**ENVIRONMENTAL MANAGEMENT PLAN**

# Operational Noise Measurement Programme
# Mining Operations 5 Metres Below Ground Level

**Voyager II Quarry, The Lakes, Shire of Northam.**

**BGC (Australia) Pty Ltd**

18 Mount Street
Perth WA 6000

Revision 1 February 2007

Revision 2 September 2011

| Rev No. | Date | Author | Update | Approved by |
|---|---|---|---|---|
| 1 | February 2007 | Lynton Storer<br>Herring Storer Acoustics | | I Le Provost; URS (Australia) |
| 2 | October 2011 | R.Holmes<br>Holmes Environmental | Current status of quarry Inclusion of monitoring results since commissioning V2. | P.Yates, BGC Quarries. |
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# 1.0 Introduction to Revision 2

Revision 1 of this Management Plan was prepared by Herring Storer Acoustics (HSA) on behalf of URS (Australia) Pty Ltd for BGC (Australia) Pty Ltd (BGC) in compliance with Ministerial Statement 706 Condition 16.1 (706:M16.1). Revision 2 of this Management Plan has been prepared in compliance with Condition 706:M16.3 that requires the Management Plan be reviewed and updated on an annual basis.

Ministerial Statement 706 set conditions on the construction and operation of a new quarry that was to replace the original Voyager Quarry, now nominated Voyager I. With the expiry of the licence agreement between the BGC and the landowner, the Operating Licence L5356 for crushing and screening at Voyager I was allowed to expire on 3 October 2010. The new quarry, nominated Voyager II, was commissioned on 24th September 2010 under Operating Licence L8415.

This Management Plan addresses Condition 706:M16 and presents an Operational Noise Measurement Program for mining operations below 5 metres depth.

At the time of this first update (Revision 2) Voyager II Quarry has been through commissioning, start-up and gradual ramping up of operations to the designed production rate; consequently, an update is now appropriate since a year has passed since commissioning. The ownership of Voyager I has now passed to the landowner and the original design strategy for managing Voyager II has now been updated in the light of operational experience.

Revision 2 includes the following changes from Revision 1.

- Current Status of the Voyager I and Voyager II Quarries with updated Figures.
- Inclusion of summary of monitoring results by HAS.

# 2.0 Element/Issue

The aspect to be managed is noise emission levels associated with normal mining activities from 5 metres below ground level. The issue is environmental noise with respect to noise sensitive (residential) locations around the quarry.

Condition 706:M16 prescribes specific processes and noise level criteria to be met. Legal criteria relative to the issue is summarised in Table 2.1 below:

**Table 2.1 – Statutory Criteria**

| Aspect | Title | Applicability |
|---|---|---|
| State Legislation: | Environmental Protection (Noise) Regulations 1997 | All aspects of environmental noise measurement and assessment |
| State Legislation: | Ministerial Statement 706, Condition 16 (Assessment Number 1413) December 2005 | Operational Noise Measurement Program. |
| Department of Environment and Conservation (DEC) | Guideline: Preparing Environmental Management Plans | Preparation of this 'Environmental Noise Management Plan' |

The proposal was for the relocation of the quarry (Voyager I) to an area of land (Lot 14, Figure 3.1) owned by the proponent and lying adjacent and to the west of Voyager I operations. In December 2001, the EPA determined the level of assessment for the proposal at PER, and this level of assessment was subject to a two week appeals process. A number of appeals against the level of assessment were considered by the Minister for the

Environment and dismissed on 1 May 2002. The subsequent PER document was released for public review for a period of eight weeks from 6 January 2003, closing on 3 March 2003. An extension was then provided to allow for further public submissions until April 2003. Following a review of the submissions, the proponent modified its proposal and incorporated details of additional monitoring work (including noise monitoring) and data within its Response to Submissions (URS 2004).

The proposal was approved by the Minister for the Environment with the signing of Ministerial Statement 706 on 16 December 2005. Relevant to this management plan is Condition 16 reproduced below.

Further to a submission by BGC in October 2010 under Section 46 of the EP Act – Statement 872 was issued in August 2011 replacing Condition 706:M6.1 with a new condition that extends the use of the tertiary crushers to 1900 hours on Saturdays.

Condition 16 - Operational Noise

*16-1* *Prior to any excavation works below five metres depth from the surface, the proponent shall prepare an Operational Noise Measurement Programme to ensure that all noise from the quarry is measured in accordance with Part 3 of the Environmental Protection (Noise) Regulations 1997.*

*16-2* *The proponent shall implement the Operational Noise Measurement Programme required by condition 16-1 and any subsequent updates as required by condition 16-3.*

*16-3* *The proponent shall review and update the Operational Noise Measurement Programme required by condition 16-1 annually.*

*16-4* *The proponent shall utilise that form of safety alarm on items of equipment which produces the least noise whilst complying with all statutory requirements, particularly safety requirements.*

*16-5* *The proponent shall report any exceedances of the Environmental Protection (Noise) Regulations 1997, aside from those which meet the requirements of condition 15-6, to the Department of Environment within 24 hours of exceedances being recorded.*

