

Chapter Four

NOISE MANAGEMENT

4.1 Introduction

The Project Approval (**Schedule 3 Condition 8**) for the Hitchcock Road development requires the preparation and implementation of a Noise Management Plan in order to demonstrate that compliance with the relevant noise impact assessment listed in the approval has been achieved

The objectives of the tenth annual audit report and first Annual Environmental Management Report on noise issues are therefore;

- identify the environmental noise emission criteria nominated in the relevant approval documents;
- document the results of environmental noise monitoring conducted in the 12 months ending June 2008;
- assess the measured noise emissions levels against the relevant criteria; and
- nominate existing noise emission monitoring methodology and establish routine measurement procedures.

Noise monitoring up to the end of June 2009 has been undertaken on the basis of locations and assessment criteria in the relevant Court orders applying to the previous consent. The new Noise Management Plan was approved on 8 July 2009. This provides the basis for the monitoring to be reported in the next AEMP for submittal in August 2010.

4.2 Noise emission criteria

The court orders (**Number 4.5**) nominated noise emission criteria as follows:

The proponent shall ensure that construction and operational noise on the development site does not exceed the background noise level when measured at the receivers boundary, by no more than 5dBA or otherwise to the notified requirements of the Environment Protection Authority and the Council's Director-Planning Services Group.

The orders also nominated hours of operation in Part 3: Operational (**Number 3.12**). These are:

Extraction, processing, maintenance and on-site transportation	Monday to Saturday 0700 to 1800 hours
Off-site transportation	Monday to Saturday 0600 to 1800 hours
No Operations	Sundays and Public Holidays

The EPA (now DECC) Environment Protection Licence 3407, nominates noise emission criteria as follows (**Section L6.1**):

The sound pressure level LA10T of noise emanating from the operation of plant or process in or on the premises must not exceed the sound pressure level of 45dB(A), (LA10T is to be measured for any time period between ten and fifteen minutes) at any point within one metre of any residential boundary or other noise sensitive areas such as hospitals in the vicinity of the premises; 5dBA must be added to the measured level if the noise is substantially tonal or impulsive in character.

The court orders (**Number 4.5**) made reference to the DECC requirements which nominated an LA10(15minute) noise emission limit of 45 dBA.

Based on unattended noise logging conducted in August 1995 and January 1999, **Table 4.1** provides the mean LA90(15minute) ambient noise levels together with the LA10(15minute) noise emission criteria based on the mean ambient LA90(15minute) level plus 5 dBA in accordance with the EPA Licence.

Table 4.1 Ambient unattended noise levels and emission criteria (dBA re 20 µPa)

Location	19 to 29 January 1999 Monday to Saturday (0700 to 1800 hours)				17 to 24 August 1995 Monday to Sunday (0700 to 2200 hours)		Mean ambient	Noise criteria
	LA1	LA10	LAeq	LA90	LA90(15minute)	LA90(15minute)		
3	65	52	59	35.0	30.5	33	45	
5	60	60	57	37.7	32.5	35	45	
6	66	58	57	36.5	32.5	35	45	
7	67	58	61	36.7	32.5	35	45	

Note: Locations are:

- 3 Jurd residence, Old Northern Road
- 5 Pignataro residence, Corner of Old Northern and Wisemans Ferry Roads
- 6 Young residence, Corner of Hitchcock and Wisemans Ferry Roads
- 7 Black residence, Lot 214, Hitchcock Road

The following information can be derived from these results in relation to the noise emission criteria.

- The reported 1999 LA90(15minute) ambient noise levels are generally 4 dBA higher than those determined in 1995. This discrepancy arises from the difference in the analysis time interval period. It should be noted that the 1999 data analysis was carried out for the approved hours of operation only, as appropriate.
- It is therefore considered reasonable (in the absence of a revised analysis of the 1995 data set) to adopt the mean LA90(15minute) ambient noise level as the basis for determining the applicable mean ambient levels.
- In accordance with the previous DEC noise emission requirements, the LA10(15minute) noise emission criteria would be 45 dBA at all locations.

The new Noise Management Plan requires the noise criteria set out in **Table 4.2** to be applied to the impact assessment.

Table 4.2 Noise impact assessment monitoring locations

Noise assessment location	Day	Night ¹	
	L _{Aeq} (15 minute)	L _{Aeq} (15 minute)	L _{A1} (1 minute)
R2 - Tornatola	39	35	45
R3 - Jurd	39	35	45
R5 - Pignataro	42	35	45
R7 – Maroota public school	36 _{(L_{Aeq}(1 hour))}	N/A	N/A

Note 1: Night time is defined as the period between 10.00pm and 7.00am. Activities on the site start at 6.00am and are completed by 6.00pm. There is no activity on the site during the evening period.

