REPORT

Noise Impact Assessment

St. Marys Cement Inc. (Canada)

Proposed Thomas Street Quarry Expansion, 4608 Perth Line 5, Perth South, ON

Submitted to:

St. Marys Cement Inc. (Canada)
55 Industrial Street
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Submitted by:

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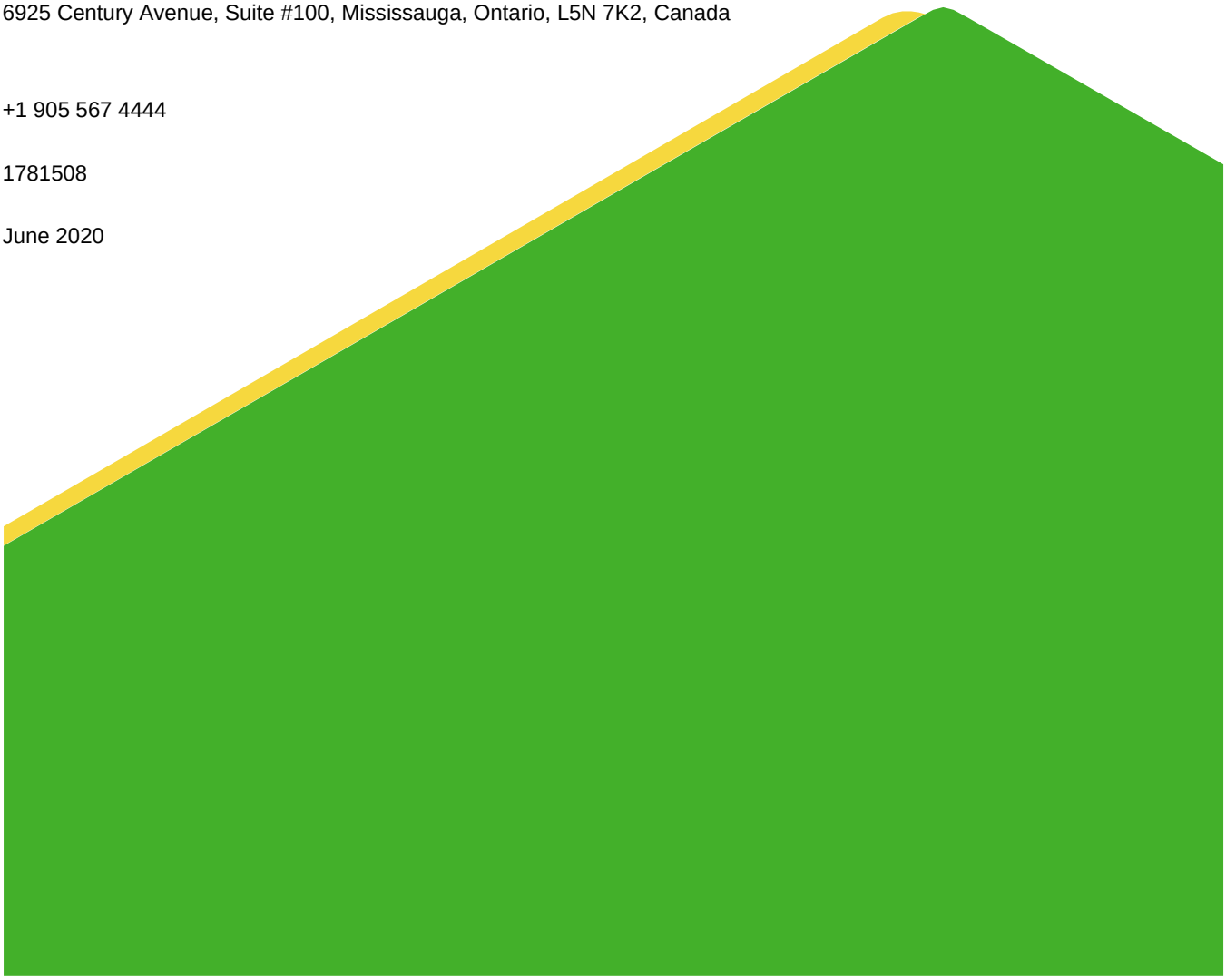
1781508

June 2020



Distribution List

e-copy: St. Marys Cement Inc. (Canada)

e-copy: Golder Associates Ltd.

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1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by St. Marys Cement Inc. (Canada) (SMC) to prepare a Noise Impact Assessment in support of a licence application under the *Aggregate Resources Act* (ARA) for a Category 2, Class A, Quarry Below the Water Table associated with the proposed Thomas Street Quarry Expansion located on part of Lot 29, 4608 Perth Road Line 5, in the geographic Township of South Perth, Perth County, Ontario (the Site).

The Site is an expansion of the existing quarry, including a sand and gravel deposit overlying the bedrock in the southern half of the site that will be extracted and utilized as part of the stripping activities. The licence area for the proposed expansion is approximately 46 hectares. A site location plan showing the proposed extent of extraction and licenced boundary for the Site is provided on Figure 1.

For the purpose of this assessment, thirteen (13) existing Point(s) of Reception (POR(s)) were selected as being representative of the sensitive receptors in all directions around the Site and identified as POR001 through POR013 (see Figure 2). The nearest POR (POR001) is located approximately 233 m west of the western edge of the proposed extraction area.

The surrounding lands are utilized for residential, agricultural, cement manufacturing, food process manufacturing and aggregate extraction/processing purposes. A zoning plan for the property and surrounding land use is provided in Appendix A.

Sound level limits for the proposed Site operations on neighbouring receptors were established in accordance with the Ministry of the Environment, Conservation and Parks (MECP) guideline, NPC 300 "*Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning"*. Noise predictions of the proposed Site operations onto neighbouring PORs were completed to determine the possible noise impact. To help understand the analysis and recommendations made in this report, a brief discussion of noise terminology is provided in Appendix B.

2.0 SITE OPERATIONS

The proposed Site operations will take place during daytime (07:00 to19:00), evening (19:00 to 23:00) and nighttime (23:00 to 07:00). The main activities at the Site will include stripping of the overburden material, including the extraction of the sand and gravel (where present) using a loader, transport/hauling of the sand and gravel to a washplant and a crushing/screening plant for processing. The quarry operation will include a drill used for blasting support, extraction using a loader, a processing plant loader, the washplant, and the crushing/screening plant and haul/transport trucks. Transport of the processed aggregate material off the Site will be by transport truck using the existing route (i.e., north of the Site) to access Perth Road 139, while limestone used for cement manufacturing will be transported south to the cement plant via the existing conveyor system. The primary noise sources are summarized in Table 1.

Table 1: Facility Noise Source Summary

Source ID	Source Description	Overall Sound Power Level [dBA] (1) / (2)	Source Location	Sound Characteristics	Noise Control Measures	Operations Day/Evening/ Night
BC	Barmac Crusher	99	O	S	U	Yes/Yes/Yes
CC	Cone Crusher	111	O	S	U	Yes/Yes/Yes
PP_G	Generator processing plant	114	O	S	U	Yes/Yes/Yes
JC_A	Jaw Crusher	119	O	S	U	Yes/Yes/Yes
PS	Primary Screen	122	O	S	U	Yes/Yes/Yes
SS	Secondary Screen	121	O	S	U	Yes/Yes/Yes
WP	Wash Plant	112	O	S	U	Yes/Yes/Yes
WP_G	Wash Plant Generator	123	O	S	U	Yes/Yes/Yes
D	Drill - HCR 15000ED (4)	117	O	S	U	Yes/No/No
Truck	Truck(3)	105	O	S	U	Yes/Yes/Yes
Loader	Loader Extraction	97	O	S	U	Yes/Yes/Yes

Notes:
1) Values presented in Table 1 do not include adjustments that were considered in the modelling (i.e. time weighting)
2) Average hourly sound power level representing various equipment activities
3) Up to 10 trips per hour assessed
4) Or equivalent

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
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

Noise Control Barriers

The following berms (or acoustically equivalent measures/barrier) will be required prior to extraction taking place at the Site:

- A 3.5 m high (above existing grade) and 395 m long west property line barrier; and,
- A 7 m high (above existing grade) and 436 m long south property line barrier.

The location of the property barriers are shown in Figure 3. In addition to these localized barriers, the following provides a description of additional operational controls that will be required.

