Hanson Bass Point Quarry Project | April 2017

SECTION 75W PLANNING ASSESSMENT REPORT

MODIFICATION 1 (PART B)- MAJOR PROJECT APPROVAL 08_0143- ATTENDED NOISE MONITORING

Report prepared by	
Name	Andrew Driver
Qualifications	B.Eng (Civil), MBA (PM)
Address	Level 18, 2-12 Macquarie Street, Parramatta NSW
In respect of	The subdivision and redevelopment of the Hanson Concrete and Asphalt Facility Eastern Creek.
Development application	DP&E Reference MP 08_0143
Applicant name	Hanson Construction Materials Pty Ltd
Applicant address	Level 18, 2-12 Macquarie Street, Parramatta NSW NSW 2150
Land to be developed	Bass Point Tourist Rd, Shellharbour NSW
Lot number DP/MPS vol./fol., Etc of Proposed development	Site is defined as Lot 22 in DP1010797
Certificate	I certify that I have prepared the contents of this Statement and to the best of my knowledge. This submission has being prepared as the mandated environmental assessment under the provisions of Section 75W of the EP&A Act 1979. It contains all available information that is relevant to the environmental assessment of the development to which the statement relates It is true in all material particulars and does not, by its presentation or omission of information, materially mislead.
Signature	
Name	Andrew Driver
Date	26 April 2017

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1 THE PROPONENT

Bass Point Quarry is owned and operated by Hanson, which is part of the, HeidelbergCement Group. Hanson is a major supplier of aggregates, sands and premixed concrete to the civil, industrial, residential, and commercial construction industries. Hanson and its subsidiaries operate over 70 quarries and more than 300 concrete plants throughout Australia, employing over 3000 people nationwide. Hanson operates to ISO/AS 14001 to reduce the impact its operations have on the environment. BPQ has an Environmental Management System in place and strives for continual improvement in all aspects of its environmental performance.

BPQ operates to a mine plan and is externally accredited by British Standards Institution (BSI) Group to AS14001 for its Environmental Management System, AS4801 for its Safety.

2 BACKGROUND

Hanson Construction Materials Pty Ltd (Hanson) has prepared this submission under the Section 75W Planning Assessment Report which accompanies an application made pursuant to Section 75W of the Environmental Planning and Assessment Act 1979 to modify MP 08_0143 According to a Fact Sheet entitled “Arrangements for projects remaining under Part 3A pending its repeal”, of May 2011 (Source: Department of Planning & Infrastructure website, 16 November 2011):

“Projects which have been determined under Part 3A can continue to be modified under section 75W of the EP&A Act.”

In January 2014, the Minister for Planning and Infrastructure, under delegation issued Major Project Consent MP 08_0143 under Section 75J of the EP&A Act.

The project involves continued operations at the quarry until 2044, to extract and process up to 69 million tonnes of hard rock by deepening extraction to a maximum depth of -40 m AHD. The approved project involves:

- extracting Latite from two pits (western and eastern extraction areas) and increasing the total approved extraction area from 87 to 111 hectares, located entirely within the existing quarry disturbance footprint;
- increasing maximum annual production to 4 Mtpa of quarry products;
- transporting up to 3 Mtpa of quarry products by road and 1 Mtpa by ship;
- decommissioning the existing processing facility and installing a new processing facility between the two extraction areas, at a lower level within the quarry compared with the current facility;
- relocating the concrete plant and administration buildings and constructing additional amenity bunds along the northern boundary of the site; and
- progressively rehabilitating the site

3 INTRODUCTION

Hanson Construction Materials Pty Ltd (Hanson) currently owns and operates the Bass Point Quarry (BPQ), In the Illawarra Region approximately 2 kilometres south of the town of Shellharbour in the Shellharbour Council (Council) Local Government Area (LGA), refer to Figure 1.

This environmental assessment (EA) has been prepared to accompany a modification application to the existing development consent for the quarry (Major Project Consent MP 08_0143).

It is proposed to make minor modifications to the construction of amenity bunds along the northern boundary of the site to allow for a suitable level area on which to locate and construct the quarry office and amenities.

This proposed modification is sought under Section 75W of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act).

Figure 1- Bass Point Quarry Location

4 PROPOSED MODIFICATION

It is proposed to make the following modifications to Major Project Consent MP 08_0143:

In **Appendix 6- NOISE COMPLIANCE ASSESSMENT.**

Compliance Monitoring

Replace;

3. Unless otherwise agreed with the Director-general, monthly attended monitoring is to be used to evaluate compliance with the relevant conditions of approval.

With;

3. Unless otherwise agreed with the Director-general, attended monitoring as detailed in the Noise Management Plan is to be used to evaluate compliance with the relevant conditions of approval.

5 WORK UNDERTAKEN IN RELATION TO THE PROJECT APPROVAL

5.1 Detailed Survey

In accordance with conditions of consent a detailed site survey was submitted to the Minister for Planning and Environment (Minister).

5.2 Environmental Management Plans

In accordance with conditions of consent Environmental Management Plans including; Noise, Air Quality, Water, Soil and Erosion were submitted to the Minister.

5.3 Environment Management Strategy

In accordance with conditions of consent an Environmental Management Strategy was submitted to the Minister.

5.4 Monthly Noise Monitoring

In accordance with conditions of consent the quarry conducts monthly noise monitoring.

6 JUSTIFCATION FOR THE MODIFICATION OF EXISTING APPROVALS

6.1 Monthly Monitoring Demonstrates Continual Compliance

The quarry operates under an approved Noise Management Plan as required by the conditions of consent. In order to check compliance, noise measurements are carried out monthly at the closest monitoring locations (R4, R5, R6, R7, R8, R9, R11 and R12) identified in Table 2, Schedule 3 of the conditions of consent. This noise monitoring is conducted by Harwood Acoustics and copies of the monthly noise monitoring reports are included in Appendix 1 of this document.

The noise monitoring conducted by Harwood Acoustics over the last six months has indicated that the quarry's noise emissions comply with the acceptable noise levels prescribed in the conditions of consent. The results are summarised in Table 1 below.

Table 1- Summary of Noise Compliance Findings of Monthly Noise Monitoring

Location / Description	Complies (Yes/No)				
	October 2016	November 2016	December 2016	January 2017	February 2017
R4	Yes	Yes	Yes	Yes	Yes
R5	Yes	Yes	Yes	Yes	Yes
R6	Yes	Yes	Yes	Yes	Yes
R7	Yes	Yes	Yes	Yes	Yes
R8	Yes	Yes	Yes	Yes	Yes
R9	Yes	Yes	Yes	Yes	Yes
R10	Yes	Yes	Yes	Yes	Yes
R11	Yes	Yes	Yes	Yes	Yes
R12	Yes	Yes	Yes	Yes	Yes

As shown in Table 1, the quarry has 100% compliance at all the nearest receivers.

6.2 Future Noise Amelioration Measures

As demonstrated in section 6.1 the quarry currently complies with the required noise level the nearest receivers. This compliance is currently being achieved with the existing quarry processing plant and infrastructure and does not take into consideration the improvements to the quarry that will provide further mitigations measures for noise attenuation.

The condition of consent also allows for a new state of the art replacement processing plant. This processing plant will generate lower levels of noise emissions. Furthermore the new plant will be located centrally within the quarry limits and at a reduced elevation below the perimeter noise mounds. This feature will further enhance the quarry's overall performance in attenuating noise emissions.

6.3 Adjustments can be made to the Noise Management Plan

The quarry is required to prepare and implement a Noise Management Plan (NMP) to the satisfaction of the Secretary. The NMP is required to include a monitoring program that:

- *is capable of regularly evaluating the performance of the project, including noisy individual items of plant, such as haulage trucks, crushers and bulldozers;*
- *includes a protocol for determining any exceedances of the relevant conditions in this approval at locations listed in Table 2; and*
- *evaluates and reports on the effectiveness of the noise management system on site*

The NMP can be adjusted accordingly to the level of monitoring that will ensure the quarry is complying with the relevant conditions of consent.

7 COMPLIANCE WITH DEVELOPMENT APPROVAL

Compliance with the Major Project Consent MP 08_0143 is detailed in Table 1 below.

Table 2- Compliance with MP08_0143

Cond. No.	Requirement (Summary) Condition/Commitment	Compliance (Yes/No)	Comments/Observations/ Supporting documentation
	Administrative		
Sch 2 Cond 6	***Staged Extraction*** *The Proponent shall not carry out quarrying operations:* *(a) below 0 m AHD without prior written approval from the Director-General under condition 23 of Schedule 3: and* *(b) below - 40 m AHD at any stage of the project.*	Yes	No operations are being undertaken below 0 metres AHD.
Sch 2 Cond 7	***Extractive Material Transport*** *The Proponent shall not permit to be transported from the site:* *(a) more than 4 million tonnes of quarry products in any calendar year; or* *(b) more than 3 million tonnes of quarry products by road in any calendar year.*	Yes	1/1/2015 – 31/12/2015 – 1,385,064 tonnes 2016 – 1,520,318 tonnes
Sch 2 Cond 8	***Transport of Products*** *The Proponent shall limit the dispatch of trucks carrying quarry products or concrete from the site to the levels shown in Table 1.*	Non-Compliant (Low)	1/1/2015 – 31/12/2015 – a number of N-C identified whereby a no of trucks was exceeded b/w 5-7am. New system has been implemented to address future non-compliances. Official caution issued 5/9/16 regarding truck exceedances SAP currently under review to

			better manage split loads.
Sch 2 Cond 9	***SURRENDER OF CONSENTS*** *By the end of June 2014, or as otherwise agreed by the Director-General, the Proponent shall surrender all development consents for existing operations on the site in accordance with Section 104A of the EP&A Act.*	Non-Compliant (Administrative)	2015 DPE compliance audit: no formal notice of surrender was provided to DPE. Hanson advised that formal notice can be provided, if required. Notice to Council dated 6 July 2016, provided to DPE 6/9/16.
Sch 2 Cond 14	*By 31 May 2014, the Proponent shall submit in writing to Council a proposed road maintenance contributions rate for the project, based on the:* *(a) sections of Buckleys Road and Dunmore Road and associated intersections to be used by trucks transporting quarry products from the site;* *(b) proportion of project-related trucks in the total trucks using these roads and intersections;* *(c) projected maintenance requirements for these roads and intersections for the life of the project; and* *(d) value of other works-in-kind proposed to be undertaken by the Proponent, such as the donation of road base material to be used in maintenance of these roads and intersections.* *Within 28 days of receiving Council's submission on the proposed contributions rate, the Proponent shall submit to the Director-General for consideration its proposed contributions rate, which includes justification for the proposed rate taking into consideration Council's submission.* *Following receipt of the Proponent's proposed contributions rate, the Director-General shall, in consultation with the Proponent and Council, determine the contributions rate to be applied for the project.*	Non-Compliant (Administrative)	Proposed road maintenance contributions rate submitted to Council 6/6/14, approved 2/3/16. Proposed contributions rate submitted to DPE 7/7/16, approved 8/7/16.

