James Keating Construction (2004) Ltd.

Acoustic Impact Assessment Report of the Elora Waste Facility

R.J. Burnside & Associates Limited
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Description: Bin Impact
ement Weighting: A
)utput Weighting: A
SOURCE TYP: Spherical
Sphere 1/ 2
Tonal Indicator:
Data Source: Meter
Enabled 1

Relevant: 1 1

Lw Technique: Spherical, Intensity, Parallelepiped, or Area	**Point 1**	**Point 2**	**Point 3**	**Point 21**	**# of Points**	**Average Lpf**	**Lwf (dBA)**	**Adjustment for Weighting from 'A' to 'A'**	**LwfA (from Lwf)**	**Octave Sound Power**
Spherical	**Radius (m)**	**Radius (m)**	**Radius (m)**	**Radius (m)**		**L'p**				
(Hz)	**22.000**	**22.000**	**22.000**	**22.000**	**22**		**1**			
	Lpfi (dBA)	**Lpfi (dBA)**	**Lpfi (dBA)**	**Lpfi (dBA)**		**(dBA)**	**2**	**(dB)**	**(dBA)**	**(dBA)**
FileID	ETS KH009									
Comment										
12.5	0.0				1	0.01	**34.8**		34.8	
16	0.0				1	0.01	**34.8**		34.8	42.31
20	5.6				1	5.61	**40.4**		40.4	
25	18.1				1	18.05	**52.9**		52.9	
32	31.4				1	31.35	**66.2**		66.2	68.68
40	30.0				1	29.99	**64.8**		64.8	
50	34.1				1	34.09	**68.9**		68.9	
63	37.1				1	37.13	**72.0**		72.0	78.81
80	42.4				1	42.36	**77.2**		77.2	
100	42.9				1	42.87	**77.7**		77.7	
125	42.9				1	42.86	**77.7**		77.7	83.07
160	44.5				1	44.49	**79.3**		79.3	
200	45.0				1	44.98	**79.8**		79.8	
250	44.3				1	44.32	**79.2**		79.2	84.60
315	45.6				1	45.60	**80.4**		80.4	
400	45.8				1	45.80	**80.6**		80.6	
500	46.4				1	46.38	**81.2**		81.2	86.97
630	49.2				1	49.15	**84.0**		84.0	
800	50.6				1	50.59	**85.4**		85.4	
1,000	54.4				1	54.42	**89.3**		89.3	95.23
1,250	58.5				1	58.51	**93.3**		93.3	
1,600	54.7				1	54.67	**89.5**		89.5	
2,000	52.8				1	52.83	**87.7**		87.7	93.53
2,500	54.0				1	54.02	**88.9**		88.9	
3,150	51.1				1	51.13	**86.0**		86.0	
4,000	49.4				1	49.36	**84.2**		84.2	89.35
5,000	48.1				1	48.12	**83.0**		83.0	
6,300	46.7				1	46.74	**81.6**		81.6	
8,000	44.8				1	44.76	**79.6**		79.6	84.54
10,000	42.1				1	42.05	**76.9**		76.9	
12,500	38.9				1	38.88	**73.7**		73.7	
16,000	34.3				1	34.25	**69.1**		69.1	75.23
20,000	27.6				1	27.56	**62.4**		62.4	
Overall (dB)	**64.1**				**1.0**	**64.1**	**98.9**		**98.9**	**98.9**

Definitions

Keating Homes	James Keating Construction (2004) Ltd.
Site (EWF)	Elora Waste Facility 6549 Gerrie Road, Elora, Ontario
Acoustic Assessment	Procedure for assessing the noise impact of a Site on the local PORs
Application	Environmental Compliance Approval Application form dated October 2011 document PIBS: 8551e
Insignificant	Negligible
MECP	Ministry of the Environment, Conservation and Parks
POR	Point of Reception (Noise)
Source ID	The alphanumeric string assigned to a discharge point otherwise known as a “source reference number” in the “Acme Example” PIBS: 5987e.pdf.

Executive Summary

This report is an Acoustic Assessment Report for James Keating Construction (2004) Ltd. (Keating Homes) of the Elora Waste Facility (EWF), located at 6549 Gerrie Road, Elora, Ontario. This assessment report has been prepared as part of an Environmental Impact Assessment to examine the impact of noise sources at the Elora Waste Facility (EWF) on the proposed development, across the road from the facility at 6549 Gerrie Road.

All the significant sources at the facility are considered and the highest measured sound power was used for every source.

Insignificant sources are documented and excluded from the model.

The worst-case scenario occurs on busiest hour on Saturday mornings, generally in the summer. This one hour occurs 2-4 times a year.

The facility shows compliance at the existing residence in the area for both steady and impulsive noise sources.

The facility would show compliance at the proposed residences in the area under the same criteria.

1.0 Introduction and Site Description

This report is an Acoustic Assessment Report for James Keating Construction (2004) Ltd. (Keating Homes) of the Elora Waste Facility (EWF), located at 6549 Gerrie Road, Elora, Ontario. This assessment report has been prepared as part of an Environmental Impact Assessment to examine the impact of noise sources at the Elora Waste Facility (EWF) on the proposed development, across the road from the facility at 6549 Gerrie Road.

The EWF is required to have an Environmental Compliance Approval (ECA) that shows compliance with all relevant noise criteria, so this assessment assumed that a compliant ECA exists for the facility.

There are no sources of vibration present at this facility, and as such, none are considered.

The intent of this study is to predict the existing noise levels at the facility resulting from its daily worst case operating conditions and to determine if the facility complies with the guidelines specified by the MECP at the existing and proposed development. For this report, measurements were made of each significant noise source at the facility. The County of Wellington (the County) has indicated that they are in the midst of developing their entire waste management plan, including which facilities will remain in operation and which facilities will be improved. While it is possible that this facility will close, this report assumes that it will be maintained or improved.

This document provides a comparison of those noise measurements with the allowable noise levels specified by the MECP in applicable NPC documents. The comparison of the measurements with the limits permits the identification of problem areas.

2.0 Facility Description

The County of Wellington (the County) operates a waste transfer facility located at 6549 Gerrie Road, Elora, Ontario. Figure 1 provides a site location map.

The EWF is open to the public from 8:00 A.M. to 4:00 P.M., Tuesdays, Thursdays and Saturdays. In addition, the facility could do work any time between 7:00 A.M. and 7:00 P.M. Monday through Friday; however, activities are usually restricted to a few hours on days when the facility is not open to the public and that work is much less than the scenario considered in this report. (i.e. less truck movement and fewer bin changes).

Figure 2 provides a zoning map of the area. Figure 3 provides a drawing of the facility including the PORs overlaid on an aerial photograph, the receptors at the proposed development, and noise sources at the facility.

3.0 Evaluation of Noise Sources

The EWF contains several significant sources of noise. Images of each significant noise source are provided in Appendix B.

The sources are listed in Table 4. Appendix C provides the measured octave or one-third octave data for the noise sources as well as the calculated sound power levels from these measurements. Measurements were taken using equipment specified in NPC-102 and following the procedures in NPC-103.

Adjustments were considered as provided in NPC-104. Only the “Intermittence” factor was used for the FEL by specifying the operating time in the Noise Model (see Section 3.3 below).

See Table 4: Noise Source Summary Table for a complete list of significant sources, sound power, source location, existing noise control measures, and required noise control measures. Insignificant Noise Sources are listed in Table 2: Insignificant Noise Sources.

The overall ground factor is set to 0.8 because the majority of the surrounding land is long grass or trees and 0.8 is a conservative estimate of the absorption.

There are berms that will not break the line of site on the southwest side of the property. These berms have not been considered in the model although they will likely cause a small reduction in impact.

There are coniferous and deciduous tree on the southwest side of the property. These trees have not been considered in the model although they will likely cause a small reduction in impact.

Similarly, a small berm and trees will be placed on the northeast side of the development, between the residences and Gerrie Road. These features have also not been considered and will likely cause a small reduction in impact.

All these features which have not been included mean that the modelled impact is conservative.

As required by ISO9613-2, the humidity was set to 70% and the temperature to 283.15 K.

Since the facility only operates during daytime hours, only daytime hours were assessed.

Each source is described in detail below.

3.1 Waste Bin Transport Truck, Trck

Waste Bin Transport Truck (Trck) is the truck used by the County to transport full and empty waste bins to and from the Site and move the waste bins around the site.

The worst case for this source happens on Saturday morning, when the Site is particularly busy, which typically happens two (2) or three (3) times a year. In this case, a truck will arrive at the Site at approximately 9:00 carrying an empty waste bin. The truck will place this empty bin in the new bin storage area, move four full bins from the Active Area to the temporary storage area, replace those four bins with new (empty) bins, pickup one of the full bins and leave Site.

Observations made of these operations found that noise from moving empty bins tended to generate more noise than full bins. The most significant impulsive noise occurred when the truck first contacted the empty bin when pushing it into place around the Active Area. These impulses were considered separately as impulsive noise while all the other noise energy was considered as part of the continuous noise emitted from the Site.

The noise from the truck driving on the site was assigned to this source (Trck) while the noise from the maneuvering, bin placement and other on-site activities were assigned to the Bin Activities (BinAct) source.

While it is possible that the truck could arrive and leave site more than twice in an hour, that situation would result in a lower impact than the more conservative situation modelled because there fewer times when empty bins would be moved. The movement of empty bins causes the most noise at the Site.

The path shown in Figure 3 is the longest path the truck could take on site and is 440 m in length.

The emission profile used was measured from the truck at the Site with a total emission of 104.90 dBA.

3.2 Bin Activities, BinAct

All the noise emissions created by bin activities, including the maneuvering of the Waste Bin Transport Truck is included in the BinAct area source. The area covered is the area used by the Waste Bin Transport Truck. Residential traffic is not permitted in this area.

Bin replacement includes picking up a full bin, placing the full bin in the temporary storage area, retrieving an empty bin from the empty bin storage area, placing the bin on the ground near where the bin will be placed, and pushing the bin into place. The profile was measured from bin activities on Site and included a complete bin replacement. The emission is 64.70 dBA/m^2.

On the worst Saturday morning, this activity could occur up to four (4) times. Each time the activity takes ten (10) minutes. To be conservative, the source is modelled to be active for an entire hour.

The County has indicated that they are considering upgrading the facility in the future by adding concrete pads to the ground under where the bins are placed. As a result, measurements were taken for the same operation at the Belwood Transfer Station. Those measurements showed that the addition of a concrete pad did not change the noise emissions measurably. Therefore, sound levels from this activity are not expected to increase after the facility is upgraded.

3.3 Front End Loader, FEL

A front-end loader (FEL) is periodically used to compact the waste in various bins. The FEL drives into the Active Area, positions itself in front of the bin to be compacted, uses the backhoe portion of the machine to compress the contents of the bin. The noise generated by the FEL is negligible during all times except when engine is revving to compact the waste.

The noise profile of the FEL was measured on Site with an overall sound power of 106.59 dBA. The measurement was taken at the point with the clearest view of the engine of the FEL. The emission in the direction of the road will be less than measured but this measurement is conservative.

The noise generated during compacting was measured while compacting waste in several bins including a general waste bin and the scrap metal bin. The noise from the scrap metal bin was indistinguishable from the noise generated while compacting the general waste bin because the dominating source was the engine revving. The noise of compacting the other bins was even lower so the compaction itself is negligible.

Each compaction took between 60 and 120 seconds. To be conservative, the model assumes the compaction takes two (2) minutes. The County has indicated that no more than six (6) bins would be compacted in one (1) hour for a total time of 12 minutes. Based on the number of bins and the time to move the FEL around the site to the various locations, this estimate is reasonable.

The compaction takes place at the location of each bin. Some of those bins are much further from the road than others. To be conservative, the entire emission was assigned to a location near the road (compacting a general waste bin) as all the sensitive receptors are located across the road.

3.4 Bin Impulses, BinImp

There is one (1) impulse generated when the Waste Bin Transport Truck first contacts the empty bin as it pushes the bin into place.

Since up to four (4) bins will be replaced in the worst-case hour on Saturday morning, there can be up to four (4) impulses during the worst-case hour. These impulses were measured several times and the highest measured value was modelled. The County indicated that it is possible, using best practises, to reduce the noise from this contact but this noise was modelled to be conservative.

The impulses were measured on Site and the total maximum sound power was 114.96 dBA.

Full bins are much quieter because they do not reverberate.

3.5 Other Sources

A variety of other activities were measured or observed at site and not included in the model as the sources above provided significantly higher impacts than the ones excluded.

The Waste Bin Transport Truck can be used to move the cans and bottles in the can and bottle recycle bin to one end. This is done by picking up the bin and shaking the bin with one end of the bin in the air. This operation takes place in the north corner of the BinAct area and is substantially quieter than the placing of an empty bin. The compaction took a total of less than two (2) minutes.

Residential vehicles are generally considered to have negligible noise emissions and this position was verified at this facility. Most vehicles were close to inaudible as they moved about the Active Area. The loudest residential vehicles were some types of pickup trucks and even these were inconsequential compared to the Waste Bin Transport Truck. The facility does not accept waste in large trucks on site.

The depositing of waste into the bins by residents did not generate significant noise.

3.6 Other Features

The retaining wall against which the bins are placed was included at a height of 1 m but its addition didn’t make any difference to the predicted impact.

