



KOIKAS ACOUSTICS PTY LTD

CONSULTANTS IN NOISE & VIBRATION

ABN 12 058 524 771

Commercial 1 (Unit 27)

Ph: (02) 9587 9702

637 - 645 Forest Road

Fax: (02) 9587 5337

BEXLEY NSW 2207


E-mail: Office@KoikasAcoustics.com

NOISE COMPLIANCE TESTING

OF PF FORMATION EXTRACTIVE INDUSTRY OPERATIONS

HITCHCOCK ROAD SAND PROJECT

(SEPTEMBER 2017 - OCTOBER 2018)

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Prepared By	Michael Fan Chiang
Checked By	Nick Koikas 
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Prepared For	PF Formation Trust 1774 Wisemans Ferry Road Maroota NSW 2756 Attention: Joshua Graham E-mail: josh@pfformation.com.au ; accounts@pfformation.com.au

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NOISE COMPLIANCE TESTING
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NOISE COMPLIANCE TESTING
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1.0 CONSULTANT'S BRIEF

Koikas Acoustics Pty Ltd was engaged by PF Formation Trust to undertake noise compliance testing during the sand extraction operations for Hitchcock Road Sand Project in Maroota.

The assessment provides the following:

- a discussion of the applicable noise criteria at each site, and
- attended noise monitoring survey results.

Sand extractions have been undertaken in this area for many years. Koikas Acoustics has been advised that there have been no noise complaints received from the local community in regards to the sand mining extraction works since periodic noise surveys commenced.

All monitoring procedures were done in accordance with the requirements of the Project Approval of 3rd February 2009 and EPA Licence 3407.

Some measurements of sleep disturbance could not be taken 1 metre from a bedroom window. Sound level measurements were taken from the boundary. Measurements taken from the boundary were closer to the noise source and therefore louder compared to if measurements had been taken outside a bedroom window.

2.0 SITE DESCRIPTION

2.1 SITE LOCATION

The Hitchcock Road Sand Project site is bounded by:

- Old Northern Road along the east,
- Wisemans Ferry Road to the west (intersecting with the Old Northern Road to the north), and
- other rural properties to the south.

Refer to Figure 1 below for the project site extraction area.



Figure 1. Hitchcock Road Sand Project Site Area

Details of the topography are attached as a rendered aerial photograph in the Hitchcock Road Sand Extraction and Rehabilitation Project, revised January 2016 Maroota Noise Management Plan (Approved 21/07/2016) and the Project Approval dated 3rd February 2009 signed by the NSW Minister for Planning.

2.2 HOURS OF OPERATION

The hours of operation are specified in the project approval as shown in Table 1 below.

Table 1. Hours of Operation		
Activity	Day	Time [Hours]
Construction	Monday to Friday Saturday Sunday and Public Holiday	0700 – 1800 0800 – 1300 None
Quarrying and processing including overburden removal	Monday to Saturday Sunday and Public Holiday	0700 – 1800 None
Product Transportation	Monday to Saturday Sunday and Public Holiday	0600 – 1800 None
Maintenance	Monday to Saturday Sunday and Public Holiday	0700 – 1800 None

2.3 AMBIENT NOISE PROFILE OF THE NOISE MONITORING SITES (RECEIVERS)

The assessment site is located in a rural-residential area. The main roads passing through this area being Old Northern Road and Wisemans Ferry Road carry light and heavy vehicles.

During the daytime, the perceived intrusiveness of noise of cars and trucks traversing along these roads whilst residents are inside or outside their homes is expected to be significantly greater compared to the noise of sand mining extraction activities.

The rustling of leaves with slight wind speeds would normally raise background noise levels. For periods when the wind is calm, background noise levels would typically be that of distant noise emanating from trucks and cars, and the sound of insects and birds.

2.4 MONITORING LOCATIONS

Noise monitoring was conducted in the Maroota area at the following locations:

1. Tornatola property Hitchcock Road (driveway);
2. Pignataro property (corner of Wisemans Ferry Road and Old Northern Road)
3. Jurds property (back of fire shed, adjacent to Old Northern Road)
4. Maroota Public School (rear of school)

The site locations are attached as an aerial photo in **Appendix A**.

3.0 NOISE CRITERIA

The noise criteria are specified in the project approval, EPA Licence 3407 and approved Noise Management Plan.