Cond. No.	Requirement (Summary) Condition/Commitment	Compliance (Yes/No)	Comments/Observations/ Supporting documentation
	Auditing		
Sch 5 Cond 9	*By 30 June 2014, and every 3 years thereafter, unless the Director-General directs otherwise, the Proponent shall commission and pay the full cost of an Independent Environmental Audit of the project. This audit must:* *(a) be conducted by suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Director-General;* *(b) include consultation with the relevant agencies;* *(c) assess the environmental performance of the project and whether it is complying with the relevant requirements in this approval and any relevant EPL and/or Water Licence (including any assessment, plan or program required under these approvals);* *(d) review the adequacy of any approved strategy, plan or program required under the these approvals; and* *(e) recommend measures or actions to improve the environmental performance of the project, and/or any assessment, plan or program required under these approvals.* *Note: This audit team must be led by a suitably qualified auditor and include experts in any fields specified by the Director-General.*	Non-Compliant (Administrative)	Last Audit undertaken in August 2015. The IEA was not completed on time in accordance with Condition 9 of Schedule 5 which was identified in the IEA. Non-compliance issues identified with air quality (dust), and transport. Also, an administrative non-compliance was identified for environmental management plans. Administrative non-compliances were recorded for the following conditions: • Schedule 2 Condition 9 – Surrender of Consents • Schedule 2 Condition 13 – Road maintenance Consent was surrendered on 6 July 2016, provided to DPE 6/9/16. Proposed contributions rate submitted to DPE 7/7/16, approved 8/7/16. Real time PM10 and TSP monitors were relocated. Revised Air MP submitted to DPE 16/9/16.

Cond. No.	Requirement (Summary) Condition/Commitment	Compliance (Yes/No)	Comments/Observations/ Supporting documentation
	Reporting		

Sch 5 Cond 4	*By the end of March each year, the Proponent shall review the environmental performance of the project to the satisfaction of the Director-General. This review must:* *(a) describe the development (including rehabilitation) that was carried out in the previous calendar year, and the development that is proposed to be carried out over the current calendar year;* *(b) include a comprehensive review of the monitoring results and complaints records of the project over the previous calendar year, which includes a comparison of these results against:* *• the relevant statutory requirements, limits or performance measures/criteria;* *• the monitoring results of previous years; and* *• the relevant predictions in the EA;* *(c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;* *(d) identify any trends in the monitoring data over the life of the project;* *(e) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and* *(f) describe what measures will be implemented over the current calendar year to improve the environmental performance of the project.*	Non-Compliant (Administrative)	The last Annual Review (AR) is dated 30 April 2016, required to be resubmitted by 6/9/16, submitted on 9/9/16. Condition 4 of Schedule 5 requires that the AR is submitted by the end of March each year. The AR submission was therefore non-compliant with this condition. It should be noted that the proponent applied by email on 11 March 2016 for an extension on the submission date for the AR, to which the Department was not able to grant the extension and therefore the original submission date of 31 March still applies and therefore a noncompliance was triggered in relation to Condition 4 of Schedule 5. Status of actions requested as part of DPE AEMR review: · Update website to include link to EPL; · Install real time PM10 and TSP monitors; · Undertake noise monitoring in accordance with approval; · Check the new traffic counting system effectiveness. PIN issued 6/9/16 re noise monitoring Official caution issued 5/9/16 re truck despatch

Cond. No.	Requirement (Summary) Condition/Commitment	Compliance (Yes/No)	Comments/Observations/ Supporting documentation
	Management Plans		
Sch 5 Cond 3	*The Proponent shall ensure that the Management Plans required under this approval are prepared in accordance with any relevant guidelines, and include:* *(a) detailed baseline data;* *(b) a description of:* *· the relevant statutory requirements (including any relevant approval, licence or lease conditions);* *· any relevant limits or performance measures/criteria; and* *· the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures;* *(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;* *(d) a program to monitor and report on the:* *· impacts and environmental performance of the project; and* *· effectiveness of any management measures (see (c) above);* *(e) a contingency plan to manage any unpredicted impacts and their consequences;* *(f) a program to investigate and implement ways to improve the environmental performance of the project over time;* *(g) a protocol for managing and reporting any:* • *incidents;* • *complaints;* • *non-compliances with statutory requirements; and* • *exceedances of the impact assessment criteria and/or performance criteria; and* *(h) a protocol for periodic review of the plan.* *Note: The Director-General may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.*	Yes	

8 CONCLUSION

This modification submission seeks to modify the current level of noise monitoring required to check that the quarry is fully compliant with the noise level criteria imposed through the quarry's conditions of consent.

Given that the monthly noise monitoring has constantly demonstrated 100% compliance at all the nearest noise receivers there is justifiable grounds that reducing the level of monitoring would not pose a risk to the local environment.

Further, the project's NMP allows for the adjustment of the level of noise monitoring required to ensure that the quarry is adequately checked for compliance with the conditions of consent.

APPENDIX 1
HARWOOD ACOUSTIC REPORTS

HARWOOD ACOUSTICS
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Environmental Noise Compliance Assessment Bass Point Quarry

1 Bass Point Quarry Road,

Shellharbour, NSW 2529

Prepared for:-

Hanson Construction Materials Pty Ltd
Locked Bag 5260
Parramatta NSW 2124

Attention: Mr Steve Butcher

Reference: 1702010E-R

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1. INTRODUCTION AND SUMMARY

Hanson Construction Materials Pty Ltd currently operates the Bass Point Quarry at 1 Bass Point Quarry Road, Shellharbour, NSW (the Quarry).

The Quarry is located at the eastern end of Bass Point Quarry Road adjacent to the Killalea State Park. The nearest residences are located toward the north west and west in the village of Shell Cove as shown in Figure 1.

The Quarry operates 24 hours per day, seven days per week under Project Approval 08_0143 issued by the Minister for Planning and Infrastructure on 28 January 2014 (the Approval).

It is a requirement of the Approval that monthly environmental noise compliance monitoring is undertaken. Schedule 3 of the Approval provides specific noise criteria that must be met at specifically identified receptor locations whilst the Quarry is operating. Appendix 6 of the Approval provides guidelines and requirements in relation to compliance noise monitoring methodology.

This report addresses those requirements. The author visited the site and all residential receptors on Monday 27 February 2017 to undertake attended noise compliance monitoring.

Noise measurements were taken in accordance with the requirements of the Approval and the level of noise emission from the operation of the Quarry was found to be well below acceptable noise limits at all receptor locations as detailed in this Report.

2. SITE AND DEVELOPMENT DESCRIPTION

2.1 Site Description

The Quarry is located adjacent to the Killalea State Park at the eastern end of Bass Point Quarry Road as shown in Figure 1 below.

The closest receptors to the site are located in Shell Cove to the north west and west of the Quarry. The nearest potentially affected residential receptors identified in the Approval are also shown in Figure 1 and as follows:-

R4 – Sloop Avenue (cnr Cutter Parade)

R5 – Apollo Drive (cnr Clipper Avenue)

R6 – 1 Makaha Way

R7 – 44 Mystics Drive

R8 – 29 Hinchinbrook Drive

R9 – 23 Magnetic Ridge

R11 – 7 Joondalup Parkway

R12 – 3 Ranfurlie Parkway

Figure 1. Location Plan – Bass Point Quarry, Shellharbour, NSW *(source: Google Maps © 2016)*

2.2 Development Description

Hanson's Bass Point Quarry is an extractive industry (hard rock quarry) supplying a range of products for projects such as building railways, roads, bridges, dams, airports, etc.

Primary activities at the site include the extraction, crushing, sorting and despatching of construction aggregates and this involves the use of the following plant and equipment:-

- Front end loader & dump truck (face loading)
- Vibrating Screens for each crusher
- Additional Front End Loader x 2 (despatch)
- Primary Jaw Crusher x 1 & Secondary Cone Crushers x 2
- Despatch truck movements

The above listed plant and machinery typically operates up until approximately 10 pm and constitutes full operation of the site. From approximately 10 pm the majority of operations cease with the exception of the secondary crushing plant and despatch loaders and trucks.

3. NOISE CRITERIA

Project specific noise limits and compliance testing conditions and methodology are derived from the Approval, and are as follows.

3.1 Acceptable Noise Limits

Schedule 3, Clause 3, Table 2 of the Approval sets noise criteria for each receptor location. Table 2 of the Approval is replicated in Table 1 below.

Table 1 Noise Criteria (Project Approval, Schedule 3 - Table 2)

Location	Day / Evening	Night	
	($L_{Aeq,\ 15\ min}$)	($L_{Aeq,\ 15\ min}$)	($L_{A1,\ 1\ min}$)
R4	44	44	54
R5	45	45	55
R6	42	42	52
R7	41	41	51
R8	35	35	45
R9	35	35	45
R11	45	45	55
R12	45	45	55
Any residential property within the Shell Harbour Marina Precinct	48	8	58
Shell Cove Primary School (when in use)	$L_{Aeq,\ 1\ hour}$ 40 (internal)	Not Applicable	

"Notes:

Noise generated by the project is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 6 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

However, these criteria do not apply if the Proponent has a written agreement with the relevant landowner to exceed the criteria, and the Proponent has advised the Department in writing of the terms of this agreement."

3.2 Noise Compliance Assessment Methodology

Appendix 6 of the Approval provides conditions and assessment methodology that is to be adhered to during noise compliance monitoring, and states:-

"<u>Applicable Meteorological Conditions</u>

1. The noise criteria in Table 1 of the conditions are to apply under all meteorological conditions except the following:

(a) during periods of rain or hail;

(b) average wind speed at microphone height exceeds 5m/s;

(c) wind speeds greater than 3 m/s measured at 10 m above ground level; or

(d) temperature inversion conditions greater than 3°c/100 m.

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall be that recorded by the meteorological station on or in the vicinity of the site.

Compliance Monitoring

3. Unless otherwise agreed with the Director-general, monthly attended monitoring is to be used to evaluate compliance with the relevant conditions of approval.

4. Unless otherwise agreed with the Director-General, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the NSW Industrial Noise Policy (as amended from time to time), in particular the requirements relating to:

(a) monitoring locations for the collection of representative noise data;

(b) meteorological conditions during which collection of noise data is not appropriate;

(c) equipment used to collect noise date, and conformity with Australian Standards relevant to such equipment; and

(d) modifications to noise data collected including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration."

4. MODIFYING FACTOR ADJUSTMENTS

Where a noise source contains certain characteristics, such as tonality, impulsiveness, intermittency or dominant low-frequency content, there is evidence to suggest that it can cause greater annoyance than other noise at the same noise level.

Section 4 of the NSW Industrial Noise Policy provides modifying factor corrections to account for the additional annoyance where applicable. The modifying factor corrections are to be applied to the measured or predicted source noise level, at the receiver location, prior to comparison with the project specific noise criterion detailed above.

Table 4.1 of the INP is replicated in the attached Appendix B.

In this instance the measured noise levels at all receptor locations during the evening and night time periods did not display characteristics requiring modifying factor adjustments.

5. MEASURED NOISE LEVELS

The author visited the Quarry and each of the receptor locations to carry out attended noise measurements during the evening and night time periods on Monday 27 February 2017. Noise measurements were undertaken at each receptor location shown in Figure 1, between the hours of approximately 6.00 pm and 11 pm.

During the noise survey, the weather was mild, with slight breezes (> 5 m/s), overcast and temperatures between approximately 19 and 24 degrees Celsius.