No trees or any other potentially mitigating features were included in the model.

The ground was modelled as flat. In fact, there is a berm along Gerrie Road which could mitigate some noise. Given that the height of that berm may not break the line of sight to the potential receptors, the berm was not included in the model.

While the County has indicated that there is potential for improvements at the Site, they indicated that those improvements would not result in operations outside of the current daytime activities or result in an activity increase to the worst-case hour.

If more activity were to occur at the site, there would just be more hours during which activity would occur.

4.0 Evaluation of Points of Reception

The Ministry of the Environment, Conservation and Parks (MECP) defines a Point of Reception (POR) as an existing, or zoned for future use, residence, hotel, nursing or retirement home, hospital, campground or other sensitive building within 500 metres of the facility. An aerial photo has been included in Figure 3 which provides an illustration of the current land use surrounding the facility, including the nearby PORs.

Table 1: Sensitive Receptor Screening contains a list of all the types of sensitive receptors and the approximate distance and direction to the closest representative of each type.

For this facility, one (1) existing sensitive receptor (POR01) has been identified within 500 m in addition to the proposed receptors (POR02-16). The existing receptor is a 2-storey house south of the facility. The proposed receptors are 2-storey townhouses southwest of the facility. The PORs locations and heights are listed in Table 5: Performance Limit(s) Summary Table.

In order to predict the noise levels at the Outdoor Point of Reception (OPOR) of a given POR, an assessment requires that noise impact calculations for both daytime and evening noise levels be made. For a residence, the OPOR is the position on the property, usually back or side yard, at a distance of up to 30 metres from the residential dwelling at a height of 1.5 m.

The nighttime point of impact is the plane of a second-story open, bedroom window. NPC-300 requires that the proponent show compliance at the Plane of Window (POW). The daytime and nighttime assessments are modeled at heights of 1.5 metres and 4.5 metres or other relevant height at the POW of the receptor.

Table 6: Point of Reception Noise Impact Table (Un-Mitigated) shows the Source ID, Source Type, Distance from Source to Receptor, and the Sound Pressure Level predicted at each POR. The results are summarized in Table 7: Acoustic Assessment Summary Table: Time of Day Model Results Summary (27Nov2018). The purpose of this table is to present the predicted impact that the applicable noise sources, identified as significant in the Noise Source Summary Table (Table 4), have on the identified points of reception (Table 5). In order to model the worst-case impact, the calculations use all relevant heights (1.5 m and 4.5 m) for all time periods (daytime). No modelling was done for evening or nighttime periods as facility does not operate during these hours.

The noise modeling software used for this study is the Brüel & Kjær Predictor Type 7810 software, version “V2019), which follows the procedure specified by ISO standard 9613-2.

As such, the prediction model takes into account the sound level attenuation of the inputted sound power data with distance as well as the any attenuation provided by building shielding and ground absorption.

For the identified noise sources, the source sound-power data is corrected for distance, directional characteristics, and other absorption effects in order to predict the sound level at the points of reception. To accomplish this, the model uses the following general equation:

$$L_w = L_P + 20Log(r) + 11 \pm DI_\theta \pm ground\ \&\ atmospheric\ corrections$$

The Brüel & Kjær Predictor software was used to predict the impact of the noise sources on the identified PORs ignoring any ambient noise contributors from nearby road traffic or stationary noise sources. Appendix E provides one page of the output from the Predictor model, which includes the identifying labels for the PORs. Note that every effort was taken in the above analysis to present the worst-case scenario.

The 12-hour per day operation model includes all identified significant noise sources. The model assumes that all sources run continuously with a 100% duty cycle (unless otherwise indicated in Section 3 above) to represent a worst-case scenario.

5.0 Acoustic Assessment

The noise source emissions considered in this study meet the definition of a stationary noise source. The site location is a mixed environment and considered as Class 2 as defined by the MECP in the Environmental Noise Guideline NPC-300. For a steady stationary noise source, the allowable limits at the nearest receptors during the day (07:00 to 19:00 hours), evening (19:00 to 23:00 hours), or nighttime (23:00 to 07:00 hours) is the higher of the Class Limit or the existing impact from road sources. In addition, NPC-300 states that the sound level limits for noise produced by emergency equipment operating in non-emergency situations are 5 dB greater than the specified limit. Table 5: Performance Limit(s) Summary Table shows the limit at each receptor and the source of that limit (MECP Class, STAMSON Calculation, or On-site measurement).

MECP traffic noise prediction model ORNAMENT calculations were not used to modify the exclusionary limits.

For all noise measurements, the sound level meters were field calibrated before and after the measurements. It was found that there was no change between calibration tests. Thus, the sound level meters complied with the calibration limits specified by the guidelines published in the MECP guidelines of the Model Municipal Noise Control By-Law, Final Report, August 1978 and other subsequent guidelines published thereafter. The battery levels remained within the operational requirements of the equipment during all measurements. During all measurements, the weather conditions remained within the acceptable range as specified by the MECP criteria (see Table 3: Weather Station Records).

Appendix A provides the details on the measuring equipment used for the acquisition of all measurement data used in this report. Meteorological conditions were observed at the time of measurements and data was downloaded from the nearest Environment Canada weather station. Wind speed and humidity were within the limits defined in MECP guidelines.

The Acoustic Assessment Summary Table (Table 7) summarizes the predicted stationary sound levels at the points of reception based on the computational modeling of the noise sources at the facility.

The impulse noise was measured several times with the highest value selected for modelling (see Figure 4b). The criterion for 4 impulses in an hour is 65 dBA[1].

[1] MECP (2013) Environmental Noise Guideline, Stationary and Transportation Sources - Approval and Planning (Publication NPC-300) Table B-3.

Based on the modelled Predictor noise propagation results using the noise data, it is demonstrated that the Elora Waste Station meets all noise requirements for daytime operation given the conditions detailed in this report. The contour plot of the calculated model results for daytime are provided in Figures 4a. The facility only operates during daytime.

Both Figure 4a and Figure 4b show the contour plots at 4.5 m above ground. Contour plots generated at 1.5 m would show less impact.

Figure 4a shows compliance contours that are very close to the proposed sensitive receptors. This presentation is recognized as the absolutely worst case. According to the Site staff, there is only a potential for this to happen two (2) to four (4) hours a year, normally around 9:00 A.M. on busy Saturdays. Every other hour is less than the scenario modelled. The contours shown were predicted using the highest measured values and without considering any mitigating circumstances.

6.0 Conclusion

A predicted noise impact analysis at the representative residential receptors has demonstrated that the worst-case noise emissions from the Elora Waste Station comply with all requirements of the applicable NPC documents for continuous daytime operation. As such, the operations of this facility do not require mitigation measures.

The Site shows compliance with all criteria at the existing and the proposed development.

7.0 Limitations and Use of Report

R.J. Burnside & Associates Limited (Burnside) has completed this report in accordance with generally accepted standards and practices. The conclusions and recommendations in this report are professional opinions based upon our understanding of anticipated Site conditions at the time of this assessment. To the best of our knowledge, the information contained in our report is accurate; however, Burnside does not guarantee the accuracy and reliability of the information provided by other persons or agencies. Burnside is not responsible for environmental concerns that are not visible or otherwise disclosed to us.

This report was prepared for the exclusive use of James Keating Construction (2004) Ltd. For submission in support of a development application. Any use or reliance on or decisions based on this report by a third party, are the responsibility of such third parties. Burnside accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Tables

Type	Name & Address	Dir	Dist.	Source
First Closest to North	Residence at 6583 Gerrie Road, Elora, ON	N	380 m	G
First Closest to South	Residence at 6550 Gerrie Road, Elora, ON	S	100 m	G
First Closest to East	Residence at 6537 Gerrie Road, Elora, ON	SE	275 m	G
First Closest to West	Residence at 6574 Gerrie Road, Elora, ON	W	275 m	G
Vacant Lot	Proposed Development	SW	60 m	C
Hotel	The Village Inn Elora	S	500 m +	G
Community Centre, Civic Centre, Arena	Elora & District Community Centre	SW	500 m +	G
Church (in residential area)	Central Pentecostal Church	E	500 m +	G
Camp ground	Elora Gorge Conservation Area	S	500 m +	G
Child care	Little Angels Elora	S	500 m +	G
Fire Dept	Elora Fire Department	S	500 m +	G
Hospital	Groves Memorial Community Hospital - future site	E	500 m +	G
Library	Aboyne Public Library	E	500 m +	G
Retirement Communities & Homes	Heritage River Retirement Residence	SW	500 m +	G
School	Elora Public School	S	500 m +	G
Park	Elora Quarry Conservation Area	S	500 m +	G

Source: G – Google Maps / Google Earth;
C – Client Provided
S – http://www.edu.gov.on.ca/eng/sift/index.html

Source ID	Description
	Passenger Vehicles

Station Name	ELORA RCS
Province	ONTARIO
Current Station Op	Environment and Climate Change Canada - Meteorological Service of Canada
Latitude	43.65
Longitude	-80.42
Elevation	376.4
Climate Identifier	6142286
WMO Identifier	71352
TC Identifier	ZEL

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is

Legend

E	Estimated
M	Missing
NA	Not Available

Date/Time	Year	Temp (°C)	Dew Point	Rel Hum (%	Wind Dir (1	Wind Spd	Stn Press (	Hmdx	Wind Chill
11Sep2018 0:00	2018	13	12.4	96	33	5	97.2		
11Sep2018 1:00	2018	13	12.5	96	1	7	97.21		
11Sep2018 2:00	2018	13.3	12.7	96	34	6	97.23		
11Sep2018 3:00	2018	13.2	12.6	96	35	7	97.26		
11Sep2018 4:00	2018	13	12.3	96	33	8	97.32		
11Sep2018 5:00	2018	12.9	12.1	95	34	11	97.37		
11Sep2018 6:00	2018	12.6	11.5	93	36	14	97.45		
11Sep2018 7:00	2018	12.1	11.2	94	34	16	97.56		
11Sep2018 8:00	2018	12.9	11.5	91	35	11	97.6		
11Sep2018 9:00	2018	14	12	88	35	10	97.65		
11Sep2018 10:00	2018	15.2	12.2	82	1	12	97.7		
11Sep2018 11:00	2018	16	12.4	79	1	12	97.72		
11Sep2018 12:00	2018	18.1	12.2	68	1	9	97.73		
11Sep2018 13:00	2018	20.2	12.4	61	35	9	97.73		
11Sep2018 14:00	2018	20.9	11.9	56	35	5	97.71		
11Sep2018 15:00	2018	21.9	12.6	55	34	7	97.69		
11Sep2018 16:00	2018	22	11.7	52	36	6	97.69		
11Sep2018 17:00	2018	21.8	11.9	53	2	5	97.69		
11Sep2018 18:00	2018	20.7	11.9	57	4	5	97.7		
11Sep2018 19:00	2018	17	14.3	84	14	8	97.75		
11Sep2018 20:00	2018	14.7	13.3	91	15	9	97.82		
11Sep2018 21:00	2018	15.4	14.1	92	10	4	97.87		
11Sep2018 22:00	2018	15.4	14.1	92	10	5	97.89		
11Sep2018 23:00	2018	14.4	13.2	92	14	4	97.92		
23Oct2018 0:00	2018	-1.2	-2.2	93	9	6	97.02		-3
23Oct2018 1:00	2018	-0.2	-0.8	96	9	7	96.94		-3
23Oct2018 2:00	2018	-1.8	-2.4	96	9	6	96.89		-4
23Oct2018 3:00	2018	-0.2	-0.6	97	12	1	96.89		-1
23Oct2018 4:00	2018	0.1	-0.3	97	17	1	96.85		
23Oct2018 5:00	2018	-0.1	-0.5	97	3	1	96.83		0
23Oct2018 6:00	2018	0.6	0	96	4	6	96.77		
23Oct2018 7:00	2018	0.9	0.4	97	27	10	96.85		
23Oct2018 8:00	2018	3	2.2	95	33	6	96.86		
23Oct2018 9:00	2018	6.4	4.6	89	27	10	96.91		
23Oct2018 10:00	2018	6.3	3.8	85	33	22	96.99		
23Oct2018 11:00	2018	6.5	4.3	86	29	14	97.01		
23Oct2018 12:00	2018	6.8	3.4	79	30	30	97.07		
23Oct2018 13:00	2018	6.8	2.8	76	30	33	97.11		
23Oct2018 14:00	2018	6.6	2.1	73	31	36	97.17		
23Oct2018 15:00	2018	6.9	1.4	68	30	31	97.24		
23Oct2018 16:00	2018	6	1.1	71	30	30	97.3		
23Oct2018 17:00	2018	5.1	0.6	73	32	27	97.38		
23Oct2018 18:00	2018	4.3	0.2	75	31	24	97.46		
23Oct2018 19:00	2018	3.9	0.4	78	31	24	97.5		
23Oct2018 20:00	2018	3.1	0	80	30	15	97.51		
23Oct2018 21:00	2018	3.3	0.7	83	34	16	97.58		
23Oct2018 22:00	2018	2.7	0.6	86	31	22	97.6		
23Oct2018 23:00	2018	2.6	0.5	86	31	20	97.61		

