FREEFIELD LTD.
Ottawa, Ontario

ACOUSTIC ASSESSMENT FOR THE MCGEE PIT EXPANSION AREA CITY OF OTTAWA ONTARIO

PEO License No. 90532110

Prepared for

Karson Holdings Inc.

Prepared by

Freefield Ltd.

29 June 2023

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ACOUSTIC ASSESSMENT FOR THE MCGEE PIT EXPANSION AREA CITY OF OTTAWA ONTARIO

Executive Summary

Karson Holdings Inc., Karson, is applying to the Ministry of Northern Development, Mines, Natural Resources and Forestry, MNDMNRF, for a Class "A" Pit License, below water extraction, under the Aggregate Resources Act, ARA, for the proposed expansion area, referred as McGee Pit Expansion Area, located immediately south of the existing licensed McGee Pit, ARA License Number: 624971, at Part of Lot 11 & 12, Concession 4, Geographic Township of Huntley, now in the City of Ottawa, Ontario, as shown in Figures 1 and 2.

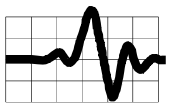
In addition, to the license application, Karson is applying to the City of Ottawa for an official plan amendment to permit extraction operations at the expansion area.

The MNDMNRF license and Municipal zoning applications require the submission of an Acoustic Assessment Report of the proposed operation. Freefield Ltd. has been retained by Karson to complete this Acoustic Assessment.

The acoustic assessment has been carried out according to the applicable MECP Noise Assessment Guidelines, including NPC-300, published August 2013.

The assessment considers the impacts on nearby noise sensitive lands, including existing residences and land zoned for potential noise sensitive use, of noise generated by all on-site equipment operations, including extraction operations by loader, excavator and dredge, aggregate processing operations by a mobile crushing plant, mobile screening plant and a mobile wash plant, loading raw material into hoppers for processing and truck movements used for delivery of material to the screening plant and shipping of product off-site.

Although the ARA license application and Municipal approval process refer only to the expansion area, Karson will hold the license for both the existing McGee Pit and the expansion area, McGee Pit Expansion Area, once the license is in place. As such, this assessment considers the cumulative impact of noise from operations occurring at both the existing licensed pit and expansion area as is appropriate under MECP guidelines. It is noted while concurrent operations in both licensed areas are considered in this assessment it is the one set of extraction and aggregate processing equipment which will be in operation on-site.



Noise impacts have been predicted and compared to the MECP sound level limits as set out in NPC-300. Where applicable, noise mitigation measures such as barriers and limits to operations have been designed to ensure all operations comply with the applicable sound level limits.

Assessment methodology is provided in Section 1. A detailed description of the facility and its operations is provided in Section 2. Noise sources associated with operations at the pit are summarized in Section 3. Noise sensitive receptors are described in Section 1 and Section 4, with Section 5, 6 and 7 detailing applicable assessment criteria, an assessment of noise impacts and recommended mitigation measures.

ACOUSTIC ASSESSMENT FOR THE MCGEE PIT EXPANSION AREA CITY OF OTTAWA ONTARIO

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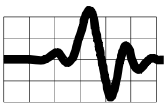


ACOUSTIC ASSESSMENT FOR THE MCGEE PIT EXPANSION AREA CITY OF OTTAWA ONTARIO

1.0 Introduction

Karson Holdings Inc., Karson, is applying to the Ministry of Northern Development, Mines, Natural Resources and Forestry, MNDMNRF, for a Class "A" Pit License, below water extraction, under the Aggregate Resources Act, ARA, for the proposed expansion area, referred as McGee Pit Expansion Area, located immediately south of the existing licensed McGee Pit, ARA License Number: 624971, at Part of Lot 11 & 12, Concession 4, Geographic Township of Huntley, now in the City of Ottawa, Ontario, as shown in Figures 1 and 2.

In addition, to the license application, Karson is applying to the City of Ottawa for an official plan amendment to permit extraction operations at the pit expansion area.

This report describes an assessment, carried out by Freefield Ltd., of the potential impact of noise from operations at the proposed McGee Pit Expansion Area (the facility), on nearby noise sensitive receptors in accordance with MECP guidelines for stationary noise sources. [1, 2]

This report has been prepared in accordance with the MECP Document NPC-233, *Information to be Submitted for Approval of Stationary Sources of Sound*, October 1995. Noise from the facility is assessed according to MECP Documents: NPC-300, *Stationary and Transportation Sources – Approval and Planning*, August 2013.[1] This report follows the recommended format contained in, *Sample Application Package, Basic Comprehensive Certificate of Approval (Air and Noise)*, July 2009.[2]

The noise assessment methodology is summarised below.

- Identification of noise sensitive receptors in the vicinity of the facility. Potential noise sensitive receptors include residences, motels, places of worship, schools, hospitals and vacant land zoned for potential noise sensitive use.

- Determination of the MECP sound level limits[1] which apply at each of the noise sensitive receptors.

- Identification of the sources of noise that will arise from the facilities operations. In the current study, the strengths of the various noise sources were obtained from noise measurements carried out on-site in October 2022 and from a database of measurements of similar operations at other aggregate operations in Ontario by Freefield Ltd.

- Based on the strengths of the individual noise sources, noise levels due to the facilities operations are predicted at nearby noise sensitive receptors using a prediction procedure[6] which is favoured by the MECP. The MECP methodology requires that compliance be assessed under predictable "worst case" conditions for normal operations.

- Assessment of compliance of the noise due to pit operations with MECP sound level limits. Where appropriate mitigation measures are recommended such that compliance, with MECP sound level limits, is achieved at all receptors.

Note that this assessment considers all significant noise sources in operation on the site. The facility is not a significant source of vibration therefore an assessment of vibration impacts is not required.

Surrounding Lands, Acoustic Environment and Noise Sensitive Receptors

The facility is located on the east side of Diamondview Road at the intersection with McGee Side Road in the City of Ottawa, Ontario, as shown in Figure 1.

Highway 417 lies immediately west of Diamondview Road and carries significant traffic on a 24-hour basis.

The surrounding lands are relatively flat with relatively minor changes in elevation general falling in a northerly direction.

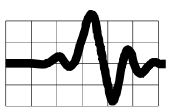
The legal description of the land occupied by the facility is as follows:

Part of Lot 11 & 12,
Concession 4,
Geographic Township of Huntley,
now in the City of Ottawa,
Ontario

A location plan showing the site with respect to the surrounding area is provided in Figure 1. A site layout plan, showing the sites detailed arrangement and elevation contours, is provided in Figure 2. A land use zoning map is provided in Appendix 1.

Directions in this report refer to Site North as shown on Figure 1.

The property parcel on which the facility is located is zoned Mineral Extraction Subzone 2 (ME2) and Rural (RU) with the proposed expansion area fully located on land zoned Rural (RU), as shown on the Zoning Map, Appendix 1.



To the north of the site the land is zoned Air Transportation Facility Zone (T1B) with small pockets of Rural (RU) zoned land fronting Diamondview Road. The Carp Airport lies immediately to the northeast of the existing licensed boundary. A small number of existing residences fronting Diamondview Road on land zoned Rural (RU) and a number of vacant lots associated with a new residential subdivision currently being constructed at the intersection of Albert Boyd Private and Diamond View Road, lie to the north and northwest of the site. The closest existing and potential future residence in this direction have been selected as noise sensitive receptors in the following assessment.

To the east of the site the land is zoned Mineral Extraction Subzone 2 (ME2), Rural (RU) and Rural Commercial (RC). A number of residences exist in this direction fronting William Mooney Road. The closest existing residences in this direction have been selected as noise sensitive receptors in the following assessment.

To the south of the site the land is zoned Rural (RU). A number of residences exist in this direction fronting McGee Side Road. The closest existing residences in this direction have been selected as noise sensitive receptors in the following assessment.

Immediately west of the site lies Diamondview Road and Highway 417 with a small pocket of Rural (RU) zoned land located between Diamondview Road and Highway 417 at the intersection of Diamondview Road and McGee Side Road. Two residences exist in this direction on this small pocket of land zoned Rural (RU). These existing residences have been selected as critical receptors in the following assessment.

Where receptors have been located on vacant land zoned for potential noise sensitive use i.e. a possible future residence located at the new subdivision currently being constructed to the north, the location selected for assessment is consistent with the proposed pattern of development of the area.

The noise sensitive noise sensitive receptors, which have been selected for detailed analysis, are shown in Figure 1. These were selected as being the receptors most likely impacted by noise from the proposed pit operations. Other noise sensitive receptors are at greater distances and will be less affected by noise from the pit.

Table 1 lists the noise sensitive receptors selected for analysis.

2.0 Facility Description

The existing McGee Pit and expansion area have an annual tonnage limit of 500,000 tonnes. The proposed expansion area will expand the extraction and aggregate processing area of the existing pit after the license is in place. No changes to the annual production are proposed with the expansion of the pit.

Raw material (sand and aggregate) will be primarily extracted by loader or excavator and loaded into aggregate trucks which deliver the raw material to stockpiles located near the processing area at the existing licensed pit. Loaders or excavators then feed the stockpiled raw material into the mobile screening plant for processing. The mobile screening plant will be located on the pit floor in the processing area at the existing licensed pit.

From the screening plant, various grades of sand and aggregate are placed into stockpiles, using conveyors and stackers.

Larger stones or rocks, separated from the sand in the screening process, are stored in stockpiles, prior to being fed into a mobile crushing plant, which is brought to site as needed, to produce various grades of aggregate. The mobile crushing unit will typically be located on the pit floor within the processing area of the existing licensed pit near the mobile screening plant.

Extraction below water will be carried out by an excavator with a large boom, a dragline or a cutter suction dredge.

At certain times extracted sand and aggregate will be fed into a wash plant for further processing. The wash plant will be located on the pit floor within the processing area of the existing licensed pit.

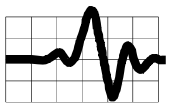
A loader is then used to load the processed sand and aggregate from stockpiles onto highway trucks which are used to haul the product off-site.

Additional material may be brought on site as needed, stored and processed, before being shipped off site.

Extraction operations consist of mobile equipment that currently operates in the existing pit. This equipment will be moved to, and operate in, the expansion area once the license is in place and as production of aggregate is needed.

The proposed expansion area is unexcavated with topography ranging from approximately 118 mASL to 120mASL.

Extraction will take place in two lifts corresponding to above water and below water extraction. The lifts may be benched to allow for rock quality considerations and to comply with Ministry of Labour requirements.



Extraction will proceed in a southerly direction from the current lift face of the McGee Pit to the setback limits at the McGee Side Road boundary, before proceeding in an easterly and westerly direction to the setback limits of the proposed expansion area.
The pit floor will sloped with the first lift down at an approximate elevation of 116 mASL. The majority of extraction and aggregate processing equipment typically operates below grade on the pit floor.

Access to the site is from the existing site entrance at William Mooney Road via Carp Road, as shown in Figure 2.

The following equipment will be operated on-site and is included in this assessment as significant sources of noise:

- One mobile track mounted screening plant (Powerscreen Warrior 1800 or similar),
- One mobile wash plant and associated diesel generator,
- One mobile track mounted crushing plant (Terex-Pegson Premiertrak or similar),
- Loaders or Excavators with buckets and or dragline,
- One cutter suction dredge,
- Aggregate trucks used to delivery raw material to stockpiles near the processing plants,
- Highway trucks used for delivery and shipping of product,
- Portable equipment for site preparation and rehabilitation, including excavators, hydraulic shovels, dozers and scrapers.

A description of each operation follows:

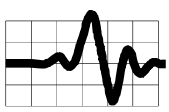
Mobile Screening Plant Operations

A mobile screening plant (mobile screener) will be brought to site as needed and located within the designated processing area of the existing licensed pit. The mobile screener will be a track mounted screener, Powerscreen Warrior 1800 or similar, and consist of a hopper (feed bin), screen deck, diesel engine, magnetic separator and a conveyor. Overburden, soil, sand and aggregate are fed through the screening plant to produce various grades of product before being stockpiled, using stackers and conveyors, and processed for shipping off site. Typically, one loader or excavator is used to feed the screening plant and fill trucks from the stockpiles for shipment off-site.

The mobile screening plant operates only during daytime hours (07:00 – 21:00).

Mobile Wash Plant Operations:

A mobile wash plant will be brought to site as needed and located within the designated processing area of the existing licensed pit. The major components of the plant include a hopper (feed bin), rotary crusher, vibrating screens (wet screen), a classifier, a single screw and double screw material washer and conveyors. Typically, associated operations include loaders used to supply raw material into the plant and to load trucks from stockpiles for delivery off-site, hydro and / or a diesel generator is used to provide power to the plant. The mobile wash plant operates only during daytime hours (07:00 – 21:00).



Mobile Crushing Plant Operations

A mobile crushing plant (mobile crusher) will be brought to site as needed and located within the designated processing area of the existing licensed pit. The mobile crusher will be track mount jaw type crusher, Terex-Pegson Premiertrak or similar. The plant consists of a hopper (feed bin), jaw crusher, diesel engine, vibrating screens, magnetic separator and a conveyor. Large stones and rock separated in the screening process, are fed into the hoppers by a loader or excavator. The hopper is used to feed material into the jaw crusher which crushes the stone into various grades of aggregate. Following crushing, the crushed stone exits the jaw crusher via gravity to a conveyor which transfers the processed aggregate via the magnetic separator to stockpiles. Typically, associated operations include one loader or excavator.

The mobile crushing plant operates only during daytime hours (07:00 – 19:00).

Loaders and Excavators

Typically, loaders and excavators are required on-site for the following:

- Loading overburden, soil and sand and aggregate into the screening plant,
- Loading separated rocks and aggregate into the crushing plant,
- Loading processed sand and aggregate from stockpiles on to trucks for delivery off-site,
- Generally pushing around aggregate to maintain the site in a safe state,
- Removing overburden and site preparation.

Loading and excavating activities take place only during the daytime and evening hours (07:00 – 21:00).

Cutter Suction Dredge

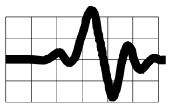
A cutter suction dredge may be used during certain periods for extraction below water. This equipment consists of a rotating cutter head, for breaking up hard soils. The sand and aggregate is sucked up by dredge pumps and deposited via pipelines to the shore deposit area prior to it being fed into the mobile washing and screening plants for processing.

Cutter suction dredge operations take place only during the daytime hours (07:00 – 19:00).

Aggregate Trucks

Aggregate trucks are used for delivery of material from the extraction face to stockpiles near the processing area. It is assumed up to 6 loads per hour will be delivered from the extraction face to the processing area during periods of maximum capacity during the daytime period, and 3 loads per hour will be delivered during the evening period. The aggregate trucks travel relatively slowly, typically 30 kph or less.

Aggregate trucks operate only during the daytime and evening hours (07:00 – 21:00).



Highway Trucks

Highway trucks are used for delivery and shipping of product off-site. It is assumed up to 12 loads per hour will be shipped during periods of maximum capacity during the daytime period and 2 loads per hour will be shipped during the evening period. Highway trucks travel relatively slowly, typically 30 kph or less. The use of Jake brakes (compression assisted brakes) is forbidden on site.

Shipping activities take place only during the daytime and evening period (07:00 to 21:00).

Hours of Operation

Daytime Operations (07:00 – 19:00 and 19:00 - 21:00)* - During the daytime and evening period, all significant noise sources are assumed to be in operation and include the following:

- One mobile screening plant,
- One mobile wash plant and associated diesel generator,
- One mobile crushing plant,
- One cutter suction dredge,
- One mobile water pump,
- Two loaders
- Three excavators,
- On-site truck movements, to deliver raw material to the processing plants and to ship the product off-site.

Early Evening Operations (19:00 - 21:00)* - During the early evening period the following significant noise sources are assumed to be in operation and include the following:

- One mobile screening plant,
- One mobile wash plant and associated diesel generator,
- One mobile water pump,
- One loader
- One excavator,
- On-site truck movements, to deliver raw material to the processing plants and to ship the product off-site.

Late Evening and Night Operations (21:00 – 23:00 and 23:00 - 07:00) – During the late evening and nighttime period all pit operations do not operate except for the following.

- One mobile water pump.

*It is noted the proposed evening period of operation from 7 pm to 9 pm (19:00 – 21:00) falls within MECP defined evening period from 7 pm to 11 pm (19:00 to 23:00), hence, this report refers to the period from 7 pm to 9 pm as the Early Evening Period, with the period from 9 pm to 11 pm, when the pit doesn't operate, referred as the late evening period.

3.0 Noise Source Summary

The following noise sources have been used to model noise generated by operations at the faciltiy. In brackets are the shortened names of the noise sources as used in the acoustic model. The characteristics of these sources, as used in acoustic modelling, are summarized in Table 2.

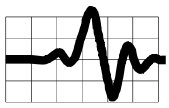
- One mobile screening plant (source: Screener);
- One mobile wash plant (source: Wash_Plant);
- One diesel generator with exhaust muffler (Source: Generator_Exhaust);
- One mobile crushing plant (source: Crusher);
- One cutter suction dredge (source: Dredge);
- One mobile water pump;
- Two loaders loading extracted material from the lift face onto aggregate trucks and loading highway trucks from stockpiles for delivery off-site (source: Loaders);
- Three excavators feeding raw material into the processing plants and carrying out below water extraction (source: Excavators);
- Aggregate trucks used for delivery of raw material to stockpiles (Source: IHR_Aggregate);
- Highway trucks used for delivery and shipping of product (Source: IHR_Shipping);

The strengths of the noise sources, i.e. the sound powers shown in Table 2, and used in this analysis, are taken from manufacturers data, data from a database of noise measurements made by Freefield Ltd. of similar operations at other facilities in Ontario and from noise measurements carried out on-site in October 2022. Refer to Table 2 for calculated sound powers, Appendix 2 for raw measurement data and Appendix 3 for manufacturers data.

Noise from the cutter suction dredge is based on noise data presented in the Swansea Channel Noise Impact Assessment prepared by Royal Haskoning DHV, dated 25th June, 2014.[7]

Noise from the on-site truck movements, and associated haul routes, is estimated using the moving point source method and modelled as a continuous loop indicating the worst-case on-site truck movements for the worst-case scenarios analysed. It is assumed twelve (12) loads of processed aggregate will be shipped off-site via highway truck, and six (6) loads of raw material will be delivered by aggregate truck from the lift face to stockpiles near the processing plants per hour during periods of maximum capacity during the daytime period. During the early evening period, during periods of limited production, it is assumed two (2) loads of processed aggregate will be shipped off-site via highway truck, and three (3) loads of raw material will be delivered by aggregate truck from the lift face to stockpiles near the processing plants per hour during periods of maximum capacity.

All conveyors used to transfer material were considered insignificant noise sources. These were running while noise measurements of the various plants were carried out, hence, the background noise associated with this operation has been included in this analysis.



Noise measurements were carried out using a Brüel & Kjær Type 2270 sound level meter. Field calibrations, using a Brüel & Kjær 4231 field calibrator, and battery checks were carried out before and after each measurement series. In no case did the field calibration vary by more than 0.1 dB over a series of measurements. In addition, the sound level meters, and the field calibrator are laboratory calibrated on an annual basis. Copies of the relevant calibration certificates are included in Appendix 4.

The weather conditions on the day of measurements were well suited to outdoor noise measurements, variable winds below 20 km/h during noise measurements. Skies were partly cloudy and humidity less than 73%. A windscreen was used during all measurements.

Refer Figure 3, 5 and 7 for location of sources for worst case scenarios analysed.

4.0 Point of Reception Summary

A total of seventeen nearby noise sensitive receptors have been selected for detailed noise evaluation. These existing and potential future residences are those closest to the pit in all directions and represent the worst-case noise impacts in comparison to other nearby or more distant noise sensitive receptors.

The seventeen points of reception selected for analysis, POR 1 to POR 17, are shown in Figure 1 and listed in Table 1.

As per MECP Guideline NPC-300, two points of reception (POR) have been selected at each noise sensitive receptor for which worst case sound levels have been calculated.

> POW – Plane of window (POW) points of reception are located on the dwelling or noise sensitive building, typically 2 m above ground for single storey dwellings and 4.5 m above ground for two storey dwellings.
>
> OPR – Outdoor Point of Reception, an area on the property of the residence. For large properties, the OPR point of reception can be up to 30 m from the dwelling at a height of 1.5 m above ground.

Where receptors have been located on vacant land zoned for potential noise sensitive use i.e. a possible future residence located at the new subdivision being built to the north, the locations selected for assessment are consistent with the existing pattern of development in the area.

5.0 Assessment Criteria, Performance Limits

Sound level limits, as specified in the MECP guideline NPC-300 [1], depend on the acoustical classification of the area as Class 1, 2, 3 or 4.

> **Class 1 area** 'an area with an acoustical environment typical of a major population centre, where the background sound level is dominated by the activities of people, usually road traffic, often referred to as urban hum.'
>
> **Class 2 area** 'an area with an acoustical environment that has qualities representative of both Class 1 and Class 3 areas: sound levels characteristic of Class 1 during daytime (07:00 to 19:00 or to 23:00 hours); and, low evening and night background sound level defined by natural environment and infrequent human activity starting as early as 19:00 hours (19:00 or 23:00 to 07:00 hours).'
>
> **Class 3 area** 'a rural area with an acoustical environment that is dominated by natural sounds having little or no road traffic, such as: a small community; agricultural area; a rural resort area such as a cottage or resort area; or, a wilderness area. '
>
> **Class 4 area** 'an area or specific site that would otherwise be defined as Class 1 or 2 and which: is an area intended for development with new noise sensitive land use(s) that are not yet built; is in proximity to existing, lawfully established stationary source(s); and, has formal confirmation from the land use planning authority with the Class 4 area classification which is determined during the land use planning process. Additionally, areas with existing noise sensitive land use(s) cannot be classified as Class 4 areas.'

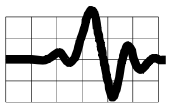
Due to the relatively low levels of road traffic along McGee Side Road and William Mooney Road, the distance to Highway 417, and the dominant rural character of the area, the area in which POR 1 to POR 11 are located is classified as Class 3 Area.