Stripping Operations and Sand and Gravel Processing

As part of the stripping operations to expose the limestone resource, the sand and gravel overburden will be utilized as an aggregate source by SMC. Depending on the depth of the sand and gravel, the overburden lift height will change throughout the Site. In completing a conservative assessment, a lift height of approximately 8 m was used. Operations related to the sand and gravel extraction will be primarily in the southern part of the Site, as it is expected, based on the site investigations, that the overburden in the northern portion of the extraction area is primarily a clayey silt till material. To take advantage of noise screening by the working face, the operations needed for processing the stripped sand and gravel material within the southern portion of the extraction area, will initially proceed in the east-to-west direction. Once reaching approximately the center of the Site, the extraction will continue generally in a southwesterly direction. The equipment associated with the sand and gravel operations will include: a loader, a processing plant, a washplant and transport trucks. It is expected the primary crusher will remain at its current location within the existing Thomas Street Quarry for the initial stages of the stripping of the sand and gravel deposit. Once the processing equipment moves onto the Site, it is expected the processing equipment will operate within 30 m of the working face.

When the processing equipment is in the expansion land, equipment noise controls in the form of local barriers (or acoustically equivalent) will be required to reduce noise emissions from the equipment on the identified PORs for operations during the evening and nighttime period.

Areas requiring a specific equipment noise control (i.e., local barriers or acoustically equivalent) during the evening and nighttime periods are shown in Figure 3. Table 2 presents the barrier height or alternative control (i.e. limiting the sound pressure level of specific equipment) needed to achieve noise compliance at the relevant noise limits at the identified sensitive PORs. Either a local barrier or limiting noise emissions (i.e. acoustically equivalent) are required for a given area (i.e. Area 1 through Area 4). Both sets of controls are not required concurrently.

Quarry Operation Concurrent with Sand & Gravel Stripping/Processing

It is expected the quarry operations can occur concurrently, once some of the area has been stripped of the sand and gravel overburden, and will follow the overburden face advancement. The quarry operations will have a separation distance from the working face of the stripping face (and subsequent sand and gravel processing in the approximate southern half of the site) of approximately 100 m. A quarry lift height of 14m was conservatively considered in the modelling. The extraction within the quarry will follow a similar direction as the stripping and processing of the sand and gravel (i.e., first in an east-to-west direction and then in a southwesterly direction until reaching the southern extent of the Site, where the face will then advance to the north). The equipment associated with the quarry operations will include: a drill, a loader, processing plant, washplant and transport trucks. The primary crusher will remain at its current location within the existing Thomas Street quarry for the initial stages of the quarry development.

In addition, equipment noise controls in the form of local barriers (or acoustically equivalent) will be required to reduce noise emissions from the equipment on the identified PORs for operations during the evening and nighttime period as shown in Figure 3 and summarized in Table 2. Again, either a local barrier or limiting noise emissions (i.e. acoustically equivalent) are required for a given area (i.e. Area 1 through Area 4). Both sets of controls are not required concurrently.

Table 2: Proposed Equipment Evening and Nighttime Noise Control

Area Requiring Noise Control	Equipment Specific Noise Control or Proposed Acoustically Equivalent[1]	
	Local Barrier Required Height	Required Equipment Noise Level [2]
1	**Primary Screen** - 7 m high local barrier two-sided S and W, **Secondary Screen** - 7m high local barrier three-sided S, W, N, and **Washplant Generator** - 5 m high local barrier two-sided S and W	**Primary Screen** - 59 dBA at 60 m, **Secondary Screen** - 60 dBA at 60 m and **Washplant Generator** - 60 dBA at 60 m
2	**Primary Screen** - 7 m high local barrier two-sided S and W, and **Secondary Screen** -7 m high local barrier two-sided S and W	**Primary Screen** - 59 dBA at 60 m and **Secondary Screen** - 60 dBA at 60 m
3	**Primary Screen** - 6 m high local barrier two-sided S and W, and **Secondary Screen** - 6 m high local barrier two-sided S and W	**Primary Screen** - 62 dBA at 60 m and **Secondary Screen** - 63 dBA at 60 m

Area Requiring Noise Control	Equipment Specific Noise Control or Proposed Acoustically Equivalent[1]	
	Local Barrier Required Height	Required Equipment Noise Level [2]
4	**Secondary Screen** - 6 m high local barrier one-sided S	**Secondary Screen** - 63 dBA at 60 m

Notes:

(1) Considered equipment noise control other than local barriers (e.g., enclosures, equipment substitution) that meets the reference noise level at distance of 60 m from equipment in direction of POR001.

(2) If the preferred control is to limit noise emissions of the specific equipment, these levels should be verified when new equipment is brought onto the Site or when acoustically significant modifications are made to the equipment

3.0 POINTS OF RECEPTION

Thirteen (13) residential receptors were identified as being representative of the most sensitive PORs within the vicinity of the Site as shown in Figure 2. The identified PORs are summarized below.

- POR001: A two-storey residence located west of the Site
- POR002: A two-storey residence located northwest of the Site
- POR003: A two-storey residence located northwest of the Site
- POR004: A two-storey residence located northwest of the Site
- POR005: A two-storey –residence located northeast of the Site
- POR006: A two-storey residence located northeast of the Site
- POR007: A two-storey residence located east of the Site
- POR008: A two-storey residence located east of the Site
- POR009: A two-storey residence located east of the Site
- POR010: A two-storey residence located southeast of the Site
- POR011: A two-storey residence located south of the Site
- POR012: A two-storey residence located south of the Site
- POR013: A two-storey residence located south of the Site

4.0 ASSESSMENT CRITERIA (PERFORMANCE LIMITS)

Based on a review of the area, it is expected the PORs in the vicinity of the Site could reasonably be defined as being in a Class 2 area as per MECP publication NPC-300. A Class 2 area can best be described as a combination of noise levels characteristic of typical urban areas including a contribution of road traffic and existing industry, and a rural area with an acoustical environment that is dominated by natural sounds, having little road traffic.

In assessing stationary noise sources, the MECP has established exclusionary Plane of Window (POW) and Outdoor POR (Outdoor POR) sound level limits for Class 2 areas. The POW sound level limit for the noise sensitive receptors in a Class 2 area is described as follows:

> *The sound level limit at a POW POR is set as the higher of either the applicable exclusionary limit of 50 dBA in the daytime period of 07:00-19:00, 50 dBA in the evening period of 19:00-23:00 and 45 dBA in the night-time period of 23:00-07:00, or the minimum background sound level that occurs or is likely to occur during the time period corresponding to the operation of the stationary source under impact assessment.*

The Outdoor sound level limit for the noise sensitive receptors in a Class 2 area is described as follows:

> *The sound level limit at an Outdoor POR is set as the higher of either the applicable exclusionary limit of 50 dBA in the daytime period of 07:00-19:00 and 45 dBA in the evening period of 19:00-23:00, or the minimum background sound level that occurs or is likely to occur during the time period corresponding to the operation of the stationary source under impact assessment. In general, the Outdoor POR will be protected during the nighttime as a consequence of meeting the sound level limit at the adjacent POW.*

As the Site activities could occur over a 24-hour basis under some capacity, the noise impact from the Site was assessed against daytime, evening and nighttime One Hour Equivalent Sound Level (Leq) MECP exclusionary sound level limits for a POR in a Class 2 area.

5.0 IMPACT ASSESSMENT

5.1 Methodology

All relevant sound levels for sources were based on; similar equipment used in other aggregate operations, and site measurements of equipment operating at the Thomas Street Quarry completed on June 27,2019 using a Larson Davis 831 sound level meter/real-time analyzer. Data collected during the site visit is included in Appendix C. The weather conditions during the measurements are summarized in Appendix D. All measurement equipment used in this study meets the MECP requirements. The instrument was calibrated before and after all sound level measurements and the calibration verified. Instrument calibration certificates are attached in Appendix E. Sound levels have been documented in 1/1 octave band level format. Noise impact predictions were generated using this data.

The predictive analysis was carried out using the commercially available software package Cadna/A V2019. The predicted levels take into consideration that the sound from a stationary point noise source spreads spherically and attenuates at a rate of 6 dB per doubling of distance. Further, attenuation from barriers, ground effect and air absorption may be included in the analysis as determined from ISO 9613 (part 2), which is the current standard used 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 and Ministry of Natural Resources and Forestry (MNRF).

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 and a value of 1 for all other areas. Attenuation from intervening structures (i.e., stockpiles) and woodlots were conservatively not considered in the noise modelling.

