

Dixon Sand Pty Ltd

Old Northern Road Quarry, Maroota

**Noise monitoring report
September 2025**

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Definition of terms

Background noise	The underlying level of noise present in the ambient noise, excluding the noise source under investigation.
Decibel (dB)	A measure of sound equivalent to 20 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure, and 10 times the logarithm (to base 10) of the ratio of a given sound power to a reference power.
dB(A)	Unit used to measure 'A-weighted' sound pressure levels. A-weighting is an adjustment made to sound-level measurement to approximate the response of the human ear.
dB(C)	Unit used to measure 'C-weighted' sound pressure levels, an adjustment made to sound level to approximate low frequency noise between 10 Hz and 200 Hz.
EPA	Environment Protection Authority
Extraneous noise	Noise resulting from activities that are not typical of the area such as construction, and traffic generated by holiday periods or special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous.
Noise level statistics	<p>L_{A90} – The A-weighted sound pressure level exceeded 90% of the monitoring period. This is considered to represent the background noise.</p> <p>L_{Aeq} – The equivalent continuous A-weighted noise level—the level of noise equivalent to the energy average of noise levels occurring over a measurement period.</p> <p>L_{A1} – The A-weighted sound pressure level exceeded 1% of the monitoring period.</p> <p>L_{Amax} – The maximum A-weighted noise level associated with the measurement period.</p> 
RBL	The Rating Background Level for each period is the medium value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period (day, evening and night)
Receiver	The land use at which noise is heard
SLM	Sound Level Meter
Sound Power Level (SWL)	The A-weighted sound power level is a logarithmic ratio of the acoustic power output of a source relative to 10^{-12} watts and expressed in decibels. Sound power level is calculated from measured sound pressure levels and represents the level of total sound power radiated by a sound source.
Sound Pressure Level (SPL)	<p>This is the level of noise, usually expressed in dB(A), as measured by a standard sound level meter (SLM) with a pressure microphone. The sound pressure level in dB(A) gives a close indication of the subjective loudness of noise.</p> <p>A technical definition for the sound pressure level, in decibels, is 20 times the logarithm (base 10) of the ratio of any two quantities related to a given sound pressure to a reference pressure (typically 20 μPa equivalent to 0 dB).</p>
Tonal noise	Noise with perceptible and definite pitch or tone



1. Introduction

Dixon Sand Pty Ltd operates the Old Northern Road Quarry in Maroota, NSW (the Quarry). The Quarry is located off Old Northern Road, as illustrated in Figure 1.

Operations at the quarry include extraction of sand and sandstone blocks, processing by screening and grading and direct sales involving loading of trucks for shipment.

The Quarry operates under Development Consent 250-09-01 and Environment Protection Licence (EPL) 3916, which set noise limits for its operation and require noise monitoring to be completed on a six-monthly basis to ensure compliance with the conditions.

Hutchison Weller was commissioned by Dixon Sand to undertake the six-monthly noise monitoring in accordance with the conditions of consent, EPL and requirements of the Noise Management Plan.

This document outlines the consent conditions, monitoring methodology and results of the monitoring undertaken on 10 June 2025.



Figure 1 Location of the Quarry

2. Noise compliance criteria

Conditions 1 and 2 of Schedule 3 of development consent DA250-09-01 outline the Quarry operating hours and condition 3 defines the noise criteria for compliance. Environment Protection Licence (EPL) 3916

1. The Applicant must comply with the operating hours set out in Table 1.

Table 1 Operating hours

Activity	Permissible hours
Quarrying operations (excluding truck arrival, loading and dispatch)	7.00 am to 6.00 pm Monday to Saturday At no time on Sundays or public holidays
Truck arrival (unladen)	5.45 am to 6.00 pm Monday to Saturday At no time on Sundays or public holidays
Truck loading Truck dispatch Truck arrival (laden)	6.00 am to 6.00 pm Monday to Saturday At no time on Sundays or public holidays
Bund construction or rehabilitation works within 250 m of Maroota Public School	7.00 am to 6.00 pm Monday to Friday during school holiday periods unless otherwise approved in writing by the EPA
Maintenance	May be conducted at any time, provided that these activities are not audible at any privately-owned residence

2. The following activities may be carried out outside the hours specified in condition 1 above:
 - (a) delivery or dispatch of materials as requested by the NSW Police Force or other public authorities; and
 - (b) emergency work to avoid the loss of lives, property or to prevent environmental harm.