Due to the relatively high levels of road traffic along Highway 417 and urban character of the new sub-division, the area in which POR 12 to POR 17 are located is subject to road traffic noise and other urban noise, particularly during the daytime and evening period (07:00 to 23:00), with low levels of noise typically realized during the night (23:00 to 07:00). As such the area in which these receptors are located is classified as Class 2 Area.

The applicable outdoor sound level limit at a point of reception is the higher of the applicable exclusion limit value, given in Tables 3 and Table 4, or the background sound level for that point of reception.

Background sound level means the sound level that is present in the environment, produced by noise sources other than the source under assessment.

A background noise assessment was not carried out, hence, the levels given in Tables 3 and 4 are taken as the sound level limits at all points of reception for the purpose of this assessment. The applicable sound level limits for each point of reception are set out in Table 5.



Sound levels are assessed in terms of the 1-hour equivalent sound level, L_{eq}, effectively the average sound level over each hour. All sound levels are A-weighted, A-weighting being a frequency weighting with represents sensitivity of human hearing to sounds of differing frequencies.

6.0 Impact Assessment

Noise levels have been predicted at the noise sensitive receptors using "predictable worst case" assumptions under normal operations and using ISO 9613-2 sound propagation methodology[6] as implemented in the sound prediction software Cadna-A, Version 2023. The "predictable worst case" is interpreted as meaning the greatest noise impact anticipated under normal operating conditions. The ISO methodology provides a conservative (i.e. high) estimate of the noise level at a receptor taking into account adverse wind and meteorological conditions.

The estimation method includes the following:

- Distance attenuation is based on spherical spreading.
- Atmospheric attenuation.
- Ground attenuations, as appropriate.
- Barrier attenuation, as appropriate.

In order to consider cases of worst noise impacts, three operational scenarios have been modeled. In general, the worst impacts are those which occur when equipment is operating concurrently.

The following three worst case scenarios are presented in this report and form the basis for the recommended mitigation measures and assessment of compliance to MECP criteria:

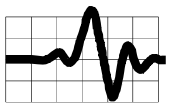
Scenario 1: *Worst Case, Mobile crushing*, and screening plants in operation at the existing pit concurrently with extraction occurring in the expansion area closest to POR 1, 2, 3, 4, 5 and 6, Day (07:00 – 19:00) and Evening (19:00 – 21:00) Period – Figure 3, 4.1 and 4.2.*

Scenario 2: *Worst Case, Mobile crushing*, and screening plants in operation at the existing pit concurrently with extraction occurring in the expansion area closest to POR 12, 13, 14 and 15, Day (07:00 – 19:00) and Evening (19:00 – 21:00) Period – Figure 5, 6.1 and 6.2.*

Scenario 3: *Worst Case, Mobile wash plant in operation at the existing pit concurrently with the dredge* in operation in expansion area closest to POR 1, 2, 3, 4, 5 and 6, Day (07:00 – 19:00) and Evening (19:00 – 21:00) Period – Figure 7, 8.1 and 8.2.*

**The evening period associated with each worst-case operating scenario presented above does not include noise from the mobile crushing plant and or dredge as applicable. The mobile crushing plant and dredge operate only during the daytime period, 7 am to 7 pm (07:00 – 19:00). Refer to Section 2.0 and 7.0 for further details.*

***The mobile water pump will be operated on a 24-hour basis. This source is included in all scenario's noted above. Compliance during the proposed evening period (19:00 – 21:00) will ensure compliance during the MECP defined evening (19:00 – 23:00) and nighttime (23:00 – 07:00) periods of operations.*



In Table 6.1 to Table 6.3, estimated noise levels at the nearest receptors for the worst-case scenarios, for daytime and evening and nighttime periods, are compared with the applicable sound level limits. More detailed estimates, for all sources and scenarios, are contained in Appendix 2, Tables A2.8.1 to A2.8.6.

It can be seen that the sound level limits are met at all noise sensitive points of reception, POR 1 to POR 17, for worst case operating conditions during the proposed daytime 7 am to 7 pm (07:00 to 19:00) and evening 7 pm to 9 pm (19:00 to 21:00) period of operation.

Details of acoustic modeling are provided in Appendix 2. Figures 4.1, 4.2, 6.1, 6.2, 8.1 and 8.2 show predicted noise contours for each mode of operation analyzed.

Statement of Compliance

It is concluded that, with the recommended mitigation measures detailed in section 7.0, noise impacts from operations at the McGee Pit Expansion Area will be in compliance with MECP Environmental Noise Guidelines[1] for the proposed daytime 7 am to 7 pm (07:00 to 19:00) and evening 7 pm to 9 pm (19:00 to 21:00) period of operation.

7.0 Mitigation Measures (Site Plan Recommendations)

Noise mitigation measures for the pit operations are detailed below. It is recommended that these measures be included on the official ARA Site Plan for the Pit. The predicted noise impacts in Tables A2.8.1 to A2.8.6 are based on the implementation of the following mitigation measures:

7.1 Noise Barriers and Berms:

7.1.1 Noise barriers and berms are to be provided as per Table 7 and Figure 9 and 10.

7.1.2 Noise barriers and berms are to be solid, having no gaps, and are to have a surface density of no less than 20 kg/m2. Examples of suitable barriers or berms are as follow:

7.1.2.1 Lift face or existing terrain;

7.1.2.2 Earth, gravel or aggregate berms or stockpiles;

7.1.2.3 Concrete or brick walls;

7.1.2.4 Commercial noise barriers;

7.1.2.5 Shipping containers or buildings,

7.1.2.6 A portable barrier such as a truck trailer equipped with movable flaps to block the space between the ground and the bottom of the trailer and increase height if required.

7.2 Mobile Screening Plant

7.2.1 The operation of the screening plant (screener) may take place during the daytime and evening period (07:00 to 21:00) and shall comply with the following:

7.2.1.1 The screener is to be located in the designated processing area on the pit floor at a maximum elevation of 117 mASL as shown on Figure 2, 3, 5 and 6.

7.2.1.2 The screener is not to operate concurrently with the mobile crushing plant or the mobile wash plant during the evening period (19:00 – 21:00).

7.3 Mobile Wash Plant Screening Plant

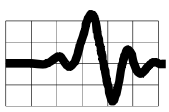
7.3.1 The operation of the mobile wash plant (wash plant) and associated diesel generator may take place during the daytime and evening period (07:00 to 21:00) and comply with the following:

7.3.1.1 The wash plant is to be located in the designated processing area on the pit floor at a maximum elevation of 117 mASL as shown on Figure 2 and 7.

7.3.1.2 The wash plant is not to operate concurrently with the mobile crushing plant or the mobile screening plant during the evening period (19:00 – 21:00).

7.3.1.3 The maximum outdoor sound power of the generator, if used to provide power to the wash plant, must not exceed the levels given in Table 2. To achieve these ratings the generator will likely need to be fitted with an exhaust silencer that meets the minimum insertion loss requirements listed in Table 8. The silencer is to be located inside the enclosures or as close as possible to the location where the exhaust exits the enclosures with the duct material between the silencer and the generator constructed of 16-gauge weather resistant metal. The silencers shall have a high transmission loss casing.

7.3.1.4 Item 7.2.1.3 above does not apply if hydro is used to provide power to the plant.



7.1 Mobile Crushing Plant

7.1.1 The operation of the mobile crushing plant (crusher) may take place only during the daytime period (07:00 to 19:00) and comply with the following:

7.1.1.1 The crusher is to be located in the designated processing area on the pit floor at a maximum elevation of 116 mASL as shown on Figure 2, 3 and 5.

7.1.1.2 The crusher is not to operate concurrently with the mobile wash plant or dredge.

7.1.1.3 Noise barriers are to be provided as per Table 7 and Figure 10.

7.2 Cutter Suction Dredge

7.2.1 The operation of the cutter suction dredge (dredge) may take place only during the daytime period (07:00 to 19:00), anywhere in the extraction area, and comply with the following:

7.2.1.1 The dredge is not to operate concurrently with the mobile crushing plant.

7.3 Loaders and Excavators

7.3.1 The operation of the loaders and excavators may take place during the daytime and evening period (07:00 to 21:00) anywhere in the extraction area, above or below grade, and shall comply with the following:

7.3.1.1 <u>During the daytime period (07:00 - 19:00):</u>

i. A maximum of three loaders OR three excavators may be in operation in the processing area carrying out stockpiling and loading operations, and

ii. A maximum of two loaders OR two excavators may be in operation in the expansion area West of Line AA, carrying out extraction and loading operations.

iii. East of Line AA, a maximum of one loader OR one excavator may be in operation in the expansion area, carrying out extraction and loading operations during the daytime period.

7.3.1.2 <u>During the evening period (19:00 – 21:00):</u>

i. A maximum of one loader OR one excavator may be in operation in the processing area carrying out stockpiling and loading operations, and

ii. A maximum of one loader OR one excavator may be in operation in the expansion area West of Line AA, carrying out extraction and loading operations.

iii. East of Line AA extraction operations are not to occur during the evening period.

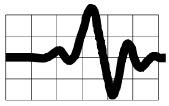
7.4 Aggregate Trucks

7.4.1 The delivery of raw material from the extraction face to the processing area using aggregate trucks may take place only during the daytime and evening period (07:00 to 21:00) and shall comply with the following:

7.4.1.1 When operating on-site, aggregate trucks shall not exceed 30 km/h and shall not use compression braking (Jake Brakes).

7.4.1.2 <u>When operating during the daytime period (07:00 – 19:00):</u> A maximum of 6 loads of raw material may be delivered from the extraction face to the processing area per hour.

7.4.1.3 <u>When operating during the evening and nighttime period (19:00 – 07:00):</u> A maximum of 3 loads of raw material may be delivered from the extraction face to



the processing area per hour.

7.4 Highway Trucks

7.4.1 The loading and shipping of product using highway trucks may take place only during the daytime and evening period (07:00 to 21:00) and shall comply with the following:

7.4.1.4 When operating on-site, highway trucks shall not exceed 30 km/h and shall not use compression braking (Jake Brakes).

7.4.1.5 When operating during the daytime period (07:00 – 19:00): A maximum of 12 loads of processed aggregate may be shipped off-site by highway truck per hour.

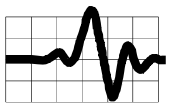
7.4.1.6 When operating during the evening and nighttime period (19:00 – 07:00): A maximum of 2 loads of processed aggregate may be shipped off-site by highway truck per hour.

7.5 Portable construction equipment

7.5.1 Portable construction equipment used for site preparation (e.g. land clearing and construction of berms) and rehabilitation shall comply with MECP Publication NPC-115, Construction Equipment, August 1978. (This publication gives noise standards to be met by construction equipment in Ontario.) Site preparation and rehabilitation activities shall take place only during daytime hours (07:00 – 19:00).

7.6 New Process

7.6.1 If a new process is introduced to the site, then this process shall be assessed by a qualified acoustical consultant prior to commissioning. Noise mitigation measures shall be reviewed, and altered, if necessary, to ensure that MECP sound level limits are met at all points of reception.



8.0 Conclusions

An acoustic assessment of operations at the proposed McGee Pit Expansion Area has been conducted according to MECP noise assessment procedures. The assessment considers the cumulative impact of noise from operations occurring at both the existing licensed pit and proposed expansion area as is appropriate under MECP guidelines.

Operations include extraction by loaders, excavators or a cutter suction dredge, delivery of raw material to stockpiles using aggregate trucks, aggregate processing operations by a mobile screening plant, mobile crushing plant or a mobile wash plant with an associated diesel generator, loading processed sand and aggregate from stockpiles using loaders or excavators, and delivery and shipping of product using highway trucks.

It has been found that noise levels from the operations at nearby receptors are in compliance with MECP sound level limits as set out in publication NPC-300[1], provided that the noise mitigation measures described in Section 7.0 of this report are followed.

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References

1. Ministry of Environment, Conservation and Parks Publication NPC-300, *Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning*, August 2013, adopted by the MECP on 22 October 2013.

2. Ministry of Environment, Conservation and Parks, *Sample Application Package, Basic Comprehensive Certificate of Approval (Air and Noise)*, July 2009.

3. Ministry of Environment, Conservation and Parks Publication NPC-206, *Sound Levels due to Road Traffic,* October 1995.

4. Ministry of Environment, Conservation and Parks, Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT), 1989.

5. Ministry of Environment, Conservation and Parks, STAMSON Software, Version 5.03, 1996. (Software implementation of reference 4).

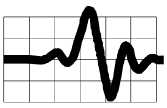
6. International Standards Organization, *Acoustics - Attenuation of Sound during Propagation Outdoors, Part 2: General Method of Calculation*, ISO 9613-2: 1996(E).

7. Mackenzie, Beau - Royal Haskoning DHV, *"Swansea Channel Noise Impact Assessment"* 25th June, 2014.

TABLES

Table 1: Point of Reception Summary Table

Point of Reception	Location*
POR 1	Residence 1200 William Mooney Rd (1 storey)
POR 2	Residence 1186 William Mooney Rd (1 storey)
POR 3	Residence 1135 William Mooney Rd (2 storey)
POR 4	Residence 1117 William Mooney Rd (2 storey)
POR 5	Residence 2448 McGee Side Rd (2 storey)
POR 6	Residence 2458 McGee Side Rd (2 storey)
POR 7	Vacant Lot 2472 McGee Side Rd (2 storey)
POR 8	Residence 2488 McGee Side Rd (2 storey)
POR 9	Residence 2508 McGee Side Rd (2 storey)
POR 10	Residence 2524 McGee Side Rd (2 storey)
POR 11	Residence 2546 McGee Side Rd (2 storey)
POR 12	Residence 2586 McGee Side Rd (2 storey)
POR 13	Residence 2620 McGee Side Rd (1 storey)
POR 14	Residence 1105 Diamondview Rd (1 storey)
POR 15	Residence 1119 Diamondview Rd (2 storey)
POR 16	Residence 1306 Diamondview Rd (2 storey)



Point of Reception	Location*
POR 17	Future Residence 202 Silver Dart Private (2 storey)

* For assessment purposes, points of reception, (POR), have been taken as upper floor windows (2 m above grade for single storey and 4.5 m above grade to represent two storey residences) and Outdoor Point of Receptions (30 m from Residence, 1.5 m above grade) in acoustic calculations. POR's located on vacant land have been assessed at 2 stories in height.

Table 2: Noise Source Summary Table

Name	Source ID	Sound Power (dBA)	Source Location Ht. above ground (m)*	Sound Character-istics	Noise Control Measures
Mobile Screening Plant	Screener	110.3	3	Steady, non-tonal, non- directional	As noted in section 7.0
Mobile Wash Plant	Wash_Plant	109.5	4	Steady, non-tonal, non-directional	As noted in section 7.0
Diesel Generator (Located in Level 2 sound attenuated enclosure or similar)	Generator	108.1**	4	Steady, moving non-tonal, non-directional	As noted in section 7.0
Mobile Crushing Plant	Crusher	118.3	4	Steady, moving non-tonal, non-directional	As noted in section 7.0
Cutter Suction Dredge	Dredge	108	2.5	Steady, Non-tonal, non-directional	As noted in section 7.0
Mobile Water Pump	Mobile_Water_Pump	97.1	2.5	Steady, Non-tonal, non-directional	As noted in section 7.0
Loaders (CAT966H or similar)	Loader_1 Loader_2	107.4	2.5	Steady, moving non-tonal, non-directional	As noted in section 7.0
Excavator (Liebherr934 or similar)	Excavator_1 Excavator_2 Excavator_3	102.6	2.5	Steady, moving non-tonal, non-directional	As noted in section 7.0
Aggregate Trucks	Aggregate_Truck_Passby	103.3	2.5	Steady, moving non-tonal, non-directional	As noted in section 7.0
Highway Trucks	Highway_Truck_Passby	108.8	2.5	Steady, moving non-tonal, non-directional	As noted in section 7.0

*Height measured from finished grade at location of equipment operation.
**Includes attenuation provided by the recommended silencer.

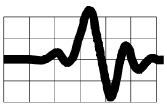


Table 3: MECP Exclusion Limit Values for One-Hour Equivalent Sound Level (Leq, dBA) at Outdoor Points of Reception

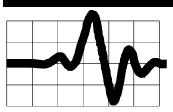
Time of Day	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 19:00	50	50	45	55
19:00 – 23:00	50	45	40	55

Table 4: MECP Exclusion Limit Values for One-Hour Equivalent Sound Level (Leq, dBA) at Plane of Window of Noise Sensitive Spaces

Time of Day	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 19:00	50	50	45	60
19:00 – 23:00	50	50	40	60
23:00 – 07:00	45	45	40	55

Table 5: Applicable One Hour Sound Level Limits for the Daytime Period (07:00 – 19:00)

Receptor & Point of Reception POW = Plane of Widow OPR = Outdoor Point of Reception	Sound Level Limit 1-hour LAEQ dBA (Daytime Period, 07:00 – 19:00)	Sound Level Limit 1-hour LAEQ dBA (Evening Period, 19:00 – 23:00)	Sound Level Limit 1-hour LAEQ dBA (Nightime Period, 23:00 – 07:00)*
POR 1 - POW	45	40	40
POR 1 - OPR	45	40	-
POR 2 - POW	45	40	40
POR 2 - OPR	45	40	-
POR 3 - POW	45	40	40
POR 3 - OPR	45	40	-
POR 4 - POW	45	40	40
POR 4 - OPR	45	40	-
POR 5 - POW	45	40	40
POR 5 - OPR	45	40	-
POR 6 - POW	45	40	40
POR 6 - OPR	45	40	-
POR 7 - POW	45	40	40
POR 7 - OPR	45	40	-
POR 8 - POW	45	40	40
POR 8 - OPR	45	40	-
POR 9 - POW	45	40	40
POR 9 - OPR	45	40	-
POR 10 - POW	45	40	40
POR 10 - OPR	45	40	-
POR 11 - POW	45	40	40
POR 11 - OPR	45	40	-
POR 12 - POW	50	50	45
POR 12 - OPR	50	45	-
POR 13 - POW	50	50	45
POR 13 - OPR	50	45	-
POR 14 - POW	50	50	45
POR 14 - OPR	50	45	-
POR 15 - POW	50	50	45
POR 15 - OPR	50	45	-

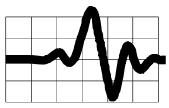


Receptor & Point of Reception POW = Plane of Widow OPR = Outdoor Point of Reception	Sound Level Limit 1-hour LAEQ dBA (Daytime Period, 07:00 – 19:00)	Sound Level Limit 1-hour LAEQ dBA (Evening Period, 19:00 – 23:00)	Sound Level Limit 1-hour LAEQ dBA (Nighttime Period, 23:00 – 07:00)*
POR 16 - POW	50	50	45
POR 16 - OPR	50	45	-
POR 17 - POW	50	50	45
POR 17 - OPR	50	45	-

*For the proposed daytime and evening period of operation, the MECP daytime and evening criteria apply. There are no plans to operate the pit during the nighttime period (19:00 – 07:00). Sound level limits for these periods are provided for information purposes only.

Table 6.1: Acoustic Assessment Summary Table, Scenario 1: Worst Case, Daytime (07:00 - 19:00) and Evening (19:00 - 21:00) Period of Operation

Point of Reception ID	POR Description	Location	Estimated Sound Level at POR Daytime Period (Worst Case) (dBA)	Performance Limit Daytime Period (dBA)	Estimated Sound Level at POR Evening Period (Worst Case) (dBA)	Performance Limit Evening Period (dBA)	Compliance with Performance Limit (Yes/No)	Verified by an acoustic Audit (Yes / No)
POR 1	Residence	POW	44.7	45	38.8	40	Yes	No
		OPR	43.8	45	38.0	40	Yes	No
POR 2	Residence	POW	42.4	45	35.8	40	Yes	No
		OPR	42.2	45	36.4	40	Yes	No
POR 3	Residence	POW	44.5	45	38.0	40	Yes	No
		OPR	44.7	45	33.1	40	Yes	No
POR 4	Residence	POW	41.6	45	33.4	40	Yes	No
		OPR	41.0	45	31.5	40	Yes	No
POR 5	Residence	POW	42.0	45	36.3	40	Yes	No
		OPR	39.3	45	32.3	40	Yes	No
POR 6	Residence	POW	42.3	45	36.6	40	Yes	No
		OPR	39.7	45	33.1	40	Yes	No
POR 7	Residence	POW	43.0	45	37.2	40	Yes	No
		OPR	40.2	45	33.1	40	Yes	No
POR 8	Residence	POW	43.0	45	37.4	40	Yes	No
		OPR	39.9	45	32.9	40	Yes	No
POR 9	Residence	POW	42.8	45	37.2	40	Yes	No
		OPR	39.8	45	33.2	40	Yes	No
POR 10	Residence	POW	43.0	45	37.5	40	Yes	No
		OPR	39.6	45	33.5	40	Yes	No
POR 11	Residence	POW	43.7	45	37.3	40	Yes	No
		OPR	39.4	45	33.4	40	Yes	No
POR 12	Residence	POW	45.6	50	36.9	50	Yes	No
		OPR	42.1	50	33.0	45	Yes	No
POR 13	Residence	POW	44.0	50	35.1	50	Yes	No
		OPR	42.3	50	33.1	45	Yes	No
POR 14	Residence	POW	44.6	50	35.0	50	Yes	No
		OPR	42.1	50	32.9	45	Yes	No



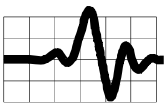
Point of Reception ID	POR Description	Location	Estimated Sound Level at POR Daytime Period (Worst Case) (dBA)	Performance Limit Daytime Period (dBA)	Estimated Sound Level at POR Evening Period (Worst Case) (dBA)	Performance Limit Evening Period (dBA)	Compliance with Performance Limit (Yes/No)	Verified by an acoustic Audit (Yes / No)
POR 15	Residence	POW	45.6	50	37.1	50	Yes	No
		OPR	42.3	50	33.1	45	Yes	No
POR 16	Residence	POW	43.7	50	34.5	50	Yes	No
		OPR	43.4	50	34.1	45	Yes	No
POR 17	Future Residence	POW	49.1	50	36.2	50	Yes	No
		OPR	48.4	50	35.8	45	Yes	No

Notes:

1. Performance limits are based on 1-hour equivalent sound levels, Leq.
2. Refer to Tables A2.8.1 to A2.8.6 in Appendix 2 for more detailed sound level estimates by source.

