Dixon Sand Pty Ltd

Old Northern Road Quarry, Maroota

Noise monitoring report
December 2025

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Revision history

0	21 April 2026	Report issued to client
1	6 May 2026	Report updated as per client comments

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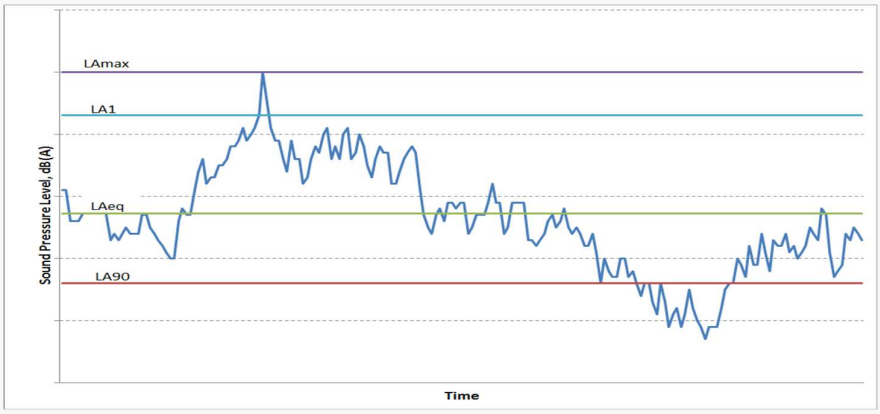
Definition of terms

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	L_{A90} – The A-weighted sound pressure level exceeded 90% of the monitoring period. This is considered to represent the background noise. 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. L_{A1} – The A-weighted sound pressure level exceeded 1% of the monitoring period. L_{Amax} – The maximum A-weighted noise level associated with the measurement period. 
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)	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. 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).
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 4 December 2025.