5.2 Noise Impact Prediction Assumptions

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

- Extraction and processing operations will occur during the daytime, evening and nighttime periods;
- General extraction outlined in Figure 3 for operations of the stripping and processing of the sand and gravel and the quarry will be followed;
- The stripping and processing of the sand and gravel will be accessed from SMC's adjacent property to the east;
- A single lift, 8 m high was considered for sand and gravel operations. Conservatively the sand and gravel processing activities was considered over the entire extent of the expansion area. Two benches with the first approximately 14 m high and the second 11 m high were considered for operation of the quarry.
- The quarry will ultimately be extracted to the maximum elevation of 271 m;
- For extraction within the expansion area the equipment will operate as specified in Section 2.0 and is expected to operate continuously unless noted;

- Extraction within the expansion area will be conducted as a combination of sand and gravel stripping and processing in primarily the southern half of the site, and ultimately quarrying operations through the full site. The quarry working face will follow the sand and gravel working face with a separation distance of approximately 100 m.
- Equipment list and sound power emissions are consistent to those listed in Table 1;
- Haul trucks, while onsite, will typically travel at 25 km/h;
- The property boundary berms will be installed as specified above in Section 2.0 and as shown in Figure 3 and Figure 4;
- Local barriers (or acoustically equivalent) noise controls will be used for the identified equipment operating within the areas indicated in Figure 3 (evening and nighttime); and,
- POW PORs for which receptor heights could not been identified either through available imagery or during onsite investigations were conservatively assessed at a height of 4.5 m.

6.0 RESULTS

The proposed Site operational sequences, as indicated in Figure 3, were modelled to determine the predictable worst-case noise levels on the identified representative PORs for the POW and Outdoor PORs. Outdoor POR sound levels (at a height of 1.5 m) were predicted by calculating sound levels using a 2 m by 2m grid resolution within the POR property boundaries and within 30 m of the POW, consistent with NPC 300 requirements. The higher of the POW or Outdoor sound levels were reported for the respective POR.

Noise levels were determined for concurrent operations of the sand and gravel stripping and processing, and the quarrying operation, with equipment located at the first lift for the respective activity.

Table 3 provides a summary of the predictable worst-case noise levels at each of the identified PORs during the daytime.

Table 3: Noise Impact Assessment Results Site Operations Daytime

Receptor ID	South Area (Area 1) Predicted Noise Level [dBA]	Center Area (Area 2) Predicted Noise Level [dBA]	North Area (Area 3 and 4) Predicted Noise Level [dBA]	Overall Maximum Noise Impact [dBA]	Daytime Noise Limit [dBA]
POR001	49	49	49	49	50
POR002	36	38	39	39	50
POR003	36	38	37	38	50
POR004	39	38	38	39	50
POR005	38	37	38	38	50
POR006	38	37	39	39	50
POR007	15	36	33	36	50
POR008	41	40	36	41	50
POR009	41	42	41	42	50
POR010	40	43	40	43	50
POR011	40	47	44	47	50
POR012	44	48	45	48	50
POR013	43	45	42	45	50

Table 4 provides a summary of the predictable worst-case noise levels at each of the identified PORs during evening and nighttime operations.

Table 4: Noise Impact Assessment Results Site Operations During Evening and Nighttime

Receptor ID	South Area (Area 1) Predicted Noise Level [dBA]	Center Area (Area 2) Predicted Noise Level [dBA]	North Area (Area 3 and 4) Predicted Noise Level [dBA]	Overall Maximum Noise Impact [dBA]	Evening and Nighttime Noise Limit [dBA]
POR001	45	43	45	45	45
POR002	33	37	38	38	45
POR003	33	37	35	37	45
POR004	36	37	36	37	45
POR005	36	36	36	36	45
POR006	36	36	37	37	45
POR007	15	36	33	36	45
POR008	40	39	34	40	45
POR009	38	39	37	39	45
POR010	37	40	38	40	45
POR011	35	45	40	45	45
POR012	39	45	41	45	45
POR013	39	40	38	40	45

The overall predicted noise levels, based on proposed site operations described above, were found to be at or below the performance limits with the implementation of noise control measures (Section 8.0), indicating that the Site can operate in compliance with MECP and MNRF noise limits. Sample calculations are also provided in Appendix F.

7.0 GENERAL SITE OPERATION NOISE CONTROLS

The following summarizes general Site operation noise controls that shall be followed in all of the operational sequences of the proposed extraction area:

- 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.
- The south and west barriers will be installed, as specified above in Section 2.0 and as shown on Figure 3, before extraction/processing occurs on the Site.
- Daytime operations within the expansion areas will not require noise controls, other than the installation of the south and west barriers, to meet relevant noise limits.
- Evening and nighttime operations will require noise controls within areas indicated in Figure 3. Noise mitigation will need to be applied to the primary and the secondary screen and the washplant generator. The applicable noise controls could include a local barrier or acoustically equivalent treatment.
- No drilling will occur during evening and nighttime hours.

Detailed description of noise recommendations, as presented in the Site Plans, related to operation of Thomas Street Quarry Expansions are provided in Appendix H.

8.0 CONCLUSIONS

Golder was retained by SMC to prepare a NIA in support of a licence application under the ARA to permit the operations of an expansion of the Thomas Street Quarry. Golder established sound level limits according to MECP noise guidelines and compared the predicted noise levels at the identified representative PORs to the established limits. The results indicate that, after the implementation of identified noise controls or equivalent measures, the noise levels predicted at representative off-site PORs are expected to be at or below the applicable noise limits. Based on the results presented in this report, it is expected the Site can operate in compliance with MECP and MNRF noise guidelines for all PORs.

9.0 STATEMENT OF QUALIFICATIONS

Refer to Appendix G for Curricula Vitae of the authors of this report.

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 SMC and, once finalized, is intended to support the application of a Category 2, Class A, Quarry Below the Water Table under the ARA associated with the proposed St. Marys Thomas Street Quarry Expansion. The draft application and supporting documents are based on observations of Site operations, discussions with SMC about current Site practices, review of documentation provided by SMC 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 SMC.

The information, recommendations and opinions expressed in this report are for the sole benefit of SMC 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 SMC 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. SMC 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. SMC acknowledges that electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore SMC 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 SMC, 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

Golder Associates Ltd.

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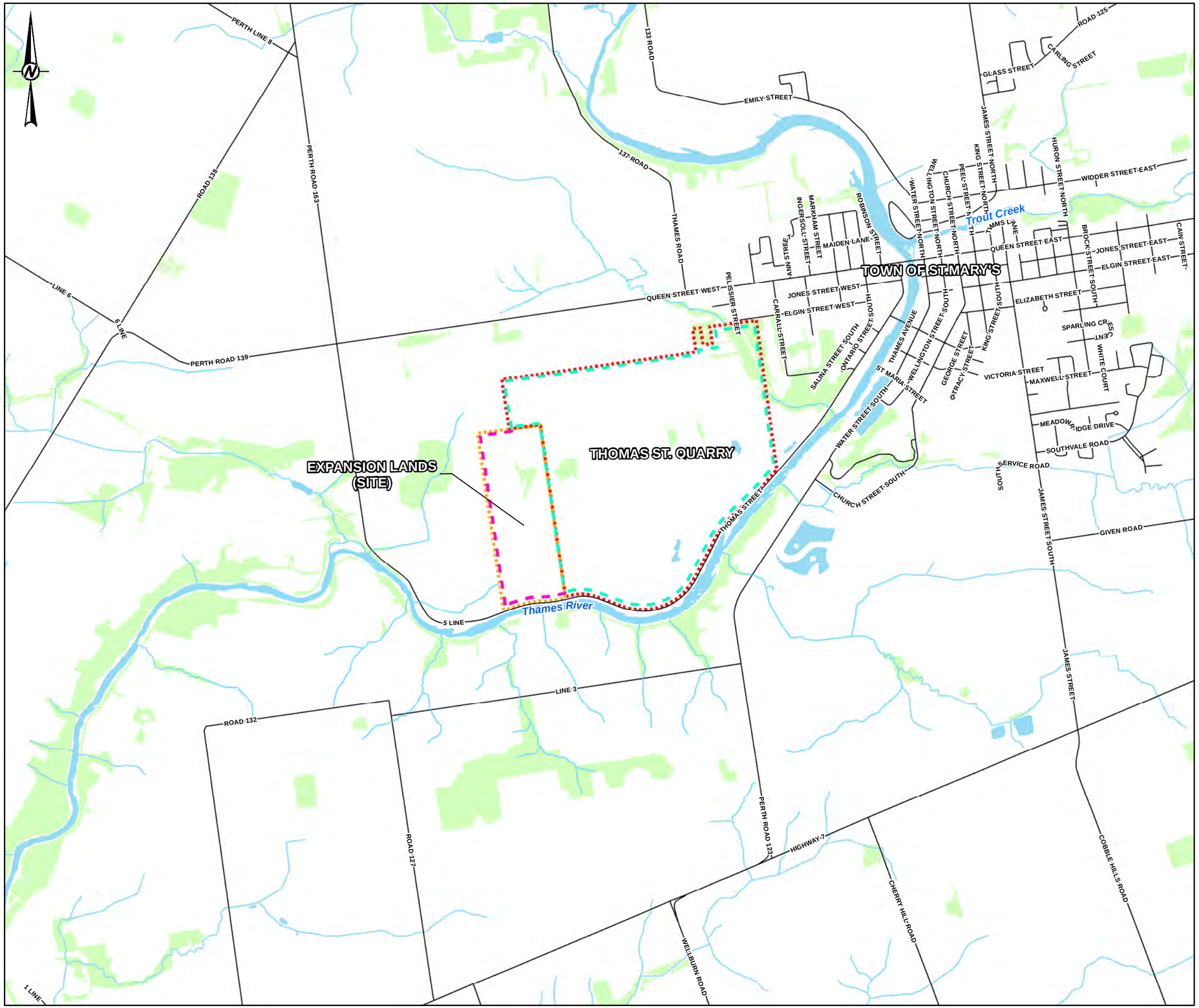
TN/JT/ly/ng