In such circumstances, the Applicant must notify the Secretary and affected residents prior to undertaking the activities, or as soon as is practical thereafter.

3. The Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 2 at any residence on privately-owned land or at the Maroota Public School.

Table 2 Noise criteria dB(A)

Receiver	Averaging period	Shoulder (6.00 am to 7.00 am)	Day (7.00 am to 6.00 pm)
Any residence on privately owned land	LAeq (15 minute)	37	44
Any classroom at Maroota Public School	LAeq (1 hour)	-	45

Noise generated by the development is to be measured in accordance with the relevant requirements and exemptions (including certain meteorological conditions and modification factors) of the NSW Noise Policy for Industry (2017). Appendix 6 sets out the meteorological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.

However, the noise criteria in Table 2 do not apply if the Applicant has an agreement with the relevant landowner to exceed the noise criteria, and the Applicant has advised the Department in writing of the terms of this agreement.

3. Monitoring methodology

Operator-attended noise monitoring was undertaken by Hutchison Weller, an independent acoustic specialist and Member of the Australian Acoustical Society. Monitoring locations included those described in the Quarry Noise Management Plan plus additional sensitive receivers, as illustrated in Figure 1 and summarised in Table 3.

Table 3 Monitoring locations

Receiver ¹	Address	Description
OR1	Maroota public school	Classroom closest to quarry operations
OR2	4624 Old Northern Road	Private residence
OR3	4634 Old Northern Road	Private residence
R2	4579 Old Northern Road	Private residence
R3	4567 Old Northern Road	Private residence
R4/5	4547 – 4543 Old Northern Road	Mid-point between private residence
OAS1	Lot 196 of the Quarry	At source monitoring, close to operations
OAS2	Lots 1 and 2 of the Quarry	At source monitoring, close to operations
OAS3	Lots 1 and 2 of the Quarry	At source monitoring, close to operations

Note 1: An agreement between Dixon Sand and receiver R1 is in place and, therefore, noise management levels defined by the development consent are not applicable.

Monitoring was conducted in accordance with procedures outlined in the Noise Policy for Industry and Section 6 of the Noise Management Plan.

At-receiver monitoring locations were within 30 metres of residential dwellings, whilst onsite measurement locations were selected for safe access and to be representative of the operations, without extraneous noise from sources such as traffic and insects.

Instrumentation included a Bruel & Kjaer Class 1 sound level meter (SLM), serial no. 3008237, field-calibrated prior to and following monitoring. The SLM was within current calibration, next due January 2025.

Monitoring was undertaken with the SLM set on a tripod at 1.5 metres above ground and measuring A-weighted sound pressure levels under fast response. Each measurement period was 15 minutes and recorded the LAeq, LA90 and LMax statistics.

Meteorological data is usually recorded during each monitoring period adjacent to the Maroota public school to establish whether meteorological conditions were suitable for monitoring. Data includes wind speed, direction, temperature, relative humidity, and sigma-theta (to establish the Pascall-Guifford stability category). This data was used to establish the meteorological conditions as being suitable for monitoring.

Where extraneous noise such as road traffic and fauna (insects/birds) were the dominant noise sources, making it impractical to discern the contribution of the Quarry to ambient noise levels, noise levels measured at alternative locations closer to the Quarry were utilised, in line with procedures outlines in Noise Policy for Industry (NSW EPA 2017). This involved extrapolation from the near-distance location to the sensitive receiver location, as described in Section 4.2.



4. Monitoring results

4.1 Attended measurements

Results of noise monitoring for each location are presented in Table 4 to Table 6.

In general, quarry operations were inaudible from most locations, with traffic the dominant source of noise for residents on the Old Northern Road.

