HUGH WILLIAMSON ASSOCIATES INC.
Ottawa, Ontario

ACOUSTIC ASSESSMENT REPORT

FREYMOND QUARRY

TOWNSHIP OF FARADAY
COUNTY OF HASTINGS

Prepared for

Freymond Lumber Ltd.

Prepared by

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ACOUSTIC ASSESSMENT OF THE PROPOSED FREYMOND QUARRY TOWNSHIP OF FARADAY, COUNTY OF HASTINGS ONTARIO

Executive Summary

Freymond Lumber Ltd. is applying to the Ministry of Natural Resources and Forestry (MNRF) for a Category 2, Class A, license under the Aggregate Resources Act (ARA), an Official Plan Amendment from the County of Hastings; and a Zoning By-law Amendment from the Municipality of Faraday, to permit a quarry at the property locally known as 2287 Bay Lake Road. The site is located to the south of the Town of Bancroft, at Part Lots 51 and 52, Concession W.H.R. Township of Faraday, County of Hastings, Ontario.

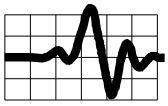
The MNRF license application requires the submission of an Acoustic Assessment Report of the proposed operation. Hugh Williamson Associates has been retained by Freymond Lumber Ltd. to complete this Acoustic Assessment.

The Acoustic Assessment has been carried out according to the applicable Ministry of Environment and Climate Change (MOECC) Noise Assessment Guidelines, including NPC-300, published August 2013.

The assessment considers the impacts on nearby noise sensitive land uses of noise generated by all on-site equipment operations, including extraction operations, aggregate processing operations, loading and truck movements but excluding the noise and vibration aspects of blasting. The impacts of blasting are being assessed by others.

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

An initial acoustic assessment report was presented during a Public Open House hosted by Freymond Lumber Ltd. on June 25, 2015 regarding an application for an Official Plan and Zoning By-law Amendment. The purpose of the Public Open House was to discuss the applications with the public and receive comments on the applications so that they could be included in the updated reports for the proposed Freymond Quarry. This report supersedes the previous report, and has been updated to reflect a revised mining plan, a smaller extraction area, reduced annual tonnage, reduced hours of operation, a new phasing plan to minimize site disturbance and a new rehabilitation plan to promote ecological diversity.



In updating the report the following was reviewed and considered:

- Comments received at the June 25, 2015 Public Open House;
- Comments received by the County on July 1, 2015 from Steve Gaebel;
- Letter received by the County on July 14, 2015 from Tara McMurtry, Adrianne Schutt and Daisy McCabe-Lokos;
- Email received by the County on September 16, 2015 from Sheila and Mike Schneider; and
- Email received by MHBC on October 14, 2015 from the County regarding blasting.

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 proposed quarry are summarized in Section 3. Critical receptors are described in Section 1 and Section 4, with Section 5 and 6 and 7 detailing applicable assessment criteria, an assessment of noise impacts and recommended noise mitigation measures.

ACOUSTIC ASSESSMENT OF THE PROPOSED FREYMOND QUARRY TOWNSHIP OF FARADAY, COUNTY OF HASTINGS ONTARIO

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ACOUSTIC ASSESSMENT OF THE PROPOSED FREYMOND QUARRY TOWNSHIP OF FARADAY, COUNTY OF HASTINGS ONTARIO

1.0 Introduction

Freymond Lumber Ltd. is applying to the Ministry of Natural Resources and Forestry (MNRF) for a Category 2, Class A, license under the Aggregate Resources Act (ARA), an Official Plan Amendment from the County of Hastings; and a Zoning By-law Amendment from the Municipality of Faraday, to permit a quarry at the property locally known as 2287 Bay Lake Road. The site is located to the south of the Town of Bancroft, at Part Lots 51 and 52, Concession W.H.R. Township of Faraday, County of Hastings, Ontario.

This report describes an assessment, carried out by Hugh Williamson Associates, of the potential impact of noise from operations at the proposed quarry on nearby noise sensitive receptors in accordance with MOECC guidelines for stationary noise sources. [1, 2]

This report has been prepared in accordance with the MOECC Document NPC-233, *Information to be Submitted for Approval of Stationary Sources of Sound*, October 1995. Noise from the facility is assessed according to MOECC Documents: NPC-300, *Stationary and Transportation Sources – Approval and Planning*, August 2013.[1]

The noise assessment methodology is summarised as follows:

- Identification of noise sensitive receptors in the vicinity of the quarry.

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

- Identification of the sources of noise that will arise from quarry operations. In the current study, the strengths of the various noise sources were obtained from noise measurements of similar operations at other aggregate operations in Ontario by Hugh Williamson Associates. Noise data for the proposed crushing plant is based on noise measurements carried out by Pinchin Environmental Ltd in February 2010.

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

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

Note that this assessment does not consider the noise and vibrations caused by blasting. The impacts of blasting at the quarry are being assessed by others.

Surrounding Lands, Acoustic Environment and Critical Receptors

The Freymond Quarry is located in a heavily wooded and hilly area, on the west side of Bay Lake Road, at Part of Lots 51 and 52, Concession W.H.R. in the Township of Faraday, County of Hastings, Ontario.

The site is at the intersection of Bay Lake Road and Highway 62 as shown in Figure 1. Highway 62 carries significant traffic on a 24-hour basis.

Note that directions in this report are referenced to Site North as shown in Figure 1.

The legal description of the land occupied by the proposed Freymond Quarry is as follows:

Part of Lots 51 and 52,
Concession W.H.R.
Township of Faraday
County of Hastings, 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. Land use and zoning maps are provided in Appendix 1.

The proposed quarry is located on land zoned Rural (RU) and Industrial (M), as shown on the Zoning Map, Appendix 1.

To the north of the site the land is zoned Industrial. An existing licensed pit lies immediately north of the subject property. To the north east the land is zoned Community Facility and contains an existing cemetery. Further north a number of residences exist fronting on Jeffrey Lake Road on land zoned Residential. The closest residences in this direction have been selected as critical receptors.

To the east of the quarry the land is zoned Industrial with a small pocket of Commercial fronting on Highway 62. An area of Environmental Protection (EP) is located to the south east. Bay Lake Road lies to the east of the site and intersects with Highway 62 at approximately 175 m east of the site's northeast boundary. A number of residences fronting on Bay Lake Road and Highway 62 lie in this direction. The closest residences in this direction have been selected as critical receptors.

South of the proposed quarry the land is zoned Rural. Freymond Lumber Ltd. operates a lumber yard, in this direction, immediately south of the proposed licensed boundary. Further south the land is zoned Rural with small pockets of Residential fronting on Bay Lake Road. The closest residences in this direction have been selected as critical receptors.

To the west of the site the land is zoned Rural with an area zoned Rural Residential located to the north west. A number of residences fronting Gaebel Road lie in this direction. The closest residences in this direction have been selected as critical receptors.

Surrounding land uses within 500 metres of the site include forested land owned by the applicant, a Class B sand and gravel pit owned by the applicant, a lumber mill owned by the applicant, rural residential uses, commercial uses on Highway 62 and a cemetery.

The lands surrounding the proposed quarry consist of undulating topography with moderate changes in elevation.

The topography of the quarry rises generally in a westerly direction, from an elevation of 335 **metres above mean sea level (mAMSL)** at the sites eastern boundary, to an elevation of approximately 392 mAMSL at the sites western boundary. A ridge rises in the mid region of the site to an elevation of 389 **mAMSL**. The land slopes down to the north and south of the ridge to an elevation of approximately 360 to 340 **mAMSL** at the site's northern boundary, and to an elevation of approximately 370 to 365 **mAMSL**, at the sites southern boundary. Refer Figure 2 showing detailed elevation contours.

The critical noise sensitive receptors, which have been selected for detailed analysis, are shown in Figure 1. These were selected as being the closest receptors to the proposed quarry operations. Other noise sensitive receptors are at greater distances and will be less affected by noise from the quarry. Vacant lands zoned for potential noise sensitive use were considered in this analysis. The noise sensitive receptors selected represent worst case locations in all directions.

Table 1 lists the noise sensitive receptors selected for analysis.

2.0 Facility Description

The applicant owns approximately 128 hectares of land, of which 33.3 hectares is proposed to be licensed and 27.8 hectares is proposed for extraction. The Freymond Quarry proposes to use the existing south entrance of the lumber mill to access Bay Lake Road, refer Figure 2. The proposed maximum tonnage limit for the proposed Freymond Quarry is 300,000 tonnes per annum.

Aggregate from the proposed Freymond Quarry is extracted using a process of drilling and blasting. Blasting produces large pieces of rock which are taken by loader or truck to a portable crushing and screening plant which is brought to site when needed and located in Phase 1 or 2. After crushing and screening, the various grades of aggregate produced are placed in stockpiles, using conveyors. Loaders will then load the stockpiled aggregates onto haul trucks which are used to haul the product off-site.

Extraction of the site is proposed in four (4) phases and will occur sequentially to minimize the disturbed area. Phase 1 (Extraction Area 1) is proposed in the northeastern portion of the site and is to be extracted to an elevation range of 333 mAMSL to 336 mAMSL. Phase 2 (Extraction Area 2) proceeds west to the northwestern portion of the site and is to be extracted to an elevation range of 337 mAMSL to 338 mAMSL. Phase 3 (Extraction Area 3) proceeds south to the southwestern portion of the site and is to be extracted to an elevation range of 337 mAMSL to 340 mAMSL. Phase 4 (Extraction Area 4) proceeds east to the southeastern portion of the site and is to be extracted to an elevation range of 334 mAMSL to 336 mAMSL. Extraction within each phase will take place in 1-2 benches. Processing will commence within Phase 1 and will be later relocated to Phase 2 for the remainder of the proposed quarries life. There will be no processing in Phase 3 and Phase 4.

For rehabilitation, the site will be forested and a watercourse will be developed on-site to passively drain the site during and after operations. The rehabilitated landform will include cliff faces and talus slopes to increase the ecological diversity of the site. Rehabilitation will occur progressively as the extraction in each phase advances.

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

- One portable rock drill
- Portable crushing and screening plants (Includes primary secondary and tertiary crushing and screening units with an associated diesel generator).
- Loaders
- Haulage trucks
- Portable equipment for site preparation and rehabilitation, including but not limited to, excavators, hydraulic shovels and dozers.

A description of each operation follows.

Portable rock drill

Rock drilling prepares a section of the rock for blasting. A rock drill is brought to the site as needed. Blasting breaks the rock into a variety of sizes. Holes, into which blast material is inserted, are drilled into the rock in a predetermined pattern. Under certain conditions, rock drilling may be carried out using a low noise rock drill with sound characteristics as described in the following section. An example of a low noise rock drill is a pneumatic unit with all air exhausts treated with silencers.

The rock drill operates only during daytime hours (07:00 – 17:30) Monday to Friday.

Portable crushing and screening plant

A portable crushing and screening plant, including crushers, diesel generator, vibrating screens and associated conveyors is brought to the site to crush the blast rock and separate it into various grades of aggregate. Typically, associated operations include loaders or trucks carrying the blast rock to the hoppers associated with the portable processing plant while another loader fills trucks from the stockpiles, after crushing, for shipment off-site. Washing will be included in the process at times. The crushing and screening plant operates only during daytime hours (07:00 – 17:30) Monday to Friday and will be located on the quarry floor. In Phase 1 area extraction, the portable crushing and screening plant will be located near the current lift face. For extraction of Phase 2, 3 and 4, the portable crushing plant will be located in the northern area of Phase 2 (Extraction Area 2), as shown in Figure 5, 7 and 9. The diesel generator associated with the crushing plant is not to exceed the maximum outdoor sound power rating as noted in Table 2.

Loaders and excavators

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

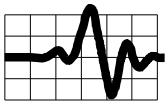
- Excavating blast rock,
- Loading blasted/excavated rock into the crushing and screening plant,
- Loading aggregate from stockpiles onto trucks for removal off-site,
- Generally pushing around rock and aggregate to maintain the site in a safe state,
- Removing overburden and site preparation,

Most activities take place during the day between 07:00 and 17:30 Monday to Friday. Truck loading may occur between 06:00 to 19:00 Monday to Friday and from 07:00 to 12:00 on Saturday.

Haulage trucks

Up to a maximum of 10 trucks per hour are expected during periods of peak operation. When operating on-site, highway trucks shall not exceed 20 km/h and shall not use compression braking (Jake Brakes).

Shipping activities are proposed between 06:00 to 19:00 Monday to Friday and from 07:00 to 12:00 on Saturday.



Portable equipment for site preparations and rehabilitation

Portable construction equipment will be used occasionally for site preparation (e.g. land clearing and construction of berms) and rehabilitation. This equipment would typically include excavators, hydraulic shovels and dozers. To minimize the impact of noise during site preparation and rehabilitation, the construction equipment used, excavators, bulldozers, etc., will comply with MOECC Publication NPC-115,[5] Construction Equipment, August 1978. This publication gives noise standards to be met by construction equipment in Ontario.

Site preparation and rehabilitation activities will take place only during daytime hours (07:00 – 17:30).

For the purposes of assessing worst-case noise impacts for the extraction operation, equipment is assumed to be located on the surface and or on the quarry floor.

Hours of Operation

The proposed hours of operation for the proposed Freymond Quarry include:

- Monday to Friday: 7:00 am to 5:30 pm for extraction and processing
- Monday to Friday: 6:00 am to 7:00 pm for shipping
- Saturday: 7:00 am to 12:00 pm for shipping

Extraction and processing operations (07:00 – 17:30, Monday to Friday) - During the daytime period, all significant noise sources are assumed to be in operation and include the following:

- One portable crushing and screening plant, may consist of primary, secondary and tertiary crushing and screening units and associated diesel generator;
- One portable standard hydraulic rock drill or low noise rock drill;
- Up to two loaders or excavators;
- On-site truck movements, to haul the product off-site.

Shipping operations (06:00 – 19:00, Monday to Friday and 07:00 to 12:00 on Saturday) – During the early morning period, 06:00 – 07:00, loading and hauling operations only are to occur and include the following:

- Up to two loaders;
- On-site truck movements, to haul the product off-site.

Activities between 06:00 – 07:00 fall under the MOECC defined nighttime period and require compliance with more conservative criteria i.e. require compliance with lower sound level limits than the sound level limits applicable for operations that occur within the MOECC defined daytime period 7 am and 7 pm (07:00 -19:00).

3.0 Noise Source Summary

The following noise sources have been used to model noise generated by operations at the Freymond Quarry. 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 portable crushing and screening plant, may consist of primary, secondary and tertiary crushing and screening units (up to three total), and, an associated diesel generator (sources: Crusher and Generator);
- One standard hydraulic rock drill (source: Rockdrill_TH_72), or, one low noise rock drill (source: Rockdrill_SmartRIG);
- Loaders (source: Loader);
- On-site truck movements (source: HWYTruck_Slow58).

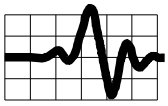
The strengths of the noise sources, i.e. the sound powers shown in Table 2 and used in this analysis, are taken from a database of noise measurements by Hugh Williamson Associates of similar operations made at other aggregate operations in Ontario.

Noise from the portable crushing and screening plant and associated diesel generator is estimated using the point source method. Noise data used in this assessment for the portable crushing and screening plant and associated generator was obtained from noise measurements carried out by Pinchin Environmental Ltd. in 2010. Hugh Williamson Associates used acoustic formula to combine the sound power of the various components of this equipment for assessment purposes.

Conveyors used to transfer crushed stone to stockpiles are considered as insignificant noise sources.

Noise from the haul route is estimated using the moving point source method. It is assumed that a maximum of 10 loads per hour will be shipped during periods of maximum capacity. The haul route is modelled as a continuous loop and represents 10 trucks entering the site and 10 trucks exiting the site in a worst case hour of operation.

Refer Figure 3, 5, 7, 9 and 11 for location of sources for worst case scenarios analysed.



