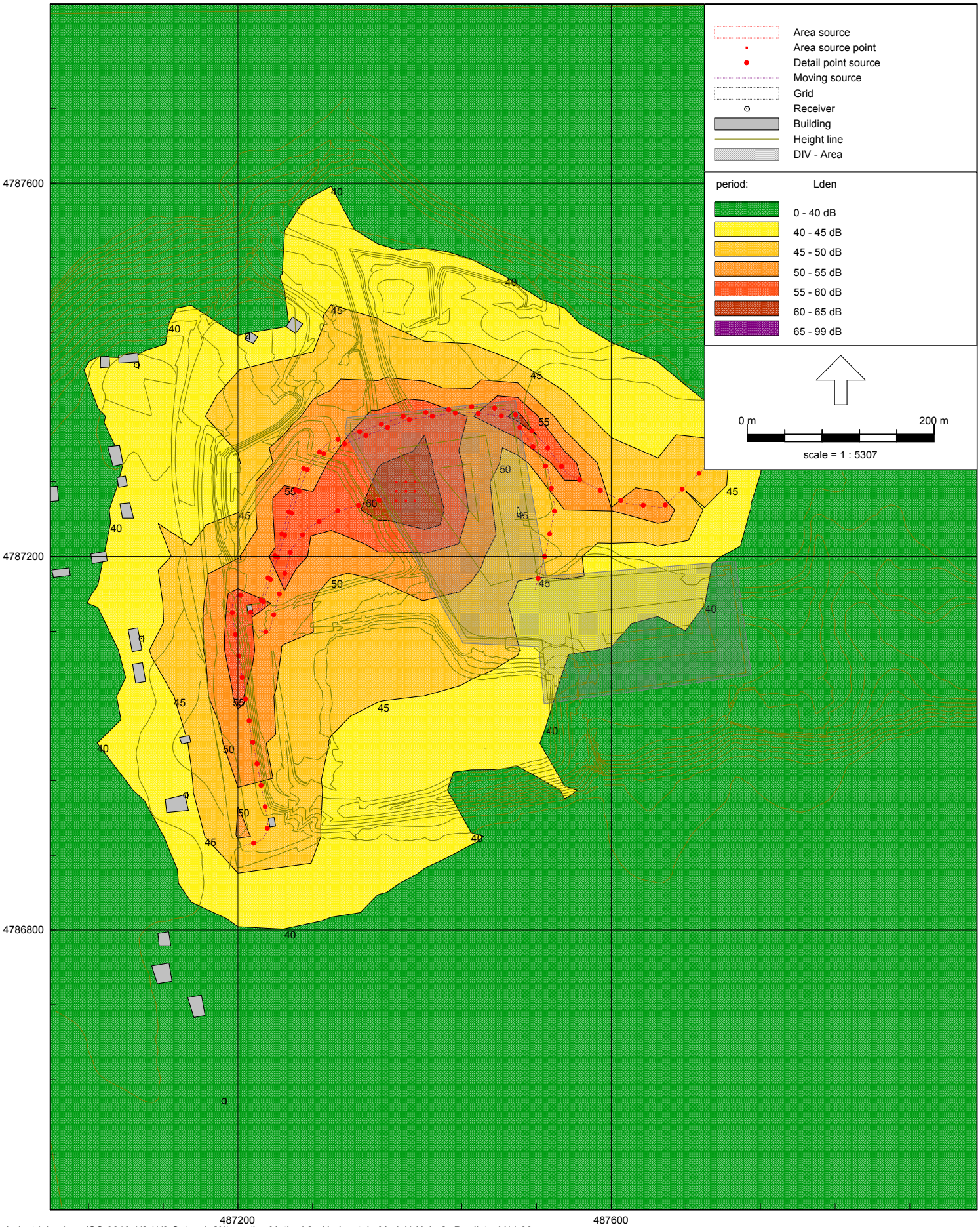


Industrial noise - ISO 9613.1/2 (1/3 Octave), [Current - Model1 Noise] , Predictor V11.00

Figure 4-M2 Noise Contours (Alternative Method 2)

