Noise Impact Analysis

Bacher Construction Limited
McClintock Quarry/Pit

Proposed Pit and Quarry Operation

McClintock Township
Municipality of Algonquin Highlands

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Project: 116-0419

Prepared for

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1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this report is to:

- identify the potential noise sources associated with the proposed quarry operation;
- outline the sound exposure levels expected at surrounding noise-sensitive receptors during the operation of the quarry; and
- provide recommendations for mitigation measures required to meet the Ministry of the Environment and Climate Change (MOE) environmental noise guidelines.

This noise impact assessment only evaluates the potential noise impacts from the steady noise sources operating on-site and does not evaluate the noise and vibration from blasting. Blasting has been addressed by others.

1.2 SITE

The proposed quarry site is located off of McClintock Road, northeast of the intersection of McClintock Road and Harvey Lake Road in the Municipality of Algonquin Highlands.

The site is identified as:

Part of Lots 11 and 12
Concession 2
McClintock Township
Municipality of Algonquin Highlands

A Key Plan has been provided as Figure 1, and a Site Plan has been provided in Figure 2. The land uses in the area of the proposed quarry include rural, environmental protection, and shoreline residential land uses. An existing quarry permit area and operation is located to the north of the proposed operation. Harvey Lake is located approximately 170 m east of the proposed operation. There is also a Municipal pit operation located to the northeast on McClintock Road.

1.3 NOISE SENSITIVE RECEPTORS

Nine (9) noise-sensitive receptors were identified southeast of the proposed quarry operation, along the western shoreline of Harvey Lake. Refer to Figure 3 for the noise sensitive receptor locations (R01 through R09). The nearest receptor is located approximately 200 m from the proposed licensed boundary. Both receptor building facades and associated worst-case outdoor points of reception (i.e a location within 30 m of the facade of a dwelling, in the direction of the proposed operation, at a height of 1.5 m above the ground) were assessed. Building facade receptors are denoted as R0#_F and outdoor points of reception as R0#_O.

Any other noise sensitive receptors are much further removed from the site and will benefit from increased distance attenuation and are expected to receive lower sound exposures from the proposed quarry operation.

2.0 PROGRAMME OF OPERATION

Initially, overburden will be removed to expose the rock. Activities associated with overburden removal are expected to be short in duration. Overburden material will be stored on-site and used later for the site rehabilitation process.

It is assumed that aggregate extraction will generally progress southward from the existing permit area north of the proposed license boundary, moving towards the receptor locations (R01 to R09) to the southeast.

Normal activity at the site would involve a front end loader loading haul trucks with material for shipment off-site. The trucks would be loaded from stockpiles of aggregate from an on site portable processing plant. It is expected that a maximum of about 100,000 tonnes of aggregate per year could be shipped from the site. Based on this extraction limit, a worst case (i.e. maximum) of about 10 truck loads of aggregate could be transported from off the site in an hour.

Rock drilling will be conducted within the proposed site permit area to create holes which will accommodate blasting materials. Once an adequate number of holes have been created, they will be filled with explosives and the rock will be blasted away from the quarry face creating a “muck pile” at the base of the working face. The drilling operation will be contracted to others, and completed on an as-needed basis.

The processing of aggregate material from the muck pile will be done on-site, also on an as-needed basis. Processing involves the use of a portable crushing and screening plant, that make up the portable processing plant. Material is moved from the muck pile to the portable processing plant by the front end loader. The processed aggregate is stored in stockpiles which are created from the processing plant using conveyors and a stacker.

3.0 ENVIRONMENTAL NOISE GUIDELINES

The MOE NPC-300 noise guidelines require that the noise assessment determine the “predictable worst case” impacts. Thus, the assessment must evaluate the largest possible excess over the noise guideline limits based on the proposed quarry operations.

3.1 ON-SITE OPERATIONS

Noise sensitive receptors considered as part of this assessment (R01 to R09) are seasonal cottages, which are considered residential land uses. The area around the McClintock Quarry site is considered a "Class 3 Area", according to MOE definitions. A Class 3 Area is an area that has an existing acoustical environment dominated by the sounds of nature. Refer to the attached Glossary of Terms for definitions of a Class 3 areas based on the MOE noise guidelines.

The area is mainly considered Class 3 due to the distance away from any major road, rail and any other sources of noise. It is understood that there are no noise-related concerns with respect to the existing operations north of the proposed permit boundary. The environmental sound level guidelines for a Class 3 Area are found in the MOE Publication NPC-300, *"Environmental Noise Guideline Stationary and Transportation Sources - Approval and Planning.* For Class 3 Areas, the sound from the source (L_{eq} in any hour) should not exceed the ambient one hour L_{eq} at the receptors of concern, in the corresponding hour.

Notwithstanding the above, for a Class 3 Area, no mitigation is required for any source that does not exceed 45 dBA (one hour L_{eq}), at any off-site receptor of concern between the hours of 0700 and 1900 hours. Between 1900 and 0700 hours, a 40 dBA limit is applicable. These guideline sound limits are referred to as "exclusion limits".

It should be noted that the MOE term "stationary source" refers to the site as a whole including the composite effect of all of the individual sound sources, even if the latter can actually move around the site. Thus, source, as referred to above, means the site (operation) as a whole.

3.2 OFF-SITE HAUL ROUTE

There are no specific statutes, regulations, formal policies under the Planning Act, or guidelines applicable to adding licensed motor vehicles to public roadways and dealing with associated noise.

4.0 APPLICABLE ENVIRONMENTAL NOISE GUIDELINES

To be conservative, the MOE exclusion limits have been applied for activities in the proposed McClintock Quarry/Pit. These are the most stringent of the noise guideline limits.

5.0 ANALYSIS

5.1 ON-SITE OPERATIONS

A quarry operation is a dynamic, continually changing process, that moves across the site. The site operations consist of various components:

- site preparation, including the removal of trees and the stripping of overburden;
- drilling and blasting;
- the processing of aggregate;
- loading trucks with aggregate and shipment off-site;
- the rehabilitation of the quarry; and
- miscellaneous construction activities.

Construction activities, including site preparation and rehabilitation, are not chronic and are excluded from the stationary noise source assessment as per the MOE guidelines.

It is understood that the proposed quarry operating hours for the portable processing plant and rock drill are limited to between 0700 and 1900 hours (i.e. daytime hours as defined by the MOE). Loading of trucks and shipping off-site may occur during daytime hours, and also between 1900 and 0700 hours (i.e. evening and nighttime hours as defined by the MOE).

A rock drill will operate on top of the working face to create blast holes. The blasts will remove the rock from the working face and create a muck pile on the quarry floor. A front end loader will load material from the muck pile at the base of the working face into the portable processing plant. The processing plant will crush and screen the aggregate into final forms which will be stockpiled on the quarry floor. The front end loader will load shipping trucks using material from the stockpiles, and the trucks will haul the processed material off-site. Note that other equipment with similar sound emission levels can be used on site without impacting off-site sound exposures at the identified noise-sensitive receptors. For example, an excavator can be used instead of a front end loader. However, the noise assessment is considered to reflect a worst case operating scenario.

As previously indicated, the normal daily operation at the site is the loading of trucks with processed aggregate for shipment off-site. Drilling and processing activities will be short duration events that will occur on an as-needed basis.

The equipment sound emission levels used as part of this analysis are included in the table on the following page. Sound emission levels are based on measurements of quarry of equipment conducted by Valcoustics Canada Ltd. as part of previous studies.

Type	Maximum Sound Emission Level
Front End Loader	78 dBA @ 15 m
Rock Drill	90 dBA @ 15 m
Portable Processing Plant	85 dBA @ 15 m
Shipping Trucks	75 dBA @ 15 m

To ensure noise emissions comply with the recommendations of this report, it is recommended that sound emission levels from equipment to be used on the site be measured to ensure they do not exceed the levels outlined herein or, for equipment brought on site on an as-needed basis, they have appropriate portable Certificates of Approval (C's of A) or Environmental Compliance Approvals (ECA's).

To assess noise impacts associated with the quarry operation at the noise sensitive receptor locations, an acoustical model was developed using CadnaA (Version 4.6) environmental noise modelling software. The model uses the prediction algorithms outlined in International Standards Organization Standard 9613-2:1996, "*Acoustics – Attenuation of sound during propagation*

outdoors – Part 2: General method of calculation". The modelling technique is an approach that is acceptable to the MOE. The model considered additional factors such as ground absorption and topography that could have an effect on the sound exposures at nearby noise-sensitive receptors.

5.2 HAUL ROUTE

As previously indicated, the MOE do not have noise guidelines for adding licensed vehicle traffic to public roadways. However, the draft MOE "*Noise Guidelines for Landfill Sites"* does address haul routes. The haul route requirements outlined in the landfill guidelines are often used for quarry applications. It states that an access route shall be selected which will result in a minimum noise impact.

It is understood in this case that McClintock Road, which is to be used as the primary haul route, is already used as a haul route for the existing permit area to the north, as well as the Municipal pit to the northeast. As such, a significant increase in truck traffic along the haul route is not expected. In the absolute worst case, if the truck traffic volume on the haul rout were to double, the sound level increase at receptors along the haul route could increase by up to 3 dBA. This is considered an "insignificant" noise impact by the MOE.

6.0 RESULTS

6.1 UNMITIGATED SCENARIO

The worst case analysis results for predicted sound exposure levels at the receptors are provided in Table 1 for daytime hours and Table 2 for evening/nighttime hours. The results presented in Tables 1 and 2 assume no mitigation measures have been taken into account. The worst case sound exposures from daytime operations are predicted to exceed 45 dBA at all noise-sensitive receptors (both outdoor and facade) except for R04_O, R08_F, and R09_F. The largest exceedance of the MOE guideline limits is predicted to occur at receptor R1_O, which is located closest to the proposed extraction area. The evening/nighttime operations include only front end loader and haul truck activity and are predicted to comply with the respective MOE noise guideline limits.

Due to the exceedance of the MOE daytime guideline limits at the identified receptors during predictable worst case operations, noise mitigation measures are required. Two alternatives have been considered and are presented in Sections 6.2 and 6.3 of this report. The first alternative considers the use of two perimeter sound barriers, and the second considers the use of a quieter rock drill and a single sound barrier.

6.2 MITIGATION RECOMMENDATIONS - ALTERNATIVE 1

To comply with the MOE daytime noise guideline limits using the operating equipment specified in Section 5.1, two perimeter sound barriers would be required as shown in Figure 4. The barrier along the southern boundary would need to be 19 m in height, and the barrier to the north would also need to be 19 m in height. The analysis results for daytime hours considering these proposed mitigation measures (i.e. Alternative 1) are presented in Table 3. With these sound barriers/berms in place, the sound exposure levels at all receptors are predicted to comply with the MOE daytime guideline limit of 45 dBA. The predicted evening/nighttime results with the proposed mitigation

measures in place are also presented in Table 4, and show compliance with the MOE guideline limits for all receptors.

Due to the significant height requirements of the sound barriers required to achieve compliance with MOE guideline limits, a second alternative was investigated that considered the use of a quieter rock drill, as discussed in the following section.

6.3 MITIGATION RECOMMENDATIONS - ALTERNATIVE 2

The most significant noise source at the quarry is the rock drill. The drill is understood to operate atop the working face of the extraction area. Therefore, for Alternative 2, it is recommended that a quieter drill with a maximum sound emission level of 80 dBA at 15 m is used for the operation. An example of a quiet drill is the Atlas Copco SmartRig fitted with a noise control shroud (product information has been included for reference in Appendix C). This compares to the drill presented in Section 5.1 and used in the Unmitigated and Alternative 1 scenario analyses, that has a maximum sound emission level of 90 dbA at 15 m.

Analysis indicates that in combination with the quiet rock drill, a shorter perimeter sound barrier along a portion of the southern license boundary would also be required. The extent of this proposed sound barrier is shown in Figure 5, and the predicted height requirement of the sound barrier is 10 m. Furthermore, with the use of the quiet rock drill, and with the assumption that aggregate extraction will generally occur from north to south within the permit boundary, this barrier would not need to be built prior to commencing extraction. The barrier would only need to be constructed once the operations reach the boundary presented in Figure 5.

The analysis results considering these proposed mitigation measures (i.e. Alternative 2) are also presented in Table 3 for daytime hours, and Table 4 for evening/nighttime hours. The results for Alternative 2 indicate that sound exposure levels at all receptors are predicted to comply with the MOE noise guideline limits.

The sound barrier configurations illustrated in Figure 4 and Figure 5 are considered conceptual and can be modified to account for grading and drainage requirements. Additional noise mitigation options are also available, including:

- using localised sound barriers to provide screening of noisier equipment, such as the portable processing plant or the rock drill; and
- using quieter equipment, if available.

Based on MOE definitions, a sound barrier is defined as a wall, berm, wall/berm combination or similar structure, with a minimum surface density (face weight) of 20 kg/m^2. The barrier must be structurally sound, appropriately designed to withstand wind and snow load, and constructed without cracks or surface gaps. Any gaps under the barrier required for drainage purposes should be minimized and localized, such that the acoustical performance of the barrier is not compromised. Sound barriers can be constructed from a variety of materials, including but not limited to wood, masonry, earthen berms, composites, or a combination of these materials, provided the requirements listed above are achieved.

It is recommended that any changes to the noise mitigation measures and/or equipment be reviewed by a qualified acoustical consultant to ensure compliance with the MOE noise guideline limits.

7.0 RECOMMENDATIONS

1. The sound emission level for all pieces of equipment used for construction activities including site preparation and rehabilitation must comply with the limits outlined in MOE Publication NPC-115, "*Construction Equipment*".

2. Construction activities should only occur during the daytime (i.e. 0700 to 1900 hours) period, Monday to Friday. There should be no construction on weekends or on statutory holidays unless required due to an emergency.

3. Sound emissions from equipment to be used on-site should be measured to confirm that they comply with the levels outlined within this report. For the quiet rock drill (i.e. Alternative 2), the maximum emission level is 80 dBA at 15 m. Details regarding a potential quiet drill alternative are included in Appendix C. Alternatively, for equipment brought on-site on an as-needed basis, they should have appropriate portable C's of A or ECA's.

4. Sound barriers are recommended to be constructed as shown in Figure 4 (Alternative 1) or Figure 5 (Alternative 2). The sound barrier may be constructed according to the timing shown in Figure 5 for Alternative 2, assuming extraction will generally occur from north to south as outlined within this report.

5. Back-up beepers are exempt from assessment by the MOE stationary noise source guidelines. However, to reduce off-site noise impacts, we recommend alternative technologies be used on all equipment operating at the McClintock Quarry/Pit site. Details regarding a potential alternative are included in Appendix C.

6. To maximize the acoustical screening provided by dense woods and minimize the sound exposures at the receptors, it is recommended that drilling not be done when there are no leaves on the trees.

7. Operational activities that involve the use of the portable processing plant and/or rock drill should only occur during the daytime (i.e. 0700 to 1900 hours) period. Evening/nighttime operation of only the front end loader and off-site haul trucks for shipping of aggregate off site is predicted to comply with the nighttime MOE guideline limits for all scenarios.

8. Off-site noise audit measurements should be completed when operations are underway on the site to confirm the MOE noise guideline limits are met. The audit measurements must be done by a qualified acoustical engineer.