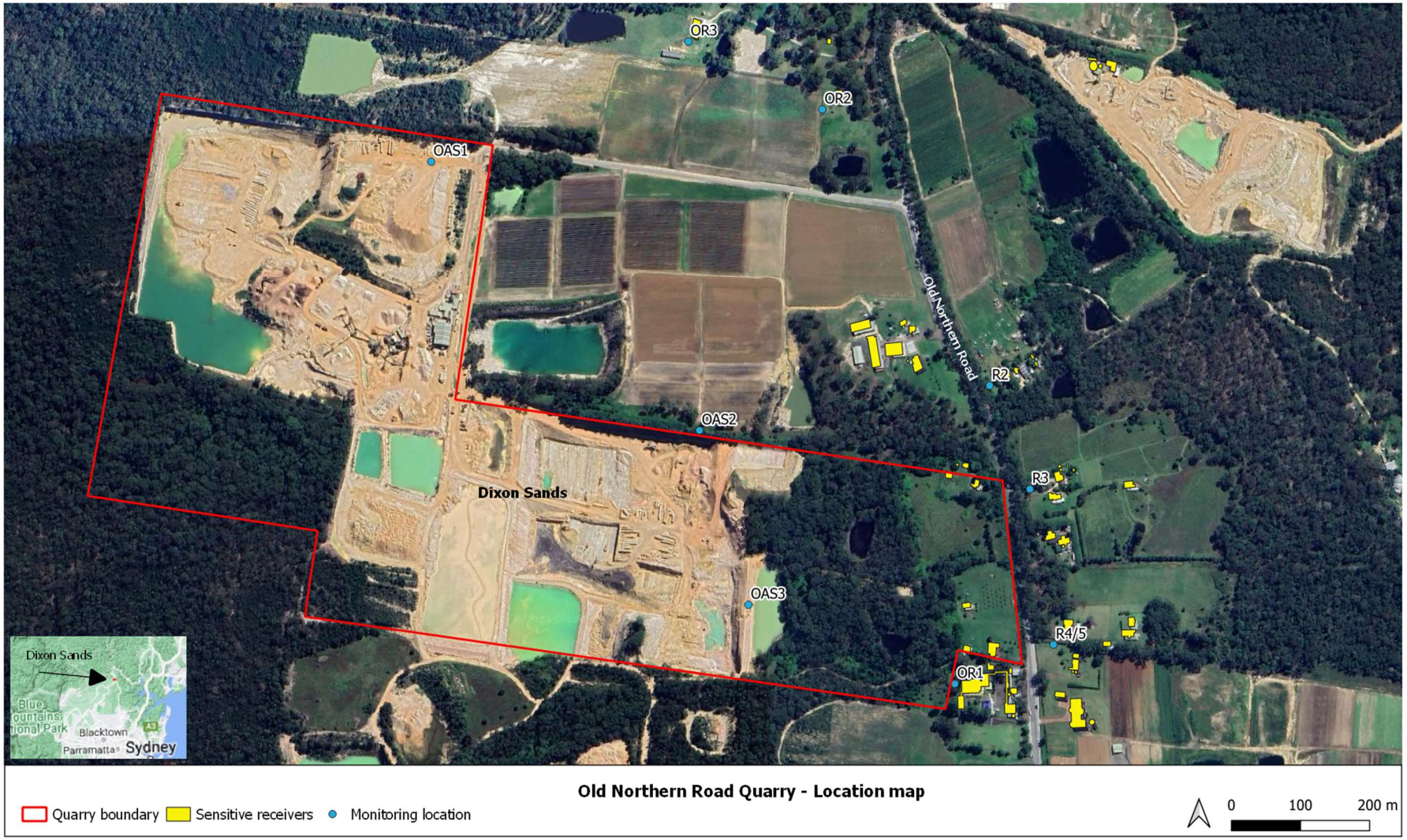


Figure 1 Location of the Quarry

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.

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 September 2026.

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 LAmax statistics.

Meteorological data was 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).

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 December 2025 fell into four 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 cutting, sawing, and log popping.
- Stockpile management with articulated dump trucks
- Watercart (moxie)

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 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	LAmax			
4/12/2025 5:55	OR3	37	46	35	63	<37	Site inaudible. Audible noise: Access road approx. 40-55 dBA SPL, Old Northern Road (ONR) up to 50 dBA SPL, insects, and birds.	Clear skies NW to SSW @ 0.3 - 3.6km/h. Extremely unstable to slightly unstable conditions, (A to C class) 16 - 18 °C
4/12/2025 6:13	OR2		51	39	66	<37	Site inaudible. Audible noise: Access road up to 56 dBA SPL, Old Northern Road up to 63 dBA SPL, insects, and dog barking in the distance.	
4/12/2025 6:32	R3		65	40	86	<37	Site inaudible. Dominant noise: Old Northern Road 67-77 dBA SPL (defining Leq and maximums). Other audible noise dominant during lulls in road traffic noise: birds and insects. Ambient around 39 dBA.	
4/12/2025 6:49	R4/5		68	41	89	<37	Site inaudible. Dominant noise: Old Northern Road up to 89 dBA (defining Leq and maximums). Other audible noise dominant during lulls in road traffic noise: birds and insects. Ambient around 39 dBA.	

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	LAmax			
4/12/2025 8:39	OAS1 (Top of ledge NW of carpark)	N/A	66	64	79	-	Dominant noise: Plant/hopper. 100m away from the SLM. Continuous and dominant. Truck emptying load 80m away from the SLM and FEL emptying load 85m away from the SLM. Noise masked by plant noise and not influencing the measurement.	Clear skies WNW to WSW @1.1 – 2.4 km/h Extremely unstable (A Class), 22 – 23 °C
4/12/2025 8:12	OAS2	N/A	57	52	70	-	Audible noise: • Excavator with triple saw (cutting) measured 59 dBA at 150 m from the SLM. • Excavator with large single saw (sawing) measured 59 dBA at 330 m from the SLM. • Intermittent reverse beepers/squawkers, as well as insects and birds, were also audible. When both saws operated simultaneously, noise levels increased to above 60 dBA. Other activities, including FEL stacking sandstone blocks and a water tanker, were observed but were masked by the saws and did not influence the measured noise levels.	Clear skies WNW to NE @0.6 – 1.4 km/h Extremely unstable (A Class) 20 – 21 °C
4/12/2025 12:18	OAS3	N/A	64	60	77	-	Audible noise: • Excavator sawing 60-61 dBA at 89m from the SLM (max 70 dBA). • Combined sawing (continuous) and log popping (intermittent) at 160m measured 62-65 dBA • Combined sawing (continuous) and cutting (continuous) at 193m measured 63-67 dBA Observations imply log popping 60-61 dBA, and cutting 63-64dBA.	Clear skies N to ENE @ 6.2 – 8.9 km/hr Extremely unstable and slightly unstable conditions, (A and C class), 29 – 30 °C