4.0 Point of Reception Summary

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

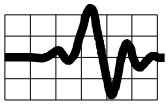
The eight points of reception selected for analysis, POR 1 to POR 8, are shown in Figure 1 and listed in Table 1.

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

> POW – Plane of window 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 points of reception, an area on the property of the residence. For large properties the OPR can be up to 30 m from the dwelling and are assessed at a height of 1.5 m above ground.

Noise prediction results are summarized in Table 6 by point of reception. Figures 4, 6, 8, 10 and 12, show predicted results as noise contours for Scenario 1 through Scenario 5.

Detailed prediction results are contained in Appendix 2, with Tables A2.7.1 to A2.7.5 providing a summary of predicted noise impacts at each point of reception (POR) for the individual sources.



5.0 Assessment Criteria, Performance Limits

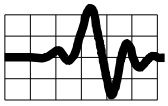
Sound level limits, as specified in the MOECC guideline NPC-300[1], depend on the acoustical classification of the area as Class 1, 2, 3 or 4.

> **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 high levels of road traffic along Highway 62, the area in which POR 1, 2, 3 and 4 are located is subject to road traffic noise, particularly during the period from 07:00 to 23:00 hours, hence, these receptors are classified as Class 2 Area (Urban). Receptors POR 5, 6, 7 and 8 are further from Highway 62, located on Bay Lake Rd, Jeffrey Lake Rd and Gaebel Rd, in a rural area, with occasional daytime traffic but dominated by natural sounds for the majority of the time. As such receptors POR 5, 6, 7 and 8 are classified as Class 3 Area (Rural).

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. Road traffic noise is the most common source of background sound and is to be established using MOECC procedures.[3, 4, 5]

A background noise assessment was carried out at the points of reception in close proximity to Highway 62. Appendix 3 contains an analysis of background traffic noise at points of reception based on road traffic data obtained from the Ontario Ministry of Transportation for Highway 62.



While this assessment indicated elevated sound levels at a number of receptors, the worst case points of reception lie in locations shielded from highway noise. As such the levels given in the Tables 3 and 4 are taken as the sound level limits at all points of reception for the purpose of this assessment according to their location in a Class 2 Area (Urban) and a Class 3 Area (Rural).

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 critical receptors using "predictable worst case" assumptions under normal operations and using the ISO sound propagation methodology[7] as implemented in the sound prediction software Cadna-A, version 4.6.155. 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, a number of operational scenarios have been modeled. In general, the worst impacts are those which occur when equipment is operating concurrently at grade or one lift down.

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

Scenario 1: *Worst Case, Extraction Area 1, standard hydraulic rock drill in operation on the surface with the portable crushing and screening plant in operation closest to POR 1, 2 and 8 (Day only) – Figure 3 and 4.*

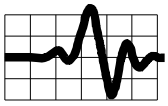
Scenario 2: *Worst Case, Extraction Area 2, low noise rock drill in operation on the surface with the portable crushing and screening plant in operation closest to POR 7 and 8 (Day only) – Figure 5 and Figure 6.*

Scenario 3: *Worst Case, Extraction Area 3, standard hydraulic rock drill in operation on the surface with the portable crushing and screening plant in operation in Extraction Area 2 – Figure 7 and Figure 8.*

Scenario 4: *Worst Case, Extraction Area 4, standard hydraulic rock drill in operation on the surface with the portable crushing and screening plant in operation in Extraction Area 2 (Day only) – Figure 9 and Figure 10.*

Scenario 5: *Worst Case, loading and hauling ONLY (Day or Early Morning) – Figure 11 and Figure 12.*

In Table 6, estimated noise levels at the nearest receptors for the worst case among all scenarios are compared with the applicable sound level limits. More detailed estimates, for all sources and scenarios are contained in Appendix 2, Tables A2.7.1 to A2.7.5.



It can be seen that the sound level limits are met at all noise sensitive points of reception, POR 1 to POR 8, for worst case operating conditions during the proposed daytime period of operation 7 am to 7 pm (07:00 to 19:00) and for the proposed early morning period of operation, 06:00 to 07:00.

Details of acoustic modeling are provided in Appendix 2. Figures 4, 6, 8, 10 and 12 show predicted noise contours for each mode of operation analyzed.

Statement of Compliance

It is concluded that with the recommended mitigation measures, noise impacts from operations at the Freymond Quarry, will be in compliance with MOECC Environmental Noise Guidelines.[1]

7.0 Mitigation Measures (Site Plan Recommendations)

Noise mitigation measures for the Freymond Quarry operations are detailed below. It is recommended that these measures be included on the ARA Site Plans. The predicted noise impacts in Tables A2.7.1 to A2.7.5 are based on the implementation of the following mitigation measures:

1. The operation of a standard hydraulic rock drill, with a sound pressure level of 79.34dBA at 30 m, may take place only during the daytime period (07:00 – 17:30) and shall comply with the following:
    a. When operating on the surface east of Line A: a 3 m high portable barrier is to be provided at a maximum distance of 5 m from the drill shielding receptors POR 1, 2 and 8.
    b. The standard hydraulic rock drill is not to operate concurrently with the portable crushing and screening plant east of Line A in Extraction Area 1.
    c. When operating on the surface west of Line A: a 6 m high portable barrier is to be provided at a maximum distance of 5 m from the drill shielding receptors POR 6, 7 and 8. This barrier can be reduced to 4 m in height when operating in Extraction Area 3 & 4 west of Line A.
    d. The standard hydraulic rock drill is not to operate on the surface less than 350 m from POR 7 concurrently with the portable crushing and screening plant.

2. The operation of a low noise rock drill, may take place concurrently with other operations anywhere in the extraction area, above or below grade, and shall comply with the following:
    a. The low noise rock drill may operate only during the daytime period (07:00 – 17:30).
    b. When operating on the surface in Extraction Area 2: less than 350 m from POR 7 a 4 m high barrier, located at a maximum of 5 m from the drill, is to be provided shielding POR 7.

3. The operation of the portable crushing and screening plant (crusher) may take place only during the daytime period (07:00 – 17:30) and shall comply with the following:
    a. The crusher is to be located in Extraction Area 1 or 2 at a maximum distance of 25 m from lift face to the north as shown on Figure 3.
    b. A 7 m high barrier located at a maximum distance of 25 m east of the plant is to be provided shielding receptors POR 1 and 2.
    c. When operating concurrently with the rock drill in Extraction Area 2, 3 and 4, a 7 m high stockpile located at a maximum distance of 30 m west of the plant is to be provided shielding receptors POR 6 and POR 7.

4. During the early morning and daytime period (06:00 to 19:00) a maximum of two (2) loaders or excavators may be in operation anywhere in the extraction area above or below grade.

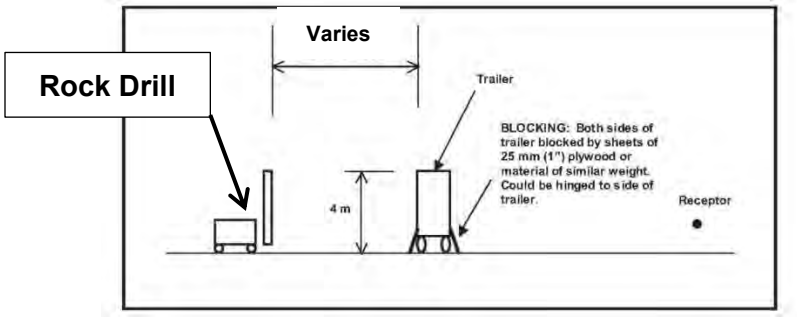
5. The loading and shipping of product using highway trucks may take place between 06:00 and 19:00 anywhere in the extraction area, above or below grade.

6. Noise barriers are to be provided as follows:
    a. The overburden storage area in the north-east corner as shown on the ARA Site Plans shall be installed during site preparation to a minimum height of 6 metres and be maintained for the duration of operations to serve as a barrier to the sensitive receptors to the east. Refer Figure 3.
    b. While operating in Extraction Area 4 the lift face to the east of the equipment is to be maintained at a minimum height of 6 m to serve as a noise barrier to the sensitive receptors to the east. Refer Figure 9. If required overburden or a barrier, as noted below, may be utilized to achieve the required height.
    c. Noise barriers shielding portable equipment may be progressively established to provide shielding from location of operation of the critical source to the identified noise sensitive point of reception (POR).
    d. Noise barriers or berms are to be solid, having no gaps, and are to have a surface density of no less than 20 kg/m^2. Examples of suitable barriers or berms are as follow:
        i. Lift face or existing terrain;
        ii. Earth, gravel or aggregate berms or stockpiles;
        iii. Concrete or brick walls;
        iv. Commercial noise barriers;
        v. Shipping containers;
        vi. 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 to 6 m if required. (Refer Diagram 1 below).

7. Portable construction equipment used for site preparation (e.g. land clearing and construction of berms) and rehabilitation are not subject to equipment restrictions as noted above and shall comply with MOECC Publication NPC-115[5], *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 – 17:30, Monday to Friday).

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

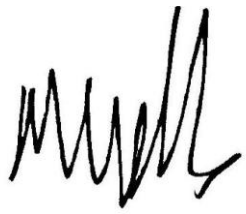
Diagram 1: Example of Portable Noise Barrier (not to scale)



8.0 Conclusions

An acoustic assessment of operations at the proposed Freymond Quarry has been conducted according to MOECC noise assessment procedures. Operations include preparing for blasting with rock drills, crushing with a portable crushing and screening plant, extraction with loaders and excavators and shipping of product using highway trucks.

It has been found that noise impacts from operations at nearby receptors are in compliance with MOECC 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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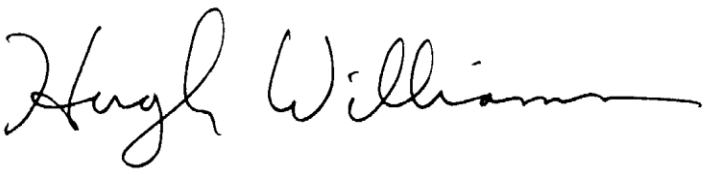


Hugh Williamson, Ph.D., P.Eng.
Member, Canadian Acoustical Society

References

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

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

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

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

5. Ministry of Environment and Climate Change, 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).

TABLES

Table 1: Point of Reception Summary Table

Point of Reception	Location*
POR 1	Residence (closest to the northeast) 2344 Bay Lake Road
POR 2	Residence (closest to the east) 27915 Highway 62
POR 3	Residence (closest to the east) 2258 Bay Lake Road
POR 4	Residence (closest to the southeast) A-B 2204 Bay Lake Road
POR 5	Residence (closest to the south) 2001 Bay Lake Road
POR 6	Residence (closest to the west) 431 Gaebel Road
POR 7	Residence (closest to the northwest) 342 Gaebel Road
POR 8	Residence (to the north) 169 Jeffrey Lake Road

* For assessment purposes, points of reception, (POR), have been taken as upper floor windows (4.5 m above grade to represent two storey residences) and outdoor points of reception 30 m from residence (1.5 m above grade) in acoustic calculations.

Table 2: Noise Source Summary Table

Source ID	Source Description	Sound Power (dBA)	Source Location Ht. above ground (m)	Sound Character-istics	Noise Control Measures
Portable Crushing and Screening Plant (Crusher_Combined)	Primary and secondary crushers with vibrating screens and associated conveyors fed by loaders and powered by a generator. Washing may be included.	120.8	2.5	Steady, non-tonal, non-directional	As noted in section 7.0
Generator (Mit_Generator)	Diesel generator	116.7*	2.5	Steady, non-tonal, non-directional	As noted in section 7.0
Standard Hydraulic Rock Drill (Rockdrill_TH_70)	Standard, hydraulic Top hammer	118.6	0.5	Steady, no significant tonality, non-directional	As noted in section 7.0
Low Noise Rock Drill (Rockdrill_SmartRIG)	Low noise rock drill (e.g. pneumatic, down-the-hole hammer, air exhausts treated)	108.3	0.5	Steady, no significant tonality, non-directional	As noted in section 7.0
Loader (Loader)	Loader or Backhoe	109.9	2.5	Non-tonal, non-directional	As noted in section 7.0
HWYTruck_Slow58	Truck movements on the property (Highway Tractor Trailers)	110.1 (per truck)	2.5	Non-tonal, non-directional	No Jake Brakes; 20 kph speed limit

*Sound power shown for diesel generator includes a 10 dB reduction at the generator exhaust from noise data presented in the Pinchin report. This will be achieved through the installation of an exhaust silencer and / or substituting the generator for a newer quitter unit. The maximum sound power of the generator is not to exceed sound power as noted above.

Table 3: MOECC 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: MOECC 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 Proposed Daytime (07:00 – 19:00) and Early Morning Period (06:00 – 07:00) period of operation.

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 1 - POW	50	50	45
POR 1 - OPR	50	45	-
POR 2 - POW	50	50	45
POR 2 - OPR	50	45	-
POR 3 - POW	50	50	45
POR 3 - OPR	50	45	-
POR 4 - POW	50	50	45
POR 4 - OPR	50	45	-
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	-

*There are no plans to operate the quarry during the evening period (19:00 – 23:00). Sound level limits for this period are provided for information purposes only.
**The proposed early morning period of operation falls within the MOECC defined Nighttime period of operation (23:00 – 07:00). Outdoor Points of Reception do not qualify as noise sensitive locations during the nighttime period (23:00 – 07:00) as per MOECC guidelines.[1]

Table 6: Acoustic Assessment Summary Table, Worst Case, Daytime Period of Operation, 7 am to 7 pm (07:00 - 19:00) and Early Morning Period (06:00 – 07:00)

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 Early Morning Period (Worst Case) (dBA)	Performance Limit Early Morning Period (dBA)	Compliance with Performance Limit (Yes/No)
POR 1	Residence	POW	49	50	43	45	Yes
		OPR	47	50	41	-	Yes
POR 2	Residence	POW	50	50	42	45	Yes
		OPR	46	50	40	-	Yes
POR 3	Residence	POW	48	50	38	45	Yes
		OPR	47	50	38	-	Yes
POR 4	Residence	POW	50	50	39	45	Yes
		OPR	48	50	37	-	Yes
POR 5	Residence	POW	40	45	28	40	Yes
		OPR	39	45	26	-	Yes
POR 6	Residence	POW	43	45	33	40	Yes
		OPR	41	45	32	-	Yes
POR 7	Residence	POW	45	45	39	40	Yes
		OPR	45	45	39	-	Yes
POR 8	Residence	POW	45	45	33	40	Yes
		OPR	45	45	32	-	Yes

Notes:

1. Performance limits are based on 1-hour equivalent sound levels, Leq.
2. Predicted noise impacts at Outdoor Points of Receptions (OPR) for the early morning period of operation are provided above for information purposes. As shown, while noise impacts at these locations are not required to be assessed during this period, noise impacts are in compliance at these locations with the criteria that is applicable to plane of window locations.
3. The highest predicted sound level, at plane of window or outdoor point of reception, are provided above as these are the most critical at each point of reception. Refer to Tables A2.7.1 to A2.7.5 in Appendix 2 for more detailed sound level estimates by source.