9. If other or new equipment is brought to the site, the sound emissions should be checked to ensure the equipment is in compliance with this noise study.

10. If alternate noise mitigation measures are to be implemented, they should be reviewed by a qualified acoustical consultant to ensure the MOE noise guideline limits will be met.

8.0 CONCLUSIONS

With the appropriate implementation of the mitigation measures outlined herein, the sound exposure levels from the worst case daily operations of the proposed McClintock Quarry/Pit are predicted to be in compliance with the MOE noise guideline limits.

As the operation moves over the site, elevation, distance and sound exposure are expected to vary relative to off-site receptors. Thus, the noise analysis has been approached on the basis of determining worst case conditions to ensure that the data presented does not under-predict the potential off-site sound exposures. The interpretation of the sound exposure predictions must take this into account.

9.0 REFERENCES

1. "Model Municipal Noise Control By-Law", Final Report, Ontario Ministry of the Environment, August 1978.

2. "Noise Emission Levels for Vehicles in Ontario", Ontario Ministry of Transportation and Communications, November 1985, H05-85-02.

3. "Sound Level Limits for Stationary Sources in Class 1 and 2 Areas (URBAN)" Ontario Ministry of the Environment, Publication NPC-205, October 1995.

4. "Sound Level Limits for Stationary Sources in Class 3 Areas (Rural)", Ontario Ministry of the Environment, Publication NPC-232, October 1995.

5. "Information to be Submitted for Approval of Stationary Sources of Sound", Ontario Ministry of the Environment, Publication NPC-233, October 1995.

6. “Noise Guidelines for Landfill Sites (Draft)”, Ontario Ministry of the Environment, October 1998.

7. PC STAMSON 5.04, “Computer Program for Road Traffic Noise Assessment”, Ontario Ministry of the Environment.

8. “Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation”, ISO 9613-2, December 15, 1996.

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GLOSSARY OF TERMS

Class 1 Area (MOE definition):

means an area with an acoustical environment typical of a major population centre, where the background sound level is dominated by the urban hum.

Class 2 Area (MOE definition):

means an area with an acoustical environment that has qualities representative of both Class 1 and Class 3 Areas, and in which a low ambient sound level, normally occurring only between 2300 and 0700 hours in Class 1 Areas, will typically be realized as early as 1900 hours.

Other characteristics which may indicate the presence of a Class 2 Area include:

- absence of urban hum between 1900 and 2300 hours;
- evening background sound level defined by natural environment and infrequency human activity; and
- no clearly audible sound from stationary sources other than from those under impact assessment.

Class 3 Area (MOE definition):

means a rural area with an acoustical environment that is dominated by natural sounds having little or no road traffic, such as the following:

- a small community with less than 1000 population;
- agricultural area;
- a rural recreational area such as a cottage or a resort area; or
- a wilderness area.

Construction (MOE definition):

"Construction" includes erection, alteration, repair, dismantling, demolition, structural maintenance, painting, moving, land clearing, earthmoving, grading, excavating, the laying of pipe and conduit whether above or below ground level, street and highway building, concreting, equipment installation and alteration and the structural installation of construction components and materials in any form or for any purpose, and includes any work in connection therewith.

Construction Equipment (MOE definition):

"Construction equipment" means any equipment or device designed and intended for use in construction, or material handling, including but not limited to, air compressors, pile drivers, pneumatic or hydraulic tools, bulldozers, tractors, excavators, trenchers, cranes, derricks, loaders, scrapers, pavers, generators, off-highway haulers or trucks, ditchers, compactors and rollers, pumps, concrete mixers, graders, or other material handling equipment.

Conveyance (MOE definition):

"Conveyance" includes a vehicle and any other device employed to transport a person or persons or goods from place to place but does not include any such device or vehicle if operated only within the premises of a person.

dB - Decibel:

See Sound (Pressure) Level.**dBA - A weighted decibel:**

A nationally and internationally standardized frequency weighting applied to the sound level spectrum to approximate the sensitivity of the human hearing mechanism as a function of frequency (pitch).

L_{eq} - The energy equivalent continuous sound level:

The constant sound level over the time period in question, that results in the same total sound energy as the actually varying sound. Must be associated with a time period.

L_x - Statistical Sound Level Descriptor:

The sound level exceeded for x% of the time. For all practical purposes, L_{90} is the residual (lowest) ambient sound level.

Sound (Pressure) Level:

Measured in decibels (dB) it is the logarithmic ratio of the instantaneous energy of a sound to the energy at the threshold of hearing. Mathematically:

$$SPL \ (dB) = 20 \log \left(\frac{p}{p_0}\right)$$

where p is the pressure due to the sound and p_o is the pressure at the threshold of hearing, taken as 20 micro Pascals.

Stationary Source (MOE definition):

"Stationary source" means a source of sound which does not normally move from place to place and includes the premises of a person as one stationary source, unless the dominant source of sound on those premises is construction or a conveyance.

TABLE 1

WORST CASE SOUND EXPOSURES DURING UNMITIGATED OPERATIONS - DAYTIME HOURS

Receptor	Combined Sound Exposure (dBA)	MOE Daytime Noise Guideline Limit (dBA)	Compliance with Limit (Y/N)?
R01_F	57	45	N
R01_O	58	45	N
R02_F	56	45	N
R02_O	57	45	N
R03_F	49	45	N
R03_O	50	45	N
R04_F	46	45	N
R04_O	44	45	Y
R05_F	51	45	N
R05_O	47	45	N
R06_F	50	45	N
R06_O	50	45	N
R07_F	46	45	N
R07_O	48	45	N
R08_F	45	45	Y
R08_O	46	45	N
R09_F	45	45	Y
R09_O	46	45	N

TABLE 2

WORST CASE SOUND EXPOSURES DURING UNMITIGATED OPERATIONS - EVENING/NIGHTTIME HOURS

Receptor	Combined Sound Exposure (dBA)	MOE Evening/Nighttime Noise Guideline Limit (dBA)	Compliance with Limit (Y/N)?
R01_F	39	40	Y
R01_O	40	40	Y
R02_F	38	40	Y
R02_O	39	40	Y
R03_F	34	40	Y
R03_O	33	40	Y
R04_F	29	40	Y
R04_O	29	40	Y
R05_F	34	40	Y
R05_O	30	40	Y
R06_F	35	40	Y
R06_O	34	40	Y
R07_F	31	40	Y
R07_O	32	40	Y
R08_F	30	40	Y
R08_O	31	40	Y
R09_F	30	40	Y
R09_O	31	40	Y

TABLE 3

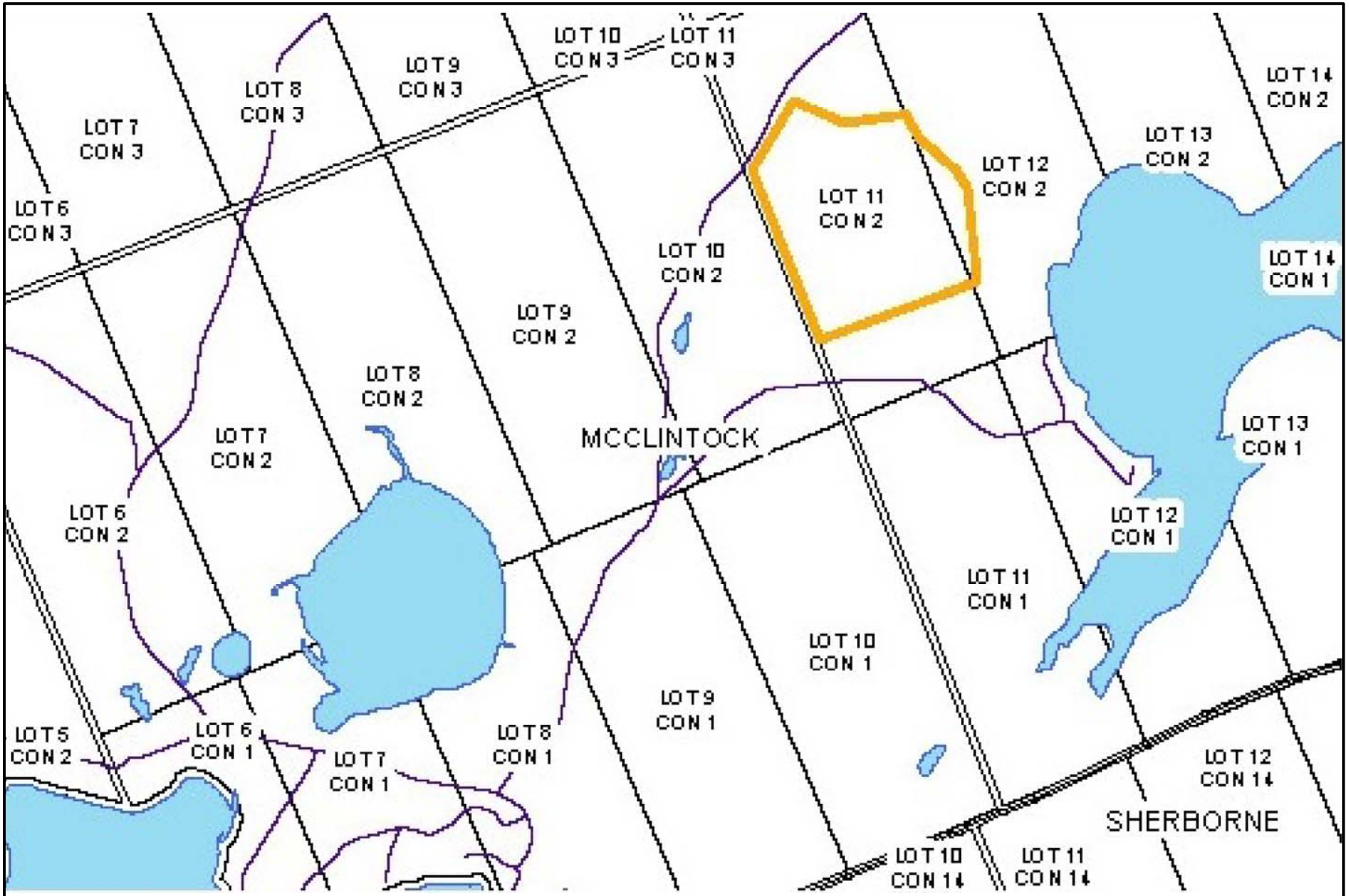
WORST CASE SOUND EXPOSURES DURING MITIGATED OPERATIONS (ALTERNATIVES 1 AND 2) - DAYTIME HOURS

Receptor	Combined Sound Exposure - Alternative 1 (dBA)	Combined Sound Exposure - Alternative 2 (dBA)	MOE Daytime Noise Guideline Limit (dBA)	Compliance with Limit (Y/N)?
R01_F	45	45	45	Y
R01_O	45	45	45	Y
R02_F	44	44	45	Y
R02_O	44	45	45	Y
R03_F	38	38	45	Y
R03_O	38	38	45	Y
R04_F	36	35	45	Y
R04_O	33	33	45	Y
R05_F	40	40	45	Y
R05_O	36	35	45	Y
R06_F	40	39	45	Y
R06_O	39	39	45	Y
R07_F	37	36	45	Y
R07_O	38	37	45	Y
R08_F	36	35	45	Y
R08_O	37	36	45	Y
R09_F	35	35	45	Y
R09_O	36	36	45	Y

TABLE 4

WORST CASE SOUND EXPOSURES DURING MITIGATED OPERATIONS (ALTERNATIVES 1 AND 2) - EVENING/NIGHTTIME HOURS

Receptor	Combined Sound Exposure - Alternative 1 (dBA)	Combined Sound Exposure - Alternative 2 (dBA)	MOE Evening/Nighttime Noise Guideline Limit (dBA)	Compliance with Limit (Y/N)?
R01_F	29	35	40	Y
R01_O	30	35	40	Y
R02_F	28	34	40	Y
R02_O	29	34	40	Y
R03_F	25	30	40	Y
R03_O	25	30	40	Y
R04_F	21	26	40	Y
R04_O	21	26	40	Y
R05_F	25	30	40	Y
R05_O	22	27	40	Y
R06_F	26	31	40	Y
R06_O	25	30	40	Y
R07_F	23	28	40	Y
R07_O	24	29	40	Y
R08_F	22	27	40	Y
R08_O	23	28	40	Y
R09_F	22	27	40	Y
R09_O	23	28	40	Y



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Title	Date	Figure
Key Plan	**March 14, 2017**	**1**
Project Name: **Bacher Construction Limited - McClintock Quarry/Pit**	Project No.: **116-0419**	

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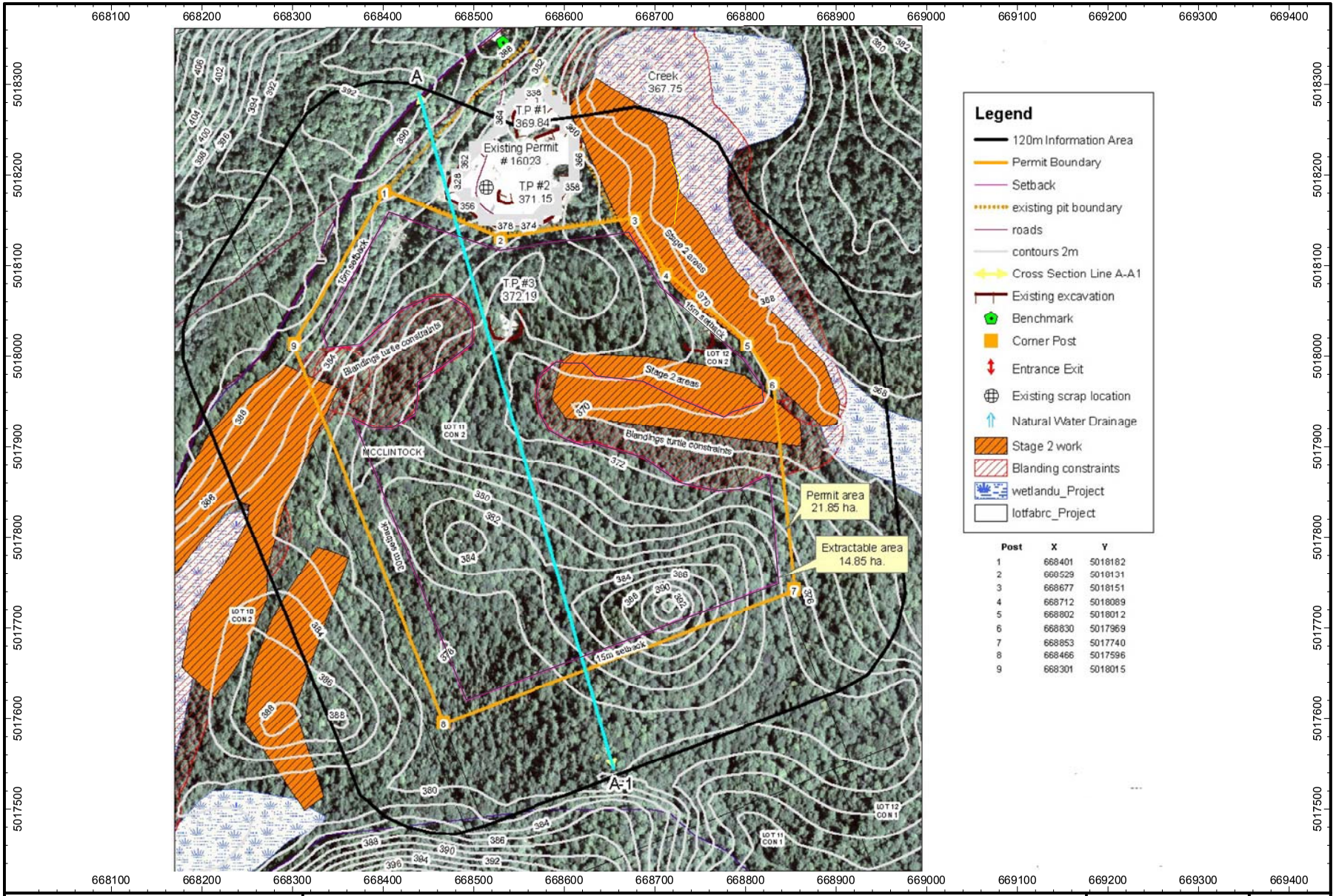
Date Plotted: 14.03.17