3.1 BACKGROUND NOISE

The noise criterion has been derived from previous noise surveys by undertaking long term ambient noise level measurements at a representative site. The background noise level was determined over consecutive 15 minute periods for a duration of at least one week. From this data of $L_{A90,15 \text{ minutes}}$ noise levels, the 10 percentile lowest background noise levels were determined for each of the days. The *rating background level* was then determined by calculating the median value of the daily 10 percentile background noise levels for each of the three specific time periods: daytime, evening and night time.

The rating background level result is used to determine the noise criteria applicable for the surrounding residential properties in accordance with the Environmental Protection Authority's (EPA) Noise Policy for Industry (NPI) assessment procedures.

The background noise level $L_{A90, 15 \text{ minutes}}$ is normally determined in the absence of extraneous noise such as traffic, wind, rain, conversation, birds chirping, insect noise and unnatural increases in noise from distant sources due to local air movement. The EPA defines such sources as *incidental noise* which can cause the masking of offensive noise from a specific source. When traffic or other incidental noises cannot be excluded, then it is considered that these noise sources are part of the background noise.

3.2 EPA NOISE POLICY FOR INDUSTRY (NPI)

The NPI defines two criteria, the Intrusive Noise Criterion and the Amenity Noise Criterion. The EPA requires that compliance with both the intrusive and amenity criteria be achieved for the purpose of controlling the intrusive nature of the industrial noise in the short term and also maintaining the noise level amenity of the area for residences and other land uses.

For the purpose of applying the NPI the following time periods apply:

- Daytime 7am to 6pm Monday to Saturday
 8am to 6pm Sunday
- Evening 6pm to 10pm Monday to Sunday
- Night-time 10pm to 7am Monday to Saturday
 10pm to 8am Sunday

3.2.1 Intrusive Noise Criterion

The intrusiveness of an industrial noise source is generally considered acceptable by people if the equivalent continuous (A-weighted) noise level ($L_{Aeq, 15 \text{ minutes}}$) does not exceed the background noise level by more than 5 dB. The intrusive noise criterion is defined as:

$$L_{Aeq, 15 \text{ minutes}} = (\text{rating background level}) L_{90, \text{Period}} + 5\text{dB}$$

When the noise source contains annoying characteristics such as prominent tonal, impulsive, intermittent, irregular and dominant low frequency components, adjustments are made.

3.2.2 Noise Amenity Criterion

In order to limit the continuing increase in noise, the EPA has nominated recommended acceptable and maximum ambient noise levels for various receiver sites from industrial noise.

Table 2.2 of the EPA's NPI (below) specifies the following acceptable and maximum recommended $L_{Aeq, \text{Period}}$ noise levels for this project specific type area. In this case, the area is described as being Rural.

The EPA refers to rural as:

Rural—means an area with an acoustical environment that is dominated by natural sounds, having little or no road traffic. Such areas may include:

- an agricultural area, except those used for intensive agricultural activities
- a rural recreational area such as resort areas
- a wilderness area or national park
- an area generally characterised by low background noise levels (except in the immediate vicinity of industrial noise sources).

This area may be located in either a **rural**, **rural-residential**, **environment protection zone** or **scenic protection zone**, as defined on a council zoning map (Local Environmental Plan (LEP) or other planning instrument).

Table 2.2: Amenity noise levels.

Receiver	Noise amenity area	Time of day	L _{Aeq} , dB(A)
(see Table 2.3 to determine which residential receiver category applies)			Recommended amenity noise level
Residential	Rural	Day	50
		Evening	45
		Night	40
	Suburban	Day	55
		Evening	45
		Night	40
	Urban	Day	60
		Evening	50
		Night	45
Hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks	See column 4	See column 4	5 dB(A) above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day
School classroom – internal	All	Noisiest 1-hour period when in use	35 (see notes for table)
Hospital ward internal external	All	Noisiest 1-hour	35
	All	Noisiest 1-hour	50
Place of worship – internal	All	When in use	40
Area specifically reserved for passive recreation (e.g. national park)	All	When in use	50

Both the predicted amenity noise level criterion and the intrusive noise level criteria need to be satisfied. In this case, the intrusive noise criterion has been considered as it is clearly the most stringent due to the low Rating Background Level (RBL).