The following noise parameters will be measured at the nominated monitoring locations.

- L_{Aeq}(15 minute) noise level measured at an appropriate free-field location close to the façade of the relevant residence or other building during day time and evening hours.
- L_{Aeq}(1 minute) noise level measured at an appropriate free-field location close to the façade of the relevant residence during night time hours.

The results of the noise monitoring undertaken over the next 12 months will be reported in the AEMP to be submitted in August 2010.

4.3 Noise monitoring

During the reporting period to the end of June 2009, PF Formation maintained a program of regular monthly noise monitoring. The locations of the monitoring stations are shown on **Figure 4.1**. In compliance with the requirements of the Noise Management Plan approved by the Director-General on 8 July 2009, monitoring frequency will be amended from monthly to quarterly and there will be a minor change to the monitoring locations with Maroota Public School substituted for the Black Residence.

In general, noise measurement procedures were guided by the requirements of AS1055-1989, *Acoustics - Description and Measurement of Environmental Noise* and the Department of Environment and Conservation *Industrial Noise Policy* (INP) (2000).

All acoustic instrumentation employed throughout the monitoring programme was designed to comply with the requirements of AS 1259.2-1990, *Sound Level Meters* and carries current NATA or manufacturer calibration certificates.

The statistical noise exceedance levels (LAN) are the levels exceeded for N% of the 15 minute interval. The LA90 represents the level exceeded for 90 percent of the interval period and is referred to as the average minimum or background noise level. The LA10 is the level exceeded for 10 percent of the time and is usually referred to as the average maximum noise level. The LAeq is the equivalent continuous sound pressure level and represents the steady sound level which is equal in energy to the fluctuating level over the interval period. The LMax is the maximum noise level recorded over the interval.