The Quarry was in full operation up until 10 pm and from approximately 10 pm onwards the secondary crusher, trucks and loaders only were in operation. All measurements were paused as trucks passed along the Haul Road, whenever this was practicable.

All measurements were carried out in accordance with Australian Standard AS 1055-1997 *"Acoustics - Description and measurement of environmental noise"* and the instrumentation used during the noise survey is shown in the attached Appendix A.

The results of the survey are shown in Tables 2 and 3 below, where Table 2 shows the measured and predicted $L_{eq,\ 15\ minute}$ noise levels for assessment against the Intrusiveness criteria and Table 3 shows the measured and predicted $L_{1,\ 1\ minute}$ noise levels for assessment against the Sleep Disturbance criteria.

Table 2 Measured & Estimated $L_{eq,\ 15\ minute}$ Noise Levels at Receptor Locations – 27 February 2017

Location / Time / Description	Noise Level (dBA)				Complies
	Measured Noise Level $L_{eq,\ 15\ minute}$	Typical Extraneous Noise Sound Pressure Level	Estimated Quarry Noise Level $L_{eq,\ 15\ minute}$	Acceptable Noise Limit $L_{eq,\ 15\ minute}$ Day, Evening & Night	
R4 – Sloop Avenue (7.18 to 7.33 pm) Quarry not audible	42	Traffic 48 - 50 Lulls 35	<35	44	Yes
R5 – Apollo Drive (7.37 to 7.52 pm) Quarry not audible	41	Traffic 55 Lulls 35	<35	45	Yes
R6 – 1 Makaha Way (7.56 to 8.11 pm) Quarry not audible	39	Traffic 45 Lulls 35	<35	42	Yes
R7 – 44 Mystics Drive (8.15 to 8.30 pm) Quarry barely audible	40	Traffic 45 - 50 Lulls 35	<35	41	Yes
R8 – 29 Hinchinbrook Drive (8.40 to 8.55 pm) Quarry not audible	38	Traffic 45 Voices 48 Lulls 33	<33	35	Yes
R9 – 23 Magnetic Ridge (9.01 to 9.16 pm) Quarry audible	37	Insects 45 Traffic 40 Lulls 34	<34	35	Yes
R11 – 7 Joondalup Parkway (6.40 pm to 6.55 pm) Quarry barely audible	40	Surf 40 Traffic 55 Lulls 35	<35	45	Yes
R12 – 3 Ranfurlie Parkway (6.20 to 6.35 pm) Quarry barely audible	42	Ocean / Surf 38 - 40 Lulls 35	<35	45	Yes

Table 3 Measured & Calculated $L_{1,\ 1\ minute}$ Noise Levels at Receptor Locations – 27 February 2017

Location / Description	Noise Level (dBA)				Complies
	Measured Noise Level $L_{1,\ 1\ minute}$	Typical Extraneous Noise Sound Pressure Level	Estimated Quarry Noise Level $L_{1,\ 1\ minute}$	Acceptable Noise Limit $L_{1,\ 1\ minute}$ at night	
R4 – Sloop Avenue (9:48 pm)* Quarry not audible	40	-	<40	54	Yes
R5 – Apollo Drive (9:53 pm)* Quarry not audible	39	-	<39	55	Yes
R6 – 1 Makaha Way (9:58 pm)* Quarry not audible	41	-	<41	52	Yes
R7 – 44 Mystics Drive (10.02 pm) Quarry barely audible	43	-	<43	51	Yes
R8 – 29 Hinchinbrook Drive (10.07 pm) Quarry not audible	38	-	<38	45	Yes
R9 – 23 Magnetic Ridge (10.13 pm) Quarry barely audible	41	-	<41	45	Yes
R11 – 7 Joondalup Parkway (10.19 pm) Quarry barely audible	36	-	<36	55	Yes
R12 – 3 Ranfurlie Parkway (10.23 pm) Quarry not audible	38	-	<38	55	Yes

Discussion

* $L_{1,\ 1\ minute}$ noise measurements were conducted at these locations prior to 10 pm despite the criteria relating to sleep disturbance (after 10 pm). This was done due to the potential threat of heavy rain. The operations at the Quarry prior to 10 pm constitute full operation of the Site and therefore compliance with the $L_{1,\ 1\ minute}$ noise levels at this time implies compliance after 10 pm when operations are scaled down. In any event, noise emission from the Quarry was not audible at the locations measured prior to 10 pm.

Extraneous noise levels are excluded from Table 3 as the measured $L_{1,\ 1\ minute}$ noise level is well below the acceptable noise limit at each location, in each instance, irrespective of the contribution of quarry noise. Subjectively, the quarry was either not audible or barely audible and in every instance, the measured level is dominated by extraneous noise, though still compliant.

No measured noise levels are considered to be enhanced by meteorological conditions outlined in Appendix 6 of the Approval and Section 3.2 of this Report, thus representing an acoustically worst-case scenario.

During all noise measurements, ambient and extraneous noise from, for example, insects, distant and local traffic, human voice noise within homes and barking dogs dominated the acoustical environment.

The contribution of Quarry noise emission to the measured levels has therefore been estimated based on observations of the sound pressure level during lulls in extraneous and ambient noise, whilst the Quarry was operating, and the subjective audibility of the Quarry.

The contribution of noise from the Quarry to the actual measured noise levels is likely to be lower still, often considerably, than those levels estimated in Tables 2 and 3.

In any event, the measured noise levels were below the acceptable noise limits, irrespective of the contribution from the Quarry, during all measurements at all receptor locations, with the exception of receptor R8 and R9 in the evening (see Table 2). The measured noise levels at these receptors were dominated by extraneous noise that was higher than the acceptable noise limit of 35 dBA. The contribution of Quarry noise at both receptors during the measurement period is predicted to be less than the acceptable limit and it therefore acceptable.

It should be noted that compliance with the acceptable noise limits during the full operation of the quarry on the evening prior to 10 pm, also ensures compliance during the night time, with the same noise limits and reduced operations.

Measurements and calculations therefore show that the level of noise emission from the operation of the Quarry during the noise survey was well below the acceptable noise limits at all receptor locations at all times.

6. CONCLUSION

Monthly Environmental Noise Compliance testing has been undertaken at Hanson's Bass Point Quarry in accordance with the requirements of the Project Approval 08_0143.

The level of noise emission from the Quarry was found to be below the acceptable noise limits at all times, at all receptor locations.

Matthew Harwood, MAAS

Principal Acoustic Consultant

Attachments:-

Appendix A – Noise Survey Instrumentation
Appendix B – Modifying Factor Corrections (EPA INP 2000)

Noise Survey Instrumentation	Appendix A

The instrumentation used during the noise survey consisted of the following:-

Description	Model No.	Serial No.
Svantek Sound Level Meter	971	39170
Svantek Acoustical Calibrator	SV 31	39580

The sound level meter conforms to Australian Standards AS IEC 61672.1-2004 : 'Electroacoustics - Sound level meters – Specifications' as a Class 1 precision sound level meter.

The calibration of the meters was checked before and after the measurement period. No significant system drift occurred over the measurement period. The sound level meter and calibrator have been checked, adjusted and aligned to conform to the factory specifications and issued with conformance certificates.

Modifying Factor Corrections (EPA INP 2000)	Appendix B

Modifying factor corrections from Section 4.3 of the NSW Industrial Noise Policy 2000.

Table B1 Modifying Factor Corrections (from Table 4.1 of the NSW INP)

Factor	Assessment/ Measurement	When to Apply	Correction	Comments
Tonal Noise	One-third octave band or narrow band analysis	Level of one third octave band exceeds the level of the adjacent bands by 5 dB or more (above 400 Hz)	+ 5 dB	Narrow band frequency analysis may be required to precisely detect occurrence
Low Frequency Noise	Measurement of C-weighted and A-weighted Level	Measure/assess C and A-weighted levels over same time period. Correction to be applied if the difference between the two is 15 dB or more	+ 5 dB	C-weighted is designed to be more responsive to low frequency noise
Impulsive Noise	Time weighting fast and impulse	If the difference in the A weighted maximum levels between 'fast' and 'impulse' are greater than 2 dB	Apply the difference in measured levels as the correction up to a maximum of 5 dB	Impulse time weighting is characterised by a short rise time (35msec) compared to 125msec for 'fast'.
Intermittent Noise	Subjectively Assessed	Level varies by more than 5 dB	+ 5 dB	Adjustment to be applied for night time only
Duration	Single-event noise duration may range from 1.5 m to 2.5 h	One event in any 24-hour period	0 to -20dBA	The acceptable noise level may be increased by an adjustment depending on duration of noise (see Table 4.2)
Maximum adjustment	Refer to individual modifying factors	Where two or more modifying factors are indicated	Maximum correction of 10 dBA[2] (excluding duration correction)	

Notes

1. *Corrections to be added to the measured or predicted levels*
2. *Where a source emits tonal and low-frequency noise, only one 5-dB correction should be applied if the tome is in the low frequency range*

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Environmental Noise Compliance Assessment Bass Point Quarry

1 Bass Point Quarry Road,

Shellharbour, NSW 2529

Prepared for:-

Hanson Construction Materials Pty Ltd
Locked Bag 5260
Parramatta NSW 2124

Attention: Mr Steve Butcher

Reference: 1701004E-R

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1. INTRODUCTION AND SUMMARY

Hanson Construction Materials Pty Ltd currently operates the Bass Point Quarry at 1 Bass Point Quarry Road, Shellharbour, NSW (the Quarry).

The Quarry is located at the eastern end of Bass Point Quarry Road adjacent to the Killalea State Park. The nearest residences are located toward the north west and west in the village of Shell Cove as shown in Figure 1.

The Quarry operates 24 hours per day, seven days per week under Project Approval 08_0143 issued by the Minister for Planning and Infrastructure on 28 January 2014 (the Approval).

It is a requirement of the Approval that monthly environmental noise compliance monitoring is undertaken. Schedule 3 of the Approval provides specific noise criteria that must be met at specifically identified receptor locations whilst the Quarry is operating. Appendix 6 of the Approval provides guidelines and requirements in relation to compliance noise monitoring methodology.

This report addresses those requirements. The author visited the site and all residential receptors on Thursday 19 January 2017 to undertake attended noise compliance monitoring.

Noise measurements were taken in accordance with the requirements of the Approval and the level of noise emission from the operation of the Quarry was found to be well below acceptable noise limits at all receptor locations as detailed in this Report.

2. SITE AND DEVELOPMENT DESCRIPTION

2.1 Site Description

The Quarry is located adjacent to the Killalea State Park at the eastern end of Bass Point Quarry Road as shown in Figure 1 below.

The closest receptors to the site are located in Shell Cove to the north west and west of the Quarry. The nearest potentially affected residential receptors identified in the Approval are also shown in Figure 1 and as follows:-

R4 – Sloop Avenue (cnr Cutter Parade)

R5 – Apollo Drive (cnr Clipper Avenue)

R6 – 1 Makaha Way

R7 – 44 Mystics Drive

R8 – 29 Hinchinbrook Drive

R9 – 23 Magnetic Ridge

R11 – 7 Joondalup Parkway

R12 – 3 Ranfurlie Parkway

Figure 1. Location Plan – Bass Point Quarry, Shellharbour, NSW *(source: Google Maps © 2016)*

2.2 Development Description

Hanson's Bass Point Quarry is an extractive industry (hard rock quarry) supplying a range of products for projects such as building railways, roads, bridges, dams, airports, etc.