*16-6* *Upon identifying any exceedances of the Environmental Protection (Noise) Regulations 1997, aside from those which meet the requirements of condition 15-6, the proponent shall provide a report, within seven days of exceedances being recorded, to the Department of the Environment on the source/reason for the exceedance, remedial actions undertaken or intended to prevent further such exceedances.*

*16-7* *The proponent shall make the Noise Measurement Programme required by condition 16-1 publicly available.*

# 3.0 CURRENT STATUS

The Voyager II Quarry is on the north side of the Great Southern Highway, about 3.5 km east of the intersection of the Great Eastern and Southern Highways (Figure 1), on Lot 14 Horton Road, The Lakes (Avon Location 1881), Shire of Northam. Figure 3.1 shows the new Voyager II quarry located to the west of Voyager I Quarry.

Development of the Voyager II Quarry will ultimately entail excavation of up to 2 million tonnes of gravel and approximately 12 million tonnes of clay from the quarry footprint. These excavations will allow approximately 60 million tonnes of granite to be quarried from the site over an estimated 50-year period.

The first areas that were quarried are designated Area 1 and Area 2 as shown on Figure 3. In these areas a bench was created at 30 m below the original ground level for locating the processing of quarry product. Areas 3 and 4 (Figure 3) are now the source of ROM material that is fed to the primary crusher. Areas 5 and 6 have been cleared of vegetation and will be subject to overburden removal for quarrying at a future time not yet determined.

**Figure 3.1. Aerial photograph showing Voyager II Quarry located to the immediate west of the now decommissioned Voyager I Quarry** *(from NearMap)*

Figure 3.2 below, from the URS (2004) shows the location of nearby residences. Based on the environmental noise impact assessments undertaken as part of the PER and the supplementary report, dated November 2004, noise levels associated with overburden removal and mining operations below 5 metres, were identified and quantified.

The proposed mining area, subject to overburden removal, was subdivided into areas that would allow better management of noise emissions. The subdivided areas are shown in Figure 3.3 below.

**Figure 3.2. Layout of Voyager I and II & Residential Locations** (*from URS 2004)*

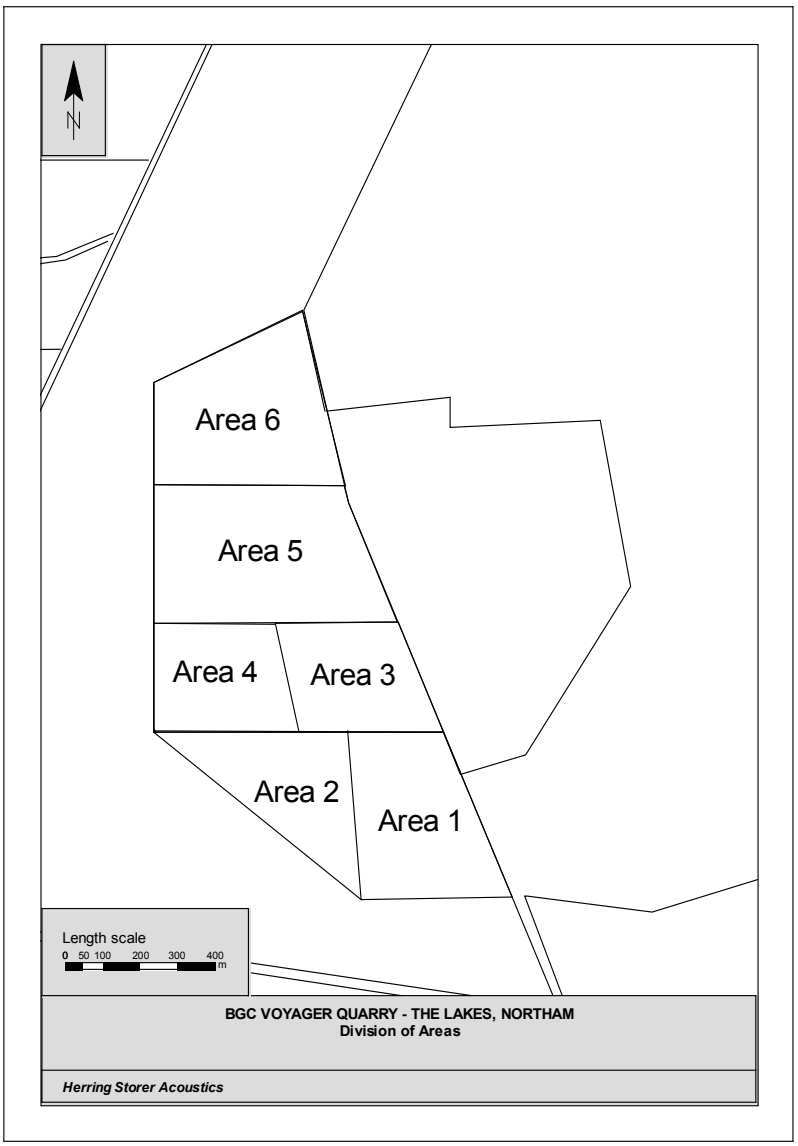


**Figure 3.3. Division of development stages within Voyager II Quarry.**

Computer modelling of noise emissions from the then proposed Voyager II Quarry was based on initial noise monitoring of Voyager I operations. Noise propagation modelling from each of the specific areas to the nearest noise sensitive premises (residential locations) was undertaken in order to predict the likely noise emission levels, for various atmospheric conditions. A summary of the predicted levels is shown in Table 3.1 below, for worst case of overburden removal at below 5 metres for both down wind and calm conditions.

