GOLDER
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REPORT

Noise Impact Assessment

CBM Dance Pit Expansion

Submitted to:

CBM Aggregates, a Division of St. Marys Cement Inc. (Canada)

CBM Aggregates, a Division of St. Marys Cement Inc. (Canada)
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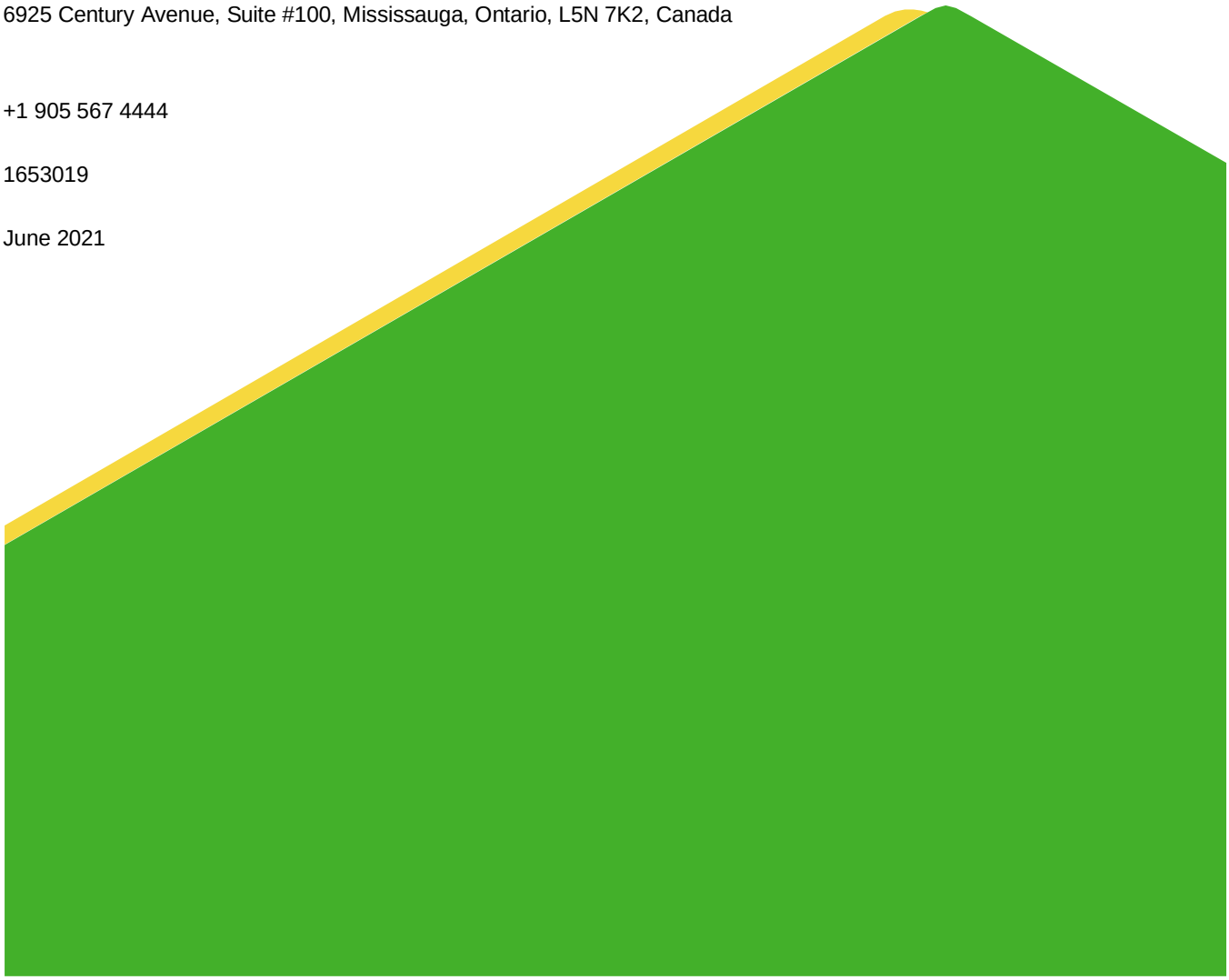

Distribution List

Electronic copy - CBM Aggregates, a Division of St. Marys Cement Inc. (Canada)

Electronic copy - Esher Planning Inc.

Electronic copy - Golder Associates Ltd.

Executive Summary

CBM Aggregates (CBM), a division of St. Marys Cement Inc. (Canada), retained Golder Associates Ltd. (Golder) to prepare a Noise Impact Assessment to support the application of a Category 3, Class “A” licence under the Aggregate Resources Act (ARA) associated with the proposed expansion of the existing CBM Dance Pit (MNRF Licence No. 17348) on Part of the North Half of Lots 14 and 15, Concession 10, Township of North Dumfries, Regional Municipality of Waterloo, Ontario (see Figure 1).

The subject property, known as the Dance Pit Expansion (the Site), is adjacent to and east of the current Dance Pit. The Site is located south of Cedar Creek Road in a semi-rural setting in the Township of North Dumfries, immediately west of the City of Cambridge. The Site is currently being actively farmed. The existing Dance Pit encompasses an area of 44.95 ha with 41.33 ha approved for aggregate extraction. The surface area of the proposed licence expansion area is approximately 29.05 ha and the surface area of the proposed extraction area is approximately 25.27 ha. The surrounding lands are utilized for residential, agricultural, and aggregate extraction/processing purposes.

The proposed pit operations include; extraction and limited processing. The operations occur between 07:00 and 19:00 Monday to Friday. Noise sources from the operation within the proposed expansion area are generally limited to loaders, haul trucks, a water truck and/or possibly conveyors with associated hopper. Noise sources related to site preparation (i.e., overburden stripping) and post operation site rehabilitation were not explicitly included in the assessment as the noise emissions from these activities are expected to be temporary and generally lower than those associated with typical operations.

Sound level limits for the Site operations on neighbouring receptors were established in accordance with Ontario Ministry of Environment, Conservation and Parks (MECP) guidelines and from previous noise studies for the existing licenced Dance Pit. Noise predictions of the Site operations onto neighbouring Point(s) of Reception (POR(s)) were completed to determine the potential noise impact.

Noise receptors were selected that are representative of sensitive PORs in all directions around the Site. For this assessment twenty locations have been selected to represent the sensitive PORs labelled POR001 through POR020. The nearest PORs are adjacent to the eastern property line of the expansion lands.

The noise analysis indicates that sound emissions from future extraction operations on the proposed lands are expected to meet MECP sound level limits at all PORs. Therefore, the pit will be able to operate in compliance with MECP sound level limits.

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FIGURES

APPENDICES

1.0 INTRODUCTION

CBM Aggregates (CBM), a division of St. Marys Cement Inc. (Canada) retained Golder Associates Ltd. (Golder) to prepare a Noise Impact Assessment to support the application of a Category 3, Class “A” licence under the Aggregate Resources Act (ARA) associated with the proposed expansion of the existing CBM Dance Pit (MNRF Licence No. 17348) on Part of the North Half of Lots 14 and 15, Concession 10, Township of North Dumfries, Regional Municipality of Waterloo, Ontario.

The subject property, known as the Dance Pit Expansion (the Site), is adjacent to and east of the current Dance Pit. The Site is located south of Cedar Creek Road in a semi-rural setting in the Township of North Dumfries, immediately west of the City of Cambridge. The Site is currently being actively farmed. The existing Dance Pit encompasses an area of 44.95 ha with 41.33 ha approved for aggregate extraction. The surface area of the proposed licence area is approximately 28.4ha and the surface area of the proposed extraction area is approximately 21.2 ha. A site location plan of the Site and most sensitive Point(s) of Reception (POR(s)) is provided on Figure 1. The surrounding lands are utilized for residential, agricultural, and aggregate extraction/processing purposes. A zoning map for the property and surrounding land use is provided in Appendix A.

Sound level limits for the Site operations on neighbouring receptors were established in accordance with Ontario Ministry of the Environment, Conservation and Parks (MECP) guidelines and from previous noise studies for the existing licenced Dance Pit. Noise predictions of the Site operations onto neighbouring PORs were completed to determine the potential noise impact. For a description of technical terminology used in this report refer to Appendix B.

Measurements of the equipment used in the pit were carried out on September 13, 2016 and September 17, 2019. Weather during the measurement period included clear atmospheric conditions, with an average temperature of 20˚C (September 13, 2016) and 22˚C (September 17, 2019). Winds were predominately from the northwest at speeds of 15 to 21 to km/hour (September 13, 2016) and from the southeast at speeds 4 to 13 km/hour (September 17, 2019). Measurements were not taken during periods of wind gusts as wind gusts could influence measured levels and this would contravene MECP typical recommended practices. Weather data is provided in Appendix C.

For this assessment, twenty existing PORs were selected as being representative of the sensitive receptors in all directions around the Site and identified as POR001 through POR020. The nearest PORs are adjacent to the eastern property line of the expansion lands.

2.0 SITE OPERATIONS

The proposed Dance Pit Expansion is located on Part of the North Half of Lots 14 and 15, Concession 10, Township of North Dumfries, Regional Municipality of Waterloo, Ontario. The proposed expansion area to be licenced is approximately 29.05 ha of which approximately 25.27 ha would be subject to extraction. Figure 1 illustrates both; the proposed licenced limit and the proposed limit of extraction.

The proposed extraction and processing operations will take place between 07:00 and 19:00, Monday to Friday. The Site operations will be limited to extraction above the water table. The operation will generally involve a single lift with a maximum face height of 10 m.

The equipment on the Site as well as the existing pit will generally be limited to:

- Two front end loaders (CAT988H, CAT982M or equivalent) for extraction / processing (one in the expansion lands and one at the Screening / Crushing Plant);
- One front end loader (John Deere 844J or equivalent) at the Wash Plant;
- One Screening / Crushing Plant in the existing pit;
- One Wash Plant in the existing pit;
- Haul trucks from the extraction face to the Screening / Crushing Plant (maximum 23 trucks/hour [46 truck trips/hour]);
- Sales trucks from the Screening / Crushing and /or Wash Plants to off-site (maximum 5 trucks/hour [10 truck trips/hour]); and
- One water truck.

The direction of extraction and the areas of extraction for the Site are provided in Figure 1. Extraction is expected to be completed in three Areas, as noted in Figure 2. Area 1 is the southernmost area of the expansion lands, while Area 2 is the central area, and Area 3 is the northernmost area. Operational controls and shielding (i.e., berms, extraction face, stockpiles) will be required during the extraction phases.

The location of the Screening/Crushing Plant will remain static on the existing licenced lands while extraction is taking place in Areas 1 and 2 on the Site. The location of the Screening/Crushing Plant, in addition to the mobile noise sources (i.e., loaders, trucks), is presented on Figure 2. The Screening / Crushing Plant will remain in the same location on the existing licenced lands throughout operations on the Site, whereas the Wash Plant may be relocated further north on the existing licenced lands to support extraction within the Area 3. This Site operational parameters could be modified through the completion of additional acoustical assessments.

One front end loader, and a combination of bin hopper and conveyor or haul truck (i.e., haul or shipping truck) will generally operate within 30 m of the extraction face. A water truck will also be used within the Site as required.

Berms indicated in Figure 2 and described within this report can be considered earth berms or berm / barrier combinations, provided the combined height of the berm / barrier matches the indicated minimum height above existing grade. Barriers are to have a minimum surface density of 20 kg / m^2 and be constructed without gaps.

Before the initial extraction in the expansion lands in Area 1, Berm A will be installed along the south and east borders of the Site. The berm will have a height of 5 m above the existing elevation. Prior to extraction in Area 2, Berm B (northerly extension of Berm A), to be located along the eastern edge of Area 2, will be constructed, while Berm A will remain in place. Berm B will also have a height of 5 m above the existing elevation. Prior to extraction in Area 3, the addition of Berm C will be required which will be an extension of Berm B at the same height (i.e., 5m) and will terminate approximate 25 m south of Cedar Creek Road. In addition, a 3 m high berm (Berm D) located along Cedar Creek Road will also be installed prior to extraction within Area 3. However, additional acoustical assessments could be completed to remove the requirement for Berm D.

A local barrier that is 7 m in height (located east of the Screening/Crushing Plant) and within 10 m of the Plant, in the direction of the PORs, will be required to reduce potential noise impacts. Acoustically equivalent treatment resulting in a measured sound pressure level of 55 dBA when measured at a distance of 100 m from the source could be implemented instead of the local barrier. As a conservative approach, this study generally does not take shielding from other stockpiles into consideration.

Noise sources related to pit construction (i.e., overburden stripping) and post operation site rehabilitation were not explicitly included in the assessment as the noise emissions from these activities are expected to be temporary and lower than those associated with typical operations.

3.0 NOISE SOURCE SUMMARY

The primary noise sources of concern are summarized in Table 1 and depicted on Figure 2.

Table 1: Noise Source Summary

Source ID	Source Description	Overall Sound Power (dBA)1	Source Location2	Sound Characteristics2	Noise Control Measures2
WP_S	Wash Plant	103	O	S	U
L_SP	Sand Plant Loader	112	O	S	U
L_CP	Loader (CP)	112	O	S	U
L_E	Loader (Extraction)	112	O	S	U
HT_E	Haul Truck	105	O	S	U
HT_S	Shipment Truck	105	O	S	U
HT_W	Water Truck	105	O	S	U
PC	Primary Crusher	114	O	S	U
SC	Secondary Crusher	121	O	S	U
PS	Primary Screen	119	O	S	U
SS	Secondary Screen	116	O	S	U
TS	Tertiary Screen	118	O	S	U
VSI	VSI Casing	108	O	S	U
WP_Gen	Wash plant Generator	110	O	S	U
SC_Gen1	Crusher Generator 1	105	O	S	U
SC_Gen2	Crusher Generator 2	99	O	S	U

Notes:

1 Overall sound power levels were obtained from equipment measurements associated with the existing operations.

2 See Appendix D for noise source nomenclature.

4.0 POINT(S) OF RECEPTION

Twenty residential receptors were identified as being representative of the most sensitive PORs in all directions around the Site as shown on Figure 1. Table 2 summarizes the PORs. A zoning map is included in Appendix A.

Table 2: Point of Reception Summary

Point of Reception ID	Point of Reception Description	Location
POR001	Two-storey Residential Receptor	North of expansion lands
POR002	One-storey Residential Receptor	North of expansion lands
POR003	Two-storey Residential Receptor	East of expansion lands
POR004	One-storey Residential Receptor	North of existing pit
POR005	Two-storey Residential Receptor	East of expansion lands
POR006	Two-storey Residential Receptor	Northwest of existing Dabrowski Pit
POR007	Two-storey Residential Receptor	Northwest of existing Dabrowski Pit
POR008	Two-storey Residential Receptor	East of expansion lands
POR009	One-storey Residential Receptor	East of expansion lands
POR010	One-storey Residential Receptor	East of expansion lands
POR011	Two-storey Residential Receptor	East of expansion lands
POR012	Two-storey Residential Receptor	East of expansion lands
POR013	Two-storey Residential Receptor	East of expansion lands
POR014	One-storey Residential Receptor	Southeast of expansion lands
POR015	Two-storey Residential Receptor	South of expansion lands
POR016	Two-storey Residential Receptor	West of existing pit
POR017	Two-storey Residential Receptor	West of existing pit
POR018	Two-storey Residential Receptor	West of existing pit
POR019	Two-storey Residential Receptor	Southeast of expansion lands
POR020	Two-storey Residential Receptor	Southeast of expansion lands

5.0 ASSESSMENT CRITERIA (PERFORMANCE LIMITS)

Based on a review of the area and a previous noise study, it is expected the PORs near the Site could reasonably be defined as being in a Class 2 or Class 3 area as per MECP publication NPC 300 “Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning” (NPC 300).

A Class 2 area can best be described as an urban/suburban blend; whereby sound levels are moderately high during the day (typically 07:00-19:00), but decrease during the evening (typically 19:00-23:00) and night-time hours (typically 2300-0700). PORs located north, east, and southeast of the Site can generally be classified as Class 2.

The sound level limit for the PORs in a Class 2 area is described as follows:

> *The energy averaged sound level (L_{eq}) produced by a source at a POR location in any one-hour period should not exceed the greater of; the energy averaged sound level produced by road traffic in the same hour period, or 50 dBA in the daytime period of 07:00-19:00, or 50 dBA in the evening period of 19:00-23:00 and 45 dBA in the night-time period of 23:00-07:00.*

The PORs located southwest of the Site are defined as Class 3 rural. A Class 3 area can best be described as a rural area with an acoustical environment that is dominated by natural sounds, having little road traffic. The sound level limit for the PORs in a Class 3 area can be described as follows:

> *The energy averaged sound level (L_{eq}) produced by a source at a POR location in any one-hour period should not exceed the greater of; the energy averaged sound level produced by road traffic in the same hour period, or 45dBA in the daytime period of 07:00-19:00, or 40 dBA in the evening period of 19:00-23:00 and 40 dBA in the night-time period of 23:00-07:00.*

In assessing stationary noise sources, the MECP has established exclusionary sound level limits for Class 2 and Class 3 areas for both; Plane of Window (POW) and Outdoor areas. The One Hour Equivalent Sound Level (L_{eq}, dBA) MECP exclusionary sound level limits for a POR in a Class 2 or 3 area are summarized in Table 3 below.

Table 3: Point of Reception Sound Level Limits

Time Period	Class 2 POW MECP Exclusionary Sound Level Limit (dBA)	Class 2 Outdoor MECP Exclusionary Sound Level Limit (dBA)	Class 3 POW MECP Exclusionary Sound Level Limit (dBA)	Class 3 Outdoor MECP Exclusionary Sound Level Limit (dBA)
Daytime (07:00-19:00)	50	50	45	45
Evening (19:00-23:00)	50	45	40	40
Night-time (23:00-07:00)	45	N/A 1	40	N/A 1

Note:

1 In accordance with NPC 300, in general, the Outdoor POR will be protected during the night-time as a consequence of meeting the sound levels at the adjacent POW.

As the operations are limited to daytime hours, the daytime sound level limits were applied in this assessment. Some PORs are located near Cedar Creek Road, which has substantial traffic volumes. Sound levels at these PORs are expected to be elevated. Sound level limits established in a previous noise study for the Site have been carried forward in this assessment. A summary of the sound level limits for each POR are presented in Table 4.

Table 4: Point of Reception Sound Level Limits

Point of Reception	Daytime Sound Level Limits (dBA)	Reference
POR001	55	AEL 2015, R31,2
POR002	55	AEL 2015, R31,2
POR003	50	MECP Class 2
POR004	57	AEL 2015, R21
POR005	50	MECP Class 2
POR006	55	AEL 2015, R31
POR007	55	AEL 2015, R31,2
POR008	50	MECP Class 2
POR009	50	MECP Class 2
POR010	50	MECP Class 2
POR011	50	MECP Class 2
POR012	50	MECP Class 2
POR013	50	MECP Class 2
POR014	50	MECP Class 2
POR015	50	MECP Class 2
POR016	45	MECP Class 3
POR017	45	MECP Class 3
POR018	45	MECP Class 3
POR019	50	MECP Class 2
POR020	50	MECP Class 2

Notes:

1 Sound level limits were established in a noise assessment prepared by Aercoustics Engineering Ltd., dated September 2015.

2 Considered similar to AEL 2015 R3 (i.e., 55 dBA)

6.0 IMPACT ASSESSMENT

6.1 Methodology

Golder generated noise impact predictions for the identified PORs using site-specific noise measurements. Source sound pressure level measurements were carried out at the existing Dance Pit on September 13, 2016 and September 17, 2019 using a Larson Davis 831 sound level meter/real-time analyzer. The instrument was calibrated before and after all sound level measurements and the calibration verified. All measuring equipment used in this study meets the MECP requirements. Instrumentation calibration certificates are attached in Appendix E.

A predictive analysis was carried out using the commercially available software package Cadna/A V2019 169.4915. Geometrical spreading, attenuation from barriers, ground effect and air absorption were included in the analysis as determined from ISO 9613 (Part 2), which is the current standard accepted by the MECP for use for outdoor sound propagation predictions. It should be noted that this standard makes provisions to include a correction to address for downwind or ground-based temperature inversion conditions. Noise predictions have been made assuming a downwind or moderate temperature inversion conditions for all PORs, a design condition consistent with the accepted practice of the MECP.

As described in ISO 9613 (Part 2), ground factor values that represent the effect of ground on sound levels range between 0 and 1. Based on the specific site conditions, the ground factor value used in the modelling was a ground factor value of 0.5 within the Site, 0.2 for intervening roads, and a value of 1.0 for all other areas. Attenuation from intervening structures (i.e., stockpiles) and woodlots were conservatively not considered in the noise modelling.

6.2 Noise Impact Predictions Assumptions

Assumptions were made in calculating the potential noise levels of the proposed operations on the identified PORs near the Site. They are as follows:

- General extraction outlined in Figure 1 will be followed.
- Extraction will generally be completed in a single lift down to the proposed pit floor, and the equipment will be operated on the pit floor.
- Equipment at the extraction face will consist of one loader, and a combination of bin hopper and conveyor or haul truck (i.e., haul or shipping truck), generally operating within 30 m of the extraction face. A water truck will also be used within the Site as required.
- The berms will be installed as specified above in Section 2.0 and as shown in Figure 2.
- The Screening / Crushing Plant and Wash Plant will be operated in the existing pit as indicated in Figure 2.
- Equipment list and sound power emissions are consistent to those listed in Table 1.

7.0 RESULTS

7.1 Noise Assessment Summary

All relevant noise measurements taken during the September 13, 2016 and September 17, 2019 site visits have been documented in 1/3 octave and 1/1 octave band level format and are summarized in Appendix F. The modelling assumed extraction equipment working on the pit floor.

The proposed Site operational sequences, as indicated in Figure 1, were modelled to determine the predictable worst-case noise levels on the identified representative PORs. Table 5 provides a summary of these predictable worst-case noise levels for each of the identified PORs. Noise levels were determined for each Area.

The overall predicted noise levels, based on proposed Site operations described above, were found to be at or below the performance limits, indicating the Site can operate in compliance with MECP noise limits. Sample calculations are also provided in Appendix G.