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	LAmax			
4/12/2025 9:16 (1-hour)	OR1 (School)	45	53	41	74	< 45	Site inaudible. Dominant noise: Old Northern Road Other noise: insect noise, birds, faint shovel impacts in the distant not influencing the measured noise level.	Clear skies SSW to WSW @ 1 – 4.8 km/hr Extremely unstable (A Class) 29 – 30 °C
4/12/2025 11:37	OR3	44	43	38	64	<44	Site inaudible. Audible noise: Access road, Old Northern Road, insects, and birds. Pickers on farm, not influencing the measured noise levels.	Clear skies NW to NNE @ 1 – 22 km/hr Extremely unstable (A Class) 28 – 30 °C
4/12/2025 11:18	OR2	44	48	40	63	<44	Site inaudible. Audible noise: Access road, Old Northern Road, insects, and birds. Dog barking in the distance, not influencing the measured noise levels.	
4/12/2025 10:59	R2	44	74	42	99	<44	Site inaudible. Audible noise: Old Northern Road dominant, defining Leq and maximums. Other noise: insects, birds, ambient activity.	
4/12/2025 10:41	R3	44	71	39	95	<44		
4/12/2025 10:23	R4/5	45	69	39	94	<45		

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 – Excavators – (1) sawing, (2) 'popping', and (3) 'cutting'

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.

Based on the above, modelled noise levels for each monitoring location are presented in Table 6. Results are shown for equipment operating in each quarry area and processing plant. Modelled noise levels are within 2 dB of measured values indicating the model is sufficiently accurate to represent operating conditions.

Table 7 Extrapolated monitoring results to intermediate measurement locations

Location	Modelled noise level, dBA	Measured noise level, LAeq, 15 minute	dB Difference
OAS1	68	66	2
OAS2	59	57	2
OAS3	64	64	0

Based on measurements described in Table 5, extrapolated noise results for each receiver are presented in Table 8. Results are shown for all equipment operating. Extrapolated results indicate the Quarry demonstrates a contribution to the ambient noise environment that meets the noise limit for the day period in all locations.

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

Table 8 Extrapolated monitoring results

Receiver	Noise criteria		Extrapolated noise level, LAeq, 15 minute	Comment
	Shoulder	Day		
OR1	-	45	44	Predicted noise levels meet the noise limits during the day period.
OR2	37	44	44	
OR3			41	
R2			33	
R3			39	
4/5			43	

4.3 Compliance summary

Results of the assessment demonstrate the following.

1. Observed operations during the day period were compliant with the noise limit at each receiver under the meteorological conditions at the time.

2. Observed operations during the shoulder period were compliant with the noise criteria at all receivers 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 (A)	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
	Excavator cutting	1.5	**113**	104	103	100	102	105	101	105	106	108	114	106	111	102	98	100	105	101	103	103	103	102	104	105	102	96	94	90	86	81
	Excavator popping	1.5	**107**	98	97	94	96	99	95	99	100	102	108	100	105	96	92	94	99	95	97	97	97	96	98	99	96	90	88	84	80	75
	Excavator sawing	1.5	**112**	82	84	84	84	90	98	98	99	99	100	94	94	101	101	101	104	104	103	98	94	94	93	93	89	87	83	80	77	73

Appendix B. Noise contours