## Table 3.1. Predicted Clearing Operations Noise Levels dB(A)

| | | All Winds | | | | | | Calm | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Res A*** | | | | | | | | | | | | | |
| **Source No.** | **Source Loc** | **Area 3** | **Area 4** | **Area 5** | **Area 6** | **Area 1** | **Area 2** | **Area 3** | **Area 4** | **Area 5** | **Area 6** | **Area 1** | **Area** |
| 2 | 3 x Scrapers Central | 41.0 | 39.2 | 40.4 | 40.6 | 40.6 | | 30.4 | 28.6 | 29.8 | 29.9 | 30.0 | |
| 3 | 3 x Scrapers East | 41.6 | 39.6 | 41.4 | 41.3 | 41.3 | | 31.0 | 29.0 | 30.8 | 30.7 | 30.7 | |
| 1 | 3 x Scrapers North | 41.1 | 39.3 | 40.5 | 40.6 | 40.8 | 39.3 | 30.5 | 28.6 | 29.9 | 30.0 | 30.2 | 28.6 |
| 4 | 3 x Scrapers South | 40.9 | 39.0 | 40.3 | 40.5 | 40.3 | 39.0 | 30.2 | 28.2 | 29.6 | 29.9 | 29.7 | 28.3 |
| 5 | 3 x Scrapers West | 40.6 | 38.7 | 39.6 | 39.9 | 40.0 | 38.5 | 29.9 | 28.0 | 28.9 | 29.2 | 29.3 | 27.8 |
| ***Res B*** | | | | | | | | | | | | | |
| **Source No.** | **Source Loc** | **Area 3** | **Area 4** | **Area 5** | **Area 6** | **Area 1** | **Area 2** | **Area 3** | **Area 4** | **Area 5** | **Area 6** | **Area 1** | **Area** |
| 2 | 3 x Scrapers Central | 43.6 | 43.2 | 46.0 | 48.7 | 41.1 | | 33.2 | 33.0 | 35.7 | 38.5 | 30.5 | |
| 3 | 3 x Scrapers East | 43.7 | 43.4 | 46.3 | 49.2 | 41.1 | | 33.3 | 32.9 | 36.0 | 39.1 | 30.5 | |
| 1 | 3 x Scrapers North | 44.3 | 43.9 | 46.7 | 49.5 | 41.9 | 41.8 | 34.0 | 33.5 | 36.4 | 39.4 | 31.3 | 31.2 |
| 4 | 3 x Scrapers South | 42.9 | 42.5 | 45.2 | 47.8 | 40.2 | 41.0 | 32.4 | 32.0 | 34.8 | 37.6 | 29.6 | 30.4 |
| 5 | 3 x Scrapers West | 43.6 | 43.1 | 45.7 | 48.1 | 41.1 | 41.5 | 33.1 | 32.6 | 35.4 | 38.0 | 30.5 | 30.9 |
| ***Res C*** | | | | | | | | | | | | | |
| **Source No.** | **Source Loc** | **Area 3** | **Area 4** | **Area 5** | **Area 6** | **Area 1** | **Area 2** | **Area 3** | **Area 4** | **Area 5** | **Area 6** | **Area 1** | **Area** |
| 2 | 3 x Scrapers Central | 45.5 | 46.3 | 49.3 | 52.9 | 42.5 | | 35.3 | 36.4 | 39.3 | 43.3 | 32.0 | |
| 3 | 3 x Scrapers East | 45.3 | 46.2 | 48.7 | 52.5 | 42.2 | | 35.0 | 35.9 | 38.7 | 42.8 | 31.7 | |
| 1 | 3 x Scrapers North | 46.4 | 47.2 | 50.1 | 54.1 | 43.4 | 44.1 | 36.2 | 37.0 | 40.3 | 44.7 | 33.0 | 33.7 |
| 4 | 3 x Scrapers South | 44.7 | 45.4 | 48.3 | 51.5 | 41.5 | 43.2 | 34.4 | 35.1 | 38.3 | 41.7 | 30.9 | 32.8 |