Primary activities at the site include the extraction, crushing, sorting and despatching of construction aggregates and this involves the use of the following plant and equipment:-

- Front end loader & dump truck (face loading)
- Vibrating Screens for each crusher
- Additional Front End Loader x 2 (despatch)
- Primary Jaw Crusher x 1 & Secondary Cone Crushers x 2
- Despatch truck movements

The above listed plant and machinery typically operates up until approximately 10 pm and constitutes full operation of the site. From approximately 10 pm the majority of operations cease with the exception of the secondary crushing plant and despatch loaders and trucks.

3. NOISE CRITERIA

Project specific noise limits and compliance testing conditions and methodology are derived from the Approval, and are as follows.

3.1 Acceptable Noise Limits

Schedule 3, Clause 3, Table 2 of the Approval sets noise criteria for each receptor location. Table 2 of the Approval is replicated in Table 1 below.

Table 1 Noise Criteria (Project Approval, Schedule 3 - Table 2)

Location	Day / Evening	Night	
	($L_{Aeq, 15\ min}$)	($L_{Aeq, 15\ min}$)	($L_{A1, 1\ min}$)
R4	44	44	54
R5	45	45	55
R6	42	42	52
R7	41	41	51
R8	35	35	45
R9	35	35	45
R11	45	45	55
R12	45	45	55
Any residential property within the Shell Harbour Marina Precinct	48	8	58
Shell Cove Primary School (when in use)	$L_{Aeq, 1\ hour}$ 40 (internal)	Not Applicable	

"Notes:

Noise generated by the project is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 6 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

However, these criteria do not apply if the Proponent has a written agreement with the relevant landowner to exceed the criteria, and the Proponent has advised the Department in writing of the terms of this agreement."

3.2 Noise Compliance Assessment Methodology

Appendix 6 of the Approval provides conditions and assessment methodology that is to be adhered to during noise compliance monitoring, and states:-

"<u>Applicable Meteorological Conditions</u>

1. The noise criteria in Table 1 of the conditions are to apply under all meteorological conditions except the following:

(a) during periods of rain or hail;

(b) average wind speed at microphone height exceeds 5m/s;

(c) wind speeds greater than 3 m/s measured at 10 m above ground level; or

(d) temperature inversion conditions greater than 3°c/100 m.

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall be that recorded by the meteorological station on or in the vicinity of the site.

Compliance Monitoring

3. Unless otherwise agreed with the Director-general, monthly attended monitoring is to be used to evaluate compliance with the relevant conditions of approval.

4. Unless otherwise agreed with the Director-General, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the NSW Industrial Noise Policy (as amended from time to time), in particular the requirements relating to:

(a) monitoring locations for the collection of representative noise data;

(b) meteorological conditions during which collection of noise data is not appropriate;

(c) equipment used to collect noise date, and conformity with Australian Standards relevant to such equipment; and

(d) modifications to noise data collected including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration."

4. MODIFYING FACTOR ADJUSTMENTS

Where a noise source contains certain characteristics, such as tonality, impulsiveness, intermittency or dominant low-frequency content, there is evidence to suggest that it can cause greater annoyance than other noise at the same noise level.

Section 4 of the NSW Industrial Noise Policy provides modifying factor corrections to account for the additional annoyance where applicable. The modifying factor corrections are to be applied to the measured or predicted source noise level, at the receiver location, prior to comparison with the project specific noise criterion detailed above.

Table 4.1 of the INP is replicated in the attached Appendix B.

In this instance the measured noise levels at all receptor locations during the evening and night time periods did not display characteristics requiring modifying factor adjustments.

5. MEASURED NOISE LEVELS

The author visited the Quarry and each of the receptor locations to carry out attended noise measurements during the evening and night time periods on Thursday 19 January 2017. Noise measurements were undertaken at each receptor location shown in Figure 1, between the hours of approximately 6.30 pm and 11 pm.

During the noise survey, the weather was warm, calm with negligible wind (> 3 m/s), predominantly clear skies and temperatures between approximately 24 and 27 degrees Celsius.

The Quarry was in full operation up until 10 pm and from approximately 10 pm onwards the secondary crusher, trucks and loaders only were in operation. All measurements were paused as trucks passed along the Haul Road, whenever this was practicable.

All measurements were carried out in accordance with Australian Standard AS 1055-1997 *"Acoustics - Description and measurement of environmental noise"* and the instrumentation used during the noise survey is shown in the attached Appendix A.

The results of the survey are shown in Tables 2 and 3 below, where Table 2 shows the measured and predicted $L_{eq,\ 15\ minute}$ noise levels for assessment against the Intrusiveness criteria and Table 3 shows the measured and predicted $L_{1,\ 1\ minute}$ noise levels for assessment against the Sleep Disturbance criteria.

Table 2 Measured & Estimated $L_{eq,\ 15\ minute}$ Noise Levels at Receptor Locations – 19 January 2017

Location / Time / Description	Noise Level (dBA)				Complies
	Measured Noise Level $L_{eq,\ 15\ minute}$	Typical Extraneous Noise Sound Pressure Level	Estimated Quarry Noise Level $L_{eq,\ 15\ minute}$	Acceptable Noise Limit $L_{eq,\ 15\ minute}$ Day, Evening & Night	
R4 – Sloop Avenue (8.21 to 8.36 pm) Quarry not audible	40	Traffic 48 Lulls 32	<32	44	Yes
R5 – Apollo Drive (8.00 to 8.15 pm) Quarry not audible	40	Traffic 55 Lulls 35	<35	45	Yes
R6 – 1 Makaha Way (7.40 to 7.55 pm) Quarry not audible	40	Insects 45 Traffic 45 Lulls 35	<35	42	Yes
R7 – 44 Mystics Drive (7.22 to 7.37 pm) Quarry barely audible	39	Traffic 48 Lull 36	<36	41	Yes
R8 – 29 Hinchinbrook Drive (9.00 to 9.15 pm) Quarry not audible	37	Traffic 45 Insects 48 Lull 33	<33	35	Yes
R9 – 23 Magnetic Ridge (9.23 to 9.38 pm) Quarry audible (hum & clang)	37	Insects 46 Traffic 42 Lull 34	<34	35	Yes
R11 – 7 Joondalup Parkway (6.35 pm to 6.50 pm) Quarry barely audible	40	Surf 40 Traffic 55 Lull 36	<36	45	Yes
R12 – 3 Ranfurlie Parkway (6.55 to 7.10 pm) Quarry barely audible	40	Surf 40 Traffic 52 Lull 35	<35	45	Yes

Table 3 Measured & Calculated $L_{1,\ 1\ minute}$ Noise Levels at Receptor Locations – 19 January 2017

Location / Description	Noise Level (dBA)				Complies
	Measured Noise Level $L_{1,\ 1\ minute}$	Typical Extraneous Noise Sound Pressure Level	Estimated Quarry Noise Level $L_{1,\ 1\ minute}$	Acceptable Noise Limit $L_{1,\ 1\ minute}$ at night	
R4 – Sloop Avenue (10:13 pm) Quarry not audible	38	-	<38	54	Yes
R5 – Apollo Drive (10:17 pm) Quarry not audible	39	-	<39	55	Yes
R6 – 1 Makaha Way (10:24pm) Quarry not audible	40	-	<40	52	Yes
R7 – 44 Mystics Drive (10.20 pm) Quarry barely audible	37	-	<37	51	Yes
R8 – 29 Hinchinbrook Drive (10.32 pm) Quarry not audible	38	-	<38	45	Yes
R9 – 23 Magnetic Ridge (10.03 pm) Quarry barely audible	38	-	<38	45	Yes
R11 – 7 Joondalup Parkway (10.37 pm) Quarry not audible	36	-	<36	55	Yes
R12 – 3 Ranfurlie Parkway (10.43 pm) Quarry not audible	38	-	<38	55	Yes

Discussion

Extraneous noise levels are excluded from Table 3 as the measured $L_{1,\ 1\ minute}$ noise level is well below the acceptable noise limit at each location, in each instance, irrespective of the contribution of quarry noise. Subjectively, the quarry was either not audible or barely audible and in every instance, the measured level is dominated by extraneous noise, though still compliant.

No measured noise levels are considered to be enhanced by meteorological conditions outlined in Appendix 6 of the Approval and Section 3.2 of this Report, thus representing an acoustically worst-case scenario.

During all noise measurements, ambient and extraneous noise from, for example, insects, distant and local traffic, voice noise within homes and barking dogs dominated the acoustical environment.

The contribution of Quarry noise emission to the measured levels has therefore been estimated based on observations of the sound pressure level during lulls in extraneous and ambient noise, whilst the Quarry was operating, and the subjective audibility of the Quarry.

The contribution of noise from the Quarry to the actual measured noise levels is likely to be lower still, often considerably, than those levels estimated in Tables 2 and 3.

In any event, the measured noise levels were below the acceptable noise limits, irrespective of the contribution from the Quarry, during all measurements at all receptor locations, with the exception of receptor R8 and R9 in the evening (see Table 2). The measured noise levels at these receptors were dominated by extraneous noise that was higher than the acceptable noise limit of 35 dBA. The contribution of Quarry noise at both receptors during the measurement period is predicted to be less than the acceptable limit and it therefore acceptable.

It should be noted that compliance with the acceptable noise limits during the full operation of the quarry on the evening prior to 10 pm, also ensures compliance during the night time, with the same noise limits and reduced operations.

Measurements and calculations therefore show that the level of noise emission from the operation of the Quarry during the noise survey was well below the acceptable noise limits at all receptor locations at all times.

6. CONCLUSION

Monthly Environmental Noise Compliance testing has been undertaken at Hanson's Bass Point Quarry in accordance with the requirements of the Project Approval 08_0143.

The level of noise emission from the Quarry was found to be below the acceptable noise limits at all times, at all receptor locations.

Matthew Harwood, MAAS

Principal Acoustic Consultant

Attachments:-

Appendix A – Noise Survey Instrumentation
Appendix B – Modifying Factor Corrections (EPA INP 2000)

Noise Survey Instrumentation	Appendix A

The instrumentation used during the noise survey consisted of the following:-

Description	Model No.	Serial No.
Svantek Sound Level Meter	971	39170
Svantek Acoustical Calibrator	SV 31	39580

The sound level meter conforms to Australian Standards AS IEC 61672.1-2004 : 'Electroacoustics - Sound level meters – Specifications' as a Class 1 precision sound level meter.

The calibration of the meters was checked before and after the measurement period. No significant system drift occurred over the measurement period. The sound level meter and calibrator have been checked, adjusted and aligned to conform to the factory specifications and issued with conformance certificates.

Modifying Factor Corrections (EPA INP 2000)	Appendix B

Modifying factor corrections from Section 4.3 of the NSW Industrial Noise Policy 2000.