https://golderassociates.sharepoint.com/sites/15168g/deliverables/noise/1781508-r-rev0 2june2020 smc proposed thomas street quarry expansion noise impact assessment.docx

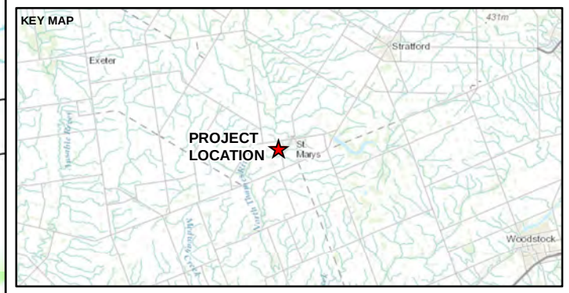
Figures



LEGEND

- Road
- Watercourse
- Waterbody
- Wooded Area
- Existing Licence Boundary (Thomas St. Quarry)
- Existing Limit of Extraction (Thomas St. Quarry)
- Proposed Licence Boundary
- Proposed Limit of Extraction

KEY MAP



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REFERENCE(S)

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2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT

ST. MARYS CEMENT INC. (CANADA)

PROJECT

THOMAS STREET QUARRY EXPANSION

TITLE

LOCATION PLAN

CONSULTANT

GOLDER

YYYY-MM-DD	2018-10-10
DESIGNED	SO
PREPARED	SO
REVIEWED	TN
APPROVED	JT

PROJECT NO.	CONTROL	REV.	FIGURE
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LEGEND

- Point of Reception
- Road
- Watercourse
- Waterbody
- Wooded Area
- Existing Licence Boundary (Thomas St. Quarry)
- Existing Limit of Extraction (Thomas St. Quarry)
- Proposed Licence Boundary
- Proposed Limit of Extraction

0 250 500 750

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REFERENCE(S)

1. BASEDATA - MNRF LIO, OBTAINED 2019
2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT

ST. MARYS CEMENT INC. (CANADA)

PROJECT

THOMAS STREET QUARRY EXPANSION

TITLE

POINTS OF RECEPTION LOCATION PLAN

CONSULTANT

GOLDER

YYYY-MM-DD	2020-04-28
DESIGNED	SO
PREPARED	SO
REVIEWED	TN
APPROVED	JT

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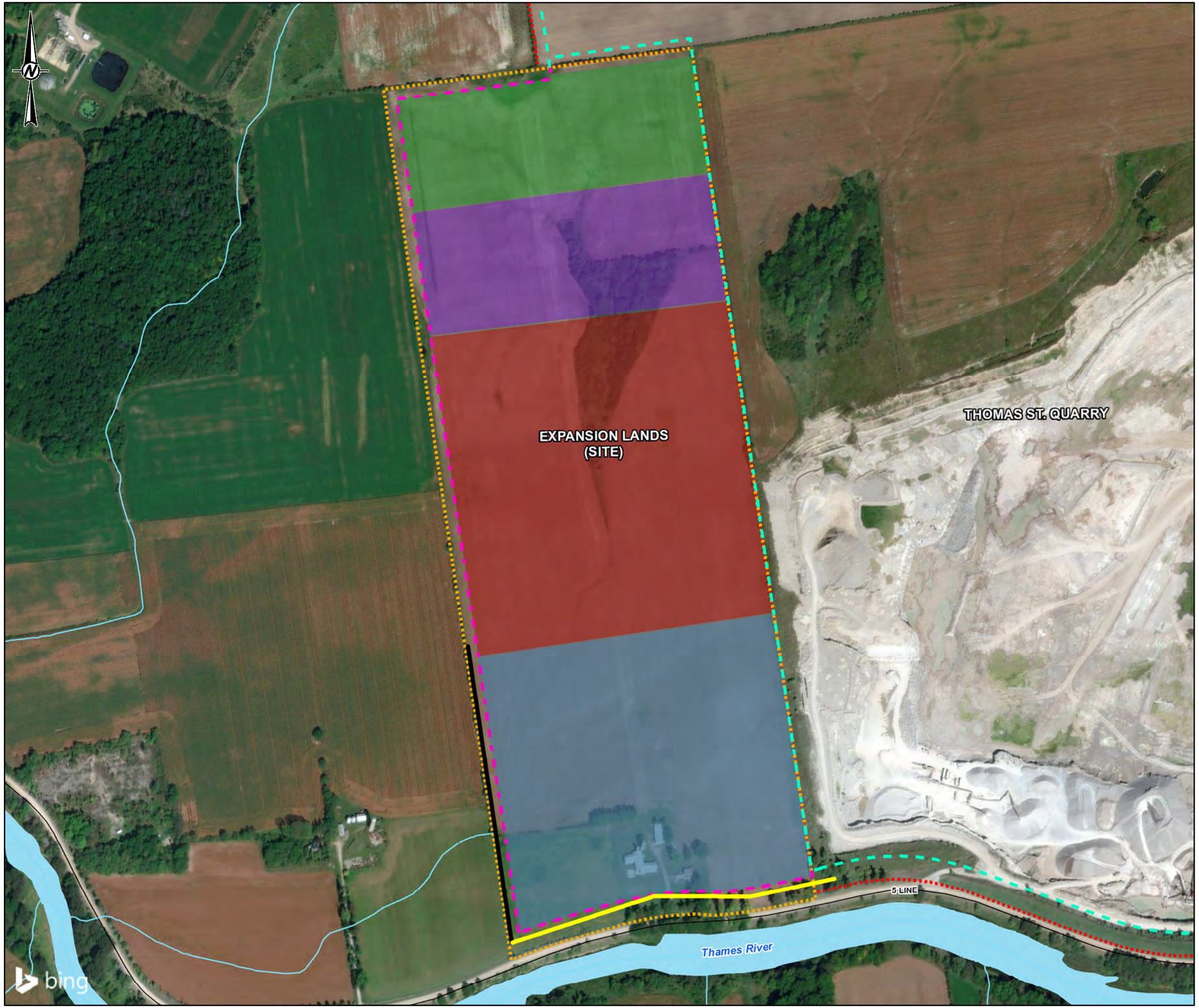

LEGEND

- Road
- Watercourse
- Waterbody
- Wooded Area
- Existing Licence Boundary (Thomas St. Quarry)
- Existing Limit of Extraction (Thomas St. Quarry)
- Proposed Licence Boundary
- Proposed Limit of Extraction

