

Noise Monitoring Assessment

Hodgson Quarries and Plant Pty Ltd

Prepared for: VGT Laboratories Pty Limited
May 2018
MAC160257RP3



Document Information

Noise Monitoring Assessment

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Document ID	Status	Date	Prepared By	Signed	Reviewed By	Signed
MAC160257RP3	Final	31 May 2018	Robin Heaton	<i>Robin Heaton</i>	Oliver Muller	<i>OM</i>

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CONTENTS

1 INTRODUCTION5

2 NOISE CRITERIA7

 2.1 OPERATIONAL NOISE CRITERIA.....7

 2.2 ROAD NOISE CRITERIA.....7

3 METHODOLOGY9

 3.1 OPERATIONAL NOISE MEASUREMENT METHODOLOGY9

 3.2 ROAD NOISE ASSESSMENT METHODOLOGY 10

4 RESULTS 13

 4.1 OPERATIONAL NOISE RESULTS 13

 4.2 ROAD NOISE RESULTS 14

5 DISCUSSION 15

 5.1 OPERATIONAL NOISE DISCUSSION 15

 5.1.1 DISCUSSION OF RESULTS – LOCATION A, 23 MAY 2018..... 15

 5.1.2 DISCUSSION OF RESULTS – LOCATION B, 23 MAY 2018..... 15

 5.1.3 DISCUSSION OF RESULTS – LOCATION C, 23 MAY 2018 15

 5.2 ROAD NOISE DISCUSSION..... 15

6 CONCLUSION 17

APPENDIX A – GLOSSARY OF TERMS

APPENDIX B – REGULATORY NOISE LIMITS

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by VGT Laboratories Pty Ltd to complete a Noise Monitoring Assessment (NMA) for Hodgson Quarries and Plant Pty Ltd ('the quarry'). The NMA has been completed to quantify operational noise emissions and off-site truck noise as per Condition 47 and 48 of their Project Approval (Department of Planning and Environment (DPE)) and Environment Protection License (EPL) (ref:6535) from NSW Environment Protection Authority (EPA).

The assessment has been conducted in accordance with the following documents:

- NSW Environment Protection Authority (EPA), 2017, Noise Policy for Industry (NPI);
- NSW Department of Environment, Climate Change and Water (DECCW), 2011, NSW Road Noise Policy (RNP);
- Australian Standard AS 1055.1:1997 - Acoustics - Description and measurement of environmental noise - General Procedures;
- NSW Environment Protection Authority (EPA), 2015, Environment Protection Licence EPL 6535 (EPL); and
- Development Application (DA No.267-11-99), 2000, Department of Planning and Environment (DPE).

A glossary of terms, definitions and abbreviations used in this report is provided in **Appendix A**.

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2 Noise Criteria

2.1 Operational Noise Criteria

The project has operational noise criteria prescribed by both the DPE and EPA (see **Appendix B**). Notwithstanding, for consistency with the Acoustic Assessment prepared for Modification 2 of the quarry, this assessment has adopted criteria as per the Development Application summarised below:

Condition 47. For typical operations, noise from the premises must not exceed:

- *an LAeq, 15 min noise emission criterion of 43dBA (7am to 6pm) Monday to Saturday;*
- *an LAeq, 15 min noise emission criterion of 40dBA (6am to 7am) Monday to Saturday; and*
- *an LA1, 1 min noise emission criterion of 50dBA (6am to 7am) Monday to Saturday.*

Noise generated by the development is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy.

However, these criteria do not apply if the Applicant has an agreement with the owner/s of the relevant residence or land to generate higher noise levels, and the Applicant has advised the Department in writing of the terms of this agreement.

2.2 Road Noise Criteria

Condition 48 of the DA specifies noise criteria for off-site road trucks from the quarry. These criteria are consistent with those outlined in the RNP (DECCW, 2011) for local roads.

Condition 48.

The Applicant shall ensure that traffic noise from the development does not exceed (LAeq(1 hr)) 55dBA between 7am and 10pm and 50dBA between 10pm and 7am at any affected residence under adverse weather conditions. Where ambient LAeq levels already exceed these criteria, the Applicant shall ensure that traffic noise from the development does not result in an increase of more than 2dBA.

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3 Methodology

Attended noise surveys for this assessment were conducted in general accordance with the procedures described in Australian Standard AS 1055-1997, "Acoustics - Description and Measurement of Environmental Noise" and the EPL.