Quarry operations in June 2025 fell into three categories representing the main sources of noise. These were:

- Sand processing and truck loading (main plant, front end loaders, trucks)
- Extraction of bulk sandstone by triple saw ("log popping")
- Stockpile management with articulated dump trucks

Depending on the receiver location, these sources played a varying role in contributing to the total noise level.

Measured results indicated quarry operations during the shoulder period (from 6.00am to 7.00am) were inaudible, including during breaks in traffic noise, and complied with the noise criteria at all measurement locations.

On-site measurements were taken to determine the noise level of various noise sources without the influence of traffic noise. Measurements were undertaken over 15-minute periods to establish representative sound power levels of the operation to allow extrapolation to receiver locations where background noise was too high to discern quarry noise contributions. This is discussed further in Section 4.2.

During the day (standard hours), measurement at the school and residential receivers established traffic was the dominant source of noise in the area and heavily influenced measured LAeq, 15-minute noise levels. Quarry noise was generally inaudible throughout the duration of the monitoring.

Estimated contributions of quarry noise on the total noise level indicated compliance with the noise limit. However, due to ambient noise (traffic, birds, breeze in trees), extrapolation from at-source measurements has been undertaken to support this assertion (See Section 4.2.)



Table 4 Monitoring results – Shoulder Period - 6.00am to 7.00am – Measurements at Sensitive Receivers

Time	Location	Noise criterion	Measured 15-minute noise level			Estimated LAeq, 15 min quarry contribution	Observations	Meteorological conditions
			LAeq	LA90	LAm _{ax}			
10/06/2025 5:55	OR3*	37	59.5	38.3	77.9	<37	Site inaudible. Dominant noise sources were road traffic noise on from the access road and Old Northern Road.	Clear skies, light winds, from ESE to NNW @ 0.4-3.8 km/hr Temperature 8.9-9.5°C Extremely unstable conditions (A Class)
10/06/2025 6:14	OR2		49.1	41.0	62.0	<37		
10/06/2025 6:34	R3		69.9	41.6	93.0	<37		
10/06/2025 6:51	R4/5		69.5	48.3	88.9	<37		

*= Measurement was conducted along the access road. Accessing monitoring location OR3 during night-time hours was challenging due to overgrown grass and limited visibility.



Table 5 Monitoring results – Day Period - 7.00am to 6.00pm – Site Boundary Measurements

Time	Location	Noise criterion	Measured 15-minute noise level			Estimated LAeq, 15 min quarry contribution	Observations	Meteorological conditions
			LAeq	LA90	LAmaz			
10/06/2025 8:31	OAS1 (Top of ledge NW of carpark)	N/A	62.7	59.9	72.2	-	<p>Continuous plant noise was audible, originating approximately 82–100 m from the sound level meter, with measured levels of 60–61 dBA.</p> <p>A front-end loader (FEL) was operating to the east of the SLM but did not influence the recorded noise levels.</p> <p>A second FEL operated at a distance of 36 m from the SLM, passing by with measured levels of 67–72 dBA before moving to pick up material approximately 70 m away.</p> <p>A truck was observed entering the site at a distance of 33 m from the SLM, generating noise levels of 65 dBA.</p>	<p>Clear skies, light to moderate winds, from WNW to SSW at 1.8–2.3km/hr</p> <p>Temperature 12–15°C</p> <p>Extremely unstable conditions (A Class)</p>
10/06/2025 10:20	OAS2	N/A	62.0	55.8	70.6	-	<p>A second pump was operational approximately 200 m from the SLM and was the dominant noise source, alongside an excavator conducting grinding works 145 m away, with measured levels ranging from 61–63 dBA.</p> <p>Hitachi EX17 excavator was observed in the distance 'cleaning the wall', contributing to intermittent noise impacts up to 64 dBA.</p> <p>General site noise was primarily attributed to the pump. Excavator log popping was not visible during the measurement period.</p>	
10/06/2025 8:59	OAS3	N/A	59.1	55.4	72.9	-	<p>Hitachi EX17 excavator was observed 'cleaning the wall' using the bucket/shovel at a distance of 131 m from the SLM, defining the measured LAmaz levels.</p> <p>Hyundai EX11 excavator was conducting log popping activities approximately 160 m from the SLM. A pump was operating continuously 194 m away from the SLM, influencing the recorded LA90 noise level.</p>	