3.3 NOMINATED NOISE CRITERIA

As per the approved Noise Management Plan January 2016, the following noise criteria were adopted:

Table 9.1 Noise impact assessment monitoring locations and criteria

Noise assessment location	Other locations covered	Day	Night ₁	Night ₁
		L _{Aeq} (15 minute)	L _{Aeq} (15 minute)	L _{A1} (1 minute)
1. R9 – Young, Hitchcock Road	R10 Tornatola	39	35	45
2. R5 - Pignataro	R6 Camilleri	42	35	45
3. R3 – Fire station/Jurd	R1 Hammond and R2 Hitchcock	40	35	45
4. R7 – Maroota Public School	R6 Camilleri and R8 Portelli	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.

4.0 NOISE SURVEYS

4.1 NOISE MONITORING PROCEDURES

All noise methodologies and equipment used comply with the following Australian Standards:

- AS1259.2-1990 "Acoustics - Sound Level Meters - Integrating - Averaging", and
- ISO 1996.2-2007 "Acoustics – Description, measurement and assessment of environmental noise" Part 2: Determination of environmental noise levels.

All sound and noise level measurements were A-frequency and Fast-time weighted.

4.2 ATTENDED NOISE MONITORING

Attended noise monitoring was conducted on the following days at each monitoring location below:

At location 1 Tornatola Property Hitchcock Road (@ driveway)

1 st September 2017	Night-time hours
1 st September 2017	Daytime hours
1 st December 2017	Night-time hours
1 st December 2017	Daytime hours
1 st March 2018	Night-time hours
1 st March 2018	Daytime hours
1 st June 2018	Night-time hours
1 st June 2018	Daytime hours

At location 2 Pignataro Property (corner of Wisemans Ferry Road and Old Northern Road)

1 st September 2017	Night-time hours
1 st September 2017	Daytime hours
1 st December 2017	Night-time hours
1 st December 2017	Daytime hours
1 st March 2018	Night-time hours
1 st March 2018	Daytime hours
1 st June 2018	Night-time hours
1 st June 2018	Daytime hours

At location 3 Jurds Property (back of fire shed, adjacent to Old Northern Road)

1 st September 2017	Night-time hours
1 st September 2017	Daytime hours
1 st December 2017	Night-time hours
1 st December 2017	Daytime hours
1 st March 2018	Night-time hours
1 st March 2018	Daytime hours
1 st June 2018	Night-time hours
1 st June 2018	Daytime hours

At location 4 Maroota Public School (rear of school)

1 st September 2017	Daytime hours
1 st December 2017	Daytime hours
1 st March 2018	Daytime hours
1 st June 2018	Daytime hours

The noise measurements taken from September 2017 to June 2018 were conducted with a Class 1 Svan 971 S/N 40412 Sound Level Meter and calibrated with a Svanteck SV 33 Class 1 Acoustic Calibrator. Following the recent investigation, it was later found that the sound level meter was not correctly set up and the noise measurements were null and void. However, the comments/notes made during noise measurements (shown in Table 2, 3, 4 and 5) are considered valid and were therefore used as part of our assessment. Further, attended noise level measurements were undertaken with NTi XL2 Type Approved precision spectrum analyser S/N A2A-06312-E0. The equipment used for taking noise level measurements is traceable to NATA calibration. The following additional noise measurements were conducted in October 2018:

At location 1 Tornatola Property Hitchcock Road (@ driveway)

19 th October 2018	Daytime hours
22 nd October 2018	Night-time hours

At location 2 Pignataro Property (corner of Wisemans Ferry Road and Old Northern Road)

19 th October 2018	Daytime hours
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At location 3 Jurds Property (back of fire shed, adjacent to Old Northern Road)

19 th October 2018	Daytime hours
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At location 4 Maroota Public School (rear of school)

19 th October 2018	Daytime hours
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5.0 NOISE SURVEY RESULTS

Table 2, 3, 4 and 5 refers to the measured noise levels obtained at locations 1, 2, 3 and 4 respectively for each monitoring period. It is noted, that in all cases the measured L_{Aeq} was dominated by environmental and intermittent noise sources unrelated to the quarry noise. The exceeding levels are therefore not that of quarry activities.