The acoustic instrumentation used carries current NATA calibration and complies with AS IEC 61672.1-2004-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ± 0.5 dBA. All equipment carried appropriate and current NATA (or manufacturer) calibration certificates.

3.1 Operational Noise Measurement Methodology

The locality surrounding the quarry is primarily rural/residential. Three representative receivers were selected for this assessment being Location A (north east), Location B (south east) and Location C (north west) (see **Figure 1**). The measurements were carried out using Svantek Type 1, 971 noise analysers on Wednesday 23 May 2018.

The monitoring consisted of six 15-minute monitoring intervals between 6am to 10am. Where possible throughout each survey the operator quantified the contribution of any significant noise sources. It is noted that quarry operations commence at 6am, with processing occurring after 8.30am. The programme of the measurements and list of quarry activities is presented in **Table 1**.

Table 1 Noise Monitoring Programme			
Number of 15 minute Measurements	Measurement Period	Assessment Period	Quarry Activities
3	6am to 7am	Night	Toolbox Talks, Loading/Transportation, No Processing
3	8.30am to 10am	Day	Full Quarry Operations, including processing

3.2 Road Noise Assessment Methodology

Road noise monitoring was conducted at 4405 Old Northern Road, Maroota NSW using a Type 1 Svantek, 957 noise analyser on Wednesday 23 May 2018. The monitoring was conducted between 6am to 10.30am as per Condition 48 of the DA, with the monitoring position situated at a 15m offset from Old Northern Road.

This location was selected as it had a clear line of site to Old Northern Road and could also be used to visually identify project related trucks entering and leaving site via Roberts Road. Noise levels obtained at the monitoring location are considered representative for receivers situated 15m from the road alignment, which is considered a representative worst case.



KEY




-  MARROOTA SAND QUARRY
-  ATTENDED NOISE MONITORING LOCATIONS
-  ROAD NOISE MONITORING LOCATION

FIGURE 1 - LOCALITY PLAN

MAC160257



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4 Results

4.1 Operational Noise Results

The monitoring and assessment results are presented in individual tables for each monitoring location. The results of the fifteen minute attended noise measurements for 23 May 2018 for Location A are summarised in **Table 2**.

Table 2 Operator-Attended Noise Survey Results – Location A						
Time (hrs)	Primary Noise Descriptor (dBA re 20 µPa)				Meteorology	Description and SPL, dBA
	L _{Amax}	L _{A10}	L _{Aeq}	L _{A90}		
5:52	73	47	52	38	Wind: 0.1 m/s	Passing Traffic 48 – 73
					Dir: S	Truck Onsite 38 – 41
					Rain: Nil	Aircraft 36 – 40
Quarry Site L _{Aeq} (15-min) Contribution						38dBA
8:34	62	43	43	38	Wind: 0.5m/s	Sand Plant 35 – 39
					Dir: SW	Passing Traffic 42 – 62
					Rain: Nil	Birds 40 – 43
Quarry Site L _{Aeq} (15-min) Contribution						37dBA

The results of the fifteen minute attended noise measurements for 23 May 2018 for Location B are summarised in **Table 3**.

Table 3 Operator-Attended Noise Survey Results – Location B						
Time (hrs)	Primary Noise Descriptor (dBA re 20 µPa)				Meteorology	Description and SPL, dBA
	L _{Amax}	L _{A10}	L _{Aeq}	L _{A90}		
6:10	73	52	53	37	Wind: 0.1m/s	Float Truck Offsite 47 – 50
					Dir: S	Passing Traffic 50 – 73
					Rain: Nil	Birds 36 – 38
Quarry Site L _{Aeq} (15-min) Contribution						Nil
9:09	68	46	47	38	Wind: 0.4m/s	Aircraft 44 – 50
					Dir: SSW	Passing Traffic 45 – 68
					Rain: Nil	Site Noise 35 – 44
Quarry Site L _{Aeq} (15-min) Contribution						37dBA

The results of the fifteen minute attended noise measurements for 23 May 2018 for Location C are summarised in **Table 4**.