Property Line Barriers

- South Barrier 7 m High
- West Barrier 3.5 m High

Area Where Noise Is Required – Evening and Night

- Area 1 – Primary and Secondary Screen and Washplant Generator Equipment Noise Control as Per Table 2
- Area 2 – Primary and Secondary Screen Equipment Noise Control as Per Table 2
- Area 3 – Primary and Secondary Screen Equipment Noise Control as Per Table 2
- Area 4 – Secondary Screen Equipment Noise Control as Per Table 2

0 100 200

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REFERENCE(S)

1. BASEDATA - MNRF LIO, OBTAINED 2019
2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT

ST. MARYS CEMENT INC. (CANADA)

PROJECT

THOMAS STREET QUARRY EXPANSION

TITLE

CONTROL AND MITIGATION MEASURES – EVENING AND NIGHTTIME

CONSULTANT

GOLDER

YYYY-MM-DD	2020-04-28
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PREPARED	SO
REVIEWED	TN
APPROVED	JT

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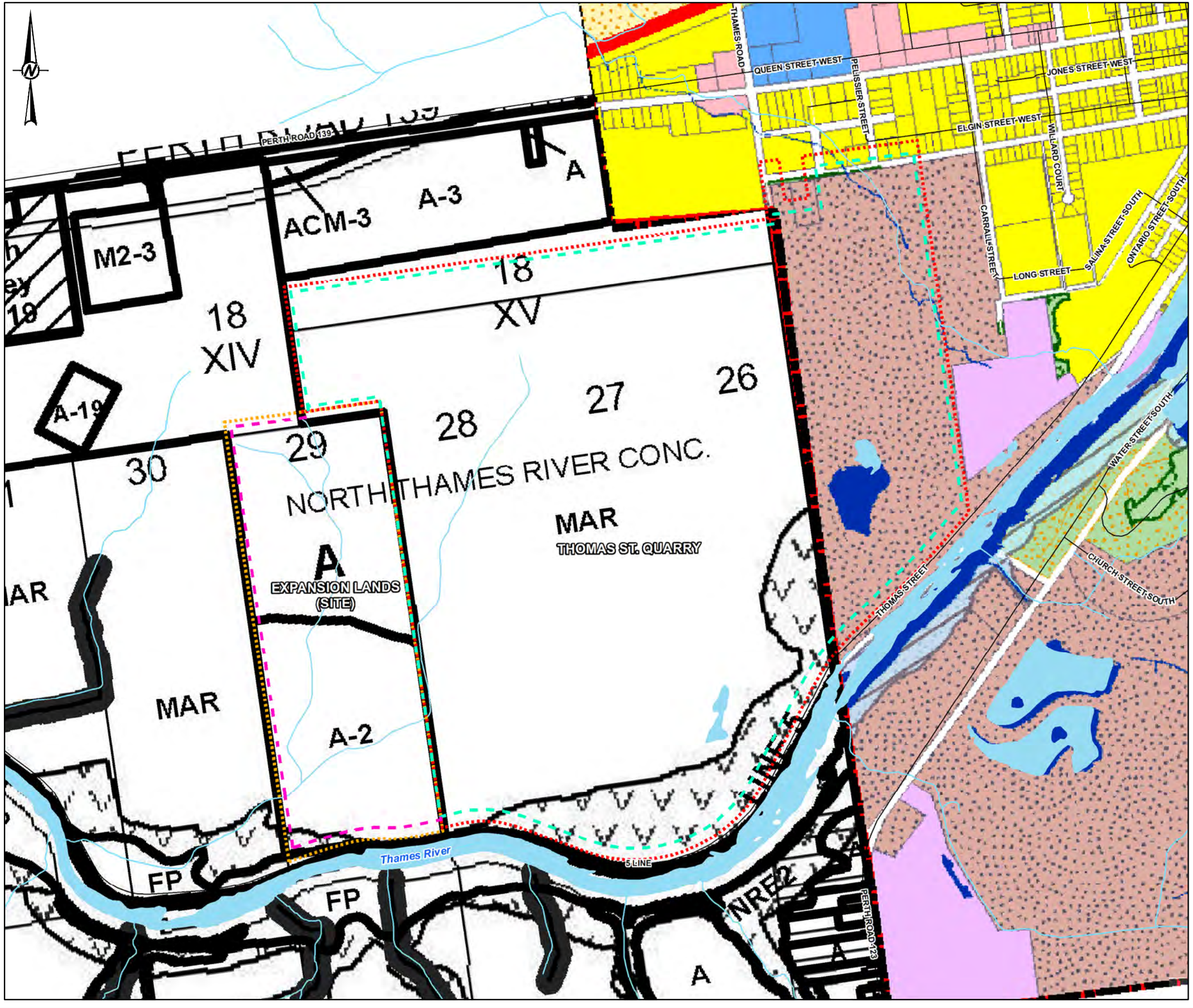
APPENDIX A

Zoning



LEGEND

- Road
- Watercourse
- Waterbody
- Wooded Area
- Existing Licence Boundary (Thomas St. Quarry)
- Existing Limit of Extraction (Thomas St. Quarry)
- Proposed Licence Boundary
- Proposed Limit of Extraction

TOWN OF ST. MARYS ZONING

- Settlement Area Boundary
- Town Boundary
- Water
- Residential
- Central Commercial
- Highway Commercial
- General Industrial
- Extractive Industrial
- Environmental Constraint
- Recreational
- Flood Plain
- Natural Heritage
- Agriculture

TOWSHIP OF PERTH SOUTH ZONING

ZONE	ZONE SYMBOL
AGRICULTURAL	A
HAMLET / VILLAGE RESIDENTIAL	HVR
RURAL RESIDENTIAL	RR
HAMLET / VILLAGE COMMERCIAL	HVC
AGRICULTURAL COMMERCIAL / INDUSTRIAL	ACM
MINERAL AGGREGATE RESOURCES	MAR
LIGHT INDUSTRIAL	M1
GENERAL INDUSTRIAL	M2
INSTITUTIONAL	IN
PARKS AND RECREATION	PR
FUTURE DEVELOPMENT	FD
NATURAL RESOURCES / ENVIRONMENT ZONE ONE	NRE1
NATURAL RESOURCES / ENVIRONMENT ZONE TWO	NRE2
FLOOD PLAIN	FP
HOLDING	(-h)
ADJACENT LAND OVERLAY	
FLOOD AND FILL CONSTRAINT AREA OVERLAY	

0 250 500

1:10,000 METRES

REFERENCE(S)

1. BASEDATA - MNRF LIO, OBTAINED 2019
2. ZONING INFORMATION HTTPS://WWW.TOWNOFSTMARYS.COM/EN/DOING-BUSINESS/OFFICIAL-PLAN.ASPX# AND HTTPS://WWW.PERTHSOUTH.CA/EN/DOING-BUSINESS/ZONING.ASPX#
3. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
ST. MARYS CEMENT INC. (CANADA)

PROJECT
THOMAS STREET QUARRY EXPANSION

TITLE
LAND USE ZONING DESIGNATION PLAN

CONSULTANT
GOLDER

YYYY-MM-DD	2020-04-28
DESIGNED	SO
PREPARED	SO
REVIEWED	TN
APPROVED	JT

PROJECT NO.	CONTROL	REV.	FIGURE
1781508	0005	0.0	A

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

Path: S:\Clients\St Marys Cement\Thomas Quarry\99_PROJ\1781508\8f40_PROD\0005_Noise\1781508-0005-RN-r00A.mxd

APPENDIX B

Description of Technical Terms

Description of Technical Terms

To help understand the analysis and recommendations made in this report, the following is a brief discussion of technical noise 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 center 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

Noise Data

NOISE DATA

Name	ID	Type	Octave Spectrum (dB)											Source Data
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	
Barmac Crusher	BC	Lw		97	99	99	100	94	94	92	86	80	99	106	Project Specific Measurements
Cone crusher	CC	Lw		98	106	109	110	107	106	103	101	97	111	116	Golder Database
Generator PP	Gen_PP	Lw		107	108	118	116	108	107	106	104	99	114	121	Project Specific Measurements
Jaw crusher	JC	Lw		118	124	123	119	113	113	112	107	100	119	128	Project Specific Measurements
Primary Screen	PS	Lw		115	115	116	118	117	117	115	112	111	122	125	Project Specific Measurements
Secondary Screen	SS	Lw		120	123	122	123	115	113	113	111	107	121	129	Project Specific Measurements
Washplant	WP	Lw		110	112	114	108	108	107	104	102	102	112	119	Project Specific Measurements
Washplant generator	WP_gen	Lw		128	127	128	120	120	118	114	110	102	123	133	Project Specific Measurements
Drill	D	Lw		101	103	114	112	111	111	108	110	106	117	120	Project Specific Measurements
Truck	Truck	Lw		92	103	105	101	101	99	98	96	90	105	110	Golder Database
Loader Extraction	Loader	Lw		96	100	98	91	93	94	89	82	76	97	104	Golder Database