Table 2. Location 1 Tornatola Property Hitchcock Road - Noise Survey Results					
Date	Applicable Criterion Level	Measured Noise Level	Measured LA90	Exceeding [dB]	Note
1 st September 2017 Night-time hours	35 $L_{Aeq,15min}$ 45 $L_{A1,1min}$	-	-	-	Noise dominated by road traffic and birds chirping. See also Note 1 .
1 st September 2017 Daytime hours	39 $L_{Aeq, 15min}$	-	-	-	Noise dominated by dogs barking, birds chirping and road traffic. See also Note 2 .
1 st December 2017 Night-time hours	35 $L_{Aeq,15min}$ 45 $L_{A1,1min}$	-	-	-	Noise dominated by road traffic, birds chirping and insects noise (cicadas). See also Note 3 .
1 st December 2017 Daytime hours	39 $L_{Aeq, 15min}$	-	-	-	Noise dominated by road traffic, birds chirping and insects noise (cicadas). See also Note 3 .
1 st March 2018 Night-time hours	35 $L_{Aeq,15min}$ 45 $L_{A1,1min}$	-	-	-	Noise dominated by road traffic. See also Note 3 .
1 st March 2018 Daytime hours	39 $L_{Aeq, 15min}$	-	-	-	Noise dominated by road traffic. See also Note 4 .
1 st June 2018 Night-time hours	35 $L_{Aeq,15min}$ 45 $L_{A1,1min}$	-	-	-	Noise dominated by road traffic and strong wind. See also Note 1 .
1 st June 2018 Daytime hours	39 $L_{Aeq, 15min}$	-	-	-	Noise dominated by road traffic, strong wind and dogs barking. See also Note 2 .
19 th October 2018 Daytime hours	39 $L_{Aeq, 15min}$	53 $L_{Aeq,15min}$	36	14	Noise dominated by road traffic. See also Note 1 .
22 nd October 2018 Night-time hours	35 $L_{Aeq,15min}$ 45 $L_{A1,1min}$	53 $L_{Aeq,15min}$ 65 $L_{A1,1min}$	42	18 20	Noise dominated by road traffic. See also Note 3 .

Table 3. Location 2 Pignataro Property - Noise Survey Results					
Date	Applicable Criterion Level	Measured Noise Level	Measured LA90	Exceeding [dB]	Note
1 st September 2017 Night-time hours	35 LAeq,15min 45 LA1,1min	-	-	-	Noise dominated by road traffic and birds chirping. See also Note 2 .
1 st September 2017 Daytime hours	42 LAeq, 15min	-	-	-	Noise dominated by road traffic and birds chirping. See also Note 1 .
1 st December 2017 Night-time hours	35 LAeq,15min 45 LA1,1min	-	-	-	Noise dominated by road traffic, birds chirping, frogs croaking. See also Note 1 .
1 st December 2017 Daytime hours	42 LAeq, 15min	-	-	-	Noise dominated by road traffic and insects. See also Note 4 .
1 st March 2018 Night-time hours	35 LAeq,15min 45 LA1,1min	-	-	-	Noise dominated by road traffic, birds chirping, insects, dogs barking and rooster crowning. See also Note 5 .
1 st March 2018 Daytime hours	42 LAeq, 15min	-	-	-	Noise dominated by road traffic and birds chirping. See also Note 2 .
1 st June 2018 Night-time hours	35 LAeq,15min 45 LA1,1min	-	-	-	Noise dominated by road traffic, birds chirping and rooster crowning. See also Note 5 .
1 st June 2018 Daytime hours	42 LAeq, 15min	-	-	-	Noise dominated by road traffic and dogs barking. See also Note 1 .
19 th October 2018 Daytime hours	42 LAeq, 15min	57 LAeq,15min	39	15	Noise dominated by road traffic. See also Note 1 .
22 nd October 2018 Night-time hours	35 LAeq,15min 45 LA1,1min	60 LAeq,15min 74 LA1,1min	39	25 29	Noise dominated by road traffic. See also Note 3 .