Table B1 Modifying Factor Corrections (from Table 4.1 of the NSW INP)

Factor	Assessment/ Measurement	When to Apply	Correction	Comments
Tonal Noise	One-third octave band or narrow band analysis	Level of one third octave band exceeds the level of the adjacent bands by 5 dB or more (above 400 Hz)	+ 5 dB	Narrow band frequency analysis may be required to precisely detect occurrence
Low Frequency Noise	Measurement of C-weighted and A-weighted Level	Measure/assess C and A-weighted levels over same time period. Correction to be applied if the difference between the two is 15 dB or more	+ 5 dB	C-weighted is designed to be more responsive to low frequency noise
Impulsive Noise	Time weighting fast and impulse	If the difference in the A weighted maximum levels between 'fast' and 'impulse' are greater than 2 dB	Apply the difference in measured levels as the correction up to a maximum of 5 dB	Impulse time weighting is characterised by a short rise time (35msec) compared to 125msec for 'fast'.
Intermittent Noise	Subjectively Assessed	Level varies by more than 5 dB	+ 5 dB	Adjustment to be applied for night time only
Duration	Single-event noise duration may range from 1.5 m to 2.5 h	One event in any 24-hour period	0 to -20dBA	The acceptable noise level may be increased by an adjustment depending on duration of noise (see Table 4.2)
Maximum adjustment	Refer to individual modifying factors	Where two or more modifying factors are indicated	Maximum correction of 10 dBA[2] (excluding duration correction)	

Notes

1. *Corrections to be added to the measured or predicted levels*
2. *Where a source emits tonal and low-frequency noise, only one 5-dB correction should be applied if the tome is in the low frequency range*

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Environmental Noise Compliance Assessment Bass Point Quarry

1 Bass Point Quarry Road,

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Prepared for:-

Hanson Construction Materials Pty Ltd
Locked Bag 5260
Parramatta NSW 2124

Attention: Mr Steve Butcher

Reference: 1612010E-R

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This report addresses those requirements. The author visited the site and all residential receptors on Friday 23 December 2016 to undertake attended noise compliance monitoring.

Noise measurements were taken in accordance with the requirements of the Approval and the level of noise emission from the operation of the Quarry was found to be well below acceptable noise limits at all receptor locations as detailed in this Report.

2. SITE AND DEVELOPMENT DESCRIPTION

2.1 Site Description

The Quarry is located adjacent to the Killalea State Park at the eastern end of Bass Point Quarry Road as shown in Figure 1 below.

The closest receptors to the site are located in Shell Cove to the north west and west of the Quarry. The nearest potentially affected residential receptors identified in the Approval are also shown in Figure 1 and as follows:-

R4 – Sloop Avenue (cnr Cutter Parade)

R5 – Apollo Drive (cnr Clipper Avenue)

R6 – 1 Makaha Way

R7 – 44 Mystics Drive

R8 – 29 Hinchinbrook Drive

R9 – 23 Magnetic Ridge

R11 – 7 Joondalup Parkway

R12 – 3 Ranfurlie Parkway

Figure 1. Location Plan – Bass Point Quarry, Shellharbour, NSW *(source: Google Maps © 2016)*

2.2 Development Description

Hanson's Bass Point Quarry is an extractive industry (hard rock quarry) supplying a range of products for projects such as building railways, roads, bridges, dams, airports, etc.

Primary activities at the site include the extraction, crushing, sorting and despatching of construction aggregates and this involves the use of the following plant and equipment:-

- Front end loader & dump truck (face loading)
- Vibrating Screens for each crusher
- Additional Front End Loader x 2 (despatch)
- Primary Jaw Crusher x 1 & Secondary Cone Crushers x 2
- Despatch truck movements

Given the Christmas period, during the noise compliance testing on 23 December 2016, the quarry was open for sales activities only, comprising the operation of trucks and front end loader.

3. NOISE CRITERIA

Project specific noise limits and compliance testing conditions and methodology are derived from the Approval, and are as follows.

3.1 Acceptable Noise Limits

Schedule 3, Clause 3, Table 2 of the Approval sets noise criteria for each receptor location. Table 2 of the Approval is replicated in Table 1 below.

Table 1 Noise Criteria (Project Approval, Schedule 3 - Table 2)

Location	Day / Evening	Night	
	($L_{Aeq, 15\ min}$)	($L_{Aeq, 15\ min}$)	($L_{A1, 1\ min}$)
R4	44	44	54
R5	45	45	55
R6	42	42	52
R7	41	41	51
R8	35	35	45
R9	35	35	45
R11	45	45	55
R12	45	45	55
Any residential property within the Shell Harbour Marina Precinct	48	8	58
Shell Cove Primary School (when in use)	$L_{Aeq, 1\ hour}$ 40 (internal)	Not Applicable	

"Notes:

Noise generated by the project is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 6 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

However, these criteria do not apply if the Proponent has a written agreement with the relevant landowner to exceed the criteria, and the Proponent has advised the Department in writing of the terms of this agreement."

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Appendix 6 of the Approval provides conditions and assessment methodology that is to be adhered to during noise compliance monitoring, and states:-

"<u>Applicable Meteorological Conditions</u>

1. The noise criteria in Table 1 of the conditions are to apply under all meteorological conditions except the following:

(a) during periods of rain or hail;

(b) average wind speed at microphone height exceeds 5m/s;

(c) wind speeds greater than 3 m/s measured at 10 m above ground level; or

(d) temperature inversion conditions greater than 3°c/100 m.

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall be that recorded by the meteorological station on or in the vicinity of the site.

Compliance Monitoring

3. Unless otherwise agreed with the Director-general, monthly attended monitoring is to be used to evaluate compliance with the relevant conditions of approval.

4. Unless otherwise agreed with the Director-General, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the NSW Industrial Noise Policy (as amended from time to time), in particular the requirements relating to:

(a) monitoring locations for the collection of representative noise data;

(b) meteorological conditions during which collection of noise data is not appropriate;

(c) equipment used to collect noise date, and conformity with Australian Standards relevant to such equipment; and

(d) modifications to noise data collected including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration."

4. MODIFYING FACTOR ADJUSTMENTS

Where a noise source contains certain characteristics, such as tonality, impulsiveness, intermittency or dominant low-frequency content, there is evidence to suggest that it can cause greater annoyance than other noise at the same noise level.

Section 4 of the NSW Industrial Noise Policy provides modifying factor corrections to account for the additional annoyance where applicable. The modifying factor corrections are to be applied to the measured or predicted source noise level, at the receiver location, prior to comparison with the project specific noise criterion detailed above.

Table 4.1 of the INP is replicated in the attached Appendix B.

In this instance there measured noise levels at all receptor locations during the evening and night time periods did not display characteristics requiring modifying factor adjustments.

5. MEASURED NOISE LEVELS

The author visited each of the receptor locations to carry out attended noise measurements during the evening and night time periods on Friday 23 December 2016. Noise measurements were undertaken at each receptor location shown in Figure 1, between the hours of approximately 6.30 pm and 11 pm.

During the noise survey, the weather was calm with negligible wind (> 3 m/s), predominantly clear skies and temperatures between approximately 25 and 20 degrees Celsius.

The Quarry was only open for sales activities given the Christmas period and this included the use of front end loaders and truck movements, throughout the entire noise survey. At no time was noise emission from the Quarry audible at any receptor location. All measurements were paused as trucks passed along the Haul Road, whenever this was practicable.

All measurements were carried out in accordance with Australian Standard AS 1055-1997 *"Acoustics - Description and measurement of environmental noise"* and the instrumentation used during the noise survey is shown in the attached Appendix A.

The results of the survey are shown in Tables 2 and 3 below, where Table 2 shows the measured and predicted $L_{eq,\ 15\ minute}$ noise levels for assessment against the Intrusiveness criteria and Table 3 shows the measured and predicted $L_{1,\ 1\ minute}$ noise levels for assessment against the Sleep Disturbance criteria.

Table 2 Measured & Estimated $L_{eq,\ 15\ minute}$ Noise Levels at Receptor Locations – 23 December 2016

Location / Time / Description	Noise Level (dBA)				Complies
	Measured Noise Level $L_{eq,\ 15\ minute}$	Typical Extraneous Noise Sound Pressure Level	Estimated Quarry Noise Level $L_{eq,\ 15\ minute}$	Acceptable Noise Limit $L_{eq,\ 15\ minute}$ Day, Evening & Night	
R4 – Sloop Avenue (6:20 to 6:35 pm) Quarry not audible	42	Traffic 49 Lulls 33	<33	44	Yes
R5 – Apollo Drive (6:40 to 6:55 pm) Quarry not audible	42	Traffic 50 Lulls 33	<33	45	Yes
R6 – 1 Makaha Way (7.07 to 7.22pm) Quarry not audible	39	Traffic 50 Lulls 32	<32	42	Yes
R7 – 44 Mystics Drive (7.30 to 7.45 pm) Quarry not audible	38	Insects 50 Traffic 47 Lulls 33	<33	41	Yes
R8 – 29 Hinchinbrook Drive (8.50 to 9.05 pm) Quarry not audible	36	Insects 47 Lulls 30	<31	35	Yes
R9 – 23 Magnetic Ridge (9.13 to 9.28 pm) Quarry not audible	35	Traffic 42 Lulls 32	<33	35	Yes
R11 – 7 Joondalup Parkway (8.03 pm to 8.18 pm) Quarry not audible	40	Surf 40 Lulls 35	<35	45	Yes
R12 – 3 Ranfurlie Parkway (8.22 to 8.37 pm) Quarry not audible	42	Surf 42 Lulls 35	<35	45	Yes

Table 3 Measured & Calculated $L_{1,\ 1\ minute}$ Noise Levels at Receptor Locations – 23 December 2016

Location / Description	Noise Level (dBA)				Complies
	Measured Noise Level $L_{1,\ 1\ minute}$	Typical Extraneous Noise Sound Pressure Level	Estimated Quarry Noise Level $L_{1,\ 1\ minute}$	Acceptable Noise Limit $L_{1,\ 1\ minute}$ at night	
R4 – Sloop Avenue (10:00 pm) Quarry not audible	42	-	<32	54	Yes
R5 – Apollo Drive (10:06 pm) Quarry not audible	40	-	<30	55	Yes
R6 – 1 Makaha Way (10:13pm) Quarry not audible	40	-	<30	52	Yes
R7 – 44 Mystics Drive (10.20 pm) Quarry not audible	37	-	<27	51	Yes
R8 – 29 Hinchinbrook Drive (10.42 pm) Quarry not audible	35	-	<25	45	Yes
R9 – 23 Magnetic Ridge (10.50 pm) Quarry not audible	37	-	<27	45	Yes
R11 – 7 Joondalup Parkway (10.30 pm) Quarry not audible	40	-	<30	55	Yes
R12 – 3 Ranfurlie Parkway (10.34 pm) Quarry not audible	40	-	<30	55	Yes

Discussion

No measured noise levels are considered to be enhanced by meteorological conditions outlined in Appendix 6 of the Approval and Section 3.2 of this Report, thus representing an acoustically worst-case scenario.

During all noise measurements, ambient and extraneous noise from, for example, insects, distant and local traffic, voice noise within homes and barking dogs dominated the acoustical environment.

The contribution of Quarry noise emission to the measured levels has therefore been estimated based on observations of the sound pressure level during lulls in extraneous and ambient noise, whilst the Quarry was operating, and the subjective audibility of the Quarry.