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Title: **Site Plan**	Date: **March 14, 2017**	Figure: **2**
Project Name: **Bacher Construction Limited - McClintock Quarry/Pit**	Project No.: **116-0419**	

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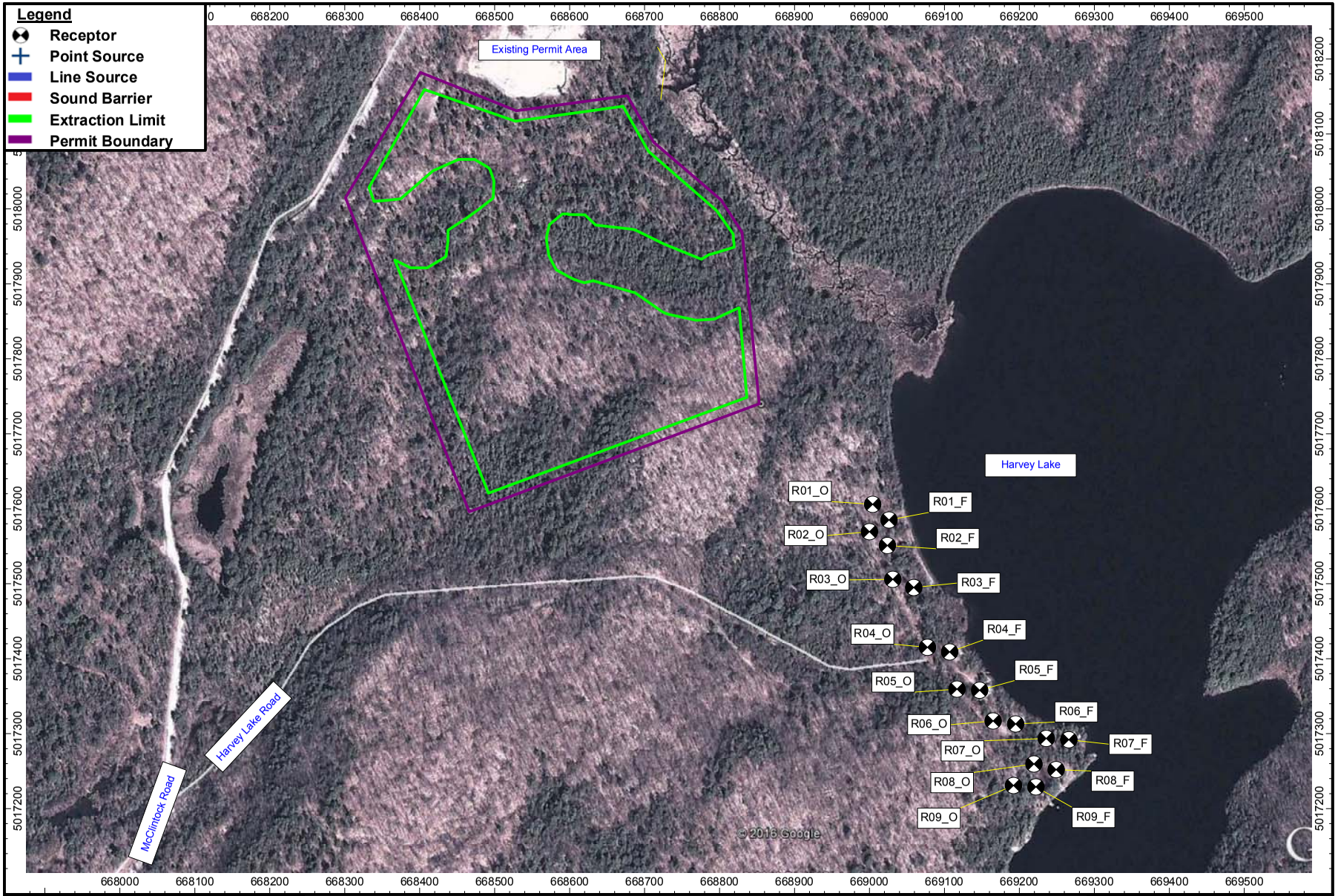

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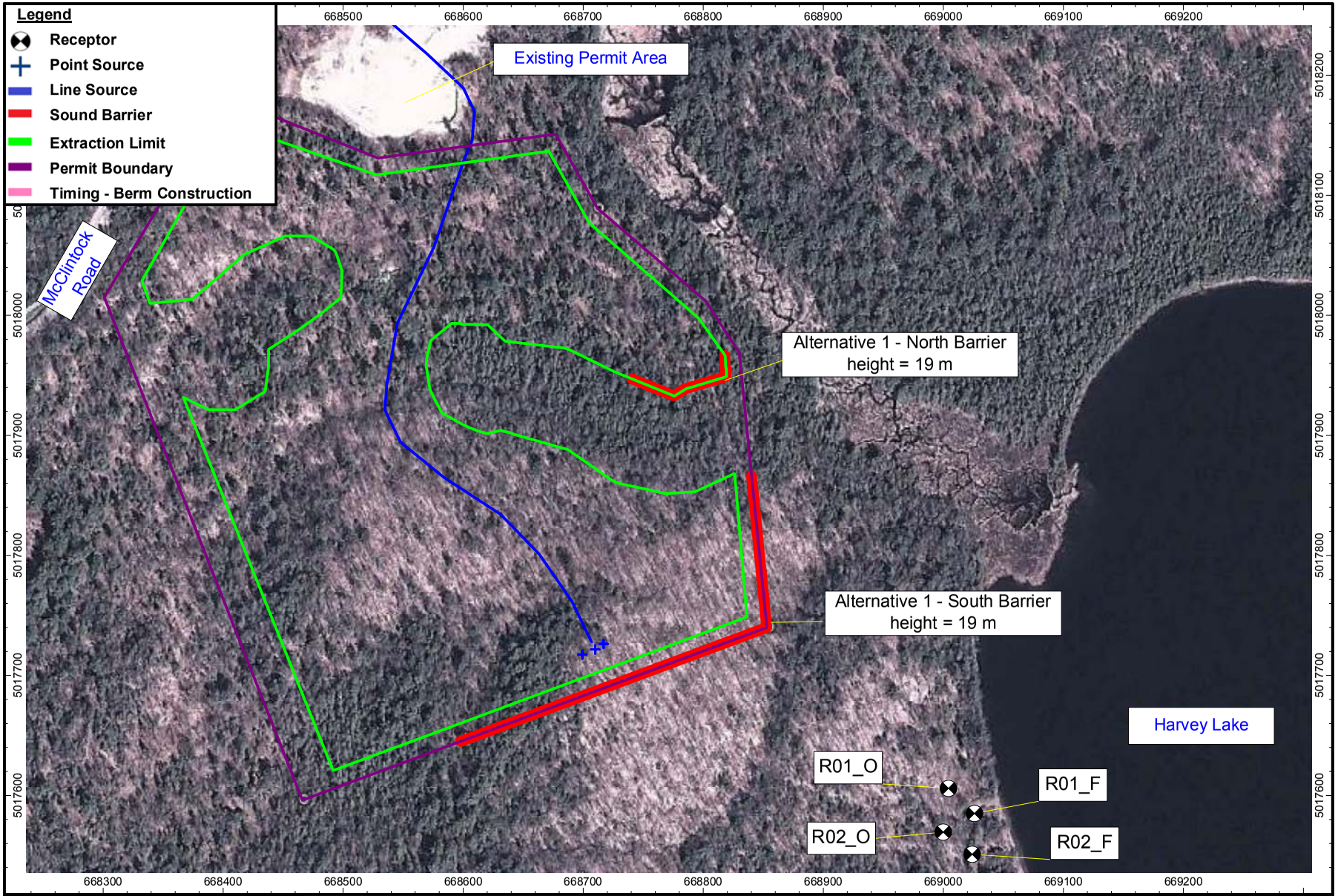
Title: **Noise Sensitive Receptor Locations**		Date: **March 14, 2017**	Figure: **3**
Project Name: **Bacher Construction Limited - McClintock Quarry/Pit**		Project No.: **116-0419**	

J:\2016\1160419\000\Analysis\figures\2017-03-08_Bacher Construction_McClintock Quarry_Figure 3.cna

Date Plotted: 15.03.17



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Title	Date	Figure
Mitigation Recommendations - Alternative 1	**March 14, 2017**	**4**
Project Name: **Bacher Construction Limited - McClintock Quarry/Pit**	Project No.: **116-0419**	

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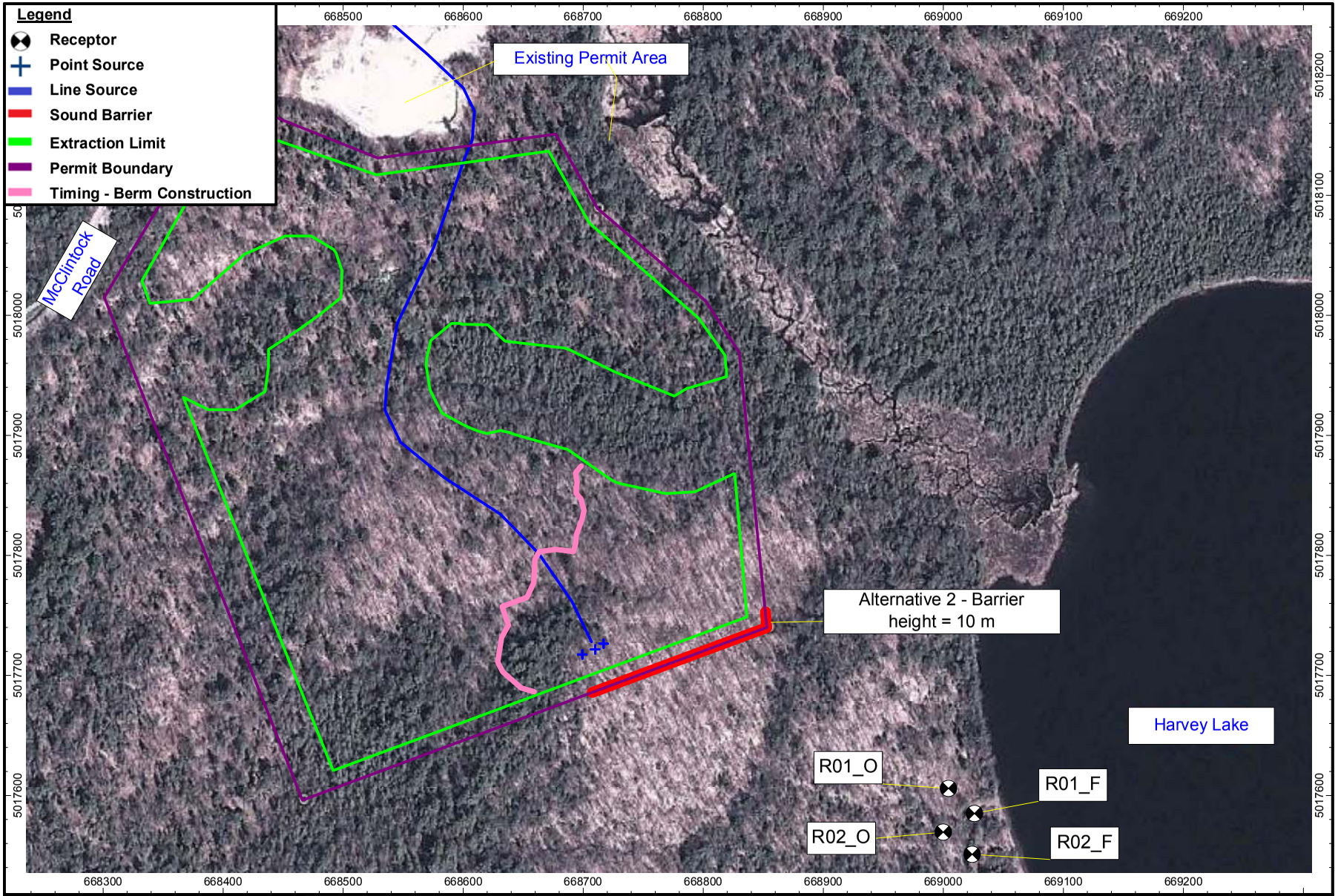
Date Plotted: 15.03.17



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Title: **Mitigation Recommendations - Alternative 2**	Date: **March 14, 2017**	Figure: **5**
Project Name: **Bacher Construction Limited - McClintock Quarry/Pit**	Project No.: **116-0419**	

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Date Plotted: 15.03.17

APPENDIX A

SAMPLE CALCULATIONS

Receiver Table - Mitigated Scenario - Class 3

Name	M.	ID	Level Lr		Limit. Value		Land Use			Height		Coordinates		
			Day	Night	Day	Night	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)				(m)		(m)	(m)	(m)
R01 - Cottage 1, Lot 12 Con 1		R01_F	44.6	34.5	45.4	40.4				1.50	r	669026.00	5017585.00	376.77
R01 - Cottage 1, Lot 12 Con 1		R01_O	45.4	35.3	45.4	40.4				1.50	r	669004.29	5017605.90	377.12
R02 - Cottage 2, Lot 12 Con 1		R02_F	43.9	33.5	45.4	40.4				1.50	r	669024.00	5017551.00	376.15
R02 - Cottage 2, Lot 12 Con 1		R02_O	44.6	34.2	45.4	40.4				1.50	r	668999.92	5017569.46	376.45
R03 - Cottage 3, Lot 12 Con 1		R03_F	37.9	30.1	45.4	40.4				1.50	r	669059.00	5017495.00	375.17
R03 - Cottage 3, Lot 12 Con 1		R03_O	38.4	29.5	45.4	40.4				1.50	r	669031.10	5017505.94	375.33
R04 - Cottage 4, Lot 12 Con 1		R04_F	34.7	25.7	45.4	40.4				1.50	r	669107.00	5017409.00	371.41
R04 - Cottage 4, Lot 12 Con 1		R04_O	33.1	25.7	45.4	40.4				1.50	r	669077.28	5017415.12	371.19
R05 - Cottage 5, Lot 12 Con 1		R05_F	39.7	30.2	45.4	40.4				1.50	r	669147.00	5017358.00	370.84
R05 - Cottage 5, Lot 12 Con 1		R05_O	35.3	26.6	45.4	40.4				1.50	r	669116.78	5017359.44	370.89
R06 - Cottage 6, Lot 12 Con 1		R06_F	39.3	30.9	45.4	40.4				1.50	r	669195.00	5017313.00	370.51
R06 - Cottage 6, Lot 12 Con 1		R06_O	38.5	30.2	45.4	40.4				1.50	r	669165.03	5017317.03	370.55
R07 - Cottage 7, Lot 12 Con 1		R07_F	35.7	28.3	45.4	40.4				1.50	r	669266.00	5017292.00	370.34
R07 - Cottage 7, Lot 12 Con 1		R07_O	37.1	29.3	45.4	40.4				1.50	r	669235.81	5017293.70	370.35
R08 - Cottage 8, Lot 12 Con 1		R08_F	34.5	27.2	45.4	40.4				1.50	r	669249.00	5017252.00	370.01
R08 - Cottage 8, Lot 12 Con 1		R08_O	36.0	28.3	45.4	40.4				1.50	r	669219.37	5017259.50	370.08
R09 - Cottage 9, Lot 12 Con 1		R09_F	34.5	27.0	45.4	40.4				1.50	r	669222.00	5017229.00	369.82
R09 - Cottage 9, Lot 12 Con 1		R09_O	35.9	28.1	45.4	40.4				1.50	r	669192.07	5017230.87	369.84