Table 4 Operator-Attended Noise Survey Results – Location C						
Time (hrs)	Primary Noise Descriptor (dBA re 20 µPa)				Meteorology	Description and SPL, dBA
	L _{Amax}	L _{A10}	L _{Aeq}	L _{A90}		
6:30	63	51	48	41	Wind: 0.2m/s Dir: S Rain: Nil	Traffic 40 – 63 Frogs 37 – 41
Quarry Site L _{Aeq} (15-min) Contribution					N/A (quarry inaudible)	
9:31	64	45	43	35	Wind: 0.3m/s Dir: SW Rain: Nil	Traffic 37 – 54 Aircraft 37 – 46 Birds 34 – 64
Quarry Site L _{Aeq} (15-min) Contribution					N/A (quarry inaudible)	

4.2 Road Noise Results

The results of the road noise attended measurements for 23 May 2018 are summarised in **Table 5**. Generally, meteorological conditions at the time of the measurements were neutral to adverse (ie noise enhancing). Notwithstanding, taking into account the wind velocity and distance to the source from receiver, meteorological conditions would not significantly increase received noise levels.

It was evident from attended noise monitoring that overall L_{Aeq}(1hr) noise levels were dominated by vehicles not associated with the quarry. Therefore, road traffic noise calculations were undertaken to quantify project road noise contributions at the measurement position. The calculations were completed using the United States (US) Environment Protection Agency's road traffic calculation method. This method is an internationally accepted theoretical traffic noise prediction model. Results of the traffic noise calculations identify that quarry vehicles satisfy the relevant day and night road noise criteria.

Table 5 Road Noise Survey Results				
Period	Number of Quarry Trucks (passbys)	Overall Measured	Calculated L _{Aeq} (1hr)	
		L _{Aeq} (1hr)	Project Truck	Criteria, dBA
		(dBA re 20 µPa)	Contribution	L _{Aeq} (1hr)
		dBA	dBA	
6am to 7am	8	75	43	50
7am to 8am	6	72	40	55

5 Discussion

5.1 Operational Noise Discussion

5.1.1 Discussion of Results – Location A, 23 May 2018

Attended measurement results for monitoring conducted at Location A on 23 May 2018 identified that quarry noise was audible prior to 7am with a haul truck idling at the top section of the haul road dominating measured noise levels. Generally, road traffic such as off-site trucks and aircraft were dominant throughout the period with the onsite trucks briefly audible which were noted to contain similar acoustic characteristics as non-project road traffic. At approximately 8.30am quarry processing commenced with the sand plant audible at the monitoring location throughout the measurement. The noise contribution from the quarry satisfied the relevant noise criterion for the entire attended measurement on 23 May 2018. L_{Amax} emissions from the quarry remained below the sleep disturbance criterion.

5.1.2 Discussion of Results – Location B, 23 May 2018

Monitoring results for Location B on 23 May 2018 were influenced primarily by non-quarrying sources such as a float truck in the neighbouring site, offsite trucks and distant road traffic. Between 6am to 7am quarrying operations were inaudible. This was primarily due to the masking effect of the float truck adjacent to the dwelling. At 8.30am noise from the quarry sand plant was audible but often masked by extraneous noise sources such as offsite trucks and aircraft. L_{Amax} emissions from the quarry remained below the sleep disturbance criterion.

5.1.3 Discussion of Results – Location C, 23 May 2018

Noise levels at Location C on 23 May 2018 were dominated by ambient sources not associated with quarrying operations including birds, aircraft and passing traffic. The quarry was not audible during the period between 6am and 10am. Therefore, quarrying operations satisfied relevant operational and sleep disturbance noise criterion.

5.2 Road Noise Discussion

Road noise emission from quarry vehicles, satisfied relevant noise criteria as specified by Condition 48 of the DA for receivers situated at a 15m offset to the roadway. Furthermore, ambient road traffic not associated with the project dominated measured noise levels throughout measurements.

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6 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment on behalf of Hodgson Quarries and Plant Pty Ltd. The assessment was completed to quantify site noise emissions against relevant noise criteria pertaining to quarry operations and off-site truck movements.

Attended monitoring has identified that operational and road noise emissions generated by the quarry comply with relevant statutory noise limits. Furthermore, project related noise emissions are generally masked by extraneous non-quarry sources.