At no time during the December 2016 noise survey was noise emission from the Quarry audible at any location.

The predicted noise levels in Table 3 are considered to be a minimum 10 dB below the measured noise level for this reason and for simplicity.

In any event, the measured noise levels were below the acceptable noise limits, irrespective of the contribution from the Quarry, during all measurements at all receptor locations, with the exception of receptor R8 in the evening (see Table 2). The measured noise levels at this receptor, at this time was dominated by extraneous noise that was higher than the acceptable noise limit of 35 dBA.

Measurements and calculations therefore show that the level of noise emission from the operation of the Quarry during the noise survey was well below the acceptable noise limits at all receptor locations.

6. CONCLUSION

Monthly Environmental Noise Compliance testing has been undertaken at Hanson's Bass Point Quarry in accordance with the requirements of the Project Approval 08_0143.

The level of noise emission from the Quarry was found to be below the acceptable noise limits at all times, at all receptor locations.

Matthew Harwood, MAAS

Principal Acoustic Consultant

Attachments:-

Appendix A – Noise Survey Instrumentation
Appendix B – Modifying Factor Corrections (EPA INP 2000)

Noise Survey Instrumentation	Appendix A

The instrumentation used during the noise survey consisted of the following:-

Description	Model No.	Serial No.
Svantek Sound Level Meter	971	39170
Svantek Acoustical Calibrator	SV 31	39580

The sound level meter conforms to Australian Standards AS IEC 61672.1-2004 : 'Electroacoustics - Sound level meters – Specifications' as a Class 1 precision sound level meter.

The calibration of the meters was checked before and after the measurement period. No significant system drift occurred over the measurement period. The sound level meter and calibrator have been checked, adjusted and aligned to conform to the factory specifications and issued with conformance certificates within the last 24 months as required by the regulations.

Modifying Factor Corrections (EPA INP 2000)	Appendix B

Modifying factor corrections from Section 4.3 of the NSW Industrial Noise Policy 2000.

Table B1 Modifying Factor Corrections (from Table 4.1 of the NSW INP)

Factor	Assessment/ Measurement	When to Apply	Correction	Comments
Tonal Noise	One-third octave band or narrow band analysis	Level of one third octave band exceeds the level of the adjacent bands by 5 dB or more (above 400 Hz)	+ 5 dB	Narrow band frequency analysis may be required to precisely detect occurrence
Low Frequency Noise	Measurement of C-weighted and A-weighted Level	Measure/assess C and A-weighted levels over same time period. Correction to be applied if the difference between the two is 15 dB or more	+ 5 dB	C-weighted is designed to be more responsive to low frequency noise
Impulsive Noise	Time weighting fast and impulse	If the difference in the A weighted maximum levels between 'fast' and 'impulse' are greater than 2 dB	Apply the difference in measured levels as the correction up to a maximum of 5 dB	Impulse time weighting is characterised by a short rise time (35msec) compared to 125msec for 'fast'.
Intermittent Noise	Subjectively Assessed	Level varies by more than 5 dB	+ 5 dB	Adjustment to be applied for night time only
Duration	Single-event noise duration may range from 1.5 m to 2.5 h	One event in any 24-hour period	0 to -20dBA	The acceptable noise level may be increased by an adjustment depending on duration of noise (see Table 4.2)
Maximum adjustment	Refer to individual modifying factors	Where two or more modifying factors are indicated	Maximum correction of 10 dBA[2] (excluding duration correction)	

Notes

1. *Corrections to be added to the measured or predicted levels*
2. *Where a source emits tonal and low-frequency noise, only one 5-dB correction should be applied if the tome is in the low frequency range*

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Environmental Noise Compliance Assessment Bass Point Quarry

1 Bass Point Quarry Road,

Shellharbour, NSW 2529

Prepared for:-

Hanson Construction Materials Pty Ltd
Locked Bag 5260
Parramatta NSW 2124

Attention: Mr Steve Butcher

Reference: 1611018E-R

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Draft	MH	MH	28/11/2016
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Advice and recommendations provided in this report are in relation to acoustical issues only. No claims of expertise are made, and no liability is accepted, in relation to issues falling outside the field of acoustical consulting. These may include, but are not limited to, structural and waterproofing considerations, fire rating or thermal rating. Relevant authorities and / or experts should be consulted regarding areas other than acoustics.

TABLE OF CONTENTS

1. INTRODUCTION AND SUMMARY

Hanson Construction Materials Pty Ltd currently operates the Bass Point Quarry at 1 Bass Point Quarry Road, Shellharbour, NSW (the Quarry).

The Quarry is located at the eastern end of Bass Point Quarry Road adjacent to the Killalea State Park. The nearest residences are located toward the north west and west in the village of Shell Cove as shown in Figure 1.

The Quarry operates 24 hours per day, seven days per week under Project Approval 08_0143 issued by the Minister for Planning and Infrastructure on 28 January 2014 (the Approval).

It is a requirement of the Approval that monthly environmental noise compliance monitoring is undertaken. Schedule 3 of the Approval provides specific noise criteria that must be met at specifically identified receptor locations whilst the Quarry is operating. Appendix 6 of the Approval provides guidelines and requirements in relation to compliance noise monitoring methodology.

This report addresses those requirements. The author visited the site and all residential receptors on Thursday 24 November 2016 to undertake attended noise compliance monitoring.

Noise measurements were taken in accordance with the requirements of the Approval and the level of noise emission from the operation of the Quarry was found to be well below acceptable noise limits at all receptor locations as detailed in this Report.

2. SITE AND DEVELOPMENT DESCRIPTION

2.1 Site Description

The Quarry is located adjacent to the Killalea State Park at the eastern end of Bass Point Quarry Road as shown in Figure 1 below.

The closest receptors to the site are located in Shell Cove to the north west and west of the Quarry. The nearest potentially affected residential receptors identified in the Approval are also shown in Figure 1 and as follows:-

R4 – Sloop Avenue (cnr Cutter Parade)

R5 – Apollo Drive (cnr Clipper Avenue)

R6 – 1 Makaha Way

R7 – 44 Mystics Drive

R8 – 29 Hinchinbrook Drive

R9 – 23 Magnetic Ridge

R11 – 7 Joondalup Parkway

R12 – 3 Ranfurlie Parkway

Figure 1. Location Plan – Bass Point Quarry, Shellharbour, NSW *(source: Google Maps © 2016)*

2.2 Development Description

Hanson's Bass Point Quarry is an extractive industry (hard rock quarry) supplying a range of products for projects such as building railways, roads, bridges, dams, airports, etc.

Primary activities at the site include the extraction, crushing, sorting and despatching of construction aggregates and this involves the use of the following plant and equipment:-

- Front end loader & dump truck (face loading)
- Vibrating Screens for each crusher
- Additional Front End Loader x 2 (despatch)
- Primary Jaw Crusher x 1 & Secondary Cone Crushers x 2
- Despatch truck movements

The above listed plant and machinery typically operates up until approximately 10 pm and constitutes full operation of the site. From approximately 10 pm the majority of operations cease with the exception of the secondary crushing plant and despatch loaders and trucks.

3. NOISE CRITERIA

Project specific noise limits and compliance testing conditions and methodology are derived from the Approval, and are as follows.

3.1 Acceptable Noise Limits

Schedule 3, Clause 3, Table 2 of the Approval sets noise criteria for each receptor location. Table 2 of the Approval is replicated in Table 1 below.

Table 1 Noise Criteria (Project Approval, Schedule 3 - Table 2)

Location	Day / Evening	Night	
	($L_{Aeq, 15\ min}$)	($L_{Aeq, 15\ min}$)	($L_{A1, 1\ min}$)
R4	44	44	54
R5	45	45	55
R6	42	42	52
R7	41	41	51
R8	35	35	45
R9	35	35	45
R11	45	45	55
R12	45	45	55
Any residential property within the Shell Harbour Marina Precinct	48	8	58
Shell Cove Primary School (when in use)	$L_{Aeq, 1\ hour}$ 40 (internal)	Not Applicable	

"Notes:

Noise generated by the project is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 6 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

However, these criteria do not apply if the Proponent has a written agreement with the relevant landowner to exceed the criteria, and the Proponent has advised the Department in writing of the terms of this agreement."

3.2 Noise Compliance Assessment Methodology

Appendix 6 of the Approval provides conditions and assessment methodology that is to be adhered to during noise compliance monitoring, and states:-

"<u>Applicable Meteorological Conditions</u>

1. The noise criteria in Table 1 of the conditions are to apply under all meteorological conditions except the following:

(a) during periods of rain or hail;

(b) average wind speed at microphone height exceeds 5m/s;

(c) wind speeds greater than 3 m/s measured at 10 m above ground level; or

(d) temperature inversion conditions greater than 3°c/100 m.

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall be that recorded by the meteorological station on or in the vicinity of the site.

Compliance Monitoring

3. Unless otherwise agreed with the Director-general, monthly attended monitoring is to be used to evaluate compliance with the relevant conditions of approval.

4. Unless otherwise agreed with the Director-General, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the NSW Industrial Noise Policy (as amended from time to time), in particular the requirements relating to:

(a) monitoring locations for the collection of representative noise data;

(b) meteorological conditions during which collection of noise data is not appropriate;

(c) equipment used to collect noise date, and conformity with Australian Standards relevant to such equipment; and

(d) modifications to noise data collected including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration."

4. MODIFYING FACTOR ADJUSTMENTS

Where a noise source contains certain characteristics, such as tonality, impulsiveness, intermittency or dominant low-frequency content, there is evidence to suggest that it can cause greater annoyance than other noise at the same noise level.

Section 4 of the NSW Industrial Noise Policy provides modifying factor corrections to account for the additional annoyance where applicable. The modifying factor corrections are to be applied to the measured or predicted source noise level, at the receiver location, prior to comparison with the project specific noise criterion detailed above.

Table 4.1 of the INP is replicated in the attached Appendix B.

In this instance there measured noise levels at all receptor locations during the evening and night time periods did not display characteristics requiring modifying factor adjustments.

5. MEASURED NOISE LEVELS

The author visited the Quarry and each of the receptor locations to carry out attended noise measurements during the evening and night time periods on Thursday 24 November 2016. Noise measurements were undertaken at each receptor location shown in Figure 1, between the hours of approximately 7 pm and 11 pm.

During the noise survey, the weather was calm with negligible wind (> 1 m/s), predominantly clear skies and temperatures between approximately 21 and 17 degrees Celsius.

The Quarry was in full operation throughout the entire noise survey which included the all plant and equipment identified in Section 2.2 of this Report operating simultaneously, at least on occasion. All measurements were paused as trucks passed along the Haul Road, whenever this was practicable.

All measurements were carried out in accordance with Australian Standard AS 1055-1997 *"Acoustics - Description and measurement of environmental noise"* and the instrumentation used during the noise survey is shown in the attached Appendix A.

The results of the survey are shown in Tables 2 and 3 below, where Table 2 shows the measured and predicted $L_{eq,\ 15\ minute}$ noise levels for assessment against the Intrusiveness criteria and Table 3 shows the measured and predicted $L_{1,\ 1\ minute}$ noise levels for assessment against the Sleep Disturbance criteria.