Point Sources

Name	M.	ID	Result. PWL			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time			K0	Freq.	Direct.	Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night						X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m²)		(min)	(min)	(min)	(dB)	(Hz)		(m)		(m)	(m)	(m)
Front End Loader		FEL_2	109.8	109.8	109.8	Lw	FEL		0.0	0.0	0.0							0.0		(none)	2.50	r	668709.92	5017721.71	390.50
Rock Drill		RD_2	111.8	111.8	111.8	Lw	QRD		0.0	0.0	0.0				60.00	0.00	0.00	0.0		(none)	9.00	r	668716.96	5017726.49	397.00
Portable Processing Plant		PPP_2	117.0	117.0	117.0	Lw	PPP		0.0	0.0	0.0				60.00	0.00	0.00	0.0		(none)	3.50	r	668699.27	5017717.48	389.63

Line Sources

Name	M.	ID	Result. PWL			Result. PWL'			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time			K0	Freq.	Direct.	Moving Pt. Src			
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night				Number			Speed
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m²)		(min)	(min)	(min)	(dB)	(Hz)		Day	Evening	Night	(km/h)
Haul Truck Traffic		HTT_2	102.0	102.0	102.0	73.3	73.3	73.3	PWL-Pt	HTT		0.0	0.0	0.0							0.0		(none)	10.0	10.0	10.0	20.0

Sound Level Library

Name	ID	Type	Oktave Spectrum (dB)												Source
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	
Front End Loader	FEL	Lw	A		87.8	101.9	102.4	100.8	104.0	102.2	97.0	93.9	109.8	120.3	Valcoustics Database & Project Notes/Specs
Rock Drill	RD	Lw	A		96.8	107.9	110.4	116.8	116.0	115.2	110.0	100.9	121.8	128.5	Valcoustics Database & Project Notes/Specs
Quiet Rock Drill	QRD	Lw	A		86.8	97.9	100.4	106.8	106.0	105.2	100.0	90.9	111.8	118.5	Valcoustics Database & Project Notes/Specs
Portable Processing Plant	PPP	Lw	A		95.5	99.9	103.0	109.6	110.1	111.2	110.9	102.1	117.0	124.0	Valcoustics Database & Project Notes/Specs
Haul Truck Traffic	HTT	Lw	A		85.8	93.9	97.4	99.8	100.0	99.2	97.0	90.9	106.3	115.3	Valcoustics Database & Project Notes/Specs

Receiver
Name: R01 - Cottage 1, Lot 12 Con 1
ID: R01_O
X: 669004.29
Y: 5017605.90
Z: 377.12

Point Source, ISO 9613, Name: "Front End Loader", ID: "FEL_2"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	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)
4	668709.92	5017721.71	390.50	0	DEN	63	87.8	0.0	0.0	0.0	0.0	61.0	0.0	-4.9	1.0	0.0	10.8	0.0	0.0	19.8
4	668709.92	5017721.71	390.50	0	DEN	125	101.9	0.0	0.0	0.0	0.0	61.0	0.1	2.6	1.5	0.0	5.0	0.0	0.0	31.6
4	668709.92	5017721.71	390.50	0	DEN	250	102.4	0.0	0.0	0.0	0.0	61.0	0.3	9.5	2.0	0.0	0.0	0.0	0.0	29.6
4	668709.92	5017721.71	390.50	0	DEN	500	100.8	0.0	0.0	0.0	0.0	61.0	0.6	4.9	2.5	0.0	6.7	0.0	0.0	25.1
4	668709.92	5017721.71	390.50	0	DEN	1000	104.0	0.0	0.0	0.0	0.0	61.0	1.2	0.1	3.0	0.0	14.0	0.0	0.0	24.7
4	668709.92	5017721.71	390.50	0	DEN	2000	102.2	0.0	0.0	0.0	0.0	61.0	3.1	-0.6	4.0	0.0	17.4	0.0	0.0	17.3
4	668709.92	5017721.71	390.50	0	DEN	4000	97.0	0.0	0.0	0.0	0.0	61.0	10.4	-0.6	4.5	0.0	20.3	0.0	0.0	1.4
4	668709.92	5017721.71	390.50	0	DEN	8000	93.9	0.0	0.0	0.0	0.0	61.0	37.0	-0.6	6.0	0.0	20.5	0.0	0.0	-30.0

Point Source, ISO 9613, Name: "Portable Processing Plant", ID: "PPP_2"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	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)
8	668699.27	5017717.48	389.63	0	D	63	95.5	0.0	0.0	0.0	0.0	61.2	0.0	-4.6	1.0	0.0	10.8	0.0	0.0	27.0
8	668699.27	5017717.48	389.63	0	D	125	99.9	0.0	0.0	0.0	0.0	61.2	0.1	3.5	1.5	0.0	5.1	0.0	0.0	28.4
8	668699.27	5017717.48	389.63	0	D	250	103.0	0.0	0.0	0.0	0.0	61.2	0.3	8.7	2.0	0.0	2.1	0.0	0.0	28.7
8	668699.27	5017717.48	389.63	0	D	500	109.6	0.0	0.0	0.0	0.0	61.2	0.6	4.6	2.5	0.0	8.5	0.0	0.0	32.1
8	668699.27	5017717.48	389.63	0	D	1000	110.1	0.0	0.0	0.0	0.0	61.2	1.2	0.3	3.0	0.0	15.5	0.0	0.0	29.0
8	668699.27	5017717.48	389.63	0	D	2000	111.2	0.0	0.0	0.0	0.0	61.2	3.1	-0.4	4.0	0.0	18.9	0.0	0.0	24.3
8	668699.27	5017717.48	389.63	0	D	4000	110.9	0.0	0.0	0.0	0.0	61.2	10.7	-0.4	4.5	0.0	20.3	0.0	0.0	14.7
8	668699.27	5017717.48	389.63	0	D	8000	102.1	0.0	0.0	0.0	0.0	61.2	38.0	-0.4	5.9	0.0	20.3	0.0	0.0	-23.0
8	668699.27	5017717.48	389.63	0	N	63	95.5	0.0	-188.0	0.0	0.0	61.2	0.0	-4.6	1.0	0.0	10.8	0.0	0.0	-161.0
8	668699.27	5017717.48	389.63	0	N	125	99.9	0.0	-188.0	0.0	0.0	61.2	0.1	3.5	1.5	0.0	5.1	0.0	0.0	-159.6
8	668699.27	5017717.48	389.63	0	N	250	103.0	0.0	-188.0	0.0	0.0	61.2	0.3	8.7	2.0	0.0	2.1	0.0	0.0	-159.3
8	668699.27	5017717.48	389.63	0	N	500	109.6	0.0	-188.0	0.0	0.0	61.2	0.6	4.6	2.5	0.0	8.5	0.0	0.0	-155.9
8	668699.27	5017717.48	389.63	0	N	1000	110.1	0.0	-188.0	0.0	0.0	61.2	1.2	0.3	3.0	0.0	15.5	0.0	0.0	-159.0
8	668699.27	5017717.48	389.63	0	N	2000	111.2	0.0	-188.0	0.0	0.0	61.2	3.1	-0.4	4.0	0.0	18.9	0.0	0.0	-163.7
8	668699.27	5017717.48	389.63	0	N	4000	110.9	0.0	-188.0	0.0	0.0	61.2	10.7	-0.4	4.5	0.0	20.3	0.0	0.0	-173.3
8	668699.27	5017717.48	389.63	0	N	8000	102.1	0.0	-188.0	0.0	0.0	61.2	38.0	-0.4	5.9	0.0	20.3	0.0	0.0	-211.0
8	668699.27	5017717.48	389.63	0	E	63	95.5	0.0	-188.0	0.0	0.0	61.2	0.0	-4.6	1.0	0.0	10.8	0.0	0.0	-161.0
8	668699.27	5017717.48	389.63	0	E	125	99.9	0.0	-188.0	0.0	0.0	61.2	0.1	3.5	1.5	0.0	5.1	0.0	0.0	-159.6
8	668699.27	5017717.48	389.63	0	E	250	103.0	0.0	-188.0	0.0	0.0	61.2	0.3	8.7	2.0	0.0	2.1	0.0	0.0	-159.3
8	668699.27	5017717.48	389.63	0	E	500	109.6	0.0	-188.0	0.0	0.0	61.2	0.6	4.6	2.5	0.0	8.5	0.0	0.0	-155.9
8	668699.27	5017717.48	389.63	0	E	1000	110.1	0.0	-188.0	0.0	0.0	61.2	1.2	0.3	3.0	0.0	15.5	0.0	0.0	-159.0
8	668699.27	5017717.48	389.63	0	E	2000	111.2	0.0	-188.0	0.0	0.0	61.2	3.1	-0.4	4.0	0.0	18.9	0.0	0.0	-163.7
8	668699.27	5017717.48	389.63	0	E	4000	110.9	0.0	-188.0	0.0	0.0	61.2	10.7	-0.4	4.5	0.0	20.3	0.0	0.0	-173.3
8	668699.27	5017717.48	389.63	0	E	8000	102.1	0.0	-188.0	0.0	0.0	61.2	38.0	-0.4	5.9	0.0	20.3	0.0	0.0	-211.0

Point Source, ISO 9613, Name: "Rock Drill", ID: "RD_2"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	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)
12	668716.96	5017726.49	397.00	0	D	63	86.8	0.0	0.0	0.0	0.0	60.9	0.0	-3.0	0.0	0.0	7.8	0.0	0.0	21.1
12	668716.96	5017726.49	397.00	0	D	125	97.9	0.0	0.0	0.0	0.0	60.9	0.1	2.0	0.0	0.0	2.8	0.0	0.0	32.1
12	668716.96	5017726.49	397.00	0	D	250	100.4	0.0	0.0	0.0	0.0	60.9	0.3	6.8	0.0	0.0	0.0	0.0	0.0	32.3
12	668716.96	5017726.49	397.00	0	D	500	106.8	0.0	0.0	0.0	0.0	60.9	0.6	4.8	0.0	0.0	0.1	0.0	0.0	40.4
12	668716.96	5017726.49	397.00	0	D	1000	106.0	0.0	0.0	0.0	0.0	60.9	1.1	0.5	0.0	0.0	4.5	0.0	0.0	39.0
12	668716.96	5017726.49	397.00	0	D	2000	105.2	0.0	0.0	0.0	0.0	60.9	3.0	-0.2	0.0	0.0	5.4	0.0	0.0	36.1
12	668716.96	5017726.49	397.00	0	D	4000	100.0	0.0	0.0	0.0	0.0	60.9	10.2	-0.2	0.0	0.0	5.8	0.0	0.0	23.2
12	668716.96	5017726.49	397.00	0	D	8000	90.9	0.0	0.0	0.0	0.0	60.9	36.5	-0.2	0.0	0.0	6.5	0.0	0.0	-12.8
12	668716.96	5017726.49	397.00	0	N	63	86.8	0.0	-188.0	0.0	0.0	60.9	0.0	-3.0	0.0	0.0	7.8	0.0	0.0	-166.9
12	668716.96	5017726.49	397.00	0	N	125	97.9	0.0	-188.0	0.0	0.0	60.9	0.1	2.0	0.0	0.0	2.8	0.0	0.0	-155.9
12	668716.96	5017726.49	397.00	0	N	250	100.4	0.0	-188.0	0.0	0.0	60.9	0.3	6.8	0.0	0.0	0.0	0.0	0.0	-155.7
12	668716.96	5017726.49	397.00	0	N	500	106.8	0.0	-188.0	0.0	0.0	60.9	0.6	4.8	0.0	0.0	0.1	0.0	0.0	-147.6
12	668716.96	5017726.49	397.00	0	N	1000	106.0	0.0	-188.0	0.0	0.0	60.9	1.1	0.5	0.0	0.0	4.5	0.0	0.0	-149.0

Point Source, ISO 9613, Name: "Rock Drill", ID: "RD_2"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	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)
12	668716.96	5017726.49	397.00	0	N	2000	105.2	0.0	-188.0	0.0	0.0	60.9	3.0	-0.2	0.0	0.0	5.4	0.0	0.0	-151.9
12	668716.96	5017726.49	397.00	0	N	4000	100.0	0.0	-188.0	0.0	0.0	60.9	10.2	-0.2	0.0	0.0	5.8	0.0	0.0	-164.8
12	668716.96	5017726.49	397.00	0	N	8000	90.9	0.0	-188.0	0.0	0.0	60.9	36.5	-0.2	0.0	0.0	6.5	0.0	0.0	-200.8
12	668716.96	5017726.49	397.00	0	E	63	86.8	0.0	-188.0	0.0	0.0	60.9	0.0	-3.0	0.0	0.0	7.8	0.0	0.0	-166.9
12	668716.96	5017726.49	397.00	0	E	125	97.9	0.0	-188.0	0.0	0.0	60.9	0.1	2.0	0.0	0.0	2.8	0.0	0.0	-155.9
12	668716.96	5017726.49	397.00	0	E	250	100.4	0.0	-188.0	0.0	0.0	60.9	0.3	6.8	0.0	0.0	0.0	0.0	0.0	-155.7
12	668716.96	5017726.49	397.00	0	E	500	106.8	0.0	-188.0	0.0	0.0	60.9	0.6	4.8	0.0	0.0	0.1	0.0	0.0	-147.6
12	668716.96	5017726.49	397.00	0	E	1000	106.0	0.0	-188.0	0.0	0.0	60.9	1.1	0.5	0.0	0.0	4.5	0.0	0.0	-149.0
12	668716.96	5017726.49	397.00	0	E	2000	105.2	0.0	-188.0	0.0	0.0	60.9	3.0	-0.2	0.0	0.0	5.4	0.0	0.0	-151.9
12	668716.96	5017726.49	397.00	0	E	4000	100.0	0.0	-188.0	0.0	0.0	60.9	10.2	-0.2	0.0	0.0	5.8	0.0	0.0	-164.8
12	668716.96	5017726.49	397.00	0	E	8000	90.9	0.0	-188.0	0.0	0.0	60.9	36.5	-0.2	0.0	0.0	6.5	0.0	0.0	-200.8