APPENDIX D

Weather Data

Station Name LONDON A

Province ONTARIO

Latitude 43°01'59.000" N

Longitude 81°09'04.000" W

Elevation 278

Climate Identifier 6144473

WMO Identifier 71623

TC Identifier YXU

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 G1Weather Data June 27, 2019

Time	Temperature (°C)	Dew Point Temperature (°C)	Relative Humidity (%)	Wind Direction (10s deg.)	Wind Speed (km/h)	Stn Pressure (kPa)	Weather
0:00	17	15	87	12	3	98.7	NA
1:00	16	15	89	NA	0	98.7	Mostly Cloudy
2:00	15	15	95	36	1	98.7	NA
3:00	15	14	95	4	3	98.8	NA
4:00	15	15	97	36	3	98.8	Mostly Cloudy
5:00	15	15	98	36	1	98.9	NA
6:00	16	16	98	36	1	98.9	NA
7:00	18	17	91	36	2	99.0	Mostly Cloudy
8:00	20	16	79	35	4	99.0	NA
9:00	22	17	77	3	5	98.9	NA

Time	Temperature (°C)	Dew Point Temperature (°C)	Relative Humidity (%)	Wind Direction (10s deg.)	Wind Speed (km/h)	Stn Pressure (kPa)	Weather
10:00	24	17	67	36	2	98.9	Mostly Cloudy
11:00	26	15	49	7	7	99.0	NA
12:00	27	14	44	26	4	99.0	NA
13:00	27	14	44	18	5	98.9	Mostly Cloudy
14:00	28	15	43	36	3	98.9	NA
15:00	28	13	38	7	7	98.9	NA
16:00	29	13	38	32	8	98.8	Mainly Clear
17:00	29	15	41	36	1	98.8	NA
18:00	28	14	41	29	7	98.8	NA
19:00	27	18	58	33	4	98.8	Mostly Cloudy
20:00	22	15	65	34	6	98.9	NA
21:00	21	14	67	30	4	98.9	NA
22:00	20	15	70	12	8	98.9	Mostly Cloudy
23:00	20	15	73	16	3	99.0	NA

NA – not applicable

APPENDIX E

Calibration Certificates

Calibration Certificate

Certificate Number 2019004150

Customer:
Golder Associates
Suite 100
6925 Century Avenue
Mississauga, ON L5N 7K2, Canada

Model Number	CAL200-NTI	***Procedure Number***	D0001.8386
Serial Number	8990	***Technician***	Abraham Ortega
Test Results	**Pass**	***Calibration Date***	4 Apr 2019
Initial Condition	AS RECEIVED same as shipped	***Calibration Due***	4 Apr 2020
Description	Larson Davis CAL200 Acoustic Calibrator	***Temperature***	23 °C ± 0.3 °C
		Humidity	39 %RH ± 3 %RH
		Static Pressure	101.2 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 60942:2017 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 9001:2015.

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	09/06/2018	09/06/2019	001021
Larson Davis Model 2900 Real Time Analyzer	04/02/2019	04/02/2020	001051
Microphone Calibration System	03/04/2019	03/04/2020	005446
1/2" Preamplifier	09/20/2018	09/20/2019	006506
Larson Davis 1/2" Preamplifier 7-pin LEMO	08/07/2018	08/07/2019	006507
1/2 inch Microphone - RI - 200V	05/10/2018	05/10/2019	006510
Pressure Transducer	07/18/2018	07/18/2019	007368

Output Level

Nominal Level [dB]	Pressure [kPa]	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
114	101.0	114.00	113.80	114.20	0.14	Pass
94	101.2	93.98	93.80	94.20	0.15	Pass

-- End of measurement results--

Frequency

Nominal Level [dB]	Pressure [kPa]	Test Result [Hz]	Lower limit [Hz]	Upper limit [Hz]	Expanded Uncertainty [Hz]	Result
114	101.0	999.97	990.00	1,010.00	0.20	Pass
94	101.2	999.99	990.00	1,010.00	0.20	Pass

-- End of measurement results--

Total Harmonic Distortion + Noise (THD+N)

Nominal Level [dB]	Pressure [kPa]	Test Result [%]	Lower limit [%]	Upper limit [%]	Expanded Uncertainty [%]	Result
114	101.0	0.41	0.00	2.00	0.25 ‡	Pass
94	101.2	0.45	0.00	2.00	0.25 ‡	Pass

-- End of measurement results--

Level Change Over Pressure

Tested at: 114 dB, 23 °C, 39 %RH

Nominal Pressure [kPa]	Pressure [kPa]	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
108.0	107.9	-0.02	-0.30	0.30	0.04 ‡	Pass
101.3	101.2	0.00	-0.30	0.30	0.04 ‡	Pass
92.0	91.9	0.01	-0.30	0.30	0.04 ‡	Pass
83.0	82.9	0.00	-0.30	0.30	0.04 ‡	Pass
74.0	73.9	-0.07	-0.30	0.30	0.04 ‡	Pass
65.0	64.8	-0.19	-0.30	0.30	0.04 ‡	Pass

-- End of measurement results--

Frequency Change Over Pressure

Tested at: 114 dB, 23 °C, 39 %RH

Nominal Pressure [kPa]	Pressure [kPa]	Test Result [Hz]	Lower limit [Hz]	Upper limit [Hz]	Expanded Uncertainty [Hz]	Result
108.0	107.9	0.00	-10.00	10.00	0.20 ‡	Pass
101.3	101.2	0.00	-10.00	10.00	0.20 ‡	Pass
92.0	91.9	0.00	-10.00	10.00	0.20 ‡	Pass
83.0	82.9	0.00	-10.00	10.00	0.20 ‡	Pass
74.0	73.9	-0.01	-10.00	10.00	0.20 ‡	Pass
65.0	64.8	-0.01	-10.00	10.00	0.20 ‡	Pass

-- End of measurement results--

Total Harmonic Distortion + Noise (THD+N) Over Pressure

Tested at: 114 dB, 23 °C, 39 %RH

Nominal Pressure [kPa]	Pressure [kPa]	Test Result [%]	Lower limit [%]	Upper limit [%]	Expanded Uncertainty [%]	Result
108.0	107.9	0.40	0.00	2.00	0.25 ‡	Pass
101.3	101.2	0.41	0.00	2.00	0.25 ‡	Pass
92.0	91.9	0.43	0.00	2.00	0.25 ‡	Pass
83.0	82.9	0.45	0.00	2.00	0.25 ‡	Pass
74.0	73.9	0.48	0.00	2.00	0.25 ‡	Pass
65.0	64.8	0.51	0.00	2.00	0.25 ‡	Pass

-- End of measurement results--

Signatory: *Abraham Ortega*

LARSON DAVIS - A PCB PIEZOTRONICS DIV.
1681 West 820 North
Provo, UT 84601, United States
716-684-0001

ACCREDITED Cert. #3622.01

LARSON DAVIS
A PCB PIEZOTRONICS DIV.

Calibration Certificate

Certificate Number 2017009620

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***	6 Sep 2017	
Initial Condition	AS RECEIVED same as shipped		***Calibration Due***		
Description	Larson Davis Model 831 Class 1 Sound Level Meter Firmware Revision: 2.314		***Temperature***	23.58 °C	± 0.25 °C
			Humidity	49.4 %RH	± 2.0 %RH
			Static Pressure	86.59 kPa	± 0.13 kPa

Evaluation Method Tested electrically using Larson Davis 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)
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 2017009656

Customer:

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

Model Number	831		***Procedure Number***	D0001.8384	
Serial Number	0001702		***Technician***	Ron Harris	
Test Results	**Pass**		***Calibration Date***	6 Sep 2017	
Initial Condition	AS RECEIVED same as shipped		***Calibration Due***		
Description	Larson Davis Model 831 Class 1 Sound Level Meter Firmware Revision: 2.314		***Temperature***	23.5 °C	± 0.25 °C
			Humidity	49 %RH	± 2.0 %RH
			Static Pressure	86.45 kPa	± 0.13 kPa

Evaluation Method ***Tested with:***

Larson Davis PRM831. S/N 019106
PCB 377B20. S/N 115034
Larson Davis CAL200. S/N 9079
Larson Davis CAL291. S/N 0203

Data reported in dB re 20 µPa.