RJ Burnside & Associates Ltd., Canada

29 Mar 2016, 14:30

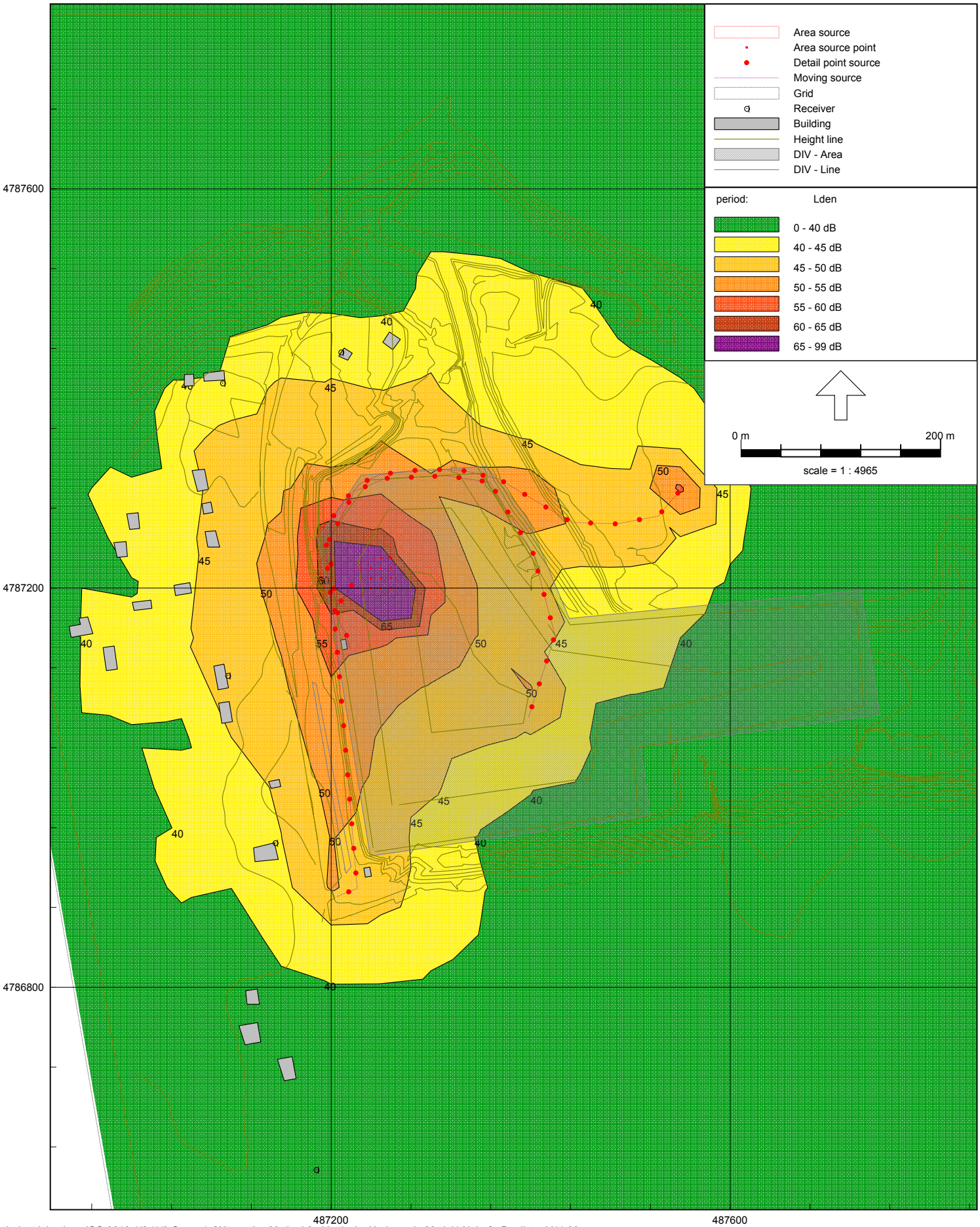


Industrial noise - ISO 9613.1/2 (1/3 Octave), [Alternative Method 2 - Horizontal - Model1 Noise] , Predictor V11.00

Figure 4-M3 Noise Contours (Alternative Method 3)