Table 2 Measured & Estimated $L_{eq,\ 15\ minute}$ Noise Levels at Receptor Locations – 24 November 2016

Location / Time / Description	Noise Level (dBA)				Complies
	Measured Noise Level $L_{eq,\ 15\ minute}$	Typical Extraneous Noise Sound Pressure Level	Estimated Quarry Noise Level $L_{eq,\ 15\ minute}$	Acceptable Noise Limit $L_{eq,\ 15\ minute}$ Day, Evening & Night	
R4 – Sloop Avenue (6:40 to 6:55 pm) Quarry not audible	40	Children 45 Traffic 48 Lulls 32	<32	44	Yes
R5 – Apollo Drive (7:00 to 7:15 pm) Quarry not audible	42	Traffic 52 Lulls 34	<34	45	Yes
R6 – 1 Makaha Way (9.40 to 9.55pm) Quarry not audible	37	Insects 43 Traffic 46 Lulls 35	<32	42	Yes
R7 – 44 Mystics Drive (8.55 to 9.10 pm) Quarry barely audible	37	Insects 45 Traffic 48 Lull 34	<34	41	Yes
R8 – 29 Hinchinbrook Drive (8.25 to 8.40 pm) Quarry not audible	34	Haul Rd 48 Dog Bark 47 Lull 31	<31	35	Yes
R9 – 23 Magnetic Ridge (9.20 to 9.35 pm) Quarry audible (general hum)	37	Haul Rd 50 Traffic 42 Lull 33	<33	35	Yes
R11 – 7 Joondalup Parkway (7.30 pm to 7.45 pm) Quarry not audible	41	Surf 40 Traffic 55 Lull 35	<35	45	Yes
R12 – 3 Ranfurlie Parkway (7.47 to 8.04 pm) Quarry not audible	44	Surf 42 Insects 47 Lull 40	<35	45	Yes

Table 3 Measured & Calculated $L_{1,\ 1\ minute}$ Noise Levels at Receptor Locations – 24 November 2016

Location / Description	Noise Level (dBA)				Complies
	Measured Noise Level $L_{1,\ 1\ minute}$	Typical Extraneous Noise Sound Pressure Level	Estimated Quarry Noise Level $L_{1,\ 1\ minute}$	Acceptable Noise Limit $L_{1,\ 1\ minute}$ at night	
R4 – Sloop Avenue (10:20 pm) Quarry not audible	38	Traffic 48 Lulls 32	<38	54	Yes
R5 – Apollo Drive (10:15 pm) Quarry not audible	40	Traffic 50 Lulls 33	<40	55	Yes
R6 – 1 Makaha Way (10:00pm) Quarry not audible	39	Children 43 Traffic 48 Lulls 35	<39	52	Yes
R7 – 44 Mystics Drive (10.07 pm) Quarry barely audible	35	Traffic 48 Lull 33	<35	51	Yes
R8 – 29 Hinchinbrook Drive (10.30 pm) Quarry not audible	36	Dog 45 Traffic 48 Lull 32	<36	45	Yes
R9 – 23 Magnetic Ridge (10.40 pm) Quarry barely audible	40	Haul Rd 48 Insects 47 Lull 35	<40	45	Yes
R11 – 7 Joondalup Parkway (10.47 pm) Quarry barely audible	38	Insects 45 Lull 34	<38	55	Yes
R12 – 3 Ranfurlie Parkway (10.55 pm) Quarry barely audible	37	Traffic 48 Lull 34	<37	55	Yes

Discussion

No measured noise levels are considered to be enhanced by meteorological conditions outlined in Appendix 6 of the Approval and Section 3.2 of this Report, thus representing an acoustically worst-case scenario.

During all noise measurements, ambient and extraneous noise from, for example, insects, distant and local traffic, voice noise within homes and barking dogs dominated the acoustical environment.

The contribution of Quarry noise emission to the measured levels has therefore been estimated based on observations of the sound pressure level during lulls in extraneous and ambient noise, whilst the Quarry was operating, and the subjective audibility of the Quarry.

It is likely that the contribution of noise from the Quarry to the actual measured noise levels is lower still, often considerably, particularly with respect to the $L_{1,\,1\,minute}$ noise levels at night, than those levels estimated in Tables 2 and 3.

In any event, the measured noise levels were below the acceptable noise limits, irrespective of the contribution from the Quarry, during all measurements at all receptor locations, with the exception of receptor R9 in the evening (see Table 2). The measured noise levels at this receptor, at this time was dominated by extraneous noise that was higher than the acceptable noise limit of 35 dBA.

It should be noted that compliance with the acceptable noise limits during the full operation of the quarry on the evening prior to 10 pm, also ensure compliance during the night time, with the same noise limits and reduced operations.

Measurements and calculations therefore show that the level of noise emission from the operation of the Quarry during the noise survey was well below the acceptable noise limits at all receptor locations.

6. CONCLUSION

Monthly Environmental Noise Compliance testing has been undertaken at Hanson's Bass Point Quarry in accordance with the requirements of the Project Approval 08_0143.

The level of noise emission from the Quarry was found to be below the acceptable noise limits at all times, at all receptor locations.

Matthew Harwood, MAAS

Principal Acoustic Consultant

Attachments:-

Appendix A – Noise Survey Instrumentation
Appendix B – Modifying Factor Corrections (EPA INP 2000)

Noise Survey Instrumentation	Appendix A

The instrumentation used during the noise survey consisted of the following:-

Description	Model No.	Serial No.
Svantek Sound Level Meter	971	39170
Svantek Acoustical Calibrator	SV 31	39580

The sound level meter conforms to Australian Standards AS IEC 61672.1-2004 : 'Electroacoustics - Sound level meters – Specifications' as a Class 1 precision sound level meter.

The calibration of the meters was checked before and after the measurement period. No significant system drift occurred over the measurement period. The sound level meter and calibrator have been checked, adjusted and aligned to conform to the factory specifications and issued with conformance certificates within the last 24 months as required by the regulations

Modifying Factor Corrections (EPA INP 2000)	Appendix B

Modifying factor corrections from Section 4.3 of the NSW Industrial Noise Policy 2000.

Table B1 Modifying Factor Corrections (from Table 4.1 of the NSW INP)

Factor	Assessment/ Measurement	When to Apply	Correction	Comments
Tonal Noise	One-third octave band or narrow band analysis	Level of one third octave band exceeds the level of the adjacent bands by 5 dB or more (above 400 Hz)	+ 5 dB	Narrow band frequency analysis may be required to precisely detect occurrence
Low Frequency Noise	Measurement of C-weighted and A-weighted Level	Measure/assess C and A-weighted levels over same time period. Correction to be applied if the difference between the two is 15 dB or more	+ 5 dB	C-weighted is designed to be more responsive to low frequency noise
Impulsive Noise	Time weighting fast and impulse	If the difference in the A weighted maximum levels between 'fast' and 'impulse' are greater than 2 dB	Apply the difference in measured levels as the correction up to a maximum of 5 dB	Impulse time weighting is characterised by a short rise time (35msec) compared to 125msec for 'fast'.
Intermittent Noise	Subjectively Assessed	Level varies by more than 5 dB	+ 5 dB	Adjustment to be applied for night time only
Duration	Single-event noise duration may range from 1.5 m to 2.5 h	One event in any 24-hour period	0 to -20dBA	The acceptable noise level may be increased by an adjustment depending on duration of noise (see Table 4.2)
Maximum adjustment	Refer to individual modifying factors	Where two or more modifying factors are indicated	Maximum correction of 10 dBA[2] (excluding duration correction)	

Notes

1. *Corrections to be added to the measured or predicted levels*
2. *Where a source emits tonal and low-frequency noise, only one 5-dB correction should be applied if the tome is in the low frequency range*

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Environmental Noise Compliance Assessment Bass Point Quarry

1 Bass Point Quarry Road,

Shellharbour, NSW 2529

Prepared for:-

Hanson Construction Materials Pty Ltd
Locked Bag 5260
Parramatta NSW 2124

Attention: Mr Steve Butcher

Reference: 1611018E-R

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Draft	MH	MH	04/11/2016
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The Quarry operates 24 hours per day, seven days per week under Project Approval 08_0143 issued by the Minister for Planning and Infrastructure on 28 January 2014 (the Approval).

It is a requirement of the Approval that monthly environmental noise compliance monitoring is undertaken. Schedule 3 of the Approval provides specific noise criteria that must be met at specifically identified receptor locations whilst the Quarry is operating. Appendix 6 of the Approval provides guidelines and requirements in relation to compliance noise monitoring methodology.

This report addresses those requirements. The author visited the site and all residential receptors on Monday 31 October 2016 to undertake attended noise compliance monitoring.

Noise measurements were taken in accordance with the requirements of the Approval and the level of noise emission from the operation of the Quarry was found to be well below acceptable noise limits at all receptor locations as detailed in this Report.

2. SITE AND DEVELOPMENT DESCRIPTION

2.1 Site Description

The Quarry is located adjacent to the Killalea State Park at the eastern end of Bass Point Quarry Road as shown in Figure 1 below.

The closest receptors to the site are located in Shell Cove to the north west and west of the Quarry. The nearest potentially affected residential receptors identified in the Approval are also shown in Figure 1 and as follows:-

R4 – Sloop Avenue (cnr Cutter Parade)

R5 – Apollo Drive (cnr Clipper Avenue)

R6 – 1 Makaha Way

R7 – 44 Mystics Drive

R8 – 29 Hinchinbrook Drive

R9 – 23 Magnetic Ridge

R11 – 7 Joondalup Parkway

R12 – 3 Ranfurlie Parkway

Figure 1. Location Plan – Bass Point Quarry, Shellharbour, NSW *(source: Google Maps © 2016)*

2.2 Development Description

Hanson's Bass Point Quarry is an extractive industry (hard rock quarry) supplying a range of products for projects such as building railways, roads, bridges, dams, airports, etc.

Primary activities at the site include the extraction, crushing, sorting and despatching of construction aggregates and this involves the use of the following plant and equipment:-

- Front end loader & dump truck (face loading)
- Vibrating Screens for each crusher
- Additional Front End Loader (despatch)
- Primary Jaw Crusher x 1 & Secondary Cone Crushers x 2
- Despatch truck movements

The above listed plant and machinery typically operates up until approximately 10 pm and constitutes full operation of the site. From approximately 10 pm the majority of operations cease with the exception of the secondary crushing plant and despatch loaders and trucks.

On the night of noise survey of 13 October 2016, this occurred at approximately 9.45 pm.

3. NOISE CRITERIA

Project specific noise limits and compliance testing conditions and methodology are derived from the Approval, and are as follows.

3.1 Acceptable Noise Limits

Schedule 3, Clause 3, Table 2 of the Approval sets noise criteria for each receptor location. Table 2 of the Approval is replicated in Table 1 below.

Table 1 Noise Criteria (Project Approval, Schedule 3 - Table 2)

Location	Day / Evening	Night	
	($L_{Aeq,\ 15\ min}$)	($L_{Aeq,\ 15\ min}$)	($L_{A1,\ 1\ min}$)
R4	44	44	54
R5	45	45	55
R6	42	42	52
R7	41	41	51
R8	35	35	45
R9	35	35	45
R11	45	45	55
R12	45	45	55
Any residential property within the Shell Harbour Marina Precinct	48	8	58
Shell Cove Primary School (when in use)	$L_{Aeq,\ 1\ hour}$ 40 (internal)	Not Applicable	

"Notes:

Noise generated by the project is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 6 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

However, these criteria do not apply if the Proponent has a written agreement with the relevant landowner to exceed the criteria, and the Proponent has advised the Department in writing of the terms of this agreement."