Source ID	Source Description	Note[A]	Source Location[B]	Coordinates		Unmitigated Sound Power Level				Characteristic Penalty	Sound Char[C]	Noise Control Measures[D]
				X	Y	Lw	Day	Evening	Night			
				(m)	(m)	(dBA)	(%)	(%)	(%)			
Point Sources												
FEL	0	2	O	546578.4	4838579.4	106.6	20%	0%	0%	0	S	U
Area Sources												
BinAct	0		O	546582.6	4838611	97.4	100%	0%	0%	0	S	U

Moving Sources			Source Location[B]	Length	Avg. Speed	Lw	Trips/h	Trips/h	Trips/h	Characteristic Penalty	Sound Char[C]	Noise Control Measures[D]
				(m)	(km/h)	(dBA)	(Day)	(Eve)	(Night)			
Trck	0	2	O	439.2	10.0	104.9	2.0	--	--	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 ID	POR Description	POR Location	UTM X Coordinate	UTM Y Coordinate	Height (m)	Class	Receptor Type (POW /OPOR)	Day 0700 - 1900	Evening 1900 - 2300	Night 2300 - 0700	Basis of Criteria
POR01_A	6550 Gerrie Road, Elora, ON - 2 Storey House	100 m south of Facility	546588.64	4838433.31	1.5	2	POW	50	50	45	MOE Class 2
POR01_B	6550 Gerrie Road, Elora, ON - 2 Storey House	100 m south of Facility	546588.64	4838433.31	4.5	2	POW	50	50	45	MOE Class 2
POR01O_A	6550 Gerrie Road, Elora, ON - OPOR	100 m south of Facility	546587.33	4838442.49	1.5	2	OPOR	50	45	--	MOE Class 2
POR02_A	Proposed location 02	Ainley Subdivision	546551.81	4838458.46	1.5	2	POW	50	50	45	MOE Class 2
POR02_B	Proposed location 02	Ainley Subdivision	546551.81	4838458.46	4.5	2	POW	50	50	45	MOE Class 2
POR03_A	Proposed location 03	Ainley Subdivision	546549.19	4838467.43	1.5	2	POW	50	50	45	MOE Class 2
POR03_B	Proposed location 03	Ainley Subdivision	546549.19	4838467.43	4.5	2	POW	50	50	45	MOE Class 2
POR04_A	Proposed location 04	Ainley Subdivision	546542.97	4838473.68	1.5	2	POW	50	50	45	MOE Class 2
POR04_B	Proposed location 04	Ainley Subdivision	546542.97	4838473.68	4.5	2	POW	50	50	45	MOE Class 2
POR05_A	Proposed location 05	Ainley Subdivision	546523.23	4838488.67	1.5	2	POW	50	50	45	MOE Class 2
POR05_B	Proposed location 05	Ainley Subdivision	546523.23	4838488.67	4.5	2	POW	50	50	45	MOE Class 2
POR06_A	Proposed location 06	Ainley Subdivision	546518.64	4838493.06	1.5	2	POW	50	50	45	MOE Class 2
POR06_B	Proposed location 06	Ainley Subdivision	546518.64	4838493.06	4.5	2	POW	50	50	45	MOE Class 2
POR07_A	Proposed location 07	Ainley Subdivision	546514.69	4838496.85	1.5	2	POW	50	50	45	MOE Class 2
POR07_B	Proposed location 07	Ainley Subdivision	546514.69	4838496.85	4.5	2	POW	50	50	45	MOE Class 2
POR08_A	Proposed location 08	Ainley Subdivision	546510.89	4838500.48	1.5	2	POW	50	50	45	MOE Class 2
POR08_B	Proposed location 08	Ainley Subdivision	546510.89	4838500.48	4.5	2	POW	50	50	45	MOE Class 2
POR09_A	Proposed location 09	Ainley Subdivision	546507.99	4838503.25	1.5	2	POW	50	50	45	MOE Class 2
POR09_B	Proposed location 09	Ainley Subdivision	546507.99	4838503.25	4.5	2	POW	50	50	45	MOE Class 2
POR10_A	Proposed location 10	Ainley Subdivision	546504.04	4838507.03	1.5	2	POW	50	50	45	MOE Class 2
POR10_B	Proposed location 10	Ainley Subdivision	546504.04	4838507.03	4.5	2	POW	50	50	45	MOE Class 2
POR11_A	Proposed location 11	Ainley Subdivision	546498.73	4838512.11	1.5	2	POW	50	50	45	MOE Class 2
POR11_B	Proposed location 11	Ainley Subdivision	546498.73	4838512.11	4.5	2	POW	50	50	45	MOE Class 2
POR12_A	Proposed location 12	Ainley Subdivision	546493.13	4838517.47	1.5	2	POW	50	50	45	MOE Class 2
POR12_B	Proposed location 12	Ainley Subdivision	546493.13	4838517.47	4.5	2	POW	50	50	45	MOE Class 2
POR13_A	Proposed location 13	Ainley Subdivision	546484.88	4838537.03	1.5	2	POW	50	50	45	MOE Class 2
POR13_B	Proposed location 13	Ainley Subdivision	546484.88	4838537.03	4.5	2	POW	50	50	45	MOE Class 2
POR14_A	Proposed location 14	Ainley Subdivision	546484.53	4838541.54	1.5	2	POW	50	50	45	MOE Class 2
POR14_B	Proposed location 14	Ainley Subdivision	546484.53	4838541.54	4.5	2	POW	50	50	45	MOE Class 2
POR15_A	Proposed location 15	Ainley Subdivision	546477.75	4838548.38	1.5	2	POW	50	50	45	MOE Class 2
POR15_B	Proposed location 15	Ainley Subdivision	546477.75	4838548.38	4.5	2	POW	50	50	45	MOE Class 2
POR16_A	Proposed location 16	Ainley Subdivision	546470.24	4838552.2	1.5	2	POW	50	50	45	MOE Class 2
POR16_B	Proposed location 16	Ainley Subdivision	546470.24	4838552.2	4.5	2	POW	50	50	45	MOE Class 2

Source ID	Source Type	POR01O_A		POR01_A		POR01_B		POR02_A		POR02_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)
FEL	Point	137.2	43.7	146.4	43.1	146.4	43.9	123.8	44.7	123.8	45.6
BinAct	Area	168.6	41.8	177.8	41.2	177.8	41.5	155.6	42.6	155.6	43.0
Trck	Moving	37.3	43.7	44.7	42.6	44.7	43.4	57.8	42.7	57.8	43.6
TOTAL			47.9		47.1		47.8		48.2		49.0
Rounded TOTAL			**48**		**47**		**48**		**48**		**49**

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

Source ID	Source Type	POR03_A		POR03_B		POR04_A		POR04_B		POR05_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)
FEL	Point	115.7	45.3	115.7	46.2	111.5	45.7	111.5	46.6	106.2	46.2
BinAct	Area	147.4	43.2	147.4	43.6	142.9	43.5	143.0	43.9	136.0	43.8
Trck	Moving	58.7	43.2	58.7	44.0	64.6	43.1	64.6	43.9	85.6	42.3
TOTAL			48.8		49.5		49.0		49.8		49.2
Rounded TOTAL			**49**		**50**		**49**		**50**		**49**

[1]The distance to the POR from nc

Source ID	Source Type	POR05_B		POR06_A		POR06_B		POR07_A		POR07_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)
FEL	Point	106.2	47.1	105.0	46.3	105.0	47.2	104.3	46.4	104.3	47.2
BinAct	Area	136.0	44.3	134.2	43.9	134.2	44.3	132.8	44.0	132.9	44.4
Trck	Moving	85.6	43.2	91.0	42.2	91.0	43.1	95.7	42.1	95.7	43.0
TOTAL			49.9		49.2		50.0		49.3		50.0
Rounded TOTAL			**50**		**49**		**50**		**49**		**50**

[1]The distance to the POR from nc

Source ID	Source Type	POR08_A		POR08_B		POR09_A		POR09_B		POR10_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)
FEL	Point	103.8	46.4	103.9	47.3	103.7	46.4	103.7	47.3	103.7	46.4
BinAct	Area	131.8	44.0	131.8	44.4	131.1	44.0	131.1	44.4	130.3	44.0
Trck	Moving	100.3	41.9	100.3	42.8	103.8	41.8	103.8	42.7	108.7	41.7
TOTAL			49.3		50.0		49.3		50.0		49.2
Rounded TOTAL			**49**		**50**		**49**		**50**		**49**

[1]The distance to the POR from nc

Table 6: Point of Reception Noise Impact Table (Model Results) (27Nov2018)

Source ID	Source Type	POR10_B		POR11_A		POR11_B		POR12_A		POR12_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)
FEL	Point	103.8	47.3	104.3	46.4	104.3	47.2	105.4	46.3	105.4	47.1
BinAct	Area	130.3	44.4	129.7	44.0	129.7	44.4	129.5	43.9	129.5	44.4
Trck	Moving	108.7	42.6	115.4	41.5	115.4	42.4	122.5	41.3	122.5	42.2
TOTAL			50.0		49.2		49.9		49.1		49.8
Rounded TOTAL			**50**		**49**		**50**		**49**		**50**

[1]The distance to the POR from nc

Source ID	Source Type	POR13_A		POR13_B		POR14_A		POR14_B		POR15_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)
FEL	Point	102.7	46.5	102.7	47.4	101.2	46.7	101.2	47.5	105.3	46.3
BinAct	Area	122.6	44.3	122.6	44.7	120.2	44.5	120.2	44.9	122.2	44.2
Trck	Moving	138.0	41.2	138.0	42.1	140.4	41.3	140.5	42.2	149.7	40.9
TOTAL			49.3		50.0		49.4		50.2		49.1
Rounded TOTAL			**49**		**50**		**49**		**50**		**49**

[1]The distance to the POR from nc

Source ID	Source Type	POR15_B		POR16_A		POR16_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)
FEL	Point	105.3	47.1	111.5	45.7	111.5	46.6
BinAct	Area	122.2	44.6	126.8	43.7	126.9	44.2
Trck	Moving	149.7	41.8	158.1	40.4	158.1	41.3
TOTAL			49.8		48.6		49.3
Rounded TOTAL			**50**		**49**		**49**

[1]The distance to the POR from nc

Table 7: Acoustic Assessment Summary Table:
Time of Day Model Results Summary (27Nov2018)