| 5 | 3 x Scrapers West | 45.8 | 46.5 | 49.6 | 53.1 | 42.8 | 44.3 | 35.5 | 36.3 | 39.7 | 43.5 | 32.4 | 34.0 |
| ***Res D*** | | | | | | | | | | | | | |
| **Source No.** | **Source Loc** | **Area 3** | **Area 4** | **Area 5** | **Area 6** | **Area 1** | **Area 2** | **Area 3** | **Area 4** | **Area 5** | **Area 6** | **Area 1** | **Area** |
| 2 | 3 x Scrapers Central | 33.4 | 54.2 | 37.2 | 34.4 | 39.3 | | 23.9 | 45.2 | 28.3 | 25.3 | 29.4 | |
| 3 | 3 x Scrapers East | 31.4 | 45.5 | 34.9 | 33.0 | 39.9 | | 21.9 | 36.1 | 25.7 | 23.7 | 29.8 | |
| 1 | 3 x Scrapers North | 32.7 | 44.8 | 36.8 | 33.9 | 38.0 | 42.0 | 23.3 | 35.6 | 28.0 | 24.7 | 28.2 | 32.4 |
| 4 | 3 x Scrapers South | 34.6 | 53.3 | 38.4 | 35.6 | 36.2 | 44.7 | 25.0 | 43.7 | 29.5 | 26.6 | 26.0 | 34.8 |
| 5 | 3 x Scrapers West | 35.8 | 55.5 | 41.9 | 36.9 | 35.6 | 52.5 | 26.3 | 46.2 | 33.4 | 28.1 | 25.7 | 42.8 |
| ***Res E*** | | | | | | | | | | | | | |
| **Source No.** | **Source Loc** | **Area 3** | **Area 4** | **Area 5** | **Area 6** | **Area 1** | **Area 2** | **Area 3** | **Area 4** | **Area 5** | **Area 6** | **Area 1** | **Area** |
| 2 | 3 x Scrapers Central | 32.5 | 49.3 | 31.3 | 29.9 | 32.4 | | 22.6 | 39.7 | 21.8 | 20.3 | 22.3 | |
| 3 | 3 x Scrapers East | 31.1 | 39.5 | 29.3 | 28.5 | 33.2 | | 21.2 | 29.4 | 19.7 | 18.7 | 23.1 | |
| 1 | 3 x Scrapers North | 32.0 | 39.5 | 30.3 | 29.7 | 33.0 | 35.1 | 22.2 | 29.9 | 20.7 | 20.0 | 23.0 | 25.0 |
| 4 | 3 x Scrapers South | 33.0 | 48.7 | 32.3 | 30.0 | 33.1 | 39.9 | 22.8 | 38.7 | 22.8 | 20.4 | 22.9 | 29.7 |
| 5 | 3 x Scrapers West | 34.0 | 50.1 | 35.5 | 31.9 | 32.5 | 48.2 | 24.2 | 40.3 | 26.1 | 22.4 | 22.5 | 38.1 |
| ***Res F*** | | | | | | | | | | | | | |
| **Source No.** | **Source Loc** | **Area 3** | **Area 4** | **Area 5** | **Area 6** | **Area 1** | **Area 2** | **Area 3** | **Area 4** | **Area 5** | **Area 6** | **Area 1** | **Area** |
| 2 | 3 x Scrapers Central | 42.9 | 41.2 | 40.1 | 38.5 | 45.6 | | 32.4 | 30.8 | 29.5 | 27.8 | 35.3 | |
| 3 | 3 x Scrapers East | 43.3 | 41.6 | 40.8 | 38.9 | 46.3 | | 32.8 | 31.1 | 30.1 | 28.1 | 36.0 | |
| 1 | 3 x Scrapers North | 42.2 | 40.7 | 39.7 | 38.1 | 44.7 | 43.0 | 31.7 | 30.1 | 29.0 | 27.3 | 34.2 | 32.6 |
| 4 | 3 x Scrapers South | 43.5 | 41.7 | 40.6 | 39.0 | 46.7 | 43.6 | 33.1 | 31.1 | 30.0 | 28.2 | 36.5 | 33.1 |
| 5 | 3 x Scrapers West | 42.5 | 40.7 | 39.6 | 38.2 | 44.8 | 42.2 | 32.0 | 30.1 | 28.9 | 27.4 | 34.5 | 31.6 |