3.2 Noise Compliance Assessment Methodology

Appendix 6 of the Approval provides conditions and assessment methodology that is to be adhered to during noise compliance monitoring, and states:-

"Applicable Meteorological Conditions

1. The noise criteria in Table 1 of the conditions are to apply under all meteorological conditions except the following:

(a) during periods of rain or hail;

(b) average wind speed at microphone height exceeds 5m/s;

(c) wind speeds greater than 3 m/s measured at 10 m above ground level; or

(d) temperature inversion conditions greater than 3°c/100 m.

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall be that recorded by the meteorological station on or in the vicinity of the site.

Compliance Monitoring

3. Unless otherwise agreed with the Director-general, monthly attended monitoring is to be used to evaluate compliance with the relevant conditions of approval.

4. Unless otherwise agreed with the Director-General, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the NSW Industrial Noise Policy (as amended from time to time), in particular the requirements relating to:

(a) monitoring locations for the collection of representative noise data;

(b) meteorological conditions during which collection of noise data is not appropriate;

(c) equipment used to collect noise date, and conformity with Australian Standards relevant to such equipment; and

(d) modifications to noise data collected including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration."

4. MODIFYING FACTOR ADJUSTMENTS

Where a noise source contains certain characteristics, such as tonality, impulsiveness, intermittency or dominant low-frequency content, there is evidence to suggest that it can cause greater annoyance than other noise at the same noise level.

Section 4 of the NSW Industrial Noise Policy provides modifying factor corrections to account for the additional annoyance where applicable. The modifying factor corrections are to be applied to the measured or predicted source noise level, at the receiver location, prior to comparison with the project specific noise criterion detailed above.

Table 4.1 of the INP is replicated in the attached Appendix B.

In this instance there measured noise levels at all receptor locations during the evening and night time periods did not display characteristics requiring modifying factor adjustments.

5. MEASURED NOISE LEVELS

The author visited the Quarry and each of the receptor locations to carry out attended noise measurements during the evening and night time periods on Monday 31 October 2016. Noise measurements were undertaken at each receptor location shown in Figure 1, between the hours of approximately 6.30 pm and 11.00 pm.

During the noise survey, the weather was calm with negligible wind (> 5 m/s), predominantly clear skies and temperatures between approximately 22 and 19 degrees Celsius.

The Quarry was in full operation throughout the entire noise survey which included the plant and equipment identified in Section 2.2 of this Report operating simultaneously, at least on occasion. All measurements were paused as trucks passed along the Haul Road, whenever this was practicable as well as for children 'trick-or-treating'.

All measurements were carried out in accordance with Australian Standard AS 1055-1997 *"Acoustics - Description and measurement of environmental noise"* and the instrumentation used during the noise survey is shown in the attached Appendix A.

The results of the survey are shown in Tables 2 and 3 below, where Table 2 shows the measured and predicted $L_{eq,\ 15\ minute}$ noise levels for assessment against the Intrusiveness criteria and Table 3 shows the measured and predicted $L_{1,\ 1\ minute}$ noise levels for assessment against the Sleep Disturbance criteria.

Table 2 Measured & Estimated $L_{eq,\ 15\ minute}$ Noise Levels at Receptor Locations – 31 October 2016

Location / Time / Description	Noise Level (dBA)				Complies
	Measured Noise Level $L_{eq,\ 15\ minute}$	Typical Extraneous Noise Sound Pressure Level	Estimated Quarry Noise Level $L_{eq,\ 15\ minute}$	Acceptable Noise Limit $L_{eq,\ 15\ minute}$ Day, Evening & Night	
R4 – Sloop Avenue (7:50 to 8:05 pm) Quarry not audible	40	Children 50 Frogs 45 Lulls 34	<34	44	Yes
R5 – Apollo Drive (8:12 to 8:27 pm) Quarry not audible	39	Traffic 52 Lulls 33	<33	45	Yes
R6 – 1 Makaha Way (8.35 to 8.50pm) Quarry not audible	38	Children 48 Traffic 45 Lulls 34	<34	42	Yes
R7 – 44 Mystics Drive (8.55 to 9.10 pm) Quarry barely audible	39	Insects 45 Hal Rd 46 Lull 33	<33	41	Yes
R8 – 29 Hinchinbrook Drive (9.42 to 9.57 pm) Quarry not audible	37	Haul Rd 50 Dog Bark 47 Lull 31	<31	35	Yes
R9 – 23 Magnetic Ridge (9.20 to 9.35 pm) Quarry audible (general hum)	36	Haul Rd 50 Insects 40 Lull 32	<32	35	Yes
R11 – 7 Joondalup Parkway (6.35 pm to 6.50 pm) Quarry not audible	42	Surf 42 Children 50 Lull 40 (surf)	<35	45	Yes
R12 – 3 Ranfurlie Parkway (6.13 to 6.28 pm) Quarry not audible	44	Surf 44 Children 50 Lull 40 (surf)	<35	45	Yes

Table 3 Measured & Calculated $L_{1,\ 1\ minute}$ Noise Levels at Receptor Locations – 31 October 2016

Location / Description	Noise Level (dBA)				Complies
	Measured Noise Level $L_{1,\ 1\ minute}$	Typical Extraneous Noise Sound Pressure Level	Estimated Quarry Noise Level $L_{1,\ 1\ minute}$	Acceptable Noise Limit $L_{1,\ 1\ minute}$ at night	
R4 – Sloop Avenue (10:26 pm) Quarry not audible	40	Traffic 48 Lulls 33	<35	54	Yes
R5 – Apollo Drive (10:20 pm) Quarry not audible	38	Traffic 50 Lulls 34	<35	55	Yes
R6 – 1 Makaha Way (10:11pm) Quarry not audible	37	Children 43 Traffic 48 Lulls 35	<35	52	Yes
R7 – 44 Mystics Drive (10.07 pm) Quarry barely audible	38	Traffic 48 Lull 33	<33	51	Yes
R8 – 29 Hinchinbrook Drive (10.00 pm) Quarry not audible	37	Haul Rd 50 Lull 31	<33	45	Yes
R9 – 23 Magnetic Ridge (10.40 pm) Quarry audible (general hum)	40	Haul Rd 48 Insects 47 Lull 35	<35	45	Yes
R11 – 7 Joondalup Parkway (10.48 pm) Quarry barely audible	36	Insects 45 Lull 31	<31	55	Yes
R12 – 3 Ranfurlie Parkway (10.55 pm) Quarry barely audible	36	Traffic 48 Lull 32	<32	55	Yes

Discussion

No measured noise levels are considered to be enhanced by meteorological conditions outlined in Appendix 6 of the Approval and Section 3.2 of this Report, thus representing an acoustically worst-case scenario.

During all noise measurements, ambient and extraneous noise from, for example, insects, distant and local traffic, children and adults during Halloween festivities, voice noise within homes and barking dogs dominated the acoustical environment.

The contribution of Quarry noise emission to the measured levels has therefore been estimated based on observations of the sound pressure level during lulls in extraneous and ambient noise, whilst the Quarry was operating, and the subjective audibility of the Quarry.

It is likely that the contribution of noise from the Quarry to the actual measured noise levels is lower still, often considerably, particularly with respect to the $L_{1,\,1\,minute}$ noise levels at night, than those levels estimated in Tables 2 and 3, again, particularly where the operation of the quarry was inaudible.

In any event, the measured noise levels were below the acceptable noise limits, irrespective of the contribution from the Quarry, during all measurements at all receptor locations, with the exception of receptor R9 in the evening (see Table 2). The measured noise levels at this receptor, at this time was dominated by extraneous noise that was higher than the acceptable noise limit of 35 dBA.

It should be noted that compliance with the acceptable noise limits during the full operation of the quarry in the evening time, prior to 10 pm, also ensures compliance during the night time, with the same noise limits and reduced operations.

Measurements and calculations therefore show that the level of noise emission from the operation of the Quarry during the noise survey was well below the acceptable noise limits at all receptor locations.

6. CONCLUSION

Monthly Environmental Noise Compliance testing has been undertaken at Hanson's Bass Point Quarry in accordance with the requirements of the Project Approval 08_0143.

The level of noise emission from the Quarry was found to be below the acceptable noise limits at all times, at all receptor locations.

Matthew Harwood, MAAS

Principal Acoustic Consultant

Attachments:-

Appendix A – Noise Survey Instrumentation
Appendix B – Modifying Factor Corrections (EPA INP 2000)

Noise Survey Instrumentation	Appendix A

The instrumentation used during the noise survey consisted of the following:-

Description	Model No.	Serial No.
Svantek Sound Level Meter	971	39170
Svantek Acoustical Calibrator	SV 31	39580

The sound level meter conforms to Australian Standards AS IEC 61672.1-2004 : 'Electroacoustics - Sound level meters – Specifications' as a Class 1 precision sound level meter.

The calibration of the meters was checked before and after the measurement period. No significant system drift occurred over the measurement period. The sound level meter and calibrator have been checked, adjusted and aligned to conform to the factory specifications and issued with conformance certificates within the last 24 months as required by the regulations

Modifying Factor Corrections (EPA INP 2000)	Appendix B

Modifying factor corrections from Section 4.3 of the NSW Industrial Noise Policy 2000.

Table B1 Modifying Factor Corrections (from Table 4.1 of the NSW INP)

Factor	Assessment/ Measurement	When to Apply	Correction	Comments
Tonal Noise	One-third octave band or narrow band analysis	Level of one third octave band exceeds the level of the adjacent bands by 5 dB or more (above 400 Hz)	+ 5 dB	Narrow band frequency analysis may be required to precisely detect occurrence
Low Frequency Noise	Measurement of C-weighted and A-weighted Level	Measure/assess C and A-weighted levels over same time period. Correction to be applied if the difference between the two is 15 dB or more	+ 5 dB	C-weighted is designed to be more responsive to low frequency noise
Impulsive Noise	Time weighting fast and impulse	If the difference in the A weighted maximum levels between 'fast' and 'impulse' are greater than 2 dB	Apply the difference in measured levels as the correction up to a maximum of 5 dB	Impulse time weighting is characterised by a short rise time (35msec) compared to 125msec for 'fast'.
Intermittent Noise	Subjectively Assessed	Level varies by more than 5 dB	+ 5 dB	Adjustment to be applied for night time only
Duration	Single-event noise duration may range from 1.5 m to 2.5 h	One event in any 24-hour period	0 to -20dBA	The acceptable noise level may be increased by an adjustment depending on duration of noise (see Table 4.2)
Maximum adjustment	Refer to individual modifying factors	Where two or more modifying factors are indicated	Maximum correction of 10 dBA[2] (excluding duration correction)	

Notes

1. *Corrections to be added to the measured or predicted levels*
2. *Where a source emits tonal and low-frequency noise, only one 5-dB correction should be applied if the tome is in the low frequency range*