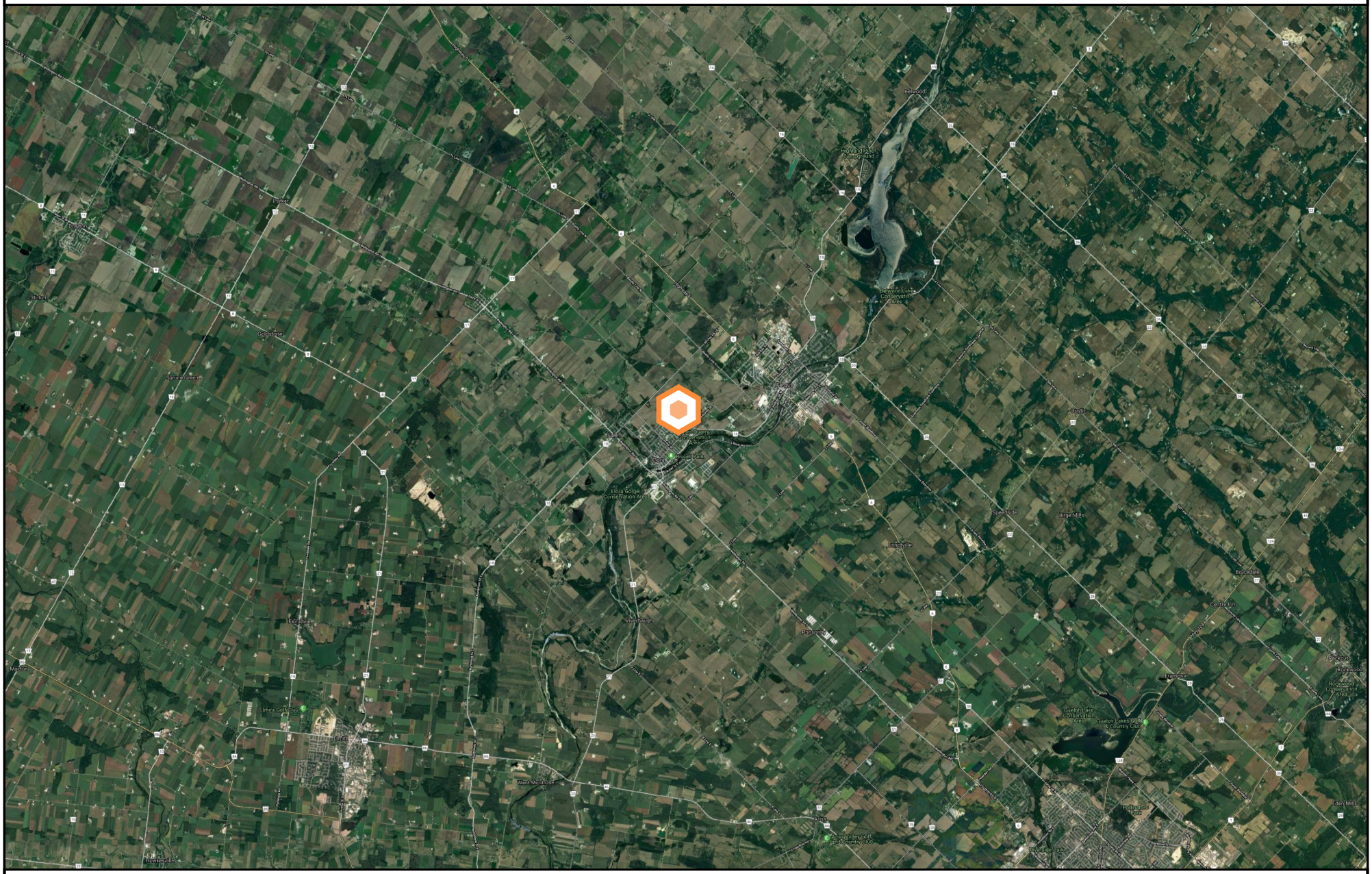
Point of Reception ID	Point of Reception Description	Height (m)	Sound Level at Point of Reception (Leq)(dBA)	Verified by an Acoustic Audit (Yes/No)	Performance Limit (0700h-1900h) (LAeq)	Compliance with Performance Limit (Yes / No)
POR01_A	6550 Gerrie Road, Elora, ON - 2 Storey House (POW)	1.5	47	No	50	Yes
POR01_B	6550 Gerrie Road, Elora, ON - 2 Storey House (POW)	4.5	48	No	50	Yes
POR01O_A	6550 Gerrie Road, Elora, ON - OPOR (OPOR)	1.5	48	No	50	Yes
POR02_A	Proposed location 02 (POW)	1.5	48	No	50	Yes
POR02_B	Proposed location 02 (POW)	4.5	49	No	50	Yes
POR03_A	Proposed location 03 (POW)	1.5	49	No	50	Yes
POR03_B	Proposed location 03 (POW)	4.5	50	No	50	Yes
POR04_A	Proposed location 04 (POW)	1.5	49	No	50	Yes
POR04_B	Proposed location 04 (POW)	4.5	50	No	50	Yes
POR05_A	Proposed location 05 (POW)	1.5	49	No	50	Yes
POR05_B	Proposed location 05 (POW)	4.5	50	No	50	Yes
POR06_A	Proposed location 06 (POW)	1.5	49	No	50	Yes
POR06_B	Proposed location 06 (POW)	4.5	50	No	50	Yes
POR07_A	Proposed location 07 (POW)	1.5	49	No	50	Yes
POR07_B	Proposed location 07 (POW)	4.5	50	No	50	Yes
POR08_A	Proposed location 08 (POW)	1.5	49	No	50	Yes
POR08_B	Proposed location 08 (POW)	4.5	50	No	50	Yes
POR09_A	Proposed location 09 (POW)	1.5	49	No	50	Yes
POR09_B	Proposed location 09 (POW)	4.5	50	No	50	Yes
POR10_A	Proposed location 10 (POW)	1.5	49	No	50	Yes
POR10_B	Proposed location 10 (POW)	4.5	50	No	50	Yes
POR11_A	Proposed location 11 (POW)	1.5	49	No	50	Yes
POR11_B	Proposed location 11 (POW)	4.5	50	No	50	Yes
POR12_A	Proposed location 12 (POW)	1.5	49	No	50	Yes
POR12_B	Proposed location 12 (POW)	4.5	50	No	50	Yes
POR13_A	Proposed location 13 (POW)	1.5	49	No	50	Yes
POR13_B	Proposed location 13 (POW)	4.5	50	No	50	Yes
POR14_A	Proposed location 14 (POW)	1.5	49	No	50	Yes
POR14_B	Proposed location 14 (POW)	4.5	50	No	50	Yes
POR15_A	Proposed location 15 (POW)	1.5	49	No	50	Yes
POR15_B	Proposed location 15 (POW)	4.5	50	No	50	Yes
POR16_A	Proposed location 16 (POW)	1.5	49	No	50	Yes
POR16_B	Proposed location 16 (POW)	4.5	49	No	50	Yes

Figures

Site Location Map

Ainley Subdivision - 6549 Gerrie Road, Elora, ON

BURNSIDE

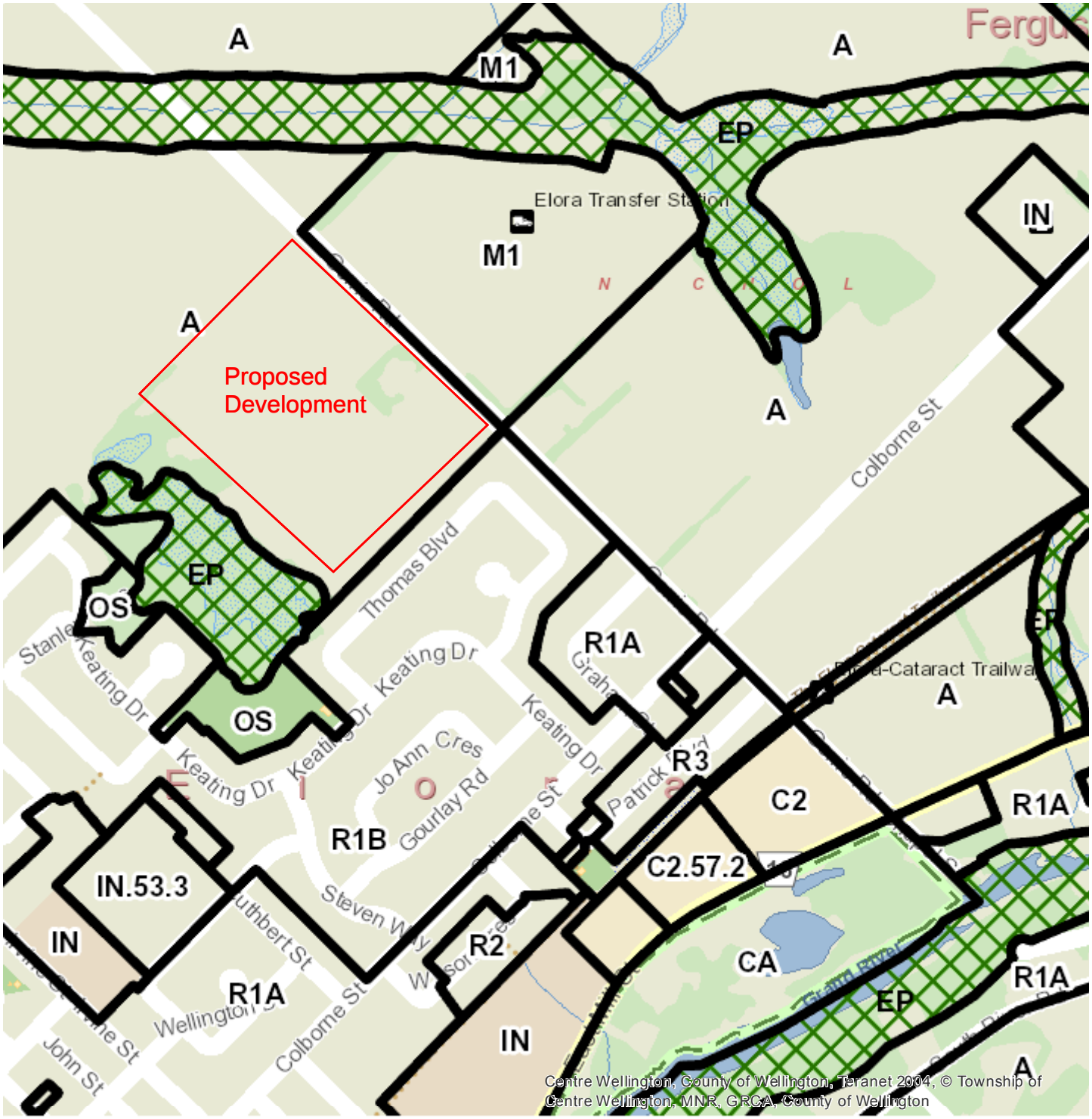


Project No.
300043184

Date:
Sept 26, 2018

Drawn By: HW
Checked By:

Figure 1



Legend

- Land not subject to By-Law 2009-045
- Zone Boundaries
- EP Zone Boundaries

Flood Line

- Floodplain
- Flood Fringe

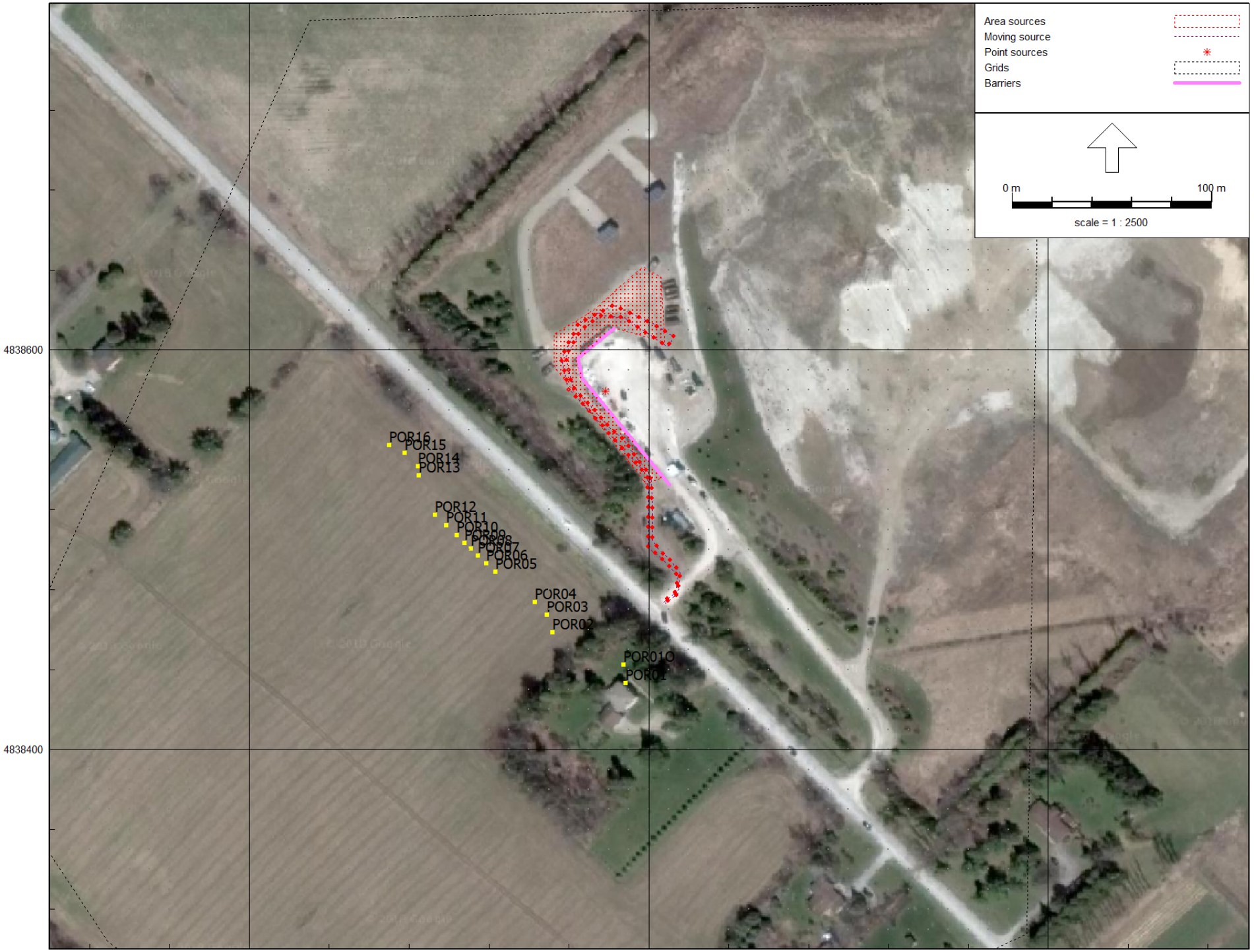
0 0.1 0.2 km

1:8,244

Date: 2018-09-24

Ainley Subdivision Zoning map

Figure 3:
Site Plan with Aerial Photograph and Proposed Receptor Locations



Industrial noise - ISO 9613.1/2, [Normal Operations - 181112 Steady 1/1 Octave Model no buildings 1.5 and 4.5 m high] , Predictor V2019