FIGURES

Figure 1: Scaled Area Location Plan - Showing Receptor Locations

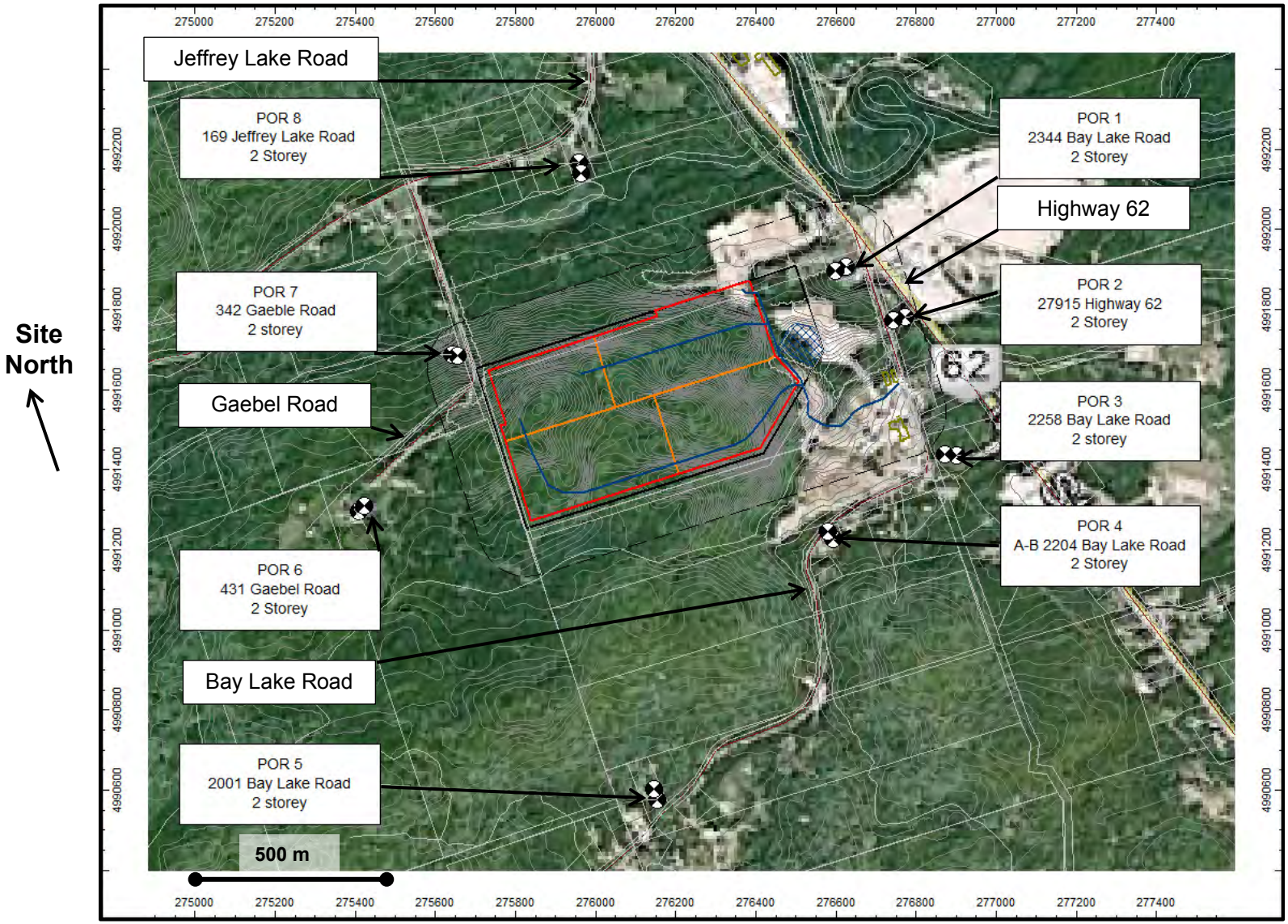


Figure 2: Detail Site Layout & Surface Elevation Contours (elevation contours at 1 meter intervals)

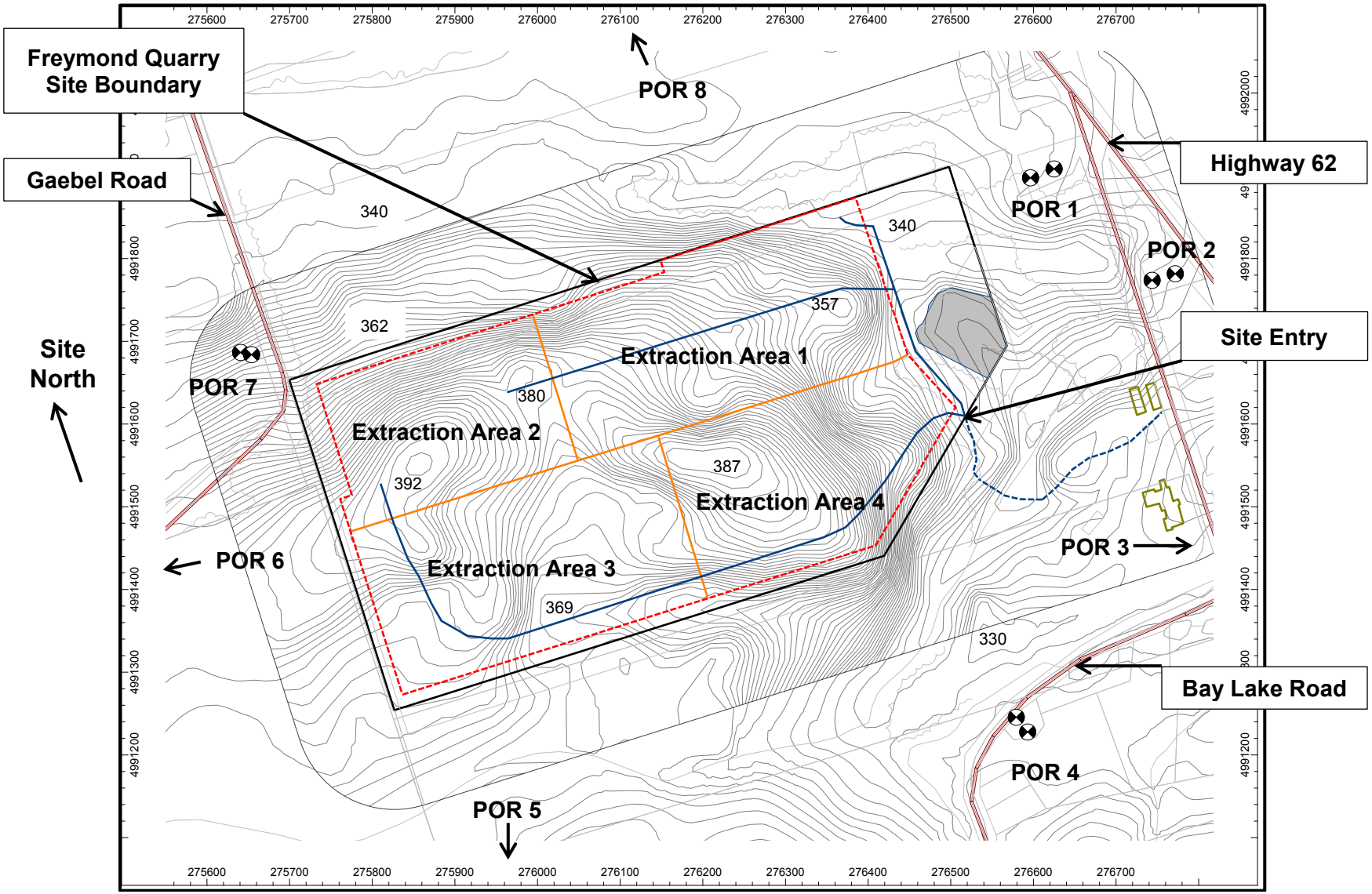


Figure 3: Scenario 1: Worst Case, Extraction Area 1, standard hydraulic rock drill in operation on the surface with portable crushing and screening plant in operation closest to POR 1, 2 & 8 (Day)

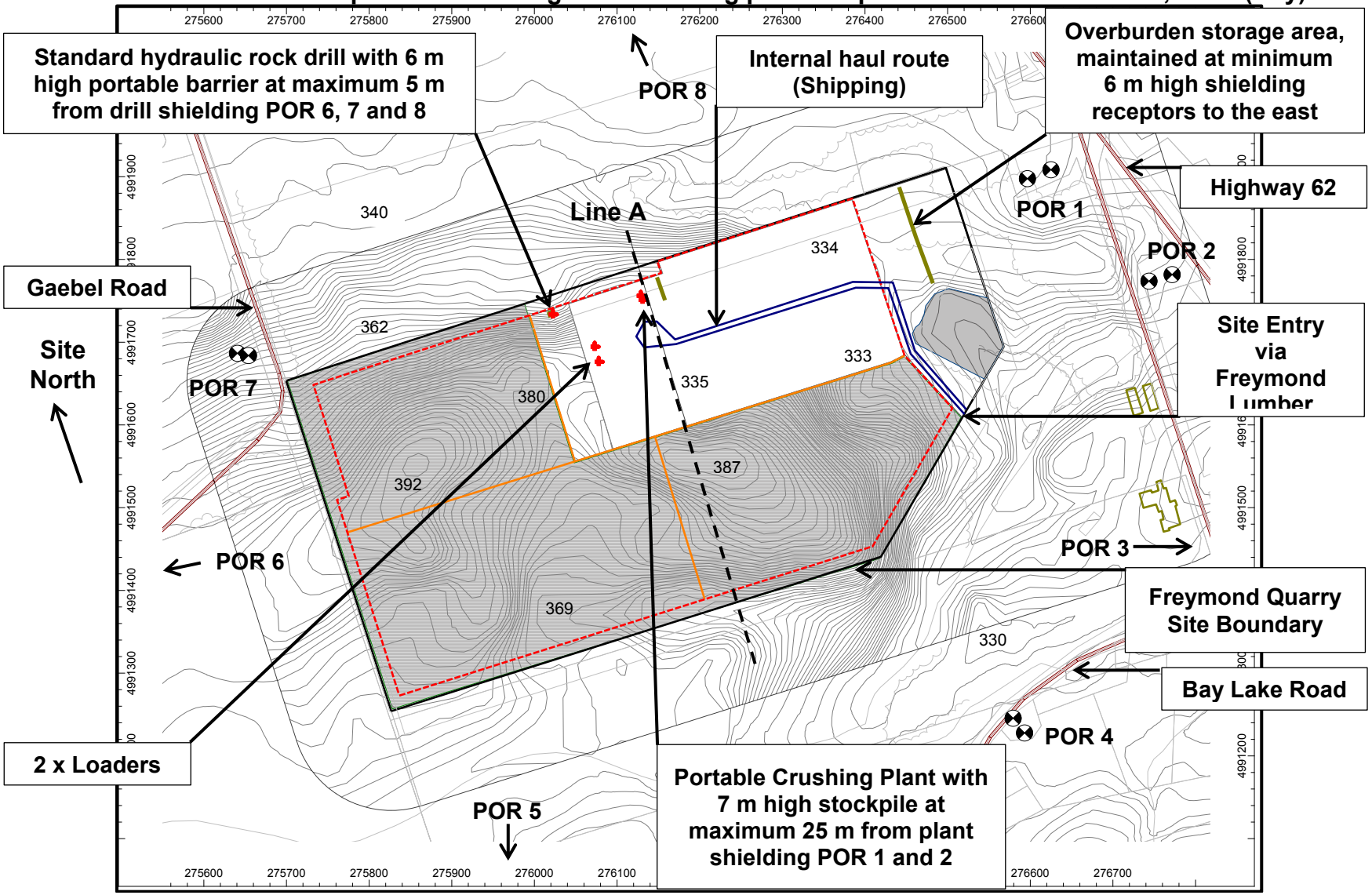
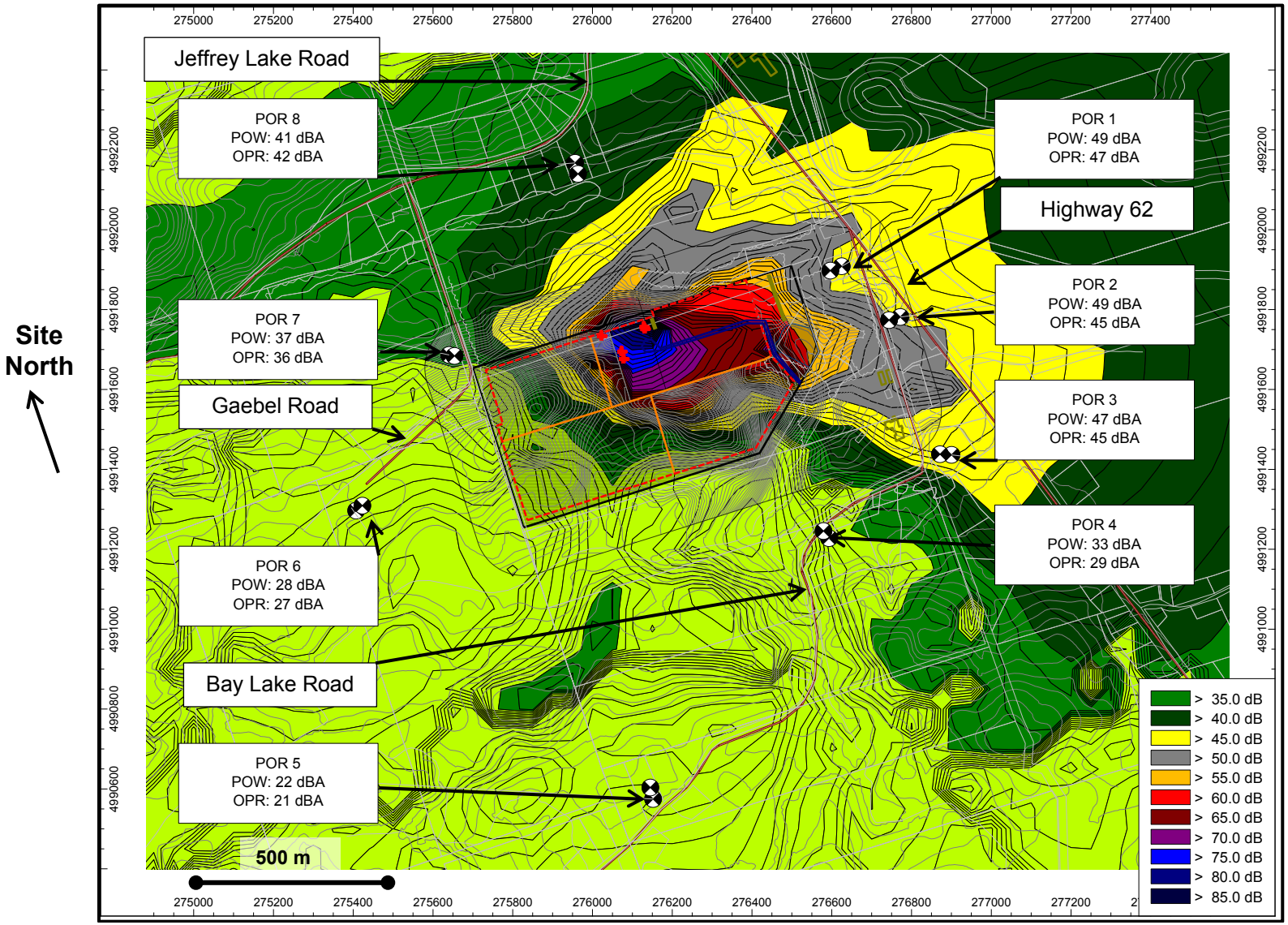


Figure 4: Prediction Results, Scenario 1 - Day only (07:00 to 19:00): Noise Contours, (Noise levels at 4.5 m)



Site North

Figure 5: Scenario 2: Worst Case, Extraction Area 2, low noise rock drill in operation on the surface with portable crushing and screening plant in operation closest to POR 7 & 8 (Day only)