RJ Burnside & Associates Ltd., Canada

29 Mar 2016, 14:32

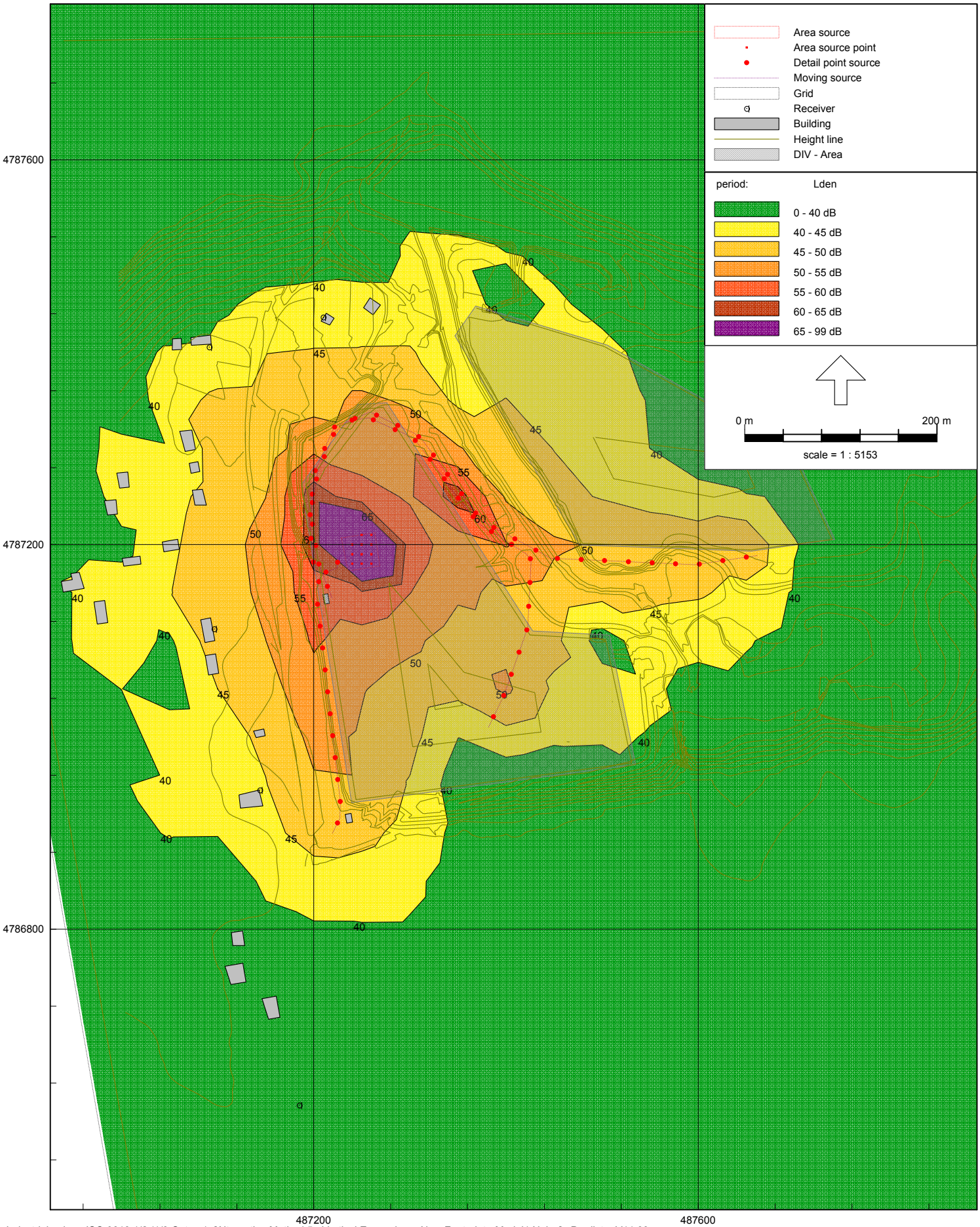


Industrial noise - ISO 9613.1/2 (1/3 Octave), [Alternative Method 3 - Vertical + Horizontal - Model1 Noise] , Predictor V11.00

Figure 4-M5 Noise Contours (Alternative Method 5)

RJ Burnside & Associates Ltd., Canada

29 Mar 2016, 14:34



Industrial noise - ISO 9613.1/2 (1/3 Octave), [Alternative Method 5 - Vertical Expansion + New Footprint - Model1 Noise] , Predictor V11.00

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix A

Off-Site Road Traffic AADT (Water Street South)

Road	2012 AADT*	2015 AADT	% Trucks	% Heavys	% Cars
Perth Road 123 (Weekday)	2125	2189	2	12	86
Landfill Site Driveway Access (Weekday)		180**	0	9	91
Landfill Site Driveway Access (Saturday)		250***	8	0	92

*Annual average daily traffic, obtained from Perth County

**Obtained by multiplying a.m. OR p.m. peak hour (whichever is higher) volumes by 10

***Obtained by multiplying a.m. peak hour volumes by 5

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix B

STAMSON Noise Model Output

POR_01
POR_02
POR_03
POR_04
POR_05
POR_06

STAMSON 5.0 NORMAL REPORT Date: 18-03-2016 07:28:51
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: Test.te Time Period: Day/Night 16/8 hours
Description: POR1 OLA Water Street

Road data, segment # 1: Water St (day/night)

Car traffic volume	: 3744/416	veh/TimePeriod *
Medium truck volume	: 87/10	veh/TimePeriod *
Heavy truck volume	: 522/58	veh/TimePeriod *
Posted speed limit	: 80 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)	: 4379
Percentage of Annual Growth	: 1.00
Number of Years of Growth	: 10.00
Medium Truck % of Total Volume	: 2.00
Heavy Truck % of Total Volume	: 12.00
Day (16 hrs) % of Total Volume	: 90.00

Data for Segment # 1: Water St (day/night)

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 29.81 / 29.81	m
Receiver height	: 1.50 / 1.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

♀
Results segment # 1: Water St (day)

Source height = 1.86 m

ROAD (0.00 + 62.88 + 0.00) = 62.88 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.65	69.24	0.00	-4.92	-1.44	0.00	0.00	0.00	62.88