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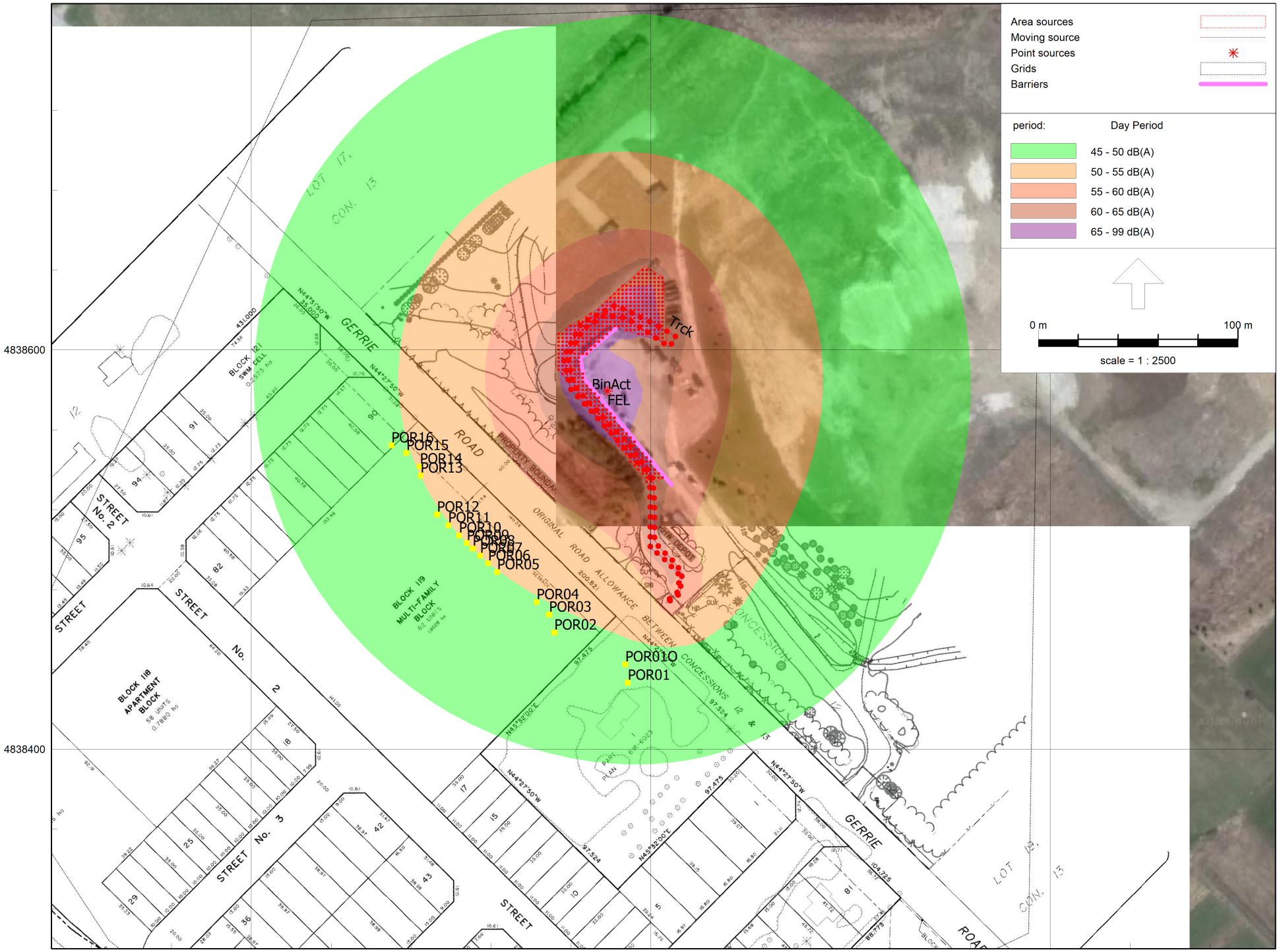

Figure 4a Steady Contours w Plan

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Industrial noise - ISO 9613.1/2, [Normal Operations - 181112 Steady 1/1 Octave Model no buildings 1.5 and 4.5 m high] , Predictor V2019

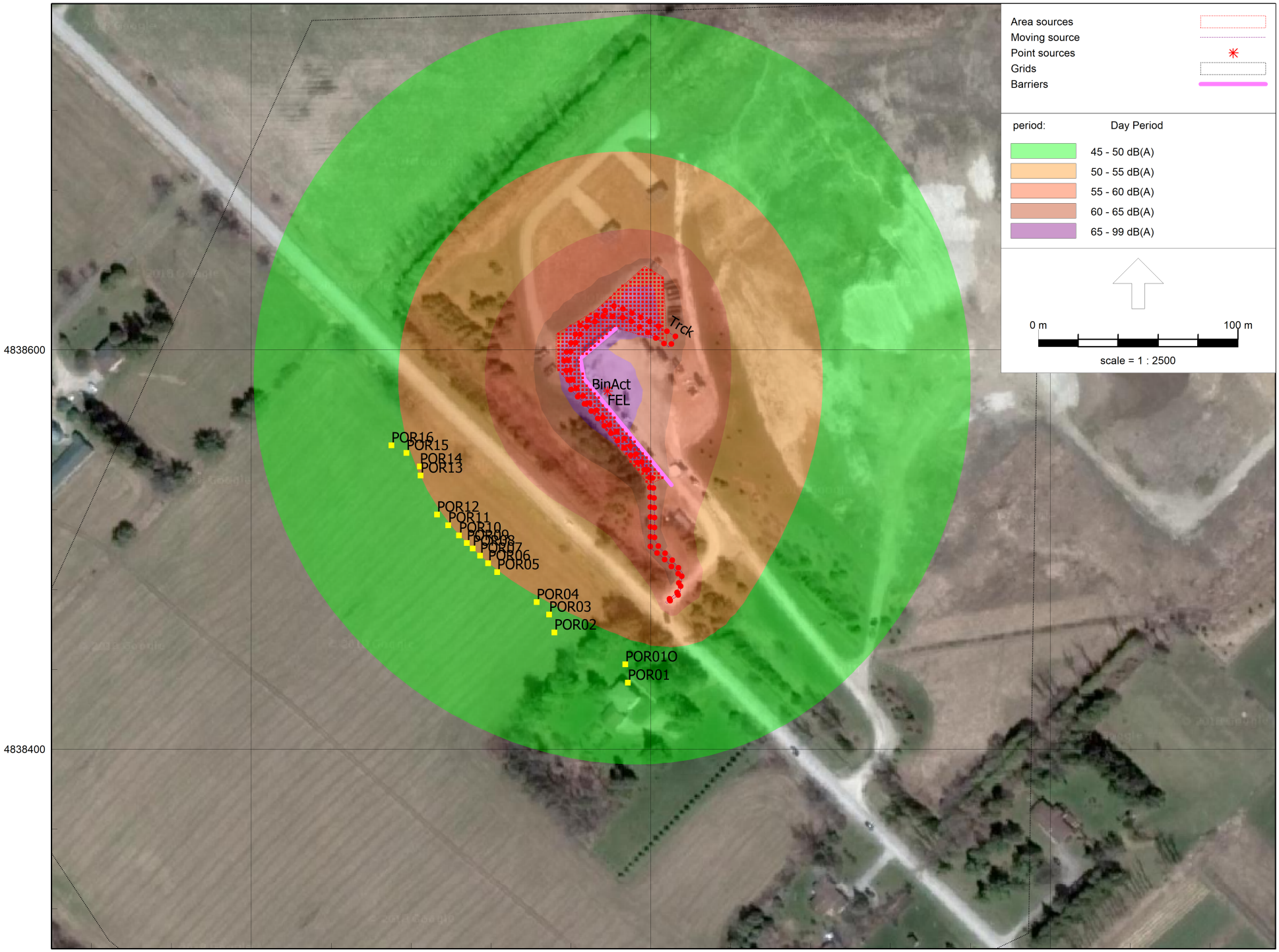

Figure 4a: Steady Contours Daytime

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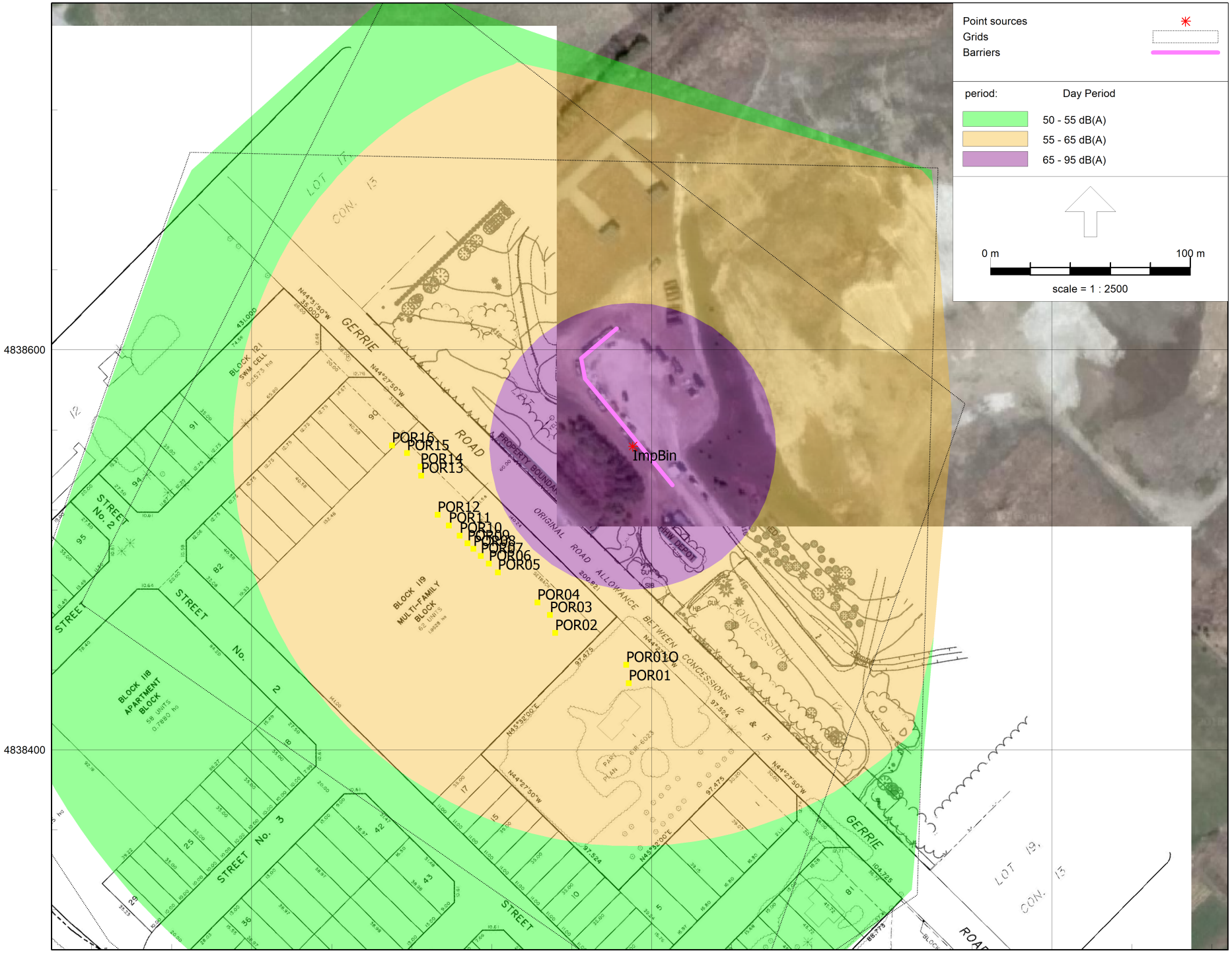
Industrial noise - ISO 9613.1/2, [Normal Operations - 181112 Steady 1/1 Octave Model no buildings 1.5 and 4.5 m high] , Predictor V2019

Figure 4b:
Controur Plot (Daytime)(Unmitigated) - Impulsive



Industrial noise - ISO 9613.1/2, [Normal Operations - 180917 Implusive Model 1/1 Octave Model Receptors to match Steady] , Predictor V2019

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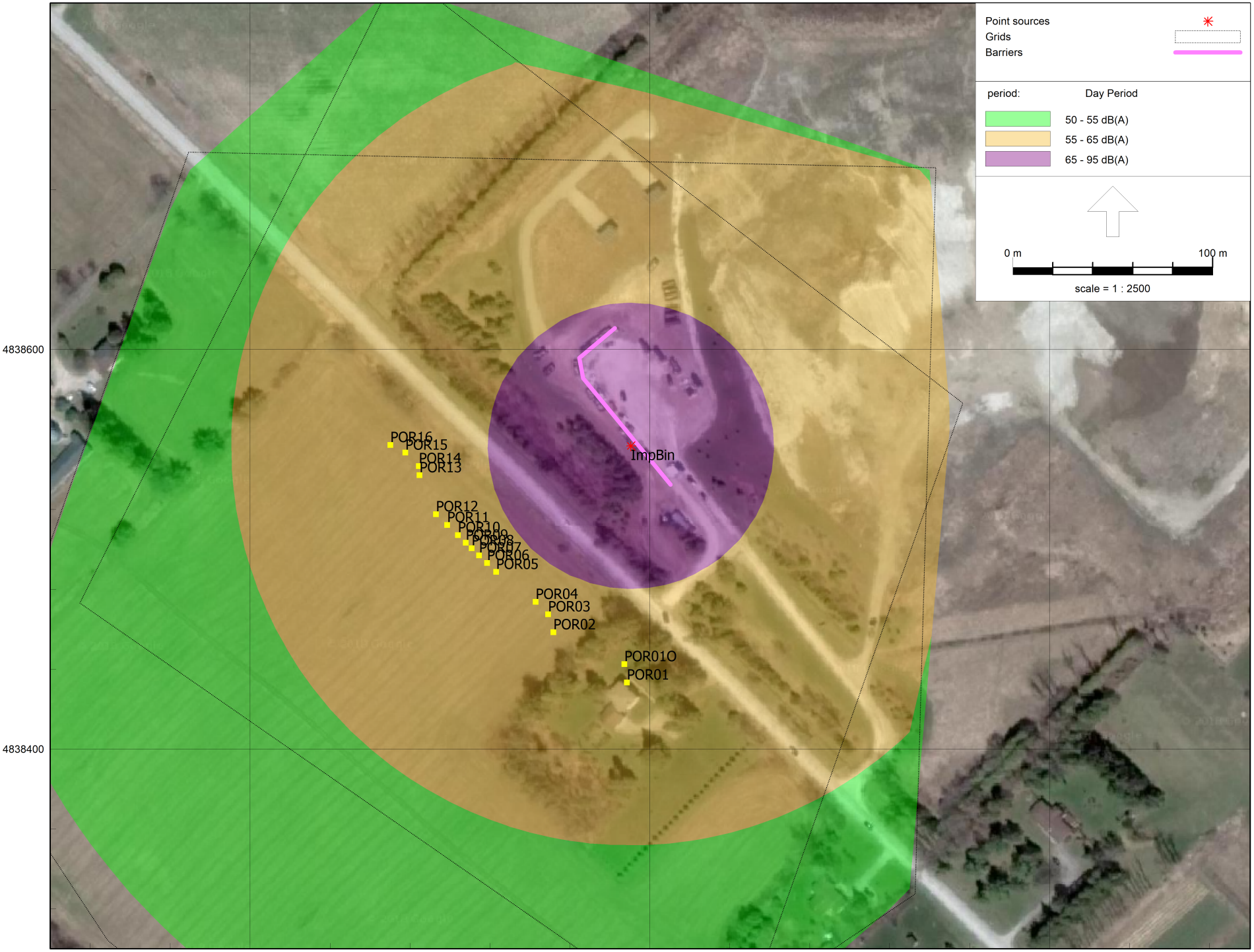
Figure 4b:
Controur Plot (Daytime)(Unmitigated) - Impulsive Without Layout