Line Source, ISO 9613, Name: "Haul Truck Traffic", ID: "HTT_2"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	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)
22	668676.88	5017781.44	377.37	0	DEN	63	52.8	16.9	0.0	0.0	0.0	62.4	0.0	-5.0	1.0	0.0	11.5	0.0	0.0	-0.3
22	668676.88	5017781.44	377.37	0	DEN	125	60.9	16.9	0.0	0.0	0.0	62.4	0.2	0.4	1.5	0.0	7.6	0.0	0.0	5.7
22	668676.88	5017781.44	377.37	0	DEN	250	64.4	16.9	0.0	0.0	0.0	62.4	0.4	5.2	2.0	0.0	4.9	0.0	0.0	6.4
22	668676.88	5017781.44	377.37	0	DEN	500	66.8	16.9	0.0	0.0	0.0	62.4	0.7	3.1	2.5	0.0	9.2	0.0	0.0	5.6
22	668676.88	5017781.44	377.37	0	DEN	1000	67.0	16.9	0.0	0.0	0.0	62.4	1.4	-1.2	3.0	0.0	16.0	0.0	0.0	2.2
22	668676.88	5017781.44	377.37	0	DEN	2000	66.2	16.9	0.0	0.0	0.0	62.4	3.6	-1.8	4.1	0.0	19.4	0.0	0.0	-4.6
22	668676.88	5017781.44	377.37	0	DEN	4000	64.0	16.9	0.0	0.0	0.0	62.4	12.2	-1.8	4.6	0.0	21.6	0.0	0.0	-18.1
22	668676.88	5017781.44	377.37	0	DEN	8000	57.9	16.9	0.0	0.0	0.0	62.4	43.4	-1.8	6.1	0.0	21.8	0.0	0.0	-57.1
27	668698.75	5017744.78	385.60	0	DEN	63	52.8	15.9	0.0	0.0	0.0	61.5	0.0	-4.9	1.0	0.0	10.6	0.0	0.0	0.4
27	668698.75	5017744.78	385.60	0	DEN	125	60.9	15.9	0.0	0.0	0.0	61.5	0.1	1.1	1.5	0.0	6.6	0.0	0.0	5.9
27	668698.75	5017744.78	385.60	0	DEN	250	64.4	15.9	0.0	0.0	0.0	61.5	0.4	6.6	2.0	0.0	3.1	0.0	0.0	6.7
27	668698.75	5017744.78	385.60	0	DEN	500	66.8	15.9	0.0	0.0	0.0	61.5	0.6	3.8	2.5	0.0	8.0	0.0	0.0	6.1
27	668698.75	5017744.78	385.60	0	DEN	1000	67.0	15.9	0.0	0.0	0.0	61.5	1.2	-0.6	3.0	0.0	14.9	0.0	0.0	2.8
27	668698.75	5017744.78	385.60	0	DEN	2000	66.2	15.9	0.0	0.0	0.0	61.5	3.2	-1.3	4.0	0.0	18.3	0.0	0.0	-3.8
27	668698.75	5017744.78	385.60	0	DEN	4000	64.0	15.9	0.0	0.0	0.0	61.5	11.0	-1.3	4.5	0.0	21.1	0.0	0.0	-17.0
27	668698.75	5017744.78	385.60	0	DEN	8000	57.9	15.9	0.0	0.0	0.0	61.5	39.2	-1.3	6.0	0.0	21.2	0.0	0.0	-53.0
40	668647.21	5017817.71	373.13	0	DEN	63	52.8	16.6	0.0	0.0	0.0	63.4	0.1	-5.1	1.0	0.0	11.2	0.0	0.0	-1.1
40	668647.21	5017817.71	373.13	0	DEN	125	60.9	16.6	0.0	0.0	0.0	63.4	0.2	0.3	1.5	0.0	6.9	0.0	0.0	5.3
40	668647.21	5017817.71	373.13	0	DEN	250	64.4	16.6	0.0	0.0	0.0	63.4	0.4	4.9	2.1	0.0	4.2	0.0	0.0	6.1
40	668647.21	5017817.71	373.13	0	DEN	500	66.8	16.6	0.0	0.0	0.0	63.4	0.8	2.8	2.6	0.0	8.4	0.0	0.0	5.5
40	668647.21	5017817.71	373.13	0	DEN	1000	67.0	16.6	0.0	0.0	0.0	63.4	1.5	-1.5	3.1	0.0	15.1	0.0	0.0	2.1
40	668647.21	5017817.71	373.13	0	DEN	2000	66.2	16.6	0.0	0.0	0.0	63.4	4.0	-2.2	4.1	0.0	18.4	0.0	0.0	-4.9
40	668647.21	5017817.71	373.13	0	DEN	4000	64.0	16.6	0.0	0.0	0.0	63.4	13.6	-2.2	4.6	0.0	21.3	0.0	0.0	-20.1
40	668647.21	5017817.71	373.13	0	DEN	8000	57.9	16.6	0.0	0.0	0.0	63.4	48.5	-2.2	6.2	0.0	22.2	0.0	0.0	-63.5
45	668607.58	5017849.58	372.36	0	DEN	63	52.8	17.5	0.0	0.0	0.0	64.4	0.1	-5.2	1.0	0.0	10.8	0.0	0.0	-0.7
45	668607.58	5017849.58	372.36	0	DEN	125	60.9	17.5	0.0	0.0	0.0	64.4	0.2	0.4	1.5	0.0	5.9	0.0	0.0	6.1
45	668607.58	5017849.58	372.36	0	DEN	250	64.4	17.5	0.0	0.0	0.0	64.4	0.5	4.6	2.1	0.0	3.1	0.0	0.0	7.3
45	668607.58	5017849.58	372.36	0	DEN	500	66.8	17.5	0.0	0.0	0.0	64.4	0.9	2.5	2.6	0.0	6.9	0.0	0.0	7.0
45	668607.58	5017849.58	372.36	0	DEN	1000	67.0	17.5	0.0	0.0	0.0	64.4	1.7	-1.8	3.1	0.0	13.4	0.0	0.0	3.8
45	668607.58	5017849.58	372.36	0	DEN	2000	66.2	17.5	0.0	0.0	0.0	64.4	4.5	-2.4	4.1	0.0	16.6	0.0	0.0	-3.4
45	668607.58	5017849.58	372.36	0	DEN	4000	64.0	17.5	0.0	0.0	0.0	64.4	15.3	-2.4	4.6	0.0	19.3	0.0	0.0	-19.6
45	668607.58	5017849.58	372.36	0	DEN	8000	57.9	17.5	0.0	0.0	0.0	64.4	54.4	-2.4	6.2	0.0	22.2	0.0	0.0	-69.3
49	668588.26	5018093.59	375.27	0	DEN	63	52.8	19.0	0.0	0.0	0.0	67.1	0.1	-5.4	0.7	0.0	10.2	0.0	0.0	-1.0
49	668588.26	5018093.59	375.27	0	DEN	125	60.9	19.0	0.0	0.0	0.0	67.1	0.3	1.7	1.1	0.0	3.1	0.0	0.0	6.6
49	668588.26	5018093.59	375.27	0	DEN	250	64.4	19.0	0.0	0.0	0.0	67.1	0.7	4.8	1.5	0.0	0.0	0.0	0.0	9.2
49	668588.26	5018093.59	375.27	0	DEN	500	66.8	19.0	0.0	0.0	0.0	67.1	1.2	2.8	1.9	0.0	2.0	0.0	0.0	10.7
49	668588.26	5018093.59	375.27	0	DEN	1000	67.0	19.0	0.0	0.0	0.0	67.1	2.3	-1.5	2.2	0.0	6.3	0.0	0.0	9.5
49	668588.26	5018093.59	375.27	0	DEN	2000	66.2	19.0	0.0	0.0	0.0	67.1	6.2	-2.2	3.0	0.0	7.0	0.0	0.0	4.1
49	668588.26	5018093.59	375.27	0	DEN	4000	64.0	19.0	0.0	0.0	0.0	67.1	21.0	-2.2	3.4	0.0	7.0	0.0	0.0	-13.3
49	668588.26	5018093.59	375.27	0	DEN	8000	57.9	19.0	0.0	0.0	0.0	67.1	74.9	-2.2	4.5	0.0	7.0	0.0	0.0	-74.5
53	668560.20	5018024.78	370.24	0	DEN	63	52.8	18.5	0.0	0.0	0.0	66.7	0.1	-5.4	4.0	0.0	10.6	0.0	0.0	-4.7
53	668560.20	5018024.78	370.24	0	DEN	125	60.9	18.5	0.0	0.0	0.0	66.7	0.3	3.5	6.0	0.0	2.0	0.0	0.0	0.9
53	668560.20	5018024.78	370.24	0	DEN	250	64.4	18.5	0.0	0.0	0.0	66.7	0.6	7.3	8.0	0.0	0.9	0.0	0.0	-0.7
53	668560.20	5018024.78	370.24	0	DEN	500	66.8	18.5	0.0	0.0	0.0	66.7	1.2	3.7	10.0	0.0	3.9	0.0	0.0	-0.2
53	668560.20	5018024.78	370.24	0	DEN	1000	67.0	18.5	0.0	0.0	0.0	66.7	2.2	-0.9	12.0	0.0	9.7	0.0	0.0	-4.3
53	668560.20	5018024.78	370.24	0	DEN	2000	66.2	18.5	0.0	0.0	0.0	66.7	5.9	-1.6	16.0	0.0	12.5	0.0	0.0	-14.8
53	668560.20	5018024.78	370.24	0	DEN	4000	64.0	18.5	0.0	0.0	0.0	66.7	20.0	-1.6	18.0	0.0	14.9	0.0	0.0	-35.6
53	668560.20	5018024.78	370.24	0	DEN	8000	57.9	18.5	0.0	0.0	0.0	66.7	71.4	-1.6	24.0	0.0	17.6	0.0	0.0	-101.7