Table 5: Predicted Operation Noise Impacts

Point of Reception	Area 1 Sound Levels (dBA)	Area 2 Sound Levels (dBA)	Area 3 Sound Levels (dBA)	Overall Maximum Sound Levels (dBA)	Performance Sound Level Limit (dBA)	Compliance with Performance Limit (Yes/No)
POR001	50	51	54	54	55	Yes
POR002	47	49	48	49	55	Yes
POR003	48	48	47	48	50	Yes
POR004	49	49	49	49	57	Yes
POR005	48	46	46	48	50	Yes
POR006	44	44	44	44	55	Yes
POR007	44	44	44	44	55	Yes
POR008	44	47	47	47	50	Yes
POR009	43	45	45	45	50	Yes
POR010	44	45	45	45	50	Yes
POR011	49	47	47	49	50	Yes
POR012	47	47	47	47	50	Yes
POR013	49	48	48	49	50	Yes
POR014	45	44	44	45	50	Yes
POR015	47	46	46	47	50	Yes
POR016	44	44	44	44	45	Yes
POR017	43	43	42	43	45	Yes
POR018	42	42	42	42	45	Yes
POR019	49	49	48	49	50	Yes
POR020	49	50	50	50	50	Yes

8.0 GENERAL PIT OPERATIONS NOISE CONTROLS

The following summarizes general pit operation noise controls and assumptions that shall be followed in the operational sequences of the proposed Site:

General Recommendations / Assumptions

- General extraction outlined in Figure 1 will be followed.
- Extraction will generally be completed in a single lift down to the proposed pit floor and equipment will operate on the pit floor.
- Equipment at the extraction face will consist of one loader, combination of bin hopper and conveyor or haul truck (i.e., extraction face to possessing plant) and trucks (i.e., haul or shipping truck), generally within 30 m of the extraction face. A water truck will also be used within the Site as required.
- The Screening / Crushing Plant will to be located in the existing pit.
- The Wash Plant will be located in the existing pit as per Figure 2.
- Pit equipment will be consistent with those listed in Table 1, or acoustically equivalent.
- Equipment will be maintained in good condition.
- On-site road-ways will be maintained to limit noise resulting from trucks driving over ruts and pot-holes.

Technical Recommendations for the Site Plan

- The identified berms shall be installed prior to extraction in Areas 1, 2 and 3 as described below.
  - A berm (Berm A) shall be installed along the south border of Area 1 and along the east border of Area 1 Area 2, with a minimum height of 5 m above existing grade, prior to extraction in Area 1.
  - A berm (Berm B) shall be installed along the east border of Areas 2 and partially Area 3 with a minimum height of 5 m above existing grade, prior to extraction in Area 2. This is an extension of Berm A.
  - A berm (Berm C) shall be installed along the east border of Area 3 with a minimum height of 5 m above existing grade, prior to extraction in Area 3. This is an extension of Berm B.
  - A berm (Berm D) shall be installed along the north border of north limit of extraction with a minimum height of 3 m above existing grade, prior to extraction in Area 3.
- Once installed, barriers will remain throughout the completion of extraction of the expansion lands.
- Local barriers, or acoustically equivalent source treatment reducing noise levels of the Crushing/Screening Plant to 55 dBA when measured at a distance of 100 m (in the direction of PORs) shall be installed.
- Alternative equipment/operations can be considered if assessed by an acoustical consultant and shown to meet the applicable noise limits.

9.0 CONCLUSIONS

Golder Associates Ltd. (Golder) was retained by CBM Aggregates (CBM), a division of St. Marys Cement Inc. (Canada) to prepare a Noise Impact Assessment in support of a licence application for the proposed expansion of the CBM Dance Pit on Part of the North Half of Lots 14 and 15, Concession 10, Township of North Dumfries, Regional Municipality of Waterloo, Ontario. Golder established sound level limits according to MECP noise guidelines and a previous noise study completed for the Site and compared the predicted noise levels at the identified representative PORs to the established limits. Based on the results and recommendations presented in this report, the site can operate in compliance with MECP noise guidelines for all PORs.

Curricula Vitae of the authors of this report are provided in Appendix H.

10.0 LIMITATIONS

Standard of Care

Golder has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practicing under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report. No other warranty expressed or implied is made.

Basis and Use of the Report

This report was prepared for the exclusive use of the CBM and once finalized, is intended to support the application of a Category 3, Class "A" licence under the Aggregate Resources Act (ARA) associated with the proposed expansion of the existing CBM Dance Pit (MNRF Licence No. 17348). The draft application and supporting documents are based on observations of Site operations, discussions with CBM about current Site practices, review of documentation provided by CBM and calculations made to predict sound levels at PORs. The report cannot account for changes in Site conditions and operational practices completed after it has been finalized and submitted by CBM.

The information, recommendations and opinions expressed in this report are for the sole benefit of the CBM and the applicable regulatory authorities that are authorized to rely on the report as Authorized Users, subject to the limitations and purposes described herein. No other party may use or rely on this report or any portion thereof without Golder's express written consent. Any other use of this report by others is prohibited and is without responsibility to Golder. The report, all plans, data, drawings and other documents as well as all electronic media prepared by Golder are considered its professional work product and shall remain the copyright property of Golder, who authorizes only CBM and Approved Users to make copies of the report, but only in such quantities as are reasonably necessary for the use of the report by those parties. CBM and Approved Users may not give, lend, sell, or otherwise make available the report or any portion thereof to any other party without the express written permission of Golder. CBM acknowledges that electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore CBM and any Authorized Users cannot rely upon the electronic media versions of Golder's report or other work products.

When evaluating the Site and developing this report, Golder has relied on information provided by CBM, the regulatory authorities, and others. Golder has acted in good faith and accepts no responsibility for any deficiencies, misstatements, or inaccuracies contained in this report resulting from omissions, misinterpretations or falsifications by those who provided Golder with information.

While ensuring that the documentation was prepared in general conformance with regulatory and guideline requirements, Golder cannot guarantee that the licence will be issued by regulator the once the final report has been submitted.

Signature Page

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TN/JT/ng

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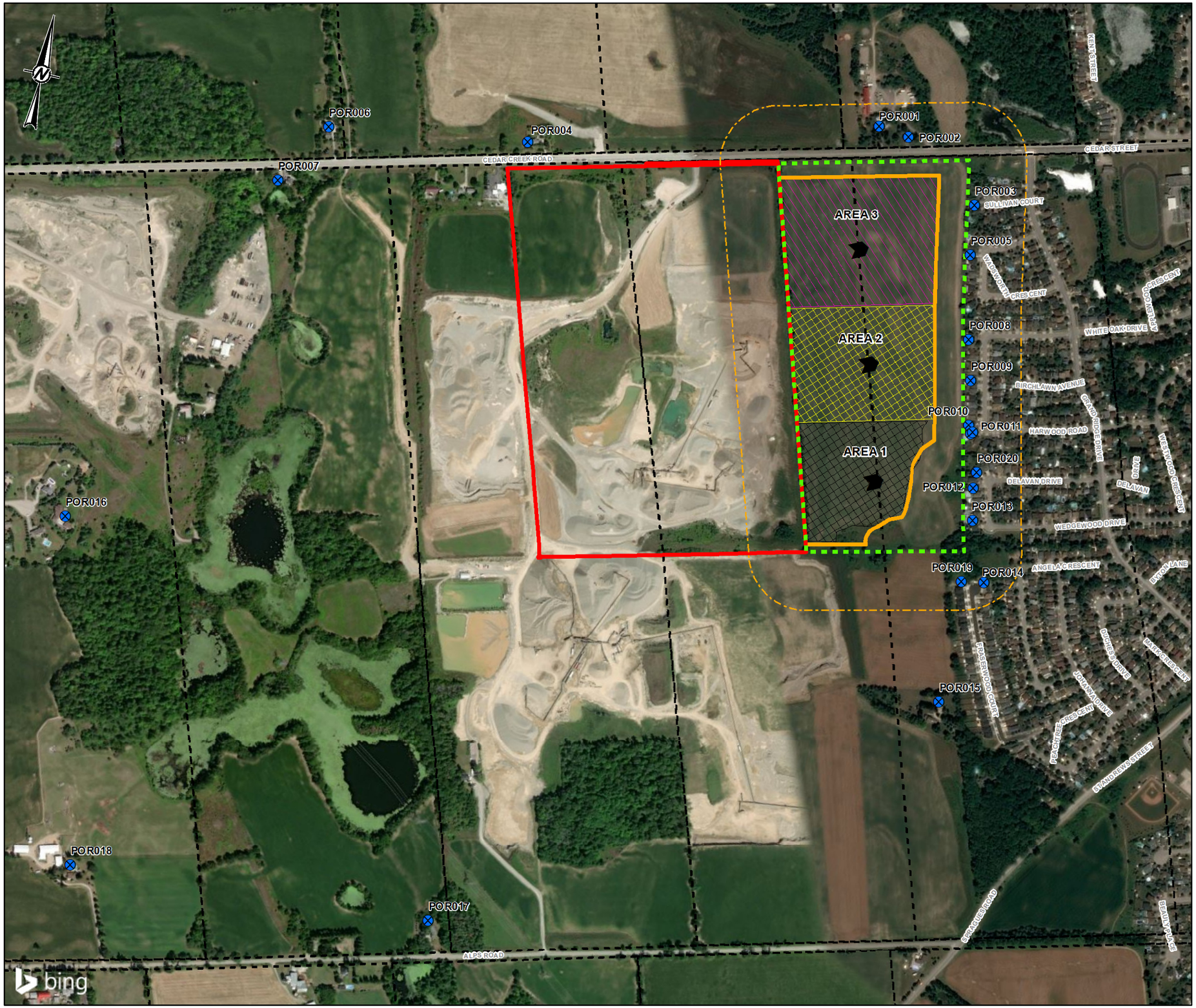
FIGURES

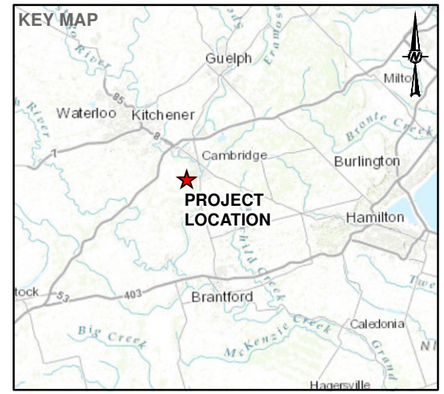


LEGEND

- EXPANSION LICENCE BOUNDARY
- EXISTING LICENCE BOUNDARY
- PROPOSED EXTRACTION LIMIT
- 120 m INFORMATION BOUNDARY
- LOT AND CONCESSION BOUNDARY
- POINT OF RECEPTION (POR)
- EXCAVATION DIRECTION

EXTRACTION AREAS

- AREA 1
- AREA 2
- AREA 3



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2. SITE PLAN PROVIDED BY CBM APRIL 2016
3. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM:UTM ZONE 17N

CLIENT

CBM AGGREGATES

ST MARYS

PROJECT

DANCE PIT EXPANSION LICENCE
CAMBRIDGE, ONTARIO

TITLE

SITE LOCATION

CONSULTANT

GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-06-08
DESIGNED	SO
PREPARED	SO
REVIEWED	TN
APPROVED	JT

PROJECT NO.	CONTROL	REV.	FIGURE
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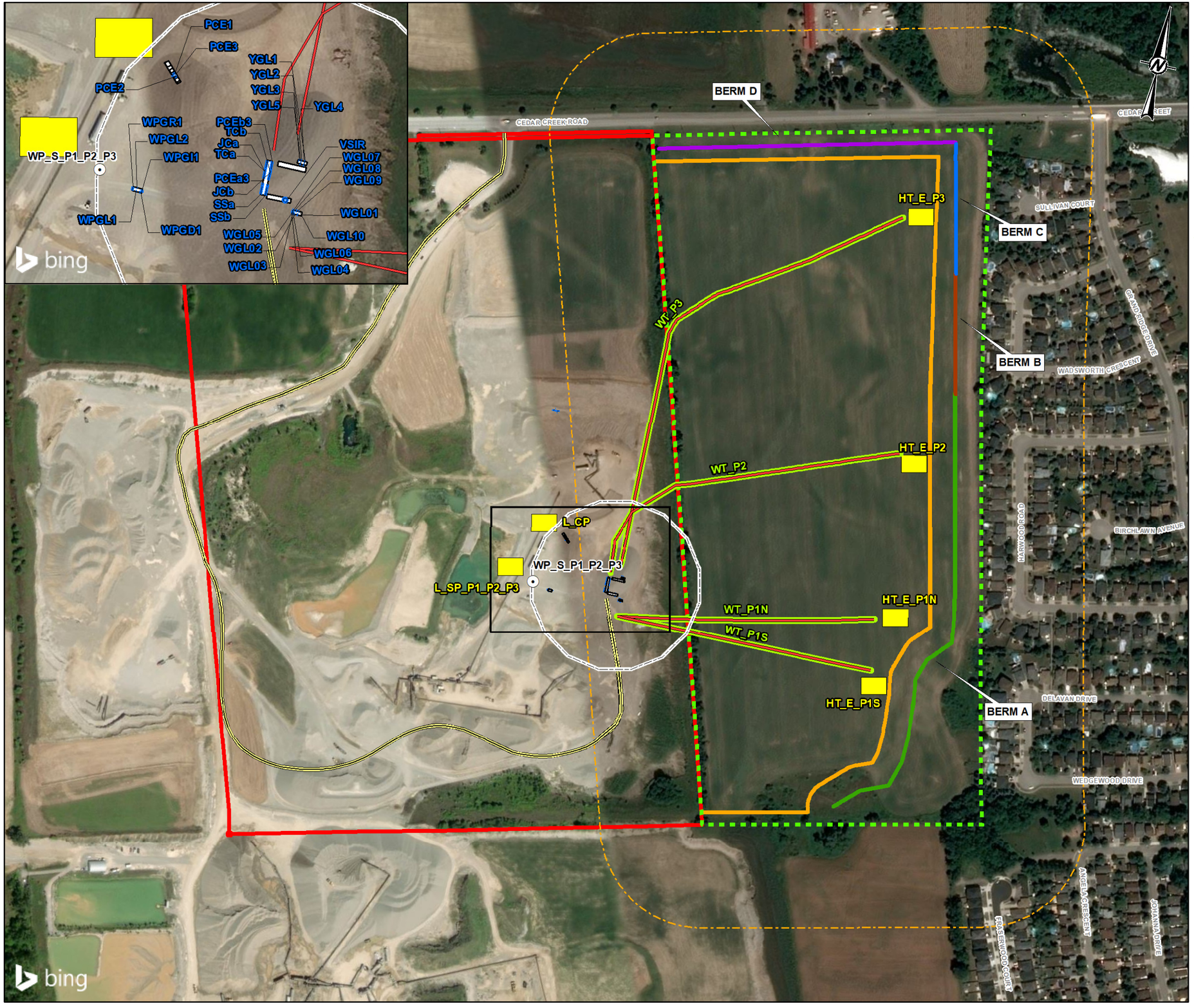


LEGEND

- EXPANSION LICENCE BOUNDARY
- EXISTING LICENCE BOUNDARY
- PROPOSED EXTRACTION LIMIT
- 120 m INFORMATION BOUNDARY
- POINT SOURCE
- BERM A
- BERM B
- BERM C
- BERM D
- VERTICAL SOURCE

LINE SOURCES

- HAUL TRUCK
- PROCESSING PLANT TO OFFSITE
- WATER TRUCK
- AREA SOURCE
- BUILDING
- 100 M PROCESSING PLANT SOUND LEVEL REFERENCE BOUNDARY

0 100 200 300

1:4,500 METRES

REFERENCE(S)

1. IMAGERY: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
© 2021 MICROSOFT CORPORATION © 2021 MAXAR ©CNES (2021) DISTRIBUTION AIRBUS DS
2. SITE PLAN PROVIDED BY CBM APRIL 2016
3. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM:UTM ZONE 17N

CLIENT

CBM AGGREGATES
ST MARYS

PROJECT

DANCE PIT EXPANSION LICENCE
CAMBRIDGE, ONTARIO

TITLE

SOURCE LOCATION PLAN

CONSULTANT

GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-06-08
DESIGNED	SO
PREPARED	SO
REVIEWED	TN
APPROVED	JT

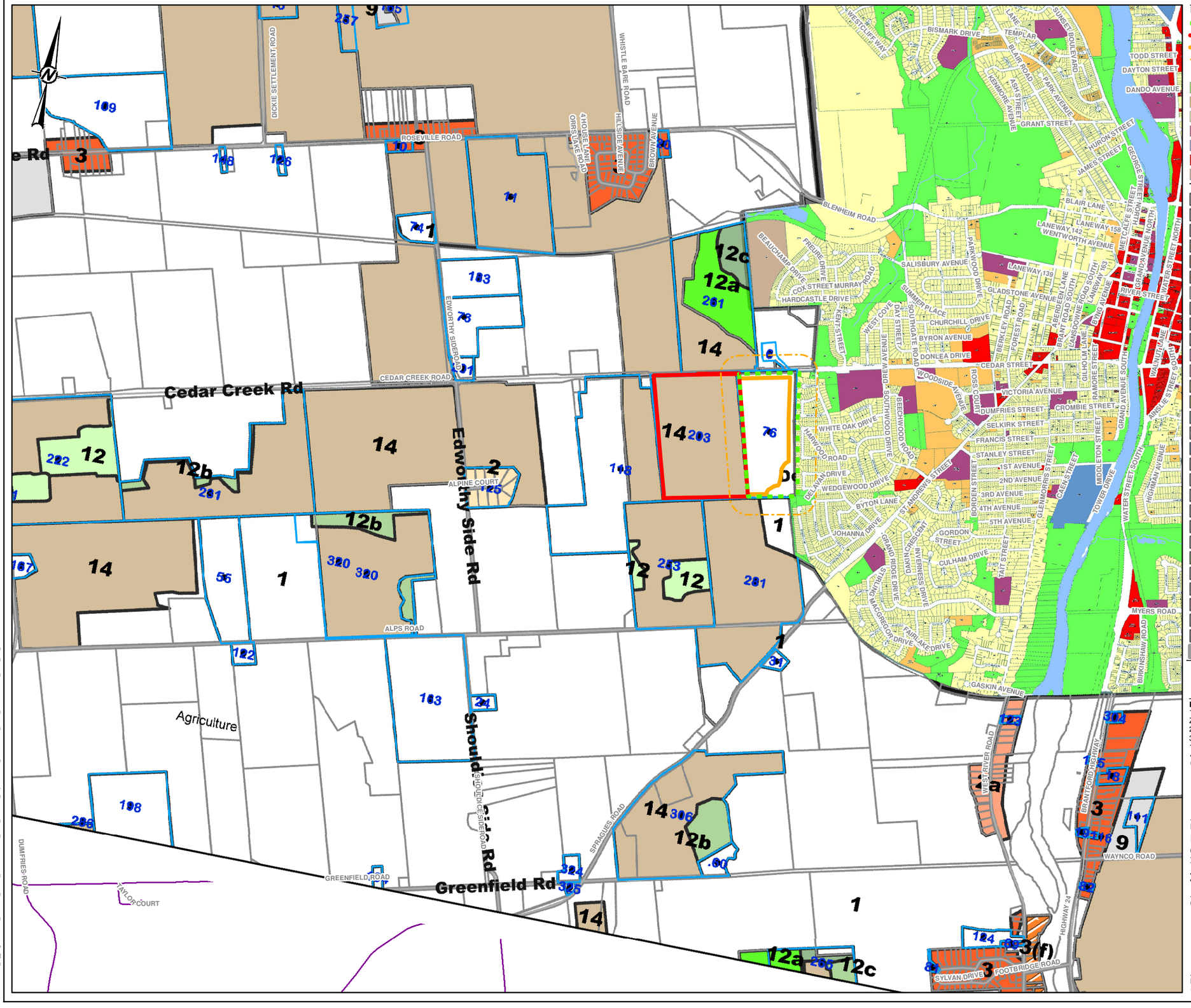
PROJECT NO.	CONTROL	REV.	FIGURE
1653019	0013	0	**2**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

S:\Clients\CBM_Aggregates\North_Dumfries_ON\99_PROJ\1653019_CBM_DancePit_Expansion\40_PROD\0013_Noise_2019\1653019_0013_RN_0r02.mxd

APPENDIX A

Land Use Zoning Designation Plan



LEGEND

- EXPANSION LICENCE BOUNDARY
- EXISTING LICENCE BOUNDARY
- PROPOSED EXTRACTION LIMIT
- 120 m INFORMATION BOUNDARY

CITY OF CAMBRIDGE ZONING LEGEND

- OPEN SPACE
- MEDIUM HIGH DENSITY RESIDENTIAL
- LOW DENSITY RESIDENTIAL
- INSTITUTIONAL
- INDUSTRIAL
- COMMERCIAL
- AGRICULTURAL

TOWNSHIP OF NORTH DUMFRIES ZONING LEGEND

- Zone 1 - Agriculture
- Zone 2 - Rural Residential
- Zone 2a - Rural Residential
- Zone 2af - Rural Residential (flood plain)
- Zone 3 - Rural Residential
- Zone 3f - Rural Residential (flood plain)
- Zone 4 - Urban Residential
- Zone 4f - Urban Residential (flood plain)
- Zone 4a - Urban Residential
- Zone 4b - Urban Residential
- Zone 4c - Urban Residential
- Zone 4d - Urban Residential
- Zone 5 - Urban Residentia
- Zone 5a - Urban Residential
- Zone 6 - Urban Commercial
- Zone 6f - Urban Commercial (flood plain)
- Zone 7 - Rural Commercial
- Zone 8 - Service Station
- Zone 9 - Industrial
- Zone 9f - Industrial (flood plain)
- Zone 10 - Industrial
- Zone 11 - Industrial
- Zone 12 - Open Space
- Zone 12a - Envronmental Protection 1
- Zone 12b - Envronmental Protection 2
- Zone 12c - Envronmental Protection Overlay
- Zone 13 - Institutional
- Zone 14 - Mineral Aggregates
- Zone 15 - Mobile Home Development
- Regional Municipal Boundaries

0 250 500 750 1,000 1,250

1:25,000 METRES

REFERENCE(S)

1. ZONING TOWN OF NORTH DUMFRIES OBTAINED FROM - HTTP://WWW.NORTHDUMFRIES.CA. ZONING CITY OF CAMBRIDGE OBTAINED FROM HTTP://WWW.CAMBRIDGE.CA
2. SITE PLAN PROVIDED BY CBM APRIL 2016
3. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM:UTM ZONE 17N

CLIENT

CBM AGGREGATES

ST MARYS

PROJECT

DANCE PIT EXPANSION LICENCE
CAMBRIDGE, ONTARIO

TITLE

ZONING

CONSULTANT

GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-06-08
DESIGNED	SO
PREPARED	SO
REVIEWED	TN
APPROVED	JT

PROJECT NO.	CONTROL	REV.	FIGURE
1653019	0013	0	A

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 25mm

S:\Clients\CBM_Aggregates\North_Dumfries_ON\99_PROJ\1653019_CBM_DancePit_Expansion\40_PROD\0013_Noise_2019\1653019_0013_RN_060A.mxd

APPENDIX B

Description of Technical Terms

Sound pressure level is expressed on a logarithmic scale in units of decibels (dB). Since the scale is logarithmic, a sound that is twice the sound pressure level as another will be three decibels (3 dB) higher.