Table 6.2: Acoustic Assessment Summary Table, Scenario 2: Worst Case, Daytime (07:00 - 19:00) and Evening (19:00 - 21:00) Period of Operation

Point of Reception ID	POR Description	Location	Estimated Sound Level at POR Daytime Period (Worst Case) (dBA)	Performance Limit Daytime Period (dBA)	Estimated Sound Level at POR Evening Period (Worst Case) (dBA)	Performance Limit Evening Period (dBA)	Compliance with Performance Limit (Yes/No)	Verified by an acoustic Audit (Yes / No)
POR 1	Residence	POW	44.6	45	39.1	40	Yes	No
		OPR	43.7	45	38.3	40	Yes	No
POR 2	Residence	POW	42.2	45	36.3	40	Yes	No
		OPR	42.0	45	36.9	40	Yes	No
POR 3	Residence	POW	43.7	45	38.5	40	Yes	No
		OPR	37.3	45	33.9	40	Yes	No
POR 4	Residence	POW	41.3	45	36.6	40	Yes	No
		OPR	37.9	45	33.4	40	Yes	No
POR 5	Residence	POW	43.1	45	38.6	40	Yes	No
		OPR	40.1	45	35.4	40	Yes	No
POR 6	Residence	POW	43.6	45	39.2	40	Yes	No
		OPR	40.5	45	35.8	40	Yes	No
POR 7	Residence	POW	44.2	45	40.0	40	Yes	No
		OPR	40.1	45	35.3	40	Yes	No
POR 8	Residence	POW	44.1	45	39.7	40	Yes	No
		OPR	39.9	45	34.6	40	Yes	No
POR 9	Residence	POW	43.9	45	39.4	40	Yes	No
		OPR	40.3	45	35.1	40	Yes	No
POR 10	Residence	POW	43.8	45	39.3	40	Yes	No
		OPR	40.5	45	35.6	40	Yes	No
POR 11	Residence	POW	43.6	45	39.1	40	Yes	No
		OPR	41.1	45	36.5	40	Yes	No
POR 12	Residence	POW	46.5	50	40.4	50	Yes	No
		OPR	44.6	50	39.3	45	Yes	No
POR 13	Residence	POW	44.7	50	37.8	50	Yes	No
		OPR	43.3	50	36.8	45	Yes	No
POR 14	Residence	POW	45.9	50	39.4	50	Yes	No
		OPR	44.5	50	39.2	45	Yes	No



Point of Reception ID	POR Description	Location	Estimated Sound Level at POR Daytime Period (Worst Case) (dBA)	Performance Limit Daytime Period (dBA)	Estimated Sound Level at POR Evening Period (Worst Case) (dBA)	Performance Limit Evening Period (dBA)	Compliance with Performance Limit (Yes/No)	Verified by an acoustic Audit (Yes / No)
POR 15	Residence	POW	46.6	50	40.3	50	Yes	No
		OPR	44.3	50	38.8	45	Yes	No
POR 16	Residence	POW	43.9	50	35.7	50	Yes	No
		OPR	43.6	50	35.1	45	Yes	No
POR 17	Future Residence	POW	49.1	50	37.0	50	Yes	No
		OPR	48.5	50	36.4	45	Yes	No

Notes:

1. Performance limits are based on 1-hour equivalent sound levels, Leq.
2. Refer to Tables A2.8.1 to A2.8.6 in Appendix 2 for more detailed sound level estimates by source.

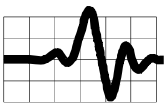
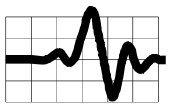


Table 6.3: Acoustic Assessment Summary Table, Scenario 3: Worst Case, Daytime (07:00 - 19:00) and Evening (19:00 - 21:00) Period of Operation

Point of Reception ID	POR Description	Location	Estimated Sound Level at POR Daytime Period (Worst Case) (dBA)	Performance Limit Daytime Period (dBA)	Estimated Sound Level at POR Evening Period (Worst Case) (dBA)	Performance Limit Evening Period (dBA)	Compliance with Performance Limit (Yes/No)	Verified by an acoustic Audit (Yes / No)
POR 1	Residence	POW	44.4	45	39.3	40	Yes	No
		OPR	43.5	45	38.4	40	Yes	No
POR 2	Residence	POW	40.8	45	36.4	40	Yes	No
		OPR	41.2	45	37.0	40	Yes	No
POR 3	Residence	POW	43.8	45	38.8	40	Yes	No
		OPR	44.9	45	33.6	40	Yes	No
POR 4	Residence	POW	42.1	45	36.6	40	Yes	No
		OPR	41.3	45	33.3	40	Yes	No
POR 5	Residence	POW	42.5	45	38.8	40	Yes	No
		OPR	39.5	45	35.3	40	Yes	No
POR 6	Residence	POW	43.0	45	39.3	40	Yes	No
		OPR	39.8	45	35.7	40	Yes	No
POR 7	Residence	POW	44.0	45	40.1	40	Yes	No
		OPR	39.4	45	35.2	40	Yes	No
POR 8	Residence	POW	43.7	45	39.9	40	Yes	No
		OPR	38.6	45	34.5	40	Yes	No
POR 9	Residence	POW	43.2	45	39.6	40	Yes	No
		OPR	38.7	45	35.0	40	Yes	No
POR 10	Residence	POW	42.9	45	39.4	40	Yes	No
		OPR	39.0	45	35.5	40	Yes	No
POR 11	Residence	POW	43.2	45	39.2	40	Yes	No
		OPR	39.8	45	36.4	40	Yes	No
POR 12	Residence	POW	44.0	50	40.5	50	Yes	No
		OPR	42.7	50	39.3	45	Yes	No
POR 13	Residence	POW	41.4	50	37.9	50	Yes	No
		OPR	40.4	50	36.8	45	Yes	No
POR 14	Residence	POW	43.0	50	39.5	50	Yes	No
		OPR	42.4	50	39.2	45	Yes	No



Point of Reception ID	POR Description	Location	Estimated Sound Level at POR Daytime Period (Worst Case) (dBA)	Performance Limit Daytime Period (dBA)	Estimated Sound Level at POR Evening Period (Worst Case) (dBA)	Performance Limit Evening Period (dBA)	Compliance with Performance Limit (Yes/No)	Verified by an acoustic Audit (Yes / No)
POR 15	Residence	POW	44.0	50	40.4	50	Yes	No
		OPR	42.1	50	38.8	45	Yes	No
POR 16	Residence	POW	40.0	50	35.9	50	Yes	No
		OPR	39.2	50	35.4	45	Yes	No
POR 17	Future Residence	POW	43.1	50	40.4	50	Yes	No
		OPR	41.6	50	38.7	45	Yes	No

Notes:

1. Performance limits are based on 1-hour equivalent sound levels, Leq.
2. Refer to Tables A2.8.1 to A2.8.6 in Appendix 2 for more detailed sound level estimates by source.

Table 7: Recommended Noise Barriers

Barrier	Minimum Height (m)	Minimum Length (m)	Maximum Distance from Source (m)	Location	Required to shield Line of Sight from Identified Source ID	Required to shield Line of Sight to Identified Receptor/s	Description
Barrier_1	7	225	Not applicable	Eastern and Southern Boundary Setback	Extraction equipment (Loaders, excavators, dredge)	POR 1 POR 2	New barrier (site berm): Required prior to commencement of the extraction in the expansion area east of Line BB
Barrier_CP1	7	60	30 m	East and South of the crushing plant	Crusher	POR 1 To POR 11	New barrier (stockpile): Required prior to commencement of the mobile crushing plant operations

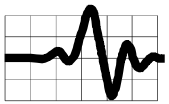


Table 8: Minimum Insertion Loss for Generator Exhaust Silencer

Name	Octave Band Centre Frequency, Hz Minimum Dynamic Insertion Loss (dB)								Rw
	63	125	250	500	1000	2000	4000	8000	
Silencer[2] to be installed at: • Generator exhaust (Source: Generator)	10	30	38	30	25	20	20	20	24

Notes:

1. Octave Band Centre Frequency, Hz, with minimum dynamic insertion loss in dB or dBA units re 10-12 Watts. Alternative levels at each frequency band permissible providing the overall insertion loss meets the overall insertion loss (Rw) as noted above and is not tonal in character.
2. Insertion loss based on Silex Silencer Model JB 6. Refer manufacturers data Appendix 3.

FIGURES

Figure 1: Scaled Area Location Plan showing Receptor Locations

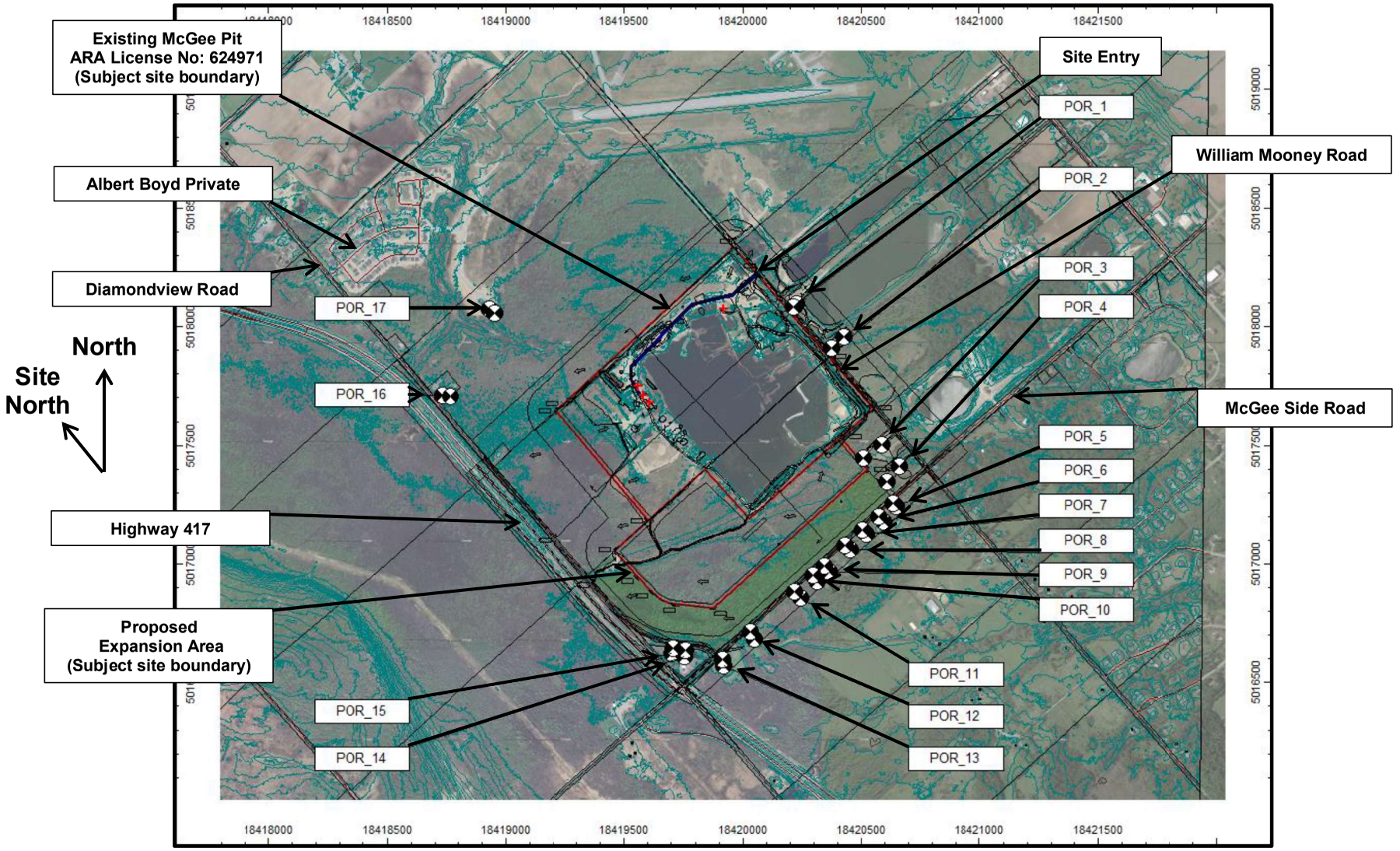


Figure 2: **Detail Site Layout & Surface Elevation Contours** (elevation contours based on Land Information Ontario (LIO), Provincial Digital Elevation Model, at 1-meter intervals)

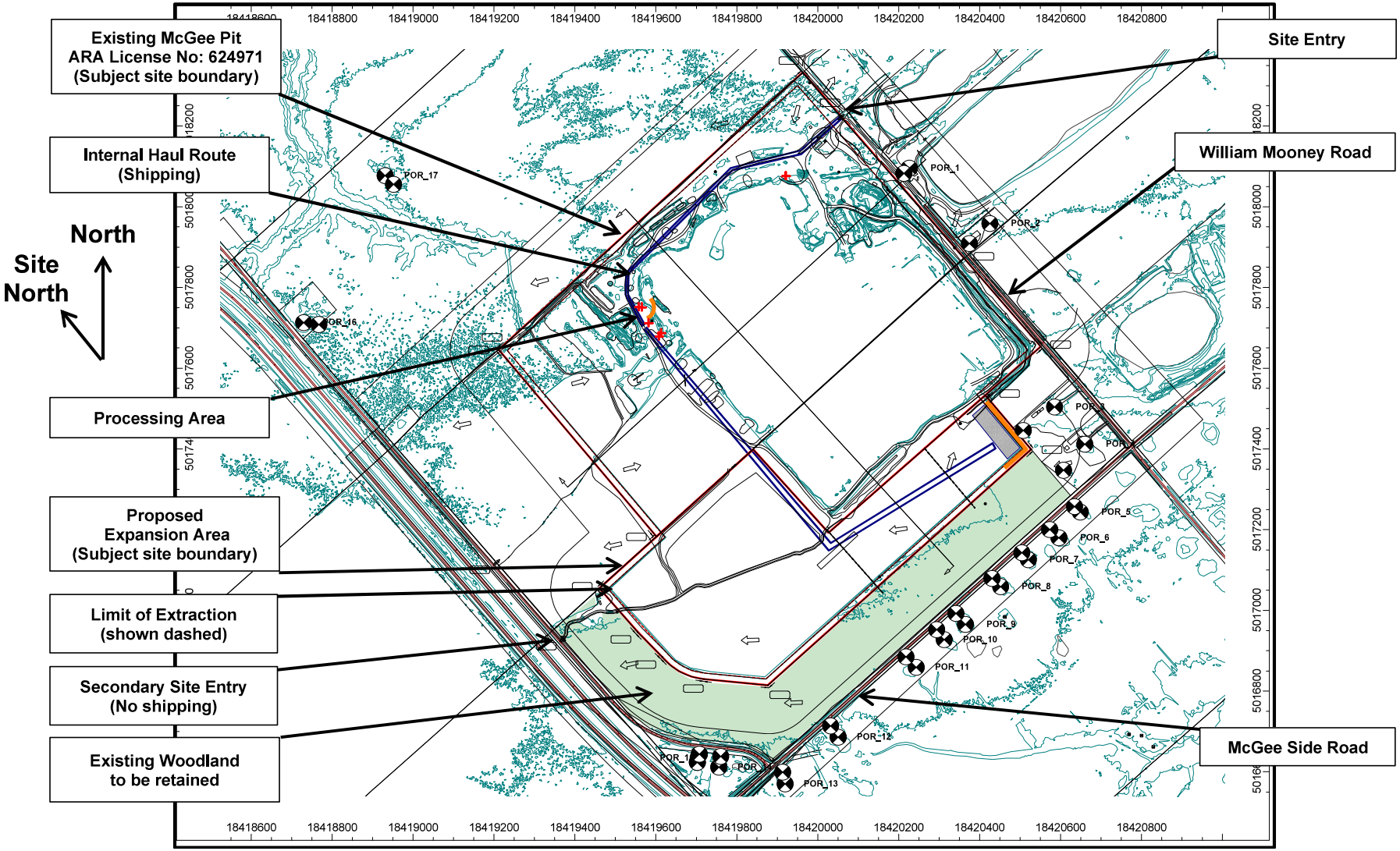


Figure 3: Scenario 1: Worst Case, Mobile crushing, and screening plants in operation at the existing pit concurrently with extraction occurring in the expansion area closest to POR 1, 2, 3, 4, 5 and 6 (Day and Evening)

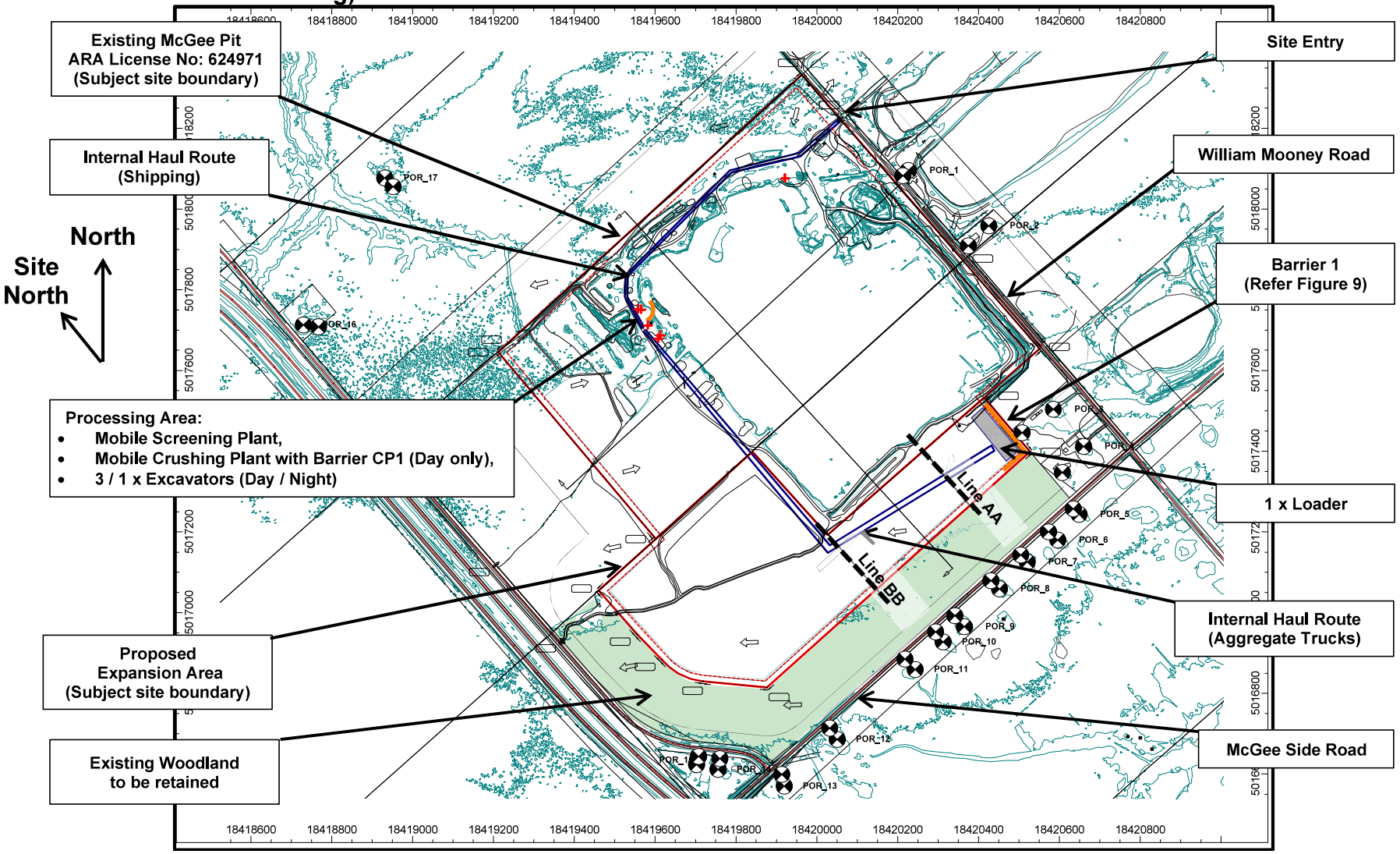


Figure 4.1: Prediction Results, Scenario 1: Worst Case, Daytime Period, Noise Contours, (Noise levels at 4.5 m)