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Appendix A – Glossary of Terms

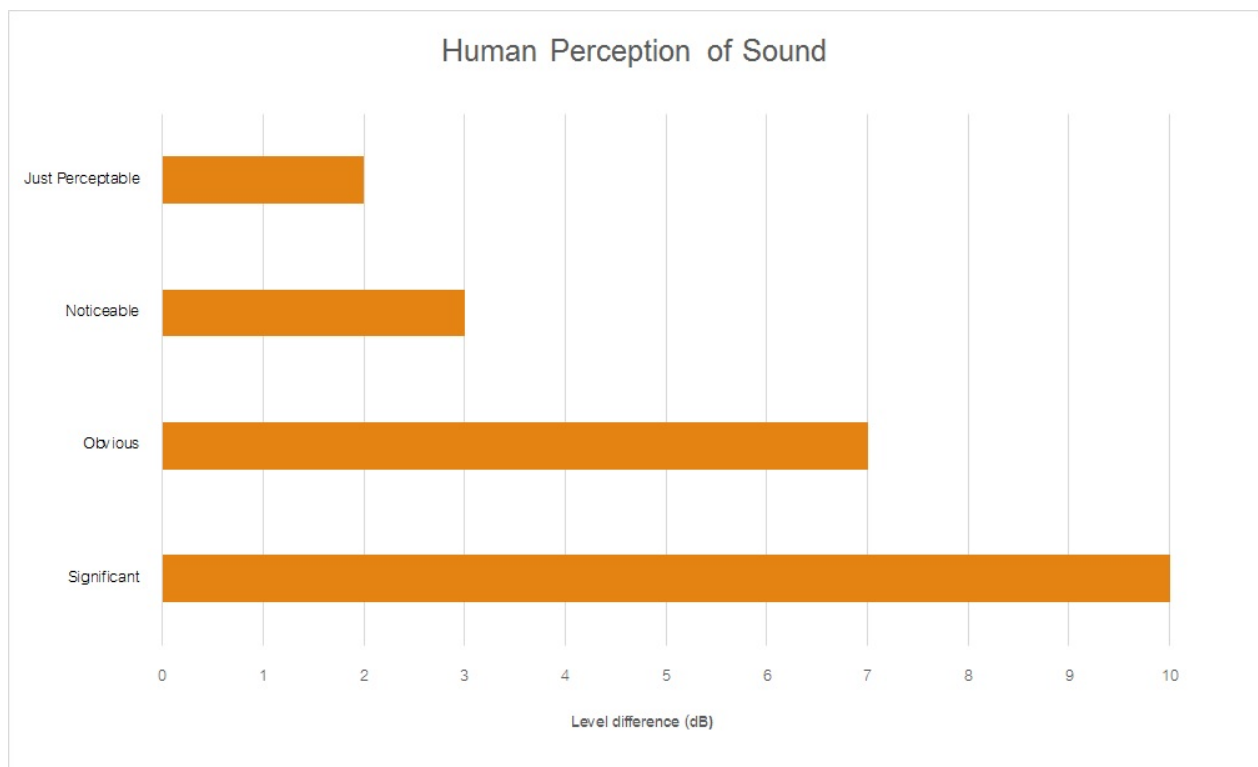
Table A1 provides a number of technical terms have been used in this report.

Table A1 Glossary of Terms	
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured LA90 statistical noise levels.
Adverse Weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient Noise	The noise associated with a given environment. Typically a composite of sounds from many sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.
dBA	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
dB(Z), dB(L)	Decibels Linear or decibels Z-weighted.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A noise level which is exceeded 10 % of the time. It is approximately equivalent to the average of maximum noise levels.
LA90	Commonly referred to as the background noise, this is the level exceeded 90 % of the time.
LAeq	The summation of noise over a selected period of time. It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period.
LAm _{ax}	The maximum root mean squared (rms) sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the ABL's.
Sound power level (LW)	This is a measure of the total power radiated by a source. The sound power of a source is a fundamental location of the source and is independent of the surrounding environment. Or a measure of the energy emitted from a source as sound and is given by : $= 10 \cdot \log_{10} (W/W_0)$ Where : W is the sound power in watts and W ₀ is the sound reference power at 10-12 watts.

Table A2 provides a list of common noise sources and their typical sound level.

Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA	
Source	Typical Sound Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom (night with windows closed)	20
Threshold of hearing	0

Figure A1 – Human Perception of Sound



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Appendix B – Regulatory Noise Limits

Environment Protection Licence



Licence - 6535

Licence Details

Number:	6535
Anniversary Date:	12-March

Licensee

HB MAROOKA PTY LTD

PO BOX 1778

GOSFORD NSW 2250

Premises

HB MAROOKA PTY LTD

CNR ROBERTS & OLD NORTHERN ROADS

MAROOKA NSW 2756

Scheduled Activity

Crushing, Grinding or Separating

Extractive Activities

Fee Based Activity

	<u>Scale</u>
Crushing, grinding or separating	> 100000-500000 T processed
Land-based extractive activity	> 100000-500000 T extracted, processed or stored

Region

Metropolitan - Sydney Industry

Level 13, 10 Valentine Ave

PARRAMATTA NSW 2150

Phone: (02) 9995 5000

Fax: (02) 9995 6900

PO Box 668 PARRAMATTA

NSW 2124

Environment Protection Licence

Licence - 6535



P1 Location of monitoring/discharge points and areas

P1.1 The following utilisation areas referred to in the table below are identified in this licence for the purposes of the monitoring and/or the setting of limits for any application of solids or liquids to the utilisation area.

3 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Noise limits

L2.1 Noise from the premises must not exceed the sound pressure level expressed as LA10 (15 minute) of 45 dB(A), except as expressly provided by this licence.

L2.2 Noise from the premises is to be measured or computed at any point within one metre of any residential boundary, or at any point within 30 metres of the dwelling where the dwelling is more than 30 metres from the boundary, to determine compliance with the noise level limits in Condition L2.1.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.

This includes:

- a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
- b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:

- a) must be maintained in a proper and efficient condition; and
- b) must be operated in a proper and efficient manner.

O3 Dust

O3.1 The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.

ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

DETERMINATION OF A DEVELOPMENT APPLICATION UNDER SECTION 80(1) OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

I, the Minister for Urban Affairs and Planning, under Section 80(1) of the Environmental Planning and Assessment Act, 1979 (the Act), determine the Development Application referred to in Schedule 1 by granting consent to the Application, subject to the conditions set out in Schedule 2.

The reason for the imposition of conditions is to minimise any adverse environmental effects of the development, consistent with the objectives of the Act.

Andrew Refshauge MP
Minister for Urban Affairs and Planning

Sydney 2000 File No. S98/00772

SCHEDULE 1

Application made by: Dr L. S. Martin ("the Applicant").

To: The Minister for Urban Affairs and Planning ("the Minister").

In respect of: Lots 1 and 2 DP 228308, Lot 2 DP 312327, Roberts Road, Maroota, in the Baulkham Hills Local Government Area.

For the following: Extraction and on-site processing of sand, clay and pebble; construction of a bund wall.

Development Application: DA No. 267-11-99 lodged with the Department of Urban Affairs and Planning on 22 November 1999, accompanied by a Environmental Impact Statement prepared by Nexus Environmental Planning Pty Ltd. and dated November 1999.

Determination: 1) To ascertain the date upon which the consent becomes effective, refer to Section 83 of the Act.
2) To ascertain the date upon which the consent is liable to lapse, refer to Section 95 of the Act.
3) Section 97 of the Act confers on an applicant who is dissatisfied with the determination of a consent authority a right of appeal to the Land and Environment Court exercisable within 12 months after receipt of notice.

This instrument includes changes made by DA 267-11-99 Mod 1 in 29 November 2000 (marked red).

This instrument includes changes made by DA 267-11-99 Mod 3 in 18 August 2015 (marked blue).

This instrument includes changes made by DA 267-11-99 Mod 2 in 18 March 2016 (marked green).

44. The results of the Groundwater Monitoring Program shall be reported the Department and DPI-Water, using contour plans depicting the surface topography, updated contour maps of the wet weather high groundwater level of the regional aquifer and proposed depth of extraction for each extraction Phase. Reporting is to occur on a six monthly basis for the duration of extractive operations, and throughout rehabilitation of the site, unless otherwise agreed with the Secretary.

The Applicant shall implement the Groundwater Monitoring Program as approved from time to time by the Secretary.

Process Water Dam Design and Construction

45. The Applicant must ensure that the Process Water Dam is designed and constructed in a manner that satisfies the design and construction criteria for the Process Water Dam as developed under the Surface Water Management Plan (see condition 42(b) above).