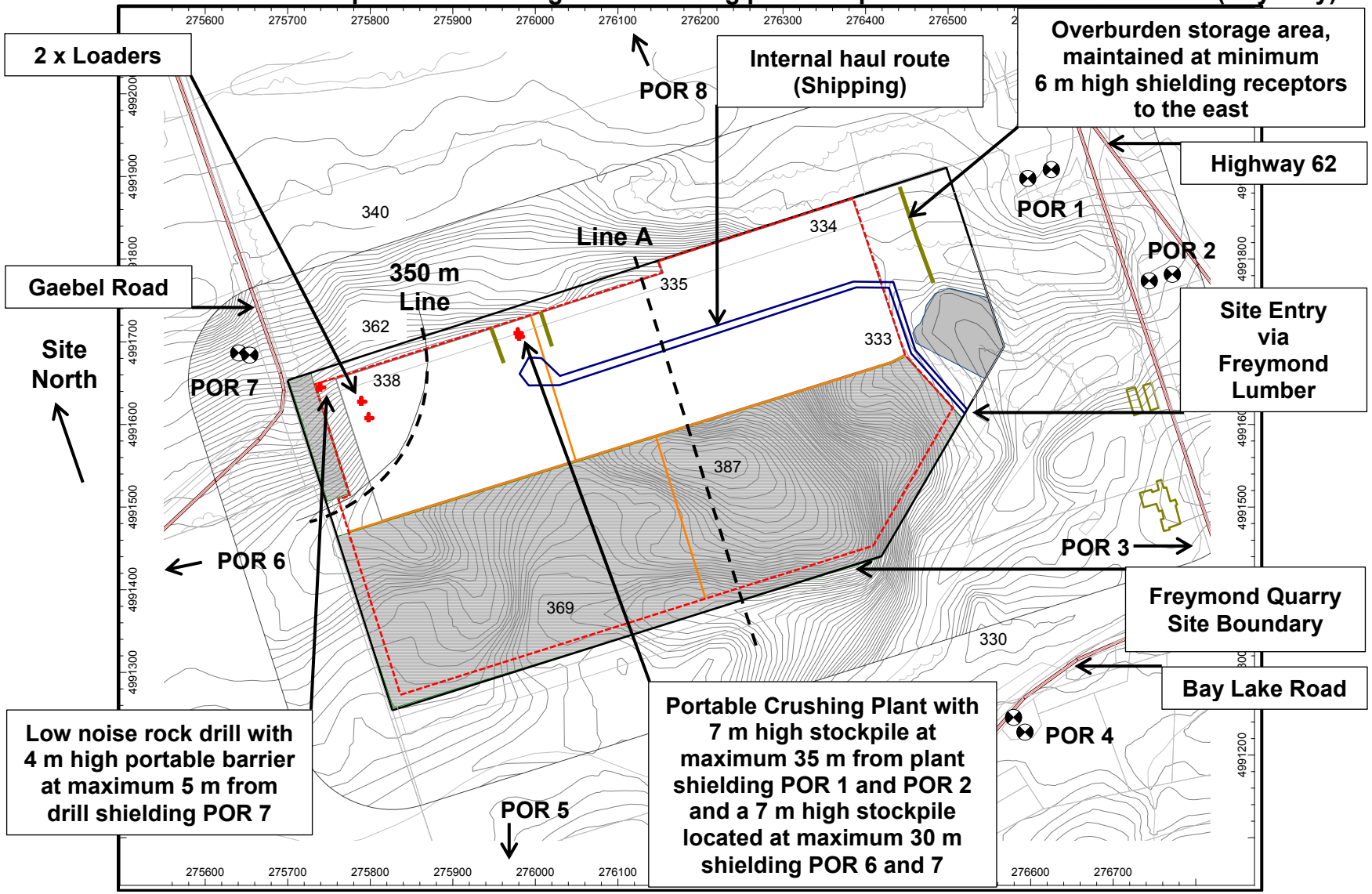


Figure 6: Prediction Results, Scenario 2 - Day only (07:00 to 19:00): Noise Contours, (Noise levels at 4.5 m)

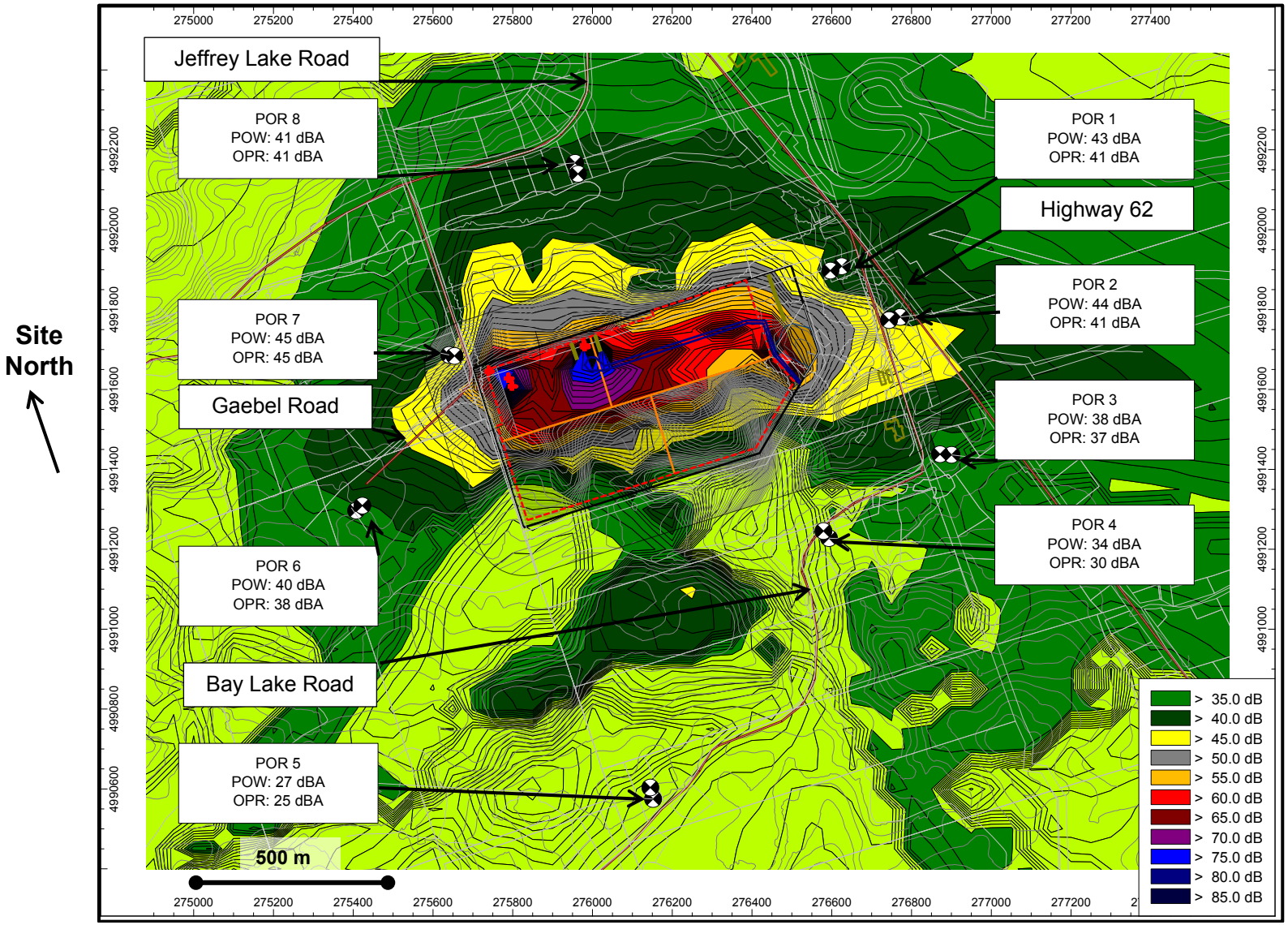


Figure 7: Scenario 3: Worst Case, Extraction Area 3, standard hydraulic rock drill in operation on the surface with portable crushing and screening plant in operation in Extraction Area 2 (Day only)

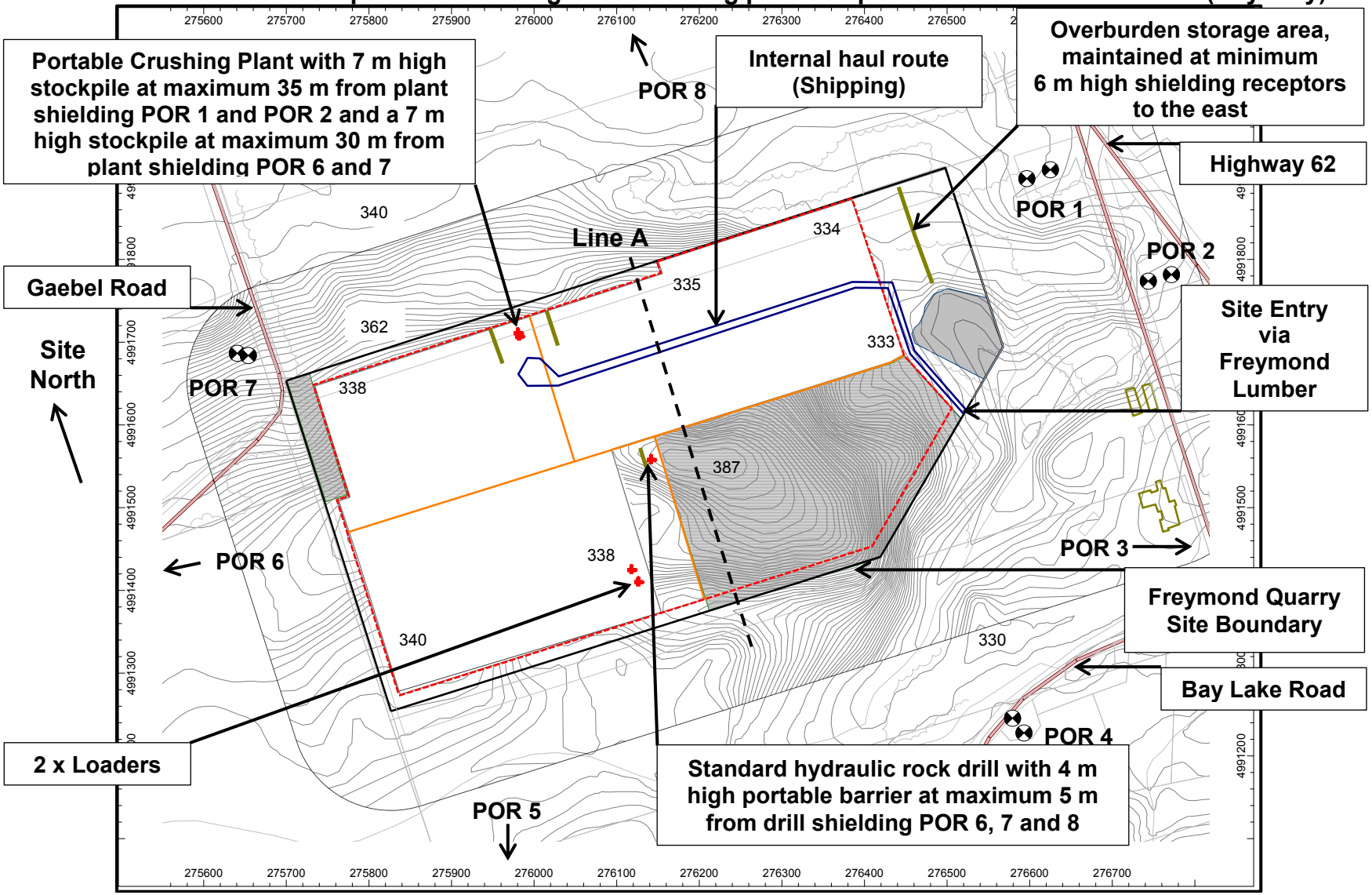
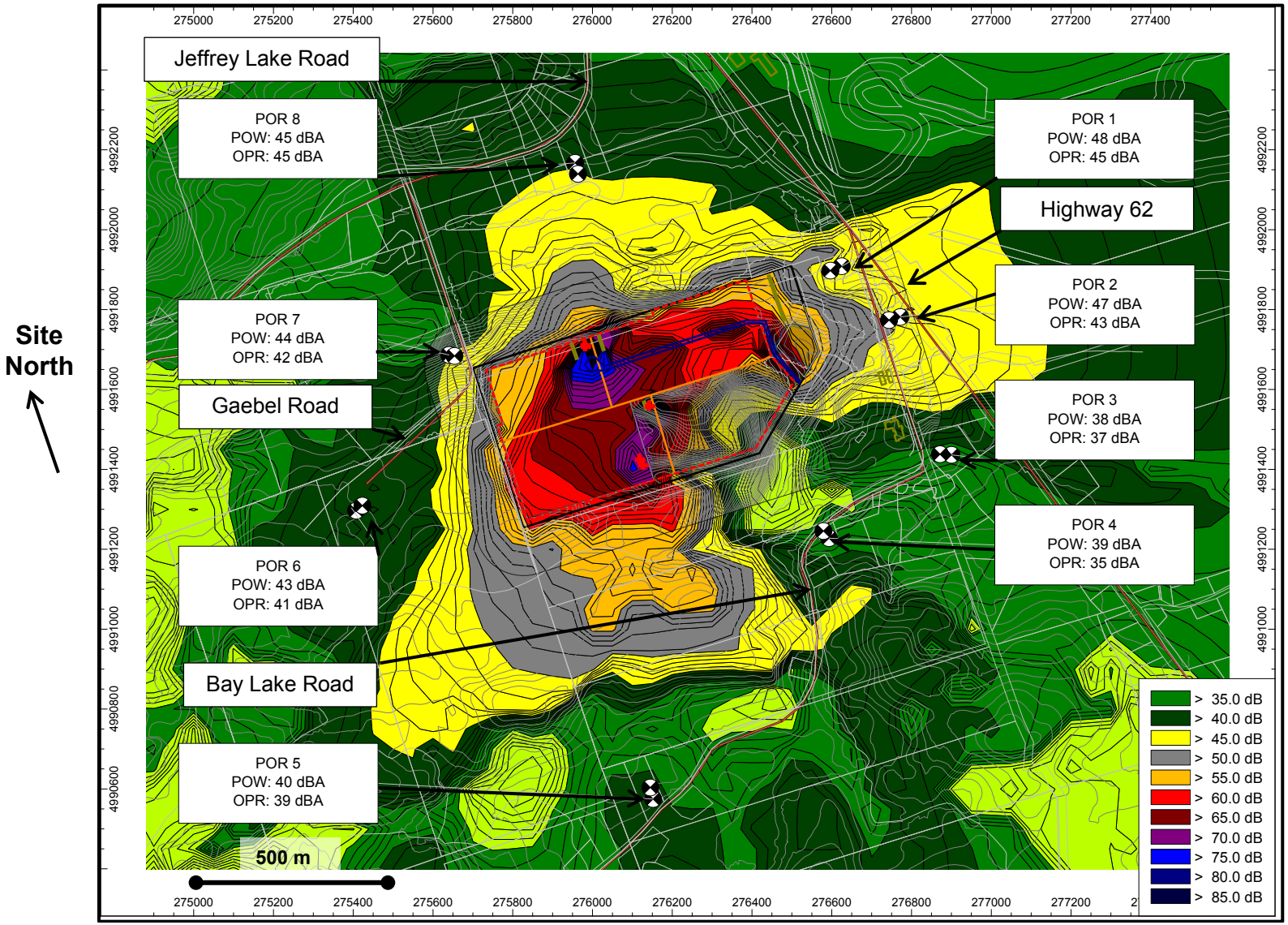


Figure 8: Prediction Results, Scenario 3 - Day only (07:00 to 19:00): Noise Contours, (Noise levels at 4.5 m)



Site North

Figure 9: Scenario 4: Worst Case, Extraction Area 4, standard hydraulic rock drill in operation on the surface with portable crushing and screening plant in operation in Extraction Area 2 (Day only)