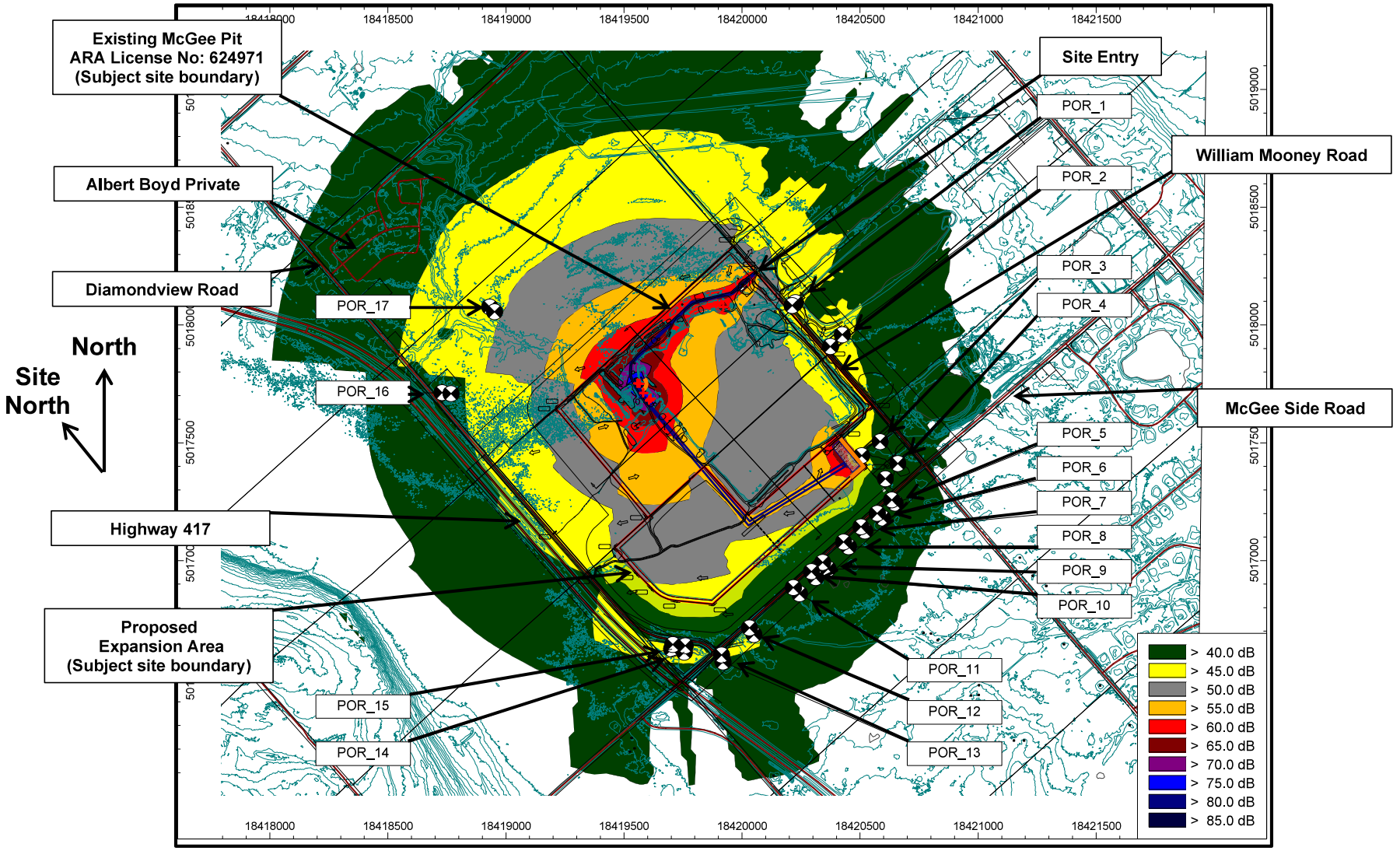


Figure 4.2: Prediction Results, Scenario 1: Worst Case, Evening Period, Noise Contours, (Noise levels at 4.5 m)

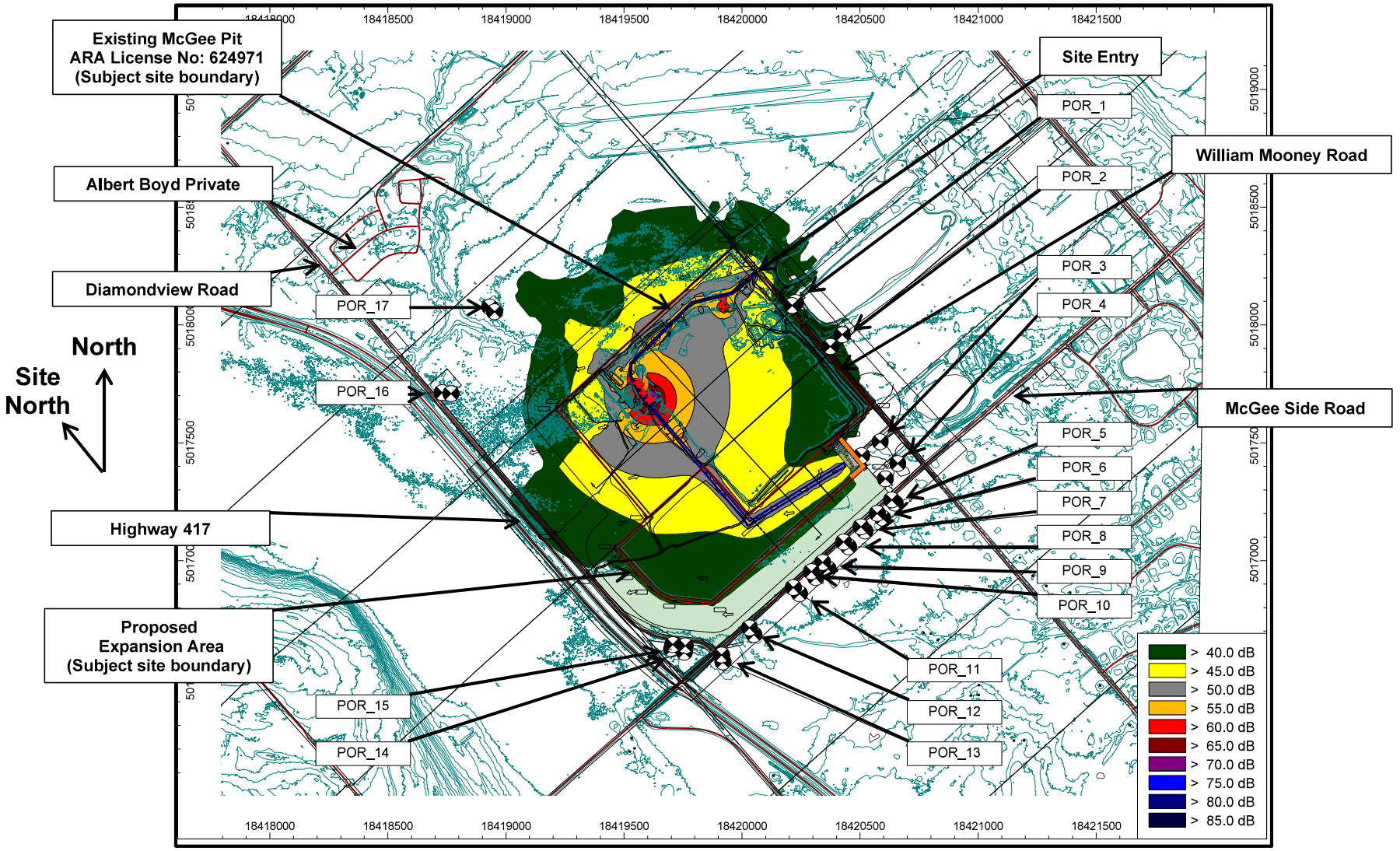


Figure 5: Scenario 2: Worst Case, Mobile crushing, and screening plants in operation at the existing pit concurrently with extraction occurring in the expansion area closest to POR 12, 13, 14 and 15 (Day and Evening)

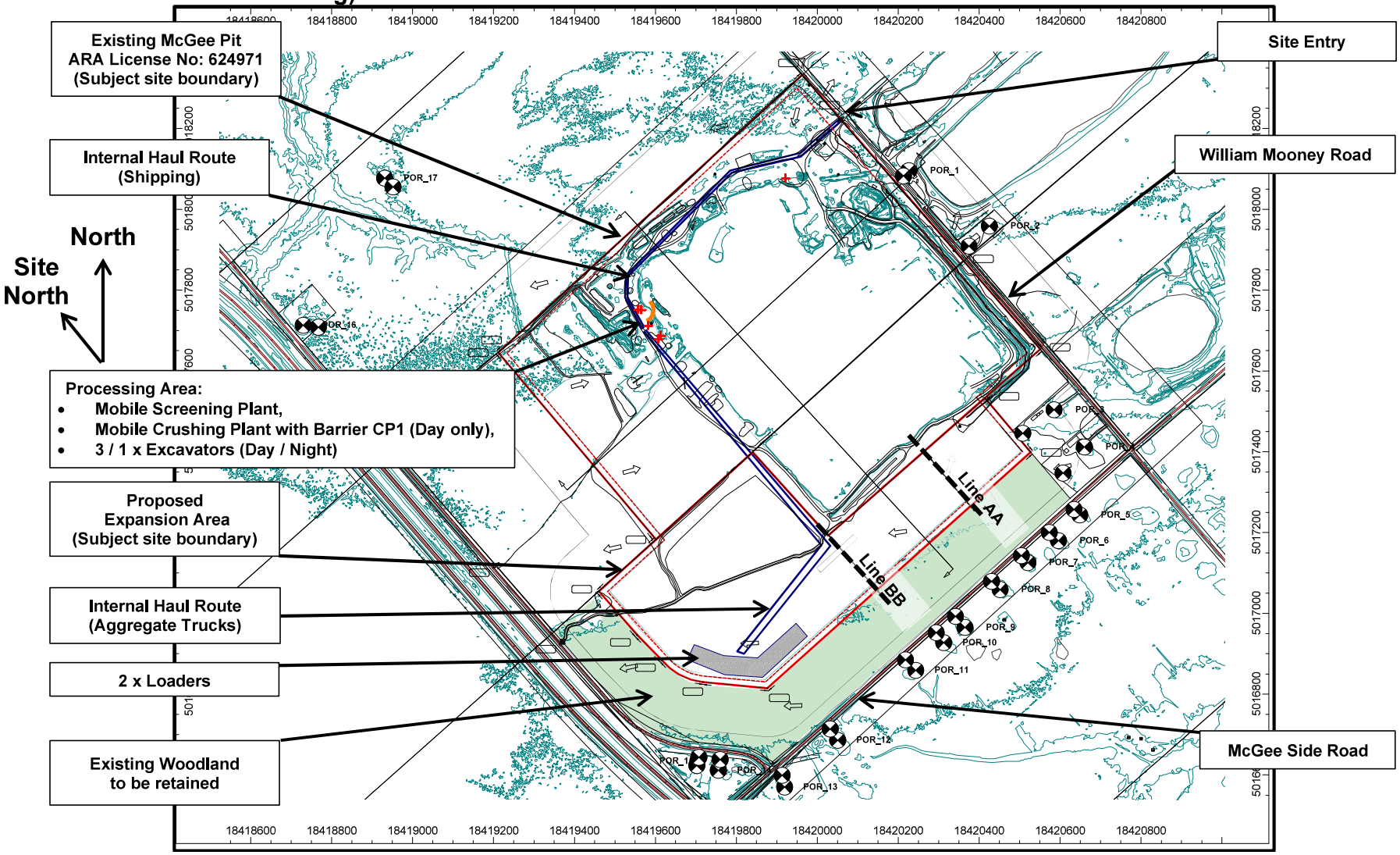


Figure 6.1: Prediction Results, Scenario 2: Worst Case, Daytime Period, Noise Contours, (Noise levels at 4.5 m)

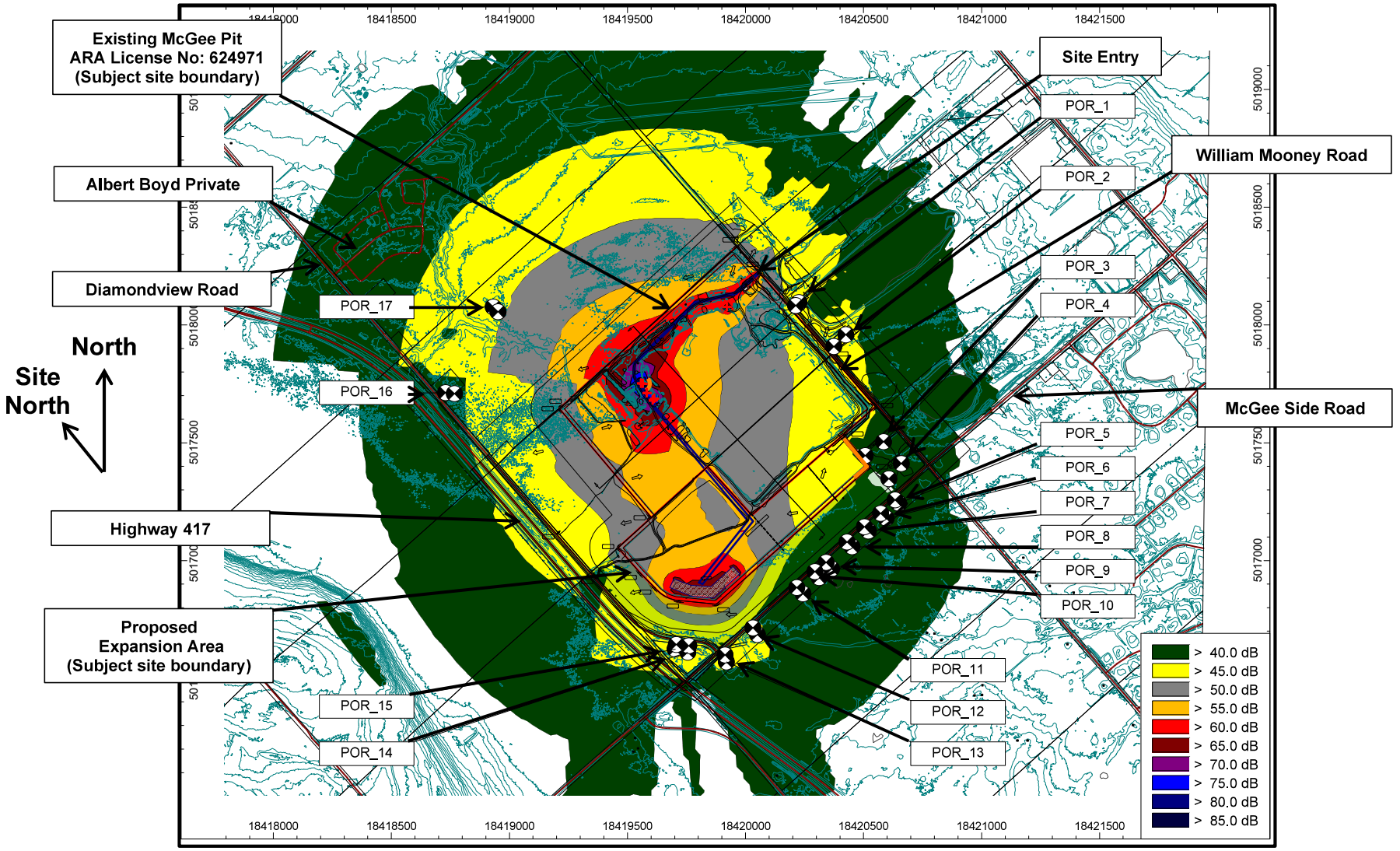


Figure 6.2: Prediction Results, Scenario 2: Worst Case, Evening Period, Noise Contours, (Noise levels at 4.5 m)

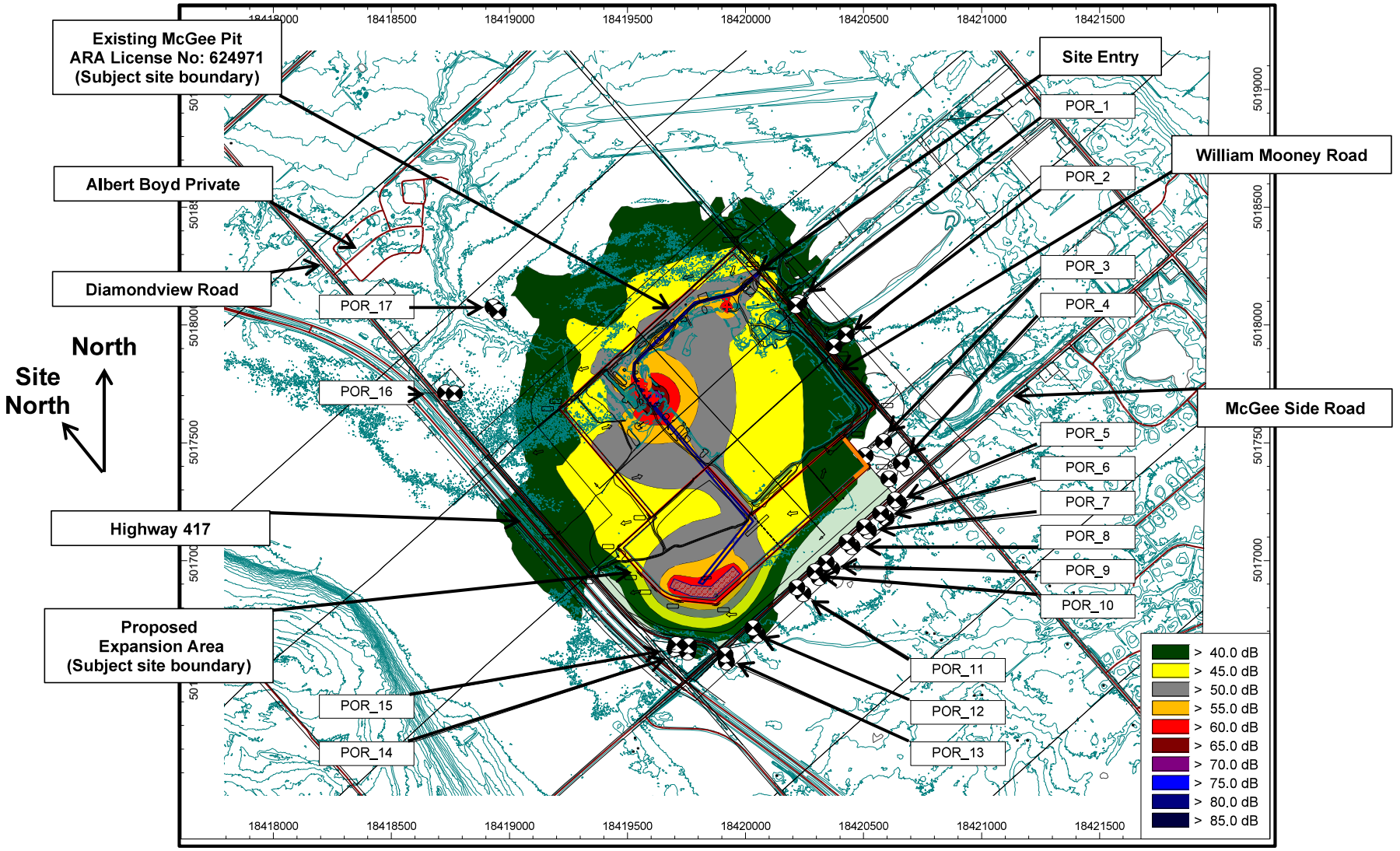


Figure 7: Scenario 3: Worst Case, Mobile wash plant in operation at the existing pit concurrently with the dredge in operation in expansion area closest to POR 1, 2, 3, 4, 5 and 6 (Day and Evening)

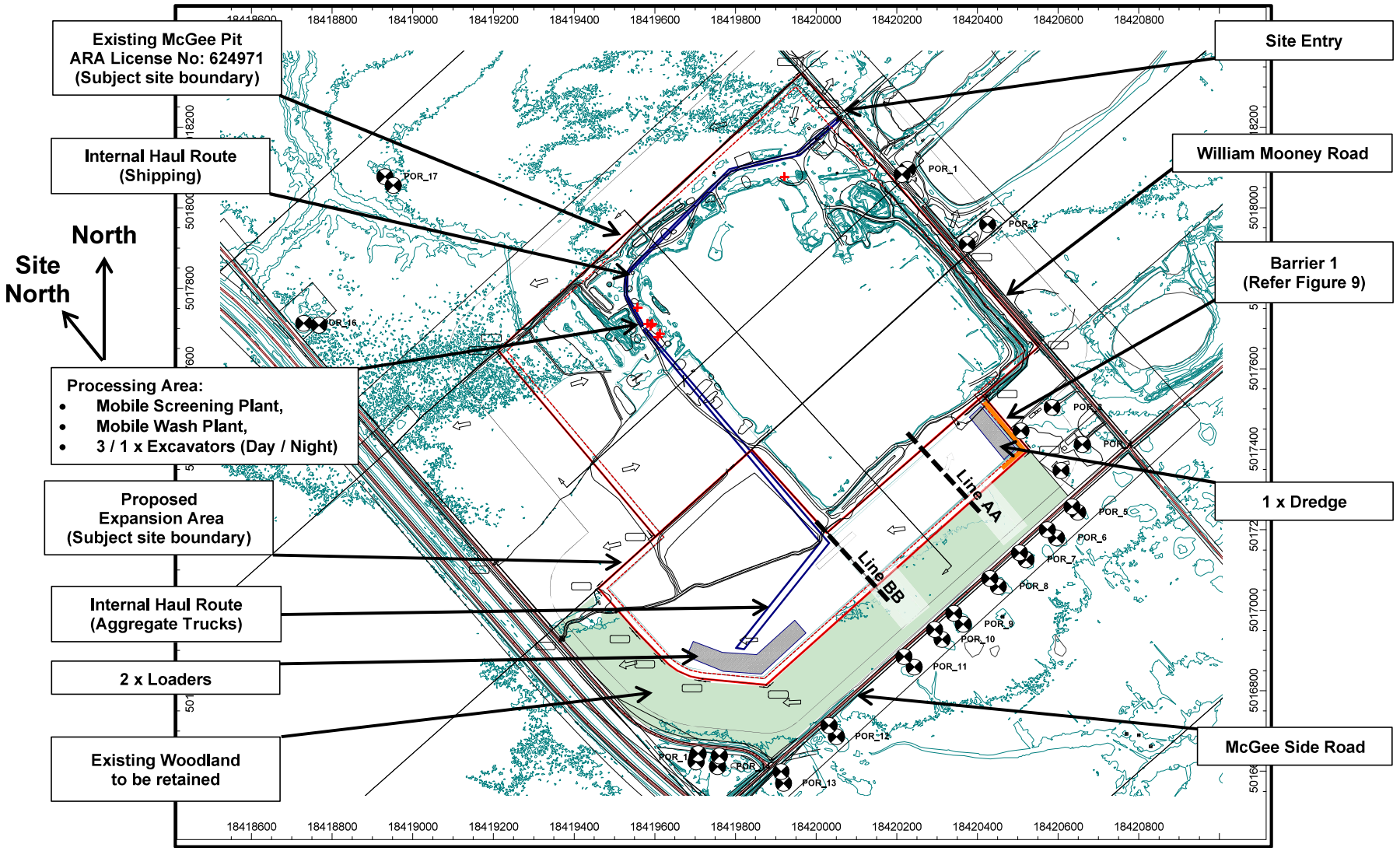


Figure 8.1: Prediction Results, Scenario 3: Worst Case, Daytime Period, Noise Contours, (Noise levels at 4.5 m)