***Residential locations A to F are shown in Figure 3.***

***Area designations 1 to 6 are shown in Figure 3.2***

# 4.0 POTENTIAL IMPACTS

Potential noise impacts are to several residential locations surrounding the site, the closest of which are shown in Figure 3.2 and are referenced as A to F in Figure 4.1 below.

Resultant noise levels at residential locations, due to overburden removal and mining operations, will be dependent on the location and depth of the area being mined, the amount and type of mining equipment, atmospheric conditions and topography of the specific site. The locations referred are the subject of Condition 706:M16 where it is reaffirmed that noise level limits will be in accordance with the *Environmental Protection (Noise) Regulations 1997*. Figure 4.1 shows a typical noise contour plot of operational noise for Areas 1 and 2.

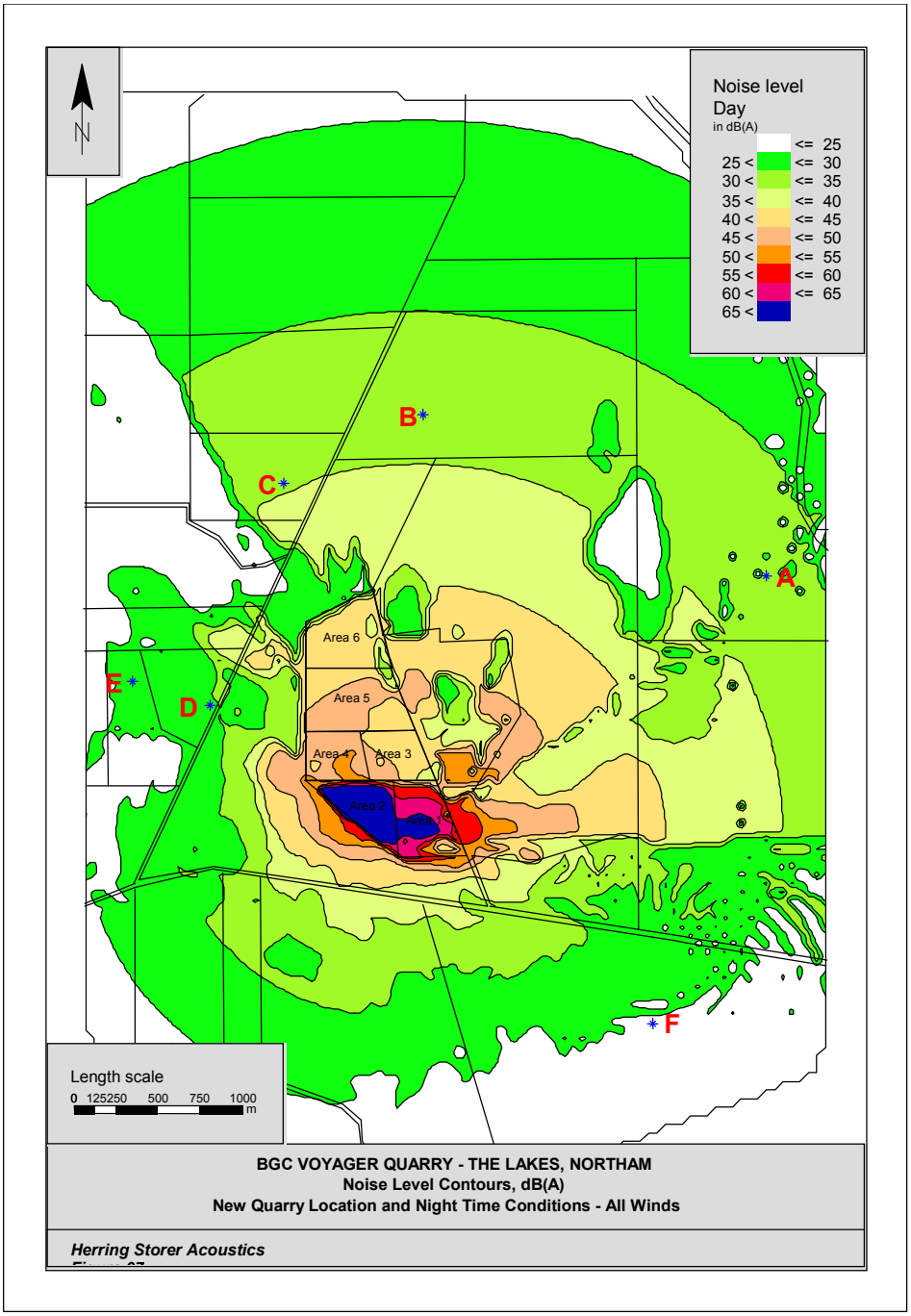


**Figure 4.1 Typical Noise Contour Plot – Stages 1 & 2**

# 5.0 ENVIRONMENTAL OBJECTIVES

The principle environmental objective is to minimise noise emission levels at residential location and to not exceed the stipulated criteria of the Noise Regulations[1]. The assigned levels of Table 1 Regulation 8 of Part 1 of the Regulations is given in Table 5.1 below.

**Assigned Noise Level Criteria**

**TABLE 5.1 - BASELINE ASSIGNED OUTDOOR NOISE LEVEL**

| Premises Receiving Noise | Time of Day | Assigned Level (dB) | | |
|---|---|---|---|---|
| | | $L_{A\ 10}$ | $L_{A\ 1}$ | $L_{A\ max}$ |
| Residential | 0700 - 1900 hours Monday to Saturday | 45 | 55 | 65 |
| | 0900 - 1900 hours Sunday and Public Holidays | 40 | 50 | 65 |
| | 1900 - 2200 hours all days | 40 | 50 | 55 |
| | 2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays | 35 | 45 | 55 |

Note: $L_{A10}$ is the noise level exceeded for 10% of the time.
$L_{A1}$ is the noise level exceeded for 1% of the time.
$L_{Amax}$ is the maximum noise level.

Noise Character: The above levels are conditional on no annoying characteristics existing in the noise of concern, such as tonality, amplitude modulation or impulsiveness. If such characteristics exist and cannot be reasonably removed then any measured level is adjusted according to Table 5.2 below.