Segment Leq : 62.88 dBA

Total Leq All Segments: 62.88 dBA

♀
Results segment # 1: Water St (night)

Source height = 1.86 m

ROAD (0.00 + 56.36 + 0.00) = 56.36 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.65	62.72	0.00	-4.92	-1.44	0.00	0.00	0.00	56.36

Segment Leq : 56.36 dBA

Total Leq All Segments: 56.36 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 62.88
(NIGHT): 56.36

STAMSON 5.0 NORMAL REPORT Date: 18-03-2016 07:29:33
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por1_pow.te Time Period: Day/Night 16/8 hours
Description: POR1 POW Water Street

Road data, segment # 1: Water St (day/night)

Car traffic volume : 3744/416 veh/TimePeriod *
Medium truck volume : 87/10 veh/TimePeriod *
Heavy truck volume : 522/58 veh/TimePeriod *
Posted speed limit : 80 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): 4379
Percentage of Annual Growth : 1.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 12.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Water St (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 26.81 / 26.81 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

♀
Results segment # 1: Water St (day)

Source height = 1.86 m

ROAD (0.00 + 64.03 + 0.00) = 64.03 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.56	69.24	0.00	-3.93	-1.28	0.00	0.00	0.00	64.03

Segment Leq : 64.03 dBA

Total Leq All Segments: 64.03 dBA

♀
Results segment # 1: Water St (night)

Source height = 1.86 m

ROAD (0.00 + 57.50 + 0.00) = 57.50 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.56	62.72	0.00	-3.93	-1.28	0.00	0.00	0.00	57.50

POR1_POW

Segment Leq : 57.50 dBA

Total Leq All Segments: 57.50 dBA

♀

TOTAL Leq FROM ALL SOURCES (DAY): 64.03
(NIGHT): 57.50

♀
♀

STAMSON 5.0 NORMAL REPORT Date: 18-03-2016 07:30:37
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por2_ola.te Time Period: Day/Night 16/8 hours
Description: POR2 OLA Water Street

Road data, segment # 1: Water St (day/night)

Car traffic volume	3744/416	veh/TimePeriod *
Medium truck volume	87/10	veh/TimePeriod *
Heavy truck volume	522/58	veh/TimePeriod *
Posted speed limit	80 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)	4379
Percentage of Annual Growth	1.00
Number of Years of Growth	10.00
Medium Truck % of Total Volume	2.00
Heavy Truck % of Total Volume	12.00
Day (16 hrs) % of Total Volume	90.00

Data for Segment # 1: Water St (day/night)

Angle1 Angle2	-65.00 deg	61.00 deg
Wood depth	0	(No woods.)
No of house rows	0 / 0	
Surface	1	(Absorptive ground surface)
Receiver source distance	68.02 / 68.02	m
Receiver height	1.50 / 1.50	m
Topography	1	(Flat/gentle slope; no barrier)
Reference angle	0.00	

♀
Results segment # 1: Water St (day)

Source height = 1.86 m

ROAD (0.00 + 56.25 + 0.00) = 56.25 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-65	61	0.65	69.24	0.00	-10.83	-2.17	0.00	0.00	0.00	56.25

Segment Leq : 56.25 dBA

Total Leq All Segments: 56.25 dBA

♀
Results segment # 1: Water St (night)

Source height = 1.86 m

ROAD (0.00 + 49.72 + 0.00) = 49.72 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-65	61	0.65	62.72	0.00	-10.83	-2.17	0.00	0.00	0.00	49.72

Segment Leq : 49.72 dBA

Total Leq All Segments: 49.72 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 56.25
(NIGHT): 49.72

STAMSON 5.0 NORMAL REPORT Date: 18-03-2016 07:30:04
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por2_pow.te Time Period: Day/Night 16/8 hours
Description: POR2 POW Water Street

Road data, segment # 1: Water St (day/night)

Car traffic volume : 3744/416 veh/TimePeriod *
Medium truck volume : 87/10 veh/TimePeriod *
Heavy truck volume : 522/58 veh/TimePeriod *
Posted speed limit : 80 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): 4379
Percentage of Annual Growth : 1.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 12.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Water St (day/night)

Angle1 Angle2 : -69.00 deg 60.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 45.17 / 45.17 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

♀
Results segment # 1: Water St (day)

Source height = 1.86 m

ROAD (0.00 + 59.76 + 0.00) = 59.76 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-69	60	0.56	69.24	0.00	-7.46	-2.02	0.00	0.00	0.00	59.76

Segment Leq : 59.76 dBA

Total Leq All Segments: 59.76 dBA

♀
Results segment # 1: Water St (night)

Source height = 1.86 m

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
-69	60	0.56	62.72	0.00	-7.46	-2.02	0.00	0.00	0.00	53.23