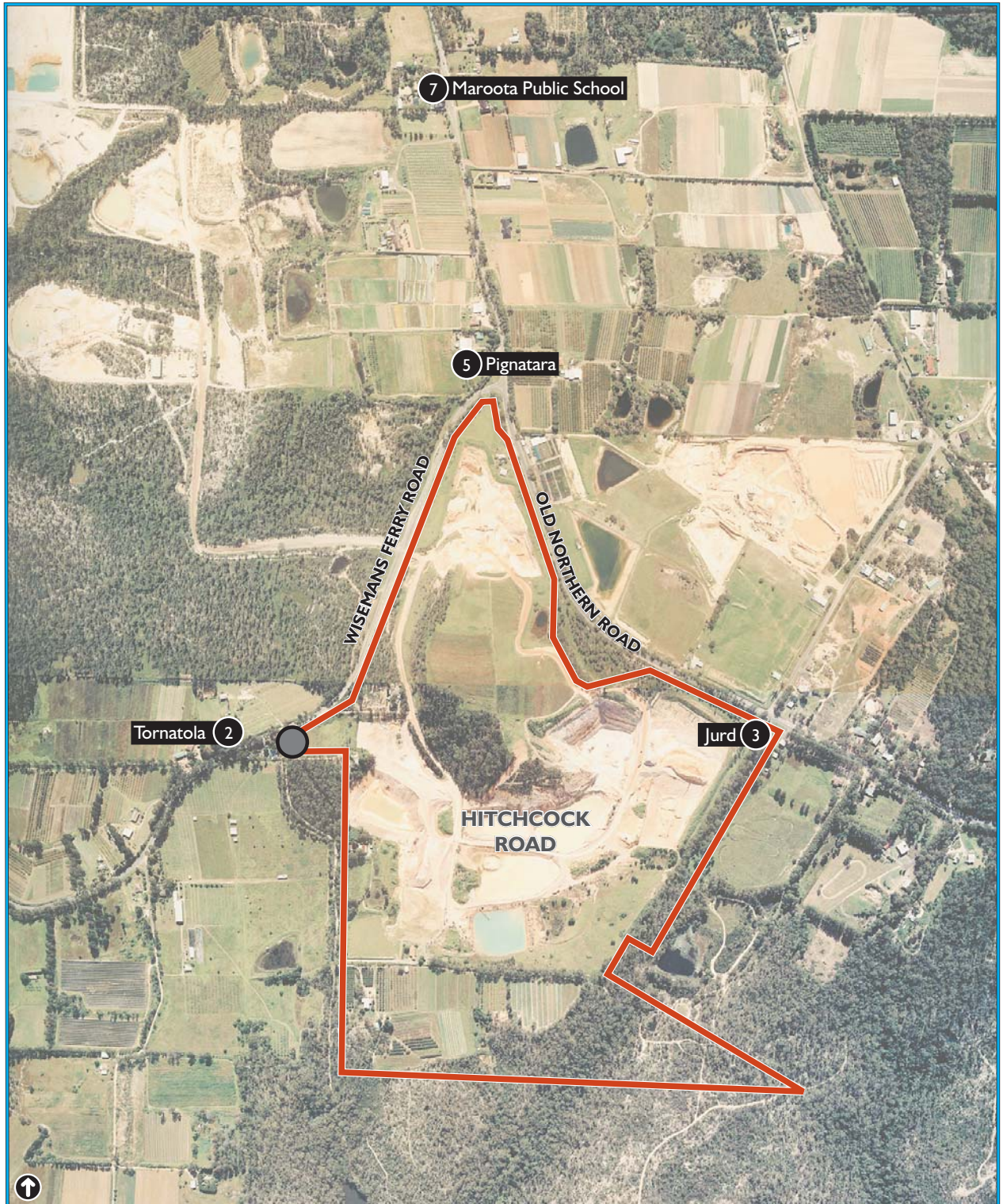


Figure 4.1

NOISE IMPACT ASSESSMENT MONITORING LOCATIONS

Scale
 0 500 Metres

- Site boundary
- 9 Monitoring locations
- 9 Monitoring location used until June 2009

Instrument calibration was checked before and after each measurement survey, with the variation in calibrated levels not exceeding $\pm 0.5\text{dBA}$.

Unattended noise logging

Four unattended continuous noise loggers were positioned at the nominated locations for a period of ten days commencing 19 January 1999 to quantify the overall ambient noise levels and to assist in the assessment of noise amenity levels in the vicinity of the Hitchcock Road site. Additional unattended noise logging has not been required over the past four years as it was considered that the ambient noise environment has not changed significantly over that time.

Operator-attended noise surveys

Daytime operator-attended noise measurements were conducted on Tuesday 20 July 2004 to quantify the overall ambient noise levels and the contributed levels of noise emissions from current extractive and processing operations. Operations at the site involve the use of both mobile equipment and fixed plant as set out in **Table 4.5**. All items of equipment were operating normally during the noise surveys.

Table 4.3 lists the test locations. These were selected as representative of the noise environment experienced at residences in the potentially affected area to provide the basis for the evaluation and assessment of noise emissions resulting from site operations.

Table 4.3 Noise test locations and measurement instrumentation

Location	Resident	Description	Operator-Attended Monitoring
			20.07.2004
3	Jurd	Old Northern Road, Maroota	
5	Pignataro	Corner of Old Northern and Wisemans Ferry Roads, Maroota	Bruel & Kjaer 2231 Sound Level Meter
6	Young	Lot 10, Corner of Hitchcock and Wisemans Ferry Roads, Maroota	Bruel & Kjaer 4230 Acoustic Calibrator
7	Black	Lot 214 Hitchcock Road, Maroota	

Plant and equipment noise emission measurements

Nearfield sound pressure level measurements were carried out on major items of equipment on Tuesday 20 July 2004.

Noise measurement procedures were guided by the requirements of AS2012-1990, *Acoustics – Measurement of airborne noise emitted by earth-moving machinery and agricultural tractors – stationary test condition*.

4.4 Operator-attended noise survey results

Operator attended daytime noise surveys were conducted at each of the four residential test locations. These were of 15 minutes duration using a precision integrating sound level meter. During attended noise surveys, the operator identified the character and duration of acoustically significant ambient noise sources. Wherever possible the operator quantified

local traffic flow and provided a qualitative assessment of the prevailing weather conditions. These are summarised in Table 4.4.