The noise data and analysis in this report have been given in terms of frequency distribution. The levels are grouped into octave bands. Typically, the centre frequencies for each octave band are 31.5, 63, 125, 250, 500, 1000, 2000, 4000 and 8000 Hertz (Hz.). The human ear responds to the pressure variations in the atmosphere that reach the ear drum. These pressure variations are composed of different frequencies that give each sound we hear its unique character.

It is common practice to sum sound levels over the entire audible spectrum (i.e., 20 Hz to 20 kHz) to give an overall sound level. However, to approximate the hearing response of humans, each octave band measured has a weighting applied to it. The resulting “A-weighted” sound level is often used as a criterion to indicate a maximum allowable sound level. In general, low frequencies are weighted higher, as human hearing is less sensitive to low frequency sound.

Environmental noise levels vary over time, and are described using an overall sound level known as the L_{eq}, or energy averaged sound level. The L_{eq} is the equivalent continuous sound level, which in a stated time, and at a stated location, has the same energy as the time varying noise level. It is common practice to measure L_{eq} sound levels in order to obtain a representative average sound level. The L_{90} is defined as the sound level exceeded for 90% of the time and is used as an indicator of the “ambient” noise level.

APPENDIX C

Weather Data

Station Name	KITCHENER/WATERLOO
Province	ONTARIO
Latitude	43°27'39.000" N
Longitude	80°22'43.000" W
Elevation	321
Climate Identifier	6144239
WMO Identifier	71368
TC Identifier	YKF

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

Table C1 Weather Data September 13, 2016

Time	Temperature (°C)	Dew Point Temperature (°C)	Relative Humidity (%)	Wind Direction (10s deg.)	Wind Speed (km/h)	Stn Pressure (kPa)	Weather
0:00	18	14.3	80	27	28	97.3	N/A
1:00	17	13.6	80	27	26	97.38	N/A
2:00	16	13.2	84	27	21	97.47	N/A
3:00	15	12.7	85	29	22	97.54	N/A
4:00	15	11.9	84	30	22	97.63	N/A
5:00	14	11.3	84	30	18	97.76	N/A
6:00	13	10.3	84	31	15	97.92	N/A
7:00	14	10.5	82	31	13	98.05	N/A
8:00	15	10.7	75	31	13	98.14	N/A
9:00	16	10.1	66	31	18	98.22	N/A
10:00	17	10.5	65	33	22	98.26	N/A
11:00	19	10.5	57	26	21	98.28	N/A
12:00	20	11	57	28	21	98.27	N/A
13:00	20	9.1	50	30	21	98.27	N/A
14:00	20	9.4	49	31	15	98.26	N/A
15:00	21	9.6	48	30	15	98.26	N/A
16:00	21	9.7	49	28	15	98.27	N/A
17:00	20	9.5	52	29	21	98.31	N/A
18:00	18	9	56	32	15	98.35	N/A

Time	Temperature (°C)	Dew Point Temperature (°C)	Relative Humidity (%)	Wind Direction (10s deg.)	Wind Speed (km/h)	Stn Pressure (kPa)	Weather
19:00	15	9.3	70	32	5	98.39	N/A
20:00	13	10	83		0	98.4	N/A
21:00	11	9.7	90	*	4	98.43	N/A
22:00	10	9.3	94	36	4	98.45	N/A
23:00	10	8.1	91		0	98.44	N/A

N/A not applicable
* missing data

Table C2 Weather Data September 17, 2019

Time	Temperature (°C)	Dew Point Temperature (°C)	Relative Humidity (%)	Wind Direction (10s deg.)	Wind Speed (km/h)	Stn Pressure (kPa)	Weather
0:00	13	12.7	100	-	0	98.36	Fog
1:00	11	11.4	100	35	8	98.38	Rain,Fog
2:00	10	10.3	100	1	8	98.38	Rain,Fog
3:00	10	9.5	100	-	0	98.39	Fog
4:00	9	9.2	100	-	0	98.39	N/A
5:00	8	8.3	100	*	4	98.41	Fog
6:00	8	8.4	100	*	4	98.5	N/A
7:00	10	9.6	100	29	5	98.56	N/A
8:00	15	13.1	91	1	5	98.6	N/A
9:00	18	14	79	6	5	98.63	N/A
10:00	20	12	61	9	9	98.61	N/A
11:00	21	10.7	51	10	13	98.58	N/A
12:00	22	11.5	51	8	9	98.55	N/A
13:00	23	10.6	46	12	11	98.53	N/A
14:00	22	10.7	47	*	4	98.5	N/A
15:00	23	11.7	49	8	5	98.49	N/A
16:00	23	12.5	53	*	4	98.45	N/A

Time	Temperature (°C)	Dew Point Temperature (°C)	Relative Humidity (%)	Wind Direction (10s deg.)	Wind Speed (km/h)	Stn Pressure (kPa)	Weather
17:00	22	12.8	56	10	13	98.44	N/A
18:00	19	12.8	67	15	11	98.41	N/A
19:00	15	10.6	73	12	9	98.45	N/A
20:00	13	11	91	-	0	98.49	N/A
21:00	11	10.5	96	-	0	98.49	N/A
22:00	11	10	94	-	0	98.53	N/A
23:00	11	10.2	96	-	0	98.55	N/A

N/A not applicable
* missing data

APPENDIX D

Noise Source Summary Table Nomenclature

NOISE SOURCE SUMMARY TABLE NOMENCLATURE

Source Location

O – located/installed outside the building, including on the roof

I – located/installed inside the building

Sound Characteristics

S – Steady

Q – Quasi Steady Impulsive

I – Impulsive

B – Buzzing

T – Tonal

C – Cyclic

Noise Control Measures

S – silencer, acoustic louver, muffler

A – acoustic lining, plenum

B – barrier, berm, screening

L – lagging

E – acoustic enclosure

O – other

U – uncontrolled

APPENDIX E

Instrumentation

Calibration Certificate

Certificate Number 2016000507

Customer:
Golder Associates Inc
6925 Century Avenue
Mississauga, ON L5N 7K2, Canada

Model Number	CAL200	***Procedure Number***	D0001.8386		
Serial Number	4561	***Technician***	Scott Montgomery		
Test Results	**Pass**	***Calibration Date***	18 Jan 2016		
Initial Condition	AS RECEIVED same as shipped	***Calibration Due***	18 Jan 2017		
		Temperature	26	°C	± 0.3 °C
Description	Larson Davis CAL200 Acoustic Calibrator	***Humidity***	32	%RH	± 3 %RH
		Static Pressure	101.3	kPa	± 1 kPa

Evaluation Method The data is aquired by the insert voltage calibration method using the reference microphone's open circuit sensitivity. Data reported in dB re 20 µPa.

Compliance Standards Compliant to Manufacturer Specifications per D0001.8190 and the following standards:
IEC 60942:2003 ANSI S1.40-2006

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005.
Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2008.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

Standards Used

Description	Cal Date	Cal Due	Cal Standard
Agilent 34401A DMM	09/04/2015	09/04/2016	001021
Sound Level Meter / Real Time Analyzer	04/07/2015	04/07/2016	001051
Microphone Calibration System	08/20/2015	08/20/2016	005446
1/2" Preamplifier	10/09/2015	10/09/2016	006506
Larson Davis 1/2" Preamplifier 7-pin LEMO	08/20/2015	08/20/2016	006507
1/2 inch Microphone - RI - 200V	02/26/2015	02/26/2016	006510
Pressure Transducer	05/07/2015	05/07/2016	007310

Calibration Certificate

Certificate Number 2017010368
Customer:
Golder Associates Inc
6925 Century Avenue
Mississauga, ON L5N 7K2, Canada

Model Number	831	***Procedure Number***	D0001.8378	
Serial Number	0001669	***Technician***	Ron Harris	
Test Results	**Pass**	***Calibration Date***	29 Sep 2017	
Initial Condition	AS RECEIVED same as shipped	***Calibration Due***	29 Sep 2019	
Description	Larson Davis Model 831 Class 1 Sound Level Meter Firmware Revision: 2.314	***Temperature***	23.12 °C	± 0.25 °C
		Humidity	50.7 %RH	± 2.0 %RH
		Static Pressure	86.61 kPa	± 0.13 kPa

Evaluation Method Tested electrically using Larson Davis PRM831 S/N 019104 and a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 µPa assuming a microphone sensitivity of 50.0 mV/Pa.

Compliance Standards Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8384:

IEC 60651:2001 Type 1	ANSI S1.4-2014 Class 1
IEC 60804:2000 Type 1	ANSI S1.4 (R2006) Type 1
IEC 61252:2002	ANSI S1.11 (R2009) Class 1
IEC 61260:2001 Class 1	ANSI S1.25 (R2007)
IEC 61672:2013 Class 1	ANSI S1.43 (R2007) Type 1

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005. **Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.**

The quality system is registered to ISO 9001:2008.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

Correction data from Larson Davis Model 831 Sound Level Meter Manual, I831.01 Rev O, 2016-09-19

Calibration Check Frequency: 1000 Hz; Reference Sound Pressure Level: 114 dB re 20 µPa; Reference Range: 0 dB gain

Periodic tests were performed in accordance with precedures from IEC 61672-3:2013 / ANSI/ASA S1.4-2014/Part3.

Calibration Certificate

Certificate Number 2015008621

Customer:
Golder Associates Inc
6925 Century Avenue
Mississauga, ON L5N 7K2, Canada

Model Number	831	***Procedure Number***	D0001.8378	
Serial Number	0001702	***Technician***	Ron Harris	
Test Results	**Pass**	***Calibration Date***	4 Sep 2015	
Initial Condition	Inoperable	***Calibration Due***	4 Sep 2017	
Description	Larson Davis Model 831	***Temperature***	23.09 °C	± 0.01 °C
		Humidity	48.8 %RH	± 0.5 %RH
		Static Pressure	85.84 kPa	± 0.03 kPa

Evaluation Method Tested electrically using PRM831 S/N 019106 and a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 µPa assuming a microphone sensitivity of 50.0 mV/Pa.

Compliance Standards Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8384:

IEC 60651:2001 Type 1	ANSI S1.4-2014 Class 1
IEC 60804:2000 Type 1	ANSI S1.4 (R2006) Type 1
IEC 61252:2002	ANSI S1.11 (R2009) Class 1
IEC 61260:2001 Class 1	ANSI S1.25 (R2007)

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005.
Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2008.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

Standards Used

Description	Cal Date	Cal Due	Cal Standard
SRS DS360 Ultra Low Distortion Generator	02/06/2015	02/06/2016	006239
Hart Scientific 2626-H Temperature Probe	06/17/2015	06/17/2016	006798

APPENDIX F

Measurement Data

Source Name	Primary Crusher - exhaust stack	Primary Crusher - top	Primary Crusher - engine louver	Primary Crusher - Engine rad opening	Crusher/Screen Plant - 2nd screen	Crusher/Screen Plant - Jaw crusher
Library ID	N001	N002	N003	N004	N005	N006
Correction Type (Distance /Area)	Hemispherical	Area	Area	Area	Area	Area
Distance/ area of Measurement (m/m^2)	1	3	1.5	1	12	7
equency (Hz)						
25	74	81	95	86	79	87
31.5	80	87	103	90	77	80
40	86	90	96	94	85	94
50	82	87	93	85	86	97
63	84	91	100	95	89	93
80	88	93	98	95	97	94
100	101	94	99	95	90	97
125	87	93	98	92	88	94
160	87	96	95	95	90	96
200	89	97	94	96	88	94
250	88	94	96	103	91	96
315	87	92	93	95	89	97
400	85	91	95	93	88	94
500	86	93	97	97	88	94
630	83	91	95	95	88	95
800	82	91	95	93	89	95
1000	84	90	95	94	90	95
1250	84	91	97	94	91	95
1600	80	89	95	93	90	93
2000	80	90	96	92	91	91
2500	79	89	94	91	90	90
3150	77	86	92	89	89	88
4000	75	83	91	87	88	86
5000	73	81	90	86	86	84
6300	70	79	88	83	84	82
8000	68	77	87	82	81	79
10000	64	75	85	79	77	76
31.5	87	92	105	96	87	95
63	90	96	102	98	98	100
125	102	100	103	99	94	101
250	93	100	99	104	94	101
500	90	97	101	100	93	99
1000	88	95	101	99	95	100
2000	84	94	100	97	95	96
4000	80	89	96	92	93	91
8000	72	82	91	86	86	84
dBA	93	101	106	104	101	103

Crusher/Screen Plant - 1st screen	Crusher/Screen Plant - Jaw crusher top	Crusher/Screen Plant - 3rd screen	VSI crusher	VSI - top	VSI - casing	Crusher Generator 1 (YG) - louver
N007	N008	N009	N010	N011	N012	N013
Area	Area	Area	Area	Area	Area	Area
12	4	6	4	3.141592654	12.56637061	0.375
83	96	95	77	75	75	74
83	84	83	80	84	81	88
89	99	93	83	81	82	81
91	103	91	84	83	84	80
87	98	87	85	84	87	85
91	98	90	86	87	92	89
95	101	94	88	87	91	89
91	95	91	87	88	90	85
94	97	93	85	86	91	89
93	96	92	85	87	92	85
95	100	93	85	87	92	89
96	103	95	85	86	94	83
95	98	93	86	86	90	79
94	97	94	84	88	89	80
94	97	95	87	87	89	75
94	97	96	86	88	89	78
94	97	96	87	89	89	75
95	97	95	89	89	88	74
93	95	93	89	90	87	74
91	94	91	89	89	86	72
89	93	89	89	89	83	71
87	93	87	90	91	83	72
85	91	85	91	91	83	69
82	89	82	90	89	83	67
79	87	80	86	87	81	66
76	85	77	85	85	78	65
72	83	75	83	84	77	67
91	100	97	86	86	85	89
95	106	95	90	90	93	91
98	103	97	92	92	96	93
99	105	99	90	91	97	91
99	102	99	90	92	94	83
99	102	101	92	93	93	81
96	99	96	94	94	90	77
90	96	90	95	95	88	74
81	90	83	90	90	84	71
103	106	104	100	101	98	88

Crusher Generator 1 (YG) - louver	Crusher Generator 1 (YG) - louver	Crusher Generator 1 (YG) - louver	Crusher Generator 1 (YG) - louver	Crusher Generator 1 (YG) - Top of generator	Crusher Generator 2 (WG) - Louver	Crusher Generator 2 (WG) - Louver
N014	N015	N016	N017	N018	N019	N020
Area	Area	Area	Area	Area	Area	Area
0.375	0.25	0.375	0.375	1	0.375	0.375
74	73	79	78	90	81	80
87	88	88	90	91	85	84
81	82	81	80	90	83	89
82	82	86	82	92	83	88
82	83	83	85	90	89	85
88	86	87	86	91	86	85
90	88	89	86	93	90	87
87	84	86	90	87	93	93
88	86	87	89	88	95	94
88	83	88	88	89	95	94
89	85	90	92	97	96	93
85	82	85	85	90	92	86
86	79	83	81	89	89	84
80	77	80	84	95	85	83
76	75	77	78	90	83	80
76	76	78	81	93	81	80
74	74	78	77	90	79	77
73	73	76	76	89	79	76
73	73	75	78	89	79	76
71	72	73	75	89	78	75
71	71	72	76	88	77	74
71	70	72	75	86	78	72
68	69	70	75	84	75	71
65	66	67	73	82	74	69
65	65	65	72	80	77	69
64	64	64	72	79	79	66
64	64	63	73	78	72	66
88	89	89	91	95	88	90
90	89	91	90	96	92	91
94	91	92	93	95	98	97
92	88	93	94	98	100	97
87	82	86	87	97	91	87
79	79	82	83	96	84	83
77	77	78	81	93	83	80
73	74	75	79	89	81	76
69	69	69	77	84	82	72
89	86	89	91	100	95	92

Crusher Louver	Generator 2 (WG) - Crusher Louver	Generator 2 (WG) - Crusher Louver	Generator 2 (WG) - Crusher Louver	Generator 2(WG) - Louver	Washplant screen	Washplant generator side louver	Washplant generator side louver
N021	N022	N023	N024		SP007	W001	W002
Area	Area	Area	Area		Hemispherical	Area	Area
0.375	0.25	0.375	0.375		60	0.5	2.13
78	77	79	82		70	80	77
83	81	83	85		66	83	80
87	85	89	90		78	80	82
88	86	89	88		67	83	84
84	85	87	88		65	93	89
86	88	88	91		63	94	95
90	88	89	90		60	95	98
93	88	92	92		59	93	93
91	92	92	92		57	100	95
92	95	93	95		58	96	98
92	92	92	95		58	99	94
83	85	85	86		54	97	95
81	79	81	84		52	95	93
80	80	81	83		50	96	94
79	77	81	82		47	96	94
80	76	81	81		45	97	94
77	75	78	78		47	95	93
76	76	78	79		46	96	93
75	76	77	78		47	95	93
75	75	77	78		47	96	93
72	74	76	77		47	93	90
71	74	75	76		45	91	88
69	74	72	74		44	90	86
67	72	71	72		43	87	83
69	71	70	71		43	88	84
64	69	67	70		42	84	80
62	67	64	66		40	84	80
89	87	90	92		78	86	85
91	91	93	94		70	96	96
96	94	96	96		64	102	101
95	97	96	98		62	102	101
85	84	86	88		55	101	98
83	80	84	84		51	101	98
79	80	81	82		51	100	97
74	78	78	79		49	94	91
71	74	73	74		46	90	87
90	91	91	93		**60**	**106**	**103**

Washplant generator side louver	Washplant generator side louver	Washplant generator side louver
W003	W004	W005
Area	Area	Area
2	0.5	4
74	80	81
78	81	83
79	80	85
82	84	88
88	90	88
92	92	99
96	93	103
91	94	96
92	97	98
93	97	98
92	99	97
91	97	98
89	97	95
89	96	95
89	97	95
90	97	96
88	97	95
88	97	94
87	96	94
87	96	94
84	93	91
82	91	90
81	90	89
78	87	85
79	89	87
75	85	82
75	86	82
82	85	88
94	95	99
98	100	104
97	103	102
94	101	100
94	102	100
91	100	98
85	95	93
81	92	89
98	**106**	**104**

APPENDIX G

Sample Calculation

Report (Dance model 2020 AAR V3.cna)

CALCULATION CONFIGURATION

Configuration	
Parameter	Value
General	
Country	(user defined)
Max. Error (dB)	0.00
Max. Search Radius (#(Unit,LEN))	2000.00
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (#(Unit,LEN))	1000.00
Min. Length of Section (#(Unit,LEN))	1.00
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Reference Time Day (min)	960.00
Reference Time Night (min)	480.00
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	0.00
Night-time Penalty (dB)	0.00
DTM	
Standard Height (m)	260.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	2
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rvcr - Reflector	1.00 1.00
Min. Distance Source - Reflector	0.10
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	Excl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (#(Unit,TEMP))	10
rel. Humidity (%)	70
Ground Absorption G	1.00
Wind Speed for Dir. (#(Unit,SPEED))	3.0
Roads (RLS-90)	
Strictly acc. to RLS-90	
Railways (Schall 03 (1990))	
Strictly acc. to Schall 03 / Schall-Transrapid	
Aircraft (???)	
Strictly acc. to AzB	