Industrial noise - ISO 9613.1/2, [Normal Operations - 180917 Implusive Model 1/1 Octave Model Receptors to match Steady] , Predictor V2019

RJ Burnside, Canada

Appendix A
Equipment Calibration Information

Appendix A
Equipment Calibration Information

The Sound Pressure Measurements were made with a calibrated type 1 sound level meter as required by NPC-300. Sound measurements were made with a Bruel & Kjaer 2270 sound level meter (S/N 3006544) equipped with a microphone listed below. Spot calibration checks were made with a Bruel & Kjaer Sound Level Calibrator Type 4231 (S/N 3012518) that produced a 94 dB tone at 1,000 Hz before measurements began and after measurements were complete at each location. All of the calibration checks produced sound pressure levels that varied less than 0.5 dBA and therefore the sound level measurements were accurately determined. The microphone was equipped with a wind screen when measurements were obtained and was mounted on a tripod approximately 1.5 m above grade. Battery level was recorded, and the batteries were recharged when required. The microphone was mounted as directed by the manufacturer to obtain the best possible free field measurement.

PCB Type 1 microphone Type 4189 (S/N 2978485)

Brüel & Kjær
North America Inc.
The Brüel & Kjær Calibration Laboratory
3079 Premiere Parkway Suite 120
Duluth, GA 30097
Telephone: 770/209-6907
Fax: 770/447-4033
Web site address: http://www.bkhome.com

ACCREDITED
Calibration Certificate Number 1568.01

CERTIFICATE OF CALIBRATION

Certificate No: CAS-297665-L5T5G7-201

CALIBRATION OF:

Sound Level Meter:	Brüel & Kjær	2270	Serial No: 3006544
Microphone:	Brüel & Kjær	4189	Serial No: 2978485
Preamplifier:	Brüel & Kjær	ZC-0032	Serial No: 22283
Supplied Calibrator:	Brüel & Kjær	4231	Serial No: 3012518
Software version:	BZ7222 Version 4.7.4		

CLIENT:

R.J. Burnside & Associates Limited
6990 Creditview Road, Unit 2
Mississauga, ON L5N 8R9

CALIBRATION CONDITIONS:

Preconditioning: 4 hours at 23 ± 3 °C
Environment conditions See actual values in Environmental Condition sections

SPECIFICATIONS:

This document certifies that the instrument as listed under "Model/Serial Number" has been calibrated and unless otherwise indicated under "Final Data", meets acceptance criteria as prescribed by the referenced Procedure. The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95%. Statements of compliance, where applicable, are based on calibration results falling within specified criteria with no reduction by the uncertainty of the measurement. The calibration of the listed instrumentation, was accomplished using a test system which conforms with the requirements of ISO/IEC 17025, ANSI/NCSL Z540-1, and ISO 10012-1. For "as received" and/or "final" data, see the attached page(s). Items marked with one asterisk (*) are not covered by the scope of the current A2LA accreditation This Certificate and attached data pages shall not be reproduced, except in full, without the written approval of the Brüel and Kjær Calibration Laboratory-Duluth, GA. Results relate only to the items tested. This instrument has been calibrated using Measurement Standards with values traceable to the National Institute of Standards and Technology, National Measurement Institutes or derived from natural physical constants.

PROCEDURE:

Brüel and Kjær Model 3630 Sound Level Meter Calibration System Software 7763 Version 7.1 - DB: 7.10 Test Collection 2270-4189.

RESULTS:

As Received Condition	As Received Data	Final Data
_X_ Received in good condition	_X_ Within acceptance criteria	_X_ Within acceptance criteria
___ Damaged - See attached report	___ Outside acceptance criteria	___ Limited test - See attached details
	___ Inoperative	
	___ Data not taken	

Date of Calibration: 19 Apr. 2018

Certificate issued: 19 Apr. 2018

Roy Moss

Calibration Technician

John Astilla

Quality Representative

Summary

Preliminary inspection	**Passed**
Environmental conditions, Prior to calibration	**Passed**
Reference information	**Passed**
Indication at the calibration check frequency	**Passed**
Acoustical signal tests of a frequency weighting, C weighting	**Passed**
Self-generated noise, Microphone installed	**Passed**
Self-generated noise, Electrical	**Passed**
Electrical signal tests of frequency weightings, A weighting	**Passed**
Electrical signal tests of frequency weightings, C weighting	**Passed**
Electrical signal tests of frequency weightings, Z weighting	**Passed**
Frequency and time weightings at 1 kHz	**Passed**
Long-term stability, Reference	**Passed**
Level linearity on the reference level range, Upper	**Passed**
Level linearity on the reference level range, Lower	**Passed**
Toneburst response, Time-weighting Fast	**Passed**
Toneburst response, Time-weighting Slow	**Passed**
Toneburst response, LAE	**Passed**
C-weighted peak sound level, 8 kHz	**Passed**
C-weighted peak sound level, 500 Hz	**Passed**
Overload indication	**Passed**
Long-term stability, 1. relative	**Passed**
High-level stability	**Passed**
Long-term stability, 2. relative	**Passed**
Environmental conditions, Following calibration	**Passed**

The sound level meter submitted for testing successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.
However, no general statement or conclusion can be made about conformance of the sound level meter to the full specifications of IEC 61672-1:2013 because (a) evidence was not publicly available, from an independent testing organization responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013 or correction data for acoustical test of frequency weighting were not provided in the Instruction Manual and (b) because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Conformance to a performance specification is demonstrated when the following criteria are both satisfied: (a) a measured deviation from a design goal does not exceed the applicable acceptance limit and (b) the corresponding uncertainty of measurement does not exceed the corresponding maximum-permitted uncertainty of measurement given in IEC 61672-1:2013 for the same coverage probability of 95 %.

Instruments

Category:	Type:	Manufacturer:	Serial No.:	Next Calibration Date:	Traceable to:
Calibrator	4226	Brüel & Kjær	2433680	09 Jun. 2018	CAS-219497-D4M8S9-908
Adaptor	WA0302B, 15 pF	Brüel & Kjær	2409010	31 Jan. 2019	403426
Voltmeter	DMM34970A	Agilent	MY44026960	31 Oct. 2018	416166
Generator	Pulse Generator	Brüel & Kjær	2604447	31 May. 2018	CAS-279628-W3D9N0-201
AmplifierDivider	3111 Output Module	Brüel & Kjær	2590603	31 May. 2018	CAS-279628-W3D9N0-201

Preliminary inspection

Visually inspect instrument, and operate all relevant controls. (section 5)

	Result
Visual inspection	OK

Environmental conditions, Prior to calibration

Actual environmental conditions prior to calibration. (section 7)

	Measured [Deg / kPa / %RH]
Air temperature	23.50
Air pressure	98.10
Relative humidity	38.70

Reference information

Information about reference range, level and channel. (section 22.h + 22.m)

	Value [dB SPL]
Reference sound pressure level	94
Reference level range	140
Channel number	1

Indication at the calibration check frequency

Measure and adjust sound level meter using the supplied calibrator. (section 10 + 22.m)

	Expected [dB SPL / Hz]	Measured [dB SPL / Hz]	Uncertainty [dB]
Calibration check frequency (supplied calibrator)	1000.00	1000.00	1.00
Initial indication (supplied calibrator)	94.00	94.12	0.14
Adjusted indication (supplied calibrator)	94.00	94.00	0.14

Acoustical signal tests of a frequency weighting, C weighting

Frequency weightings measured acoustically with a calibrated multi-frequency sound calibrator. Averaging time is 10 seconds, and the result is the average of 2 measurements. (section 12)

	Coupler Pressure Lc	Mic. Correction C4226	Body Influence	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB]	[dB]	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
1000Hz, Ref. (1st)	94.10	0.10	-0.07	94.07	94.01	-0.7	0.7	-0.06	0.25
1000Hz, Ref. (2nd)	94.10	0.10	-0.07	94.07	94.01	-0.7	0.7	-0.06	0.25
1000Hz, Ref. (Average)	94.10	0.10	-0.07	94.07	94.01	-0.7	0.7	-0.06	0.25
125.89Hz (1st)	94.08	0.00	0.00	93.89	93.94	-1.0	1.0	0.05	0.25
125.89Hz (2nd)	94.08	0.00	0.00	93.89	93.95	-1.0	1.0	0.06	0.25
125.89Hz (Average)	94.08	0.00	0.00	93.89	93.94	-1.0	1.0	0.05	0.25
7943.3Hz (1st)	93.52	2.80	-0.08	87.81	87.45	-2.5	1.5	-0.36	0.52
7943.3Hz (2nd)	93.52	2.80	-0.08	87.81	87.45	-2.5	1.5	-0.36	0.52
7943.3Hz (Average)	93.52	2.80	-0.08	87.81	87.45	-2.5	1.5	-0.36	0.52

Self-generated noise, Microphone installed

Self-generated noise measured with microphone submitted for periodic testing. Averaging time is 30 seconds. An anechoic chamber is used to isolate environmental noise.
The level of self-generated noise is reported for information only and is not used to assess conformance to a requirement. (section 11.1)

	Max	Measured	Uncertainty
	[dB SPL]	[dB SPL]	[dB]
A weighted	17.70	16.89	0.50

Self-generated noise, Electrical

Self-generated noise measured in most sensitive range, with electrical substitution for microphone, according to manufactures specifications.
The level of self-generated noise is reported for information only and is not used to assess conformance to a requirement. (section 11.2)

	Max	Measured	Uncertainty
	[dB SPL]	[dB SPL]	[dB]
A weighted	13.60	12.69	0.30
C weighted	14.30	12.94	0.30
Z weighted	19.40	17.77	0.30

Electrical signal tests of frequency weightings, A weighting

Frequency response measured with electrical signal relative to level at 1 kHz in reference range. (section 13)
Electrical and acoustical response and body influence corrections are adjusted with the respective correction values at the reference frequency, in accordance with section 13.6

	Input Level	Expected	Measured	El.+Acous. Resp.	Body Influence	Corr. Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dBV]	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
1000Hz, Ref.	-24.28	95.00	95.00	0.00	0.00	95.00	-0.5	0.5	0.00	0.12
63.096Hz	1.92	95.00	95.07	-0.01	0.07	95.13	-1.0	1.0	0.13	0.12
125.89Hz	-8.18	95.00	95.03	-0.01	0.07	95.09	-1.0	1.0	0.09	0.12
251.19Hz	-15.68	95.00	94.98	-0.01	0.14	95.11	-1.0	1.0	0.11	0.12
501.19Hz	-21.08	95.00	94.97	-0.02	0.29	95.24	-1.0	1.0	0.24	0.12
1995.3Hz	-25.48	95.00	95.01	0.03	-0.02	95.02	-1.0	1.0	0.02	0.12
3981.1Hz	-25.28	95.00	95.00	0.03	-0.02	95.01	-1.0	1.0	0.01	0.12
7943.3Hz	-23.18	95.00	95.00	-0.04	-0.01	94.95	-2.5	1.5	-0.05	0.12
15849Hz	-17.68	95.00	94.11	0.86	0.18	95.15	-16.0	2.5	0.15	0.12

Electrical signal tests of frequency weightings, C weighting

Frequency response measured with electrical signal relative to level at 1 kHz in reference range. (section 13)
Electrical and acoustical response and body influence corrections are adjusted with the respective correction values at the reference frequency, in accordance with section 13.6