POR2_POW

Segment Leq : 53.23 dBA

Total Leq All Segments: 53.23 dBA

♀

TOTAL Leq FROM ALL SOURCES (DAY): 59.76
(NIGHT): 53.23

♀
♀

STAMSON 5.0 NORMAL REPORT Date: 18-03-2016 07:31:02
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por3_ola.te Time Period: Day/Night 16/8 hours
Description: POR3 OLA Water Street

Road data, segment # 1: Water St (day/night)

Car traffic volume : 3744/416 veh/TimePeriod *
Medium truck volume : 87/10 veh/TimePeriod *
Heavy truck volume : 522/58 veh/TimePeriod *
Posted speed limit : 80 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): 4379
Percentage of Annual Growth : 1.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 12.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Water St (day/night)

Angle1 Angle2 : -77.00 deg 67.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 72.79 / 72.79 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

♀
Results segment # 1: Water St (day)

Source height = 1.86 m

ROAD (0.00 + 56.12 + 0.00) = 56.12 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-77	67	0.65	69.24	0.00	-11.31	-1.81	0.00	0.00	0.00	56.12

Segment Leq : 56.12 dBA

Total Leq All Segments: 56.12 dBA

♀
Results segment # 1: Water St (night)

Source height = 1.86 m

ROAD (0.00 + 49.59 + 0.00) = 49.59 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-77	67	0.65	62.72	0.00	-11.31	-1.81	0.00	0.00	0.00	49.59

Segment Leq : 49.59 dBA

Total Leq All Segments: 49.59 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 56.12
(NIGHT): 49.59

STAMSON 5.0 NORMAL REPORT Date: 18-03-2016 07:31:32
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por3_pow.te Time Period: Day/Night 16/8 hours
Description: POR3 POW Water Street

Road data, segment # 1: Water St (day/night)

Car traffic volume : 3744/416 veh/TimePeriod *
Medium truck volume : 87/10 veh/TimePeriod *
Heavy truck volume : 522/58 veh/TimePeriod *
Posted speed limit : 80 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): 4379
Percentage of Annual Growth : 1.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 12.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Water St (day/night)

Angle1 Angle2 : -70.00 deg 65.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 59.24 / 59.24 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

♀
Results segment # 1: Water St (day)

Source height = 1.86 m

ROAD (0.00 + 58.06 + 0.00) = 58.06 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-70	65	0.56	69.24	0.00	-9.30	-1.88	0.00	0.00	0.00	58.06

Segment Leq : 58.06 dBA

Total Leq All Segments: 58.06 dBA

♀
Results segment # 1: Water St (night)

Source height = 1.86 m

ROAD (0.00 + 51.54 + 0.00) = 51.54 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-70	65	0.56	62.72	0.00	-9.30	-1.88	0.00	0.00	0.00	51.54

POR3_POW

Segment Leq : 51.54 dBA

Total Leq All Segments: 51.54 dBA

♀

TOTAL Leq FROM ALL SOURCES (DAY): 58.06
(NIGHT): 51.54

♀
♀

STAMSON 5.0 NORMAL REPORT Date: 18-03-2016 07:32:12
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por4_ola.te Time Period: Day/Night 16/8 hours
Description: POR4 OLA Water Street

Road data, segment # 1: Water St (day/night)

Car traffic volume : 3744/416 veh/TimePeriod *
Medium truck volume : 87/10 veh/TimePeriod *
Heavy truck volume : 522/58 veh/TimePeriod *
Posted speed limit : 80 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): 4379
Percentage of Annual Growth : 1.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 12.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Water St (day/night)

Angle1 Angle2 : -60.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 46.95 / 46.95 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

♀
Results segment # 1: Water St (day)

Source height = 1.86 m

ROAD (0.00 + 59.22 + 0.00) = 59.22 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-60	90	0.65	69.24	0.00	-8.17	-1.85	0.00	0.00	0.00	59.22

Segment Leq : 59.22 dBA

Total Leq All Segments: 59.22 dBA

♀
Results segment # 1: Water St (night)

Source height = 1.86 m

ROAD (0.00 + 52.69 + 0.00) = 52.69 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-60	90	0.65	62.72	0.00	-8.17	-1.85	0.00	0.00	0.00	52.69

Segment Leq : 52.69 dBA

Total Leq All Segments: 52.69 dBA

♀

TOTAL Leq FROM ALL SOURCES (DAY): 59.22
(NIGHT): 52.69

♀
♀

STAMSON 5.0 NORMAL REPORT Date: 18-03-2016 07:32:48
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por4_pow.te Time Period: Day/Night 16/8 hours
Description: POR4 POW Water Street

Road data, segment # 1: Water St (day/night)

Car traffic volume : 3744/416 veh/TimePeriod *
Medium truck volume : 87/10 veh/TimePeriod *
Heavy truck volume : 522/58 veh/TimePeriod *
Posted speed limit : 80 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): 4379
Percentage of Annual Growth : 1.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 12.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Water St (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 31.61 / 31.61 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