NOISE

Noise Management Plan

46. The Applicant shall prepare a Noise Management Plan as part of the EMP.

The Noise Management Plan shall:

- (a) identify existing and potential noise sources and their relative contribution to noise impacts from the development;
- (b) specify appropriate intervals for noise monitoring to evaluate, assess and report noise emission levels due to construction and normal operations of the development under prevailing weather conditions;
- (c) outline the methodologies to be used, including justification for monitoring intervals, weather conditions, seasonal variations, selecting locations, periods and times of measurements, the design of any noise modelling or other studies, including the means for determining the noise levels emitted by the development;
- (d) specify measures to be taken to document any higher level of impacts or patterns of temperature inversions, and detail actions to quantify and ameliorate enhanced impacts if they occur;
- (e) provide details of noise amelioration measures, including measures to be used to reduce the impact of intermittent, low frequency and tonal noise (including truck reversing alarms) and reactive management responses for particular noise sources; and
- (f) contingency measures to be implemented should noise complaints be received.
- (g) provision for the notification of adjoining property owners of the commencement and duration of works adjoining the boundary;
- (h) construction of temporary noise shielding to residences affected by short-term noise impacts, including the bund recommended under Modification 2, and include an assessment of the effectiveness of this measure in reducing noise levels; and
- (i) include a noise reduction strategy for typical operations to ensure the noise levels from these operations do not exceed the noise criteria specified in Condition 47.

The Applicant shall implement the approved management plan as approved from time to time by the Secretary.

47. For typical operations, noise from the premises must not exceed:
- an $L_{Aeq,15 \text{ min}}$ noise emission criterion of 43 dB(A) (7am to 6pm) Monday to Saturday;
 - an $L_{Aeq,15 \text{ min}}$ noise emission criterion of 40 dB(A) (6am to 7am) Monday to Saturday; and
 - an $L_{A1,1 \text{ minute}}$ noise emission criterion of 50 dB(A) (6am to 7am) Monday to Saturday.

Noise generated by the development is to be measured in accordance with the relevant requirements of the *NSW Industrial Noise Policy* (as may be updated or replaced from time-to-time).

However, these criteria do not apply if the Applicant has an agreement with the owner/s of the relevant residence or land to generate higher noise levels, and the Applicant has advised the Department in writing of the terms of this agreement."

- 47(a) The excavator to be used is to be fitted with acoustic mufflers to achieve a noise level of approximately 76dB(A) when measured at 7 metres.
- 47(b) The on-site generator is to be fitted with an acoustic enclosure to ensure that noise levels less than 44dB(A) at 30m are achieved.
- 47(c) A noise compliance investigation is to undertaken within one month of the installation of the equipment to demonstrate compliance with the noise level limits stated in Conditions 47(a) and 47(b). The results of the compliance investigation are to be provided for the approval of the Secretary within 14 days of the completion of the investigations.
- 47(d) The Applicant must ensure works associated with atypical operations, as described in Modification 2, only occur:
- (a) for a maximum of 24 days in a year, and only between 8 am to 5 pm on those days, Monday to Saturday;
 - (b) after an investigation of options for avoiding multiple atypical operations at any one time so as to limit noise levels at affected receptors, and the outcomes of this investigation are detailed in the Noise Management Plan; and
 - (c) at least 24 hours after notifying potentially affected receptors, with such notification to include information on the duration and extent of works, the likely noise to be experienced, and a contact telephone number.

TRAFFIC AND TRANSPORT

Road Noise Management Plan

48. The Applicant shall ensure that traffic noise from the development does not exceed (L Aeq(1 hr)) 55 dB(A) between 7 am and 10 pm and 50 dB(A) between 10 pm and 7 am at any affected residence under adverse weather conditions. Where ambient Leq levels already exceed these criteria, the Applicant shall ensure that traffic noise from the development does not result in an increase of more than 2 dB(A).

Note: Adverse weather conditions means in the presence of winds up to 3 metres per second and/or temperature inversions of up to 4 degrees Centigrade per 100 metres.

49. The Applicant shall prepare a Road Noise Management Plan as part of the EMP. The Plan shall document measures to be taken to meet the criteria, including a monitoring, reporting and response program; and methods for educating drivers in the reduction of road noise impacts.

The Applicant shall implement the approved management plan as approved from time to time by the Secretary.

Truck movements

50. The Applicant shall ensure that truck movements associated with the development do not exceed 100 movements per day (50 laden truck movements) or 20 (10 laden truck movements) movements per hour, during construction or operation.

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