	Input Level	Expected	Measured	El.+Acous. Resp.	Body Influence	Corr. Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dBV]	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
1000Hz, Ref.	-24.29	95.00	95.00	0.00	0.00	95.00	-0.5	0.5	0.00	0.12
63.096Hz	-23.49	95.00	95.01	-0.01	0.07	95.07	-1.0	1.0	0.07	0.12
125.89Hz	-24.09	95.00	95.04	-0.01	0.07	95.10	-1.0	1.0	0.10	0.12
251.19Hz	-24.29	95.00	95.00	-0.01	0.14	95.13	-1.0	1.0	0.13	0.12
501.19Hz	-24.29	95.00	95.03	-0.02	0.29	95.30	-1.0	1.0	0.30	0.12
1995.3Hz	-24.09	95.00	95.04	0.03	-0.02	95.05	-1.0	1.0	0.05	0.12
3981.1Hz	-23.49	95.00	95.00	0.03	-0.02	95.01	-1.0	1.0	0.01	0.12
7943.3Hz	-21.29	95.00	94.99	-0.04	-0.01	94.94	-2.5	1.5	-0.06	0.12
15849Hz	-15.79	95.00	94.07	0.86	0.18	95.11	-16.0	2.5	0.11	0.12

Electrical signal tests of frequency weightings, Z weighting

Frequency response measured with electrical signal relative to level at 1 kHz in reference range. (section 13)
Electrical and acoustical response and body influence corrections are adjusted with the respective correction values at the reference frequency, in accordance with section 13.6

	Input Level	Expected	Measured	El.+Acous. Resp.	Body Influence	Corr. Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dBV]	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
1000Hz, Ref.	-24.29	95.00	95.00	0.00	0.00	95.00	-0.5	0.5	0.00	0.12
63.096Hz	-24.29	95.00	95.03	-0.01	0.07	95.09	-1.0	1.0	0.09	0.12
125.89Hz	-24.29	95.00	95.01	-0.01	0.07	95.07	-1.0	1.0	0.07	0.12
251.19Hz	-24.29	95.00	95.00	-0.01	0.14	95.13	-1.0	1.0	0.13	0.12
501.19Hz	-24.29	95.00	95.00	-0.02	0.29	95.27	-1.0	1.0	0.27	0.12
1995.3Hz	-24.29	95.00	95.00	0.03	-0.02	95.01	-1.0	1.0	0.01	0.12
3981.1Hz	-24.29	95.00	95.02	0.03	-0.02	95.03	-1.0	1.0	0.03	0.12
7943.3Hz	-24.29	95.00	95.00	-0.04	-0.01	94.95	-2.5	1.5	-0.05	0.12
15849Hz	-24.29	95.00	94.13	0.86	0.18	95.17	-16.0	2.5	0.17	0.12

Frequency and time weightings at 1 kHz

Frequency and time weighting measured at 1 kHz with electrical signal in reference range. Measured relative to A-weighted and Fast response. (section 14)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
LAF, Ref.	94.00	94.00	-0.5	0.5	0.00	0.12
LCF	94.00	94.00	-0.2	0.2	0.00	0.12
LZF	94.00	94.00	-0.2	0.2	0.00	0.12
LAS	94.00	93.95	-0.1	0.1	-0.05	0.12
LAeq	94.00	93.99	-0.1	0.1	-0.01	0.12

Long-term stability, Reference

Long-term stability over 25 to 35 minutes, with steady 1kHz signal at reference level. (section 15)
Adjusting to reference level indication.

	Measured	Accept - Limit	Accept + Limit	Deviation	Timestamp	Uncertainty
	[dB SPL]	[dB]	[dB]	[dB]		[dB]
Reference	94.00	-0.5	0.5	0.00	2018-04-19 15:59:06	0.10

Level linearity on the reference level range, Upper

Level linearity in reference range, measured at 8 kHz until overload. (section 16)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
94 dB	94.00	94.00	-0.2	0.2	0.00	0.13
99 dB	99.00	99.00	-0.8	0.8	0.00	0.13
104 dB	104.00	104.00	-0.8	0.8	0.00	0.13
109 dB	109.00	109.00	-0.8	0.8	0.00	0.13
114 dB	114.00	114.01	-0.8	0.8	0.01	0.13
119 dB	119.00	119.01	-0.8	0.8	0.01	0.13
124 dB	124.00	124.01	-0.8	0.8	0.01	0.13
129 dB	129.00	129.02	-0.8	0.8	0.02	0.13
134 dB	134.00	134.02	-0.8	0.8	0.02	0.13
135 dB	135.00	135.02	-0.8	0.8	0.02	0.13
136 dB	136.00	136.02	-0.8	0.8	0.02	0.13
137 dB	137.00	137.01	-0.8	0.8	0.01	0.13
138 dB	138.00	138.02	-0.8	0.8	0.02	0.13
139 dB	139.00	139.01	-0.8	0.8	0.01	0.13

Level linearity on the reference level range, Lower

Level linearity in reference range, measured at 8 kHz down to lower limit, or until underrange. (section 16)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
94 dB	94.00	94.00	-0.2	0.2	0.00	0.13
89 dB	89.00	89.00	-0.8	0.8	0.00	0.13
84 dB	84.00	84.00	-0.8	0.8	0.00	0.13
79 dB	79.00	79.00	-0.8	0.8	0.00	0.13
74 dB	74.00	74.00	-0.8	0.8	0.00	0.13
69 dB	69.00	68.99	-0.8	0.8	-0.01	0.13
64 dB	64.00	63.99	-0.8	0.8	-0.01	0.13
59 dB	59.00	58.99	-0.8	0.8	-0.01	0.13
54 dB	54.00	54.00	-0.8	0.8	0.00	0.13
49 dB	49.00	49.01	-0.8	0.8	0.01	0.13
44 dB	44.00	44.01	-0.8	0.8	0.01	0.13
39 dB	39.00	39.03	-0.8	0.8	0.03	0.24
34 dB	34.00	34.06	-0.8	0.8	0.06	0.24
30 dB	30.00	30.14	-0.8	0.8	0.14	0.24
29 dB	29.00	29.15	-0.8	0.8	0.15	0.24
28 dB	28.00	28.19	-0.8	0.8	0.19	0.24
27 dB	27.00	27.23	-0.8	0.8	0.23	0.24
26 dB	26.00	26.29	-0.8	0.8	0.29	0.24
25 dB	25.00	25.37	-0.8	0.8	0.37	0.24
24 dB	24.00	24.45	-0.8	0.8	0.45	0.24

Toneburst response, Time-weighting Fast

Response to 4 kHz toneburst measured in reference range, relative to continuous signal. (section 18)

	Expected [dB SPL]	Measured [dB SPL]	Accept - Limit [dB]	Accept + Limit [dB]	Deviation [dB]	Uncertainty [dB]
Continuous, Ref.	137.00	137.00	-0.5	0.5	0.00	0.12
200 ms Burst	136.00	135.99	-0.5	0.5	-0.01	0.12
2 ms Burst	119.00	118.92	-1.5	1.0	-0.08	0.12
0.25 ms Burst	110.00	109.82	-3.0	1.0	-0.18	0.12

Toneburst response, Time-weighting Slow

Response to 4 kHz toneburst measured in reference range, relative to continuous signal. (section 18)

	Expected [dB SPL]	Measured [dB SPL]	Accept - Limit [dB]	Accept + Limit [dB]	Deviation [dB]	Uncertainty [dB]
Continuous, Ref.	137.00	137.00	-0.5	0.5	0.00	0.12
200 ms Burst	129.60	129.60	-0.5	0.5	0.00	0.12
2 ms Burst	110.00	109.99	-3.0	1.0	-0.01	0.12

Toneburst response, LAE

Response to 4 kHz toneburst measured in reference range, relative to continuous signal. (section 18)

	Expected [dB SPL]	Measured [dB SPL]	Accept - Limit [dB]	Accept + Limit [dB]	Deviation [dB]	Uncertainty [dB]
Continuous, Ref.	137.00	137.00	-0.5	0.5	0.00	0.12
200 ms Burst	130.00	129.99	-0.5	0.5	-0.01	0.12
2 ms Burst	110.00	109.96	-1.5	1.0	-0.04	0.12
0.25 ms Burst	101.00	100.85	-3.0	1.0	-0.15	0.12

C-weighted peak sound level, 8 kHz

Peak-response to a 8 kHz single-cycle sine measured in least-sensitive range, relative to continuous signal. (section 19)

	Expected [dB SPL]	Measured [dB SPL]	Accept - Limit [dB]	Accept + Limit [dB]	Deviation [dB]	Uncertainty [dB]
Continuous, Ref.	135.00	135.00	-0.5	0.5	0.00	0.09
Single Sine	138.40	138.49	-2.0	2.0	0.09	0.12

C-weighted peak sound level, 500 Hz

Peak-response to a 500 Hz half-cycle sine measured in least-sensitive range, relative to continuous signal. (section 19)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
Continuous, Ref.	135.00	135.00	-0.5	0.5	0.00	0.09
Half-sine, Positive	137.40	137.11	-1.0	1.0	-0.29	0.12
Half-sine, Negative	137.40	137.12	-1.0	1.0	-0.28	0.12

Overload indication

Overload indication in the least sensitive range determined with a 4 kHz positive/negative half-cycle signal. (section 20)

	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB]	[dB]	[dB]	[dB]
Continuous	140.00	-0.5	0.5	0.00	0.20
Half-sine, Positive	141.03	-10.0	10.0	1.03	0.20
Half-sine, Negative	141.33	-10.0	10.0	1.33	0.20
Difference	141.33	-1.5	1.5	0.30	0.24

Long-term stability, 1. relative

Long-term stability over 25 to 35 minutes, with steady 1kHz signal at reference level. (section 15)
Relative to prior adjustment to reference level indication.

	Measured	Accept - Limit	Accept + Limit	Deviation	Timestamp	Uncertainty
	[dB SPL / Min]	[dB / Min]	[dB / Min]	[dB / Min]		[dB]
Measurement	94.00	-0.1	0.1	0.00	2018-04-19 16:14:57	0.10
Time passed	15.51	0.0	35.0	15.51		0.00

High-level stability

High-level stability over 5 minutes, with steady 1kHz signal, 1dB below upper boundary. (section 21)

	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB]	[dB]	[dB]	[dB]
High-level, Ref.	139.00	-0.5	0.5	0.00	0.10
High-level, after 5min	139.00	-0.1	0.1	0.00	0.10

Long-term stability, 2. relative

Long-term stability over 25 to 35 minutes, with steady 1kHz signal at reference level. (section 15)
Relative to prior adjustment to reference level indication.

	Measured	Accept - Limit	Accept + Limit	Deviation	Timestamp	Uncertainty
	[dB SPL/ Min]	[dB / Min]	[dB / Min]	[dB / Min]		[dB]
Wait	25.00	25.0	120.0	25.00		0.00
Measurement	94.00	-0.1	0.1	0.00	2018-04-19 16:24:51	0.10

Environmental conditions, Following calibration

Actual environmental conditions following calibration. (section 7)

	Measured
	[Deg / kPa / %RH]
Air temperature	23.00
Air pressure	98.80
Relative humidity	31.10

Brüel & Kjær
North America Inc.

The Bruel and Kjaer Calibration Laboratory
3079 Premiere Parkway Suite 120
Duluth, GA 30097
Telephone: 770-209-6907
Fax: 770-447-4033
Web site address: http://www.bksv.com

A2LA ACCREDITED

Calibration Certificate # 1568.01

CERTIFICATE OF CALIBRATION

No.: CAS-297665-L5T5G7-902

CALIBRATION OF:

Microphone: Brüel & Kjær Type 4189 Serial No. 2978485

CUSTOMER:

R.J. Burnside & Associates Limited
6990 Creditview Road, Unit 2
Mississauga, ON L5N 8R9

CALIBRATION CONDITIONS:

Environment conditions:	Air temperature:	23	°C
	Air pressure:	97.634	kPa
	Relative Humidity:	40	%RH
Applied polarization voltage:	0 Vdc		

SPECIFICATIONS:

This document certifies that the instrument as listed under "Type" has been calibrated and unless otherwise indicated under "Final Data", meets acceptance criteria as prescribed by the referenced Procedure. Statements of compliance, where applicable, are based on calibration results falling within specified criteria with no reduction by the uncertainty of the measurements. The calibration of the listed transducer was accomplished using a test system which conforms to the requirements of ISO/IEC 17025, ANSI/NCSL Z540-1, and guidelines of ISO 10012-1. For "as received" and "final" data, see the attached page(s). Items marked with one asterisk (*) are not covered by the scope of the current A2LA accreditation. This Certificate and attached data pages shall not be reproduced, except in full, without written approval of the Bruel and Kjaer Calibration Laboratory-Duluth, GA. Results relate only to the items tested. The transducer has been calibrated using Measurement Standards with values traceable to the National Institute of Standards and Technology, National Measurement Institutes or derived from natural physical constants.

PROCEDURE:

The measurements have been performed with the assistance of Brüel & Kjær Microphone Calibration System
B&K 9721 with application software WT9649 and WT9650 version 6.0.12 using calibration procedure: 4189-S251-FF-01

RESULTS:

- [X] "As Received" Data: Within Acceptance Criteria
- [ ] "As Received" Data: Outside Acceptance Criteria
- [X] "Final" Data : Within Acceptance Criteria
- [ ] "Final" Data : Outside Acceptance Criteria

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k=2$ providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from standards, calibration method, effect of environmental conditions and any short term contribution from the device under calibration.