NOISE SOURCES

Noise Source Library

Name	ID	Type	Oktave Spectrum (dB)												Source
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	
Crushing Plant - Jaw Crusher	SP001	Lw		116.6	119.0	119.9	116.6	110.8	112.0	111.8	108.0	103.0	117.8	125.0	
Crushing Plant - Bin	SP002	Lw		104.2	106.4	109.5	111.8	114.2	115.4	115.7	113.1	106.0	121.1	121.9	
Crushing Plant - Secondary Screen	SP003	Lw		107.9	110.5	109.6	110.4	110.6	109.2	110.8	109.5	103.5	116.5	119.1	
Crushing Plant - Cone Crusher	SP004	Lw		102.4	105.9	113.5	115.2	116.0	116.3	112.6	108.5	101.6	120.0	122.3	
Wash Plant - Motor	SP006	Lw		101.5	96.0	100.5	106.4	103.3	99.4	97.1	93.2	90.8	105.5	110.5	
Wash Plant - Screen 1	SP007	Lw		122.0	113.6	107.2	105.6	98.5	94.4	94.9	92.6	90.0	103.1	122.8	
Wash Plant Genset - Louvre	SV003	Lw		100.3	98.5	97.5	94.2	89.5	79.0	77.8	74.7	75.4	90.7	104.3	
Loader - Crushing Plant	SL001	Lw		112.9	116.8	116.1	114.0	109.9	106.1	106.4	101.9	95.5	113.3	121.9	
Loader - Wash Plant	SL002	Lw		112.9	116.8	116.1	114.0	109.9	106.1	106.4	101.9	95.5	113.3	121.9	
Truck	SL003	Lw		91.9	103.1	105.0	100.7	100.8	99.0	97.9	95.6	90.2	104.7	109.8	
Crushing Plant Genset - Louvre 1	SV001	Lw		101.0	100.8	101.3	93.0	89.8	88.8	88.1	83.6	77.8	94.8	106.3	
Crushing Plant Genset - Louvre 2	SV002	Lw		101.3	97.8	99.9	92.9	90.9	91.0	90.3	87.3	83.3	96.7	105.5	
Crushing Plant Genset - Door	SP015	Lw		92.8	99.7	99.8	90.3	86.0	86.4	85.8	81.7	77.6	92.5	103.7	
Crushing Plant - Screen	SP016	Lw		110.4	118.7	125.8	116.7	118.0	116.6	114.3	109.3	102.9	121.4	128.2	
Crushing Plant - Cone Crusher	SP017	Lw		104.4	117.8	124.8	113.1	111.6	110.2	108.5	102.4	98.8	116.0	126.2	
Crushing Plant - Generator	SP018	Lw		106.4	125.0	134.7	120.6	117.5	113.6	111.8	106.8	103.4	122.2	135.4	
Crushing Plant - Generator	SP019	Li		90.4	105.1	114.5	111.2	106.5	103.1	101.2	97.6	96.0	109.8	117.3	
Louver A	WPG001	Li		87.4	90.9	95.2	94.9	85.2	80.1	77.5	72.7	69.4	89.4	99.4	
Louver B	WPG002	Li		89.1	91.6	98.1	98.9	88.3	81.1	79.5	76.0	73.8	92.7	102.4	
Louver C	WPG003	Li		89.6	90.6	98.3	100.2	92.6	84.6	83.3	80.9	82.4	95.2	103.4	
Louver D	WPG004	Li		85.3	89.3	92.1	97.5	83.9	76.1	75.2	70.3	69.3	90.2	99.4	
Louver E	WPG005	Li		89.6	92.4	95.9	95.7	85.8	82.5	79.7	75.1	71.0	90.6	100.4	
Louver F	WPG006	Li		89.6	92.4	95.9	95.7	85.8	82.5	79.7	75.1	71.0	90.6	100.4	
Louver G	WPG007	Li		89.7	91.2	94.5	99.2	88.1	82.4	80.1	76.1	72.9	92.8	101.6	
Louver H	WPG008	Li		89.7	92.3	97.6	98.8	89.7	82.6	80.0	77.2	73.4	93.1	102.4	
Generator stack	WPG009	Lw		95.4	99.6	99.0	99.8	91.5	88.5	83.6	78.1	74.0	95.2	105.1	
Generator top	WPG010	Li		83.1	88.6	90.8	91.3	82.3	78.5	72.7	68.2	64.0	86.1	95.7	
Primary Crusher - top	N002	Li		94.0	98.0	102.0	102.0	99.0	97.0	96.0	91.0	84.0	102.7	107.7	Golder Measurement
Primary Crusher - engine louver	N003	Li		107.0	104.0	105.0	101.0	103.0	103.0	102.0	98.0	93.0	108.0	112.6	Golder Measurement
Primary Crusher - Engine rad opening	N004	Li		98.0	100.0	101.0	106.0	102.0	101.0	99.0	94.0	88.0	106.0	110.3	Golder Measurement
Jaw/Screen Plant - 2nd screen	N005	Li		89.0	100.0	96.0	96.0	95.0	97.0	97.0	95.0	88.0	102.6	105.5	Golder Measurement
Jaw/Screen Plant - Jaw crusher	N006	Li		97.0	102.0	103.0	103.0	101.0	102.0	98.0	93.0	86.0	105.6	109.9	Golder Measurement
Jaw/Screen Plant - 1st screen	N007	Li		93.0	97.0	100.0	101.0	101.0	101.0	98.0	92.0	83.0	104.9	108.0	Golder Measurement
Jaw/Screen Plant - Jaw crusher top	N008	Li		102.0	108.0	105.0	107.0	104.0	104.0	101.0	98.0	92.0	108.5	113.6	Golder Measurement
Jaw/Screen Plant - 3rd screen	N009	Li		99.0	97.0	99.0	101.0	101.0	103.0	98.0	92.0	85.0	105.9	108.7	Golder Measurement
VSI crusher	N010	Li		88.0	92.0	94.0	92.0	92.0	94.0	96.0	97.0	92.0	102.1	103.2	Golder Measurement
VSI - top	N011	Li		88.0	92.0	94.0	93.0	94.0	95.0	96.0	97.0	92.0	102.4	103.6	Golder Measurement
VSI - casing	N012	Li		87.0	95.0	98.0	99.0	96.0	95.0	92.0	90.0	86.0	100.0	104.5	Golder Measurement
Yellow Generator (YG) - louver 01	N013	Li		91.0	93.0	95.0	93.0	85.0	83.0	79.0	76.0	73.0	89.4	99.6	Golder Measurement
Yellow Generator (YG) - louver 02	N014	Li		90.0	92.0	96.0	94.0	89.0	81.0	79.0	75.0	71.0	90.4	100.1	Golder Measurement
Yellow Generator (YG) - louver 03	N015	Li		91.0	91.0	93.0	90.0	84.0	81.0	79.0	76.0	71.0	87.8	97.8	Golder Measurement
Yellow Generator (YG) - louver 04	N016	Li		91.0	93.0	94.0	95.0	88.0	84.0	80.0	77.0	71.0	91.0	100.0	Golder Measurement
Yellow Generator (YG) - louver 05	N017	Li		93.0	92.0	95.0	96.0	89.0	85.0	83.0	81.0	79.0	92.6	100.9	Golder Measurement
Yellow Generator (YG) - Top of generator	N018	Li		97.0	98.0	97.0	100.0	99.0	98.0	95.0	91.0	86.0	102.5	106.6	Golder Measurement
White Generator (WG) - Louver 01	N019	Li		90.0	94.0	100.0	102.0	93.0	86.0	85.0	83.0	84.0	96.7	105.1	Golder Measurement
White Generator (WG) - Louver 02	N020	Li		92.0	93.0	99.0	99.0	89.0	85.0	82.0	78.0	74.0	93.6	103.2	Golder Measurement
White Generator (WG) - Louver 03	N021	Li		91.0	93.0	98.0	97.0	87.0	85.0	81.0	76.0	73.0	92.1	101.9	Golder Measurement
White Generator (WG) - Louver 04	N022	Li		89.0	93.0	96.0	99.0	86.0	82.0	82.0	80.0	76.0	92.8	101.9	Golder Measurement
White Generator (WG) - Louver 05	N023	Li		92.0	95.0	98.0	98.0	88.0	86.0	83.0	80.0	75.0	93.3	102.7	Golder Measurement
White Generator (WG) - Louver 06	N024	Li		94.0	96.0	98.0	100.0	90.0	86.0	84.0	81.0	76.0	94.7	103.9	Golder Measurement
White Generator (WG) - Top	N025	Li		100.0	101.0	97.0	97.0	92.0	90.0	88.0	84.0	77.0	95.8	105.6	Golder Measurement
Wash Plant - generator side louver	W001	Li		86.0	96.0	102.0	102.0	101.0	101.0	100.0	94.0	90.0	105.8	108.7	Golder Measurement
Wash Plant - generator door	W002	Li		85.0	96.0	101.0	101.0	98.0	98.0	97.0	91.0	87.0	103.0	106.9	Golder Measurement
Wash Plant - generator intake	W003	Li		82.0	94.0	98.0	97.0	94.0	94.0	91.0	85.0	81.0	98.3	103.2	Golder Measurement
Wash Plant - generator side louver	W004	Li		85.0	95.0	100.0	103.0	101.0	102.0	100.0	95.0	92.0	106.4	108.8	Golder Measurement
Wash Plant - generator rad	W005	Li		88.0	99.0	104.0	102.0	100.0	100.0	98.0	93.0	89.0	104.6	109.0	Golder Measurement
		Li		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	9.5	
		Li		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	9.5	
		Li		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	9.5	

Point Source(s)

Name	M.	ID	Result. PWL			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time			K0	Freq.
			Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night		
			(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m²)		(min)	(min)	(min)	(dB)	(Hz)
Screen	-	!010210!	121.4	121.4	121.4	Lw	SP016		0.0	0.0	0.0							0.0	
Screen	-	!0102011!	121.4	121.4	121.4	Lw	SP016		0.0	0.0	0.0							0.0	
Screen	-	!0102011!	121.4	121.4	121.4	Lw	SP016		0.0	0.0	0.0							0.0	
Screen	-	!0102011!	121.4	121.4	121.4	Lw	SP016		0.0	0.0	0.0							0.0	
Screen	-	!010310!	121.4	121.4	121.4	Lw	SP016		0.0	0.0	0.0							0.0	
Cone Crusher	-	!010210!	106.0	106.0	106.0	Lw	SP017		0.0	0.0	0.0			10				0.0	
Cone Crusher	-	!0102011!	106.0	106.0	106.0	Lw	SP017		0.0	0.0	0.0			10				0.0	
Cone Crusher	-	!010310!	106.0	106.0	106.0	Lw	SP017		0.0	0.0	0.0			10				0.0	
Generator	-	!010310!	122.2	122.2	122.2	Lw	SP018		0.0	0.0	0.0							0.0	

Name	M.	ID	Result. PWL			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time			K0	Freq.
			Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night		
			(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m²)		(min)	(min)	(min)	(dB)	(Hz)
Generator	-	!010210!	122.2	122.2	122.2	Lw	SP018		0.0	0.0	0.0							0.0	
Wash Plant - Screen 1		!WP01!WP_S_P1_P2	103.1	103.1	103.1	Lw	SP007		0.0	0.0	0.0							0.0	
Generator stack	-	WPG009	95.2	95.2	95.2	Lw	WPG009		0.0	0.0	0.0							0.0	
Screen	-	!010106!	121.4	121.4	121.4	Lw	SP016		0.0	0.0	0.0							0.0	
Screen	-	!010107!	121.4	121.4	121.4	Lw	SP016		0.0	0.0	0.0							0.0	
Screen	-	!010211!	121.4	121.4	121.4	Lw	SP016		0.0	0.0	0.0							0.0	
Screen	-	!010311!	121.4	121.4	121.4	Lw	SP016		0.0	0.0	0.0							0.0	
Cone Crusher	-	!010106!	106.0	106.0	106.0	Lw	SP017		0.0	0.0	0.0			10				0.0	
Cone Crusher	-	!010107!	106.0	106.0	106.0	Lw	SP017		0.0	0.0	0.0			10				0.0	
Cone Crusher	-	!010211!	106.0	106.0	106.0	Lw	SP017		0.0	0.0	0.0			10				0.0	
Cone Crusher	-	!010311!	106.0	106.0	106.0	Lw	SP017		0.0	0.0	0.0			10				0.0	
Generator	-	!010106!	112.2	112.2	112.2	Lw	SP018		0.0	0.0	0.0			10				0.0	
Generator	-	!010107!	112.2	112.2	112.2	Lw	SP018		0.0	0.0	0.0			10				0.0	
Generator	-	!010211!	112.2	112.2	112.2	Lw	SP018		0.0	0.0	0.0			10				0.0	
Generator	-	!010311!	112.2	112.2	112.2	Lw	SP018		0.0	0.0	0.0			10				0.0	
Wash Plant - Screen 1	~	!WP02!WP_S_P3	103.1	103.1	103.1	Lw	SP007		0.0	0.0	0.0							0.0	
Generator stack	-	WPG009	95.2	95.2	95.2	Lw	WPG009		0.0	0.0	0.0							0.0	

Line Source(s)

Name	M.	ID	Result. PWL			Result. PWL'			Lw / Li		norm.	Correction			Sound Reduction		Attenuation	Operati	
			Day	Evening	Night	Day	Evening	Night	Type	Value		Day	Evening	Night	R	Area		Day	Spe
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m²)		(min)	(m
Haul Truck	~	!010310!	102.9	-13.7	-13.7	77.4	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Water Truck	~	!010311!WT	94.5	-11.6	-11.6	66.8	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Haul Truck	~	!010101!SL001	102.4	-14.2	-14.2	77.4	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Extraction Loader	~	!010206!	113.3	113.3	113.3	94.9	94.9	94.9	Lw	SL001		0.0	0.0	0.0					
Extraction Loader	~	!010306!	113.3	113.3	113.3	95.8	95.8	95.8	Lw	SL001		0.0	0.0	0.0					
Extraction Loader	~	!010207!	113.3	113.3	113.3	94.7	94.7	94.7	Lw	SL001		0.0	0.0	0.0					
Extraction Loader	~	!010307!	113.3	113.3	113.3	95.3	95.3	95.3	Lw	SL001		0.0	0.0	0.0					
Extraction Loader	~	!010108!	113.3	113.3	113.3	94.9	94.9	94.9	Lw	SL001		0.0	0.0	0.0					
Extraction Loader	~	!010208!!010104!	113.3	113.3	113.3	95.7	95.7	95.7	Lw	SL001		0.0	0.0	0.0					
Extraction Loader	~	!010308!	113.3	113.3	113.3	94.7	94.7	94.7	Lw	SL001		0.0	0.0	0.0					
Extraction Loader	~	!010301!	113.3	113.3	113.3	95.3	95.3	95.3	Lw	SL001		0.0	0.0	0.0					
Extraction Loader	~	!010101!	113.3	113.3	113.3	94.5	94.5	94.5	Lw	SL001		0.0	0.0	0.0					
Extraction Loader	~	!010201!	113.3	113.3	113.3	94.7	94.7	94.7	Lw	SL001		0.0	0.0	0.0					
Extraction Loader	~	!010210!	113.3	113.3	113.3	94.7	94.7	94.7	Lw	SL001		0.0	0.0	0.0					
Extraction Loader	~	!010310!	113.3	113.3	113.3	94.7	94.7	94.7	Lw	SL001		0.0	0.0	0.0					
Haul Truck	~	!010208!	102.3	-14.3	-14.3	77.4	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Haul Truck	~	!010201!	103.1	-13.5	-13.5	77.4	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Haul Truck	~	!010206!	102.6	-14.0	-14.0	77.4	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Haul Truck	~	!010207!	103.2	-13.5	-13.5	77.4	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Haul Truck	~	!010308!SL001	105.3	-11.3	-11.3	77.4	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Haul Truck	~	!010306!SL001	105.3	-11.3	-11.3	77.4	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Haul Truck	~	!010307!SL001	105.7	-10.9	-10.9	77.4	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Other trucks	~	!010310!	103.6	-6.4	-6.4	70.7	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Other trucks	~	!010210!	103.0	-7.0	-7.0	70.7	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Haul Truck	~	!0102011!	102.9	-13.7	-13.7	77.4	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Haul Truck	~	!010210!	103.0	-13.6	-13.6	77.4	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Other trucks	~	!0102011!	103.0	-7.0	-7.0	70.7	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Other trucks		!010106!HT_PP_S_P1N	102.6	-7.4	-7.4	70.7	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Water truck		!010106!WT	91.6	-14.5	-14.5	66.8	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Other trucks	~	!010107!HT_PP_S_P1S	102.6	-7.4	-7.4	70.7	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Water Truck	~	!010107!WT	91.6	-14.4	-14.4	66.8	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Other trucks	~	!010211!HT_PP_S_P2	102.6	-7.4	-7.4	70.7	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Water Truck	~	!010211!WT	92.8	-13.2	-13.2	66.8	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Other trucks	~	!010311!HT_PP_S_P3	102.6	-7.4	-7.4	70.7	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Haul Truck	-	!010311!	102.6	-14.0	-14.0	77.4	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Extraction to offite P1S	-	!010107!HT_E_S_P1S	103.0	-7.0	-7.0	70.7	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Extraction to offsite P1N	-	!010106!HT_E_S_P1N	103.1	-6.9	-6.9	70.7	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Extraction to offsite P2	-	!010211!HT_E_S_P2	103.5	-6.5	-6.5	70.7	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Extraction to offsite P3	-	!010311!HT_E_S_P3	103.8	-6.2	-6.2	70.7	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Haul Truck		!010106!HT_PP_P1N	102.2	-14.5	-14.5	77.4	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Haul Truck	~	!010107!HT_PP_P1S	102.2	-14.4	-14.4	77.4	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Haul Truck	~	!010211!HT_PP_P2	103.4	-13.2	-13.2	77.4	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					
Haul Truck	~	!010311!HT_PP_P3	105.1	-11.6	-11.6	77.4	-39.3	-39.3	PWL-Pt	SL003		0.0	0.0	0.0					

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL"			Lw / Li			Correction			Sound Reduction			Attenuation	Operating Time		
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area			Day	Special	Ni
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m²)			(min)	(min)	(m
Generator top	-	WPG010	88.6	88.6	88.6	86.1	86.1	86.1	Lw"	WPG010		0.0	0.0	0.0							
Sand Plant Loader		!WP01!L_SP_P1_P2	112.0	112.0	112.0	84.2	84.2	84.2	Lw	SL001		0.0	0.0	0.0				1.3			
Loader (CP)		!010106!L_CP	112.0	112.0	112.0	84.2	84.2	84.2	Lw	SL001		0.0	0.0	0.0				1.3			
Loader (Extraction)		!010106!L_E	112.0	112.0	112.0	84.2	84.2	84.2	Lw	SL001		0.0	0.0	0.0				1.3			
Loader (CP)	~	!010107!	112.0	112.0	112.0	84.2	84.2	84.2	Lw	SL001		0.0	0.0	0.0				1.3			
Loader (Extraction)	~	!010107!L_E	112.0	112.0	112.0	84.2	84.2	84.2	Lw	SL001		0.0	0.0	0.0				1.3			
Loader (CP)	~	!010211!	112.0	112.0	112.0	84.2	84.2	84.2	Lw	SL001		0.0	0.0	0.0				1.3			
Loader (CP)	~	!010311!	112.0	112.0	112.0	84.2	84.2	84.2	Lw	SL001		0.0	0.0	0.0				1.3			

Name	M.	ID	Result. PWL			Result. PWL"			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time		
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Ni
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m²)		(min)	(min)	(m
Loader (Extraction)	~	!010211!L_E	112.0	112.0	112.0	84.2	84.2	84.2	Lw	SL001		0.0	0.0	0.0			1.3			
Loader (Extraction)	~	!010311!L_E	112.0	112.0	112.0	84.2	84.2	84.2	Lw	SL001		0.0	0.0	0.0			1.3			
Sand Plant Loader	~	!WP02!L_SP_P3	112.0	112.0	112.0	84.2	84.2	84.2	Lw	SL001		0.0	0.0	0.0			1.3			