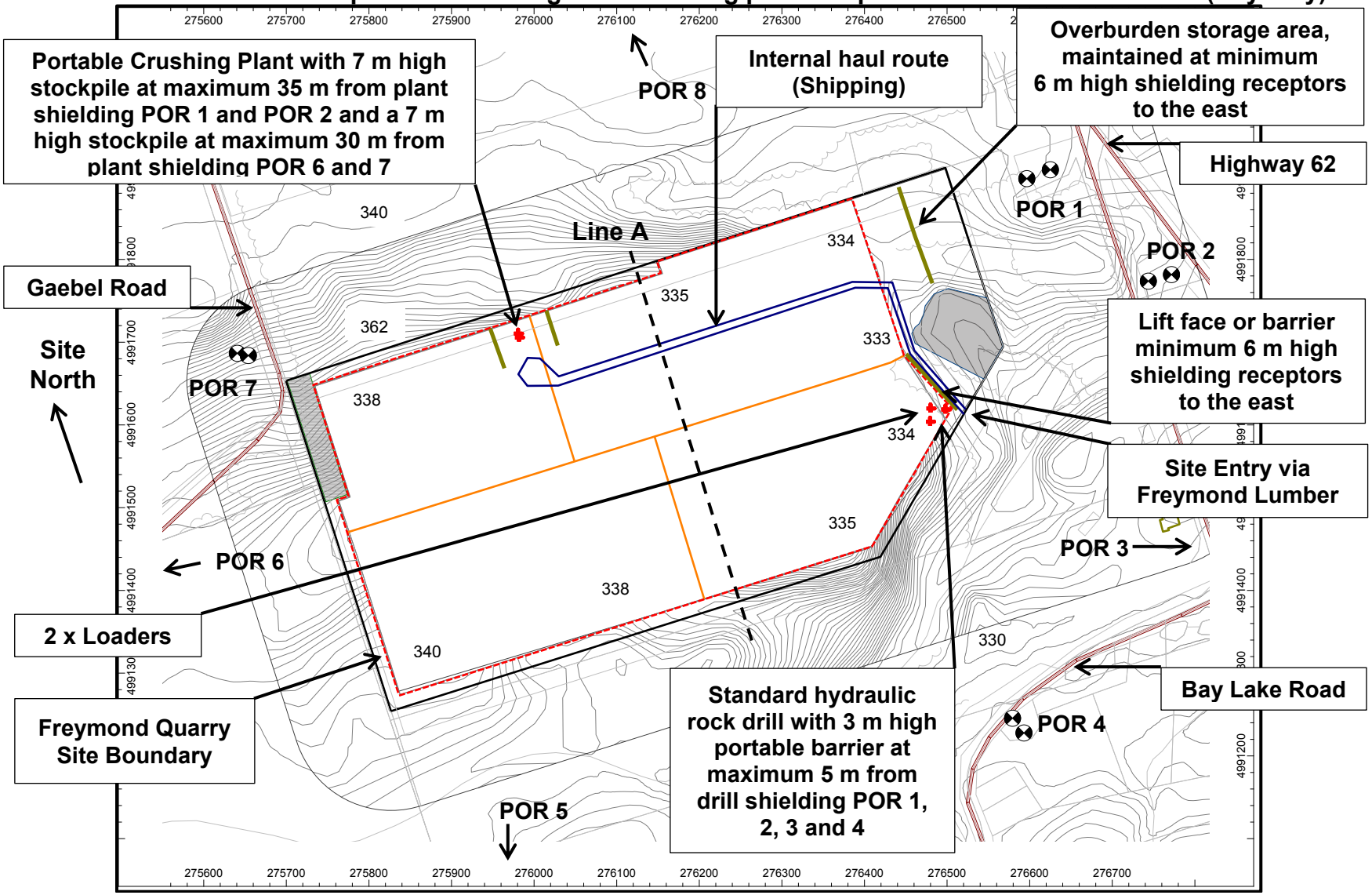
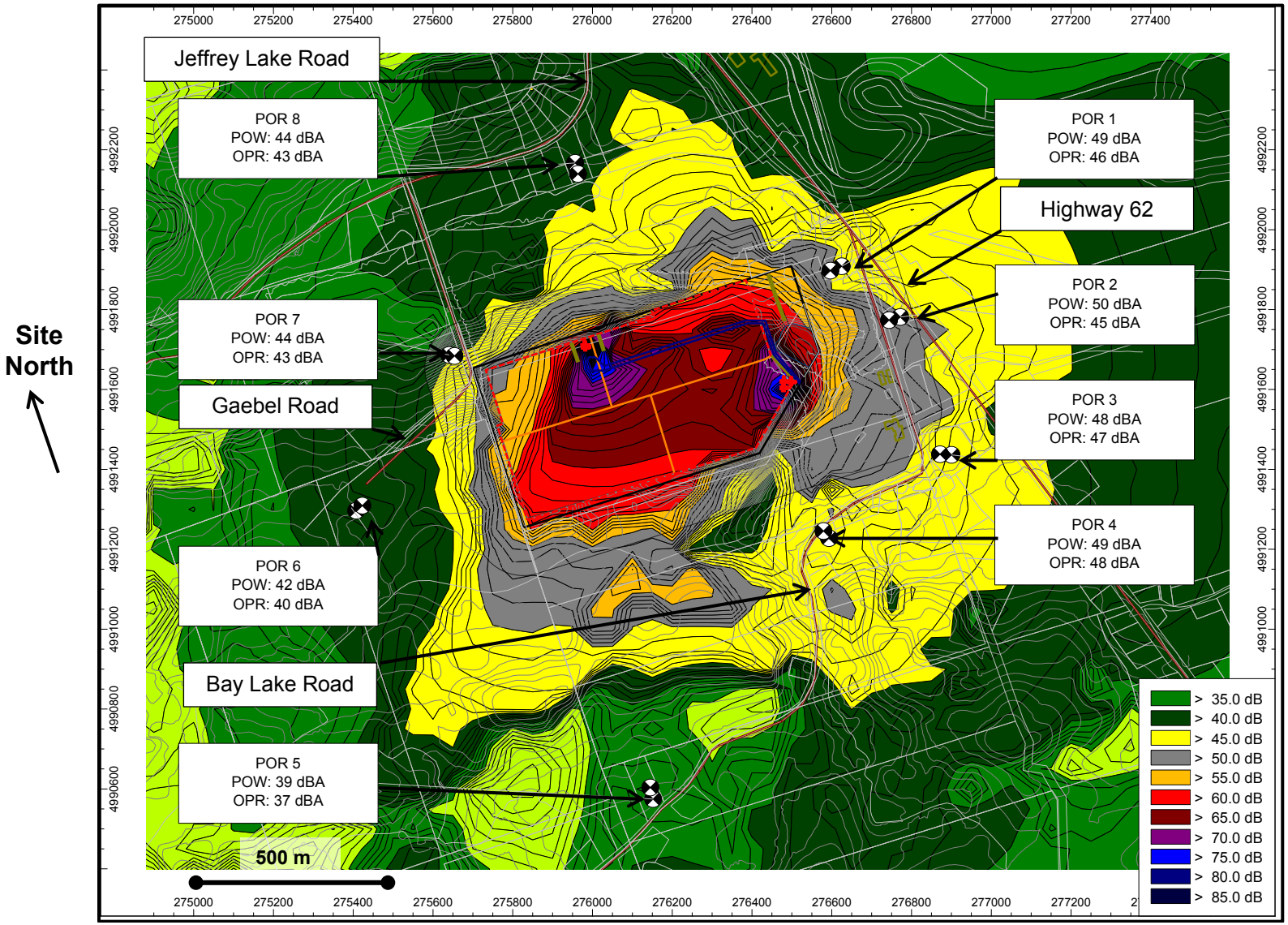


Figure 10: Prediction Results, Scenario 4 - Day only (07:00 to 19:00): Noise Contours, (Noise levels at 4.5 m)



Site North

Figure 11: Scenario 5: Worst Case, Worst case, loading and hauling only (Early morning and daytime period)

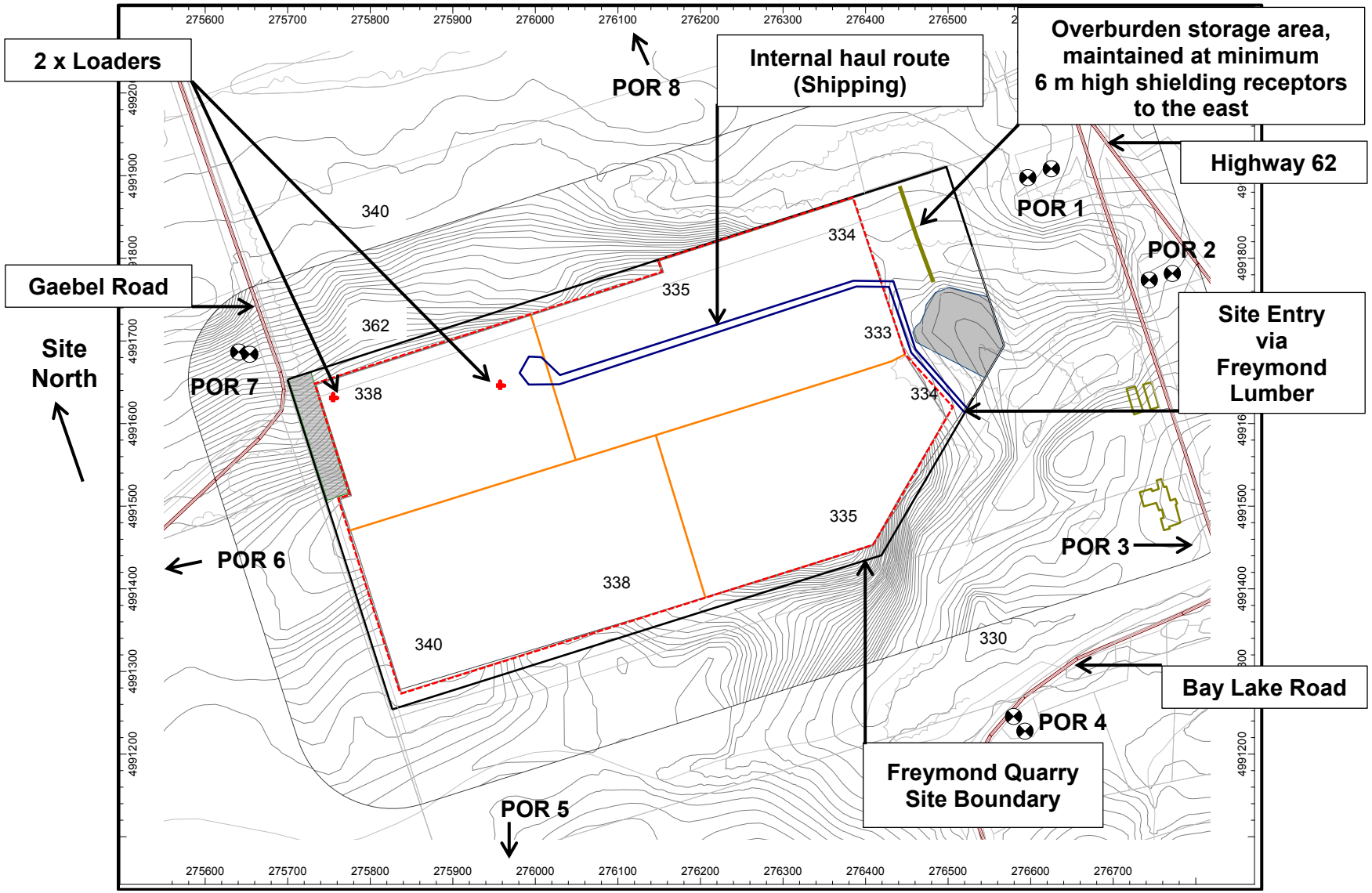
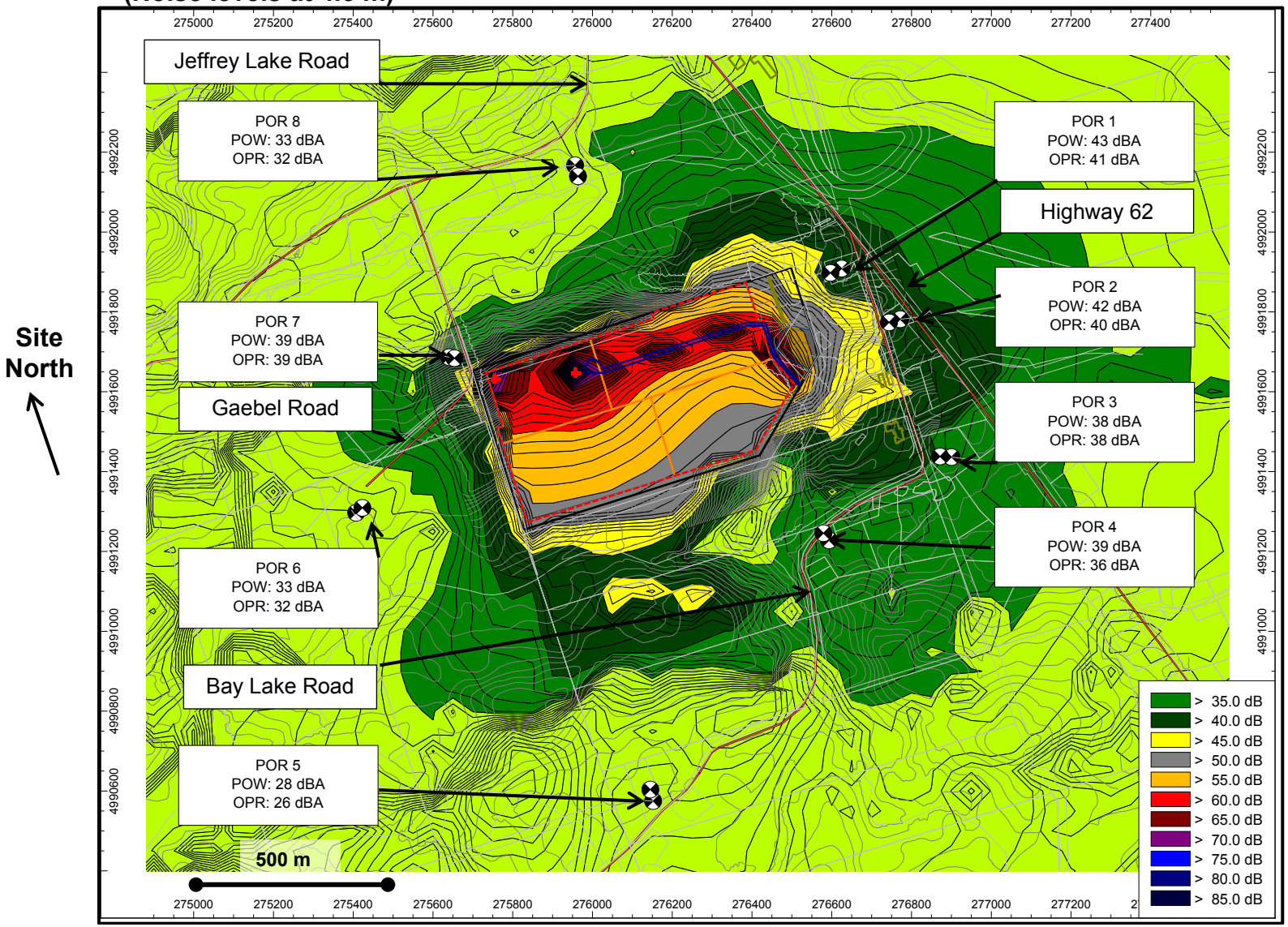


Figure 12: Prediction Results, Scenario 5 – Early morning period (06:00 to 07:00): Noise Contours, (Noise levels at 4.5 m)