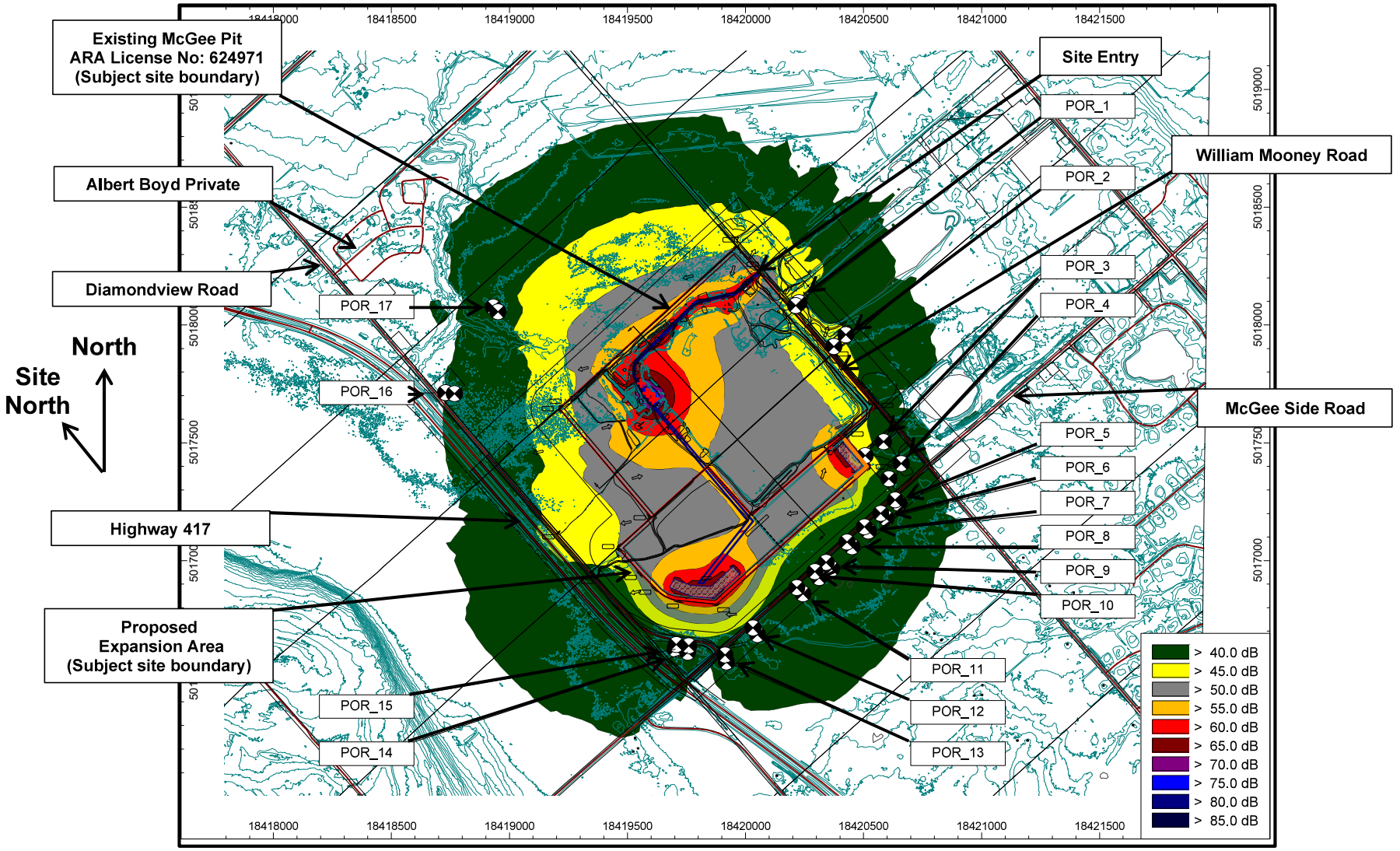


Figure 8.2: Prediction Results, Scenario 3: Worst Case, Evening Period, Noise Contours, (Noise levels at 4.5 m)

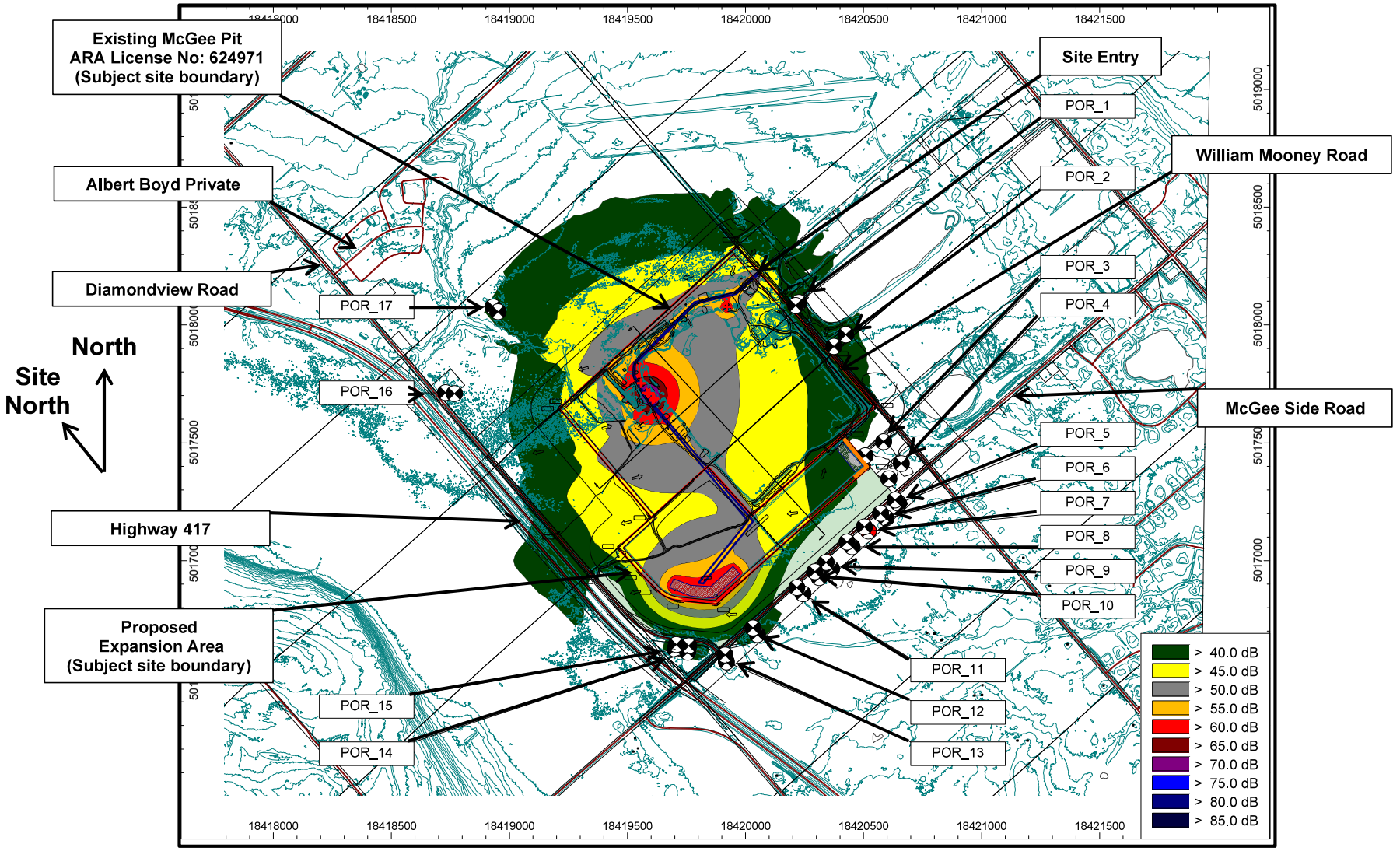


Figure 9: Detailed Plan showing location of Barrier 1

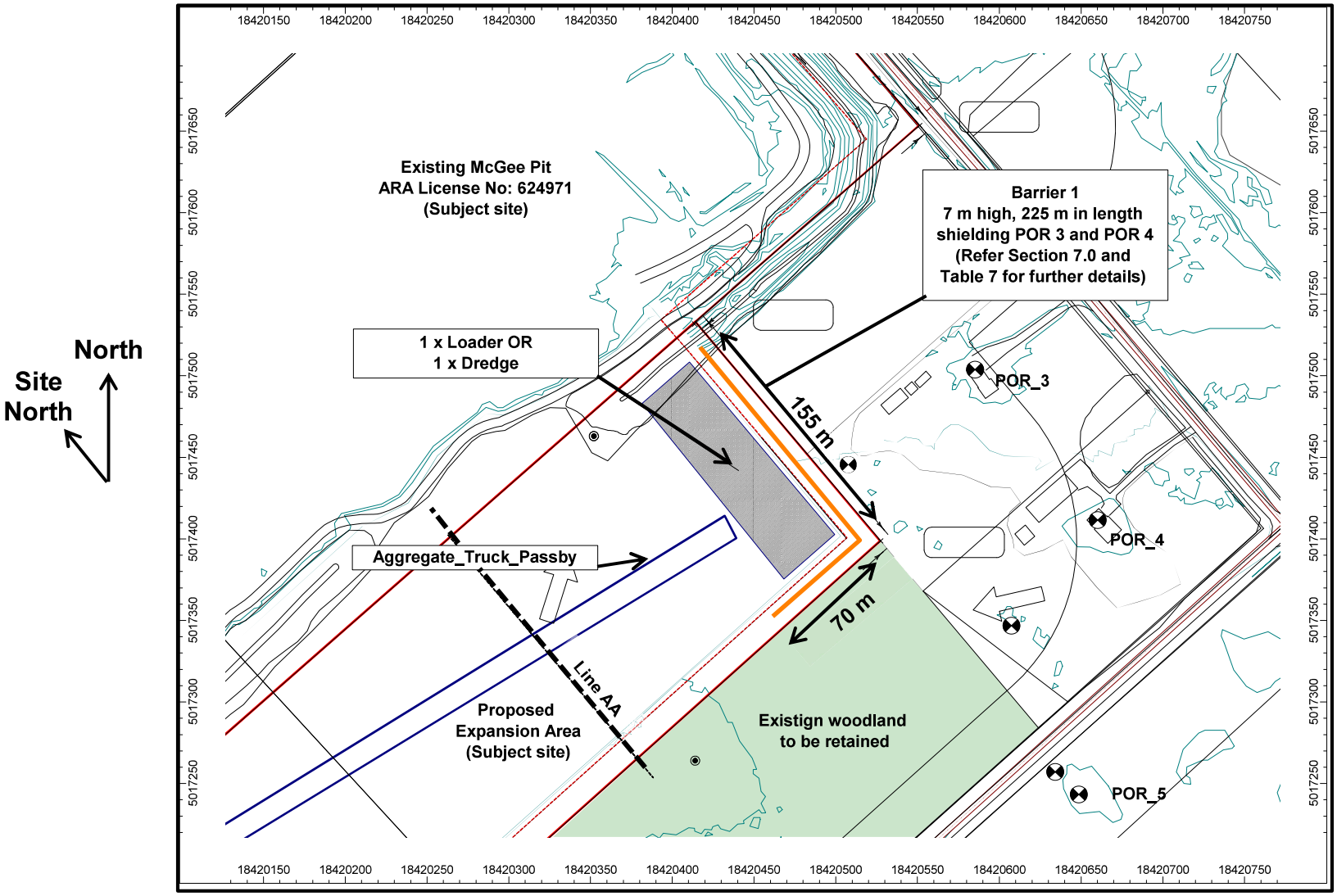
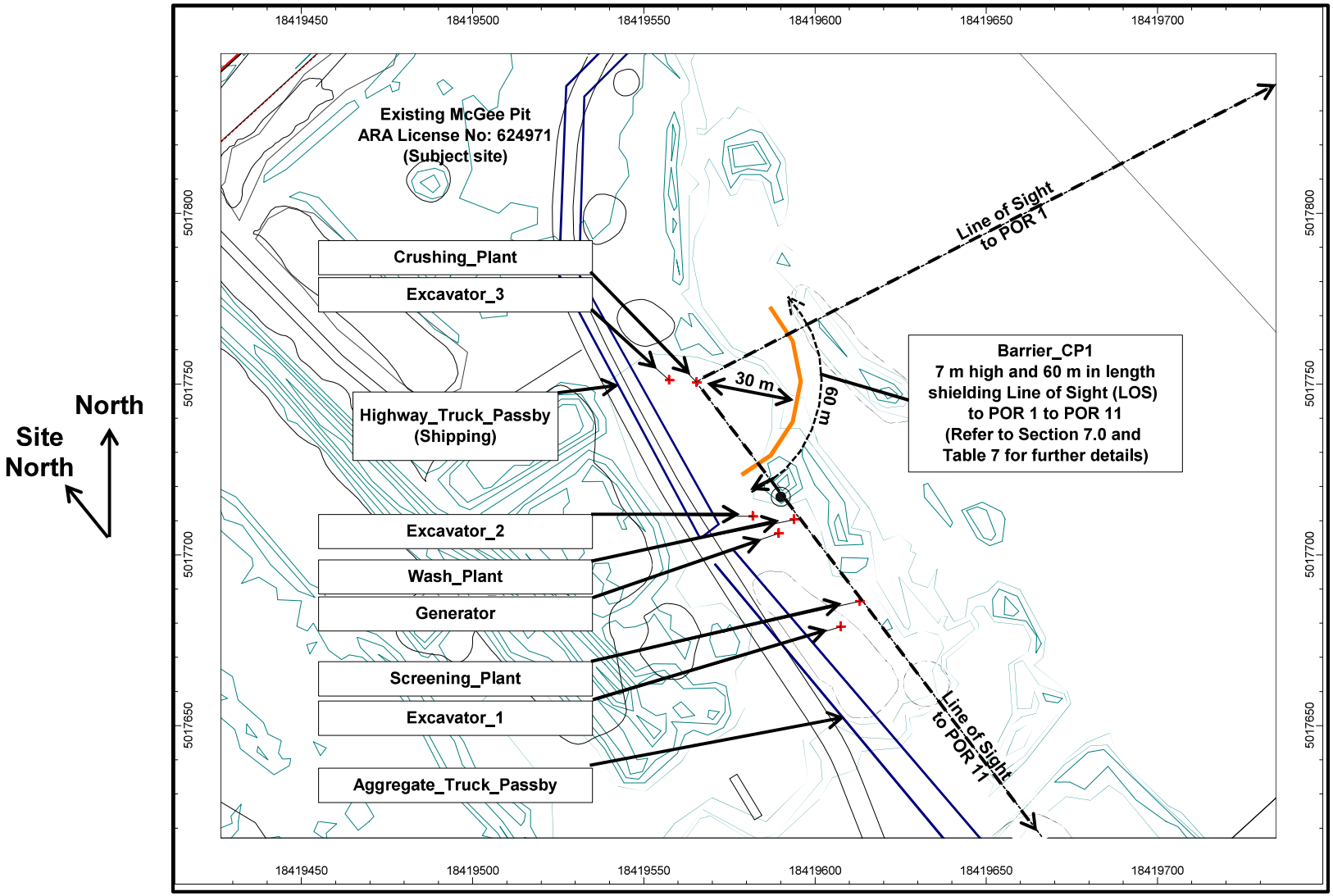


Figure 10: Detailed Plan at Mobile Crushing Plant showing location of Barrier CP1



Appendix 1

Zoning Plan and Land Use Designations

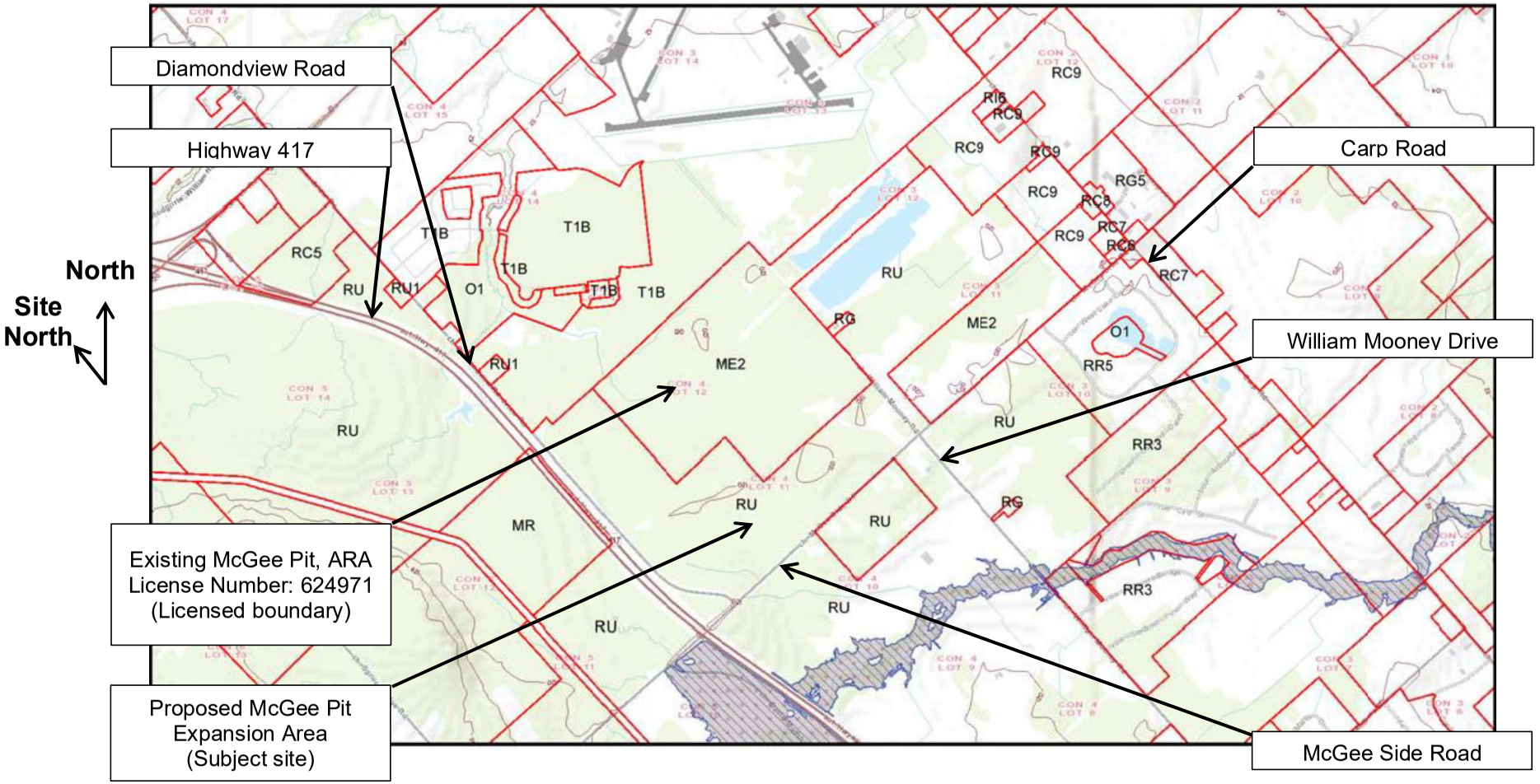
Contents:

- **Zoning Map: The City of Ottawa Zoning By-law (**Source: GeoOttawa)

Legend:

- ME - Mineral Extraction Zone
- RC - Rural Commercial Zone
- RR - Rural Residential Zone
- RU - Rural Countryside Zone
- O1 - Parks and Open Space Zone
- T1 - Air Transportation Facility Zone

Zoning Plan, source: City of Ottawa Zoning By-law No. 2008-250 (Source: GeoOttawa)



Appendix 2

Acoustic Modelling Details

Modeling Notes:

1. Acoustic model developed uses Cadna-A software, Version 2023.

2. Sound propagation is modeled according to ISO 9613-2: 1996(E).

3. The whole of the extraction area is modelled as a relatively reflective surface indicative of sand and exposed earth, with an absorption coefficient of 0.35, a conservative assumption. The surrounding area is modeled with an absorption coefficient of 1.0 indicative of a Class 3 Area.

4. MECP favoured conservative modelling assumptions are used, that is, 'no subtraction of negative ground attenuation' and 'no negative path differences'.