Table 6 Monitoring results – Day Period - 7.00am to 6.00pm – Measurements at Sensitive Receivers

Time	Location	Noise criterion	Measured 15-minute noise level			Estimated LAeq, 15 min quarry contribution	Observations	Meteorological conditions
			LAeq	LA90	LAmx			
10/06/2025 10:54	OR3*		51.9	42.4	74.6	<44	(Measurement taken along the access road) Site generally inaudible. Continuous plant near OAS1 was intermittently just audible, with levels around 43 dBA (equivalent to approx. 40dBA distance corrected to the façade of OR3). Audibility appeared wind-influenced as the plant operates continuously. A truck pass-by on the access road recorded 72 dBA. A truck idling approximately 150 m east of the SLM (facing the site) generated 50 dBA from 12 minutes onward.	Clear skies, light to moderate winds, from SW/WSW at 2-10km/hr Temperature 15-16°C Extremely unstable conditions (A Class)
10/06/2025 11:12	OR2		49.4	43.6	62.2	<44	Site was inaudible during the measurement period. Noise environment was dominated by activity on the access road and main road. Occasional farm activity across the access road and distant bird calls were also audible.	
10/06/2025 11:32	R2		70.5	45.9	95.7	<44	Site generally inaudible. Some site noise barely audible and not influencing the measure Old Northern Road dominant.	
10/06/2025 11:51	R3		72.3	47.0	94.7	<44	Occasional shovel impacts were barely audible and did not influence measured levels. Main road was audible and the dominant noise source. Brief shovel impacts reached approximately 52 dBA for a few seconds but did not define LAeq measurement. Wind in surrounding trees also audible.	
10/06/2025 12:08	R4/5		70.1	46.3	90.4	<45	Brief shovel impacts were audible for a few seconds but did not define LAeq measurement. Main road was audible and the dominant source, influencing both LAeq and LAmx. Bird calls	



Time	Location	Noise criterion	Measured 15-minute noise level			Estimated LAeq, 15 min quarry contribution	Observations	Meteorological conditions
			LAeq	LA90	LAmix			
							were audible within the range of 45–52 dBA. Wind in surrounding trees was also audible.	
10/06/2025 12:30	OR1 (School)	45	53.5	47.8	72.6	<45	<p>The site was generally inaudible during the attended monitoring. Occasional light shovel or bucket impacts were audible intermittently during some 15-minute measurement periods but did not define any of the measured noise levels. The dominant noise source was road traffic from Old Northern Road.</p> <p>Continuous mid-frequency tonal plant noise, likely from a screening plant, was audible from the adjacent PF Formation Sand & Concrete site and is not associated with Dixon Sands operations.</p> <p>Other background noise sources included near and distant bird calls within the surrounding vegetation, wind in trees, and intermittent voices from school children, audible for approximately 5 minutes during the final 15-minute measurement period.</p>	
10/06/2025 12:45	OR1 (School)	45	54.0	49.2	75.8	<45		
10/06/2025 13:01	OR1 (School)	45	55.6	49.0	74.0	<45		
10/06/2025 13:16	OR1 (School)	45	54.7	49.6	72.6	<45		

*= Measurement was conducted along the access road. Accessing monitoring location OR3 during night-time hours was challenging due to overgrown grass and limited visibility.



4.2 Extrapolated measurements

A conclusive noise level attributable to the Quarry was not possible in all locations due to ambient noise levels. Therefore, measurements captured on-site without substantial influence from extraneous noise were used to calculate sound pressure levels at each receiver.

Based on observations close to the quarry, the following plant and equipment was in use during the monitoring period.