♀
Results segment # 1: Water St (day)

Source height = 1.86 m

ROAD (0.00 + 62.91 + 0.00) = 62.91 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.56	69.24	0.00	-5.05	-1.28	0.00	0.00	0.00	62.91

Segment Leq : 62.91 dBA

Total Leq All Segments: 62.91 dBA

♀
Results segment # 1: Water St (night)

Source height = 1.86 m

ROAD (0.00 + 56.39 + 0.00) = 56.39 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.56	62.72	0.00	-5.05	-1.28	0.00	0.00	0.00	56.39

Segment Leq : 56.39 dBA

Total Leq All Segments: 56.39 dBA

♀

TOTAL Leq FROM ALL SOURCES (DAY): 62.91
(NIGHT): 56.39

♀
♀

STAMSON 5.0 NORMAL REPORT Date: 18-03-2016 07:33:46
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por5_ola.te Time Period: Day/Night 16/8 hours
Description: POR5 OLA Water Street

Road data, segment # 1: Water St (day/night)

Car traffic volume : 3744/416 veh/TimePeriod *
Medium truck volume : 87/10 veh/TimePeriod *
Heavy truck volume : 522/58 veh/TimePeriod *
Posted speed limit : 80 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): 4379
Percentage of Annual Growth : 1.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 12.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Water St (day/night)

Angle1 Angle2 : -85.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 55.00 / 55.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

♀
Results segment # 1: Water St (day)

Source height = 1.86 m

ROAD (0.00 + 58.48 + 0.00) = 58.48 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-85	90	0.65	69.24	0.00	-9.31	-1.46	0.00	0.00	0.00	58.48

Segment Leq : 58.48 dBA

Total Leq All Segments: 58.48 dBA

♀
Results segment # 1: Water St (night)

Source height = 1.86 m

ROAD (0.00 + 51.95 + 0.00) = 51.95 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-85	90	0.65	62.72	0.00	-9.31	-1.46	0.00	0.00	0.00	51.95

Segment Leq : 51.95 dBA

Total Leq All Segments: 51.95 dBA

♀

TOTAL Leq FROM ALL SOURCES (DAY): 58.48
(NIGHT): 51.95

♀
♀

STAMSON 5.0 NORMAL REPORT Date: 18-03-2016 07:33:19
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por5_pow.te Time Period: Day/Night 16/8 hours
Description: POR5 POW Water Street

Road data, segment # 1: Water St (day/night)

Car traffic volume : 3744/416 veh/TimePeriod *
Medium truck volume : 87/10 veh/TimePeriod *
Heavy truck volume : 522/58 veh/TimePeriod *
Posted speed limit : 80 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): 4379
Percentage of Annual Growth : 1.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 12.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Water St (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 36.96 / 36.96 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

♀
Results segment # 1: Water St (day)

Source height = 1.86 m

ROAD (0.00 + 61.85 + 0.00) = 61.85 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.56	69.24	0.00	-6.11	-1.28	0.00	0.00	0.00	61.85

Segment Leq : 61.85 dBA

Total Leq All Segments: 61.85 dBA

♀
Results segment # 1: Water St (night)

Source height = 1.86 m

ROAD (0.00 + 55.33 + 0.00) = 55.33 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.56	62.72	0.00	-6.11	-1.28	0.00	0.00	0.00	55.33

POR5_POW

Segment Leq : 55.33 dBA

Total Leq All Segments: 55.33 dBA

♀

TOTAL Leq FROM ALL SOURCES (DAY): 61.85
(NIGHT): 55.33

♀
♀

STAMSON 5.0 NORMAL REPORT Date: 18-03-2016 07:34:28
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por6_ola.te Time Period: Day/Night 16/8 hours
Description: POR6 OLA Water Street

Road data, segment # 1: Water St (day/night)

Car traffic volume : 3744/416 veh/TimePeriod *
Medium truck volume : 87/10 veh/TimePeriod *
Heavy truck volume : 522/58 veh/TimePeriod *
Posted speed limit : 80 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): 4379
Percentage of Annual Growth : 1.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 12.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Water St (day/night)

Angle1 Angle2 : -85.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 43.57 / 43.57 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

♀
Results segment # 1: Water St (day)

Source height = 1.86 m

ROAD (0.00 + 60.15 + 0.00) = 60.15 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-85	90	0.65	69.24	0.00	-7.64	-1.46	0.00	0.00	0.00	60.15

Segment Leq : 60.15 dBA

Total Leq All Segments: 60.15 dBA

♀
Results segment # 1: Water St (night)

Source height = 1.86 m

ROAD (0.00 + 53.62 + 0.00) = 53.62 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-85	90	0.65	62.72	0.00	-7.64	-1.46	0.00	0.00	0.00	53.62