Compliance Standards Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8378:

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

For 1/4" microphones, the Larson Davis ADP024 1/4" to 1/2" adaptor is used with the calibrators and the Larson Davis ADP043 1/4" to

Calibration Certificate

Certificate Number 2017009618
Customer:
Golder Associates Inc
6925 Century Avenue
Mississauga,ON L5N 7K2,Canada

Model Number	PRM831	***Procedure Number***	D0001.8383		
Serial Number	019106	***Technician***	Ron Harris		
Test Results	**Pass**	***Calibration Date***	6 Sep 2017		
Initial Condition	AS RECEIVED same as shipped	***Calibration Due***			
		Temperature	23.55	°C	± 0.01 °C
Description	Larson Davis 1/2" Preamplifier for Model 831 Type 1	***Humidity***	50.9	%RH	± 0.5 %RH
		Static Pressure	86.58	kPa	± 0.03 kPa

Evaluation Method Tested electrically using 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

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
Larson Davis Model 2900 Real Time Analyzer	03/08/2017	03/08/2018	003003
Hart Scientific 2626-S Humidity/Temperature Sensor	06/11/2017	06/11/2018	006943
Agilent 34401A DMM	06/28/2017	06/28/2018	007165
SRS DS360 Ultra Low Distortion Generator	10/14/2016	10/14/2017	007167

APPENDIX F

Sample Calculations

Receiver
Name: POR001
ID: POR001
X: 485379.00 m
Y: 4787478.00 m
Z: 301.62 m

vert. Area Source, ISO 9613, Name: "Wash Plant Gen Door Opening Washplant", ID: "!E03!!PE08!Gen_WP_D"																				
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	485756.28	4787443.07	276.00	0	DEN	A	118.0	-1.2	0.0	0.0	0.0	62.6	2.3	1.0	0.0	0.0	11.7	0.0	0.0	39.1
17	485756.28	4787443.07	277.00	0	DEN	A	118.0	-1.2	0.0	0.0	0.0	62.6	2.3	-0.1	0.0	0.0	12.1	0.0	0.0	39.8

vert. Area Source, ISO 9613, Name: "Gen Large Door Opening Washplant", ID: "!E03!!PE08!Gen_D_WP"																				
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)
36	485759.85	4787441.64	277.00	0	DEN	A	112.9	3.0	0.0	0.0	0.0	62.7	2.3	0.1	0.0	0.0	21.7	0.0	0.0	29.3
58	485759.85	4787441.64	276.00	0	DEN	A	112.9	3.0	0.0	0.0	0.0	62.7	2.3	1.2	0.0	0.0	21.7	0.0	0.0	28.1

vert. Area Source, ISO 9613, Name: "Primary Screener b", ID: "!E03!!PE08!PS_B"																				
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)
75	485729.93	4787455.45	281.00	0	DEN	A	106.4	7.8	0.0	0.0	0.0	61.9	2.5	-0.4	0.0	0.0	12.6	0.0	0.0	37.5
90	485729.93	4787455.45	280.00	0	DEN	A	106.4	7.8	0.0	0.0	0.0	61.9	2.5	-0.5	0.0	0.0	13.2	0.0	0.0	37.0
107	485729.93	4787455.45	279.00	0	DEN	A	106.4	7.8	0.0	0.0	0.0	61.9	2.5	-0.6	0.0	0.0	13.7	0.0	0.0	36.6

vert. Area Source, ISO 9613, Name: "Primary Screener a", ID: "!E03!!PE08!PS_A"																				
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)
123	485729.93	4787453.37	279.00	0	DEN	A	106.4	7.8	0.0	0.0	0.0	61.9	2.5	-0.6	0.0	0.0	23.7	0.0	0.0	26.6
141	485731.72	4787453.37	281.00	0	DEN	A	106.4	3.8	0.0	0.0	0.0	62.0	2.5	-0.4	0.0	0.0	20.8	0.0	0.0	25.2
148	485728.74	4787453.37	281.00	0	DEN	A	106.4	5.5	0.0	0.0	0.0	61.9	2.5	-0.4	0.0	0.0	21.0	0.0	0.0	26.9
166	485729.93	4787453.37	280.00	0	DEN	A	106.4	7.8	0.0	0.0	0.0	61.9	2.5	-0.5	0.0	0.0	22.7	0.0	0.0	27.5

Point Source, ISO 9613, Name: "Drill - HCR 15000 ED", ID: "!E03!D"																				
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)
174	485648.10	4787444.16	291.90	0	D	A	117.0	0.0	0.0	0.0	0.0	59.7	2.7	0.1	0.0	0.0	18.0	0.0	0.0	36.5

vert. Area Source, ISO 9613, Name: "Secondary Screener b", ID: "!E03!!PE08!SS_B"																				
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)
185	485717.27	4787475.66	281.00	0	DEN	A	105.0	7.8	0.0	0.0	0.0	61.6	2.0	0.2	0.0	0.0	11.5	0.0	0.0	37.5
209	485717.27	4787475.66	280.00	0	DEN	A	105.0	7.8	0.0	0.0	0.0	61.6	2.0	0.2	0.0	0.0	11.9	0.0	0.0	37.0
230	485717.27	4787475.66	279.00	0	DEN	A	105.0	7.8	0.0	0.0	0.0	61.6	2.0	0.2	0.0	0.0	12.3	0.0	0.0	36.7

vert. Area Source, ISO 9613, Name: "Secondary Screener a", ID: "!E03!!PE08!SS_A"																				
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)
248	485718.18	4787473.79	280.00	0	DEN	A	105.0	7.8	0.0	0.0	0.0	61.6	2.0	0.2	0.0	0.0	21.0	0.0	0.0	27.9
271	485718.18	4787473.79	279.00	0	DEN	A	105.0	7.8	0.0	0.0	0.0	61.6	2.0	0.2	0.0	0.0	22.0	0.0	0.0	27.0
294	485718.18	4787473.79	281.00	0	DEN	A	105.0	7.8	0.0	0.0	0.0	61.6	2.0	0.2	0.0	0.0	19.5	0.0	0.0	29.5

vert. Area Source, ISO 9613, Name: "Jaw Crusher a", ID: "!E03!!PE08!JS_A"																				
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)
322	485692.45	4787448.85	278.00	0	DEN	A	106.9	4.8	0.0	0.0	0.0	61.0	1.7	0.1	0.0	0.0	17.6	0.0	0.0	31.3
369	485692.45	4787448.85	279.00	0	DEN	A	106.9	4.8	0.0	0.0	0.0	61.0	1.7	0.1	0.0	0.0	17.2	0.0	0.0	31.7
505	485692.45	4787448.85	277.25	0	DEN	A	106.9	1.8	0.0	0.0	0.0	61.0	1.7	0.3	0.0	0.0	17.7	0.0	0.0	28.0

vert. Area Source, ISO 9613, Name: "Jaw Crusher b", ID: "!E03!!PE08!JS_B"																				
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)
417	485694.36	4787448.20	278.00	0	DEN	A	106.9	4.8	0.0	0.0	0.0	61.0	1.7	0.0	0.0	0.0	22.4	0.0	0.0	26.6
465	485694.36	4787448.20	279.00	0	DEN	A	106.9	4.8	0.0	0.0	0.0	61.0	1.7	0.1	0.0	0.0	21.7	0.0	0.0	27.2
541	485694.36	4787448.20	277.25	0	DEN	A	106.9	1.8	0.0	0.0	0.0	61.0	1.7	0.3	0.0	0.0	22.5	0.0	0.0	23.2
578	485694.12	4787447.50	277.25	1	DEN	A	106.9	-1.2	0.0	0.0	0.0	63.8	2.2	0.0	0.0	0.0	7.3	0.0	12.3	20.2

Point Source, ISO 9613, Name: "Wash Plant Combustion Exhaust", ID: "!E03!!PE08!WP_exh"																				
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)
612	485757.41	4787442.37	279.00	0	DEN	A	108.2	0.0	0.0	0.0	0.0	62.6	1.1	-0.3	0.0	0.0	9.3	0.0	0.0	35.5