Contents:

Table A2.1 Point of Reception Location Table

Name	ID	Height	Coordinates		
			X	Y	Z
		(m)	(m)	(m)	(m)
POR_1	POR_1_POW	2.0	18420226.7	5018095.5	119.5
POR_1	POR_1_OPR	1.5	18420212.9	5018082.4	119.4
POR_2	POR_2_POW	2.0	18420425.2	5017958.3	120.0
POR_2	POR_2_OPR	1.5	18420375.1	5017908.6	119.5
POR_3	POR_3_POW	4.5	18420585.3	5017503.7	124.5
POR_3	POR_3_OPR	1.5	18420507.8	5017445.5	120.5
POR_4	POR_4_POW	4.5	18420660.2	5017411.4	123.5
POR_4	POR_4_OPR	1.5	18420607.6	5017346.7	120.5
POR_5	POR_5_POW	4.5	18420648.7	5017243.3	123.5
POR_5	POR_5_OPR	1.5	18420634.3	5017257.0	120.5
POR_6	POR_6_POW	4.5	18420596.2	5017179.7	123.5
POR_6	POR_6_OPR	1.5	18420573.2	5017200.1	120.5
POR_7	POR_7_POW	4.5	18420520.5	5017125.5	123.5
POR_7	POR_7_OPR	1.5	18420504.4	5017142.8	120.5
POR_8	POR_8_POW	4.5	18420451.8	5017058.6	123.5
POR_8	POR_8_OPR	1.5	18420430.5	5017078.8	120.5
POR_9	POR_9_POW	4.5	18420364.7	5016965.1	123.5
POR_9	POR_9_OPR	1.5	18420341.6	5016992.2	120.5
POR_10	POR_10_POW	4.5	18420312.7	5016927.0	123.5
POR_10	POR_10_OPR	1.5	18420294.0	5016952.2	120.5
POR_11	POR_11_POW	4.5	18420243.6	5016859.0	123.5
POR_11	POR_11_OPR	1.5	18420218.1	5016884.5	120.5
POR_12	POR_12_POW	4.5	18420050.4	5016685.8	123.5
POR_12	POR_12_OPR	1.5	18420032.1	5016713.7	119.9
POR_13	POR_13_POW	2.0	18419919.3	5016569.7	121.0
POR_13	POR_13_OPR	1.5	18419913.4	5016598.8	120.0
POR_14	POR_14_POW	2.0	18419755.7	5016611.0	120.0
POR_14	POR_14_OPR	1.5	18419760.4	5016638.2	119.5
POR_15	POR_15_POW	4.5	18419702.6	5016623.5	123.5
POR_15	POR_15_OPR	1.5	18419707.7	5016643.5	120.1
POR_16	POR_16_POW	4.5	18418730.2	5017712.7	122.5
POR_16	POR_16_OPR	1.5	18418767.6	5017707.9	119.5
POR_17	POR_17_POW	4.5	18418931.6	5018076.7	121.5
POR_17	POR_17_OPR	1.5	18418952.1	5018055.3	118.5

Table A2.2 Point Sources

ID	Result. PWL			Lw / Li	Noise Source Library File	Attenuation	Operating Time			Direct.	Height
	Day	Evening	Night	Type	Value		Day	Evening	Night		
	(dBA)	(dBA)	(dBA)				(min/hr)	(min/hr)	(min/hr)		(m)
Screening_Plant	110.3	110.3	-	Lw	PowerscreenWarrior1800_P1		60.0	60.0	-	(none)	3.0
Crushing_Plant	118.3	118.3	-	Lw	Crusher		60.0	-	-	(none)	4.0
Wash_Plant	109.5	109.5	-	Lw	Washplant		60.0	60.0	-	(none)	4.0
Generator	108.1	108.1	-	Lw	Genset_Exhaust	Silex_Silencer_Model_JB_6	60.0	60.0	-	(none)	4.0
Mobile_Water_Pump	97.1	97.1	-	Lw	Mobile_Water_Pump		60.0	60.0	-	(none)	2.5
Excavator_1	102.6	102.6	-	Lw	Excavator_Liebherr934		60.0	60.0	-	(none)	2.5
Excavator_2	102.6	102.6	-	Lw	Excavator_Liebherr934		60.0	-	-	(none)	2.5
Excavator_3	102.6	102.6	-	Lw	Excavator_Liebherr934		60.0	-	-	(none)	2.5

Table A2.3 Line Sources

ID	Result. PWL			Lw / Li	Noise Source Library File	Operating Time			Direct.	Moving Pt. Src			
	Day	Evening	Night	Type	Value	Day	Evening	Night		Number			Speed
	(dBA)	(dBA)	(dBA)			(min)	(min)	(min)		Day	Evening	Night	(km/h)
Highway_Truck_Passby	106.9	99.2	-	PWL-Pt	Highway_Truck_Passby	60	60	-	(none)	12.0	2.0	-	30.0
Aggregate_Truck_Passby_S1	100.1	97.1	-	PWL-Pt	Aggregate_Truck_Passby	60	60	-	(none)	6.0	3.0	-	30.0
Aggregate_Truck_Passby_S2	99.5	96.5	-	PWL-Pt	Aggregate_Truck_Passby	60	60	-	(none)	6.0	3.0	-	30.0
Aggregate_Truck_Passby_S3	99.5	96.5	-	PWL-Pt	Aggregate_Truck_Passby	60	60	-	(none)	6.0	3.0	-	30.0
Aggregate_Truck_Passby_S4	97.8	94.7	-	PWL-Pt	Aggregate_Truck_Passby	60	60	-	(none)	6.0	3.0	-	30.0

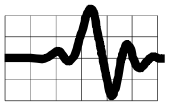


Table A2.4 Area Sources

ID	Result. PWL			Lw / Li	Noise Source Library File	Operating Time			Direct.	Moving Pt. Src		
	Day	Evening	Night	Type	Value	Day	Evening	Night		Number		
	(dBA)	(dBA)	(dBA)			(min)	(min)	(min)		Day	Evening	Night
Loader_1_2_S1	107.4	-	-	PWL-Pt	Loader_CAT966H	60	-	-	(none)	1.0	0.0	0.0
Loader_1_2_S2	110.4	107.4	-	PWL-Pt	Loader_CAT966H	60	60	-	(none)	2.0	1.0	1.0
Loader_1_2_S3	110.4	107.4	-	PWL-Pt	Loader_CAT966H	60	60	-	(none)	2.0	1.0	1.0
Loader_1_2_S4	110.4	107.4	-	PWL-Pt	Loader_CAT966H	60	60	-	(none)	2.0	1.0	1.0
Dredge_S3	108.0	-	-	PWL-Pt	Dredge	60	-	-	(none)	1.0	0.0	0.0

Table A2.5 Noise Barriers

ID	Height Above Grade (m)	Length
Barrier_1_S1_3	7	225
Barrier_CP1_S1_2	7	60

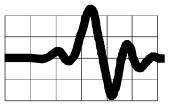


Table A2.6 Noise Source Library

ID	Type	Spectra (dB)											Source
		31.5	63	125	250	500	1000	2000	4000	8000	A	lin	
PowerscreenWarrior1800_P1	Lw	113.1	117.3	116.2	107.6	103.0	103.9	104.7	100.4	92.9	110.3	121.1	Meas. McGee Pit 22/10/21 67.5 dBA at 52.3m
PowerscreenWarrior1800_P2	Lw	111.6	114.7	110.8	104.4	100.6	100.1	98.6	94.7	88.3	105.7	117.9	Meas. McGee Pit 22/10/21 63 dBA at 51.8m
Crusher	Lw	120.9	128.0	123.1	113.0	111.6	116.0	107.9	102.7	98.0	118.3	130.2	Meas. Rideau Quarry 18-01-17 80.2dBA at 31.1m
Washplant	Lw	109.8	96.6	104.1	102.6	105.2	104.8	103.1	99.8	92.8	109.5	113.8	Albion_Pit_30/4/18 at 2.2m and 11/4/19 at L1-L5
Genset_Exhaust	Lw	64.9	97.4	112.5	120.2	121.8	122.9	124.9	121.1	109.3	129.3	129.6	Manufacturers Data - Cummin Model 600DQPAA
Mobile_Water_Pump	Lw	96.1	117.4	107.9	92.1	89.6	89.3	86.0	82.0	80.2	97.1	117.9	Meas. McGee Pit 22/10/21 66.8 dBA at 13m
Dredge	Lw	100.4	116.0	109.9	110.1	105.6	102.4	98.1	91.9	84.9	108.0	118.3	Haskoning Study "8A0370_Noise_Memo" June 2014
Loader_CAT966H	Lw	115.1	117.7	109.4	106.5	102.2	102.0	101.2	95.2	85.4	107.4	120.4	Meas. McGee Pit 22/10/21 67.6 dBA at 38m
Excavator_Liebherr934	Lw	98.6	112.8	105.5	107.0	99.1	95.6	91.1	86.5	83.2	102.6	114.7	Meas. McGee Pit 22/10/21 61.8 dBA at 43m
Aggregate_Truck_Passby	Lw	104.5	103.9	104.1	102.1	99.5	99.5	94.5	91.2	79.6	103.3	110.7	Meas. Howe-Ross Pit 20-05-13 73.7dBA at 12m
Highway_Truck_Passby	Lw	115.6	114.2	113.3	106.9	105.6	103.9	101.0	95.4	86.1	108.8	119.9	Meas. McGee Pit 22/10/21 74.2 Lmax at 21m

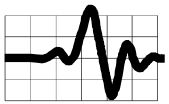


Table A2.7 Noise Measurement Data

ID	Type	Spectra (dB)											Source
		31.5	63	125	250	500	1000	2000	4000	8000	A	lin	
Meas_PowerscreenWarrior1800_P1	Li	70.3	74.5	73.4	64.8	60.2	61.1	61.9	57.6	50.1	67.5	78.3	Meas. McGee Pit 22/10/21 67.5 dBA at 52.3m
Meas_PowerscreenWarrior1800_P2	Li	68.9	72.0	68.1	61.7	57.9	57.4	55.9	52.0	45.6	63.0	75.2	Meas. McGee Pit 22/10/21 63 dBA at 51.8m
Meas_Crusher_Premiertrak	Li	82.8	89.9	85.0	74.9	73.5	77.9	69.8	64.6	59.9	80.2	92.1	Meas. Rideau Quarry 18-01-17 80.2dBA at 31.1m
Meas_Wash_Plant	Li	92.2	79.0	86.5	85.0	87.6	87.2	85.5	82.2	75.2	91.9	96.2	Meas. Albion Pit 19-04-11 at L1-L5
Meas_Mobile_Water_Pump	Li	65.8	87.1	77.6	61.8	59.3	59.0	55.7	51.7	49.9	66.8	87.6	Meas. McGee Pit 22/10/21 66.8 dBA at 13m
Meas_Dredge_CSD	Li	74.4	90.0	83.9	84.1	79.6	76.4	72.1	65.9	58.9	82.0	92.3	Haskoning Study "8A0370_Noise_Memo" June 2014
Meas_Loader_CAT966H	Li	75.3	77.9	69.6	66.7	62.4	62.2	61.4	55.4	45.6	67.6	80.6	Meas. McGee Pit 22/10/21 67.6 dBA at 38m
Meas_Excavator_Liebherr934	Li	57.8	72.0	64.7	66.2	58.3	54.8	50.3	45.7	42.4	61.8	73.9	Meas. McGee Pit 22/10/21 61.8 dBA at 43m
Meas_Excavator_Liebherr934	Li	59.2	75.4	66.9	60.8	58.1	58.2	51.3	47.0	42.8	62.0	76.3	Meas. McGee Pit 22/10/21 62 dBA at 28.5 m
Meas_Aggregate_Truck_Passby	Li	74.9	74.3	74.5	72.5	69.9	69.9	64.9	61.6	50.0	73.7	81.1	Meas. Howe-Ross Pit 20-05-13 73.7dBA at 12m
Meas_Highway_Truck_Passby	Li	81.0	79.6	78.7	72.3	71.0	69.3	66.4	60.8	51.5	74.2	85.3	Meas. McGee Pit 22/10/21 74.2 Lmax at 21m

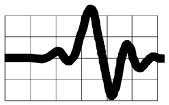


Table A2.8.1 Point of Reception Impacts by Source for Scenario 1* - Daytime Period (07:00 – 19:00)

ID	Screening_Plant_S1_2	Crushing_Plant_S1_2	Mobile_Water_Pump	Excavator_1	Excavator_2	Excavator_3	Highway_Truck_Passby	Aggregate_Truck_Passby_S1	Loader_1_2_S1	Total
	dBA	dBA	dBA	dBA	dBA	dBA	dBA	dBA	dBA	dBA
POR_1	34.4	38.4	32.2	28.1	28.2	24.2	41.7	24.3	32.6	44.7
POR_1	33.7	37.7	31.8	27.5	27.6	23.4	40.5	23.9	32.4	43.8
POR_2	33.1	39.4	28.5	26.8	26.6	23.6	34.1	24.9	32.7	42.4
POR_2	33.8	38.6	29.2	27.2	27.0	23.0	34.4	25.6	32.5	42.2
POR_3	36.2	40.7	24.0	30.4	30.1	25.3	33.4	29.5	38.3	44.5
POR_3	30.7	31.3	24.1	25.1	24.9	16.6	28.5	25.3	44.0	44.7
POR_4	30.8	37.2	22.8	25.1	24.8	21.7	28.3	28.7	37.6	41.6
POR_4	28.9	33.7	22.7	22.8	22.7	18.7	27.1	25.0	39.0	41.0
POR_5	34.6	39.2	21.9	29.1	28.8	24.0	28.1	27.2	32.3	42.0
POR_5	30.7	36.4	20.5	24.2	24.0	21.0	24.6	22.8	32.2	39.3
POR_6	34.8	39.3	21.7	29.3	28.9	24.1	30.3	28.1	32.1	42.3
POR_6	31.0	36.7	24.7	24.5	24.2	21.2	27.0	23.9	32.2	39.7
POR_7	35.3	39.7	26.0	29.7	29.3	24.4	31.4	28.2	34.2	43.0
POR_7	31.0	36.7	24.6	24.5	24.3	21.3	27.0	24.6	34.4	40.2
POR_8	35.5	39.9	25.9	29.9	29.5	24.6	31.5	28.3	33.4	43.0
POR_8	31.1	36.8	20.3	24.6	24.4	21.3	27.0	25.1	33.0	39.9
POR_9	35.6	39.9	21.2	29.9	29.5	24.6	31.4	28.2	31.4	42.8
POR_9	31.5	37.1	20.3	25.0	24.7	21.6	27.2	25.1	30.6	39.8
POR_10	35.7	40.0	25.3	30.0	29.6	24.7	31.3	28.0	32.4	43.0
POR_10	31.5	37.1	24.2	24.9	24.7	21.6	27.2	24.8	28.7	39.6
POR_11	35.6	39.9	25.0	29.9	29.6	24.6	31.0	27.7	37.7	43.7
POR_11	31.5	37.1	24.0	25.0	24.7	21.6	27.2	24.1	26.4	39.4
POR_12	35.0	44.0	24.1	29.5	29.1	28.7	30.3	28.9	35.1	45.6
POR_12	31.2	40.9	23.4	24.7	24.5	24.2	26.7	21.9	29.9	42.1
POR_13	33.3	42.8	23.2	26.9	26.6	26.2	28.2	27.4	30.9	44.0
POR_13	31.3	41.0	23.2	24.8	24.5	24.2	26.7	23.8	30.5	42.3
POR_14	33.4	43.6	23.4	26.9	26.6	26.2	28.2	25.0	32.0	44.6
POR_14	31.2	41.0	22.8	24.7	24.5	24.3	26.0	22.1	29.5	42.1
POR_15	35.3	44.3	23.6	29.7	29.4	24.6	29.9	28.7	33.0	45.6
POR_15	31.4	41.2	22.8	24.9	24.7	21.8	26.3	22.5	29.8	42.3
POR_16	32.6	42.4	20.7	26.9	27.2	27.4	31.9	24.4	27.6	43.7
POR_16	32.5	42.3	20.8	26.1	26.4	26.6	30.3	22.7	26.2	43.4
POR_17	33.8	48.5	26.9	28.0	28.4	32.9	35.3	22.0	28.2	49.1
POR_17	33.6	47.9	26.9	27.1	27.6	30.8	33.8	20.2	23.2	48.4

* Values at first floor window height (W) at 4.5 m or 2 m and Outdoor Point of Reception (OPR) at 1.5 m are given above as these where the most critical points at each receptor.

Table A2.8.2 Point of Reception Impacts by Source for Scenario 1* - Evening Period (19:00 – 21:00)

ID	Screening_Plant_S1_2	Mobile_Water_Pump	Excavator_1	Highway_Truck_Passby	Aggregate_Truck_Passby_S1	Loader_1_2_S1	Total
	dBA	dBA	dBA	dBA	dBA	dBA	dBA
POR_1	34.4	32.2	28.1	33.9	21.3	-67.4	38.8
POR_1	33.7	31.8	27.5	32.7	20.9	-67.6	38.0
POR_2	33.1	28.5	26.8	26.4	21.9	-67.3	35.8
POR_2	33.8	29.2	27.2	26.6	22.6	-67.5	36.4
POR_3	36.2	24.0	30.4	25.6	26.5	-61.7	38.0
POR_3	30.7	24.1	25.1	20.8	22.3	-56.0	33.1
POR_4	30.8	22.8	25.1	20.5	25.7	-62.4	33.4
POR_4	28.9	22.7	22.8	19.3	22.0	-61.0	31.5
POR_5	34.6	21.9	29.1	20.3	24.2	-67.7	36.3
POR_5	30.7	20.5	24.2	16.9	19.8	-67.8	32.3
POR_6	34.8	21.7	29.3	22.5	25.1	-67.9	36.6
POR_6	31.0	24.7	24.5	19.2	20.9	-67.8	33.1
POR_7	35.3	26.0	29.7	23.6	25.2	-65.8	37.2
POR_7	31.0	24.6	24.5	19.2	21.6	-65.6	33.1
POR_8	35.5	25.9	29.9	23.7	25.3	-66.6	37.4
POR_8	31.1	20.3	24.6	19.2	22.1	-67.0	32.9
POR_9	35.6	21.2	29.9	23.7	25.2	-68.6	37.2
POR_9	31.5	20.3	25.0	19.5	22.1	-69.4	33.2
POR_10	35.7	25.3	30.0	23.5	25.0	-67.6	37.5
POR_10	31.5	24.2	24.9	19.4	21.8	-71.3	33.5
POR_11	35.6	25.0	29.9	23.2	24.7	-62.3	37.3
POR_11	31.5	24.0	25.0	19.4	21.1	-73.6	33.4
POR_12	35.0	24.1	29.5	22.5	25.8	-64.9	36.9
POR_12	31.2	23.4	24.7	18.9	18.9	-70.1	33.0
POR_13	33.3	23.2	26.9	20.4	24.4	-69.1	35.1
POR_13	31.3	23.2	24.8	18.9	20.8	-69.5	33.1
POR_14	33.4	23.4	26.9	20.4	22.0	-68.0	35.0
POR_14	31.2	22.8	24.7	18.2	19.1	-70.5	32.9
POR_15	35.3	23.6	29.7	22.1	25.7	-67.0	37.1
POR_15	31.4	22.8	24.9	18.5	19.5	-70.2	33.1
POR_16	32.6	20.7	26.9	24.1	21.4	-72.4	34.5
POR_16	32.5	20.8	26.1	22.5	19.7	-73.8	34.1
POR_17	33.8	26.9	28.0	27.5	18.9	-71.8	36.2
POR_17	33.6	26.9	27.1	26.0	17.2	-76.8	35.8

* Values at first floor window height (W) at 4.5 m or 2 m and Outdoor Point of Reception (OPR) at 1.5 m are given above as these where the most critical points at each receptor.

Table A2.8.3 Point of Reception Impacts by Source for Scenario 2* - Daytime Period (07:00 – 19:00)

ID	Screening_Plant_S1_2	Crushing_Plant_S1_2	Mobile_Water_Pump	Excavator_1	Excavator_2	Excavator_3	Highway_Truck_Passby	Aggregate_Truck_Passby_S2	Loader_1_2_S2	Total
	dBA	dBA	dBA	dBA	dBA	dBA	dBA	dBA	dBA	dBA
POR_1	34.4	38.4	32.2	28.1	28.2	24.2	41.7	22.8	29.6	44.6
POR_1	33.7	37.7	31.8	27.5	27.6	23.4	40.5	22.4	29.5	43.7
POR_2	33.1	39.4	28.5	26.8	26.6	23.6	34.1	22.7	30.0	42.2
POR_2	33.8	38.6	29.2	27.2	27.0	23.0	34.4	23.3	30.4	42.0
POR_3	36.2	40.7	24.0	30.4	30.1	25.3	33.4	25.4	33.3	43.7
POR_3	30.7	31.3	24.1	25.1	24.9	16.6	28.5	20.4	30.3	37.3
POR_4	30.8	37.2	22.8	25.1	24.8	21.7	28.3	25.9	37.1	41.3
POR_4	28.9	33.7	22.7	22.8	22.7	18.7	27.1	20.9	32.6	37.9
POR_5	34.6	39.2	21.9	29.1	28.8	24.0	28.1	27.9	37.8	43.1
POR_5	30.7	36.4	20.5	24.2	24.0	21.0	24.6	22.0	35.5	40.1
POR_6	34.8	39.3	21.7	29.3	28.9	24.1	30.3	28.6	38.8	43.6
POR_6	31.0	36.7	24.7	24.5	24.2	21.2	27.0	21.5	35.6	40.5
POR_7	35.3	39.7	26.0	29.7	29.3	24.4	31.4	27.8	39.7	44.2
POR_7	31.0	36.7	24.6	24.5	24.3	21.3	27.0	21.2	34.4	40.1
POR_8	35.5	39.9	25.9	29.9	29.5	24.6	31.5	27.3	39.1	44.1
POR_8	31.1	36.8	20.3	24.6	24.4	21.3	27.0	21.3	33.3	39.9
POR_9	35.6	39.9	21.2	29.9	29.5	24.6	31.4	26.9	38.6	43.9
POR_9	31.5	37.1	20.3	25.0	24.7	21.6	27.2	22.8	33.9	40.3
POR_10	35.7	40.0	25.3	30.0	29.6	24.7	31.3	27.2	37.7	43.8
POR_10	31.5	37.1	24.2	24.9	24.7	21.6	27.2	23.5	34.5	40.5
POR_11	35.6	39.9	25.0	29.9	29.6	24.6	31.0	27.7	37.2	43.6
POR_11	31.5	37.1	24.0	25.0	24.7	21.6	27.2	24.4	36.5	41.1
POR_12	35.0	44.0	24.1	29.5	29.1	28.7	30.3	28.0	40.9	46.5
POR_12	31.2	40.9	23.4	24.7	24.5	24.2	26.7	24.1	41.2	44.6
POR_13	33.3	42.8	23.2	26.9	26.6	26.2	28.2	25.3	37.5	44.7
POR_13	31.3	41.0	23.2	24.8	24.5	24.2	26.7	22.6	37.5	43.3
POR_14	33.4	43.6	23.4	26.9	26.6	26.2	28.2	24.9	40.5	45.9
POR_14	31.2	41.0	22.8	24.7	24.5	24.3	26.0	23.3	41.0	44.5
POR_15	35.3	44.3	23.6	29.7	29.4	24.6	29.9	28.1	40.6	46.6
POR_15	31.4	41.2	22.8	24.9	24.7	21.8	26.3	23.0	40.4	44.3
POR_16	32.6	42.4	20.7	26.9	27.2	27.4	31.9	24.3	32.8	43.9
POR_16	32.5	42.3	20.8	26.1	26.4	26.6	30.3	22.7	31.4	43.6
POR_17	33.8	48.5	26.9	28.0	28.4	32.9	35.3	22.7	32.1	49.1
POR_17	33.6	47.9	26.9	27.1	27.6	30.8	33.8	20.3	30.7	48.5

* Values at first floor window height (W) at 4.5 m or 2 m and Outdoor Point of Reception (OPR) at 1.5 m are given above as these where the most critical points at each receptor.