1. Processing plant - conveyors and drives, screens, front end loaders, Moxies (plant to stockpile)
2. Pit – Excavator-mounted rock saw, excavators grinding and popping logs, front end loaders.
3. FEL(near the plant) moving stockpile

Measurements close to these plant items were undertaken to establish a representative noise model of the quarry operations. A summary of noise emission data for these items is presented in Appendix A.

Predictions of noise at nearby receivers were based on measured onsite noise levels and propagation methods described in ISO 9613-2:1996 *Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation*, which accounts for geometric spreading, air and ground absorption as well as barrier effects, assuming worst case meteorology of a gentle breeze from source to receiver and stable conditions.

Since site operations were generally inaudible at the receiver locations, source noise measurements have been modelled and extrapolated to estimate the noise levels at the surrounding sensitive receivers.

Based on the above, modelled noise levels for each monitoring location are presented in Table 7 and Table 8. It should be noted a change in dominant or active equipment was observed during measurements at OAS2 and OAS3 and have been considered in the model validation. Refer to Table 5.

Modelled noise levels are within 2dB of the measured values indicating the model is sufficiently accurate represent operating conditions.

Table 7 Extrapolated monitoring results to intermediate measurement locations – Pit Activity Scenario A

Location	Modelled noise level, dBA	Measured noise level, LAeq, 15 minute	dB Difference
OAS1	63.7	62.7	1
OAS3	57	57.2	0.2

Table 8 Extrapolated monitoring results to intermediate measurement locations – Pit Activity Scenario B

Location	Modelled noise level, dBA	Measured noise level, LAeq, 15 minute	dB Difference
OAS1	63.8	62.7	1.1
OAS2	60.5	62.0	1.5



The predicted noise levels at the sensitive receiver locations are presented in Table 9 and Table 10.

Extrapolated results indicate residential receivers meet the daytime criteria during both modelled scenarios.

The school, OR1 is also compliant with the daytime noise criteria during both modelled scenarios.

Noise contour maps from the model are presented in Appendix B and C and illustrate noise propagation from the Quarry to all surrounding sensitive receiver locations.

Table 9 Extrapolated monitoring results – Scenario A

Receiver	Noise criteria		Pit Scenario A Extrapolated noise level, LAeq, 15 minute	Compliant with the day criteria (yes/no)
	Shoulder	Day		
OR1	-	45	34	Yes
OR2	37	44	39	Yes
OR3			38	Yes
R2			34	Yes
R3			36	Yes
R4/5			39	Yes

Table 10 Extrapolated monitoring results – Scenario B

Receiver	Noise criteria		Pit Scenario A Extrapolated noise level, LAeq, 15 minute	Compliant with the day criteria (yes/no)
	Shoulder	Day		
OR1	-	45	40	Yes
OR2	37	44	42	Yes
OR3			42	Yes
R2			36	Yes
R3			36	Yes
R4/5			39	Yes