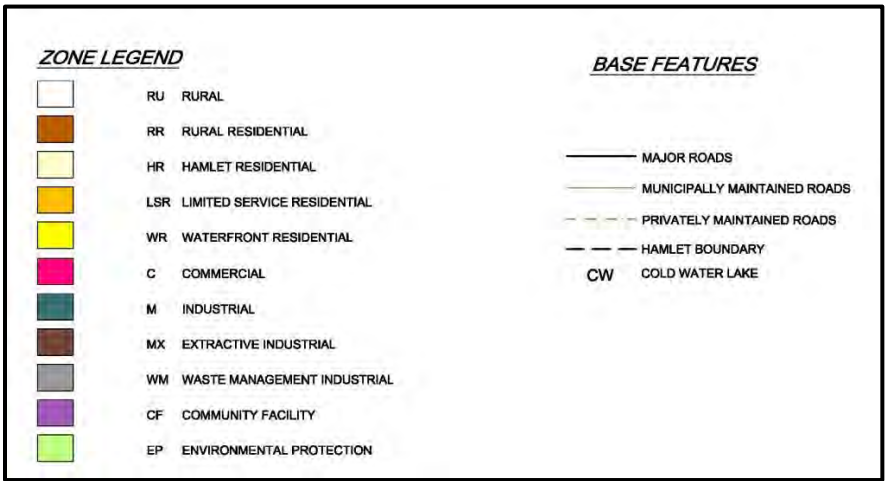
Appendix 1

Zoning Plan and Land Use Designations

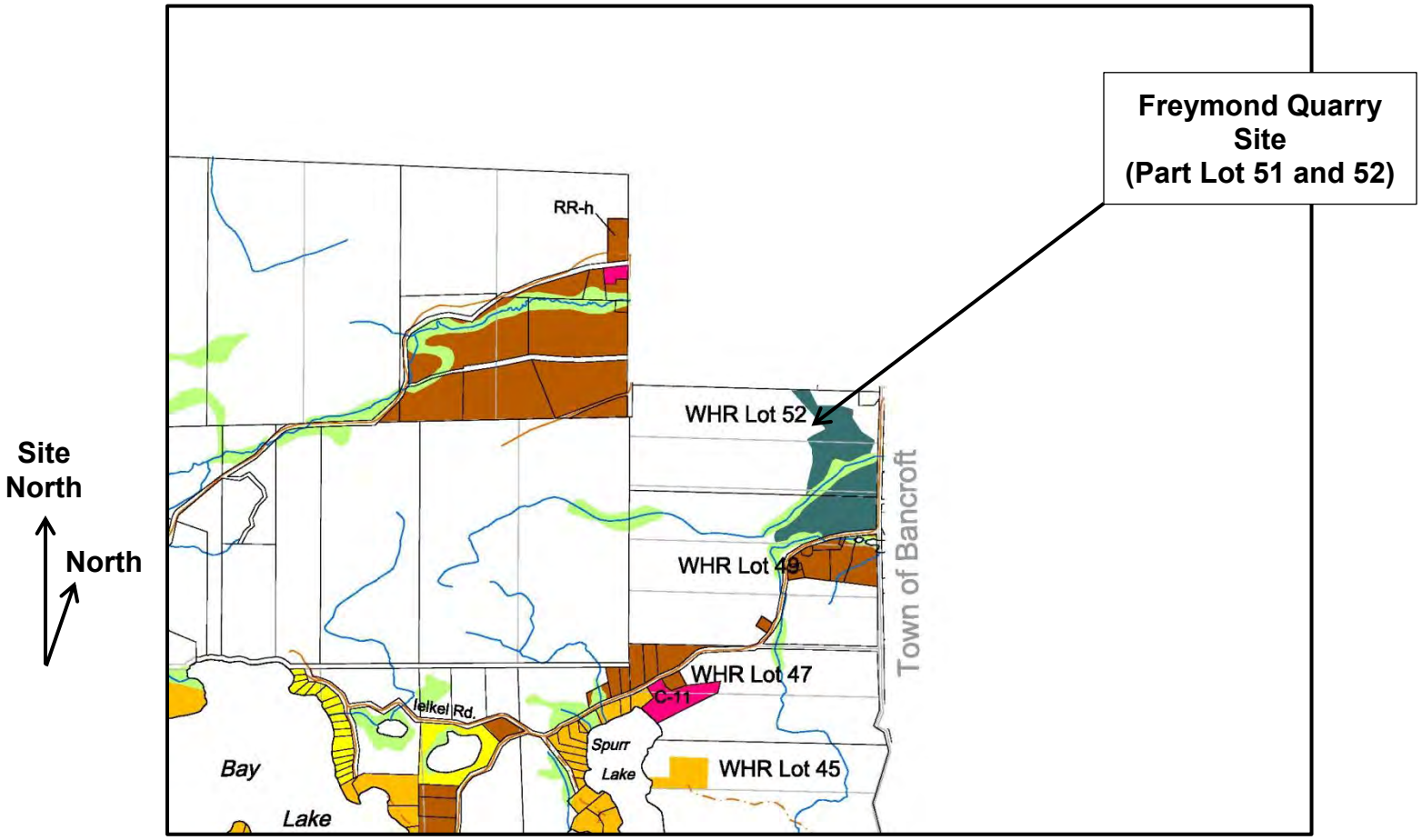
Contents:

- **Detailed Zoning Plan - Township of Faraday**
- **Official Plan Schedule A5-1 - Township of Faraday**
- **Official Plan Appendix Aii - Bancroft Urban Area**

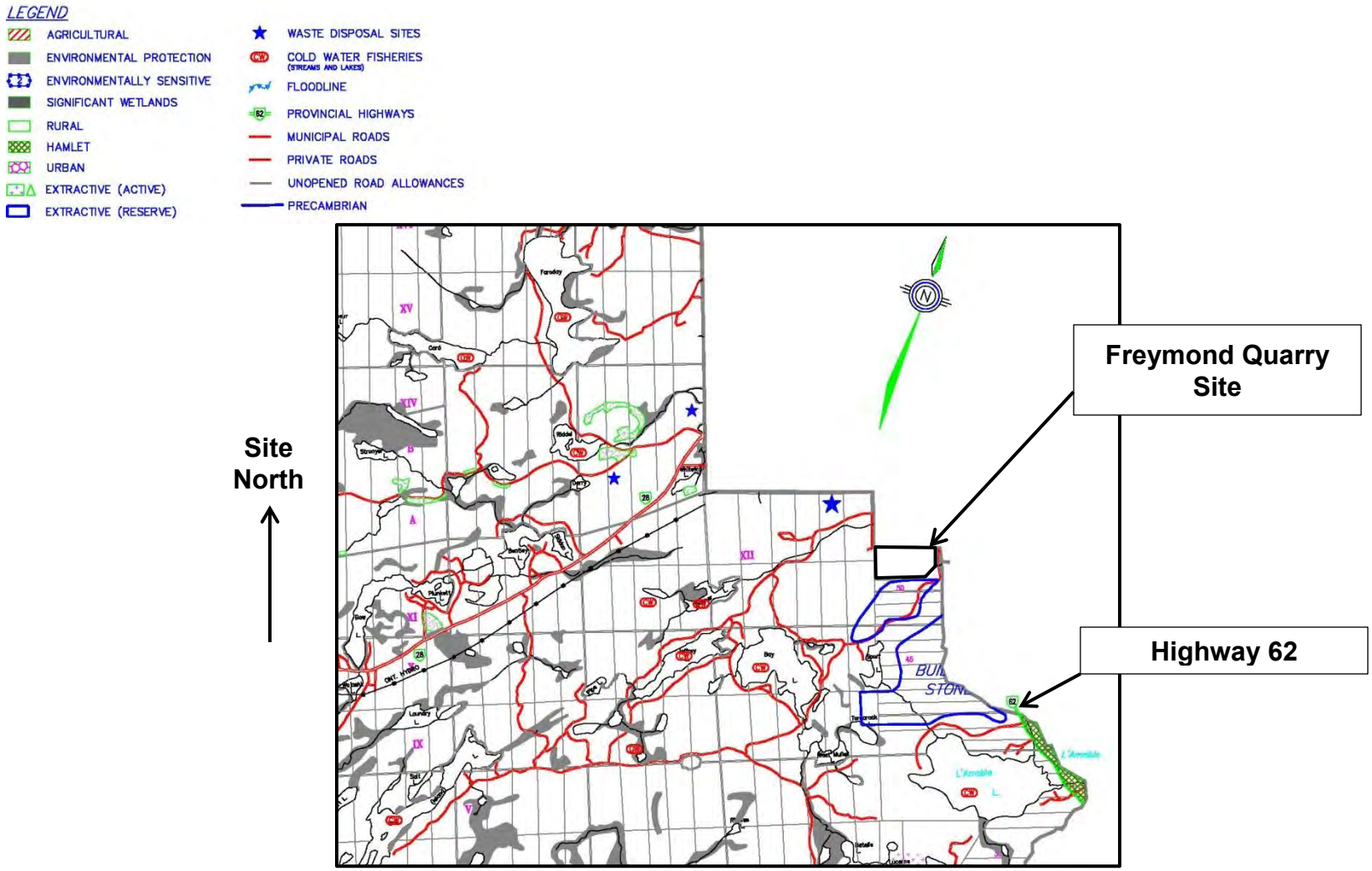
Legend for Zoning Plan:



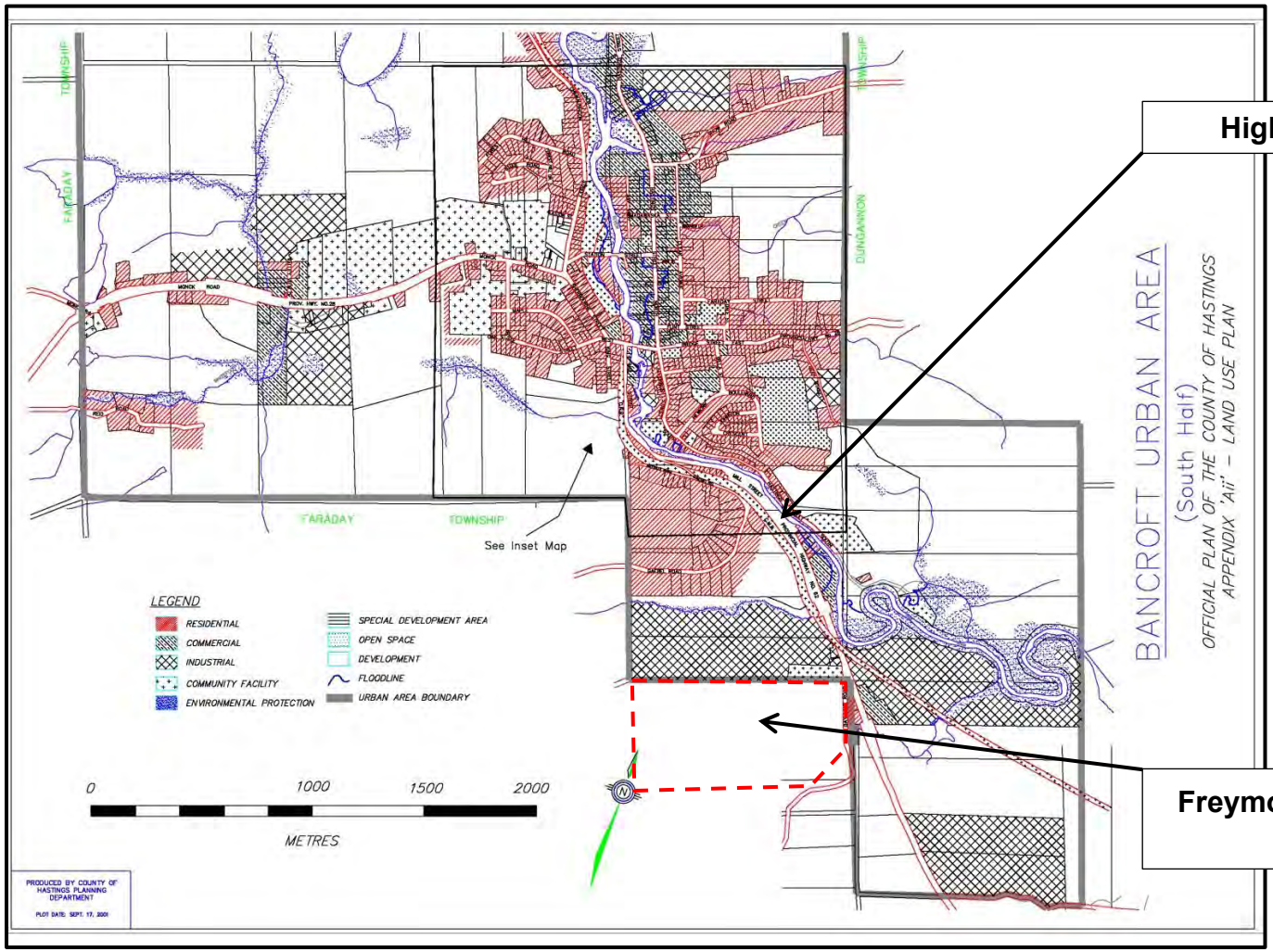
Detailed Zoning Plan, source: Township of Faraday Zoning By-law



Official Plan Schedule A5-1 - Township of Faraday, source: Official Plan of the County of Hastings



Official Plan Appendix "Aii" – Bancroft Urban Area, source: Official Plan of the County of Hastings



Appendix 2

Acoustic Modelling Details

Modeling Notes:

1. Acoustic model developed uses Cadna-A software, Version 4.6.155.
2. Sound propagation is modeled according to ISO 9613-2: 1996(E).
3. The whole of the extraction area is modeled as reflective, a conservative assumption.
4. MOECC favoured conservative modelling assumptions are used, that is, 'no subtraction of negative ground attenuation' and 'no negative path differences'.

Contents:

Table A2.1 Calculation Configuration

Configuration	
Parameter	Value
General	
Country	(user defined)
Max. Error (dB)	0.00
Max. Search Radius (m)	2000.00
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (m)	1000.00
Min. Length of Section (m)	1.00
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Reference Time Day (min)	60.00
Reference Time Night (min)	60.00
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	6.00
Night-time Penalty (dB)	10.00
DTM	
Standard Height (m)	0.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	0
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rvcr - Reflector	1.00 1.00
Min. Distance Source - Reflector	0.10
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	Excl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (°C)	10
rel. Humidity (%)	70
Ground Absorption G	1.00
Wind Speed for Dir. (m/s)	3.0
Roads (RLS-90)	
Strictly acc. to RLS-90	
Railways (Schall 03 (1990))	
Strictly acc. to Schall 03 / Schall-Transrapid	
Aircraft (???)	
Strictly acc. to AzB	

Table A2.2 Point of Reception Location Table

Name	ID	Height	Coordinates, ground		
		Above Ground	X	Y	Z
		(m)	(m)	(m)	(m)
POR 1 POW	POR_1_POW	4.5	276625.1	4991908	339.12
POR 1 OPR	POR_1_OPR	1.5	276596.6	4991898	336.75
POR 2 POW	POR_2_POW	4.5	276771.8	4991782	337.55
POR 2 OPR	POR_2_OPR	1.5	276743.7	4991774	335.43
POR 3 POW	POR_3_POW	4.5	276900.4	4991436	336.51
POR 3 OPR	POR_3_OPR	1.5	276871.7	4991438	335.43
POR 4 POW	POR_4_POW	4.5	276593.2	4991228	342.14
POR 4 OPR	POR_4_OPR	1.5	276579.4	4991245	337.76
POR 5 POW	POR_5_POW	4.5	276152	4990575	366.6
POR 5 OPR	POR_5_OPR	1.5	276145.2	4990604	366.5
POR 6 POW	POR_6_POW	4.5	275407.5	4991297	393.98
POR 6 OPR	POR_6_OPR	1.5	275423	4991309	389.7
POR 7 POW	POR_7_POW	4.5	275640.7	4991687	358.86
POR 7 OPR	POR_7_OPR	1.5	275654.1	4991684	357.22
POR 8 POW	POR_8_POW	4.5	275956.5	4992167	334.5
POR 8 OPR	POR_8_OPR	1.5	275963.7	4992140	331.5