Line Source, ISO 9613, Name: "Haul Truck Traffic", ID: "HTT_2"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	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)
58	668565.85	5017879.67	370.97	0	DEN	63	52.8	16.7	0.0	0.0	0.0	65.3	0.1	-5.3	1.0	0.0	10.6	0.0	0.0	-2.2
58	668565.85	5017879.67	370.97	0	DEN	125	60.9	16.7	0.0	0.0	0.0	65.3	0.2	0.5	1.5	0.0	5.3	0.0	0.0	4.8
58	668565.85	5017879.67	370.97	0	DEN	250	64.4	16.7	0.0	0.0	0.0	65.3	0.5	4.4	2.1	0.0	2.5	0.0	0.0	6.3
58	668565.85	5017879.67	370.97	0	DEN	500	66.8	16.7	0.0	0.0	0.0	65.3	1.0	2.3	2.6	0.0	6.1	0.0	0.0	6.3
58	668565.85	5017879.67	370.97	0	DEN	1000	67.0	16.7	0.0	0.0	0.0	65.3	1.9	-2.0	3.1	0.0	12.2	0.0	0.0	3.2
58	668565.85	5017879.67	370.97	0	DEN	2000	66.2	16.7	0.0	0.0	0.0	65.3	5.0	-2.7	4.1	0.0	15.3	0.0	0.0	-4.1
58	668565.85	5017879.67	370.97	0	DEN	4000	64.0	16.7	0.0	0.0	0.0	65.3	16.9	-2.7	4.6	0.0	17.9	0.0	0.0	-21.5
58	668565.85	5017879.67	370.97	0	DEN	8000	57.9	16.7	0.0	0.0	0.0	65.3	60.4	-2.7	6.2	0.0	20.8	0.0	0.0	-75.4
69	668540.66	5017967.49	368.52	0	DEN	63	52.8	17.1	0.0	0.0	0.0	66.4	0.1	-5.4	2.4	0.0	11.1	0.0	0.0	-4.6
69	668540.66	5017967.49	368.52	0	DEN	125	60.9	17.1	0.0	0.0	0.0	66.4	0.2	3.1	3.6	0.0	5.6	0.0	0.0	-0.9
69	668540.66	5017967.49	368.52	0	DEN	250	64.4	17.1	0.0	0.0	0.0	66.4	0.6	7.3	4.7	0.0	4.4	0.0	0.0	-1.9
69	668540.66	5017967.49	368.52	0	DEN	500	66.8	17.1	0.0	0.0	0.0	66.4	1.1	3.3	5.9	0.0	10.5	0.0	0.0	-3.3
69	668540.66	5017967.49	368.52	0	DEN	1000	67.0	17.1	0.0	0.0	0.0	66.4	2.2	-1.4	7.1	0.0	16.6	0.0	0.0	-6.7
69	668540.66	5017967.49	368.52	0	DEN	2000	66.2	17.1	0.0	0.0	0.0	66.4	5.7	-2.1	9.5	0.0	19.9	0.0	0.0	-16.0
69	668540.66	5017967.49	368.52	0	DEN	4000	64.0	17.1	0.0	0.0	0.0	66.4	19.3	-2.1	10.7	0.0	22.9	0.0	0.0	-36.0
69	668540.66	5017967.49	368.52	0	DEN	8000	57.9	17.1	0.0	0.0	0.0	66.4	68.7	-2.1	14.2	0.0	25.1	0.0	0.0	-97.3
74	668541.26	5017907.71	369.30	0	DEN	63	52.8	14.7	0.0	0.0	0.0	65.9	0.1	-5.3	1.0	0.0	10.5	0.0	0.0	-4.6
74	668541.26	5017907.71	369.30	0	DEN	125	60.9	14.7	0.0	0.0	0.0	65.9	0.2	0.6	1.6	0.0	4.9	0.0	0.0	2.5
74	668541.26	5017907.71	369.30	0	DEN	250	64.4	14.7	0.0	0.0	0.0	65.9	0.6	4.2	2.1	0.0	2.2	0.0	0.0	4.2
74	668541.26	5017907.71	369.30	0	DEN	500	66.8	14.7	0.0	0.0	0.0	65.9	1.1	2.2	2.6	0.0	5.5	0.0	0.0	4.4
74	668541.26	5017907.71	369.30	0	DEN	1000	67.0	14.7	0.0	0.0	0.0	65.9	2.0	-2.1	3.1	0.0	11.4	0.0	0.0	1.5
74	668541.26	5017907.71	369.30	0	DEN	2000	66.2	14.7	0.0	0.0	0.0	65.9	5.3	-2.8	4.1	0.0	14.3	0.0	0.0	-5.9
74	668541.26	5017907.71	369.30	0	DEN	4000	64.0	14.7	0.0	0.0	0.0	65.9	18.1	-2.8	4.7	0.0	16.9	0.0	0.0	-24.0
74	668541.26	5017907.71	369.30	0	DEN	8000	57.9	14.7	0.0	0.0	0.0	65.9	64.6	-2.8	6.2	0.0	19.6	0.0	0.0	-80.9
76	668585.07	5018203.56	379.41	0	DEN	63	52.8	16.1	0.0	0.0	0.0	68.3	0.1	-5.5	0.0	0.0	10.3	0.0	0.0	-4.2
76	668585.07	5018203.56	379.41	0	DEN	125	60.9	16.1	0.0	0.0	0.0	68.3	0.3	7.2	0.0	0.0	0.0	0.0	0.0	1.3
76	668585.07	5018203.56	379.41	0	DEN	250	64.4	16.1	0.0	0.0	0.0	68.3	0.8	10.9	0.0	0.0	0.0	0.0	0.0	0.6
76	668585.07	5018203.56	379.41	0	DEN	500	66.8	16.1	0.0	0.0	0.0	68.3	1.4	4.7	0.0	0.0	0.0	0.0	0.0	8.5
76	668585.07	5018203.56	379.41	0	DEN	1000	67.0	16.1	0.0	0.0	0.0	68.3	2.7	-0.4	0.0	0.0	5.1	0.0	0.0	7.4
76	668585.07	5018203.56	379.41	0	DEN	2000	66.2	16.1	0.0	0.0	0.0	68.3	7.1	-1.0	0.0	0.0	5.8	0.0	0.0	2.2
76	668585.07	5018203.56	379.41	0	DEN	4000	64.0	16.1	0.0	0.0	0.0	68.3	23.9	-1.0	0.0	0.0	5.8	0.0	0.0	-16.8
76	668585.07	5018203.56	379.41	0	DEN	8000	57.9	16.1	0.0	0.0	0.0	68.3	85.3	-1.0	0.0	0.0	5.8	0.0	0.0	-84.3
78	668553.25	5018232.19	381.00	0	DEN	63	52.8	16.5	0.0	0.0	0.0	68.8	0.1	-5.5	0.0	0.0	10.3	0.0	0.0	-4.3
78	668553.25	5018232.19	381.00	0	DEN	125	60.9	16.5	0.0	0.0	0.0	68.8	0.3	7.5	0.0	0.0	0.0	0.0	0.0	0.8
78	668553.25	5018232.19	381.00	0	DEN	250	64.4	16.5	0.0	0.0	0.0	68.8	0.8	10.9	0.0	0.0	0.0	0.0	0.0	0.4
78	668553.25	5018232.19	381.00	0	DEN	500	66.8	16.5	0.0	0.0	0.0	68.8	1.5	4.8	0.0	0.0	0.0	0.0	0.0	8.3
78	668553.25	5018232.19	381.00	0	DEN	1000	67.0	16.5	0.0	0.0	0.0	68.8	2.8	-0.3	0.0	0.0	5.1	0.0	0.0	7.1
78	668553.25	5018232.19	381.00	0	DEN	2000	66.2	16.5	0.0	0.0	0.0	68.8	7.5	-1.0	0.0	0.0	5.8	0.0	0.0	1.7
78	668553.25	5018232.19	381.00	0	DEN	4000	64.0	16.5	0.0	0.0	0.0	68.8	25.3	-1.0	0.0	0.0	5.8	0.0	0.0	-18.3
78	668553.25	5018232.19	381.00	0	DEN	8000	57.9	16.5	0.0	0.0	0.0	68.8	90.2	-1.0	0.0	0.0	5.8	0.0	0.0	-89.4
80	668540.31	5018268.03	382.55	0	DEN	63	52.8	16.4	0.0	0.0	0.0	69.2	0.1	-5.6	0.0	0.0	10.3	0.0	0.0	-4.9
80	668540.31	5018268.03	382.55	0	DEN	125	60.9	16.4	0.0	0.0	0.0	69.2	0.3	7.8	0.0	0.0	0.0	0.0	0.0	-0.0
80	668540.31	5018268.03	382.55	0	DEN	250	64.4	16.4	0.0	0.0	0.0	69.2	0.8	11.0	0.0	0.0	0.0	0.0	0.0	-0.2
80	668540.31	5018268.03	382.55	0	DEN	500	66.8	16.4	0.0	0.0	0.0	69.2	1.6	4.8	0.0	0.0	0.0	0.0	0.0	7.6
80	668540.31	5018268.03	382.55	0	DEN	1000	67.0	16.4	0.0	0.0	0.0	69.2	3.0	-0.3	0.0	0.0	5.0	0.0	0.0	6.5
80	668540.31	5018268.03	382.55	0	DEN	2000	66.2	16.4	0.0	0.0	0.0	69.2	7.8	-0.9	0.0	0.0	5.7	0.0	0.0	0.8
80	668540.31	5018268.03	382.55	0	DEN	4000	64.0	16.4	0.0	0.0	0.0	69.2	26.5	-0.9	0.0	0.0	5.7	0.0	0.0	-20.1
80	668540.31	5018268.03	382.55	0	DEN	8000	57.9	16.4	0.0	0.0	0.0	69.2	94.5	-0.9	0.0	0.0	5.7	0.0	0.0	-94.2
84	668535.53	5017931.52	368.62	0	DEN	63	52.8	13.2	0.0	0.0	0.0	66.1	0.1	-5.4	1.0	0.0	10.4	0.0	0.0	-6.3
84	668535.53	5017931.52	368.62	0	DEN	125	60.9	13.2	0.0	0.0	0.0	66.1	0.2	0.6	1.6	0.0	4.7	0.0	0.0	0.9
84	668535.53	5017931.52	368.62	0	DEN	250	64.4	13.2	0.0	0.0	0.0	66.1	0.6	4.1	2.1	0.0	1.9	0.0	0.0	2.8
84	668535.53	5017931.52	368.62	0	DEN	500	66.8	13.2	0.0	0.0	0.0	66.1	1.1	2.1	2.6	0.0	4.9	0.0	0.0	3.1
84	668535.53	5017931.52	368.62	0	DEN	1000	67.0	13.2	0.0	0.0	0.0	66.1	2.1	-2.2	3.1	0.0	10.7	0.0	0.0	0.4
84	668535.53	5017931.52	368.62	0	DEN	2000	66.2	13.2	0.0	0.0	0.0	66.1	5.5	-2.9	4.2	0.0	13.4	0.0	0.0	-6.9
84	668535.53	5017931.52	368.62	0	DEN	4000	64.0	13.2	0.0	0.0	0.0	66.1	18.7	-2.9	4.7	0.0	15.8	0.0	0.0	-25.3
84	668535.53	5017931.52	368.62	0	DEN	8000	57.9	13.2	0.0	0.0	0.0	66.1	66.7	-2.9	6.3	0.0	18.5	0.0	0.0	-83.7
88	668608.40	5018158.09	378.08	0	DEN	63	52.8	13.8	0.0	0.0	0.0	67.6	0.1	-5.5	0.0	0.0	10.2	0.0	0.0	-5.9
88	668608.40	5018158.09	378.08	0	DEN	125	60.9	13.8	0.0	0.0	0.0	67.6	0.3	4.0	0.0	0.0	0.8	0.0	0.0	2.0
88	668608.40	5018158.09	378.08	0	DEN	250	64.4	13.8	0.0	0.0	0.0	67.6	0.7	7.4	0.0	0.0	0.0	0.0	0.0	2.4
88	668608.40	5018158.09	378.08	0	DEN	500	66.8	13.8	0.0	0.0	0.0	67.6	1.3	3.6	0.0	0.0	1.2	0.0	0.0	6.9
88	668608.40	5018158.09	378.08	0	DEN	1000	67.0	13.8	0.0	0.0	0.0	67.6	2.5	-1.1	0.0	0.0	5.9	0.0	0.0	5.9
88	668608.40	5018158.09	378.08	0	DEN	2000	66.2	13.8	0.0	0.0	0.0	67.6	6.6	-1.8	0.0	0.0	6.5	0.0	0.0	1.0
88	668608.40	5018158.09	378.08	0	DEN	4000	64.0	13.8	0.0	0.0	0.0	67.6	22.3	-1.8	0.0	0.0	6.5	0.0	0.0	-16.9

Line Source, ISO 9613, Name: "Haul Truck Traffic", ID: "HTT_2"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	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)
88	668608.40	5018158.09	378.08	0	DEN	8000	57.9	13.8	0.0	0.0	0.0	67.6	79.4	-1.8	0.0	0.0	6.5	0.0	0.0	-80.1
92	668604.68	5018179.83	378.34	0	DEN	63	52.8	13.3	0.0	0.0	0.0	67.9	0.1	-5.5	0.0	0.0	10.3	0.0	0.0	-6.6
92	668604.68	5018179.83	378.34	0	DEN	125	60.9	13.3	0.0	0.0	0.0	67.9	0.3	5.8	0.0	0.0	0.0	0.0	0.0	0.2
92	668604.68	5018179.83	378.34	0	DEN	250	64.4	13.3	0.0	0.0	0.0	67.9	0.7	9.5	0.0	0.0	0.0	0.0	0.0	-0.4
92	668604.68	5018179.83	378.34	0	DEN	500	66.8	13.3	0.0	0.0	0.0	67.9	1.3	4.2	0.0	0.0	0.5	0.0	0.0	6.1
92	668604.68	5018179.83	378.34	0	DEN	1000	67.0	13.3	0.0	0.0	0.0	67.9	2.6	-0.7	0.0	0.0	5.4	0.0	0.0	5.1
92	668604.68	5018179.83	378.34	0	DEN	2000	66.2	13.3	0.0	0.0	0.0	67.9	6.8	-1.3	0.0	0.0	6.1	0.0	0.0	0.1
92	668604.68	5018179.83	378.34	0	DEN	4000	64.0	13.3	0.0	0.0	0.0	67.9	22.9	-1.3	0.0	0.0	6.1	0.0	0.0	-18.3
92	668604.68	5018179.83	378.34	0	DEN	8000	57.9	13.3	0.0	0.0	0.0	67.9	81.7	-1.3	0.0	0.0	6.1	0.0	0.0	-83.2
95	668544.41	5018304.32	385.52	0	DEN	63	52.8	14.8	0.0	0.0	0.0	69.4	0.1	-5.6	0.0	0.0	10.3	0.0	0.0	-6.7
95	668544.41	5018304.32	385.52	0	DEN	125	60.9	14.8	0.0	0.0	0.0	69.4	0.3	8.1	0.0	0.0	0.0	0.0	0.0	-2.1
95	668544.41	5018304.32	385.52	0	DEN	250	64.4	14.8	0.0	0.0	0.0	69.4	0.9	11.1	0.0	0.0	0.0	0.0	0.0	-2.2
95	668544.41	5018304.32	385.52	0	DEN	500	66.8	14.8	0.0	0.0	0.0	69.4	1.6	4.9	0.0	0.0	0.0	0.0	0.0	5.6
95	668544.41	5018304.32	385.52	0	DEN	1000	67.0	14.8	0.0	0.0	0.0	69.4	3.1	-0.2	0.0	0.0	4.9	0.0	0.0	4.5
95	668544.41	5018304.32	385.52	0	DEN	2000	66.2	14.8	0.0	0.0	0.0	69.4	8.1	-0.8	0.0	0.0	5.6	0.0	0.0	-1.3
95	668544.41	5018304.32	385.52	0	DEN	4000	64.0	14.8	0.0	0.0	0.0	69.4	27.4	-0.8	0.0	0.0	5.6	0.0	0.0	-22.8
95	668544.41	5018304.32	385.52	0	DEN	8000	57.9	14.8	0.0	0.0	0.0	69.4	97.7	-0.8	0.0	0.0	5.6	0.0	0.0	-99.2
99	668543.05	5018334.20	389.12	0	DEN	63	52.8	14.8	0.0	0.0	0.0	69.7	0.1	-5.6	0.0	0.0	10.4	0.0	0.0	-7.0
99	668543.05	5018334.20	389.12	0	DEN	125	60.9	14.8	0.0	0.0	0.0	69.7	0.4	8.3	0.0	0.0	0.0	0.0	0.0	-2.7
99	668543.05	5018334.20	389.12	0	DEN	250	64.4	14.8	0.0	0.0	0.0	69.7	0.9	11.2	0.0	0.0	0.0	0.0	0.0	-2.6
99	668543.05	5018334.20	389.12	0	DEN	500	66.8	14.8	0.0	0.0	0.0	69.7	1.7	5.0	0.0	0.0	0.0	0.0	0.0	5.2
99	668543.05	5018334.20	389.12	0	DEN	1000	67.0	14.8	0.0	0.0	0.0	69.7	3.2	-0.1	0.0	0.0	4.8	0.0	0.0	4.1
99	668543.05	5018334.20	389.12	0	DEN	2000	66.2	14.8	0.0	0.0	0.0	69.7	8.3	-0.7	0.0	0.0	5.5	0.0	0.0	-1.9
99	668543.05	5018334.20	389.12	0	DEN	4000	64.0	14.8	0.0	0.0	0.0	69.7	28.3	-0.7	0.0	0.0	5.5	0.0	0.0	-24.0
99	668543.05	5018334.20	389.12	0	DEN	8000	57.9	14.8	0.0	0.0	0.0	69.7	100.8	-0.7	0.0	0.0	5.5	0.0	0.0	-102.6
102	668604.30	5018138.35	378.31	0	DEN	63	52.8	12.2	0.0	0.0	0.0	67.5	0.1	-5.5	0.0	0.0	10.2	0.0	0.0	-7.3
102	668604.30	5018138.35	378.31	0	DEN	125	60.9	12.2	0.0	0.0	0.0	67.5	0.3	2.5	0.0	0.0	2.3	0.0	0.0	0.6
102	668604.30	5018138.35	378.31	0	DEN	250	64.4	12.2	0.0	0.0	0.0	67.5	0.7	5.7	0.0	0.0	0.0	0.0	0.0	2.8
102	668604.30	5018138.35	378.31	0	DEN	500	66.8	12.2	0.0	0.0	0.0	67.5	1.3	3.0	0.0	0.0	1.8	0.0	0.0	5.5
102	668604.30	5018138.35	378.31	0	DEN	1000	67.0	12.2	0.0	0.0	0.0	67.5	2.4	-1.5	0.0	0.0	6.3	0.0	0.0	4.5
102	668604.30	5018138.35	378.31	0	DEN	2000	66.2	12.2	0.0	0.0	0.0	67.5	6.4	-2.1	0.0	0.0	6.9	0.0	0.0	-0.3
102	668604.30	5018138.35	378.31	0	DEN	4000	64.0	12.2	0.0	0.0	0.0	67.5	21.8	-2.1	0.0	0.0	6.9	0.0	0.0	-17.9
102	668604.30	5018138.35	378.31	0	DEN	8000	57.9	12.2	0.0	0.0	0.0	67.5	77.8	-2.1	0.0	0.0	6.9	0.0	0.0	-80.0

APPENDIX B

CURRICULUM VITAE

VALCOUSTICS
Canada Ltd.
Sound solutions to acoustical challenges

JOHN EMELJANOW, P.Eng.

Principal Acoustical Engineer

Mr. Emeljanow (John) has been employed with Valcoustics Canada Ltd. for over 27 years. He is a Principal Engineer, a Designated Consulting Engineer with the Professional Engineers of Ontario, a graduate of the Ministry of the Environment's Acoustics Technology in Land Use Planning Course and has given evidence as an expert witness before the Ontario Municipal Board, dealing with environmental acoustics issues in land use planning. John has acted as project manager on a number of major architectural and environmental projects. His responsibilities include noise/vibration measurement, analysis, design computations, and report preparation. In addition, John was an active contributor to the acoustics section of the Architectural Design Standards for Ontario Courthouses prepared for the Ministry of the Attorney General.

EXPERIENCE:

Architectural acoustics involving the interaction of sound and architectural elements within a space to obtain the desired acoustical environment. This involves control of reverberation, ambient sound level, location of sound absorbing and sound reflecting surfaces as well as isolation of sound to and from adjacent spaces. Representative projects are: Niagara Convention Centre; Durham Consolidated Courthouse; Brampton Consolidated Courthouses; Upper Canada College Expansion, Toronto; Toronto Stock Exchange Renovations (The Design Exchange); Sunnybrook Health Science Centre Expansion and Renovation, Toronto; Metro Convention Centre Expansion, Toronto; Canary Wharf (DS5), London; Sudbury Regional Hospital; and GTAA Infield Development, Mississauga.