Table 4.4 Daytime operator-attended noise survey (20 July 2004)

Location start time	Primary noise descriptor (dBA re μ Pa)					Description of noise emission typical maximum (LA _{max})
	LA1	LA10	LA _{eq}	LA50	LA90	
3 (Jurd) ¹ 10.57 hours W Wind-1-2 m/s	59	51	49	47	43	Local traffic (cars)-52-56dBA Local traffic (truck)-58-67dBA Site extraction works audible Reversing alarms-52dBA
	Site contribution LA10 46 dBA (estimated)					
5 (Pignatara) 11.41 hours W Wind-1m/s	67	59	57	48	40	Local traffic (cars)-45-63dBA Local traffic (trucks)-81dBA Birds-40-48dBA Site extraction works audible
	Site contribution LA10 45 dBA (estimated)					
6 (Davies) 12.28 hours W Wind-1m/s	60	53	50	45	37	Local traffic (car)-46-56dBA Local traffic (truck)-46-64dBA Site works just audible during wind lulls-34dBA Excavator-33-35dBA Wind in trees-42-46dBA
	Site contribution LA10 34 dBA (estimated)					
7 (Black) 13.18 hours Wind-calm	41	39	36	35	32	Distant traffic (car)-39-41dBA Distant traffic (trucks)-39-42dBA Wind in trees-32-38dBA Wood saw-33-35dBA Site extraction works audible Excavator-33-40dBA
	Site contribution LA10 39dBA (estimated)					

Note 1: The Jurd property is included in the area subject to the present approval.

The following information can be derived from these results in relation to the noise emission criteria.

- Hitchcock Road site extraction works were audible at Locations 7 (Black), 3 (Jurd) and 5 (Pignatara) are only just audible (during traffic lulls) at Location 6 (Davies).
- The highest LA10(15minute) noise level was 46 dBA recorded at Location 3 (Jurd) due to the relative proximity of the extraction operations.
- The LA10(15minute) noise emission levels at all assessment locations were below the 45 dBA noise emission criteria based on site contribution except for a marginal (1 dBA) exceedance at Location 3 (Jurd). It is expected that noise emission levels at this location will decrease as the depth of extraction increases.

It was therefore concluded that noise emission impacts were acceptable.

4.5 Nearfield plant and equipment measurement results

The nearfield and equipment measurement results were subsequently processed to derive the 1/1 octave band and overall maximum Sound Power Level (SWL) for each item which are summarised in Table 4.5.

Table 4.5 L_{Amax} plant and equipment sound power levels
(dBA 10^{-12} Watts)

Description	1/1 octave band centre frequency (Hz)										Overall SWL
	31	63	125	250	500	1k	2k	4k	8k	16k	
CAT D9L Dozer	109	111	120	119	120	114	114	119	106	104	120
CAT 730 Dump Truck	104	124	125	119	117	112	108	104	106	104	117
CAT 330CL Excavator	102	119	120	108	111	102	102	100	100	92	110
CAT 633D Scraper	123	118	123	122	119	116	116	111	112	103	121
CAT D6D Dozer	110	123	114	109	110	111	108	116	107	99	118
Cat 966F Loader	105	113	116	108	110	109	108	100	94	90	113
Slurry Plant	117	113	109	105	106	106	103	102	97	91	110

The following information can be derived from these results:

- The measured sound power levels of all items of plant indicate that the equipment is well maintained with relatively low noise emissions and no apparent defects warranting further investigation.

4.6 Monthly noise monitoring results

PF Formation has conducted operator-attended noise measurements on a monthly basis since April 1996. Noise monitoring instrumentation comprises a Bruel & Kjaer Type 2226 (S/N 1014703) sound level meter and acoustic calibrator Type 4230 (S/N 1059668). The sound level meter records the overall ambient equivalent continuous noise level (LAeq) from all noise sources including sand mining operations. In the event that sand extraction noise emissions dominate the ambient noise environment then the measured LAeq value can be used to estimate the corresponding LA10(15minute) and LA90(15minute) statistical noise exceedance levels.

Where items of mobile equipment are the major source of noise emission from sand mining operations, noise levels are constantly fluctuating. An examination of noise logging results for many of these types of operations indicates that the LA10(15minutes), LA90(15minutes) and LAeq(15minutes) are generally related by the following factors:

Estimated LA10(15minutes) = LAeq(15minutes) plus 3 dBA

Estimated LA90(15minutes) = LAeq(15minutes) minus 7 dBA

A complete copy of the monthly noise monitoring records from Location 1 (Maroota Public School), Location 3 (Jurd house), Location 5 (Pignataro house) and Location 6 (Davies house) is included as **Attachment 4B**. The Jurd property is included in the site of the present approval for sand extraction. While it remains a noise monitoring location, it cannot be considered to be a sensitive receiver. Three of the monitoring sites are located close to the roads surrounding the site and the acoustic records indicate that the noise environment is substantially influenced by traffic.