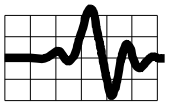


Table A2.3 Point Sources

Name	Result. PWL			Lw / Li	Noise Source	Operating Time			Direct.	Source
	Day	Evening	Night*	Type	Library File	Day	Evening	Night		Height
	(dBA)	(dBA)	(dBA)			(min/Hr)	(min/Hr)	(min/Hr)		(m)
Loader S1	109.9	-	109.9	Lw	Loader				(none)	2.5
Loader S1	109.9	-	109.9	Lw	Loader				(none)	2.5
Rock_Drill_S1	119	-	-	Lw	Rockdrill_TH_70				(none)	0.5
Crusher S1	121	-	-	Lw	Crusher_Combined				(none)	2.5
Generator S1	117	-	-	Lw	Mit_Generator_Combined				(none)	2.5
Low_Noise_Rock_Drill_S2	108	-	-	Lw	Rockdrill_SmartRIG				(none)	0.5
Generator S2	117	-	-	Lw	Mit_Generator_Combined				(none)	2.5
Crusher S2	121	-	-	Lw	Crusher_Combined				(none)	2.5
Loader S2	109.9	-	109.9	Lw	Loader				(none)	2.5
Loader S2	109.9	-	109.9	Lw	Loader				(none)	2.5
Rock_Drill_S3	119	-	-	Lw	Rockdrill_TH_70				(none)	0.5
Loader S3	109.9	-	109.9	Lw	Loader				(none)	2.5
Loader S3	109.9	-	109.9	Lw	Loader				(none)	2.5
Crusher S3	121	-	-	Lw	Crusher_Combined				(none)	2.5
Generator S3	121	-	-	Lw	Generator_Combined				(none)	2.5
Loader S4	109.9	-	109.9	Lw	Loader				(none)	2.5
Loader S4	109.9	-	109.9	Lw	Loader				(none)	2.5
Generator S3	116.7	-	-	Lw	Mit_Generator_Combined				(none)	2.5
Crusher S3	120.8	-	-	Lw	Crusher_Combined				(none)	2.5
Crusher S4	120.8	-	-	Lw	Crusher_Combined				(none)	2.5
Generator S4	116.7	-	-	Lw	Mit_Generator_Combined				(none)	2.5
Rock_Drill_S4	118.6	-	-	Lw	Rockdrill_TH_70				(none)	0.5
Loader S5	109.9	-	109.9	Lw	Loader				(none)	2.5
Loader S5	109.9	-	109.9	Lw	Loader				(none)	2.5

*Nighttime operations occur during the early morning period 6 am and 7 am (06:00 to 07:00) only

Table A2.4 Line Sources

Name	Result. PWL			Lw / Li			Moving Pt. Src			
	Day	Evening	Night	Type	Value	norm.	Number			Speed
	(dBA)	(dBA)	(dBA)			dB(A)	Day	Evening	Night*	(km/h)
Internal Haul Route S1	107	-	107	PWL-Pt	HWYTruck_Slow58		10	-	10	20
Internal Haul Route S2	106	-	106	PWL-Pt	HWYTruck_Slow58		10	-	10	20
Internal Haul Route S3	108	-	108	PWL-Pt	HWYTruck_Slow58		10	-	10	20
Internal Haul Route S4	108	-	108	PWL-Pt	HWYTruck_Slow58		10	-	10	20
Internal Haul Route S5	108	-	108	PWL-Pt	HWYTruck_Slow58		10	-	10	20

*Nighttime operations occur during the early morning period 6 am and 7 am (06:00 to 07:00) only

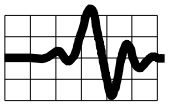


Table A2.5 Noise Barriers

Name	ID	Height
		Begin
		(m)
Barrier_1 (Overburden Storage Area)	Barrier_1	6
Barrier_2 Lift face and/or barrier	Barrier_2_S4	Top of Lift or Barrier Minimum 6 m above Quarry Floor
Barrier_S1 Portable Barrier at Rock Drill	Barrier_S1	3
Barrier_S1 Stockpile at Crusher	Barrier_S1	7
Barrier_S2 Portable Barrier at Rock Drill	Barrier_S2	4
Barrier_S2 Stockpile at Crusher	Barrier_S2	7
Barrier_S2 Stockpile at Crusher	Barrier_S2	6
Barrier_S3 Portable Barrier at Rock Drill	Barrier_S3	4
Barrier_S3 Stockpile at Crusher	Barrier_S3	7
Barrier_S3 Stockpile at Crusher	Barrier_S3	6
Barrier_S4 Portable Barrier at Rock Drill	Barrier_S4	4
Barrier_S4 Stockpile at Crusher	Barrier_S4	7
Barrier_S4 Stockpile at Crusher	Barrier_S4	6

Table A2.6 Noise Source Library

ID	Type	Spectra (dB)											Source*
		31.5	63	125	250	500	1000	2000	4000	8000	A	lin	
Rockdrill_TH_70	Lw	111.2	110.6	112.4	108.9	108.7	109.3	113.6	112.2	109.9	118.6	120.6	Furukawa Model HCR12-ES Rock Drill Measured 2012
Rockdrill_SmartRIG	Lw	103.4	109.4	112.6	106.8	102.2	101.7	102.5	98.6	91.3	108.3	116	Measured 30/08/11
Loader	Lw	103.4	110.4	114.1	113.6	107.1	104.1	97.2	91.2	83.6	109.9	118.5	HW Historical Meas
HWYTruck_Slow58	Lw	115.9	112.7	110.2	101.6	101.4	105	104.2	97.6	103.5	110.1	119	Brockville McDowell Study, 2003
Crusher_Combined	Lw	2.8	120.8	122.8	121.8	118.8	114.8	111.8	106.8	101.8	120.8	127.7	Hugh Williamson Associates – Acoustic formula from Pinchin Report Data
Generator_Combined	Lw	112.8	121.8	119.8	128.8	108.8	106.8	99.8	95.8	90.8	120.7	130.2	Hugh Williamson Associates Acoustic formula from Pinchin Report Data
Mit_Generator_Combined	Lw	108.8	117.8	115.8	124.8	104.8	102.8	95.8	91.8	86.8	116.7	126.2	Hugh Williamson Associates Acoustic formula from Pinchin Report Data

* Measured by Hugh Williamson Associates on site and / or at a similar facility in Ontario.

Table A2.7.1 Point of Reception Impacts by Source for Scenario 1*

	Daytime Period (07:00 to 19:00)															
	POR 1 W	POR 1 OPR	POR 2 W	POR 2 OPR	POR 3 W	POR 3 OPR	POR 4 W	POR 4 OPR	POR 5 W	POR 5 OPR	POR 6 W	POR 6 OPR	POR 7 W	POR 7 OPR	POR 8 W	POR 8 OPR
Sources	dBA		dBA		dBA		dBA		dBA		dBA		dBA		dBA	
Loader_S1	40	38	38	36	22	20	10	9	4	3	6	6	12	12	27	27
Loader_S1	40	38	38	36	18	16	9	9	4	3	6	6	12	12	29	28
Rock_Drill_S1	43	40	35	31	26	24	10	10	14	13	22	21	32	30	38	38
Crusher_S1	43	40	46	41	46	44	21	20	18	17	23	22	32	31	36	36
Generator_S1	42	39	42	39	42	39	20	20	18	17	23	22	32	31	32	33
IHR_S1	39	38	40	36	32	31	33	27	8	7	20	18	22	19	31	30
Total	49	47	49	45	48	45	33	29	22	21	28	27	37	36	41	42

* 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 A2.7.2 Point of Reception Impacts by Source for Scenario 2*

	Daytime Period (07:00 to 19:00)															
	POR 1 W	POR 1 OPR	POR 2 W	POR 2 OPR	POR 3 W	POR 3 OPR	POR 4 W	POR 4 OPR	POR 5 W	POR 5 OPR	POR 6 W	POR 6 OPR	POR 7 W	POR 7 OPR	POR 8 W	POR 8 OPR
Sources	dBA		dBA		dBA		dBA		dBA		dBA		dBA		dBA	
Low_Noise_Rock_Drill_S2	32	29	28	25	15	14	19	16	14	13	34	33	41	42	37	37
Generator_S2	31	28	34	30	29	28	19	18	23	22	34	31	37	33	32	33
Crusher_S2	33	31	36	33	36	34	20	19	23	20	35	33	39	39	35	36
Loader_S2	36	35	35	33	22	20	12	11	5	5	23	23	33	33	26	26
Loader_S2	36	33	35	33	22	21	13	12	6	6	23	18	31	32	24	24
IHR_S2	39	38	40	36	32	32	33	28	10	9	28	27	31	30	31	30
Total	43	41	44	41	38	37	34	30	27	25	40	38	45	45	41	41

* 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 A2.7.3 Point of Reception Impacts by Source for Scenario 3*

	Daytime Period (07:00 to 19:00)															
	POR 1 W	POR 1 OPR	POR 2 W	POR 2 OPR	POR 3 W	POR 3 OPR	POR 4 W	POR 4 OPR	POR 5 W	POR 5 OPR	POR 6 W	POR 6 OPR	POR 7 W	POR 7 OPR	POR 8 W	POR 8 OPR
Sources	dBA		dBA		dBA		dBA		dBA		dBA		dBA		dBA	
Rock_Drill_S3	38	37	35	35	32	31	37	33	35	34	37	36	39	33	43	43
Loader_S3	8	7	7	7	7	7	24	18	16	16	35	32	36	34	35	33
Loader_S3	8	7	7	7	9	8	20	20	15	15	35	33	36	34	35	33
Generator_S3	43	39	41	37	32	29	19	18	35	34	34	32	35	33	32	33
Crusher_S3	44	40	43	39	32	29	20	19	36	35	36	33	37	37	35	36
IHR_S3	39	38	40	36	32	32	33	28	11	11	29	28	30	28	31	30
Total	48	45	47	43	38	37	39	35	40	39	43	41	44	42	45	45

* 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 A2.7.4 Point of Reception Impacts by Source for Scenario 4*

	Daytime Period (07:00 to 19:00)															
	POR 1 W	POR 1 OPR	POR 2 W	POR 2 OPR	POR 3 W	POR 3 OPR	POR 4 W	POR 4 OPR	POR 5 W	POR 5 OPR	POR 6 W	POR 6 OPR	POR 7 W	POR 7 OPR	POR 8 W	POR 8 OPR
Sources	dBA		dBA		dBA		dBA		dBA		dBA		dBA		dBA	
Loader_S4	36	35	37	35	37	36	37	34	18	18	33	32	36	34	37	36
Loader_S4	40	38	40	36	34	34	33	30	17	17	33	32	36	34	36	36
Crusher_S4	44	40	43	39	45	44	41	38	36	35	36	33	38	37	35	36
Generator_S4	42	39	41	37	42	41	40	37	35	34	34	32	35	33	32	33
Rock_Drill_S4	43	41	46	41	37	36	47	46	18	17	36	35	40	38	40	39
IHR_S4	39	38	40	36	34	34	35	32	19	18	29	28	30	28	31	30
Total	49	47	50	46	48	47	50	48	39	37	42	40	45	43	44	43

* 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 A2.7.5 Point of Reception Impacts by Source for Scenario 5*

	Early Morning Period (06:00 to 07:00)															
	POR 1 W	POR 1 OPR	POR 2 W	POR 2 OPR	POR 3 W	POR 3 OPR	POR 4 W	POR 4 OPR	POR 5 W	POR 5 OPR	POR 6 W	POR 6 OPR	POR 7 W	POR 7 OPR	POR 8 W	POR 8 OPR
Sources	dBA		dBA		dBA		dBA		dBA		dBA		dBA		dBA	
Loader_S5	36	34	34	33	33	31	34	32	24	23	18	18	35	36	21	21
Loader_S5	38	37	37	35	34	33	32	30	23	22	30	29	35	34	27	27
IHR_S5	39	38	40	36	34	34	36	33	19	18	29	28	31	29	31	30
Total	43	41	42	40	38	38	39	37	28	26	33	32	39	39	33	32

* 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 Noise Measurement Data

ID	Type	Spectra (dB)											Notes
		31.5	63	125	250	500	1000	2000	4000	8000	A	lin	
Meas_Rock_Drill	Li	69	74	80	82	79	80	80	79	77	87	89	Measured by Hugh Williamson Associates 13th April 2012
Meas_Loader (CAT II 62H)	Li	57.2	79.5	83.0	69.1	59.5	58.2	72.2	62.8	51.4	73.4	85.1	Measured in 2nd April 2012 at Van Dyk Quarry, Ontario at 20 m
Crusher_Primary	Lw	0	118	120	119	116	112	109	104	99	118	124.9	Pinchin Environmental Ltd Noise Report 2010
Crusher_Secondary	Lw	107	111	114	115	112	111	109	105	98	116	120.6	Pinchin Environmental Ltd Noise Report 2010
Generator_Exhaust	Lw	111	120	118	127	107	105	98	94	89	118.9	128.4	Pinchin Environmental Ltd Noise Report 2010
Generator_Outlet	Lw	108	117	114	115	111	110	107	102	98	114.8	121.6	Pinchin Environmental Ltd Noise Report 2010
Generator_Intake	Lw	105	108	107	112	106	104	101	97	90	109.6	115.9	Pinchin Environmental Ltd Noise Report 2010
Mit_Generator_Combined	Lw	109	118	116	125	104.8	102.8	95.8	91.8	86.8	116.7	126.2	Hugh Williamson Associates - Calc x Pinchin Data
Meas_HWYTruck_Slow58	Li	80.8	77.6	75.1	66.5	66.3	69.9	69.1	62.5	68.4	75	83.9	Measured 2003 from Brockville McDowell measurements at 15 m

Table A2.9 Distance from Source to Point of Reception

Source ID	Coordinates			POR_1_POW	POR_1_OPR	POR_2_POW	POR_2_OPR	POR_3_POW	POR_3_OPR	POR_4_POW	POR_4_OPR	POR_5_POW	POR_5_OPR	POR_6_POW	POR_6_OPR	POR_7_POW	POR_7_OPR	POR_8_POW	POR_8_OPR
	X	Y	X (m)	276625	276597	276772	276743.7	276900.4	276871.7	276593.2	276579.35	276151.98	276145.15	275407.53	275422.99	275640.7	275654.08	275956.45	275964
	(m)	(m)	Y (m)	4991908	4991898	4991782	4991773.64	4991436.32	4991437.78	4991227.71	4991245.46	4990574.76	4990603.55	4991296.64	4991309.23	4991686.5	4991683.86	4992167.17	4992140
Loader_S1	276072.97	4991694.46		592	562	704	675	867	839	699	677	1122	1093	775	756	432	419	487	458
Loader_S1	276077.81	4991676.25		594	564	702	673	857	829	683	661	1104	1075	770	751	437	424	506	477
Rock_Drill_S1	276022.33	4991733.58		628	597	751	722	927	899	763	741	1166	1137	754	734	385	372	439	410
Crusher_S1	276130.94	4991751.36		519	488	642	613	831	804	698	676	1177	1148	854	835	495	482	451	423
Generator_S1	276128.75	4991756.01		519	489	644	615	835	808	703	681	1181	1153	855	835	493	480	446	418
Low_Noise_Rock_Drill_S2	275739.46	4991644.66		924	894	1041	1012	1179	1151	950	930	1147	1117	481	461	107	94	566	543
Generator_S2	275978.73	4991710.38		676	646	796	768	962	934	781	760	1149	1119	705	685	339	326	457	429
Crusher_S2	275980.33	4991706.11		676	645	795	766	959	931	777	756	1144	1115	704	684	340	327	462	434
Loader_S2	275797.93	4991607.68		880	850	989	960	1116	1087	881	861	1092	1062	499	479	176	163	582	557
Loader_S2	275789.1	4991627.44		882	852	995	966	1128	1099	898	878	1113	1084	505	485	160	146	565	541
Rock_Drill_S3	276141.73	4991557.7		597	568	669	640	768	740	559	538	983	954	779	760	517	504	637	609
Loader_S3	276117.89	4991424.52		701	673	745	717	783	754	514	495	850	821	722	704	544	531	760	731
Loader_S3	276126.14	4991409.9		705	678	745	717	775	746	501	482	836	807	727	710	559	546	776	748
Crusher_S3	276095.87	4991405.92		730	702	773	745	805	776	528	509	833	804	697	680	535	522	774	745
Generator_S3	276083.98	4991410.76		735	707	781	753	817	788	541	522	839	810	686	669	522	509	767	739
Loader_S4	276479.94	4991619.84		323	301	334	305	459	432	408	387	1095	1070	1120	1102	842	828	757	733
Loader_S4	276479.44	4991603.83		338	316	342	314	453	426	393	372	1080	1055	1115	1097	843	829	769	744
Generator_S3	275980.46	4991710.79		674	644	794	766	960	932	780	758	1149	1119	707	687	341	327	457	429
Crusher_S3	275981.88	4991706.85		674	644	793	765	957	930	777	755	1145	1115	706	686	342	329	461	433
Crusher_S4	275981.77	4991705.59		675	644	794	765	957	929	776	754	1144	1114	705	685	342	328	462	434
Generator_S4	275980.57	4991710.22		674	644	794	766	960	932	780	758	1148	1119	707	687	341	328	458	430
Rock_Drill_S4	276498.04	4991618.53		316	296	319	291	442	415	402	382	1100	1075	1137	1119	860	846	771	746
Loader_S5	275755.07	4991630.89		913	883	1028	999	1162	1133	930	910	1128	1099	482	462	127	114	573	550
Loader_S5	275957.4	4991645.96		717	687	826	797	966	938	761	740	1089	1059	651	632	319	306	521	494