Vertical Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL"			Lw / Li			Correction			Sound Reduction		Attenuation	O
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m²)		(min)
Louver A	-	WPG001	84.1	84.1	84.1	89.4	89.4	89.4	Lw"	WPG001		0.0	0.0	0.0				
Louver B	-	WPG002	88.1	88.1	88.1	92.7	92.7	92.7	Lw"	WPG002		0.0	0.0	0.0				
Louver C	-	WPG003	90.6	90.6	90.6	95.2	95.2	95.2	Lw"	WPG003		0.0	0.0	0.0				
Louver D	-	WPG004	83.8	83.8	83.8	90.2	90.2	90.2	Lw"	WPG004		0.0	0.0	0.0				
Louver E	-	WPG005	88.1	88.1	88.1	90.6	90.6	90.6	Lw"	WPG005		0.0	0.0	0.0				
Louver F	-	WPG006	88.1	88.1	88.1	90.6	90.6	90.6	Lw"	WPG006		0.0	0.0	0.0				
Louver G	-	WPG007	88.2	88.2	88.2	92.8	92.8	92.8	Lw"	WPG007		0.0	0.0	0.0				
Louver H	-	WPG008	88.5	88.5	88.5	93.1	93.1	93.1	Lw"	WPG008		0.0	0.0	0.0				
VSI - Casing		VSIR	108.2	108.2	108.2	100.0	100.0	100.0	Lw"	N012		0.0	0.0	0.0				
Primary Crusher Engine 1		PCE1	109.7	109.7	109.7	108.0	108.0	108.0	Lw"	N003		0.0	0.0	0.0				
Primary Crusher Engine 2		PCE2	109.7	109.7	109.7	108.0	108.0	108.0	Lw"	N003		0.0	0.0	0.0				
Primary Crusher Rad 3		PCE3	108.8	108.8	108.8	106.0	106.0	106.0	Lw"	N004		0.0	0.0	0.0				
Primary Screener a		PCEa3	115.7	115.7	115.7	104.9	104.9	104.9	Lw"	N007		0.0	0.0	0.0				
Jaw Crusher a		JCa	117.5	117.5	117.5	108.5	108.5	108.5	Lw"	N008		0.0	0.0	0.0				
Secondary Screener a		SSa	113.4	113.4	113.4	102.6	102.6	102.6	Lw"	N005		0.0	0.0	0.0				
Thirdly Screener a		TCa	114.9	114.9	114.9	105.9	105.9	105.9	Lw"	N009		0.0	0.0	0.0				
Primary Screener b		PCEb3	115.7	115.7	115.7	104.9	104.9	104.9	Lw"	N007		0.0	0.0	0.0				
Jaw Crusher b		JCb	117.5	117.5	117.5	108.5	108.5	108.5	Lw"	N008		0.0	0.0	0.0				
Secondary Screener b		SSb	113.4	113.4	113.4	102.6	102.6	102.6	Lw"	N005		0.0	0.0	0.0				
Thirdly Screener b		TCb	114.9	114.9	114.9	105.9	105.9	105.9	Lw"	N009		0.0	0.0	0.0				
Gen 1 Louver 1		YGL1	101.6	101.6	101.6	105.9	105.9	105.9	Lw"	N009		0.0	0.0	0.0				
Gen 1 Gen Louver 2		YGL2	97.9	97.9	97.9	102.1	102.1	102.1	Lw"	N010		0.0	0.0	0.0				
Gen 1 Louver 3		YGL3	96.4	96.4	96.4	102.4	102.4	102.4	Lw"	N011		0.0	0.0	0.0				
Gen 1 Louver 4		YGL4	95.7	95.7	95.7	100.0	100.0	100.0	Lw"	N012		0.0	0.0	0.0				
Gen 1 Louver 5		YGL5	85.2	85.2	85.2	89.4	89.4	89.4	Lw"	N013		0.0	0.0	0.0				
Gen 2 Louver 01		WGL01	92.4	92.4	92.4	96.7	96.7	96.7	Lw"	N019		0.0	0.0	0.0				
Gen 2 Louver 02		WGL02	89.3	89.3	89.3	93.6	93.6	93.6	Lw"	N020		0.0	0.0	0.0				
Gen 2 Louver 03		WGL03	87.9	87.9	87.9	92.1	92.1	92.1	Lw"	N021		0.0	0.0	0.0				
Gen 2 Louver 04		WGL04	82.7	82.7	82.7	92.1	92.1	92.1	Lw"	N021		0.0	0.0	0.0				
Gen 2 Louver 05		WGL05	86.8	86.8	86.8	92.8	92.8	92.8	Lw"	N022		0.0	0.0	0.0				
Gen 2 Louver 06		WGL06	83.8	83.8	83.8	93.3	93.3	93.3	Lw"	N023		0.0	0.0	0.0				
White Gen Louver 07		WGL07	89.1	89.1	89.1	93.3	93.3	93.3	Lw"	N023		0.0	0.0	0.0				
Gen 2 Louver 08		WGL08	89.1	89.1	89.1	93.3	93.3	93.3	Lw"	N023		0.0	0.0	0.0				
Gen 2 Louver 09		WGL09	90.4	90.4	90.4	94.7	94.7	94.7	Lw"	N024		0.0	0.0	0.0				
Gen 2 Louver 10		WGL10	90.4	90.4	90.4	94.7	94.7	94.7	Lw"	N024		0.0	0.0	0.0				
Wash Plant Gen Louver 1		!WP01!WPGL1_P1_P2	102.9	102.9	102.9	105.8	105.8	105.8	Lw"	W001		0.0	0.0	0.0				
Wash Plant - generator door		!WP01!WPGD1_P1_P2	106.0	106.0	106.0	103.0	103.0	103.0	Lw"	W002		0.0	0.0	0.0				
Wash Plant - generator intake		!WP01!WPGI1_P1_P2	101.8	101.8	101.8	98.3	98.3	98.3	Lw"	W003		0.0	0.0	0.0				
Wash Plant Gen Louver 2		!WP01!WPG2_P1_P2	101.6	101.6	101.6	104.6	104.6	104.6	Lw"	W005		0.0	0.0	0.0				
Wash Plant - generator rad		!WP01!WPGR1_P1_P2	111.9	111.9	111.9	105.8	105.8	105.8	Lw"	W001		0.0	0.0	0.0				
Louver A	-	WPG001	84.1	84.1	84.1	89.4	89.4	89.4	Lw"	WPG001		0.0	0.0	0.0				
Louver B	-	WPG002	88.1	88.1	88.1	92.7	92.7	92.7	Lw"	WPG002		0.0	0.0	0.0				
Louver C	-	WPG003	90.6	90.6	90.6	95.2	95.2	95.2	Lw"	WPG003		0.0	0.0	0.0				
Louver D	-	WPG004	83.8	83.8	83.8	90.2	90.2	90.2	Lw"	WPG004		0.0	0.0	0.0				
Louver E	-	WPG005	88.1	88.1	88.1	90.6	90.6	90.6	Lw"	WPG005		0.0	0.0	0.0				
Louver F	-	WPG006	88.1	88.1	88.1	90.6	90.6	90.6	Lw"	WPG006		0.0	0.0	0.0				
Louver G	-	WPG007	88.2	88.2	88.2	92.8	92.8	92.8	Lw"	WPG007		0.0	0.0	0.0				
Louver H	-	WPG008	88.5	88.5	88.5	93.1	93.1	93.1	Lw"	WPG008		0.0	0.0	0.0				
Wash Plant Gen Louver 1	~	!WP02!WPGL1_P3	102.9	102.9	102.9	105.8	105.8	105.8	Lw"	W001		0.0	0.0	0.0				
Wash Plant - generator door	~	!WP02!WPGD1_P3	106.0	106.0	106.0	103.0	103.0	103.0	Lw"	W002		0.0	0.0	0.0				
Wash Plant - generator intake	~	!WP02!WPGI1_P3	101.8	101.8	101.8	98.3	98.3	98.3	Lw"	W003		0.0	0.0	0.0				
Wash Plant Gen Louver 2	~	!WP02!WPGL2_P3	103.4	103.4	103.4	106.4	106.4	106.4	Lw"	W004		0.0	0.0	0.0				
Wash Plant - generator rad	~	!WP02!WPGR1_P3	110.7	110.7	110.7	104.6	104.6	104.6	Lw"	W005		0.0	0.0	0.0				

Barrier(s)

Name	M.	ID	GIS LABEL	Absorption		Z-Ext.	Cantilever		Height			
				left	right		horz.	vert.	Begin		End	
						(m)	(m)	(m)	(m)		(m)	
Shipping container		!010106!		0.21	0.21				7.00	r		
Shipping container	-	!010211!		0.21	0.21				7.00	r		
Shipping container	-	!010311!		0.21	0.21				7.00	r		
Berm A - Visual Berm	~	!010210!	Berm A	0.60	0.60				3.00	r		
Berm A - Visual Berm	-	!010100!	Berm A	0.60	0.60				3.00	r		
Berm A - Visual Berm	-	!010211!	Berm A	0.60	0.60				3.00	r		
Berm A - Visual Berm	~	!010300!	Berm A	0.60	0.60				3.00	r		
Berm B - Phase 1 Berm - 30 m base, 3:1 slope	~	!010200!	Berm C	0.60	0.60				5.00	r		
Berm C - Phase 2 Berm - 30 m base, 3:1 slope	~	!010200!	Berm D	0.60	0.60				5.00	r		
Berm D - Phase 3 Berm - 30 m base, 3:1 slope	~	!010300!	Berm E	0.60	0.60				5.00	r		
Berm B - Phase 1 Berm - 30 m base, 3:1 slope		!010106!	Berm C	0.60	0.60				5.00	r		
Berm B - Phase 1 Berm - 30 m base, 3:1 slope	~	!010107!	Berm C	0.60	0.60				5.00	r		

Name	M.	ID	GIS LABEL	Absorption		Z-Ext.	Cantilever		Height			
				left	right		horz.	vert.	Begin		End	
						(m)	(m)	(m)	(m)		(m)	
Jaw crusher local barrier			Berm C	0.60	0.60				7.00	r		
Shipping container	~	!010211!		0.21	0.21				7.00	r		
Shipping container	~	!010311!		0.21	0.21				7.00	r		
Shipping container	~	!010107!		0.21	0.21				7.00	r		
Primary crusher local berm	-	!010107!		0.60	0.60				3.00	r		
									0.00	r		
									0.00	r		

Ground Absorption Area(s)

Name	M.	ID	G
Site			0.5
Road			0.2

Receptor Noise Impact Level(s)

Name	M.	ID	GIS LABEL	Level Lr			Limit. Value			Land Use			Height		Coordinates		
				Day	Evening	Night	Day	Evening	Night	Type	Auto	Noise Type			X	Y	
				(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(m)		(m)	(m)	
Two-storey		POR001	POR001	50.1	50.1	50.1	55.4	0.0	0.0				4.50	r	553046.71	4799806.41	3
One-storey		POR002	POR002	47.0	47.0	47.0	55.4	0.0	0.0				1.50	r	553111.13	4799796.90	3
Two-storey		POR003	POR003	46.9	46.8	46.8	50.4	0.0	0.0				4.50	r	553275.34	4799687.24	3
R2 One-storey		POR004	POR004 (R2)	48.9	48.8	48.8	57.4	0.0	0.0				1.50	r	552339.22	4799621.57	3
Two-storey		POR005	POR005	47.2	47.2	47.2	50.4	0.0	0.0				4.50	r	553288.32	4799584.09	3
R3 Two-storey		POR006	POR006 (R3)	44.2	44.2	44.2	55.4	0.0	0.0				4.50	r	551927.97	4799566.13	3
R4 Two-storey		POR007	POR007 (R4)	43.6	43.5	43.5	55.4	0.0	0.0				4.50	r	551847.93	4799435.57	3
Two-storey		POR008	POR008	42.8	42.7	42.7	50.4	0.0	0.0				4.50	r	553322.61	4799411.59	3
One-storey		POR009	POR009	42.4	42.3	42.3	50.4	0.0	0.0				1.50	r	553344.38	4799330.28	3
R8 (one-storey)		POR010	POR010 (R8)	43.6	43.1	43.1	50.4	0.0	0.0				1.50	r	553359.72	4799238.89	3
Two-storey		POR011b	POR011	47.6	47.2	47.2	50.4	0.0	0.0				4.50	r	553369.97	4799225.52	3
Two-storey		POR012	POR012	46.9	46.6	46.6	50.4	0.0	0.0				4.50	r	553395.65	4799113.06	3
Two-storey		POR013	POR013	48.3	48.1	48.1	50.4	0.0	0.0				4.50	r	553408.89	4799046.79	3
One-storey		POR014	POR014	44.6	44.3	44.3	50.4	0.0	0.0				1.50	r	553457.33	4798925.30	3
Two-storey		POR015	POR015	46.7	46.6	46.6	50.4	0.0	0.0				4.50	r	553417.25	4798664.77	3
R9 Two-storey		POR016	POR016 (R9)	43.8	43.8	43.8	45.4	0.0	0.0				4.50	r	551561.70	4798662.28	3
R11 Two-storey		POR017	POR017 (R11)	42.5	42.4	42.4	45.4	0.0	0.0				4.50	r	552473.89	4797998.04	3
R12 Two-storey		POR018	POR018 (R12)	41.8	41.8	41.8	45.4	0.0	0.0				4.50	r	551722.59	4797955.08	3
POR - Vacant		POR019	POR019	48.9	48.8	48.8	59.0	0.0	0.0				4.50	r	553411.78	4798917.78	3
POR020		POR020	POR020	48.8	48.4	48.4	50.4	0.0	0.0				4.50	r	553395.89	4799145.75	3
R12 Two-storey	-	Cali	Cali	-88.0	-88.0	-88.0	75.0	0.0	0.0				1.50	r	552673.37	4799024.97	3
One-storey extension	-	POR011a	POR011	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553366.79	4799222.31	3
One-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553257.51	4799705.93	3
Two-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553255.87	4799683.58	3
Two-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553266.04	4799660.63	3
Two-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553297.05	4799474.72	3
Two-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553269.66	4799597.96	3
Two-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553277.36	4799548.92	3
Two-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553274.68	4799562.90	3
One-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553280.43	4799535.86	3
Two-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553268.85	4799580.44	3
One-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553365.04	4799202.25	3
Two-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553285.92	4799491.28	3
Two-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553282.38	4799521.06	3
Two-storey (backsplit)	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553390.72	4799025.46	3
Two-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553305.81	4799428.36	3
One-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553282.23	4799507.23	3
Two-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553389.42	4799043.14	3
Two-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553327.00	4799314.81	3
One-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553322.00	4799337.80	3
One-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553324.91	4799326.62	3
Two-storey (backsplit)	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553376.41	4799142.10	3
One-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553329.77	4799301.48	3
Two-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553314.48	4799380.97	3
Two-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553384.45	4799081.18	3
Two-storey (backsplit)	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553370.87	4799121.80	3
1 1/2 storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553317.88	4799351.83	3
Two-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553376.17	4799109.40	3
Two-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553381.12	4799097.06	3
1 1/2 storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553331.34	4799287.88	3
Two-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553309.74	4799393.13	3
1 1/2 storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553338.34	4799261.26	3
1 1/2 storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553314.18	4799363.74	3
1 1/2 storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553332.83	4799276.42	3
Two-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553303.13	4799407.93	3
One-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553340.04	4799247.04	3
Two-storey	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553347.54	4799218.47	3
R8 (one-storey)	-	OutdoorCheck	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553340.24	4799235.24	3
Two-storey (backsplit)	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				4.50	r	553410.20	4799029.11	3
Two-storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				4.50	r	553409.66	4799060.05	3
Two-storey (backsplit)	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				4.50	r	553390.34	4799125.46	3

Name	M.	ID	GIS LABEL	Level Lr			Limit. Value			Land Use			Height		Coordinates		
				Day	Evening	Night	Day	Evening	Night	Type	Auto	Noise Type			X	Y	
				(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(m)		(m)	(m)	
Two-storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				4.50	r	553400.60	4799100.71	3
Two-storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				4.50	r	553346.48	4799318.46	3
Two-storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				4.50	r	553403.92	4799084.83	3
Two-storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				4.50	r	553466.40	4798862.60	3
Two-storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				4.50	r	553289.14	4799601.61	3
Two-storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				4.50	r	553285.51	4799664.28	3
Two-storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				4.50	r	553296.83	4799552.57	3
Two-storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				4.50	r	553294.16	4799566.55	3
One-storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553276.99	4799709.58	3
One-storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553468.96	4798851.54	3
Two-storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				4.50	r	553305.40	4799494.93	3
Two-storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				4.50	r	553301.86	4799524.71	3
Two-storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				4.50	r	553316.53	4799478.37	3
One-storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553461.58	4798888.14	3
One-storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553462.15	4798874.80	3
Two-storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				4.50	r	553325.29	4799432.01	3
Two-storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				4.50	r	553333.96	4799384.62	3
Two-storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				4.50	r	553329.21	4799396.78	3
1 1/2 storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				3.00	r	553337.36	4799355.48	3
1 1/2 storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				3.00	r	553350.82	4799291.53	3
1 1/2 storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				3.00	r	553352.30	4799280.08	3
1 1/2 storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				3.00	r	553357.82	4799264.91	3
1 1/2 storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				3.00	r	553333.65	4799367.39	3
One-storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553299.90	4799539.51	3
One-storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553301.71	4799510.88	3
One-storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553384.51	4799205.91	3
One-storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553341.48	4799341.45	3
One-storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553349.25	4799305.13	3
One-storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553359.52	4799250.69	3
One-storey	-	CheckPOR	DoNotShow	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553406.83	4799072.28	3
Onsite cali 1 pt	-	CalR017		-88.0	-88.0	-88.0	59.0	0.0	0.0				1.50	r	552763.84	4799656.90	3
Onsite cali 1 pt	-	CalR017		-88.0	-88.0	-88.0	59.0	0.0	0.0				1.50	r	553384.43	4799151.18	3
Onsite cali 1 pt	-	CalR017		-88.0	-88.0	-88.0	59.0	0.0	0.0				4.50	r	553385.62	4799150.77	3
Onsite cali 1 pt	-	CalR017		-88.0	-88.0	-88.0	59.0	0.0	0.0				1.50	r	553392.96	4798913.48	3
Onsite cali 1 pt	-	CalR017		-88.0	-88.0	-88.0	59.0	0.0	0.0				1.50	r	553387.65	4798895.89	3
Onsite cali 1 pt	-	CalR017		-88.0	-88.0	-88.0	59.0	0.0	0.0				1.50	r	553392.55	4798878.71	3
Onsite cali 1 pt	-	CalR017		-88.0	-88.0	-88.0	59.0	0.0	0.0				1.50	r	553398.49	4798857.85	3
Onsite cali 1 pt	-	CalR017		-88.0	-88.0	-88.0	59.0	0.0	0.0				1.50	r	553403.39	4798842.72	3
Onsite cali 1 pt	-	CalR017		-88.0	-88.0	-88.0	59.0	0.0	0.0				4.50	r	553413.21	4798901.21	3
Onsite cali 1 pt	-	CalR017		-88.0	-88.0	-88.0	59.0	0.0	0.0				4.50	r	553416.48	4798884.65	3
Onsite cali 1 pt	-	CalR017		-88.0	-88.0	-88.0	59.0	0.0	0.0				4.50	r	553425.07	4798862.56	3
Onsite cali 1 pt	-	CalR017		-88.0	-88.0	-88.0	59.0	0.0	0.0				4.50	r	553430.39	4798849.88	3
Onsite cali 2 pt	-	CalR016		-88.0	-88.0	-88.0	63.0	0.0	0.0				1.50	r	552826.84	4799443.90	3
106 Delavan Drive	-	CalR015		-88.0	-88.0	-88.0	48.0	0.0	0.0				1.50	r	553413.41	4799107.80	3
106 Delavan Drive	-	CalR015		-88.0	-88.0	-88.0	48.0	0.0	0.0				1.50	r	553393.93	4799104.15	3
Harwood Road (with lawnmower)	-	CalR014		-88.0	-88.0	-88.0	50.0	0.0	0.0				1.50	r	553365.35	4799328.11	3
Harwood Road (with lawnmower)	-	CalR014		-88.0	-88.0	-88.0	50.0	0.0	0.0				1.50	r	553345.87	4799324.46	3
63 Wadsworth Cres.	-	CalR013		-88.0	-88.0	-88.0	48.0	0.0	0.0				1.50	r	553316.14	4799525.02	3
63 Wadsworth Cres.	-	CalR013		-88.0	-88.0	-88.0	48.0	0.0	0.0				1.50	r	553296.66	4799521.37	3
Screen 1 / Screen 2 cali pt	-	CalR012		-88.0	-88.0	-88.0	58.0	0.0	0.0				1.50	r	552691.84	4798946.90	3
Screen 1 / Screen 2 cali pt	-	CalR011		-88.0	-88.0	-88.0	76.0	0.0	0.0				1.50	r	552765.99	4799131.47	3
Screen 1 / Screen 2 / Motor cali pt	-	CalR010		-88.0	-88.0	-88.0	68.0	0.0	0.0				1.50	r	552750.15	4799161.49	3
Screen 1 / Screen 2 cali pt	-	CalR009		-88.0	-88.0	-88.0	66.0	0.0	0.0				1.50	r	552750.16	4799161.54	3
Crushing Plant cali pt	-	CalR008		-88.0	-88.0	-88.0	69.0	0.0	0.0				1.50	r	552882.92	4799161.27	3
Jaw Crusher cali pt	-	CalR007		-88.0	-88.0	-88.0	67.0	0.0	0.0				1.50	r	553054.45	4799309.71	3
Primary Screen / Bin / Cone Crusher cali pt	-	CalR006		-88.0	-88.0	-88.0	82.0	0.0	0.0				1.50	r	552943.84	4799325.19	3
Primary Screen cali pt	-	CalR005		-88.0	-88.0	-88.0	82.0	0.0	0.0				1.50	r	552962.40	4799290.43	3
Secondary Screen / Cone Crusher cali pt	-	CalR004		-88.0	-88.0	-88.0	88.0	0.0	0.0				1.50	r	552958.30	4799265.99	3
Primary Screen / Cone Crusher cali pt	-	CalR003		-88.0	-88.0	-88.0	98.0	0.0	0.0				1.50	r	552942.10	4799281.98	3
Primary Screen cali pt	-	CalR002		-88.0	-88.0	-88.0	99.0	0.0	0.0				1.50	r	552943.78	4799283.12	3
Jaw Crusher / Gen louver cali pt	-	CalR001		-88.0	-88.0	-88.0	82.0	0.0	0.0				1.50	r	552907.61	4799297.00	3
R10 (AEL 2008)	-		R10 (AEL 2008)	-88.0	-88.0	-88.0	50.4	0.0	0.0				4.50	r	553887.29	4798488.49	3
R5 (AEL 2008)	-		R5 (AEL 2008)	-88.0	-88.0	-88.0	50.4	0.0	0.0				4.50	r	552583.04	4799590.50	3
R6 (AEL 2008)	-		R6 (AEL 2008)	-88.0	-88.0	-88.0	50.4	0.0	0.0				4.50	r	552258.20	4799491.67	3
R7 (AEL 2008)	-		R7 (AEL 2008)	-88.0	-88.0	-88.0	50.4	0.0	0.0				4.50	r	551774.27	4798929.88	3
test mesurements	-		R7 (AEL 2008)	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	552946.51	4799160.75	3
test mesurements	-		R7 (AEL 2008)	-88.0	-88.0	-88.0	50.4	0.0	0.0				1.50	r	553015.65	4799162.81	3