**TABLE 5.2 - ADJUSTMENTS TO MEASURED SOUND LEVELS**

| Where tonality is present | Where modulation is present | Where impulsiveness is present |
|---|---|---|
| +5 dB(A) | +5 dB(A) | +10 dB(A) |

Note: these adjustments are cumulative to a maximum of 15 dB.

Influencing Factor: The various residential locations around the site do not have any significant roads or particular land zonings within 450m that will result in an influencing factor; hence the assigned levels will be as per the baseline levels in Table 5.1. However, it is worth noting that recording noise emissions from the quarry near residences are difficult to achieve due to high ambient noise levels.

# 6.0 PERFORMANCE INDICATORS/CRITERIA

Indicators of performance and achievement of the objectives will be the measurement of the noise level parameters at or near noise sensitive premises.

# 7.0 IMPLEMENTATION STRATEGY

Overburden Removal has been completed for Areas 1, 2, 3 and 4.

Areas 5 and 6 which remain to have overburden removed and mining will be addressed specifically to ensure the best locations of monitoring equipment.

The assessment will also consider the duration as well as the level of noise, in order to minimise any impacts.

[1] The regulations as at 7th November 2003. Amended regulations (Draft 6) due to be promulgated in the second half of 2012 are unlikely to change assigned noise levels or adjustments required for Voyager II Quarry.

In addition to fixed noise data loggers monitoring will be conducted in the initial stages of each area mining. As a minimum, measurements and observations will be made by an experienced person capable of quantifying and assessing environmental noise. This will also be a condition stipulated in the mining plan.

# 8.0 MONITORING

## 8.1 Monitoring Proposal

Two permanent automatic noise level monitors are operational at Voyager II Quarry. One logger is located relatively close to the nearest premises to the West of the site. The other logger is semi-portable and is located appropriately, based on initial measurements.

Revision 1 of this management plan committed to conduct noise monitoring at the start of mining operations for each of Areas 1&2, 3 & 4 and 5 &6.

Mining operations have now been completed for Areas 1 & 2 and are now active in Areas 3 & 4. Noise monitoring for mining within Areas 5 & 6 will be conducted at a future date after overburden has been removed. Monitoring will be through observation and measurement by experienced persons using equipment and methods consistent with current *Environmental Protection (Noise) Regulations 1997* and with Australian Standard 1055.1-1989 (amended regulations are due to be released in 2012).

Noise level recordings will be made as near as possible to the selected residential locations; however, experience to date during noise monitoring operations has shown that ambient noise in the area may preclude quantification of the mining noise at these locations.

Should noise level monitoring at residential locations show that mining noise does not contribute to an increase in ambient noise levels or characteristics, then the objectives will be considered to be achieved and reference will be made to the fixed loggers, located closer to the operations.

Initial stages of mining will also be subject to measurement in the relatively near field, where equipment noise dominates, and this data used for calibration checks of the predictive modelling. Base parameters to be measured will be:

LA10 and LA1 values over a 1 hour period.

LAmax values during the 1 hour period.

A reasonable assessment of compliance can be made at the time of the initial monitoring and remedial actions taken if necessary. Results of the monitoring will be summarised and forwarded to OEPA.

## 8.2 Monitoring to Date

HSA consultancy was engaged to conduct monitoring of mining operations for the following:

**October 2010 – Operational Activities**

Monitoring was conducted at Residence D (Figure 4.1) using a directional microphone over a period of ten days while mining activities were underway and with all crushers operational. HSA also used the data to predict night time noise emissions assuming similar emissions to the day operations. HSA conclusions are reproduced below.

> Estimations of noise emissions associated with the primary crusher exceed the Assigned Noise Levels by 2 dB for the evening period and 7 dB for the night, if the quarry was operational at these times.
>
> Tertiary crusher estimated noise levels are considered to exceed the night period Assigned Noise Levels by 5 dB, if the quarry was operational at these times.

Noise levels associated with the quarry have not been able to be accurately defined during the monitoring period due to background noise levels originating from the direction of the quarry and insufficient noise level data during appropriate periods of wind and operational conditions.

It is recommended that further noise monitoring, ideally during evening/night period trial operations, be conducted to more accurately define noise level emissions associated with the quarry.

### 8.3 Monitoring Conclusion

Noise monitoring has confirmed that the Voyager II Quarry was compliant with Noise Regulations during mining operations for Areas 1 &2 and Areas 3 &4 when material movement and crushing and screening is in operation. Significantly, the acoustic consultants recommended additional monitoring to confirm noise emission during evening and night time operations. It may now be assumed that the predictive modelling shown in Table 3.1 was conservative in that it overestimated the noise impacts at residences under certain conditions and operations.

## 9.0 CONTINGENCIES

The following contingency planning was included in Revision 1.

Management of noise emissions from the mining activities will be reactive, in that any non conformance indicated by the initial noise level monitoring will result in immediate modification of the mining process. If non conformance is indicated then a review of the predictive modelling will be triggered.

Initial staged of overburden removal will be subject to detailed monitoring to allow consideration of modifying the process should noise exceedances occur. Modifications that can be considered are, reducing the number of items of equipment or varying the type of equipment or considering restricting operations to certain wind direction and strength conditions.