Environmental noise and vibration studies to determine impact of ground and air transportation and stationary sources of sound on adjacent land use, both existing and proposed, as well as selection and analysis of noise mitigation measures, including sound barriers, architectural elements, and operational techniques. Projects are prepared for private and government sectors, involving residential, industrial and commercial development. Representative projects include: Walker Brothers Quarry, Thorold; Keele Valley Landfill Vertical Expansion, Maple; Canadian National Railway Lands Redevelopment, Toronto; The Woodbridge Expansion Area, Vaughan; Rimply Manufacturing Plant, Newmarket; Honda Canada Manufacturing Minivan Plant, Alliston; Sheppard Subway, Toronto; and Highway 11, Burk's Falls to Powassin.

Mechanical system noise and vibration analyses to control the impact of air-borne and structure-borne sound from mechanical equipment on adjacent spaces through the design of demising surfaces, as well as the control of noise generated and transmitted through HVAC systems. Representative projects include: the New Princess Margaret Hospital, Toronto; National Trade Centre, Toronto; IBM Facility for Software Development, Markham; Niagara College – Glendale Campus, Niagara Falls; The American School, Shanghai; Guelph General Hospital; and Xiamen Conference Centre, China.

EDUCATION:

B.Eng.
McMaster University, June 1989, Mechanical Engineering

Course on Noise Control in Land Use Planning; Ministry of the Environment and Energy, Toronto, June 1989

PROFESSIONAL AFFILIATION:

Registered Professional Engineer, Professional Engineers of Ontario
Designated Consulting Engineer, Professional Engineers of Ontario

PUBLICATIONS & PRESENTATIONS:

- "A Technique for Comparing Alternative Transportation Corridor Alignments Based on Noise Impact", presented at Inter-Noise 92, Toronto, Ontario, July 1992.
- "Environmental Noise Aspects of Landfill Site Selection", Canadian Acoustics, Vol. 21, No. 3, September 1993.
- "Acoustical Challenge of Quarry Design", Canadian Acoustics, Vol. 22, No. 3, September 1994.
- "NPC-300 Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning", Seminar for Municipalities, December 9, 2013 (co-presenter).
- "Environmental Acoustics in Land Use Planning", Seminar in Acoustics for the City of Mississauga, June 24-26, 2014 (co-presenter).
- "Environmental Acoustics in Land Use Planning", Seminar in Acoustics for the City of London, July 9-11, 2014 (co-presenter).
- "Environmental Acoustics in Land Use Planning", Seminar in Acoustics for the City of London, July 9-11, 2014 (co-presenter).
- "Workshop: Noise and Vibration for New Development in Proximity to Railway Operations", Prepared for the FCM-RAC Proximity Steering Committee, June 26, 2015 (co-presenter).

VALCOUSTICS
Canada Ltd.
Sound solutions to acoustical challenges

KENI MALLINEN, B.A.Sc., CRM

Acoustic Specialist

Mr. (Keni) Mallinen has over 4 years of experience in acoustical consulting. Prior to joining Valcoustics, Keni worked as an Acoustics, Noise and Vibration Specialist at Stantec Consulting Ltd. His key responsibilities include analysis, field work, computations and report preparation.

EXPERIENCE:

Keni's work involves primarily environmental noise and vibration studies to determine impact of road, rail and stationary sources of sound on adjacent land uses, both existing and proposed. He is also responsible for selection and analysis of noise mitigation measures, including sound barriers and operational techniques. Projects have been prepared for private and government sectors, involving residential, industrial and commercial developments.

EDUCATION:

B.A.Sc., Chemical Engineering, Queen's University, May 2010

CRM, Canadian Risk Management designation, July 2016

Some representative noise and vibration-related projects include:

- Ontario Graphite Limited Acoustic Assessment – Kearney, Ontario;
- Brampton Brick Quarry Acoustic Assessment – Cheltenham, Ontario;
- CN Milton Logistics Hub Environmental Assessment – Milton, Ontario;
- Enbridge GTA Project vibration monitoring – Toronto (GTA), Ontario;
- Niagara Region Wind Farm Project REA – Niagara, Ontario;
- Niagara Region Wind Farm Project vibration monitoring – Niagara, Ontario;
- De Beers Victor Mine Noise Monitoring – Northern Ontario;
- Highway 138 Road Expansion – Cornwall, Ontario;
- Cargill AgHorizons Acoustic Assessment – Sarnia, Ontario;
- Suncor Ottawa Terminal Acoustic Assessment – Ottawa, Ontario;
- Greater Toronto Airport Authority Study – Toronto (GTA), Ontario;
- Algonquin College Acoustic Assessment – Ottawa, Ontario;
- TransCanada PipeLines HDD Project Vibration Monitoring – Mississauga, Ontario;
- TransCanada PipeLines Pipeline Construction Vibration Monitoring – Maple, Ontario;
- TransCanada PipeLines Compression Station Noise Monitoring – Barrie, Ontario;
- Ambico Limited Acoustic Assessment – Ottawa, Ontario;
- Raywal Cabinets Acoustic Assessment – Thornhill, Ontario;
- Highway 637 (MTO) Project Noise Monitoring – Killarney, Ontario;
- Wal-Mart Store Acoustic Assessment – Winnipeg, Manitoba;
- and many others.

APPENDIX C

EQUIPMENT ALTERNATIVES

Atlas Copco Surface Drill Rigs

SmartRig™ ROC D7C, D9C and F9C

Smart up your drilling business

SmartRig ROC D7C hole range 64 – 115 mm (2½ – 4½″)
SmartRig ROC D9C hole range 76 – 115 mm (3 – 4½″)
SmartRig ROC F9C hole range 89 – 127 mm (3½ – 5″)

Atlas Copco

Drill smarter
with SmartRig

Thanks to the SmartRig™ from Atlas Copco you can now drill smarter holes. Each hole you drill saves you time and earns you money.

With its high shift capacity, low energy consumption and innovative modules that improve productivity, we can safely say that SmartRig is a ground-breaking rig. The options available make it one of the quietest running rigs of its kind, with greatly reduced setup time and efficient high precision drilling – under any conditions.

The unique SmartRig features all add up to a set of tools that enable you to optimize operations, to maintain your competitive edge and maximize profitability. Smarter drilling with SmartRig.

SmartRig gives you:

- High productivity
- Outstanding safety & ergonomics
- Environmental friendliness
- Excellent documentation of the work progress

Silenced
The Silenced SmartRig's noise level is approximately 10 dB (A) below that of other rigs on the market, making it one of the world's quietest running rigs.

ROC Manager
Planning & analysis of drilling and blasting. Design drill patterns, log deviation data and analyse MWD (Measure While Drilling) results.

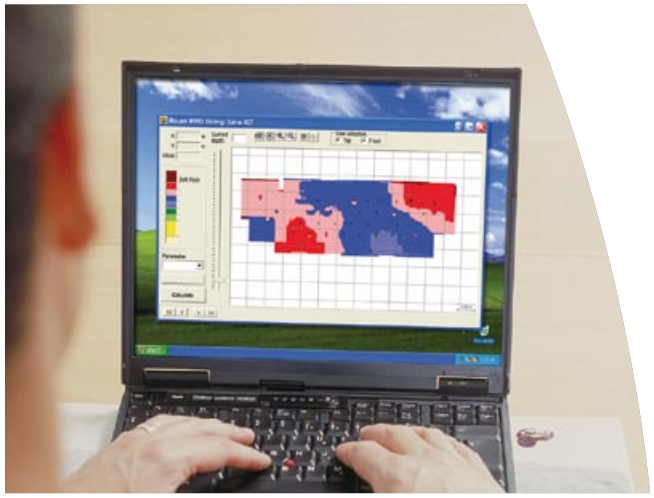
Hole navigation
For high precision drilling, fast set-up, monitoring, project integration and control.

SmartRig modules

Hole navigation for accuracy, fast set-up and high precision drilling

The **Hole Navigation System** adds a new dimension to the extensive automation already available on a SmartRig to complete pre-planned drill patterns after initial set-up. All drilling functions are monitored and controlled to provide a record of hole alignment, burden and spacing. Drill rig operations can also be integrated with other equipment such as dozers, dumpers and graders, using the same set-out input data on a common computer system used at the project site.

The precision of the navigation system optimizes drilling and blasting results, improves fragmentation and decreases the amount of explosives needed, substantially lowering your overall production costs. By using hole navigation, you will also profit from reduced setup time and efficient high precision drilling – under any weather conditions. The net result is a significant increase in rig utilization and substantial savings in both time and money.



Outstanding planning and control with ROC Manager

The **ROC Manager** is, together with the **Hole Navigation System** (HNS), simply put, your best friend when it comes to planning and control of the drilling and blasting operations. ROC Manager runs on a standard PC and can be used to consolidate data about multiple rigs at multiple sites. You can use ROC Manager to design drill patterns and analyze drilling results.

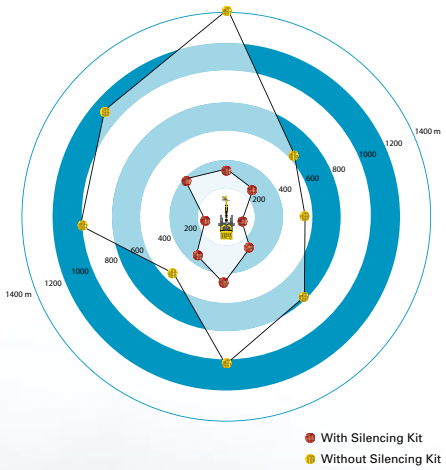
Reduced set-up time and increased efficiency with Automatic Feed Alignment & Rod Adding System

SmartRig's **Automatic Feed Alignment** reduces set-up time and cancels out operator error by setting the feed to predefined angles at the touch of a button. The **Automatic Rod Adding System** enables the operator to drill automatically to a given depth, while carrying out other duties such as maintenance checks or grinding bits. The net result is a significant increase – about 10-15 % – in rig utilization. Operation is easy and setup time is reduced.

The rig can be equipped with a laser plane receiver that gives you an accurate reference height. All holes can then be drilled to exactly the same depth. There is no need for sight rods or manual marking of bench heights. The advantages of accurately drilling all holes to the same depth are considerable. Overdrilling is not necessary and the costs for secondary breaking, crushing, loading and haulage are considerably reduced.

Drill anywhere at anytime with the Silenced SmartRig

With a noise level approximately 10 dB (A) below that of other rigs on the market, the **Silenced SmartRig** is one of the worlds quietest running rigs. A perfect choice for civil engineering work sites in restricted urban areas. The advanced silencing system consists of several components which work to reduce the overall noise level. The Silenced version is available for SmartRig ROC D7C and D9C.



Noise level with and without Silencer
The noise mat shows the breakthrough difference of sound level with and without Silencer, and shows that the Silenced SmartRig can work up to 1 km nearer to settlements and buildings. The reference sound level is 55 dB (A). This is a common max sound level (in northern Europe) when drilling close to urban areas. The area should be used as an indication only.

More ground-breaking features ahead

At Atlas Copco, we are continuously innovating to improve your productivity. More additional options to the SmartRig will be available in the future. Keep ahead of the competition with SmartRig.

No matter how you finally decide to equip your SmartRig, every SmartRig delivered from us at Atlas Copco comes with highly intelligent standard equipment. Innovative equipment that has been developed with a focus on improving productivity.

More power with less fuel

The SmartRig delivers the exact right amount of power for each phase of the drilling operation from its new Stage 3/Tier III engine. This makes it possible to reduce fuel consumption by up to 30 % compared to similar rigs on the market.

Increased drilling efficiency

Using the SmartRig **Rock Drill Control System**, the service life length of drilling consumables, such as the shank adapter and drill steel, increases by more than 20 per cent. The system works by adjusting drilling power to suit the ground conditions, with the three vital control parameters being rotation pressure, drill dampening pressure and penetration rate.

The latter two are factory-set as default values according to the basic rock types: hard, medium or soft. For harder rock, the power is increased automatically. If voids are encountered, the speed is automatically reduced. For softer rock, different levels of control pressures are set. In addition to better economy in consumables, the risk of drill strings getting stuck in blast holes is reduced, resulting in increased rig availability and overall drilling productivity.

Superb operator ergonomics and safety

With the SmartRig control system, electrical signals are generated to control the hydraulic valves. This introduces the concept of a “dry cab”, with no hydraulic pipe work and gauges, considerably reducing both the noise for the operator and the risk of oil leakage. Control gauges and instruments are replaced by a display unit. This releases space in the cab, increases visibility, and improves operator ergonomics.

Easy maintenance & environmentally friendly

With 30 % less hoses and hose meters there is less need for maintenance and less risk of spillage, making the SmartRig environmentally friendly. Service is trouble-free with easy fault finding and self diagnostics.

The SmartRig™ family

The SmartRig comes in three different power classes; all with their unique characteristics, but all featuring the intelligence and efficiency of the SmartRig concept. Contact your local Atlas Copco dealer now for a smarter drilling business.

SmartRig ROC D7C

A crawler rig with power, flexibility and excellent rough terrain capabilities. Characteristics that elevate surface drilling to impressive new levels of quality, productivity and cost effectiveness. Ideal for construction and quarrying.

SmartRig ROC D9C

All the advantages of the SmartRig ROC D7C, but with a more powerful rock drill and more flushing air. A perfect choice when taking assignments focused on high productivity.

SmartRig ROC F9C

A powerful tophammer rig with SmartRig intelligence. Its top-of-the-range power and remarkable versatility make the SmartRig ROC F9C ideal for large-scale quarries and construction work.

Quick facts SmartRig ROC D7C, D9C and F9C

Main application area:	☐ DIMENSION STONE INDUSTRY	☒ CONSTRUCTION	☒ AGGREGATE QUARRIES
	☒ LIMESTONE QUARRIES *(mainly ROC F9C)*	☐ SELECTIVE MINING	☐ OPEN PIT MINING
Drilling method:	☒ TOPHAMMER	☐ DOWN-THE-HOLE	☐ COPROD
Rock drill:	ROC D7C COP 1840	ROC D9C COP 2560	ROC F9C COP 2560
Drill steel:	ROC D7C T38, T45, T51	ROC D9C T45, T51	ROC F9C T45, T51
Hole diameter:	64 mm (2½ ") – ROC D7C – 115 mm (4½")	76 mm (3 ") – ROC D9C – 115 mm (4½")	89 mm (3½") – ROC F9C – 127 mm (5")
Maximum hole depth:	28 m (92')		
Engine power: rating at 2200 rpm (rpm varies for different type of rigs)	ROC D7C 168 kW (225 HP)	ROC D9C 168 kW (225 HP)	ROC F9C 224 kW (300 HP)
Rock drill power output:	ROC D7C 20 kW (26,8 HP)	ROC D9C 25 kW (33,5 HP)	ROC F9C 25 kW (33,5 HP)

Atlas Copco

www.atlascopco.com

9851 2425 01c 0808 Örebro, Sweden

bbs-tek BACKALARM® Back-up Alarms

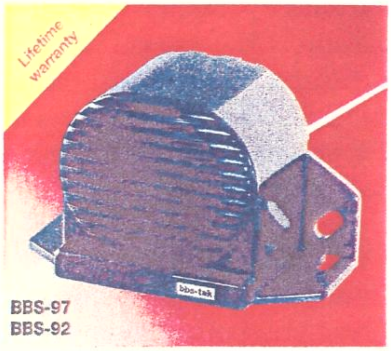
BBS-107
BBS-102

Heavy Duty

Ideal for dump trucks, bulldozers, loading shovels and all heavy earthmoving machinery.