Sample Calculation POR1 Phase 3

Receiver
Name: Two-storey
ID: POR001
X: 553046.71 m
Y: 4799806.41 m
Z: 324.31 m

vert. Area Source, ISO 9613, Name: "Jaw Crusher b", ID: "JCb"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
1	552915.71	4799163.53	315.50	0	DEN	A	108.5	2.8	0.0	0.0	0.0	67.3	3.2	-1.6	0.0	0.0	4.7	0.0	0.0	37.7
3	552915.72	4799161.52	315.50	0	DEN	A	108.5	3.2	0.0	0.0	0.0	67.4	3.2	-1.6	0.0	0.0	7.0	0.0	0.0	35.8
24	552915.71	4799163.53	316.50	0	DEN	A	108.5	2.8	0.0	0.0	0.0	67.3	3.2	-1.6	0.0	0.0	4.7	0.0	0.0	37.7
26	552915.72	4799161.52	316.50	0	DEN	A	108.5	3.2	0.0	0.0	0.0	67.4	3.2	-1.6	0.0	0.0	6.0	0.0	0.0	36.7

vert. Area Source, ISO 9613, Name: "Jaw Crusher a", ID: "JCa"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
46	552913.08	4799162.48	315.50	0	DEN	A	108.5	6.0	0.0	0.0	0.0	67.4	3.2	-1.6	0.0	0.0	9.5	0.0	0.0	36.1
59	552913.08	4799162.48	316.50	0	DEN	A	108.5	6.0	0.0	0.0	0.0	67.4	3.2	-1.6	0.0	0.0	8.9	0.0	0.0	36.8

vert. Area Source, ISO 9613, Name: "Primary Screener b", ID: "PCEb3"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
65	552915.69	4799167.50	315.50	0	DEN	A	104.9	7.8	0.0	0.0	0.0	67.3	3.0	-1.8	0.0	0.0	4.8	0.0	0.0	39.4
78	552915.69	4799167.50	316.50	0	DEN	A	104.9	7.8	0.0	0.0	0.0	67.3	3.0	-1.7	0.0	0.0	4.8	0.0	0.0	39.4

vert. Area Source, ISO 9613, Name: "Primary Screener a", ID: "PCEa3"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
90	552913.06	4799167.49	315.50	0	DEN	A	104.9	7.8	0.0	0.0	0.0	67.3	3.0	-1.8	0.0	0.0	8.8	0.0	0.0	35.4
106	552913.06	4799167.49	316.50	0	DEN	A	104.9	7.8	0.0	0.0	0.0	67.3	3.0	-1.7	0.0	0.0	8.1	0.0	0.0	36.0

vert. Area Source, ISO 9613, Name: "Thirdly Screener b", ID: "TCb"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
119	552915.71	4799163.53	314.00	0	DEN	A	105.9	2.8	0.0	0.0	0.0	67.3	2.9	-1.8	0.0	0.0	4.7	0.0	0.0	35.5
121	552915.72	4799161.52	314.00	0	DEN	A	105.9	3.2	0.0	0.0	0.0	67.4	2.9	-1.8	0.0	0.0	8.6	0.0	0.0	32.0
137	552915.71	4799163.53	313.00	0	DEN	A	105.9	2.8	0.0	0.0	0.0	67.3	2.9	-1.6	0.0	0.0	4.7	0.0	0.0	35.3
138	552915.72	4799161.52	313.00	0	DEN	A	105.9	3.2	0.0	0.0	0.0	67.4	2.9	-1.6	0.0	0.0	9.4	0.0	0.0	31.0

vert. Area Source, ISO 9613, Name: "Thirdly Screener a", ID: "TCa"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
156	552913.08	4799162.48	314.00	0	DEN	A	105.9	6.0	0.0	0.0	0.0	67.4	2.9	-1.8	0.0	0.0	10.3	0.0	0.0	33.2
172	552913.08	4799162.48	313.00	0	DEN	A	105.9	6.0	0.0	0.0	0.0	67.4	2.9	-1.6	0.0	0.0	10.5	0.0	0.0	32.6

vert. Area Source, ISO 9613, Name: "Secondary Screener b", ID: "SSb"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
176	552915.77	4799154.37	316.50	0	DEN	A	102.6	6.0	0.0	0.0	0.0	67.5	4.8	-1.8	0.0	0.0	6.5	0.0	0.0	31.6
178	552915.75	4799157.36	316.50	0	DEN	A	102.6	3.1	0.0	0.0	0.0	67.4	4.7	-1.8	0.0	0.0	6.4	0.0	0.0	29.0
187	552915.77	4799154.37	315.50	0	DEN	A	102.6	6.0	0.0	0.0	0.0	67.5	4.8	-1.8	0.0	0.0	7.5	0.0	0.0	30.7
189	552915.75	4799157.36	315.50	0	DEN	A	102.6	3.1	0.0	0.0	0.0	67.4	4.7	-1.8	0.0	0.0	7.5	0.0	0.0	27.9
196	552915.78	4799153.33	315.50	2	DEN	A	102.6	2.7	0.0	0.0	0.0	67.5	4.8	-1.8	0.0	0.0	4.8	0.0	7.3	22.8

vert. Area Source, ISO 9613, Name: "Secondary Screener a", ID: "SSa"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
200	552913.13	4799155.39	316.50	0	DEN	A	102.6	7.8	0.0	0.0	0.0	67.5	4.8	-1.8	0.0	0.0	11.2	0.0	0.0	28.7
205	552913.13	4799155.39	315.50	0	DEN	A	102.6	7.8	0.0	0.0	0.0	67.5	4.8	-1.8	0.0	0.0	12.1	0.0	0.0	27.9

vert. Area Source, ISO 9613, Name: "Primary Crusher Engine 1", ID: "PCE1"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
215	552856.06	4799204.21	314.00	0	DEN	A	108.0	1.0	0.0	0.0	0.0	67.0	3.7	-1.8	0.0	0.0	4.7	0.0	0.0	35.3
216	552855.51	4799203.69	314.00	0	DEN	A	108.0	-6.1	0.0	0.0	0.0	67.0	3.7	-1.8	0.0	0.0	9.2	0.0	0.0	23.7

vert. Area Source, ISO 9613, Name: "Primary Crusher Engine 2", ID: "PCE2"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
228	552857.39	4799202.67	314.00	0	DEN	A	108.0	1.8	0.0	0.0	0.0	67.0	3.7	-1.8	0.0	0.0	10.2	0.0	0.0	30.6
232	552857.02	4799202.32	314.00	1	DEN	A	108.0	-3.2	0.0	0.0	0.0	67.0	3.7	-1.8	0.0	0.0	4.7	0.0	3.8	27.3

Area Source, ISO 9613, Name: "Loader (CP)", ID: "!010106!L_CP"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
251	552816.33	4799219.63	313.40	0	DEN	A	84.2	13.8	0.0	0.0	0.0	67.0	2.7	-0.9	0.0	0.0	4.4	0.0	0.0	24.8
252	552827.47	4799220.04	313.40	0	DEN	A	84.2	22.3	0.0	0.0	0.0	66.9	2.7	-0.9	0.0	0.0	4.4	0.0	0.0	33.4
253	552834.75	4799220.27	313.40	0	DEN	A	84.2	16.1	0.0	0.0	0.0	66.9	2.7	-0.9	0.0	0.0	4.4	0.0	0.0	27.2
257	552836.42	4799216.21	313.40	0	DEN	A	84.2	17.0	0.0	0.0	0.0	66.9	2.7	-0.9	0.0	0.0	4.4	0.0	0.0	28.1
930	552833.83	4799209.02	313.40	0	DEN	A	84.2	9.4	0.0	0.0	0.0	67.0	2.7	-0.9	0.0	0.0	4.4	0.0	0.0	20.3
931	552830.76	4799209.21	313.40	0	DEN	A	84.2	9.8	0.0	0.0	0.0	67.1	2.7	-0.9	0.0	0.0	4.4	0.0	0.0	20.8
933	552822.16	4799209.71	313.40	0	DEN	A	84.2	20.5	0.0	0.0	0.0	67.1	2.7	-0.9	0.0	0.0	4.4	0.0	0.0	31.4
936	552816.23	4799210.74	313.40	0	DEN	A	84.2	12.1	0.0	0.0	0.0	67.1	2.7	-0.9	0.0	0.0	4.4	0.0	0.0	23.0
937	552814.20	4799214.14	313.40	0	DEN	A	84.2	16.1	0.0	0.0	0.0	67.1	2.7	-0.9	0.0	0.0	4.4	0.0	0.0	27.0
1982	552826.79	4799226.24	313.40	0	DEN	A	84.2	14.4	0.0	0.0	0.0	66.9	2.7	-0.9	0.0	0.0	4.4	0.0	0.0	25.5
1984	552816.15	4799223.11	313.40	0	DEN	A	84.2	15.1	0.0	0.0	0.0	66.9	2.7	-0.9	0.0	0.0	4.4	0.0	0.0	26.2
1994	552840.41	4799213.33	313.40	0	DEN	A	84.2	14.2	0.0	0.0	0.0	67.0	2.7	-0.9	0.0	0.0	4.4	0.0	0.0	25.3
1995	552839.35	4799219.58	313.40	0	DEN	A	84.2	14.9	0.0	0.0	0.0	66.9	2.7	-0.9	0.0	0.0	4.4	0.0	0.0	26.1

Area Source, ISO 9613, Name: "Sand Plant Loader", ID: "!WP01!L_SP_P1_P2"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
272	552792.54	4799164.66	313.40	0	DEN	A	84.2	18.3	0.0	0.0	0.0	67.8	2.9	-0.9	0.0	0.0	4.4	0.0	0.0	28.3
276	552803.74	4799163.88	313.40	0	DEN	A	84.2	21.6	0.0	0.0	0.0	67.7	2.9	-0.9	0.0	0.0	4.4	0.0	0.0	31.7
277	552810.11	4799161.56	313.40	0	DEN	A	84.2	17.2	0.0	0.0	0.0	67.7	2.9	-0.9	0.0	0.0	4.4	0.0	0.0	27.3
278	552812.23	4799158.00	313.40	0	DEN	A	84.2	13.5	0.0	0.0	0.0	67.8	2.9	-0.9	0.0	0.0	4.4	0.0	0.0	23.6
280	552814.09	4799154.85	313.40	0	DEN	A	84.2	11.8	0.0	0.0	0.0	67.8	2.9	-0.9	0.0	0.0	4.4	0.0	0.0	21.8
290	552799.58	4799152.62	313.40	0	DEN	A	84.2	21.6	0.0	0.0	0.0	67.9	2.9	-0.9	0.0	0.0	4.4	0.0	0.0	31.6
293	552791.46	4799153.11	313.40	0	DEN	A	84.2	16.8	0.0	0.0	0.0	67.9	2.9	-0.9	0.0	0.0	4.4	0.0	0.0	26.7
294	552787.50	4799157.26	313.40	0	DEN	A	84.2	19.7	0.0	0.0	0.0	67.9	2.9	-0.9	0.0	0.0	4.4	0.0	0.0	29.7

vert. Area Source, ISO 9613, Name: "Wash Plant - generator rad", ID: "!WP01!WPGR1_P1_P2"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
296	552847.59	4799141.30	311.75	0	DEN	A	105.8	3.0	0.0	0.0	0.0	67.8	3.7	0.1	0.0	0.0	10.1	0.0	0.0	27.2
297	552847.59	4799141.30	312.75	0	DEN	A	105.8	3.0	0.0	0.0	0.0	67.8	3.7	-1.2	0.0	0.0	10.2	0.0	0.0	28.5

vert. Area Source, ISO 9613, Name: "Primary Crusher Rad 3", ID: "PCE3"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
299	552855.93	4799202.65	314.13	0	DEN	A	106.0	1.7	0.0	0.0	0.0	67.0	2.9	-1.4	0.0	0.0	13.5	0.0	0.0	25.8

Area Source, ISO 9613, Name: "Loader (Extraction)", ID: "!010106!L_E"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
955	553245.53	4799189.12	312.40	0	DEN	A	84.2	16.7	0.0	0.0	0.0	67.2	2.8	-1.0	0.0	0.0	10.5	0.0	0.0	21.4

Point Source, ISO 9613, Name: "Wash Plant - Screen 1", ID: "!WP01!WP_S_P1_P2"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
1998	552829.08	4799147.42	314.00	0	DEN	A	103.1	0.0	0.0	0.0	0.0	67.8	2.6	-1.1	0.0	0.0	4.4	0.0	0.0	29.3

vert. Area Source, ISO 9613, Name: "Gen 1 Louver 1", ID: "YGL1"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
2364	552932.03	4799173.88	312.50	0	DEN	A	105.9	-4.3	0.0	0.0	0.0	67.2	2.9	-1.2	0.0	0.0	4.8	0.0	0.0	27.9

vert. Area Source, ISO 9613, Name: "Wash Plant Gen Louver 2", ID: "!WP01!WPG2_P1_P2"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
2381	552849.83	4799142.27	312.00	0	DEN	A	104.6	-3.0	0.0	0.0	0.0	67.8	3.4	-0.1	0.0	0.0	4.0	0.0	0.0	26.5

vert. Area Source, ISO 9613, Name: "Wash Plant - generator intake", ID: "!WP01!WPGI1_P1_P2"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
2711	552852.65	4799141.20	312.75	0	DEN	A	98.3	1.8	0.0	0.0	0.0	67.8	3.0	-1.0	0.0	0.0	4.5	0.0	0.0	25.7
2777	552852.65	4799141.20	312.00	0	DEN	A	98.3	-1.2	0.0	0.0	0.0	67.8	3.0	0.0	0.0	0.0	3.9	0.0	0.0	22.3

vert. Area Source, ISO 9613, Name: "Gen 1 Gen Louver 2", ID: "YGL2"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
2725	552930.27	4799173.91	312.50	0	DEN	A	102.1	-4.3	0.0	0.0	0.0	67.2	6.6	-1.5	0.0	0.0	5.0	0.0	0.0	20.6

vert. Area Source, ISO 9613, Name: "VSI - Casing", ID: "VSIR"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
3022	552926.58	4799153.15	314.00	0	DEN	A	100.0	-3.9	0.0	0.0	0.0	67.4	3.2	-1.5	0.0	0.0	4.6	0.0	0.0	22.3
3032	552926.96	4799153.02	314.00	0	DEN	A	100.0	-3.9	0.0	0.0	0.0	67.4	3.2	-1.5	0.0	0.0	4.6	0.0	0.0	22.3
3048	552926.18	4799153.12	314.00	0	DEN	A	100.0	-3.9	0.0	0.0	0.0	67.4	3.2	-1.5	0.0	0.0	4.6	0.0	0.0	22.3
3056	552927.26	4799152.76	314.00	0	DEN	A	100.0	-3.9	0.0	0.0	0.0	67.5	3.2	-1.5	0.0	0.0	4.6	0.0	0.0	22.3
3069	552925.82	4799152.94	314.00	0	DEN	A	100.0	-3.9	0.0	0.0	0.0	67.5	3.2	-1.5	0.0	0.0	4.6	0.0	0.0	22.3
3089	552927.44	4799152.40	314.00	0	DEN	A	100.0	-3.9	0.0	0.0	0.0	67.5	3.2	-1.5	0.0	0.0	4.6	0.0	0.0	22.3
3103	552925.56	4799152.63	314.00	0	DEN	A	100.0	-3.9	0.0	0.0	0.0	67.5	3.2	-1.5	0.0	0.0	4.6	0.0	0.0	22.3
3125	552927.47	4799152.00	314.00	0	DEN	A	100.0	-3.9	0.0	0.0	0.0	67.5	3.2	-1.5	0.0	0.0	4.6	0.0	0.0	22.3
3138	552925.43	4799152.25	314.00	0	DEN	A	100.0	-3.9	0.0	0.0	0.0	67.5	3.2	-1.5	0.0	0.0	4.6	0.0	0.0	22.3
3147	552927.35	4799151.62	314.00	0	DEN	A	100.0	-3.9	0.0	0.0	0.0	67.5	3.2	-1.5	0.0	0.0	4.6	0.0	0.0	22.3
3170	552925.46	4799151.85	314.00	0	DEN	A	100.0	-3.9	0.0	0.0	0.0	67.5	3.2	-1.5	0.0	0.0	4.6	0.0	0.0	22.3
3192	552927.09	4799151.31	314.00	0	DEN	A	100.0	-3.9	0.0	0.0	0.0	67.5	3.2	-1.5	0.0	0.0	4.6	0.0	0.0	22.3
3211	552925.64	4799151.49	314.00	0	DEN	A	100.0	-3.9	0.0	0.0	0.0	67.5	3.2	-1.5	0.0	0.0	4.6	0.0	0.0	22.3
3220	552926.73	4799151.13	314.00	0	DEN	A	100.0	-3.9	0.0	0.0	0.0	67.5	3.2	-1.5	0.0	0.0	4.6	0.0	0.0	22.3
3233	552925.94	4799151.23	314.00	0	DEN	A	100.0	-3.9	0.0	0.0	0.0	67.5	3.2	-1.5	0.0	0.0	4.6	0.0	0.0	22.3
3245	552926.33	4799151.10	314.00	0	DEN	A	100.0	-3.9	0.0	0.0	0.0	67.5	3.2	-1.5	0.0	0.0	4.6	0.0	0.0	22.3

APPENDIX H

Statement of Qualifications

Education

M.Eng. Mechanical Engineering, University of Toronto, 2004

B.A.Sc. Mechanical Engineering, Waterloo University, 2001

Mississauga

Employment History

Golder Associates – Mississauga, Ontario
Associate / Acoustics, Noise and Vibration Engineer (2005 to Present)

Responsible for the preparation of Ontario Ministry of the Environment (MOE) Environmental Compliance Approval applications, Noise and Vibration Impact Statements, Environmental Assessments and Peer Reviews. Duties include the measurement and prediction of noise and vibration sources, recommendation and design of noise and vibration control measures, maintaining project budgets and schedules, client liaison, conducting site visits, preparing reports and senior review. Recognized as an Expert Witness at OMB and ERT Proceedings. Permitting and EA support provided to many sectors including mining, power & energy, iron & steel, manufacturing, landfill & aggregate, oil & gas, urban, etc.

Aercoustics Engineering Limited – Toronto, Ontario
Acoustics Noise and Vibration Consultant (2001 to 2005)

Responsible for measuring, analyzing and predicting the noise / vibration impacts on sensitive receptor locations. Ensured compliance with client, MOE or other governing body guidelines by providing acoustical performance specifications for the recommended noise / vibration control measures. Performing seismic designs of mechanical, electrical and life safety systems to ensure compliance with applicable codes, including but not limited to; OBC, SMACNA and NFPA-13. Projects included noise impact assessments, EAs, noise control specification for performing arts schools and universities, baseline noise studies for landfills and pits and quarries, acoustic audits, ambient noise assessments, assessment of rail and road, noise impact statements for residential developments, mechanical noise / vibration control, structural vibration isolation, vibration monitoring, design of vibration isolated buildings and software development for; the prediction of noise impacts and the qualifications of seismic restraints.

PROJECT EXPERIENCE – PROJECT WITH PORTS

Cement Plant
Picton, Ontario, Canada

Responsible for preparing and overseeing a noise study of a cement manufacturing plant in Picton, Ontario that included a port facility. Golder was responsible for source-specific noise measurements and short-term noise monitoring. The assessment included the quantification of noise emissions associated with a port. The assessment required the development of a multi-year, multi-phase, Noise Abatement Action Plan for the facility to be able to achieve MECP noise limits.

Meliadine
Nunavut, Canada

Retained to carry out a noise assessment in support local permitting and an Environmental Assessment for a proposed precious metals mine in Nunavut, Canada. The noise study included the assessment of the mining/processing operations, transportation (air and ground) and port facility in Rankin Inlet. Potential noise impacts were assessed against applicable limits, and noise controls (where required) and an environmental monitoring program were developed.

Noise Study - Peru
Melchorta, Peru

Retained by Compania Operadora de LNG del Peru (COLP) to carry out a noise assessment of the Melchrita Liquefaction Process Train, which included an export terminal port, to identify significant noise sources on-site and determine whether noise mitigation was feasible. A noise mitigation program was developed, which addressed significant noise sources and would reduce noise levels within the plant to a levels where the auditory emergency notification system could be perceived by operators.

Ontario Trap Rock
Sault Ste. Marie, Canada

Noise task manager responsible for completing a noise assessment for an active quarry, which involved baseline monitoring, site specific noise measurements, and modelling in order to assess compliance with applicable noise limits. The assessment include the consideration of noise emissions associated with a port facility. Conceptual noise mitigation was provided and designed to ensure compliance.

Noise Impact Assessment
Manitoulin, Ontario

Responsible for the prediction of the noise impact of a proposed expansion to an aggregate quarry, which had an associated port facility. Assisted in the design of extraction procedures to minimize noise impacts on residential receptors as part of a licensing application with the MNRF.

Algoma Steel
Sault Ste. Marie, Ontario

Retained to perform a facility wide noise survey for Algoma Steel as required for their ECA application. Long-term noise monitoring was used to establish the appropriate ambient noise levels for the surrounding residential receptors. The assessment included the quantification of noise emissions associated with a port.

PROJECT EXPERIENCE – MINING

Morelos - Media Luna Cocula, Guerrero State, Mexico	The proposed project consists of a new underground gold, copper and silver mine development in Mexico. To date, Golder has completed a gap analysis to identify the necessary information needs and baseline data requirements that would support both the Mexican permitting and approvals (MIA), as well as any future Environmental and Social Impact Assessment in accordance with the International Finance Corporation's Performance Standards. Participated in the analysis of potential gaps, the identification of a planned course of action to address the gaps and the development of the report for the noise, vibration and light disciplines
Morelos - El Limon Cocula, Guerrero State, Mexico	Retained to carry out a noise, vibration and light assessment in support local permitting and an SEIA for a proposed precious metals mine in Mexico. The noise, vibration and light studies included the assessment of the mining/processing operations, and transportation facilities. Potential impacts were assessed against applicable limits, and controls (where required) and an environmental monitoring program were developed.
Glencore - Raglan Nunavik, Quebec, Canada	Retained by Glencore to complete a light assessment in support local permitting requirements. The assessment was completed in response to the regulators request to confirm light emissions onto the Pingualuit National Park (the Park) were within applicable limits. The assessment involved a field program, to quantify all on-site emissions and levels at the Park, and detailed modelling to confirm the source of the measured levels.
Matamec - Témiscamingue Témiscamingue, Québec, Canada	Retained to carry out a baseline noise assessment in support local permitting and an Environmental Assessment for a proposed mine in Témiscamingue, Québec, Canada. The noise study included areas potentially expected to be affected by the mining/processing operations, and transportation activities. Monitored noise levels were compared against applicable limits.
Meliadine Nunavut, Canada	Retained to carry out a noise assessment in support local permitting and an Environmental Assessment for a proposed precious metals mine in Nunavut, Canada. The noise study included the assessment of the mining/processing operations, transportation (air and ground) and port facility in Rankin Inlet. Potential noise impacts were assessed against applicable limits, and noise controls (where required) and an environmental monitoring program were developed.
Various Various, Peru	The projects consisted of various; expansion to existing mines and new mines throughout Peru. The project involved the completion of baseline studies (where appropriate) and an EIA for projects across Peru in accordance applicable regulating authorities. Was the Noise and Vibration Lead for assessments in support of the numerous EIAs. Projects ranged from power plants to resource and precious metal mines

PROJECT EXPERIENCE – REGULATORY

ACME Sample Application Package
Toronto, Ontario

Worked with the Ministry of the Environment and Climate Change (MOECC) in preparing a sample Acoustic Assessment Report, which forms part of the sample application package prepare in cooperation with the MOE that demonstrates the technical requirements for CofA (Air and Noise) applications.

Revised - ACME Sample Application Package
Toronto, Ontario

Worked with the MOECC in preparing a revised sample Acoustic Assessment Report, in support of the MOECC Modernization initiative, which forms part of the sample application package prepare in cooperation with the MOECC that demonstrates the technical requirements for Environmental Compliance Approval (ECA) applications.

ACME Aggregates Sample Application Package
Toronto, Ontario, Canada

Retained by OSSGA to prepare a sample Acoustic Assessment Report, which forms part of a sample application package for MOECC approval for an aggregate site in Ontario. The package demonstrated the technical requirements for ECA applications.

PROJECT EXPERIENCE – POWER AND ENERGY SECTOR

Environmental Assessment
Tiverton, Ontario

Preparing an environmental noise impact assessment for a proposed 4000 MW New Build Project at the Bruce Nuclear Power Facility. Noise predictions will be carried out to determine the noise impact over the life of the project. The noise assessment will include construction and operations. Acoustic Assessment Reports will be prepared in support of permitting with the Ministry of the Environment, which will include the design and recommendation of required noise controls to ensure noise impacts on neighbouring receptors during operations were within MOE guideline limits.