Area Source, ISO 9613, Name: "Exhaust Gen Processing Plant", ID: "!E03!!PE08!Gen_exh"																				
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)
623	485704.90	4787462.79	278.55	0	DEN	A	105.9	-0.1	0.0	0.0	0.0	61.3	2.9	-0.3	0.0	0.0	15.4	0.0	0.0	26.5
713	485705.23	4787462.14	278.55	0	DEN	A	105.9	-0.1	0.0	0.0	0.0	61.3	2.9	-0.3	0.0	0.0	15.3	0.0	0.0	26.5

vert. Area Source, ISO 9613, Name: "Gen Large Door Opening Processing plant", ID: "!E03!!PE08!Gen_LD_PP"																				
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)
778	485705.66	4787462.46	277.90	0	DEN	A	101.6	3.0	0.0	0.0	0.0	61.3	1.3	0.5	0.0	0.0	19.8	0.0	0.0	21.6
818	485705.66	4787462.46	276.90	0	DEN	A	101.6	3.0	0.0	0.0	0.0	61.3	1.3	1.2	0.0	0.0	20.3	0.0	0.0	20.4

vert. Area Source, ISO 9613, Name: "Gen Door Processing plant", ID: "!E03!!PE08!Gen_D_PP"																				
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)
854	485699.25	4787463.46	277.75	0	DEN	A	103.7	-0.0	0.0	0.0	0.0	61.1	0.9	1.8	0.0	0.0	14.6	0.0	0.0	25.1
884	485699.25	4787463.46	276.75	0	DEN	A	103.7	-0.0	0.0	0.0	0.0	61.1	0.9	2.6	0.0	0.0	17.6	0.0	0.0	21.4

vert. Area Source, ISO 9613, Name: "Wash Plant Black Plant c", ID: "!E03!!PE08!WP_BP_C"																				
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)
917	485745.04	4787449.97	279.00	0	DEN	A	96.3	5.6	0.0	0.0	0.0	62.3	2.4	-0.5	0.0	0.0	11.6	0.0	0.0	26.0
996	485745.04	4787449.97	280.00	0	DEN	A	96.3	5.6	0.0	0.0	0.0	62.3	2.4	-0.4	0.0	0.0	11.1	0.0	0.0	26.4
1004	485745.03	4787452.97	280.00	0	DEN	A	96.3	3.8	0.0	0.0	0.0	62.3	2.4	-0.4	0.0	0.0	11.2	0.0	0.0	24.7

vert. Area Source, ISO 9613, Name: "Wash Plant Black Plant b", ID: "!E03!!PE08!WP_BP_B"																				
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)
1137	485746.57	4787454.17	279.00	0	DEN	A	99.4	4.7	0.0	0.0	0.0	62.3	2.4	-0.5	0.0	0.0	18.3	0.0	0.0	21.5
1181	485746.57	4787454.17	280.00	0	DEN	A	99.4	4.7	0.0	0.0	0.0	62.3	2.4	-0.5	0.0	0.0	11.0	0.0	0.0	28.7

vert. Area Source, ISO 9613, Name: "Wash Plant Black Plant a", ID: "!E03!!PE08!WP_BP_A"																				
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)
1323	485748.10	4787449.42	280.00	1	DEN	A	96.3	4.0	0.0	0.0	0.0	62.7	2.5	-0.5	0.0	0.0	10.1	0.0	2.7	22.9

vert. Area Source, ISO 9613, Name: "Gen Louver 2 Processing plant ", ID: "!E03!!PE08!Gen_L2_PP"																				
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)
1401	485700.34	4787463.46	277.75	0	DEN	A	101.5	-0.0	0.0	0.0	0.0	61.2	1.4	0.4	0.0	0.0	14.3	0.0	0.0	24.2

APPENDIX G

Curricula Vitae

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 – 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 – 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 – 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.

APPENDIX H

Site Plan Recommendations

Thomas Street Pit/Quarry Extension (Y321X)
Noise Report Recommendations for Site Plan - May 28, 2020

1.2.28 - Technical Report Recommendations/Monitoring Requirements
Noise Impact Assessment (Golder, May 2020)

A) General

1) Site operations shall take place during daytime (07:00 to19:00), evening (19:00 to 23:00) and nighttime (23:00 to 07:00). The types of Site operations shall be subject to specific controls and limitations as specified below.
2) No drilling shall occur during evening and nighttime hours.
3) On-Site road-ways shall be maintained to limit noise resulting from trucks driving over ruts and pot-holes, and haul trucks will typically travel at speeds less than 25 km/h.
4) Extraction shall initially occur as a pit operation in the sand/gravel layer in an east-to-west direction from the existing pit/quarry site and will then proceed in a southwesterly and southerly direction and then a northerly direction. Height of stripping face and/or pit face will change throughout the Site (approximately 8m assumed). Processing equipment will be located on the pit floor below the stripping face.
5) Extraction of the quarry will follow a similar pattern as the pit operation. The uppermost quarry lift height will be approximately 14m.
6) Quarry operations can occur concurrent with pit extraction and any processing associated with it. A separation distance of approximately 100m from the quarry face to the pit face shall be maintained. Processing equipment will operate within 30m of the working pit or quarry face.

B) Operational Controls and Shielding

Highest permissible sound levels of primary noise sources are detailed in the Noise Impact Assessment.

1) Daytime (07:00 to 19:00)

The following berms (or acoustically equivalent measures) shall be required prior to on-Site extraction and processing:
- A 3.5 m high (above existing grade) part of west property line barrier; and,
- A 7 m high (above existing grade) south property line barrier.

The location of the property barriers are shown on the Operations Schematic, on this page of the ARA Site Plans.

2) Evening (19:00 to 23:00) and Nighttime (23:00 to 07:00)

i) No drilling shall occur during evening and nighttime hours.

ii) In addition to the daytime controls, equipment noise controls in the form of local barriers (or acoustically equivalent) shall be required to reduce noise emissions from the equipment on the identified PORs for operations during the evening and nighttime period, as follows:
two-sided barrier (i.e., L-shaped) to the south and west of the majority of the equipment located in the Areas 1 through 3;
three-sided barrier (i.e., C-shaped) to the south, west and north direction for the secondary screen located within the Area 1 (i.e., near receptor POR01); and,
one-sided barrier to the south for the secondary screen when located in Area 4.

iii) Noise mitigation shall be applied to the primary and the secondary screen and the wash plant generator. The applicable required
noise controls could include a local barrier or acoustically equivalent treatment.

iv) Areas requiring a specific equipment noise control (i.e. local barriers or acoustically equivalent) during the evening and nighttime period are as shown on ARA site plans.

v) The below Table presents the barrier height or alternative control (i.e. limiting the sound pressure level of specific equipment) needed to achieve noise compliance at the relevant noise limits at the identified sensitive PORs. Either a local barrier or limiting noise emissions (i.e. acoustically equivalent) are required for a given area (i.e. Area 1 through Area 4). Both sets of controls are not required concurrently.

Proposed Equipment Evening and Nighttime Noise Control

Area Requiring Noise Control	**Equipment Specific Noise Control or Proposed Acoustically Equivalent(1)**	
	Local Barrier Required Height	**Required Equipment Noise Level (2)**
1	**Primary Screen** - 7 m high local barrier, **Secondary Screen** - 7m high local barrier, and **Washplant Generator** - 5 m high local barrier	**Primary Screen** - 59 dBA at 60 m, **Secondary Screen** - 60 dBA at 60 m and **Washplant Generator** - 60 dBA at 60 m
2	**Primary Screen** - 7 m high local barrier, and **Secondary Screen** -7 m high local barrier	**Primary Screen** - 59 dBA at 60 m and **Secondary Screen** - 60 dBA at 60 m
3	**Primary Screen** - 6 m high local barrier, and **Secondary Screen** - 6 m high local barrier	**Primary Screen** - 62 dBA at 60 m and **Secondary Screen** - 63 dBA at 60 m
4	**Secondary Screen** - 6 m high local barrier	**Secondary Screen** - 63 dBA at 60 m

Notes:

(1) Considered equipment noise control other than local barriers (e.g., enclosures, equipment substitution) that meets the reference noise level at distance of 60 m from equipment in direction of POR001.

(2) If the preferred control is to limit noise emissions of the specific equipment, these levels should be verified when new equipment is brought onto the Site or when acoustically significant modifications are made to the equipment

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