- Conform to SAE J994 environmental standards
- Tough, durable, guaranteed waterproof (IP68)
- Solid-state, spark-free electronics, epoxy-sealed against mud, water and vibration
- Can be steam-cleaned and pressure-hosed
- CE and 'e' marked (EMC)

STOCK CODE	MODEL	VOLTS DC	SOUND LEVEL dB(A)@1m	FREQUENCY KHZ	CURRENT AMPS	SOUNDER UNIT	SIZE mm (WxHxD)	HOLE CENTRES (mm)
A0899	BBS-107	24	107	Multi	1.0	Driver	173x80x95	152
A0898	BBS-102	24	102	Multi	1.0	Driver	173x80x95	152



BBS-97
BBS-92

Medium Duty

Ideal for trucks, buses and coaches, light mobile plant, forklift trucks and industrial vehicles.

- Conform to SAE J994 environmental standards
- Tough, durable, guaranteed waterproof (IP68)
- Solid-state, spark-free electronics, epoxy-sealed against mud, water and vibration
- Can be steam-cleaned and pressure-hosed
- CE and 'e' marked (EMC)

STOCK CODE	MODEL	VOLTS DC	SOUND LEVEL dB(A)@1m	FREQUENCY KHZ	CURRENT AMPS	SOUNDER UNIT	SIZE mm (WxHxD)	HOLE CENTRES (mm)
A0935	BBS-97	12-24	97	Multi	0.5	Speaker	127x65x76	98-108
A0934	BBS-92	12-24	92	Multi	0.5	Speaker	127x65x76	98-108

BBS-87
BBS-82
BBS-77

Light Duty

Ideal for forklift trucks, light commercial vehicles, MPVs and cars.

- Conform to SAE J994 environmental standards
- Tough, durable, guaranteed waterproof (IP68)
- Solid-state, spark-free electronics, epoxy-sealed against mud, water and vibration
- Can be steam-cleaned and pressure-hosed
- CE and 'e' marked (EMC)

STOCK CODE	MODEL	VOLTS DC	SOUND LEVEL dB(A)@1m	FREQUENCY KHZ	CURRENT AMPS	SOUNDER UNIT	SIZE mm (WxHxD)	HOLE CENTRES (mm)
A0897	BBS-87	12-24	87	Multi	0.5	Speaker	90x49x39	76
A0896	BBS-82	12-24	82	Multi	0.5	Speaker	90x49x39	76
A1397	BBS-77	12-24	77	Multi	0.5	Speaker	90x49x39	76

Electric Forklift Truck

BBS-87HV
BBS-82HV

Medium Duty

- Conform to SAE J994 environmental standards
- Tough, durable, guaranteed waterproof (IP68)
- Solid-state, spark-free electronics, epoxy-sealed against mud, water and vibration
- Can be steam-cleaned and pressure-hosed
- CE and 'e' marked (EMC)

STOCK CODE	MODEL	VOLTS DC	SOUND LEVEL dB(A)@1m	FREQUENCY KHZ	CURRENT AMPS	SOUNDER UNIT	SIZE mm (WxHxD)	HOLE CENTRES (mm)
A1323	BBS-87HV	36-80	87	Multi	0.15	Speaker	127x65x76	98-108
A1322	BBS-82HV	36-80	82	Multi	0.15	Speaker	127x65x76	98-108

J.E. COULTER ASSOCIATES LIMITED

Consulting Engineers in
Acoustics, Noise & Vibration

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Toronto, Ontario M2K 1E3
Tel: (416) 502-8598
Fax: (416) 502-3473
e-mail: jcoulter@on.aibn.com

TRANSMITTAL RECORD

Date: May 22, 2009

To: AUSTIN POWDER

Enclosing Herewith: LETTER

Via: EMAIL & MAIL

**Title: SOUND TESTING OF
ATLAS-COPCO ROC 9 SILENCED HYDRAULIC DRILL
AT BRECHIN QUARRY, BRECHIN, ONTARIO**

Comments:

Distribution: KEITH TAYLOR

Per:F MAGNANTE

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e-mail: jcoulter@on.aibn.com

May 21, 2009

Austin Powder
910 Dew Drop Road
Sudbury, Ontario
P3G 1L2

Attention: Keith Taylor

Re: **Sound Testing of**
Atlas-Copco ROC 9 Silenced Hydraulic Drill
At Brechin Quarry, Brechin, Ontario

Gentlemen:

On May 15, 2009, J.E. Coulter Associates Limited investigated the sound generated by the Atlas Copco ROC 9 Silenced Hydraulic Drill. Sound level measurements were conducted at various locations and setbacks around the machine during normal drilling operations in limestone near Brechin, Ontario.

The sound level measurements were taken using a B&K 2230 sound level meter in conjunction with a Larsen Davies 720 SLM meter. Recordings of the equipment operating were taken with a laptop computer with a ST190 sound card.

The drilling was being conducted to a depth of 40' with a 5" diameter drill bit. The engine was operating at an rpm of 1850.

A summary of the sound level measurements is indicated in the table below. The attached drawing provides a graphical representation of the sound generated by the machine when drilling.

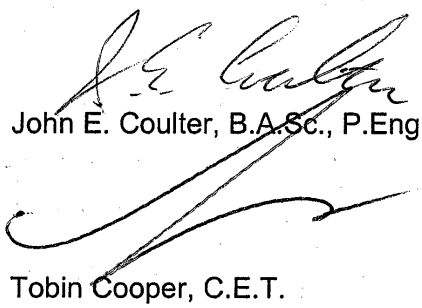
Atlas Copco ROC9 Drill Sound Level Measurements		
Location	**Setback**	**Sound Level**
Rear of Machine	15m	77 dBA
	18m	75 dBA
	30m	72 dBA
	60m	64 dBA
Right Side of Machine	15m	78 dBA
	18m	77 dBA
	30m	71 dBA
	60m	63 dBA
Left Side of Machine	15m	79 dBA
	18m	78 dBA
	30m	70 dBA
	60m	62 dBA
Front of Machine	15m	76 dBA
	18m	75 dBA
	30m	69 dBA
	60m	61 dBA
Drill Head	1.0m	97 dBA

Based upon the above data, the drill is operating at a sound level that is much quieter than other hydraulic drills of this capacity we have tested or reviewed thus far. It generates a sound power level of approximately 110BA PWL. This level is approximately 9 - 12dB lower than the Furukawa HCR 1500 drill in the company's fleet that was measured operating under similar conditions in the same quarry.

Should you have any questions or comments, please do not hesitate to contact the undersigned.

Yours truly,

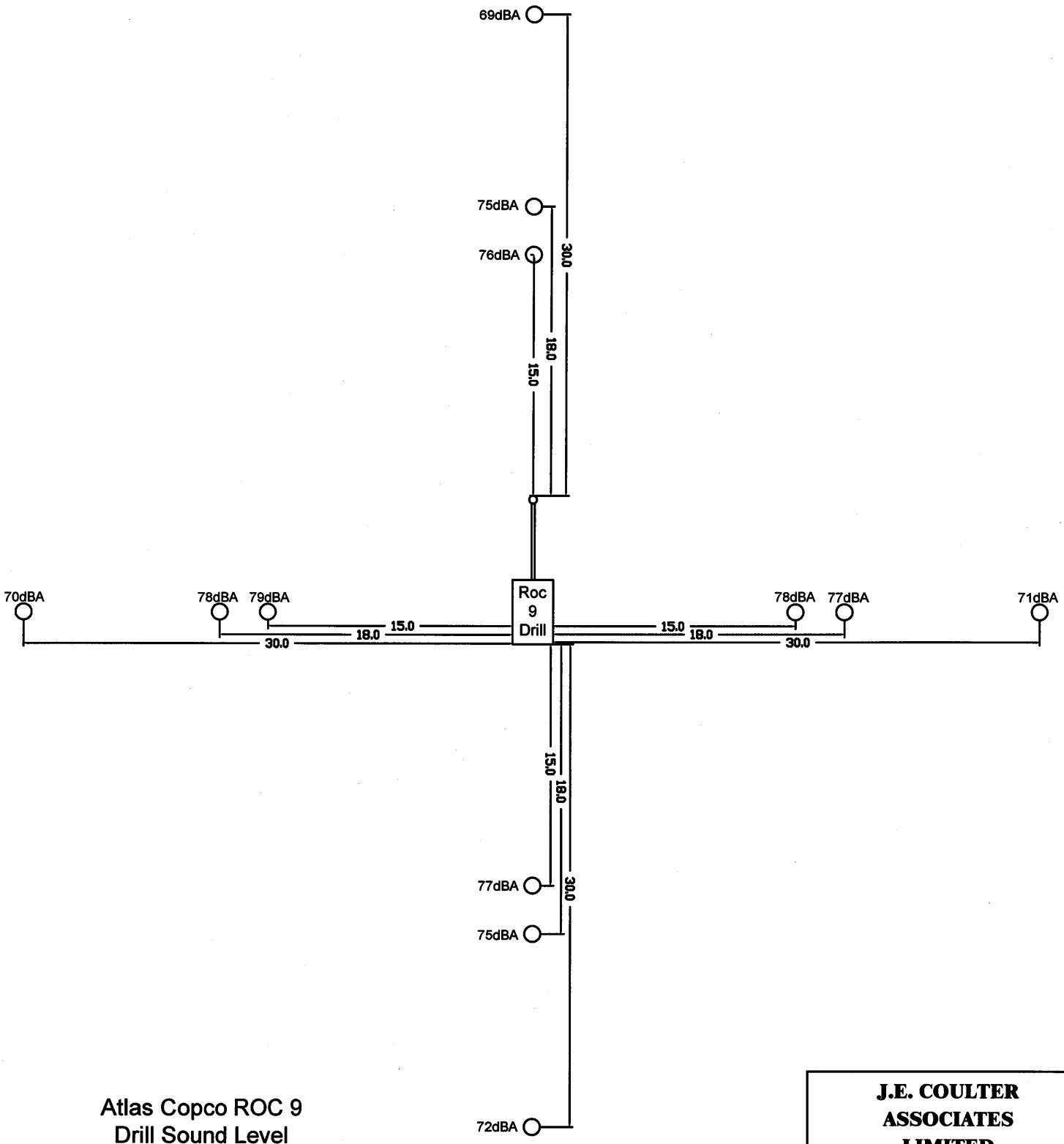
J. E. COULTER ASSOCIATES LIMITED



John E. Coulter, B.A.Sc., P.Eng.

Tobin Cooper, C.E.T.

TC:jcc



Atlas Copco ROC 9
Drill Sound Level
Measurement Summary

J.E. COULTER ASSOCIATES LIMITED

Consulting Engineers in Acoustics, Noise & Vibration
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Toronto, Ontario M2K 1E3
Tel: 416-502-8598 Fax: 416-502-3473
email: jcoulter@on.aibn.com

Client: Austin Powder Project: ROC 9 Silenced Drill	Drawn by: T.C.	Dwg No.: M1	Date: 05/15/2009

Bokhari, Atif

From: mike.smitko@ca.atlascopco.com
Sent: Wednesday, March 26, 2014 10:34 AM
To: Bokhari, Atif
Cc: reg.labelle@ca.atlascopco.com
Subject: RE: DC9 Drilling Rig Acoustic Information
Attachments: SKMBT_C22414032608120.pdf

Good Morning Atif

Please see the attached information below. I hope this helps answer your questions. If you need any firther information please don't hesitate to ask.

Below are calculated noise level; 50 - 150 meters from the rig

Average Sound Pressure in Semifree Conditions - Calculator			
Distance	50	m	*Add distance in the green cell*

Average Sound Pressure at 50m from Rig									
	TOTAL [dBA]	Octave Spectrum [dBA]							
		63	125	250	500	1000	2000	4000	8000
F6	81	37	58	67	73	77	74	74	67
D9	85	35	59	62	71	76	80	82	74
D9C	85	35	59	62	71	76	80	82	74
D9C Silence	76	39	58	60	67	70	71	69	61
D7	85	35	59	62	71	76	80	82	74
D7C	85	35	59	62	71	76	80	82	74
D7C Silence	76	39	58	60	67	70	71	69	61
D9 RRC	85	35	59	62	71	76	80	82	74
D7 RRC	85	35	59	62	71	76	80	82	74

Average Sound Pressure in Semifree Conditions - Calculator			
Distance	75	m	*Add distance in the green cell*

Average Sound Pressure at 75m from Rig									
	TOTAL [dBA]	Octave Spectrum [dBA]							
		63	125	250	500	1000	2000	4000	8000
F6	78	34	55	64	70	74	71	71	64
D9	82	32	56	59	68	73	77	79	71
D9C	82	32	56	59	68	73	77	79	71
D9C Silence	72	36	55	57	64	67	68	66	58
D7	82	32	56	59	68	73	77	79	71
D7C	82	32	56	59	68	73	77	79	71
D7C Silence	72	36	55	57	64	67	68	66	58
D9 RRC	82	32	56	59	68	73	77	79	71
D7 RRC	82	32	56	59	68	73	77	79	71

Average Sound Pressure in Semifree Conditions - Calculator			
Distance	100	m	*Add distance in the green cell*

Average Sound Pressure at 100m from Rig									
	TOTAL [dBA]	Octave Spectrum [dBA]							
		63	125	250	500	1000	2000	4000	8000
F6	75	31	52	61	67	71	68	68	61
D9	79	29	53	56	65	70	74	76	68
D9C	79	29	53	56	65	70	74	76	68
D9C Silence	70	33	52	54	61	64	65	63	55
D7	79	29	53	56	65	70	74	76	68
D7C	79	29	53	56	65	70	74	76	68
D7C Silence	70	33	52	54	61	64	65	63	55
D9 RRC	79	29	53	56	65	70	74	76	68
D7 RRC	79	29	53	56	65	70	74	76	68

Average Sound Pressure in Semifree Conditions - Calculator			
Distance	150	m	*Add distance in the green cell*

Average Sound Pressure at 150m from Rig									
	TOTAL [dBA]	Octave Spectrum [dBA]							
		63	125	250	500	1000	2000	4000	8000
F6	72	27	48	57	63	67	64	64	57
D9	76	25	49	52	61	66	70	72	64
D9C	76	25	49	52	61	66	70	72	64
D9C Silence	66	29	48	50	57	60	61	59	51
D7	76	25	49	52	61	66	70	72	64
D7C	76	25	49	52	61	66	70	72	64
D7C Silence	66	29	48	50	57	60	61	59	51
D9 RRC	76	25	49	52	61	66	70	72	64
D7 RRC	76	25	49	52	61	66	70	72	64

We don´t have any drawings. However, this is the data sheet of the material we use.

Best Regards,

Mike Smitko
Sales Support Manager SDE

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Committed to sustainable productivity

From: "Bokhari, Atif" <Atif.Bokhari@aecom.com>