Environmental Assessment
Sarnia, Ontario

Prepared an environmental noise impact assessment for a proposed 570 MW Natural Gas Cogeneration facility. Noise predictions were carried out to determine the noise impact over the life project. The noise assessment included construction and operations. Acoustic Assessment Reports were prepared in support of permitting with the Ministry of the Environment, which included the design and recommendation of required noise controls to ensure noise impacts on neighbouring receptors during operations were within MOE guideline limits.

Environmental Assessment
York Region, Ontario

Preparing an environmental noise impact assessment for a proposed 400 MW Natural Gas Peaking Power Facility. Noise predictions were carried out to determine the noise impact over the life of the project. The noise assessment included construction and operations. Acoustic Assessment Reports will be prepared in support of permitting with the Ministry of the Environment, which included the design and recommendation of required noise controls to ensure noise impacts on neighbouring receptors during operations were within MOE guideline limits.

Renewable Energy Application - Noise Assessment Nanticoke, Ontario	Responsible for the preparation of a noise study report for a proposed Windfarm with a rated capacity of approximately 130 MW. Noise predictions were carried out to determine the noise impact over the life project. The Nosie Study Report was prepared in support of a Renewable Energy Application through the Ministry of the Environment, which included the assistance in optimizing the turbine layout to help lower project noise levels.
Noise Impact Assessment Adelaide, Ontario	Prepared a Noise Impact Assessment for a proposed wind farm in Adelaide Ontario, consisting of forty (40) 1.5 MW wind turbines. Noise predictions were carried out to determine the noise impact of the project at participating and non-participating receptors.
Environmental Assessment Bradford, Ontario	Prepared an environmental noise impact assessment for a proposed Natural Gas Peak Power facility. Noise predictions were carried out to determine the noise impact over the life project. The noise assessment included construction and operations. An Acoustic Assessment Report was prepared in support of permitting with the Ministry of the Environment, which included the design and recommendation of required noise controls to ensure noise impacts on neighbouring receptors during operations were within MOE guideline limits.
Boiler Tube Vibration Burlington, Ontario	Carried out vibration measurements and analysis for IST on boiler tube bundles to determine whether or not tube resonant frequencies excited by vortex shedding of steam passing over the tubes could be reduced with the installation of an agitator.
Monitoring and Calibration of Active Noise Cancellation Ottawa, Ontario	Monitored and re-calibrated an active noise cancellation system fitted at a Trans-Alta power generation facility in Ottawa, Ontario.
Noise Control Design Hartford, Connecticut	Designed noise controls to ensure a sub-megawatt stationary multi-fuel fuel cell unit meets designed noises limit for application in Japan.
Environmental Noise Impact and Site Selection Kitchener, Ontario	Carried out an Environmental Noise Impact Assessment for a proposed power generation and transformer station for Northland Power. The noise impact assessment involved establishing the ambient noise environment at various sites, which would be impacted with the installation of a proposed power generation and transformer station
Environmental Noise Impact Assessment Various, Ontario	Predicted the noise impact of proposed emergency back-up power generator. Designed and recommended required noise controls to ensure noise impacts on neighbouring receptors during periodic testing are within MOE guideline limits. These include projects across Ontario and one in Calgary Alberta
Noise and Vibration Impact Assessment Toronto, Ontario	Retained to assess and mitigate the impact of four (4) 1200 kW emergency diesel back-up generators on receptors outside the building, and receptors within the building, which included the CARLU center in Toronto. Noise and vibration controls were designed and recommended.

Heartland Generating Station Alberta, Canada	Retained by ATCO Power to carry out a Noise Impact Assessment for a proposed Combined Cycle Gas Turbine Generating Station facility within the Alberta Industrial Heartland. Potential noise impacts were assessed against the Alberta Utilities Commission Rule 012: 'Noise Control' regulation.
Fenix Power Plant Peru, Peru	Retained to carry out a noise assessment in support local permitting and an ESIA for a proposed single cycle natural gas power plant in Peru in close proximity to sensitive points of reception. Potential noise impacts were assessed against applicable limits and noise controls were developed.

PROJECT EXPERIENCE – OIL & GAS

TransCanada PipeLines - Vaughan Mainline Expansion Ontario, Canada	Retained to carry out a noise assessment in support of the preparation of a National Energy Board Section 58 application, related permitting and bylaw exemption support of TransCanada's proposed expansion of their Canadian Mainline in the Greater Toronto Area in Ontario, consisting of an approximately 12 km natural gas pipeline. Support also included carrying out vibration monitoring during construction
TransCanada PipeLines - King's North Connection Ontario, Canada	Retained to carry out a noise assessment in support of the preparation of a National Energy Board Section 58 application, related permitting and bylaw exemption support of TransCanada's proposed expansion of their Canadian Mainline in the Greater Toronto Area in Ontario, consisting of an approximately 11 km natural gas pipeline. Support also included carrying out noise and vibration monitoring during construction, and providing conceptual control design.
TransCanada PipeLines - Eastern Mainline Pipeline Ontario, Canada	Retained to carry out a noise and light assessment in support of the preparation of a National Energy Board Section 52 application in support of TransCanada's proposed expansion of their Canadian Mainline in the Eastern Triangle region of Ontario, consisting of an approximately 356 km natural gas pipeline and 6 compressor stations along an existing pipeline corridor paralleling the 401 Highway between the Cornwall area southwest to the Greater Toronto Area.
TransCanada PipeLines - Various Compressor Stations Ontario, Canada	Retained by TransCanada's compression design team (over a number of projects) to support them and/or their external design consultants to provide detailed noise design services for proposed compressor station upgrades. The support included providing complete noise engineering design services for a number of compressor stations within Ontario.
TransCanada PipeLines - Parkway West. Ontario, Canada	Retained to provide noise services in support of the preparation of a National Energy Board Section 58 application, related permitting and bylaw exemption support of TransCanada's proposed project to construct and operate a pipeline between Union Gas Limited's (Union Gas) neighbouring Parkway West Compressor Station and TransCanada's existing mainline

TransCanada PipeLines- Greater Golden Horseshoe Project. Ontario, Canada	Retained to provide noise services in support of the preparation of a National Energy Board Section 58 application, related permitting and bylaw exemption support of TransCanada's proposed project upgrade the Ancaster and Douglastown Compressor Stations, the Mainline Valve Regulating Station, and the Parkway Belt, Douglastown Border and Niagara Border Meter Stations all along TransCanada Mainline between Fort Erie and Mississauga.
TransCanada PipeLines - Cacunna – Energy East Project Quebec, Canada	Retained to complete a noise assessment of proposed construction activities associated with a proposed natural gas port. The noise assessment required the establishment of baseline conditions and prediction of expected noise levels from construction activities at off-site points of reception.
TransCanada PipeLines - Otter Lake Compressor Station Alberta , Canada	A noise assessment was carried out to assess the construction and operation of a compressor, which is located northeast of the Town of Peace River, Alberta, for a National Energy Board 58 Application
Noise Study Melchorita, Peru	Retained by Compania Operadora de LNG del Peru (COLP) to carry out a noise assessment of the Melchrita Liquefaction Process Train, which included an export terminal port, to identify significant noise sources on-site and determine whether noise mitigation was feasible. A noise mitigation program was developed, which addressed significant noise sources and would reduce noise levels within the plant to a levels where the auditory emergency notification system could be perceived by operators.
Noise Impact Assessment Bowmanville, Ontario	Retained by TransCanada PipeLines Limited to carry out a noise impact assessment as a technical report as part of TransCanada's application to the National Energy Board (NEB) for the proposed upgrade to the Bowmanville Compressor Station. The proposed equipment was assessed and noise mitigation was provided.
TransCanada PipeLines Carmon Creek Pipeline Alberta, Canada	A noise assessment was carried out to assess the construction and operation activities of a pipeline, which is located northeast of the Town of Peace River, Alberta, for a National Energy Board (NEB) 52 Application
Noise Impact Audits Various Sites, Ontario, Quebec	Retained by Trans-Canada Pipelines (TCPL) to perform site surveys of various remote pumping stations. To determine the noise impact on neighbouring receptors. The results of the Audits were compared to historical Audits to ensure that the acoustic emissions of the facility have not changed significantly.
Acoustic Assessment Paris, Ontario	Retained by Sun Canadian Pipelines (SCPL) to perform an Acoustic Assessment of an existing pumping facility for permitting applications with MOE. The Acoustic Assessment included an assessment of proposed equipment as part of an expansion project. A report was prepared in support of permitting with the Ministry of the Environment, which included the design and recommendation of required noise controls to ensure noise impacts on neighbouring receptors during operations were within MOE guideline limits. As the project design develops, will be taking an active role in the noise control designs to ensure MOE requirements are realized and SCPL's design criteria met.

PROJECT EXPERIENCE – LANDFILL & AGGREGATE SECTOR

Environmental Impact Assessment Niagara, Ontario	Noise task manager preparing a noise assessment for the Humberstone Landfill in, which involved site specific noise measurements and modelling in order to assess compliance with MOECC Guidelines.
Ontario Trap Rock Sault Ste. Marie, Canada	Noise task manager responsible for completing a noise assessment for an active quarry, which involved baseline monitoring, site specific noise measurements, and modelling in order to assess compliance with applicable noise limits. The assessment include the consideration of noise emissions associated with a port facility. Conceptual noise mitigation was provided and designed to ensure compliance.
Environmental Impact Assessment Ottawa, Ontario	Senior technical noise support for the noise assessment completed for the expansion of the Brighton Landfill providing support with the Environmental Assessment.
Environmental Permitting Assessments Various, Ontario	Noise task manager responsible for ECA applications for various landfill sites operated by Simcoe County. These projects involved site-specific noise measurements and modelling in order to assess compliance with MOE Guidelines. Where required, noise mitigation was provided and designed to ensure compliance.
Environmental Permitting Support Various, Ontario	Noise task manager responsible for supporting various landfill operations in meeting ECA requirements for sites in the Ottawa region. These projects involved annual or twice annual noise monitoring programs to document noise levels in the environment to allow the landfill operations to demonstrate compliance with EA and ECA conditions.
Environmental Permitting Assessment New York State, US	Noise task manager responsible for completing a noise assessment for a proposed expansion to a quarry in up-state New York, which involved baseline monitoring, site specific noise measurements, and modelling in order to assess compliance with applicable noise limits. Conceptual noise mitigation was provided and designed to ensure compliance.
Environmental Permitting Assessment Halifax, Nova Scotia	Noise task manager responsible for completing a noise assessment for a proposed quarry, which involved baseline monitoring, site specific noise measurements, and modelling in order to assess compliance with applicable noise limits. Conceptual noise mitigation was provided and designed to ensure compliance.
Environmental Permitting Assessments Various, Ontario	Noise task manager preparing acoustic assessments of various pits, quarries, asphalt and ready-mix facilities across Ontario for many clients including; Lafarge, CBM, Walker, Karson, Tomlinson, and Vicdom. Projects involved site specific noise measurements and modelling in order to assess compliance with MECP Guidelines. Where required, noise mitigation was provided and designed to ensure compliance

Environmental Noise Impact Assessment Watford, Ontario	Project manager involved in the EA process of the Waste Management Warwick Landfill Expansion. Noise predictions were carried out over a period of 25 years and included options for Reclamation and / or Land Filling. The noise assessment included haul route analysis, berm construction, leachate equipment and on-site landfill operations equipment. Project duties also involved presentation of results and reports at public open houses.
Environmental Noise Impact Assessment Napanee, Ontario	Involved in the noise modelling of the Richmond Landfill Expansion. Noise predictions were carried out over a period of 25 years and included options for Reclamation and / or Land Filling. The noise assessment included haul route analysis, berm construction, leachate equipment and on-site landfill operations equipment.
Noise/Vibration Impact Assessment Orillia, Ontario	Responsible for predicting the noise and vibration impact of a proposed quarry expansion. Designed noise controls and blast designs to ensure operations are within Ministry of Natural Resources (MNR) and Ministry of Environment (MOE) guidelines. Preparation of reports as part of MNR licensing requirements. Noise predictions included noise emissions from hydraulic drills, front-end loaders, portable crushers, dump trucks, conveying equipment and other associated equipment.
Noise Impact Assessment Cambridge, Ontario	Responsible for the prediction of the noise impact of a proposed expansion to an aggregate pit. Assisted in the design of extraction procedures to minimize noise impacts on residential receptors as part of a licensing application with the MNR.
Noise Impact Assessment Manitoulin Island, Ontario	Responsible for the prediction of the noise impact of a proposed expansion to an aggregate quarry, which had an associated port facility. Assisted in the design of extraction procedures to minimize noise impacts on residential receptors as part of a licensing application with the MNR.
Noise Impact Assessment Vaughan, Ontario	Responsible for the prediction and assessment of the noise impacts of an asphalt recycling facility. Assessed noise impact on neighbouring receptors. Designed required noise controls and assisted in the design of operations to minimize further impact.
Aggregate Pit and Waste Transfer Facility Operation Measurements Various, Ontario	Carried out noise measurements of on-site operations including specific equipment measurements. Measurements were used to ensure that operation of equipment at various locations on the site would remain in compliance with MOE Noise Guidelines, where the impact exceeds MOE Noise Guidelines noise controls were designed and recommended.
Environmental Permitting Assessments Ontario, Canada	Noise task manager preparing acoustic assessment for a quarry in Ontario that included a shipping port. The noise assessment involved site specific noise measurements and modelling in order to assess compliance with MOE Guidelines. Where required, noise mitigation was provided and designed to ensure compliance.

PROJECT EXPERIENCE – MANUFACTURING/DISTRIBUTION SECTOR

Colacem
L'Orignal, Ontario

Retained by Colacem Canada Inc. to be responsible for preparing an AAR for the proposed new Portland cement manufacturing facility. Was responsible for providing design input to help demonstrate the site could operate in compliance with MOECC noise limits.

Lehigh
Picton, Ontario

Responsible for preparing and overseeing a noise study of a cement manufacturing plant in Picton, Ontario that included a port facility. Golder was responsible for source-specific noise measurements and short-term noise monitoring. The assessment included the quantification of noise emissions associated with a port. The assessment required the development of a multi-year, multi-phase, Noise Abatement Action Plan for the facility to be able to achieve MECP noise limits.

Sanofi Pasteur
Toronto, Ontario

Retained by Sanofi Pasteur to be responsible for overseeing the site-wide MOECC ECA. Was responsible for preparing the AAR and overseeing the Noise Abatement implementation team to ensure the site was in compliance with MOE noise limits.

Acoustic Assessments
Various, Ontario

Responsible for preparing and overseeing acoustic assessments of numerous sites manufacturing facilities throughout Ontario, which involved site specific noise measurements and modelling in order to assess compliance with MOE Guidelines. Where required, noise mitigation was provided and designed to ensure compliance. Liaison and negotiations with the MOE review engineers were carried out when required.

Acoustic Assessments
Various, Quebec

Responsible for preparing and overseeing noise studies of numerous sites manufacturing facilities throughout Quebec, which involved site specific noise measurements and modelling in order to assess compliance with MDDELCC Guidelines. Where required, noise mitigation was provided and designed to ensure compliance. Liaison and negotiations with the MDDELCC staff were carried out when required. Clients include Saputo, and Parmalat.

Acoustic Audit
Wingham, Ontario

Performed an acoustic audit of the Wescast Industries Auto Parts Machining Plant. Noise measurements were taken of all on-site noise sources in order to establish compliance with MOE Guidelines. Identified noise sources requiring mitigation and specified the appropriate noise control measures.

Acoustic Audit
Ingersoll, Ontario

Performed an acoustic audit of the Ingersoll Fasteners Plant. Noise measurements were taken of all on-site noise sources in order to establish compliance with MOE Guidelines. Identified noise sources requiring mitigation and specified the appropriate noise control measures.

Noise Survey & Acoustic Audit
Cambridge, Ontario

Retained to perform a noise survey and acoustic audit of the Loblaws Distribution Facility. Established the background noise levels at the nearest residential receptors and performed noise impact predictions based on source measurements.

Impulse Noise
Cambridge, Ontario

Responsible for the measurement of impulse noise generated by truck marshalling events for the Loblaws Distribution facility. Measurements were used to determine whether or not the Loblaws Distribution facility was within the MOE guidelines for impulse noise at the nearest residential receptor locations.

Acoustic Audit
Trent, Ontario

Performed an acoustic audit of the Quaker Trenton Plant for an application for a Certificate of Approval (CofA). Noise measurements were taken of all on-site noise sources in order to establish compliance with MOE Guidelines. Identified noise sources requiring mitigation and specified the appropriate noise control measures.

Acoustic/Vibration Audit
Port Robinson, Ontario

Performed an acoustic and vibration audit of Demshe Products stamping plant. Noise and vibration measurements were taken of all on-site noise sources and at residential receptors in the vicinity in order to establish compliance with MOE Guidelines. Identified noise sources requiring mitigation and specified the appropriate noise control measures.

Noise Survey & Acoustic Audit
Woodbridge, Ontario

Retained to perform a noise survey and acoustic audit of the Woodbridge Foam Facility. Established the background noise levels at the nearest residential receptors and performed noise impact predictions based on source measurements. Based on these predictions, offending noise sources were identified and noise control measures were specified accordingly.

Noise/Vibration Audit
Sarnia, Ontario

Performed an internal noise and vibration audit of a Woodbridge Foam manufacturing facility. The measured levels were compared to OSHA guidelines and various international (ISO) standards. Noise and vibration controls were recommended.

Noise Control Design
Toronto, Ontario

Measured emission noise levels on an air handling unit, and designed a silencer for the Air handling unit manufacturer. Performance of the installed silencer was verified.

Vibration Analysis
Shelburne, Ontario

Performed intensive vibration studies to qualify a state-of-the-art load and acceleration transducer setup for Johnson Controls for the active control of automotive airbag deployment.

PROJECT EXPERIENCE – IRON AND STEEL

Environmental Noise Studies
Ottawa area, Ontario

Responsible for preparing and overseeing acoustic assessments for a steel mill in eastern Ontario, which involved site specific noise measurements and modelling in order to assess compliance with MOE Guidelines. Noise mitigation support was provided and designed to ensure compliance. Liaison and negotiations with the MOE review engineers were carried out as part of the permitting efforts for the site

Environmental Noise Survey
Sault Ste. Marie, Ontario

Retained to perform a facility wide noise survey for Algoma Steel as required for their Certificate of Approval (Air) application. Long-term noise monitoring was used to establish the appropriate ambient noise levels for the surrounding residential receptors.

PROJECT EXPERIENCE – TRANSPORTATION

Noise Impact Study - Third Crossing - Cataraqui River Kingston, Ontario	Golder was retained by the City of Kingston, through JLR to assess the potential environmental noise impact of the proposed third crossing of the Cataraqui River to the atmosphere, specifically considering human receptors. Golder identified that noise mitigation is required for certain locations in the vicinity of the Project.
Environmental Noise Studies Brampton, Ontario	Retained to carry out a noise assessment in support of a Municipal Class Environmental Assessment for Airport Road (Braydon Blvd to Countryside Road) in Peel Region. Golder will support with the alternative assessment. The noise assessment will be carried out in general accordance with MOECC/MTO and the City's Noise Wall retrofit Policy guidelines which form the basis for the City's requirements.
Noise and Vibration Assessment Montreal, Quebec	Retained to carry out a noise and vibration assessment to identify the potential noise and vibration levels of a proposed LRT project in Montreal, Quebec. The study included the establishment of existing levels (without the LRT), and establish expected future levels (with the LRT) on sensitive receivers, which included a state of the art movie production studio.
On-Board Sound Intensity (OBSI Varios, Ontario	Retained to complete OBSI assessments for various road sections in central and eastern Ontario. Work was completed under the MTO Assignment No. 4013-E-0030. Sections included recently groved sections along Hwys 115, 417, 410 and 401.
Environmental Noise Studies York, Ontario	Retained to carry out a noise assessment in support of a Municipal Class Environmental Assessment for Teston Road (Pine Valley to Weston Road) in York Region. Golder supported with the alternative assessment. The noise assessment will be carried out in general accordance with MOECC/MTO guidelines which form the basis for the Region's requirements.
Environmental Noise Studies York, Ontario	Retained to carry out a noise assessment in support of a Municipal Class Environmental Assessment for Portage Road (Jane Street to Credit Stone) in York Region. The noise assessment was carried out in general accordance with MOECC/MTO guidelines which form the basis for the Region's requirements.
West Toronto Diamond (WTD) Toronto, Ontario, Canada	Retained on behalf of Go/Metrolinx to complete a noise and vibration assessment of the WTD Grade Separation Project. Golder was responsible to assess baseline conditions, monitor construction activities, support in the development of best practices and mitigation plans and provide expert advice in relation to noise and vibration.
Environmental Noise Studies Regina, Saskatchewan, Canada	Retained by City of Regina to undertake a noise study of significant roadways within the City of Regina limits to identify locations where noise mitigation is warranted. The studies will identify locations and will provide recommendations as to the appropriate mitigation methods.

Environmental Noise Studies
Innisfil, Ontario

Was the senior acoustics engineer for the noise assessment in support of a Municipal Class Environmental Assessment for 6th Line (County Road 27 to St. John's Road) in the Town of Innisfil. The noise assessment will be in general accordance with MOECC/MTO guidelines which form the basis for the Region's requirements.

Environmental Noise Studies
Durham, Ontario

Was the senior acoustics engineer for the noise assessment in support of a Class Environmental Assessment for Regional Road #57, from Baseline Road to Nash Road in the Municipality of Clarington in the Region of Durham, Ontario. In their Noise Policy, the Region of Durham adopted the MOECC/MTO guidelines. The noise assessment predicted future noise levels and identified noise barrier requirements for the entire corridor.

Environmental Noise Studies
Eastern Region, Ontario

Was the noise/vibration lead on a project for the MTO, which required the assessment of potential noise and vibration impacts from activities associated with the redesign of three (3) intersections in eastern Ontario. The studies were designed to; establish existing conditions and assess potential noise and vibration impacts from construction and operational activities associated with the proposed project.