The following information can be derived from the results summarised in **Table 4.6** and the noise emission criteria for the Hitchcock Road development:

- There were two minor exceedances of the noise emission criterion of 45dBA at Maroota Public School (2dBA recorded in July 2008 and 1dBA in September 2008). This location is some 1,500 metres to the north of current site operations at Hitchcock Road and is unlikely to be influenced by noise emissions from there. Similar sand extraction activities are undertaken by other operators much closer to the school site.
- Exceedances (up to 5dBA) were also recorded at the monitoring site at the Jurd house (Location 3). This house is occupied by tenants of PF Formation and is included within the operational area. The monthly noise monitoring records suggest that extraction activity does not contribute significantly to the noise environment here which is dominated by traffic noise, some of which is contributed by truck movements generated by sand extraction.
- Extraction works were recorded as inaudible at Location 5 (Pignataro house) and Location 6 (Davies house) for all the monitoring period and for nine out of eleven months at Location 1 (Maroota Public School), the noise environment dominated by traffic on Wisemans Ferry Road and Old Northern Road respectively.

The results of the monitoring suggest that noise emission impacts relating to sand extraction activities were generally acceptable at the assessment locations.

4.7 Conclusions

In accordance with the requirements of the court orders for the previous Hitchcock Road development and the current relevant approval conditions, PF Formation has implemented a program of environmental noise monitoring.

The results of the regular monthly noise monitoring indicate that environmental noise emission levels at the nearest potentially affected receivers to both sites were generally acceptable throughout the year. There would appear to have been minor changes to the acoustic environment from the previous year resulting in a slight increase in noise impacts generated by site related activities while traffic related noise would appear to be increasing. The latter would be expected as a result of increasing activity in the area.

Table 4.6 Summary of daytime noise monitoring results (Contribution of extraction operations)

Date	Location 1 (Maroota Public School)			Location 3 (Jurd house) ¹			Location 5 (Pignataro house)			Location 6 (Davies house)		
	Audibility of operations	Estimated		Audibility of operations	Estimated		Audibility of operations	Estimated		Audibility of operations	Estimated	
		LA90 (15 min)	LA10 (15 min)		LA90 (15 min)	LA10 (15 min)		LA90 (15 min)	LA10 (15 min)		LA90 (15 min)	LA10 (15 min)
15.07.08	Audible	37	47	Audible	40	50	Inaudible	<20	<30	Inaudible	<20	<30
11.08.09	Inaudible	<20	<30	Audible	40	50	Inaudible	<20	<30	Inaudible	<20	<30
19.09.08	Audible	36	46	Inaudible	<20	<30	Inaudible	<20	<30	Inaudible	<20	<30
24.10.08	Inaudible	<20	<30	Audible	39	49	Inaudible	<20	<30	Inaudible	<20	<30
21.11.08	Inaudible	<20	<30	Audible	39	49	Inaudible	<20	<30	Inaudible	<20	<30
19.12.08	Audible	33	43	Inaudible	<20	<30	Inaudible	<20	<30	Inaudible	<20	<30
29.01.09	Inaudible	<20	<30	Inaudible	<20	<30	Inaudible	<20	<30	Inaudible	<20	<30
19.02.09	Inaudible	<20	<30	Inaudible	<20	<30	Inaudible	<20	<30	Inaudible	<20	<30
30.03.09	Inaudible	<20	<30	Inaudible	<20	<30	Inaudible	<20	<30	Inaudible	<20	<30
27.04.09	Inaudible	<20	<30	Inaudible	<20	<30	Inaudible	<20	<30	Inaudible	<20	<30
28.05.09	Inaudible	<20	<30	Audible	38	48	Inaudible	<20	<30	Inaudible	<20	<30
17.06.09	Inaudible	<20	<30	Audible	34	44	Inaudible	<20	<30	Inaudible	<20	<30

Note 1: This house is no longer occupied and the lot is included in the development area.

At this stage, field noise measurement procedures and instrumentation requirements are considered to be satisfactory. Nearfield plant and equipment noise measurements will also continue to be checked as necessary to identify any potential deterioration in acoustic performance and ensure that existing noise emission levels are maintained.

Noise impacts at the monitoring locations appear to be dominated by traffic using Old Northern and Wisemans Ferry Roads. Modelled noise generated by site operations however, provided the basis for the development of the assessment criteria included in the new Noise Management Plan. This may result in difficulties for future compliance and may require a further review of noise monitoring procedures once the results for the next 12 months are analysed. These will be undertaken in compliance with the requirements of the approved management plan.