4.3 Compliance summary

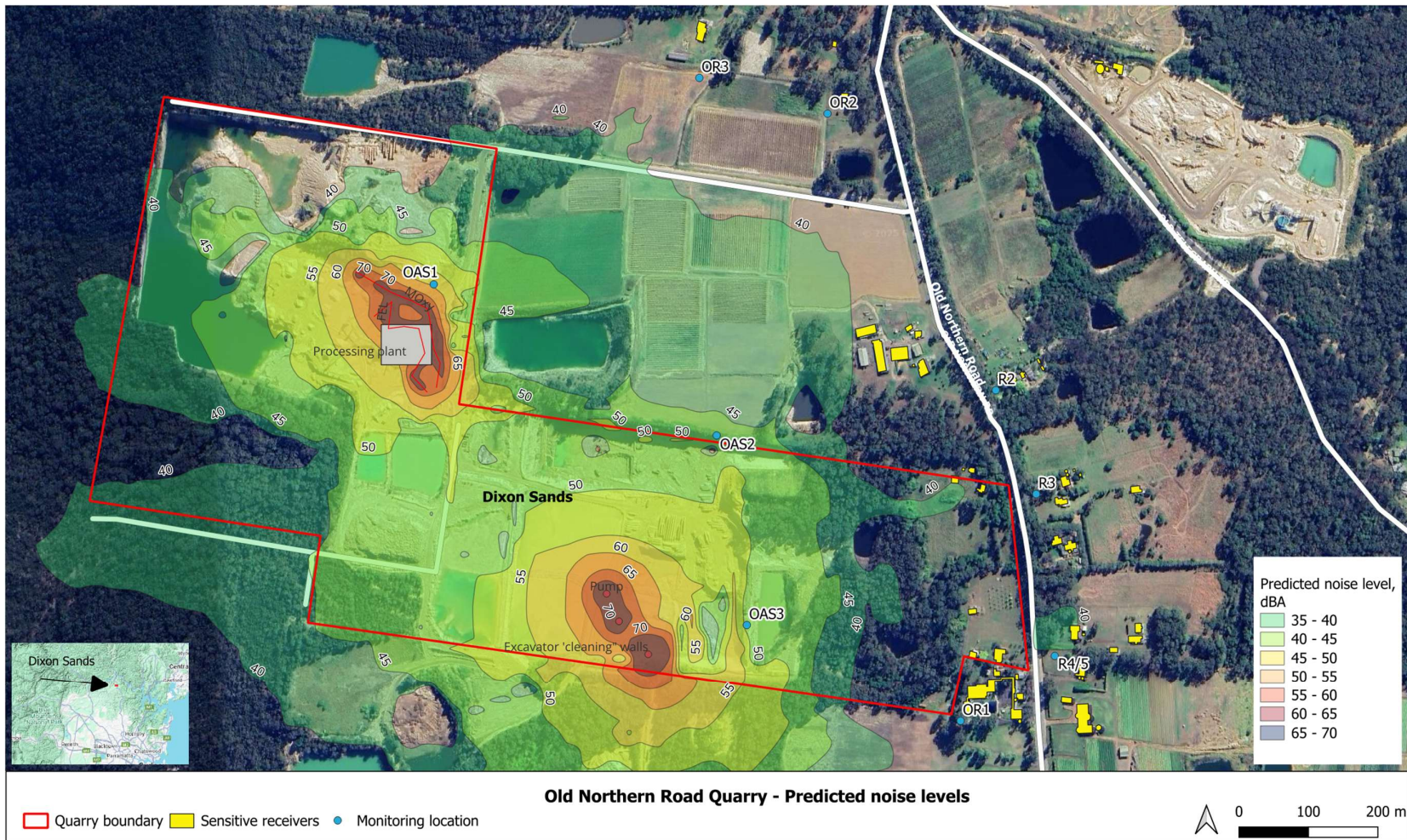
Results of attended monitoring and extrapolated noise levels demonstrate the observed operations during the day period were compliant with the noise limit at each receiver under the meteorological conditions at the time.



Appendix A. On-site measurements

Location	Plant item	Height, m	Sound Power Level, (third octave, Hz), dBA																													
			Sum	12.5	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k
Process area	Screens, conveyors	4	106	42	58	53	59	74	74	83	81	81	80	82	83	84	84	87	90	92	91	93	95	96	94	93	93	96	95	99	92	86
Pit operations	FEL only	4	98	39	52	52	55	66	67	71	75	77	75	78	78	79	79	81	84	86	88	88	89	90	88	87	85	83	77	72	70	67
	Excavators (2) grinding and popping logs	4	104	28	47	46	50	58	71	76	79	87	84	88	92	91	90	90	94	91	94	94	92	92	93	92	94	93	91	83	78	72
	Rock saw / cleaning	1.5	108	85	95	91	92	95	100	95	101	106	100	110	104	95	94	95	97	98	98	101	100	100	96	95	94	92	87	82	80	76
	Pump	1.5	111	77	89	84	80	84	84	97	114	95	91	98	90	97	90	95	94	93	96	99	99	104	103	101	100	98	96	97	95	92

Appendix B. Noise contours – Scenario A



Appendix C. Noise Contours – Scenario B