Segment Leq : 53.62 dBA

Total Leq All Segments: 53.62 dBA

♀

TOTAL Leq FROM ALL SOURCES (DAY): 60.15
(NIGHT): 53.62

♀
♀

STAMSON 5.0 NORMAL REPORT Date: 18-03-2016 07:34:55
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por6_pow.te Time Period: Day/Night 16/8 hours
Description: POR6 POW Water Street

Road data, segment # 1: Water St (day/night)

Car traffic volume : 3744/416 veh/TimePeriod *
Medium truck volume : 87/10 veh/TimePeriod *
Heavy truck volume : 522/58 veh/TimePeriod *
Posted speed limit : 80 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): 4379
Percentage of Annual Growth : 1.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 12.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Water St (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 32.27 / 32.27 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

♀
Results segment # 1: Water St (day)

Source height = 1.86 m

ROAD (0.00 + 62.77 + 0.00) = 62.77 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.56	69.24	0.00	-5.19	-1.28	0.00	0.00	0.00	62.77

Segment Leq : 62.77 dBA

Total Leq All Segments: 62.77 dBA

♀
Results segment # 1: Water St (night)

Source height = 1.86 m

ROAD (0.00 + 56.25 + 0.00) = 56.25 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.56	62.72	0.00	-5.19	-1.28	0.00	0.00	0.00	56.25

POR6_POW

Segment Leq : 56.25 dBA

Total Leq All Segments: 56.25 dBA

♀

TOTAL Leq FROM ALL SOURCES (DAY): 62.77
(NIGHT): 56.25

♀
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Appendix C
Source Measurements and Sound Power Calculations

Name	ID	Type	Octave Spectrum (dB)										
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin
Delivery Trucks	TThigh	Lw			105.1	112	115.3	113.9	109.9	105.4	98.2	90.2	115.1	119.6
Delivery Truck medium speed	TTmed	Lw			95.1	102	105.3	103.9	99.9	95.4	88.2	80.2	105.1	109.6
Delivery Truck at idle	TTidle	Lw			97.7	97.4	94.6	95.2	95.9	90.2	80.6	71.3	98.8	103.5
			Octave Spectrum (dBA)											
a-weight adjustment				-39.4	-26.2	-16.1	-8.6	-3.2	1E-12	1.2	1	-1.1		
Delivery Trucks	TThigh	Lw			78.9	95.9	106.7	110.7	109.9	106.6	99.2	89.1	115.1	
Delivery Truck medium speed	TTmed	Lw			68.9	85.9	96.7	100.7	99.9	96.6	89.2	79.1	105.1	
Delivery Truck at idle	TTidle	Lw			71.5	81.3	86	92	95.9	91.4	81.6	70.2	98.8	

SOURCE Des: Compactor 1986 CAT 816D Tonal Indicator:

SOURCE TYP: Spherical Sphere 1/ 2

Enabled 1 1 1 1

Lw Technique: Spherical, Parallelepiped, or Area	Point 1	Point 2	Point 3	Point 4	# of Points	Average Lpf	LwfA (from Lwf)	Octave Sound Power
Spherical	Radius (m)	Radius (m)	Radius (m)	Radius (m)		L'p		
(Hz)	15.000	15.000	15.000	15.000	315.0000			
	Lpfi in dB	Lpfi in dB	Lpfi in dB	Lpfi in dB		(dB)	(dBA)	(dBA)
FileID	001	002	003					
Comment								
12.5	70.7	73.3	60.4		3	70.53	102.0	
16	70.5	70.1	57.8		3	68.63	100.1	104.16
20	63.3	67.3	56.2		3	64.24	45.2	
25	60.9	65.5	55.4		3	62.29	49.1	
32	61.1	65.4	64.3		3	63.93	56.0	59.43
40	59.0	61.2	55.5		3	59.14	56.0	
50	58.1	63.3	60.8		3	61.19	62.5	
63	57.4	62.1	59.2		3	59.99	65.3	78.16
80	69.7	67.8	68.7		3	68.81	77.8	
100	68.4	76.5	81.5		3	78.04	90.4	
125	68.1	81.6	72.7		3	77.54	92.9	95.46
160	64.0	71.8	66.4		3	68.65	86.7	
200	61.3	69.9	62.8		3	66.40	87.0	
250	58.6	71.3	66.9		3	68.02	90.9	94.06
315	58.4	66.7	63.9		3	64.17	89.1	
400	62.0	66.5	62.5		3	64.18	90.9	
500	63.9	68.4	66.2		3	66.55	94.9	98.58
630	61.1	67.0	65.0		3	64.99	94.6	
800	66.7	67.2	66.4		3	66.79	97.5	
1,000	69.9	70.9	64.2		3	69.13	100.6	104.22
1,250	66.5	68.2	67.8		3	67.56	99.7	
1,600	64.8	68.0	64.6		3	66.10	98.6	
2,000	63.1	65.1	62.7		3	63.77	96.5	101.25
2,500	57.5	61.3	57.9		3	59.27	92.1	
3,150	56.3	60.4	59.0		3	58.91	91.6	
4,000	57.1	59.4	59.7		3	58.85	91.3	95.74
5,000	56.4	58.3	58.4		3	57.78	89.8	
6,300	50.8	54.0	53.0		3	52.80	84.2	
8,000	48.8	51.1	50.8		3	50.35	80.8	86.36
10,000	44.5	49.2	48.8		3	47.93	76.9	
12,500	39.8	45.9	43.8		3	43.81	71.0	
16,000	34.1	41.7	39.9		3	39.55	64.5	71.97
20,000	27.6	35.6	33.0		3	33.17	55.4	
Overall (dB)	**79.5**	**85.3**	**83.4**		**3.0**	**88.1**	**109.2**	
Overall (dBA)	**77.3**	**79.5**	**75.2**					