Table A2.8.4 Point of Reception Impacts by Source for Scenario 2* - Evening Period (19:00 – 21:00)

ID	Screening_Plant_S1_2	Mobile_Water_Pump	Excavator_1	Highway_Truck_Passby	Aggregate_Truck_Passby_S2	Loader_1_2_S2	Total
	dBA	dBA	dBA	dBA	dBA	dBA	dBA
POR_1	34.4	32.2	28.1	33.9	19.8	26.6	39.1
POR_1	33.7	31.8	27.5	32.7	19.4	26.4	38.3
POR_2	33.1	28.5	26.8	26.4	19.7	27.0	36.3
POR_2	33.8	29.2	27.2	26.6	20.3	27.4	36.9
POR_3	36.2	24.0	30.4	25.6	22.4	30.3	38.5
POR_3	30.7	24.1	25.1	20.8	17.4	27.3	33.9
POR_4	30.8	22.8	25.1	20.5	22.9	34.1	36.6
POR_4	28.9	22.7	22.8	19.3	17.9	29.6	33.4
POR_5	34.6	21.9	29.1	20.3	24.9	34.8	38.6
POR_5	30.7	20.5	24.2	16.9	19.0	32.5	35.4
POR_6	34.8	21.7	29.3	22.5	25.6	35.8	39.2
POR_6	31.0	24.7	24.5	19.2	18.5	32.6	35.8
POR_7	35.3	26.0	29.7	23.6	24.8	36.7	40.0
POR_7	31.0	24.6	24.5	19.2	18.1	31.4	35.3
POR_8	35.5	25.9	29.9	23.7	24.3	36.0	39.7
POR_8	31.1	20.3	24.6	19.2	18.2	30.3	34.6
POR_9	35.6	21.2	29.9	23.7	23.9	35.6	39.4
POR_9	31.5	20.3	25.0	19.5	19.8	30.9	35.1
POR_10	35.7	25.3	30.0	23.5	24.2	34.6	39.3
POR_10	31.5	24.2	24.9	19.4	20.5	31.5	35.6
POR_11	35.6	25.0	29.9	23.2	24.6	34.2	39.1
POR_11	31.5	24.0	25.0	19.4	21.4	33.5	36.5
POR_12	35.0	24.1	29.5	22.5	25.0	37.9	40.4
POR_12	31.2	23.4	24.7	18.9	21.1	38.2	39.3
POR_13	33.3	23.2	26.9	20.4	22.3	34.5	37.8
POR_13	31.3	23.2	24.8	18.9	19.6	34.5	36.8
POR_14	33.4	23.4	26.9	20.4	21.9	37.5	39.4
POR_14	31.2	22.8	24.7	18.2	20.3	38.0	39.2
POR_15	35.3	23.6	29.7	22.1	25.1	37.6	40.3
POR_15	31.4	22.8	24.9	18.5	20.0	37.4	38.8
POR_16	32.6	20.7	26.9	24.1	21.3	29.7	35.7
POR_16	32.5	20.8	26.1	22.5	19.6	28.4	35.1
POR_17	33.8	26.9	28.0	27.5	19.7	29.1	37.0
POR_17	33.6	26.9	27.1	26.0	17.3	27.7	36.4

* Values at first floor window height (W) at 4.5 m or 2 m and Outdoor Point of Reception (OPR) at 1.5 m are given above as these where the most critical points at each receptor.

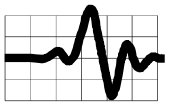


Table A2.8.5 Point of Reception Impacts by Source for Scenario 3* - Daytime Period (07:00 – 19:00)

ID	Wash_Plant_S3	Generator_S3	Mobile_Water_Pump	Excavator_1	Excavator_2	Excavator_3	Screening_Plant_S3	Highway_Truck_Passby	Aggregate_Truck_Passby_S3	Loader_1_2_S3	Dredge_S3	Total
	dBA	dBA	dBA	dBA	dBA	dBA	dBA	dBA	dBA	dBA	dBA	dBA
POR_1	33.6	29.2	32.2	28.1	28.2	28.2	34.4	41.7	22.8	29.6	33.3	44.4
POR_1	32.6	27.8	31.8	27.5	27.6	27.8	33.7	40.5	22.4	29.4	33.2	43.5
POR_2	31.9	27.3	28.5	26.8	26.6	26.5	33.1	34.2	22.7	30.0	33.2	40.8
POR_2	32.6	28.4	29.2	27.2	27.0	26.8	33.8	34.5	23.3	30.4	32.6	41.2
POR_3	35.6	29.9	24.0	30.4	30.1	29.8	36.2	33.6	25.4	33.3	38.7	43.8
POR_3	29.0	23.3	24.1	25.1	24.9	24.8	30.7	28.8	20.4	30.3	44.1	44.9
POR_4	29.8	23.7	22.8	25.1	24.8	24.5	30.8	28.3	25.9	37.1	38.1	42.1
POR_4	27.3	21.8	22.7	22.8	22.7	22.6	28.9	27.3	20.9	32.6	39.4	41.3
POR_5	34.0	27.8	21.9	29.1	28.8	28.4	34.6	28.6	27.9	37.8	32.9	42.5
POR_5	29.3	24.1	20.5	24.2	24.0	23.7	30.7	25.0	22.0	35.5	32.4	39.5
POR_6	34.2	28.1	21.7	29.3	28.9	28.6	34.8	30.6	28.6	38.8	32.7	43.0
POR_6	29.6	24.5	24.7	24.5	24.2	24.0	31.0	27.2	21.5	35.6	32.4	39.8
POR_7	34.6	28.6	26.0	29.7	29.3	28.9	35.3	31.7	27.8	39.7	35.5	44.0
POR_7	29.6	24.5	24.6	24.5	24.3	24.0	31.0	27.2	21.2	34.5	32.3	39.4
POR_8	34.8	28.9	25.9	29.9	29.5	29.1	35.5	31.8	27.3	39.1	34.5	43.7
POR_8	29.7	24.7	20.3	24.6	24.4	21.4	31.1	27.3	21.3	33.3	30.2	38.6
POR_9	34.9	29.0	21.2	29.9	29.5	24.7	35.6	31.7	26.9	38.6	32.4	43.2
POR_9	30.1	25.2	20.3	25.0	24.7	21.7	31.5	27.5	22.8	33.9	28.1	38.7
POR_10	35.0	29.1	25.3	30.0	29.6	29.2	35.7	31.6	27.2	37.7	30.7	42.9
POR_10	30.1	25.1	24.2	24.9	24.7	24.4	31.5	27.4	23.5	34.5	27.2	39.0
POR_11	34.9	29.0	25.0	29.9	29.6	29.1	35.6	31.2	27.7	37.2	34.7	43.2
POR_11	30.1	25.2	24.0	25.0	24.7	24.4	31.5	27.3	24.4	36.5	25.9	39.8
POR_12	34.3	28.3	24.1	29.5	29.1	28.7	35.0	30.4	28.0	40.9	32.8	44.0
POR_12	29.8	24.8	23.4	24.7	24.5	24.2	31.2	26.8	24.1	41.2	30.2	42.7
POR_13	32.6	27.2	23.2	26.9	26.6	26.2	33.3	28.3	25.3	37.5	29.6	41.4
POR_13	30.0	25.0	23.2	24.8	24.5	24.2	31.3	26.8	22.6	37.5	29.5	40.4
POR_14	32.5	27.3	23.4	26.9	26.6	26.2	33.4	28.3	24.9	40.5	31.5	43.0
POR_14	29.9	24.9	22.8	24.7	24.5	24.3	31.2	26.1	23.3	41.0	27.1	42.4
POR_15	34.6	28.7	23.6	29.7	29.4	24.6	35.3	30.0	28.1	40.6	34.5	44.0
POR_15	30.1	25.2	22.8	24.9	24.7	21.8	31.4	26.4	23.0	40.4	30.2	42.1
POR_16	31.8	26.7	20.7	26.9	27.2	27.4	32.6	31.9	24.3	32.8	29.3	40.0
POR_16	31.5	27.1	20.8	26.1	26.4	26.6	32.5	30.3	22.7	31.4	26.7	39.2
POR_17	37.9	33.2	26.9	28.0	28.4	32.9	33.8	35.3	22.7	32.1	29.8	43.1
POR_17	36.7	28.8	26.9	27.1	27.6	30.8	33.6	33.8	20.3	30.7	24.4	41.6

* Values at first floor window height (W) at 4.5 m or 2 m and Outdoor Point of Reception (OPR) at 1.5 m are given above as these where the most critical points at each receptor.

Table A2.8.6 Point of Reception Impacts by Source for Scenario 3* - Evening Period (19:00 – 21:00)

ID	Wash_Plant_S3	Generator_S3	Mobile_Water_Pump	Excavator_1	Highway_Truck_Passby	Aggregate_Truck_Passby_S3	Loader_1_2_S3	Total
	dBA	dBA	dBA	dBA	dBA	dBA	dBA	dBA
POR_1	33.6	29.2	32.2	28.1	33.9	19.8	26.6	39.3
POR_1	32.6	27.8	31.8	27.5	32.7	19.3	26.4	38.4
POR_2	31.9	27.3	28.5	26.8	26.4	19.7	27.0	36.4
POR_2	32.6	28.4	29.2	27.2	26.7	20.3	27.4	37.0
POR_3	35.6	29.9	24.0	30.4	25.8	22.4	30.3	38.8
POR_3	29.0	23.3	24.1	25.1	21.0	17.4	27.2	33.6
POR_4	29.8	23.7	22.8	25.1	20.6	22.9	34.0	36.6
POR_4	27.3	21.8	22.7	22.8	19.5	17.9	29.6	33.3
POR_5	34.0	27.8	21.9	29.1	20.8	24.9	34.8	38.8
POR_5	29.3	24.1	20.5	24.2	17.2	19.0	32.5	35.3
POR_6	34.2	28.1	21.7	29.3	22.9	25.6	35.7	39.3
POR_6	29.6	24.5	24.7	24.5	19.5	18.5	32.6	35.7
POR_7	34.6	28.6	26.0	29.7	23.9	24.8	36.7	40.1
POR_7	29.6	24.5	24.6	24.5	19.5	18.1	31.5	35.2
POR_8	34.8	28.9	25.9	29.9	24.0	24.3	36.1	39.9
POR_8	29.7	24.7	20.3	24.6	19.5	18.2	30.3	34.5
POR_9	34.9	29.0	21.2	29.9	24.0	23.9	35.6	39.6
POR_9	30.1	25.2	20.3	25.0	19.7	19.8	30.9	35.0
POR_10	35.0	29.1	25.3	30.0	23.8	24.2	34.6	39.4
POR_10	30.1	25.1	24.2	24.9	19.6	20.5	31.5	35.5
POR_11	34.9	29.0	25.0	29.9	23.5	24.6	34.2	39.2
POR_11	30.1	25.2	24.0	25.0	19.6	21.4	33.5	36.4
POR_12	34.3	28.3	24.1	29.5	22.6	25.0	37.9	40.5
POR_12	29.8	24.8	23.4	24.7	19.1	21.0	38.1	39.3
POR_13	32.6	27.2	23.2	26.9	20.5	22.3	34.5	37.9
POR_13	30.0	25.0	23.2	24.8	19.0	19.6	34.5	36.8
POR_14	32.5	27.3	23.4	26.9	20.5	21.8	37.5	39.5
POR_14	29.9	24.9	22.8	24.7	18.3	20.3	38.0	39.2
POR_15	34.6	28.7	23.6	29.7	22.2	25.1	37.6	40.4
POR_15	30.1	25.2	22.8	24.9	18.6	20.0	37.4	38.8
POR_16	31.8	26.7	20.7	26.9	24.1	21.3	29.7	35.9
POR_16	31.5	27.1	20.8	26.1	22.5	19.6	28.4	35.4
POR_17	37.9	33.2	26.9	28.0	27.5	19.7	29.1	40.4
POR_17	36.7	28.8	26.9	27.1	26.0	17.3	27.7	38.7

* Values at first floor window height (W) at 4.5 m or 2 m and Outdoor Point of Reception (OPR) at 1.5 m are given above as these where the most critical points at each receptor.

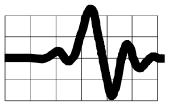


Table A2.9 Distance Source to Point of Reception

ID	Coordinates		Screening_Plant_S1_2	Screening_Plant_S3	Screening_Plant_S4	Crushing_Plant_S1_2	Crushing_Plant_S4	Wash_Plant_S3	Generator_S3	Mobile_Water_Pump	Excavator_1	Excavator_2	Excavator_3
	X (m)		18419613	18419613	18419613	18419565.44	18419565.44	18419593.89	18419589.39	18419921.12	18419607.52	18419581.84	18419557.43
		Y (m)	5017686.35	5017686.35	5017686.35	5017750.5	5017750.5	5017710.32	5017706.25	5018075.72	5017678.97	5017711.23	5017751.12
POR_1_POW	18420226.7	5018095.5	738	738	738	746	746	741	747	306	746	751	753
POR_1_OPR	18420212.9	5018082.4	719	719	719	728	728	722	728	292	727	732	734
POR_2_POW	18420425.2	5017958.3	856	856	856	884	884	867	873	518	864	879	892
POR_2_OPR	18420375.1	5017908.6	794	794	794	825	825	806	811	484	801	817	833
POR_3_POW	18420585.3	5017503.7	989	989	989	1049	1049	1013	1016	877	993	1025	1057
POR_3_OPR	18420507.8	5017445.5	927	927	927	990	990	951	955	861	930	963	998
POR_4_POW	18420660.2	5017411.4	1083	1083	1083	1146	1146	1107	1111	994	1086	1119	1154
POR_4_OPR	18420607.6	5017346.7	1051	1051	1051	1118	1118	1077	1080	1001	1054	1089	1125
POR_5_POW	18420648.7	5017243.3	1127	1127	1127	1196	1196	1154	1156	1106	1129	1165	1204
POR_5_OPR	18420634.3	5017257.0	1108	1108	1108	1177	1177	1135	1137	1086	1110	1146	1185
POR_6_POW	18420596.2	5017179.7	1106	1106	1106	1178	1178	1134	1136	1122	1108	1145	1186
POR_6_OPR	18420573.2	5017200.1	1076	1076	1076	1148	1148	1104	1106	1092	1078	1115	1156
POR_7_POW	18420520.5	5017125.5	1067	1067	1067	1141	1141	1096	1097	1123	1068	1106	1148
POR_7_OPR	18420504.4	5017142.8	1044	1044	1044	1118	1118	1073	1075	1100	1045	1084	1125
POR_8_POW	18420451.8	5017058.6	1048	1048	1048	1124	1124	1077	1078	1147	1048	1088	1131
POR_8_OPR	18420430.5	5017078.8	1019	1019	1019	1095	1095	1048	1049	1120	1019	1058	1102
POR_9_POW	18420364.7	5016965.1	1042	1042	1042	1121	1121	1072	1073	1196	1041	1082	1127
POR_9_OPR	18420341.6	5016992.2	1006	1006	1006	1085	1085	1037	1037	1162	1005	1046	1091
POR_10_POW	18420312.7	5016927.0	1033	1033	1033	1112	1112	1063	1063	1214	1031	1072	1118
POR_10_OPR	18420294.0	5016952.2	1001	1001	1001	1081	1081	1032	1032	1184	1000	1041	1087
POR_11_POW	18420243.6	5016859.0	1040	1040	1040	1120	1120	1071	1070	1259	1038	1079	1126
POR_11_OPR	18420218.1	5016884.5	1005	1005	1005	1084	1084	1035	1035	1228	1002	1043	1090
POR_12_POW	18420050.4	5016685.8	1092	1092	1092	1170	1170	1122	1120	1396	1087	1127	1174
POR_12_OPR	18420032.1	5016713.7	1059	1059	1059	1137	1137	1089	1087	1367	1055	1094	1141
POR_13_POW	18419919.3	5016569.7	1158	1158	1158	1233	1233	1186	1183	1506	1152	1190	1236
POR_13_OPR	18419913.4	5016598.8	1128	1128	1128	1203	1203	1156	1154	1477	1123	1161	1206
POR_14_POW	18419755.7	5016611.0	1085	1085	1085	1155	1155	1111	1108	1474	1078	1114	1157
POR_14_OPR	18419760.4	5016638.2	1058	1058	1058	1129	1129	1085	1082	1446	1052	1088	1131
POR_15_POW	18419702.6	5016623.5	1067	1067	1067	1135	1135	1092	1089	1469	1060	1094	1137
POR_15_OPR	18419707.7	5016643.5	1047	1047	1047	1116	1116	1073	1069	1448	1040	1075	1118
POR_16_POW	18418730.2	5017712.7	883	883	883	836	836	864	859	1245	878	852	828
POR_16_OPR	18418767.6	5017707.9	846	846	846	799	799	826	822	1211	840	814	791
POR_17_POW	18418931.6	5018076.7	785	785	785	713	713	757	755	990	784	746	705
POR_17_OPR	18418952.1	5018055.3	757	757	757	685	685	729	727	969	756	718	677

Table A2.10 Sample Calculations – Scenario 1

Receiver
Name: POR_1
ID: POR_1_POW
X: 18420226.65 m
Y: 5018095.47 m
Z: 119.49 m

Point Source, ISO 9613, Name: "Screening_Plant", ID: "Screening_Plant_S1_2"																				
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)
7	18419613.00	5017686.35	120.50	0	D	32	73.7	0.0	0.0	0.0	0.0	68.4	0.0	-5.4	0.0	0.0	4.8	0.0	0.0	5.9
7	18419613.00	5017686.35	120.50	0	D	63	91.1	0.0	0.0	0.0	0.0	68.4	0.1	-5.4	0.0	0.0	4.8	0.0	0.0	23.3
7	18419613.00	5017686.35	120.50	0	D	125	100.1	0.0	0.0	0.0	0.0	68.4	0.3	3.0	0.0	0.0	1.8	0.0	0.0	26.6
7	18419613.00	5017686.35	120.50	0	D	250	99.0	0.0	0.0	0.0	0.0	68.4	0.8	4.8	0.0	0.0	0.0	0.0	0.0	25.0
7	18419613.00	5017686.35	120.50	0	D	500	99.8	0.0	0.0	0.0	0.0	68.4	1.4	-0.2	0.0	0.0	5.0	0.0	0.0	25.2
7	18419613.00	5017686.35	120.50	0	D	1000	103.9	0.0	0.0	0.0	0.0	68.4	2.7	-2.4	0.0	0.0	5.4	0.0	0.0	29.8
7	18419613.00	5017686.35	120.50	0	D	2000	105.9	0.0	0.0	0.0	0.0	68.4	7.1	-2.5	0.0	0.0	6.1	0.0	0.0	26.8
7	18419613.00	5017686.35	120.50	0	D	4000	101.4	0.0	0.0	0.0	0.0	68.4	24.2	-2.5	0.0	0.0	7.2	0.0	0.0	4.2
7	18419613.00	5017686.35	120.50	0	D	8000	91.8	0.0	0.0	0.0	0.0	68.4	86.2	-2.5	0.0	0.0	8.7	0.0	0.0	-69.0
7	18419613.00	5017686.35	120.50	0	N	32	73.7	0.0	0.0	0.0	0.0	68.4	0.0	-5.4	0.0	0.0	4.8	0.0	0.0	5.9
7	18419613.00	5017686.35	120.50	0	N	63	91.1	0.0	0.0	0.0	0.0	68.4	0.1	-5.4	0.0	0.0	4.8	0.0	0.0	23.3
7	18419613.00	5017686.35	120.50	0	N	125	100.1	0.0	0.0	0.0	0.0	68.4	0.3	3.0	0.0	0.0	1.8	0.0	0.0	26.6
7	18419613.00	5017686.35	120.50	0	N	250	99.0	0.0	0.0	0.0	0.0	68.4	0.8	4.8	0.0	0.0	0.0	0.0	0.0	25.0
7	18419613.00	5017686.35	120.50	0	N	500	99.8	0.0	0.0	0.0	0.0	68.4	1.4	-0.2	0.0	0.0	5.0	0.0	0.0	25.2
7	18419613.00	5017686.35	120.50	0	N	1000	103.9	0.0	0.0	0.0	0.0	68.4	2.7	-2.4	0.0	0.0	5.4	0.0	0.0	29.8
7	18419613.00	5017686.35	120.50	0	N	2000	105.9	0.0	0.0	0.0	0.0	68.4	7.1	-2.5	0.0	0.0	6.1	0.0	0.0	26.8
7	18419613.00	5017686.35	120.50	0	N	4000	101.4	0.0	0.0	0.0	0.0	68.4	24.2	-2.5	0.0	0.0	7.2	0.0	0.0	4.2
7	18419613.00	5017686.35	120.50	0	N	8000	91.8	0.0	0.0	0.0	0.0	68.4	86.2	-2.5	0.0	0.0	8.7	0.0	0.0	-69.0
7	18419613.00	5017686.35	120.50	0	E	32	73.7	0.0	0.0	0.0	0.0	68.4	0.0	-5.4	0.0	0.0	4.8	0.0	0.0	5.9
7	18419613.00	5017686.35	120.50	0	E	63	91.1	0.0	0.0	0.0	0.0	68.4	0.1	-5.4	0.0	0.0	4.8	0.0	0.0	23.3
7	18419613.00	5017686.35	120.50	0	E	125	100.1	0.0	0.0	0.0	0.0	68.4	0.3	3.0	0.0	0.0	1.8	0.0	0.0	26.6
7	18419613.00	5017686.35	120.50	0	E	250	99.0	0.0	0.0	0.0	0.0	68.4	0.8	4.8	0.0	0.0	0.0	0.0	0.0	25.0
7	18419613.00	5017686.35	120.50	0	E	500	99.8	0.0	0.0	0.0	0.0	68.4	1.4	-0.2	0.0	0.0	5.0	0.0	0.0	25.2
7	18419613.00	5017686.35	120.50	0	E	1000	103.9	0.0	0.0	0.0	0.0	68.4	2.7	-2.4	0.0	0.0	5.4	0.0	0.0	29.8
7	18419613.00	5017686.35	120.50	0	E	2000	105.9	0.0	0.0	0.0	0.0	68.4	7.1	-2.5	0.0	0.0	6.1	0.0	0.0	26.8
7	18419613.00	5017686.35	120.50	0	E	4000	101.4	0.0	0.0	0.0	0.0	68.4	24.2	-2.5	0.0	0.0	7.2	0.0	0.0	4.2
7	18419613.00	5017686.35	120.50	0	E	8000	91.8	0.0	0.0	0.0	0.0	68.4	86.2	-2.5	0.0	0.0	8.7	0.0	0.0	-69.0