Fixed monitor data will be reviewed daily with any excursions noted, investigated and reported to DEC as per section 16.5 and 16.6 of Ministerial Statement 706.

## 10.0 Noise Abatement Infrastructure

Table 10.1 lists specific noise abatement infrastructure that was built into the design of the Voyager II Quarry. Since the completion of the construction of the operations area, additional infrastructure has been installed since the publication of Revision 1 of this document. These include:

- Conveyor belt strips installed on the opening to the primary crusher ROM Bin.
- East side of primary-crusher building has been enclosed using foil-backed R2 insulation backing.
- Tertiary crushers have been enclosed using foil-backed R2 insulation backing.
- A bund is under construction on the western side of the Voyager II Quarry boundary in between the primary crusher and nearest residences. The height of the bund will additionally attenuate noise emissions from the operations area. Additionally, the bund will be planted out with trees and shrubs to further improve noise attenuation.

BGC is confident that the above medications, together with the infrastructure listed in Table 10 will ensure that quarry operations will be compliant with the Noise Regulations at all times, day or night.

**Table 10.1 Noise control infrastructure built into Voyager II Quarry**

| Component | Any improvements to noise control? |
|---|---|
| Operations Area | Operations Area constructed on a platform mined to a level 30m below original ground level. |
| Haul Pak dumping into ROM Bin | ROM Bin is inside primary building hence noise of tipping will be reduced by containment inside the building |
| Rom Bin | Mounted on concrete structure rather than steel – reduces vibration of system and hence reduces noise |
| Apron Feeder beneath ROM Bin | |
| Vibrating Grizzly | |
| Vibrating Grizzly Undersize Chute | Fully rubber lined to absorb flow and impact noise |
| Jaw Crusher | Mounted on concrete structure rather than steel – reduces vibration of system and hence reduces noise |
| Discharge conveyor from Jaw Crusher | Contained within below-ground concrete vault that reduces noise escaping from building |
| Primary crushing building | Foil-backed R2 insulation used on external walls will reduce noise escaping building |
| Conveyors in secondary screening area | general noise improvements from having new and refurbished conveyor components which will run smoother and quieter than older items |
| 5 off Screens | All fitted with rubber screen decks which will be quieter than existing quarry screens which have metal decks.<br>All fitted with rubber dust covers which will further reduce noise escaping from the unit. |
| Screen discharge chutes | All are rubber lined to reduce noise of material flow and impact. |
| 3 off Cone Crushers | All mounted on concrete structures rather than steel which will reduce vibrations and hence reduce noise.<br>All fitted with new motors which should run quieter than older motors on existing quarry. |

# 11.0 STAKEHOLDERS CONSULTATION

A Community Liaison Group was established in accordance with the requirements of Condition 706:M19. The Liaison Group includes representation by Local Government, local residents and government agencies who have committed to attending Liaison Group meetings.

# 12.0 REPORTING

The following was included in Revision 1 of the Management Plan.

Within three months of the completion of the first phase of mining operations, a report will be provided to the DEC providing an outline of compliance with this Noise Management Plan. Thereafter, a summary report will be required every twelve months following completion of overburden removal.

The experience gained during the first phase of the operations for Areas 1 and 2 will be documented and reported to the DEC Audit Branch in the first annual report as required by Condition 706:M5.1.

Following completion of all clearing operations, a report will be provided within 12 months.

# 13.0 KEY MANAGEMENT ACTION TABLE

The pre-mining section of this table is to be completed prior to initiating work in any specific area.

Area (1 and 2) Overburden Clearing – Environmental Noise

Objective Noise Level Limits at residential locations:

**Table 13.1 Noise Level Criteria**

| Type of premises receiving noise | Time of day | Assigned level (dB) | | |
|---|---|---|---|---|
| | | $L_{A\,10}$ | $L_{A\,1}$ | $L_{A\,max}$ |
| Noise sensitive premises at locations within 15 metres of a building directly associated with a noise sensitive use | 0700 to 1900 hours Monday to Saturday | 45 | 55 r | 65 |
| | 0900 to 1900 hours Sunday and public holidays | 40 | 50 | 65 |
| | 1900 to 2200 hours all days | 40 | 50 | 55 |
| | 2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays | 35 | 45 | 55 |
| Noise sensitive premises at locations further than 15 metres from a building directly associated with a noise sensitive use | All hours | 60 | 75 | 80 |
| Commercial premises | All hours | 60 | 75 | 80 |
| Industrial and utility premises | All hours | 65 | 80 | 90 |

The above levels are conditional on no annoying characteristics existing in the noise of concern, such as tonality, amplitude modulation or impulsiveness. If such characteristics exist and cannot be reasonably removed then any measured level is adjusted according to Table 5.2.