Table A2.10 Sample Calculations – Scenario 1

Receiver
Name: POR 1 POW
ID: POR_1_POW
X: 276625.14
Y: 4991908.31
Z: 339.12

Point Source, ISO 9613, Name: "Crusher S1", ID: "Crusher_S1"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	I
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB
1	276130.94	4991751.36	337.77	0	DEN	32	-36.6	0.0	0.0	0.0	0.0	65.3	0.0	-4.8	0.0	0.0	5.9	0.0	0.0	-10
1	276130.94	4991751.36	337.77	0	DEN	63	94.6	0.0	0.0	0.0	0.0	65.3	0.1	-4.8	0.0	0.0	7.2	0.0	0.0	2
1	276130.94	4991751.36	337.77	0	DEN	125	106.7	0.0	0.0	0.0	0.0	65.3	0.2	-0.4	0.0	0.0	8.9	0.0	0.0	3
1	276130.94	4991751.36	337.77	0	DEN	250	113.2	0.0	0.0	0.0	0.0	65.3	0.5	-2.2	0.0	0.0	11.0	0.0	0.0	3
1	276130.94	4991751.36	337.77	0	DEN	500	115.6	0.0	0.0	0.0	0.0	65.3	1.0	-3.4	0.0	0.0	13.5	0.0	0.0	3
1	276130.94	4991751.36	337.77	0	DEN	1000	114.8	0.0	0.0	0.0	0.0	65.3	1.9	-3.4	0.0	0.0	16.2	0.0	0.0	3
1	276130.94	4991751.36	337.77	0	DEN	2000	113.0	0.0	0.0	0.0	0.0	65.3	5.0	-3.4	0.0	0.0	19.1	0.0	0.0	2
1	276130.94	4991751.36	337.77	0	DEN	4000	107.8	0.0	0.0	0.0	0.0	65.3	17.0	-3.4	0.0	0.0	22.0	0.0	0.0	
1	276130.94	4991751.36	337.77	0	DEN	8000	100.7	0.0	0.0	0.0	0.0	65.3	60.6	-3.4	0.0	0.0	24.9	0.0	0.0	-4

Point Source, ISO 9613, Name: "Rock_Drill_S1", ID: "Rock_Drill_S1"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	I
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB
3	276022.33	4991733.58	359.10	0	DEN	32	71.8	0.0	0.0	0.0	0.0	67.0	0.0	-5.3	0.0	0.0	4.8	0.0	0.0	
3	276022.33	4991733.58	359.10	0	DEN	63	84.4	0.0	0.0	0.0	0.0	67.0	0.1	-5.3	0.0	0.0	4.8	0.0	0.0	1
3	276022.33	4991733.58	359.10	0	DEN	125	96.3	0.0	0.0	0.0	0.0	67.0	0.3	-0.8	0.0	0.0	4.9	0.0	0.0	2
3	276022.33	4991733.58	359.10	0	DEN	250	100.3	0.0	0.0	0.0	0.0	67.0	0.7	-2.7	0.0	0.0	5.0	0.0	0.0	3
3	276022.33	4991733.58	359.10	0	DEN	500	105.5	0.0	0.0	0.0	0.0	67.0	1.2	-3.9	0.0	0.0	5.3	0.0	0.0	3
3	276022.33	4991733.58	359.10	0	DEN	1000	109.3	0.0	0.0	0.0	0.0	67.0	2.3	-3.9	0.0	0.0	5.7	0.0	0.0	3
3	276022.33	4991733.58	359.10	0	DEN	2000	114.8	0.0	0.0	0.0	0.0	67.0	6.1	-3.9	0.0	0.0	6.5	0.0	0.0	3
3	276022.33	4991733.58	359.10	0	DEN	4000	113.2	0.0	0.0	0.0	0.0	67.0	20.6	-3.9	0.0	0.0	7.8	0.0	0.0	2
3	276022.33	4991733.58	359.10	0	DEN	8000	108.8	0.0	0.0	0.0	0.0	67.0	73.4	-3.9	0.0	0.0	9.5	0.0	0.0	-3

Point Source, ISO 9613, Name: "Generator S1", ID: "Generator_S1"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	I
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB
5	276128.75	4991756.01	337.78	0	DEN	32	69.4	0.0	0.0	0.0	0.0	65.3	0.0	-4.8	0.0	0.0	5.8	0.0	0.0	
5	276128.75	4991756.01	337.78	0	DEN	63	91.6	0.0	0.0	0.0	0.0	65.3	0.1	-4.8	0.0	0.0	7.1	0.0	0.0	2
5	276128.75	4991756.01	337.78	0	DEN	125	99.7	0.0	0.0	0.0	0.0	65.3	0.2	-0.4	0.0	0.0	8.7	0.0	0.0	2
5	276128.75	4991756.01	337.78	0	DEN	250	116.2	0.0	0.0	0.0	0.0	65.3	0.5	-2.2	0.0	0.0	10.8	0.0	0.0	4
5	276128.75	4991756.01	337.78	0	DEN	500	101.6	0.0	0.0	0.0	0.0	65.3	1.0	-3.4	0.0	0.0	13.3	0.0	0.0	2
5	276128.75	4991756.01	337.78	0	DEN	1000	102.8	0.0	0.0	0.0	0.0	65.3	1.9	-3.4	0.0	0.0	16.0	0.0	0.0	2
5	276128.75	4991756.01	337.78	0	DEN	2000	97.0	0.0	0.0	0.0	0.0	65.3	5.0	-3.4	0.0	0.0	18.9	0.0	0.0	1
5	276128.75	4991756.01	337.78	0	DEN	4000	92.8	0.0	0.0	0.0	0.0	65.3	17.0	-3.4	0.0	0.0	21.8	0.0	0.0	
5	276128.75	4991756.01	337.78	0	DEN	8000	85.7	0.0	0.0	0.0	0.0	65.3	60.7	-3.4	0.0	0.0	24.8	0.0	0.0	-6

Point Source, ISO 9613, Name: "Loader S1", ID: "Loader_S1"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	I
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB
8	276072.97	4991694.46	338.38	0	DEN	32	64.0	0.0	0.0	0.0	0.0	66.4	0.0	-4.9	0.0	0.0	4.8	0.0	0.0	
8	276072.97	4991694.46	338.38	0	DEN	63	84.2	0.0	0.0	0.0	0.0	66.4	0.1	-4.9	0.0	0.0	4.8	0.0	0.0	1
8	276072.97	4991694.46	338.38	0	DEN	125	98.0	0.0	0.0	0.0	0.0	66.4	0.2	-0.5	0.0	0.0	4.8	0.0	0.0	2
8	276072.97	4991694.46	338.38	0	DEN	250	105.0	0.0	0.0	0.0	0.0	66.4	0.6	-2.3	0.0	0.0	4.8	0.0	0.0	3
8	276072.97	4991694.46	338.38	0	DEN	500	103.9	0.0	0.0	0.0	0.0	66.4	1.1	-3.6	0.0	0.0	4.8	0.0	0.0	3
8	276072.97	4991694.46	338.38	0	DEN	1000	104.1	0.0	0.0	0.0	0.0	66.4	2.2	-3.6	0.0	0.0	4.8	0.0	0.0	3
8	276072.97	4991694.46	338.38	0	DEN	2000	98.4	0.0	0.0	0.0	0.0	66.4	5.7	-3.6	0.0	0.0	4.9	0.0	0.0	2
8	276072.97	4991694.46	338.38	0	DEN	4000	92.2	0.0	0.0	0.0	0.0	66.4	19.4	-3.6	0.0	0.0	5.1	0.0	0.0	
8	276072.97	4991694.46	338.38	0	DEN	8000	82.5	0.0	0.0	0.0	0.0	66.4	69.2	-3.6	0.0	0.0	5.3	0.0	0.0	-5

Appendix 3

Background Traffic Noise Analysis

This Appendix presents the results of an analysis of background noise from road traffic on Highway 62, south of Bancroft, approx. 8.6 km north of the intersection with Hastings Road, in the vicinity of the Freymond Quarry, conducted in October 2010.

The 24-hour period occurring on Wednesday the 6th of October 2010 was selected on the basis that this period of time represented the lowest traffic volumes occurring during a period of time that the Freymond Quarry is proposed to be in operation. This results in the calculation of the minimum background noise from Highway 62 at the selected points of reception.

The minimum background noise level is determined for one time period.

Day: 07:00 to 19:00 – daytime operational period for the Freymond Quarry

Contents:

Table A3.1: Traffic Volumes and Background Noise Estimates for Highway 62 near Proposed Freymond Quarry

Project: Proposed Freymond Quarry
Traffic count from MTO - Kingston
Count from Highway 62, south of Bancroft, Approx. 8.6 km north of Hastings Road intersection Highway 62.
Posted Speed Limit: 60 km/h
Traffic Count Date: Wednesday 6th October, 2010

		Estimated split**			Noise Predictions in dBA, STAMSON		
Hour Beginning	Total Vehicles Count no.	Cars no.	Medium Trucks no.	Heavy Trucks no.	POR 2 2nd Storey d = 30 m h = 1.5 m	POR 2 OPR d = 30 m h = 4.5 m	***
0:00	6						
1:00	2						
2:00	I						
3:00	3						
4:00	19						
5:00	28						
6:00	79						
7:00	118						
8:00	152						
9:00	161						
10:00	140						
11:00	159						
12:00	148						
13:00	150						
14:00	163						
15:00	156						
16:00	181						
17:00	152						
18:00	**90**	**79.2 (79)**	**6.3 (6)**	**4.5 (5)**	**54.38**	**53.95**	*
19:00	75						
20:00	49						
21:00	41						
22:00	20						
23:00	10						
Total	2103						

* Minimum background sound level for Day, 18:00 to 19:00 inclusive
** Estimated Split based on City of Ottawa Environmental Noise Control Guidelines as no suitable data available. Split used for Medium Trucks to Heavy Trucks is 7% and 5% respectively.
*** Receptors effected by Highway 62 Background Noise.

Data from the MTO Kingston, hourly traffic counts - Hwy 62 South of Bancroft

Traffic Engineering Software

Weekly Volume Summary

Thu, Nov 18, 2010

Location: Hwy 62 - 8.6 km North of Hastings Rd 620

LHRS/Offset: 33780 / 0.0 **Region:** Eastern

Pattern Type: Low Tourist **PCS#:** 49 **Hwy. TVIS#:** 62125

Count Direction: NB/SB **Report Dates:** Sep 30, 2010 **to** Oct 6, 2010

Hour Interval	Thu 10/09/30	Fri 1	Sat 2	Sun 3	Mon 4	Tue 5	Wed 6	Thu 7
0:00- 1:00		12	10	22	2	5	6	2
1:00- 2:00		8	15	6	10	8	2	3
2:00- 3:00		6	9	4	2	4	1	5
3:00- 4:00		2	5	5	4	3	3	7
4:00- 5:00		13	7	3	15	10	19	14
5:00- 6:00		21	12	10	35	33	28	21
6:00- 7:00		58	19	18	78	65	79	71
7:00- 8:00		117	77	30	132	113	118	117
8:00- 9:00		138	119	47	176	159	152	175
9:00-10:00		169	183	96	160	139	161	161
10:00-11:00		161	199	172	157	129	140	174
11:00-12:00		193	205	182	154	136	159	158
AM Total	0	898	860	595	925	804	868	908
12:00-13:00	151	206	231	216	170	151	148	
13:00-14:00	151	166	232	217	166	152	150	
14:00-15:00	161	205	203	233	153	179	163	
15:00-16:00	189	229	223	213	166	169	156	
16:00-17:00	162	234	182	194	188	152	181	
17:00-18:00	180	219	169	157	172	154	152	
18:00-19:00	110	151	109	105	95	98	90	
19:00-20:00	83	111	88	111	69	76	75	
20:00-21:00	65	64	71	57	42	36	49	
21:00-22:00	60	67	56	44	25	32	41	
22:00-23:00	23	50	50	18	24	26	20	
23:00-24:00	19	23	26	6	6	6	10	
PM Total	1,354	1,725	1,640	1,571	1,276	1,231	1,235	0
24 Hr. Total	1,354	2,623	2,500	2,166	2,201	2,035	2,103	908
Noon - Noon	2,252	2,585	2,235	2,496	2,080	2,099	2,143	

ADT	AWD	AADT	AAWD	SADT	SAWDT	WADT	DHV
2,270	2,144	2,154	2,081	2,950	2,767	1,594	274

Page 3 of 3

Samples of Traffic Noise Predictions using STAMSON

```
STAMSON 5.0        SUMMARY REPORT        Date: 08-09-2012 17:17:36
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por2_w.te            Time Period: 1 hours
```

Description: POR 2 2nd Storey

```
Road data, segment # 1:
-----------------------
Car traffic volume  :    79 veh/TimePeriod
Medium truck volume :     6 veh/TimePeriod
Heavy truck volume  :     5 veh/TimePeriod
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1:
----------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  30.00 m
Receiver height           :   4.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Result summary
--------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !    (m)   !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.                 !     1.54 !    54.38 !    54.38
--------------------+---------+---------+---------
                      Total                  54.38 dBA
```

TOTAL Leq FROM ALL SOURCES: 54.38

```
STAMSON 5.0        SUMMARY REPORT        Date: 08-09-2012 17:18:48
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por2_OPR.te          Time Period: 1 hours
```

Description: POR 2 OPR

```
Road data, segment # 1:
-----------------------
Car traffic volume  :    79 veh/TimePeriod
Medium truck volume :     6 veh/TimePeriod
Heavy truck volume  :     5 veh/TimePeriod
Posted speed limit  :    60 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1:
---------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  30.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Result summary
--------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.                 !     1.54 !    53.95 !    53.95
--------------------+---------+---------+---------
                      Total                  53.95 dBA
```

TOTAL Leq FROM ALL SOURCES: 53.95

HUGH WILLIAMSON ASSOCIATES INC.
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QUALIFICATIONS:

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

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KEY COMPETENCIES:

- Environmental noise and vibration assessments, Environmental Compliance Approval (ECA). Noise assessment for land use planning
- 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.

PROFESSIONAL EXPERIENCE:

Hugh Williamson is a professional engineer with many years of experience in the measurement, analysis and control of noise and vibration. Hugh Williamson Associates was incorporated in 1997 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 establishing Hugh Williamson Associates, 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 20 years of experience as a consultant.

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Hugh Williamson Associates provides consulting services to large and small clients including: National Research Council, National Capital Commission, J. L. Richards & Associates, Barry Padolsky Associates, HOK Urbana Architects, Genivar, Nasittuq Corporation, PWGSC, R. W. Tomlinson, Geo. Tackaberry Construction and Miller Paving.

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- Environmental noise and vibration assessments, Environmental Compliance Approval (ECA). Noise assessment for land use planning.
- 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.
- Design services including sketch design, design development (development / permit applications), contract documents, tendering and contract administration.

PROFESSIONAL EXPERIENCE:

Michael Wells is a professional Architect registered in NSW with many years of experience in the Architectural and Construction industries. With key competencies in measurement, analysis and control of noise and vibration, Michael Wells joined Hugh Williamson Associates in 2012 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 Hugh Williamson Associates, his career includes the founding of Michael Wells Architect in Sydney Australia which specialized in the design of institutional, commercial and residential projects. He is a Director of Architectural Workshops Australia and Vision Blue Pty Ltd. He has more than 10 years of experience as a consultant.

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