Point Source, ISO 9613, Name: "Crushing_Plant", ID: "Crushing_Plant_S1_2"																				
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)
13	18419565.44	5017750.50	121.00	0	D	32	81.5	0.0	0.0	0.0	0.0	68.5	0.0	-5.3	0.0	0.0	5.0	0.0	0.0	13.3
13	18419565.44	5017750.50	121.00	0	D	63	101.8	0.0	0.0	0.0	0.0	68.5	0.1	-5.3	0.0	0.0	5.3	0.0	0.0	33.3
13	18419565.44	5017750.50	121.00	0	D	125	107.0	0.0	0.0	0.0	0.0	68.5	0.3	3.1	0.0	0.0	4.0	0.0	0.0	31.2
13	18419565.44	5017750.50	121.00	0	D	250	104.4	0.0	0.0	0.0	0.0	68.5	0.8	4.3	0.0	0.0	4.9	0.0	0.0	26.0
13	18419565.44	5017750.50	121.00	0	D	500	108.4	0.0	0.0	0.0	0.0	68.5	1.4	-0.2	0.0	0.0	10.7	0.0	0.0	28.0
13	18419565.44	5017750.50	121.00	0	D	1000	116.0	0.0	0.0	0.0	0.0	68.5	2.7	-2.3	0.0	0.0	13.4	0.0	0.0	33.7
13	18419565.44	5017750.50	121.00	0	D	2000	109.1	0.0	0.0	0.0	0.0	68.5	7.2	-2.4	0.0	0.0	16.2	0.0	0.0	19.6
13	18419565.44	5017750.50	121.00	0	D	4000	103.7	0.0	0.0	0.0	0.0	68.5	24.4	-2.4	0.0	0.0	19.1	0.0	0.0	-5.9
13	18419565.44	5017750.50	121.00	0	D	8000	96.9	0.0	0.0	0.0	0.0	68.5	87.2	-2.4	0.0	0.0	22.1	0.0	0.0	-78.4
13	18419565.44	5017750.50	121.00	0	N	32	81.5	0.0	-188.0	0.0	0.0	68.5	0.0	-5.3	0.0	0.0	5.0	0.0	0.0	-174.7
13	18419565.44	5017750.50	121.00	0	N	63	101.8	0.0	-188.0	0.0	0.0	68.5	0.1	-5.3	0.0	0.0	5.3	0.0	0.0	-154.7
13	18419565.44	5017750.50	121.00	0	N	125	107.0	0.0	-188.0	0.0	0.0	68.5	0.3	3.1	0.0	0.0	4.0	0.0	0.0	-156.8
13	18419565.44	5017750.50	121.00	0	N	250	104.4	0.0	-188.0	0.0	0.0	68.5	0.8	4.3	0.0	0.0	4.9	0.0	0.0	-162.0
13	18419565.44	5017750.50	121.00	0	N	500	108.4	0.0	-188.0	0.0	0.0	68.5	1.4	-0.2	0.0	0.0	10.7	0.0	0.0	-160.0
13	18419565.44	5017750.50	121.00	0	N	1000	116.0	0.0	-188.0	0.0	0.0	68.5	2.7	-2.3	0.0	0.0	13.4	0.0	0.0	-154.3
13	18419565.44	5017750.50	121.00	0	N	2000	109.1	0.0	-188.0	0.0	0.0	68.5	7.2	-2.4	0.0	0.0	16.2	0.0	0.0	-168.4
13	18419565.44	5017750.50	121.00	0	N	4000	103.7	0.0	-188.0	0.0	0.0	68.5	24.4	-2.4	0.0	0.0	19.1	0.0	0.0	-193.9
13	18419565.44	5017750.50	121.00	0	N	8000	96.9	0.0	-188.0	0.0	0.0	68.5	87.2	-2.4	0.0	0.0	22.1	0.0	0.0	-266.4
13	18419565.44	5017750.50	121.00	0	E	32	81.5	0.0	-188.0	0.0	0.0	68.5	0.0	-5.3	0.0	0.0	5.0	0.0	0.0	-174.7
13	18419565.44	5017750.50	121.00	0	E	63	101.8	0.0	-188.0	0.0	0.0	68.5	0.1	-5.3	0.0	0.0	5.3	0.0	0.0	-154.7
13	18419565.44	5017750.50	121.00	0	E	125	107.0	0.0	-188.0	0.0	0.0	68.5	0.3	3.1	0.0	0.0	4.0	0.0	0.0	-156.8
13	18419565.44	5017750.50	121.00	0	E	250	104.4	0.0	-188.0	0.0	0.0	68.5	0.8	4.3	0.0	0.0	4.9	0.0	0.0	-162.0
13	18419565.44	5017750.50	121.00	0	E	500	108.4	0.0	-188.0	0.0	0.0	68.5	1.4	-0.2	0.0	0.0	10.7	0.0	0.0	-160.0
13	18419565.44	5017750.50	121.00	0	E	1000	116.0	0.0	-188.0	0.0	0.0	68.5	2.7	-2.3	0.0	0.0	13.4	0.0	0.0	-154.3
13	18419565.44	5017750.50	121.00	0	E	2000	109.1	0.0	-188.0	0.0	0.0	68.5	7.2	-2.4	0.0	0.0	16.2	0.0	0.0	-168.4

Appendix 3

Manufacturers Data

Contents:

- Manufacturers Data for Silex Silencer Model JB 6.

Manufacturers Data for Silex Silencer Model JB 6.

www.silex.com JB

CRITICAL CYLINDRICAL SILENCERS

25 to 32 dBA Noise Reduction

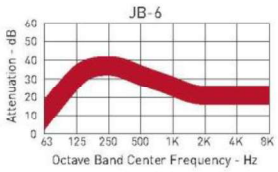
SILENCER SELECTION

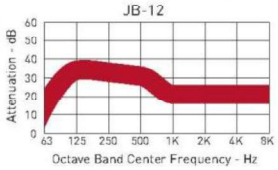
For immediate assistance to select the appropriate silencer that best suits your application's acoustical and backpressure requirements contact Silex Innovations. Or, use our exclusive silencer sizing and selection program, found at www.silex.com.

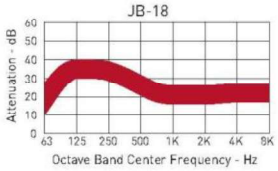
PERFORMANCE & MATERIALS

The critical grade series are reactive silencers with good acoustical performance. All of the silencers are manufactured from light to heavy gauge steel and finished with high temperature black paint. A drain is included as a standard component on the silencer.

TYPICAL ATTENUATION CURVE







DIMENSIONS

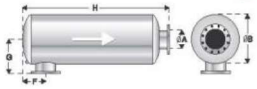
Model	ØA in[mm]	ØB in[mm]	C in[mm]	D in[mm]	F** in[mm]	G in[mm]	H in[mm]	Wgt lb[kg]
JB-1.5	1.5	9[229]	24[610]	30[762]	4[102]	7.5[191]	27[686]	23[10]
JB-2	2	9[229]	24[610]	30[762]	4.5[114]	7.5[191]	27[686]	24[11]
JB-2.5	2.5	10[254]	28[711]	34[864]	5[127]	8[203]	31[787]	34[15]
JB-3	3	12[305]	32[813]	38[660]	5.5[140]	9[229]	35[889]	46[21]
JB-3.5	3.5	14[356]	36[914]	42[1067]	6[152]	10[254]	39[991]	65[29]
JB-4	4	14[356]	40[1016]	48[1219]	6[152]	11[279]	44[1118]	77[35]
JB-5	5	16[406]	49[1245]	57[1448]	7[178]	12[305]	53[1346]	107[49]
JB-6	6	18[457]	55[1397]	63[1600]	8[203]	13[330]	59[1499]	135[61]
JB-8	8	22[559]	66[1676]	74[1880]	9.5[241]	15[381]	70[1778]	208[94]
JB-10	10	26[660]	81[2057]	89[2261]	11.5[292]	17[432]	85[2159]	370[168]
JB-12	12	30[762]	94[2388]	102[2591]	13[330]	19[483]	98[2489]	505[229]
JB-14	14	36[914]	99[2515]	109[2769]	15.5[394]	23[584]	104[2642]	642[291]
JB-16	16	40[1016]	109[2769]	119[3023]	16.5[419]	25[635]	114[2896]	971[440]
JB-18	18	45[1143]	117[2972]	127[3226]	18[457]	27.5[699]	122[3099]	1167[529]
JB-20	20	50[1270]	127[3226]	137[3480]	20.5[521]	30[762]	132[3353]	1669[757]
JB-22	22	54[1372]	139[3531]	149[3785]	22.5[572]	32[813]	144[3658]	1972[894]
JB-24	24	60[1524]	152[3861]	162[4115]	24[610]	35[889]	157[3988]	2384[1081]
JB-26	26	64[1626]	173[4394]	183[4648]	25.5[648]	37[940]	178[4521]	2854[1295]
JB-28	28	68[1727]	190[4826]	200[5080]	26.5[673]	39[991]	195[4953]	3278[1487]
JB-30	30	72[1829]	206[5232]	216[5486]	28[711]	41[1041]	211[5359]	3777[1713]

**For F dimension other than that specified, please contact Silex Innovations.
Available in sizes up to 60" inlet.

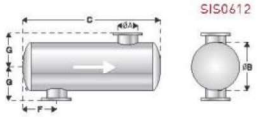
TYPICAL ORIENTATIONS

ST

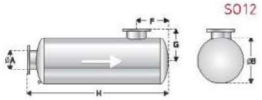
SI



SIS0612



SO12



OPTIONS

- Aluminized steel, 304L or 316L stainless steel
- Dual inlet or custom inlet / outlet configurations
- Thermal insulation blankets to suit all configurations
- Mounting brackets, gussets and lifting lugs

Metric dimensions rounded to nearest mm. Dimensions and weights are nominal and may vary slightly in production models. On silencers 4" and larger the inlet and outlet are flanged, manufactured from minimum ¼" thick plate and drilled to ANSI class 150.
The default material used is aluminized steel, however NGP reserves the right to substitute to carbon steel due to material availability, gauge and size limitations.

Corporate Headquarters
1560 Williams Drive
Stoughton, WI 53589
Tel: 608-719-1800

Silex INNOVATIONS

silex.com
Silex: 1-800-387-7818
Sales/Quote Email: Silex.Sales@nelsonggp.com
Order Email: Silex.Orders@nelsonggp.com

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Appendix 4

Calibration Certificates

www.pylonelectronics.com

Pylon Electronics Inc.
147 Colonnade Road
Ottawa, ON K2E 7L9

CERTIFICATE OF CALIBRATION

Description	**SOUND LEVEL CALIBRATOR**	**Work Order**	**N0996745**
Model Number	**4231**	**Serial Number**	**2730374**
Instrument Id	**N/A**	**Cal Procedure**	**33K3-4-2871-1**
Manufacturer	**BRUEL & KJAER**	**Cal Date**	**4 Mar 2022**
Customer Name	**FREEFIELD LTD.**	**Recall Cycle**	**52 Weeks**
		Next Cal Date	**4 Mar 2023**
		Purchase Order	**Credit Card**

Calibration Environment: Temperature **22.8 °C** Relative Humidity **35.5 %RH**

Received Condition: **Within Tolerance**

Completed Condition: **Within Tolerance**

Standards Used to Establish Traceability

Instrument Type	Model	Asset #	Cal Due Date
3550 B&K, SIGNAL ANALYZER	3550	240-1202	11 Nov 2022
4220 BRUEL&KJAER PISTONPHONE	4220	240-1378	4 Jan 2023
4190 BRUEL & KJAER, MICROPHONE	4190	240-1398	14 Oct 2022
2669 BRUEL & KJAER, PREAMPLIFIER	2669	240-1399	14 Oct 2022

Pylon certifies that, at the time of calibration, the above listed instrument meets or exceeds all of the specifications defined on the Test Data Sheet (TDS), unless otherwise indicated. The Certificate received and completed conditions and the TDS specifications are based on the procedure(s) and/or specification(s) referenced on the TDS unless otherwise indicated. Any statement of compliance is made without taking measurement uncertainty into account and is based on the instrument's performance against the test limits documented on the test data sheet.

The above listed instrument has been calibrated using standards that are traceable to the International System of Units (SI) through a National Metrological Institute (such as NRC or NIST). Pylon's quality system meets the requirements of ISO/IEC 17025:2017. Unless otherwise specified, Pylon maintains a minimum of a 4:1 ratio between the equipment under test and the measurement system.

Test data As Found and Final (as left) results are the same unless reported otherwise. Certificate remarks identify if adjustments were performed.

Metrologist : ***146*** Quality Assurance: ***301*** Date of Issue: **7 Mar 2022** F083 Rev 16 pylcert1

HALIFAX MONTREAL OTTAWA TORONTO EDMONTON CALGARY

PYLON

Calibration Test Data

Page 1 of 1

Description:	**SOUND LEVEL CALIBRATOR**	Work order:	**N0996745**
Model:	**4231**	Serial:	**2730374**
Customer ID.:	**N/A**	Procedure:	**33K3-4-2871-1**
Manufacturer:	**BRUEL & KJAER**	Proc. Rev.:	**30-Oct-2006**
Customer:	**FREEFIELD LTD.**	Cal Date:	**04-Mar-2022**

Rev:03Jul2009 AF=0 F=0

4231 BRÜEL & KJÆR.xls Temp 006 Appr 062 23-Oct-2018

TEST REF.	TEST DESCRIPTION	RESULTS MIN	AS FOUND	FINAL	MAX
4.1	**Sound Level Calibration:**				
	Nominal dB_{SPL}	dB_{SPL}	dB_{SPL}		dB_{SPL}
	94.0	93.80	93.97		94.20
	(+20 dB Button) 114.0	113.80	113.95		114.20
4.2	**Frequency Calibration:**				
	Nominal (Hz)	Hz	Hz		Hz
	1 k	999.0	1000.0		1001.0
4.3	**Distortion Calibration :**				
	Measured Value	-	0.38 %		1.00 %
	ADDITIONAL TEST:				
	AUTO SHUT OFF	Pass / Fail	Pass		

PYLON

www.pylonelectronics.com

Pylon Electronics Inc.
147 Colonnade Road
Ottawa, ON K2E 7L9

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CERTIFICATE OF CALIBRATION

Description	**SOUND ANALYZER**	**Work Order**	**N0996743**
Model Number	**2270**	**Serial Number**	**3008643**
Instrument Id	**N/A**	**Cal Procedure**	**BE1713-32**
Manufacturer	**BRUEL & KJAER**	**Cal Date**	**4 Mar 2022**
Customer Name	**FREEFIELD LTD.**	**Recall Cycle**	**52 Weeks**
		Next Cal Date	**4 Mar 2023**
		Purchase Order	**Credit Card**

Calibration Environment: Temperature **22.8 °C** Relative Humidity **32.6 %RH**

Received Condition: **Within Tolerance**

Completed Condition: **Within Tolerance**

Remarks: **The unit calibrated with Preamp ZC 0032 S/N 23073 and Mic 4189 S/N 2985656**

Standards Used to Establish Traceability

Instrument Type	Model	Asset #	Cal Due Date
SOUND LEVEL CALIBRATOR	4231	240-1151	23 Sep 2022

Pylon certifies that, at the time of calibration, the above listed instrument meets or exceeds all of the specifications defined on the Test Data Sheet (TDS), unless otherwise indicated. The Certificate received and completed conditions and the TDS specifications are based on the procedure(s) and/or specification(s) referenced on the TDS unless otherwise indicated. Any statement of compliance is made without taking measurement uncertainty into account and is based on the instrument's performance against the test limits documented on the test data sheet.

The above listed instrument has been calibrated using standards that are traceable to the International System of Units (SI) through a National Metrological Institute (such as NRC or NIST). Pylon's quality system meets the requirements of ISO/IEC 17025:2017. Unless otherwise specified, Pylon maintains a minimum of a 4:1 ratio between the equipment under test and the measurement system.

Test data As Found and Final (as left) results are the same unless reported otherwise. Certificate remarks identify if adjustments were performed.

Metrologist : *146* Quality Assurance: *301* Date of Issue: **7 Mar 2022** F083 Rev 16 pylcert1

HALIFAX MONTREAL OTTAWA TORONTO EDMONTON CALGARY

Page 1 of 1

PYLON

Calibration Test Data

Description:	**SOUND ANALYZER**	Work order:	**N0996743**	
Model:	**2270**	Serial:	**3008643**	
Customer ID.:	**N/A**	Procedure:	**BE1713-32**	
Manufacturer:	**BRUEL & KJAER**	Proc. Rev.:	**23-Feb-2016**	Rev:25Jan2007
Customer:	**FREEFIELD LTD.**	Cal Date:	**04-Mar-2022**	AF=0

2270 BRÜEL & KJÆR.xls Temp 006 Appr 062 27-Mar-2017 F=0

TEST REF.	TEST DESCRIPTION	RESULTS MIN	AS FOUND	FINAL	MAX
P. 52	**SOUND LEVEL CALIBRATION**				
	CONNECT TI TO SOUND CALIBRATOR MODEL 4231,				
	SWITCH ON THE CALIBRATOR, PRESS "START" ON TI,				
	NOTE THAT TI INDICATING "DETECTING LEVEL"	Pass / Fail	Pass		
	WHILE TI SEARCHING FOR SIGNAL & SIGNAL IS				
	STABILISING, THE "TRAFFIC LIGHT" INDICATES				
	SHORT GREEN FLASH EVERY SECOND	Pass / Fail	Pass		
	WHEN SIGNAL IS STABLE, THE GREEN LIGHT IS				
	STABLE	Pass / Fail	Pass		
	WHEN CALIBRATION IS COMPLETED SUCCESSFULLY				
	THE TRAFFIC LIGHT INDICATES A SHORT YELLOW				
	FLASH EVERY 5 SECONDS	Pass / Fail	Pass		
	Nominal SPL with 4189 Microphone attached	dB	dB		dB
	93.8 dB	92.8	93.8		94.8
	CALIBRATION COMPLETED	Pass / Fail	Pass		

RESUME: Dr. HUGH WILLIAMSON, P.Eng.

QUALIFICATIONS:

Ph.D. Mechanical Engineering, University of New South Wales, 1972

B.Sc. Mechanical Engineering, (with Distinction), University of Alberta, 1967

Member, Professional Engineers, Ontario

Member, Canadian Acoustical Association

KEY COMPETENCIES:

- Environmental noise and vibration assessments, Environmental Compliance Approval (ECA). Noise assessment for land use planning
- Noise impact assessments for the Aggregates Industry.
- Architectural and building acoustics, acoustics of office spaces, meeting rooms, auditoriums and studios, noise and vibration control of building mechanical services.
- Industrial noise and vibration assessment and control.
- Transportation noise and vibration.
- Noise and vibration aspects of Occupational Health and Safety (OH&S).

PROFESSIONAL EXPERIENCE:

Hugh Williamson is a professional engineer with many years of experience in the measurement, analysis and control of noise and vibration. Freefield Ltd. was incorporated in 2017 and provides consulting services in architectural, building, industrial, transportation and environmental acoustics and vibration. Clients include architects, engineering firms, industrial firms and government departments. Prior to joining Freefield Ltd. Hugh Williamson founded and directed Hugh Williamson Associates Inc. which specialized in consulting services in architectural, building, industrial, transportation and environmental acoustics and vibration. His career included extensive periods in industry as well as university level research and teaching. He is a former Director of the Acoustics and Vibration Unit at the Australian Defence Force Academy. He has published over 50 engineering and scientific papers and has been an invited speaker on noise and vibration at national and international conferences. He has more than 27 years of experience as a consultant.

CLIENT LIST:

Hugh Williamson has provided consulting services to large and small clients including National Research Council, J. L. Richards & Associates, Barry Padolsky Associates, Atkinson Schroeter Design Group, R. W. Tomlinson Limited, Geo. Tackaberry Construction, Miller Paving, City of Ottawa and Government of Canada.

Postal Address: PO Box 74056, RPO Beechwood, Ottawa, Ontario, K1M 2H9, Canada
Phone: 613-747-0983, Email: hugh@freefieldacoustics.com, http://www.freefieldacoustics.com

RESUME: MICHAEL WELLS

QUALIFICATIONS:

Registered Architect of NSW, Registration Number: 8111

B. Architecture (Hons), University of Sydney, 2002

B.Sc. Architecture, University of Sydney, 1999

Member, Canadian Acoustical Association

Member, Australian Acoustical Society (M.A.A.S.)

KEY COMPETENCIES:

- Environmental noise and vibration assessments, Environmental Compliance Approval (ECA). Noise assessment for land use planning.
- Noise impact assessments and acoustic audits for the Aggregates Industry.
- Architectural and building acoustics, acoustics of office spaces, meeting rooms, auditoriums and studios, noise and vibration control of building mechanical services.
- Industrial noise and vibration assessment and control.
- Transportation noise and vibration.
- Noise and vibration aspects of Occupational Health and Safety (OH&S)

PROFESSIONAL EXPERIENCE:

Michael Wells is a professional Architect registered in NSW, Australia, with many years of experience in the measurement, analysis and control of noise and vibration. Michael Wells is a founding Director of Freefield Ltd., incorporated in 2017, and provides consulting services in architectural, building, industrial, transportation and environmental acoustics and vibration. Clients include aggregate producers, architects, engineering firms, industrial firms, governments and private citizens. Prior to establishing Freefield Ltd., his career included working for Hugh Williamson Associates Inc. specializing in acoustics, noise and vibration consulting services, and, the founding of Michael Wells Architect in Sydney, Australia, specializing in the design of institutional, commercial and residential projects. He is the former Director of Architectural Workshops Australia and Vision Blue Pty Ltd. He has more than 17 years of experience as a consultant.

CLIENT LIST:

Michael Wells has provided consulting services to large and small clients including National Research Council, R. W. Tomlinson, G. Tackaberry & Sons Construction, Miller Paving, J. L. Richards & Associates, Barry Padolsky Associates, Atkinson Schroeter Design Group and the Government of Canada.

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