Date of Calibration: April 18, 2018

Certificate issued: April 18, 2018

Harold Williams
Calibration Technician

Quality Representative

Sensitivity

Nominal sensitivity:	-26 dB re. 1V/Pa	+/-	1.5 dB	
Sensitivity at calibration conditions:	-25.69 dB re. 1V/Pa	or	51.96 mV/Pa	
Sensitivity at reference conditions:	-25.72 dB re. 1V/Pa	or	51.74 mV/Pa	
Uncertainty:	+/- 0.11 dB			
Correction factor K at reference conditions:	-0.28 dB			
Calibration Frequency:	251.19 Hz			

Reference Conditions:
Pressure: 101.3 kPa
Temperature: 23 °C
Relative Humidity: 50%

Traceable references

Type	Serial no	Cal. date	Due date	Calibrated by	Trace number
4180	2602440	2018-02-28	2019-02-28	DPLA	M2.10-1140.3.1

Condition "As Received":
GOOD

Comments:

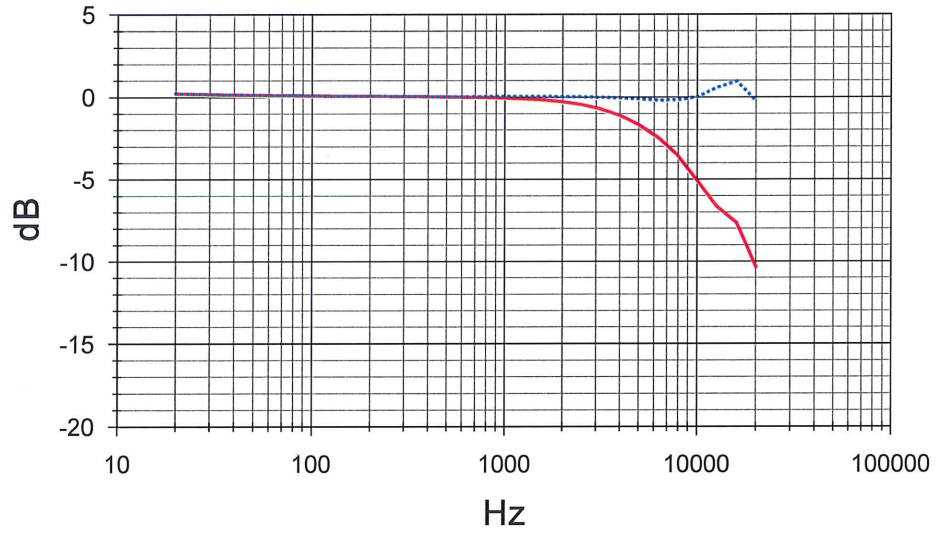
Normalized Frequency Response

Normalization Frequency: 251.19 Hz
Actuator Response is valid at Calibration Conditions
Applied Sound Field Correction: Free-field Correction with Grid, 0 deg incidence.

Frequency [Hz]	Actuator Response [dB]	Sound Field Response [dB]	Combined Uncertainty [dB]	Upper Tolerance [dB]	Lower Tolerance [dB]	Tolerance Exceeded
19.9526	0.16	0.16	0.30	1.00	-1.00	
25.1189	0.13	0.13	0.24	1.00	-1.00	
31.6228	0.11	0.11	0.19	1.00	-1.00	
39.8107	0.09	0.09	0.17	1.00	-1.00	
50.1187	0.08	0.07	0.16	1.00	-1.00	
63.0957	0.06	0.06	0.16	1.00	-1.00	
79.4328	0.05	0.05	0.16	1.00	-1.00	
100.000	0.04	0.03	0.16	1.00	-1.00	
125.893	0.02	0.02	0.16	1.00	-1.00	
158.489	0.01	0.01	0.16	1.00	-1.00	
199.526	0.01	0.01	0.16	1.00	-1.00	
251.189	0.00	0.00	0.02	1.00	-1.00	
316.228	-0.01	0.00	0.16	1.00	-1.00	
398.107	-0.02	-0.01	0.16	1.00	-1.00	
501.187	-0.04	-0.02	0.16	1.00	-1.00	
630.957	-0.05	-0.02	0.16	1.00	-1.00	
794.328	-0.08	-0.01	0.16	1.00	-1.00	
1000.00	-0.10	-0.01	0.16	1.00	-1.00	
1258.93	-0.16	-0.01	0.16	1.00	-1.00	
1584.89	-0.23	-0.01	0.16	1.00	-1.00	
1995.26	-0.34	-0.02	0.16	1.00	-1.00	
2511.89	-0.51	-0.04	0.17	1.00	-1.00	
3162.28	-0.77	-0.06	0.18	1.00	-1.00	
3981.07	-1.17	-0.10	0.19	1.00	-1.00	
5011.87	-1.73	-0.16	0.19	1.00	-1.00	
6309.57	-2.52	-0.25	0.20	1.00	-1.00	
7943.28	-3.60	-0.22	0.20	1.00	-1.00	
10000.0	-5.15	-0.03	0.25	2.00	-2.00	
12589.3	-6.67	0.52	0.31	2.00	-2.00	
15848.9	-7.67	0.91	0.40	2.00	-2.00	
19952.6	-10.34	-0.29	0.54	2.00	-2.00	

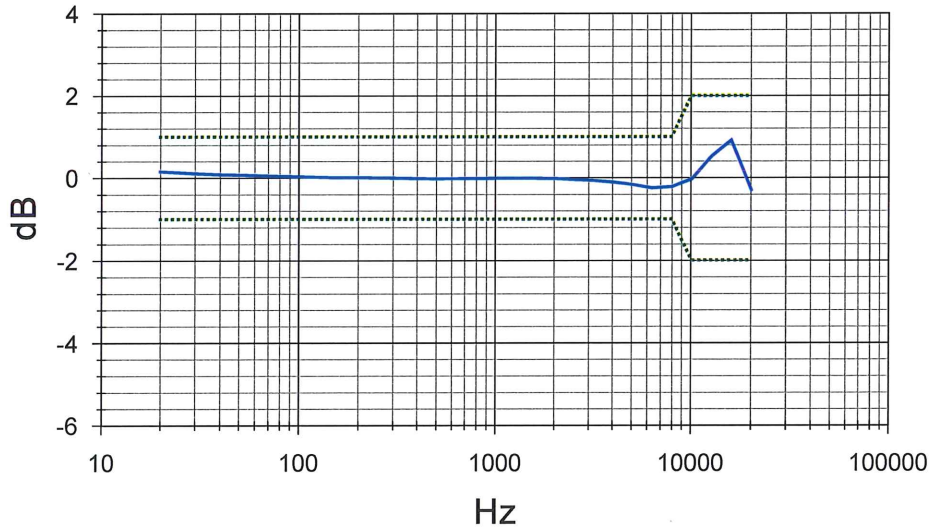
Measured Frequency Response

Solid curve: Actuator response Dotted curve: Sound field response
Applied Sound Field Correction: Free-field Correction with Grid, 0 deg incidence.



Result Response

Solid curve: Sound field response Dotted curves: Tolerance limits
Applied Sound Field Correction: Free-field Correction with Grid, 0 deg incidence.



Appendix B
Photographs of Significant Noise Sources

Front End Loader (FEL)
Bin Activity (BinAct)

Appendix B
Photographs of Significant Noise Sources

Sources listed below are shown in this Appendix and represent the significant noise sources at the Site.

Photographs

Photograph 1: Front End Loader (FEL)

Photograph 2: Bin Activity (BinAct)

Appendix C
Source Measurements and Sound Power Calculations

Appendix C
Source Measurements and Sound Power Calculations

SourceID Description

FEL: Front End Loader (Table C01)
BinAct: Bin Activity (Table C02)

Description: Front End Loader
ement Weighting: A
)utput Weighting: A
SOURCE TYP: Spherical
Sphere 1/ 2
Tonal Indicator:
Data Source: Meter
Enabled 1

Relevant: 1 1

Lw Technique: Spherical, Intensity, Parallelepiped, or Area	Point 1	Point 2	Point 3	Point 21	# of Points	Average Lpf	Lwf (dBA)	Adjustment for Weighting from 'A' to 'A'	LwfA (from Lwf)	Octave Sound Power
Spherical	Radius (m)	Radius (m)	Radius (m)	Radius (m)		L'p				
(Hz)	7.500	7.500	7.500	7.500	7.5		1			
	Lpfi (dBA)	Lpfi (dBA)	Lpfi (dBA)	Lpfi (dBA)		(dBA)	2	(dB)	(dBA)	(dBA)
FileID	ETS KH003									
Comment										
12.5	0.0				1	0.01	25.5		25.5	
16	8.1				1	8.06	33.5		33.5	37.55
20	9.4				1	9.37	34.9		34.9	
25	16.0				1	15.96	41.4		41.4	
32	34.0				1	34.02	59.5		59.5	65.19
40	38.4				1	38.35	63.8		63.8	
50	41.6				1	41.64	67.1		67.1	
63	61.6				1	61.61	87.1		87.1	87.52
80	51.3				1	51.25	76.7		76.7	
100	55.8				1	55.76	81.2		81.2	
125	60.9				1	60.89	86.4		86.4	90.15
160	61.2				1	61.24	86.7		86.7	
200	64.9				1	64.86	90.3		90.3	
250	66.0				1	65.98	91.5		91.5	95.57
315	65.0				1	65.02	90.5		90.5	
400	67.1				1	67.09	92.6		92.6	
500	69.5				1	69.52	95.0		95.0	99.27
630	70.0				1	69.96	95.4		95.4	
800	69.5				1	69.47	95.0		95.0	
1,000	71.2				1	71.21	96.7		96.7	100.63
1,250	70.2				1	70.21	95.7		95.7	
1,600	69.3				1	69.34	94.8		94.8	
2,000	68.1				1	68.12	93.6		93.6	99.47
2,500	70.0				1	69.97	95.5		95.5	
3,150	69.1				1	69.05	94.5		94.5	
4,000	66.8				1	66.81	92.3		92.3	99.25
5,000	70.4				1	70.42	95.9		95.9	
6,300	67.6				1	67.60	93.1		93.1	
8,000	63.1				1	63.11	88.6		88.6	94.89
10,000	59.5				1	59.48	85.0		85.0	
12,500	53.2				1	53.24	78.7		78.7	
16,000	45.2				1	45.19	70.7		70.7	79.38
20,000	34.1				1	34.10	59.6		59.6	
Overall (dB)	81.1				1.0	81.1	106.6		106.6	106.6

Description: Bin Impact
ement Weighting: A
)utput Weighting: A
SOURCE TYP: Spherical
Sphere 1/ 2
Tonal Indicator:
Data Source: Meter
Enabled 1

Relevant: 1 1

Lw Technique: Spherical, Intensity, Parallelepiped, or Area	**Point 1**	**Point 2**	**Point 3**	**Point 21**	**# of Points**	**Average Lpf**	**Lwf (dBA)**	**Adjustment for Weighting from 'A' to 'A'**	**LwfA (from Lwf)**	**Octave Sound Power**
Spherical	**Radius (m)**	**Radius (m)**	**Radius (m)**	**Radius (m)**		**L'p**				
(Hz)	**22.000**	**22.000**	**22.000**	**22.000**	**22**		**1**			
	Lpfi (dBA)	**Lpfi (dBA)**	**Lpfi (dBA)**	**Lpfi (dBA)**		**(dBA)**	**2**	**(dB)**	**(dBA)**	**(dBA)**
FileID	ETS KH009									
Comment										
12.5	0.0				1	0.01	**34.8**		34.8	
16	0.0				1	0.01	**34.8**		34.8	42.31
20	5.6				1	5.61	**40.4**		40.4	
25	18.1				1	18.05	**52.9**		52.9	
32	31.4				1	31.35	**66.2**		66.2	68.68
40	30.0				1	29.99	**64.8**		64.8	
50	34.1				1	34.09	**68.9**		68.9	
63	37.1				1	37.13	**72.0**		72.0	78.81
80	42.4				1	42.36	**77.2**		77.2	
100	42.9				1	42.87	**77.7**		77.7	
125	42.9				1	42.86	**77.7**		77.7	83.07
160	44.5				1	44.49	**79.3**		79.3	
200	45.0				1	44.98	**79.8**		79.8	
250	44.3				1	44.32	**79.2**		79.2	84.60
315	45.6				1	45.60	**80.4**		80.4	
400	45.8				1	45.80	**80.6**		80.6	
500	46.4				1	46.38	**81.2**		81.2	86.97
630	49.2				1	49.15	**84.0**		84.0	
800	50.6				1	50.59	**85.4**		85.4	
1,000	54.4				1	54.42	**89.3**		89.3	95.23
1,250	58.5				1	58.51	**93.3**		93.3	
1,600	54.7				1	54.67	**89.5**		89.5	
2,000	52.8				1	52.83	**87.7**		87.7	93.53
2,500	54.0				1	54.02	**88.9**		88.9	
3,150	51.1				1	51.13	**86.0**		86.0	
4,000	49.4				1	49.36	**84.2**		84.2	89.35
5,000	48.1				1	48.12	**83.0**		83.0	
6,300	46.7				1	46.74	**81.6**		81.6	
8,000	44.8				1	44.76	**79.6**		79.6	84.54
10,000	42.1				1	42.05	**76.9**		76.9	
12,500	38.9				1	38.88	**73.7**		73.7	
16,000	34.3				1	34.25	**69.1**		69.1	75.23
20,000	27.6				1	27.56	**62.4**		62.4	
Overall (dB)	**64.1**				**1.0**	**64.1**	**98.9**		**98.9**	**98.9**