Table 4. Location 3 Jurds Property - Noise Survey Results					
Date	Applicable Criterion Level	Measured Noise Level	Measured LA90	Exceeding [dB]	Note
1 st September 2017 Night-time hours	35 LAeq,15min 45 LA1,1min	-	-	-	Noise dominated by road traffic and birds chirping. See also Note 1 .
1 st September 2017 Daytime hours	40 LAeq, 15min	-	-	-	Noise dominated by road traffic and birds chirping. See also Note 1 .
1 st December 2017 Night-time hours	35 LAeq,15min 45 LA1,1min	-	-	-	Noise dominated by road traffic and birds chirping. See also Note 1 .
1 st December 2017 Daytime hours	40 LAeq, 15min	-	-	-	Noise dominated by road traffic and insects. See also Note 4 .
1 st March 2018 Night-time hours	35 LAeq,15min 45 LA1,1min	-	-	-	Noise dominated by road traffic, birds chirping and insects. See also Note 1 .
1 st March 2018 Daytime hours	40 LAeq, 15min	-	-	-	Noise dominated by road traffic and birds chirping. See also Note 2 .
1 st June 2018 Night-time hours	35 LAeq,15min 45 LA1,1min	-	-	-	Noise dominated by road traffic and strong wind. See also Note 1 .
1 st June 2018 Daytime hours	40 LAeq, 15min	-	-	-	Noise dominated by road traffic and strong wind. See also Note 1 .
19 th October 2018 Daytime hours	40 LAeq, 15min	53 LAeq,15min	30	13	Noise dominated by road traffic. See also Note 1 .
22 nd October 2018 Night-time hours	35 LAeq,15min 45 LA1,1min	48 LAeq,15min 61 LA1,1min	34	13 16	Noise dominated by road traffic. See also Note 3 .

Table 5. Location 4 Maroota Public School - Noise Survey Results					
Date	Applicable Criterion Level	Measured Noise Level	Measured LA90	Exceeding [dB]	Note
1 st September 2017 Daytime hours	36 LAeq, 15min	-	-	-	Noise dominated by traffic and school noise. See also Note 6 .
1 st December 2017 Daytime hours		-	-	-	Noise dominated by traffic and school noise. See also Note 6 .
1 st March 2018 Daytime hours		-	-	-	Noise dominated by traffic and quarry noise. See also Note 7 .
1 st June 2018 Daytime hours		-	-	-	Noise dominated by traffic and school noise. See also Note 6 .
19 th October 2018 Daytime hours		46 LAeq, 15min	40	10	Noise dominated by traffic and distant quarries. See also Note 7 .

Note 1. Dominant noise source is that of traffic and birds chirping or natural sounds such as wind and rustling of leaves (during lulls in traffic). Quarry noise was not audible.

Note 2. Dominant noise source is that of traffic and birds chirping or dogs barking or natural sounds such as wind and rustling of leaves (during lulls in traffic). Quarry noise was audible but not measurable.

Note 3. Dominant noise source is that of traffic and/or insect noise. Quarry noise was not audible and not measurable.

Note 4. Dominant noise source is that of traffic and/or insect noise. Quarry noise was audible during lulls in traffic but not measurable.

Note 5. Dominant noise source is that of traffic, birds chirping, dogs barking, insects and roosters crowning or natural sounds such as wind and rustling of leaves (during lulls in traffic). Quarry noise was not audible.

Note 6. Dominant noise source is that of traffic and school noise. Quarry noise audible but not quantifiable nor intrusive.

Note 7. Dominant noise source is that of traffic and quarry noise. It is in our opinion that the quarry noise was not intrusive.

On account of the large distances which sound travels from the sand mining extraction activities to the surrounding residential premises, it is often not measureable because it is either less than the prevailing background noise or because it is inaudible. At all the noise monitoring sites, the noise emanating from the Hitchcock Road Sand Project currently has minimal contribution compared to other noise sources such as traffic noise, birds chirping, insect noise, rustling of leaves, strong wind and other quarry operation.

The noise criteria nominated by EPA Licence 3407, Minister of Planning approval and Table 9.1 of the approved Noise Management Plan January 2016 for the hours of operation were therefore not exceeded.

6.0 CONCLUSIONS

Koikas Acoustics was requested to undertake noise level surveys around the Hitchcock Road Sand Project sand mining extraction and processing quarry (from September 2017 to October 2018) and ascertain whether the noise from the extraction and processing works currently exceed the nominated noise criteria as nominated by EPA licence 3407 and the project approval.

The results of the noise surveys show that the site extraction works are currently comply with all the nominated noise criteria (including cumulative noise criteria).

At most sites, quarry activities are either just audible or inaudible and in most of cases, the noise emanating from the site was found not to be measureable on account of that the natural noise (which includes birds chirping, insects, rustling of leaves) and un-natural noise (being cars and trucks traversing along the main roads).

There are no noise mitigation measures necessary to be implemented for the subject quarry sites.

Koikas Acoustics therefore certifies that the subject Maroota Hitchcock Road Sand Project currently complies with the nominated noise criteria despite that the measured noise levels (predominantly that of traffic and other natural sound sources) are currently producing sound levels in excess of the nominated noise criteria.

APPENDIX A - AERIAL PHOTOGRAPH