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Appendix D

Photographs of Noise Sources

Compactor (CMPTR)

Photograph 1: Compactor (CMPTR)

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Appendix E

Predictor Model Inputs

Receivers Limit of 88

Group	Item ID	Grp ID	Date	1st Kid	Kid Cnt	Name	Desc.	Shape	X	Y	Terrain L
4		0	8/4/2016 10:41	-60	2	POR_04		Point	487144	4786945	324.61
5		0	8/4/2016 10:38	-66	2	POR_03		Point	487096	4787112	323.92
6		0	8/4/2016 10:32	-72	2	POR_02		Point	487091	4787405	324
7		0	3/15/2016 14:33	-78	2	POR_05		Point	487185	4786617	324
8		0	3/15/2016 14:33	-84	2	POR_06		Point	487326	4786203	324
67		0	8/4/2016 10:16	-249	2	POR_01		Point	487219	4787431	320.53
684		0	42586.42917	-2573	1	OPOR_01	OLA fo	Point	487244	4787406	319.64
685		0	42586.44167	-2579	1	OPOR_02	OLA fo	Point	487053	4787428	321.69
686		0	42586.44444	-2585	1	OPOR_03	OLA fo	Point	487053	4787104	294.6
687		0	42586.44931	-2591	1	OPOR_04	OLA fo	Point	487143	4786895	324
688		0	42586.45694	-2597	1	OPOR_05	OLA fo	Point	487149	4786613	324
689		0	42586.45694	-2603	1	OPOR_06	OLA fo	Point	487366	4786204	324

Area Source Limit of 20

Group	Item ID	Grp ID	Date	1st Kid	Kid Cnt	Name	Desc.	Shape	X1	Y1	Height
207		0	3/17/2016 9:19	###############	13	CMPTR	1986 C	Polygon	487259.5	4787100	2.8

Moving Source Limit of 20

Group	Item ID	Grp ID	Date	1st Kid	Kid Cnt	Name	Desc.	Shape	X1	Y1	Xn
251		0	3/15/2016 13:13	-2090	14	OnSiteTrk1	Entran	Polyline	487215.7	4787129	487205.5
254		0	3/17/2016 7:42	-2508	4	OnSiteTrk2	Scale t	Polyline	487217.5	4787125	487262.8
268		0	3/15/2016 10:31	-2385	30	OnSiteTrk3	Travelli	Polyline	487221.1	4787128	487858.6
272		0	3/15/2016 13:17	-2421	17	OnSiteTrk4	Travelli	Polyline	487222.7	4787126	487402.5

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Appendix F

Predictor Model Outputs

Day	Day	Limit 100 Sources, 88 PORs											
	Group / source	Reducti	POR_04_A		POR_04_B		POR_03_A		POR_03_B		POR_02_A		
		[dB]	result	corr.	result	corr.	result	corr.	result	corr.	result		
CMPTR	CMPTR - 1986 CAT 81...	--	42	42	44.9	44.9	41	41	45.5	45.5	35.3		
OnSiteTrk1	OnSiteTrk1 - Entrance...	--	43.1	43.1	44.9	44.9	39.3	39.3	41.1	41.1	29.9		
OnSiteTrk2	OnSiteTrk2 - Scale to ...	--	25.4	25.4	27.5	27.5	27.2	27.2	28.1	28.1	19		
OnSiteTrk3	OnSiteTrk3 - Travellin...	--	28.4	28.4	32.1	32.1	29.5	29.5	33.1	33.1	26.1		
OnSiteTrk4	OnSiteTrk4 - Travellin...	--	26.2	26.2	29.5	29.5	26.6	26.6	30	30	22		
0													
Total	Total		45.8	45.8	48.1	48.1	43.6	43.6	47.2	47.2	37		

R.J. Burnside & Associates Limited