## Table 13.2 Key Management Action Table

| Issue | Management Action | Responsibility | Reporting | Status |
|---|---|---|---|---|
| Pre-mining Operations Below 5 metres | Mine Plan including:<br>• Equipment Numbers<br>• Equipment Types<br>• Equipment Locations<br>• Area Topography | BGC Planners | Internal | |
| | Noise Modeling<br>Prediction of resultant noise levels at nominated residential locations for various weather condition scenarios. | BGC Environmental | Internal<br>DEC | |
| | Schedule Monitoring | BGC Environmental | | |
| Start of Operations Below 5 metres | Monitor resulting noise levels, as near as practicable, at residential locations, log wind conditions | BGC Environmental | DEC | |
| During Operations Below 5 metres | If initial monitoring indicates potential exceedances, conduct further monitoring during operations | BGC Environmental | DEC | |
| On-going | Analysis of monitoring data and assessment of conformance | BGC Environmental | DEC | |

## 14.0 REFERENCES

Herring Storer Acoustics (May 2007). Overburden Removal Areas 1 and 2 Voyager Quarry, The Lakes, Western Australia – Acoustic Monitoring May 2007 ref 7525-1-06144-01

Herring Storer Acoustics (Sept 2007). Voyager Quarry, The Lakes, Western Australia. Overburden Removal Ares 3 and 3. Noise Level Monitoring September 2007 ref 8080-2-06144-01

Herring Storer Acoustics (Oct 2010). Voyaber Quarry 2, The Lakes, Western Australia. Noise Impact Assessment. Ref 12532-1-06144.

## 15.0 LIMITATIONS

Revision 2 of this report was prepared in accordance with the usual care and thoroughness of the consulting profession for the use of BGC (Australia) Pty Ltd. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report.

The methodology adopted and sources of information are outlined in this report. No independent verification of this information beyond the agreed scope of works and the author assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to the author was false.

This report was revised in the month of September 2011 and is based on the conditions encountered and information reviewed at the time of preparation. The author disclaims responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

# Attachment 1

# BGC Voyager II Complaint Report Form

# BGC Quarries Complaint Report

**Noise ☐ Dust ☐ Blast ☐**

| Complaint Description | Complaint Number | Number of Complaints | Complaint received | Complaint by | Date of event | Time of Event |
|---|---|---|---|---|---|---|
| | | | | | | |

## Weather Details

| Wind Direction | Wind Speed | Ambient temperature | Humidity level | Dew Point |
|---|---|---|---|---|
| | | | | |

Wind Direction, Temperature, Dew point and Humidity Data gathered from Bureau of Meteorology Yes (attach) ☐ No ☐

## Voyager II Operations running at time

| Primary Plant | | Tertiary Plant | | Load out | | Pit operations | | Other: | |
|---|---|---|---|---|---|---|---|---|---|
| Yes ☐ | No ☐ | Yes ☐ | No ☐ | Yes ☐ | No ☐ | Yes ☐ | No ☐ | Yes ☐ | No ☐ |

## Noise Levels

| Time | Location | Was the level over the prescribed limit at location of event when calculated from Horton Rd Noise monitor | Was there audio recording available and listened to. |
|---|---|---|---|
| | | Yes ☐ No ☐ | Yes ☐ No ☐ |

**Were BGC Noise Levels Compliant at time of the event Yes ☐ No ☐**

## Blasting

| Baseline reading taken 5 mins prior to blast | Dust level at blast time from baseline | Dust level 2 mins after blast from baseline | Dust level 5 mins after blast from baseline | Dust level 10 mins after blast from baseline | Dust level 15 mins after blast from baseline |
|---|---|---|---|---|---|
| Yes ☐ No ☐ | Increase ☐<br>same ☐<br>decrease ☐ | Increase ☐<br>same ☐<br>decrease ☐ | Increase ☐<br>same ☐<br>decrease ☐ | Increase ☐<br>same ☐<br>decrease ☐ | Increase ☐<br>same ☐<br>decrease ☐ |

| **Did ground vibration breach limit of 10mm/s** | | | **Did air overpressure breach limit of 125dBl's** | | |
|---|---|---|---|---|---|
| Horton Road | Paddock | Other: | Horton Road | Paddock | Other: |
| Yes ☐ No ☐ | Yes ☐ No ☐ | Yes ☐ No ☐ | Yes ☐ No ☐ | Yes ☐ No ☐ | Yes ☐ No ☐ |

**Were BGC Blast Levels Compliant at time of the event Yes ☐ No ☐**

## Visible Dust levels

| Time | Location 1 | Location 2 | Location 3 | Location 4 | Location 5 | Location 6 |
|---|---|---|---|---|---|---|
| | High ☐<br>Low ☐<br>None ☐ | High ☐<br>Low ☐<br>None ☐ | High ☐<br>Low ☐<br>None ☐ | High ☐<br>Low ☐<br>None ☐ | High ☐<br>Low ☐<br>None ☐ | High ☐<br>Low ☐<br>None ☐ |

| Was Access Rd TEOM 24 hr average within the standard of 50mg/m3 | Was Horton Rd TEOM 24 hr average within the standard of 50mg/m3 |
|---|---|
| Yes ☐ No ☐ | Yes ☐ No ☐ |

**Were BGC Dust Levels Compliant at time of the event Yes ☐ No ☐**

Observations/Comments:

Please attach any other information gathered ie photos and graphs.