Environmental Noise Studies
Eastern Region, Ontario

Retained by Ministry of Transportation (MTO) to undertake noise studies from various road re-surfacing techniques in the MTO's Eastern Region. The studies aimed to quantify and compare the noise levels from vehicle tire and road surface interaction for various road surfacing techniques.

In-Vehicle Noise Studies
Eastern Region, Ontario

Retained by Ministry of Transportation (MTO) to undertake noise studies from various road re-surfacing techniques in the MTO's Eastern Region. The studies aimed to quantify and compare the noise levels in the vehicle from vehicle tire and road surface interaction for various road surfacing techniques.

Road/Rail Noise Assessment
Various, Ontario

As part of the preparation of numerous noise impact statements required for proposed residential development projects, road and rail noise was assessed according to MOE protocol to ensure that the noise impacts met the MOE prescribed noise limits. Where noise limits were exceeded, noise mitigation was designed. Mitigation involved the design of noise barriers, selection for appropriate window glazings and design of wall constructions.

Road Noise Assessments
Niagara Region, Ontario

Part of a team contracted to the MTO to carry out an assessment of proposed rehabilitation to MTO roadways in the Niagara Region, Ontario. The studies were designed to; establish existing conditions and assess potential noise and vibration impacts from construction activities associated with the proposed project.

Noise/Vibration Assessments
Central Ontario

Was the noise/vibration lead on a project for the MTO, which required the assessment of potential noise and vibration impacts from activities associated with the redesign of eight (8) intersections throughout central Ontario. The studies were designed to; establish existing conditions and assess potential noise and vibration impacts from construction and operational activities associated with the proposed project.

Noise/Vibration Assessment
Central Ontario

Part of a team contracted to the MTO to carry out an assessment of proposed realignment of the Highway 401 interchange at Highway 8 in the Kitchener/Waterloo Region, Ontario. The studies were designed to; establish existing conditions and assess potential noise and vibration impacts from construction and operation activities associated with the proposed project.

Environmental Noise Studies
Various, Ontario

Was retained by a number of design firms to carryout noise studies for various roadways throughout Ontario. These studies involved the assessment on noise levels from both construction and motorway public use. Studies were carried out for both existing roadways undergoing rehabilitation, to roadways undergoing realignments.

Construction Noise Monitoring
Toronto, Ontario

Retained to carryout construction noise monitoring for the redevelopment of a rail corridor in Toronto. This support included providing construction noise management recommendations.

Road/Rail Noise Assessments
Various, Ontario

As part of the preparation of numerous noise impact statements required for proposed residential development projects, road and rail noise was assessed according to MOE protocol to ensure that the noise impacts met the MOE prescribed noise limits. Where noise limits were exceeded, noise mitigation was designed. Mitigation involved the design of noise barriers, selection for appropriate window glazings and design of wall constructions.

PROJECT EXPERIENCE – MEDICAL SECTOR

Pharmaceutical
Toronto, Ontario

Retained to support a vaccine production facility in Toronto to prepare a CofA (Air and Noise) Application package. Responsible for the preparation of the AAR, development of the NAAP, and providing on-going engineering support on capital expenditure projects.

Subway Vibration
Toronto, Ontario

Measured existing subway and building vibration levels at Mount Sinai Hospital and compared these levels with GE Medical's acceptable vibration levels for their MRIs. Based on these measurements and manufacturer's specifications, vibration isolated floors were designed and recommended to support these MRIs and ensure that subway induced vibration would not interfere with image quality.

Environmental Noise Assessment
Burlington, Ontario

Retained to conduct an environmental noise assessment for Burlington Long-term Care Facility. Predicted noise impact for all rooftop mechanical equipment and ground level noise sources. Background measurements were used as inputs for predicting the noise impact from the hospital equipment on neighbouring receptors. Identified sources requiring noise abatement and provided noise control design.

Environmental Noise Assessment
Thunder bay, Ontario

Retained to conduct a preliminary environmental noise assessment for Thunder Bay General Hospital. Predicted noise impact for all rooftop mechanical equipment and ground level noise sources. Used the MOE minimum noise limits as background for predicting the noise impact from the hospital equipment on neighbouring receptors.

Environmental Noise Assessment
Oakville, Ontario

Retained to conduct a preliminary environmental noise assessment for Grace Long-term Care Facility. Predicted noise impact for all rooftop mechanical equipment and ground level noise sources. Minimum MOE limits were used as background for predicting the noise impact from the hospital equipment on neighbouring receptors.

PROJECT EXPERIENCE – MUNICIPAL / URBAN SECTOR

Noise and Vibration Study
Toronto, Ontario

Retained by SmartReit to support with completing a noise and vibration assessment for a proposed construction project that would implement piling activities. The support included a preliminary assessment of expected noise and vibration levels of associated constructions activities, which included piling activities. Sensitive receptors were identified surrounding the proposed site. The support also included the monitoring of piling activities at a number of locations within the site. Golder was responsible for monitoring noise and vibration emissions and documenting them against piling progression. A noise and vibration management plan was developed to support the proposed construction plans

Noise Feasibility Study – Former CFB Rockcliffe Lands
Ottawa, Ontario

Golder was retained to prepare a noise feasibility study as supporting documentation for a draft plan of subdivision approval for the former Canadian Forces Base Rockcliffe Lands property, which encompasses approximately 140 hectares, in the City of Ottawa. Golder's study assessed the feasibility of the community design plan with respect to the expected noise impact on the Site from road traffic and other facilities, and outlines recommended mitigation measures for the proposed development.

Feasibility Noise Study – All Seniors Care
Kingston, Ontario

Golder was retained by the developer of a proposed retirement home development in the City of Kingston to assess the potential environmental noise impacts of existing transportation and stationary noise sources on the proposed development. In the scope of the noise work, Golder will consider the: impacts on the environment on the development; the potential impacts of the development on the environment; and the potential impacts of the development on itself. Where required, Golder will identify noise mitigation that will need to be designed into the development

Noise Impact Study - Various
Ottawa, Ontario

Retained to carry out an environmental noise impact study for a number of proposed residential developments of single family; attached, and detached homes in the vicinity of roadways identified as major collector roadways. The noise assessments were carried out in accordance with both; the City of Ottawa Environmental Noise Control Guidelines and MOE noise guideline NPC-300. Noise predictions were performed in order to determine whether or not additional, in addition to the minimum Ontario Building Code, noise control measures would be required. Construction wall, window and door types were provided.

Ville de Sept Ilse Sept Ilse, Quebec	Retained by the Ville de Sept Ilse to be responsible for preparing a noise study for their snow dump facility. Golder's scope of work included three phases; 1) establishment of noise levels during operations, 2) establishment of ambient conditions and 3) the preparation of a detailed noise model to predict current and future noise levels and assist in the development of noise controls if required
Noise Impact Study - Concord Adex - City Place Toronto, Ontario, Canada	Completed various noise and vibration impact studies for a number of proposed high rise residential buildings along the Queens Elizabeth Highway (the Gardiner), and adjacent to a major rail corridor rail right-of-way. As a result of the development's proximity to the rail lines, on-site vibration measurements were conducted to ensure that vibration levels at the proposed condominium locations, due to a nearby rail corridor, were below the Ministry of the Environment limits. Noise predictions were completed in order to determine whether or not additional, in addition to the minimum Ontario Building Code, noise and vibration controls measures would be required. Construction wall, window and door types were provided.
Noise Impact Study - Concord Adex Toronto, Ontario, Canada	Completed a noise impact study for a proposed highrise residential buildings along Highway 401 (one of the busiest highways in Canada). Noise predictions were completed in order to determine whether or not additional, in addition to the minimum Ontario Building Code, noise and vibration controls measures would be required. Construction wall, window and door types were provided.
Noise Impact Study Brampton, Ontario	Retained to perform an environmental noise impact study for a proposed residential development of single family attached, detached and town-homes in the vicinity of transformer yards in Brampton. Noise predictions were performed in order to determine whether or not additional, in addition to the minimum Ontario Building Code, noise control measures would be required. Construction wall, window and door types were provided.
Noise Impact Study Various, Ontario	Conducted a noise and vibration impact study for a proposed residential development of single family attached, detached and town-homes. All within 45m of CN rail right-of-way and in the vicinity of either; provincial, regional and/or local roadways. As a result of the development's proximity to the CN rail lines, on-site vibration measurements were conducted to ensure that vibration levels at the proposed condominium locations, due to a nearby rail corridor, were below the Ministry of the Environment limits. Noise predictions were performed in order to determine whether or not additional, in addition to the minimum Ontario Building Code, noise and vibration controls measures would be required. Construction wall, window and door types were provided. These include developments in; Toronto, Brampton, North-bay and Alliston.

Noise Impact Study
Various, Ontario

Retained to perform an environmental noise impact study for a proposed residential development of single family attached, detached and town-homes in the vicinity of; provincial, regional and/or local roadways. Noise predictions were performed in order to determine whether or not additional, in addition to the minimum Ontario Building Code, noise control measures would be required. Construction wall, window and door types were provided. These include developments in; Toronto, Mississauga, Brampton, Caledon, Gravenhurst and Wasaga Beach.

Vibration Impact Study
Toronto, Ontario

Conducted a noise and vibration impact study for a proposed residential condominium development located along TTC subway and streetcar lines. Predictions of the vibration impact were performed with documented and/or measured data. Building isolation systems were designed and proposed where appropriate.

Noise and Vibration Impact Study - Bayview Mansions
Toronto, Ontario, Canada

Completed a noise impact study for a proposed high density residential development along a major local roadway. The assessment required the predictions of the potential vibration impacts from a proposed TTC subway line were performed with documented and/or measured data. Predictions were completed in order to determine whether or not additional, in addition to the minimum Ontario Building Code, noise and vibration controls measures would be required. Construction wall, window and door types were provided.

Noise/Vibration Impact Study
Toronto, Ontario

Retained to perform a study reviewing the possible noise and vibration intrusion between suites for a proposed building conversion from commercial/industrial to residential lofts.

Noise/Vibration Investigation
Toronto, Ontario

Conducted a noise and/or vibration intrusion investigation to determine the source of the noise/vibration intrusion for numerous residential buildings in the City of Toronto.

PROJECT EXPERIENCE – MUSICAL/ARTS PERFORMANCE AND FILM VIEWING VENUES AND SCHOOLS

HVAC Noise Control
Ottawa, Ontario

Responsible for performing noise analysis of HVAC systems and proposing noise controls for HVAC noise from intruding into the sensitive technical spaces including Studios and booths in the CBC Ottawa building. Noise control recommendations included the use of duct liner, plenums and high performance silencers for the air handling units servicing these rooms.

Mechanical Equipment Noise Control
Toronto, Ontario

Reviewed noise control measures for the TVO voice over booths and control rooms. Noise controls for the HVAC system were proposed to mitigate noise levels to within the design criteria.

Vibration Intrusion Investigation
Toronto, Ontario

Investigation of the noise/vibration intrusion into the Glenn Gould studio within the CBC Toronto building.

Mechanical Equipment Noise Control and Architectural Acoustics
Toronto, Ontario

Performed noise and vibration analysis for the proposed mechanical equipment for the National Ballet School. Performed room acoustic analysis to design the dance studios and music rooms. Results of the various analysis were used to specify noise and vibration controls including, suspended ceilings, equipment vibration isolation and studio architectural designs.

Mechanical Equipment Noise Control
Various

Responsible for analyzing and proposing noise controls for HVAC noise to ensure that noise is prevented from intruding into the sensitive spaces including; classrooms and auditoria in various schools and universities. Noise control recommendations included the use of duct liner, plenums and high performance silencers for the air handling units servicing these rooms. Provided the silencer schedule for all air handling units servicing the buildings:

UBC Life Sciences Building	Vancouver, British Columbia
Ajax Multi-use School	Ajax, Ontario
Jean Vanier	Collingwood, Ontario
Toronto French School	Toronto, Ontario
Brock University	Brock, Ontario
Trent University	Trent, Ontario

PROJECT EXPERIENCE – FLOOR AND STRUCTURAL VIBRATION

Subway Induced Vibration
Toronto, Ontario

Responsible for the design of the structural isolation pads for 20 Gothic, a residential condominium in Toronto, Ontario. In order to ensure that vibration levels are not perceptible, the building structure needed to be isolated from the subway induced vibration.

Streetcar Induced Vibration
Toronto, Ontario

Retained to determine the intrusive vibration levels due to streetcar movement on a proposed office space. Unmitigated vibration and noise levels induced by streetcar pass-bys would have caused fixtures to rattle. In addition, the excessive noise levels would have made it unbearable to work in the office space.

Subway Induced Vibration
Toronto, Ontario

Designed the vibration isolation system for a residential condominium development along the TTC Sheppard subway transit line. Predictions were made before the Sheppard Line was commissioned. The isolation system design was limited to theoretical modelling, post construction measurements were performed and found to be as predicted.

Subway Vibration Monitoring Program
Toronto, Ontario

Responsible for performing measurements for the TTC at track level and ground level at receptors, before and after work was performed on either the tracks and/or wheels of the subway car. A comparison analysis was performed to assess the effectiveness of the efforts in reducing vibration levels perceived by receptors.

PROJECT EXPERIENCE – SEISMIC

Software Development
Toronto, Ontario

Responsible for the development of software which could incorporate many aspects of seismic restraint design.

Post Disaster Building
Various, Ontario

Responsible for the design and specification of seismic restraint systems and seismic restraint layouts of piping systems for fire protection systems under NFPA-13 and Factory Mutual, and piping/conduit and ducting systems under ASHRAE guidelines Including the design and specification of restraint systems for mechanical equipment, which includes but not limited to; back-up power generators, Chillers/cooling equipment, HVAC equipment, pumps and tanks for post disaster buildings, as required in the Ontario Building Code (OBC). A list of projects includes;

Toronto General Hospital, Toronto Ontario. Systems restrained included; fire protection, medical gas, mechanical piping, ducting and air-handling equipment, back-up diesel generators, and general mechanical and electrical equipment.

Children's Hospital of Eastern Ontario, Ottawa, Ontario. Mechanical equipment and layouts were seismically qualified.

Glebe Center Long-term Care Facility, Ottawa, Ontario. Seismically qualified the fire protection system, mechanical and electrical equipment and layouts

St Vincent Hospital, Ottawa, Ontario. Seismically qualified the mechanical and electrical equipment and layouts.

Queensway Carton Hospital, Ottawa, Ontario. Seismically qualified the fire protection system.

Royal Canadian Mounted Police (R.C.M.P) Ottawa, Ontario. Seismically qualified the installation of equipment, piping/conduit and ducting as part of an expansion of base building.

Etisalat, United Arab Emirates. Seismically qualified the installation of equipment, including diesel back-up generator systems, piping/conduit and ducting as part of the design and construction of their flag ship office tower.

Ottawa Airport, Ottawa, Ontario. Seismically qualified the installation of equipment, piping/conduit and ducting as part of the construction project.

MDS Nordion, Ottawa, Ontario. Seismically qualified the installation of equipment, piping/conduit and ducting as part of the construction project, which included hazardous material equipment.

School Building
Various, Ontario

Responsible for the design and specification of seismic restraint systems and seismic restraint layouts of piping systems for fire protection systems under NFPA-13 and Factory Mutual, and piping/conduit and ducting systems under ASHRAE guidelines. Including the design and specification of restraint systems for mechanical equipment, which includes but not limited to; back-up power generators, Chillers/cooling equipment, HVAC equipment, pumps and tanks for school buildings, as required in the Ontario Building Code (OBC). A list of projects include:

North Grenville, Ottawa, Ontario. Seismically qualified the fire protection system installed as part of the project.

For various schools and universities, in the Ottawa and Kingston areas, the mechanical equipment restraint system was designed and seismically qualified. These projects included; Bridlewood School, Cambridge Public School, Samuel Genest School, St Bernadette School, Ottawa University Bioscience Building, Terre Des Jeunes and College Catholique Samuel.

Joules Leger, Ottawa, Ontario – Seismically qualified the electrical equipment and conduit layout as part of the construction contract.

For various schools and universities, in the Ottawa area, the mechanical equipment restraint system, along with the fire protection system was designed and seismically qualified. These projects included; Cumberland High-school, Carlton University, Tory building & student residence and Russell Catholic High-school.

Not a Post Disaster Building
Various, Ontario

Responsible for the design and specification of seismic restraint systems and seismic restraint layouts of piping systems for fire protection systems under NFPA-13 and Factory Mutual, and piping/conduit and ducting systems under ASHRAE guidelines. Including the design and specification of restraint systems for mechanical equipment, which includes but not limited to; back-up power generators, Chillers/cooling equipment, HVAC equipment, pumps and tanks for non-post disaster buildings, as required in the Ontario Building Code (OBC). A list of projects include:

For various projects in the Ottawa area, the electrical and mechanical equipment restraint systems were designed and seismically qualified. These projects included; Canadian War Museum, Morrisburg Water Treatment/Pumping Station, East Market and Joules Leger.

For various projects in the Ottawa area, the mechanical equipment restraint system was designed and seismically qualified. These projects included; 269 Laurier, Metropole, Adelaide Preston Square, Louis Riel Dome, Bell Semplex, 181 Queen Street, West District Ice Rink and CBC Ottawa.

1600 Startop, Ottawa, Ontario. Seismically qualified the restraint of the mechanical equipment and fire protection systems.

For various projects in the Ottawa area, the fire protection restraint system was designed and seismically qualified. These projects included; Canadian Aviation Museum, Nortel, Loeb Center, and the Glebe Center.

PROJECT EXPERIENCE – EXPERT WITNESS

Ontario Municipal Board
Toronto, Ontario

Was retained by the City of Toronto to support the City at an OMB preceding, involving a proposed residential development directly exposed to noise levels from industry, road and rail activities.

LPAT
Kawartha Lakes, Ontario

Was retained by an aggregate producer to support at an LPAT proceeding involving a proposed aggregate pit in Kawartha Lakes. Golder completed the noise assessment for the project which included the development of noise controls.

LPAT
Ottawa, Ontario

Was retained by a producer to support at an LPAT proceeding involving a proposed Ready-Mix plant pit in Ottawa. Golder completed the noise assessment for the project which included the development of noise controls.

Environmental Review Tribunal
Haldimand, Ontario

Appeared at an ERT for a proposed Windfarm in Haldimand County. Was recognized as an expert witness on the subject of environmental noise, specifically with respect to the Noise Study Report prepared in support of the Renewable Energy Approval issued by the MOE.

Planning Board Hearing Nova Scotia	Supported an application for an aggregate facility in Nova Scotia. Carried out the noise work in preparation for the hearings and was put forward as the Expert Witness on behalf of the proponent.
Ontario Municipal Board Lincoln, Ontario	Retained by the Town of Lincoln as their expert noise specialist, with respect to an application for site plan approval for a proposed waste management facility.
Quebec Hearing Board Salaberry-de-Valleyfield, Quebec	Retained by the City of Salaberry-de-Valleyfield as their expert noise specialist, with respect to noise concern associated with the recently expended Autoroute NA 30 and associated noise barriers.

PROFESSIONAL AFFILIATIONS

Professional Engineers of Ontario (P.Eng)

Canadian Council for Human Resources in the Environment Industry (CCHREI)

MTO – RAQs approved for the provision of Acoustic and Vibration Services

Air and Waste Management Association (AWMA)

National Fire Protection Agency (NFPA)

Ontario Sand Stone and Gravel Association - Environmental Committee

Ready Mix Concrete Association of Ontario - Environmental Committee

Tomasz Nowak M.Sc., M.Eng.

Acoustics, Noise and Vibration Specialist

Education

Master of Science Mechanical Engineering, AGH University of Science and Technology, Krakow, Poland, 2001

Master of Engineering Materials Engineering, McGill University, 2007

Certifications

PROFESSIONAL SUMMARY

Tomasz is an acoustics scientist with a background in mechanical engineering, acoustics and noise control. His technical background allows him to successfully solve noise-related issues by understanding the nature of the technological processes, operational parameters and design characteristics of the mechanical equipment used in various industrial installations.
Recent experience includes working on noise impact assessments for mining, energy and oil and gas developments. His responsibilities include identification of the noise sources, calculation of noise emissions, development of acoustical models, proposing noise mitigation solutions and reporting the results.

EMPLOYMENT HISTORY

Golder Associates Ltd. – Calgary, Edmonton, Montreal, Canada

Acoustic Scientist (2012 to Present)

Involved in preparation of noise impact assessments for the energy and resources sector. Responsible for calculation of noise emissions from industrial facilities and development of computer acoustical models. Developing of suitable noise mitigation and control measures. Conducting field noise measurement.

Independent contractor – Montreal, Canada

Service engineer (2009 to 2010)

Performed inspections and maintenance on LNG cargo control system, assisting in testing and calibration of the control system components including temperature, level and pressure sensors.

McGill University – Montreal, Canada

Graduate Student (2004 to 2007)

Development and testing of a system to protect building ventilation systems against toxic airborne substances. Responsible for conducting research regarding monitoring and removal of hazardous substances from airstream.

RELEVANT EXPERIENCE

Confidential Client

Nunavut

Performing blasting induced vibrations in support of research project at a gold mine. Data analysis and reporting.

Confidential Client

Quebec

Conducting noise impact assessment of a quarry operations in support of regulatory permitting process. Noise modelling and reporting.

Confidential Client
Ghana

Performing field baseline noise measurements in support of regulatory permitting process for a gold mine. Data analysis and reporting.

DeBeers – Victor Mine
Ontario

Performing field baseline noise measurements in support of regulatory permitting process for a diamond mine. Data analysis and reporting.

Suncor McKay River, Firebag
Alberta

Performing in-plant noise measurements to update and develop computer model of processing facilities. Data analysis and reporting.

Suncor McKay River, Firebag
Alberta

Performing in-plant noise measurements to update and develop computer model of processing facilities. Data analysis and reporting.

Confidential Client
Nunavut

Performing field baseline noise measurements in support of regulatory permitting process for a gold mine. Data analysis and reporting.

Confidential Client
Northwest Territories

Performing field baseline noise measurements in support of regulatory permitting process for a diamond mine. Data analysis and reporting.

Suncor Fort Hills
Alberta

Development of detailed indoor noise models for facility processing buildings. Performing model calculation and presenting the results.

BluEarth Bull Creek Wind Energy Project
Alberta

Performing field noise measurements of the third-party facilities located in the project area. Data analysis and reporting.

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