MANILDRA SOLAR FARM
RCR INFRASTRUCTURE
Reference: 11543

R_1
DATE OF RELEASE: 29/10/2018

Assured Environmental

RCR Infrastructure
Level 23, Gateway,
1 Macquarie Place
Sydney, NSW 2000

Attn: Danny Dyson [danny.dyson@rcrtom.com.au]

Dear Danny,

Assured Environmental Pty Ltd was commissioned by RCR infrastructure to undertake compliance noise monitoring at existing sensitive receptors near the Manildra Solar Farm (Subject Site) in Manildra, NSW.

Noise monitoring of truck movements associated with the Subject Site were measured at six (6) locations to determine compliance with the conditions of the Development Approval (MP10_0122 dated 5 March 2017).

The purpose of the attended noise monitoring is to:

- Establish the existing noise levels experienced by the receptors adjacent to the Subject Site during daytime periods when the solar farm is at full capacity; and
- Measure noise levels at the boundary of the Subject Site to assist with determining compliance at sensitive receptors.
- Establish background noise levels in the absence of the Subject Site to derive the baseline noise levels for comparison with the sensitive receptors.

This report provides the results of monitoring undertaken during the daytime period on 15 October 2018.

All monitoring was undertaken by Michelle Clifton, a senior consultant with over 10 years' experience in acoustics, a member of the Australian Acoustical Society (MAAS) and a member of the Institute of Acoustics (UK).

1 APPROVAL CONDITIONS

Part F of the Development Approval (MP10_0122) dated 5 March 2017 provides the following conditions related to noise emissions and the associated compliance monitoring:

F1. During operations, the Proponent shall ensure that the noise generated by the project does not exceed 35dB(A)(LAeq15min) at any residence on privately-owned land. Noise generated by the project is to be measured in accordance with relevant requirements of the NSW Industrial Noise Policy (as may be updated from time to time). This limit does not apply if the Proponent has entered into a written agreement with the relevant landowner to exceed the limits, and the Proponent has advised the Department in writing of the terms of this agreement.

F2. The Proponent shall prepare a noise compliance report within 3 months of commissioning of the project. The noise compliance report must:

(a) be prepared by a suitably qualified noise expert;

(b) demonstrate that the project is complying with the noise criteria in condition F1; and

(c) be submitted to the Department and EPA within one month of receiving the report, to the satisfaction of the Secretary.

2 NOISE MONITORING

2.1 Monitoring Location

Figure 1 and Table 1 present the noise monitoring locations in relation to the Subject Site.

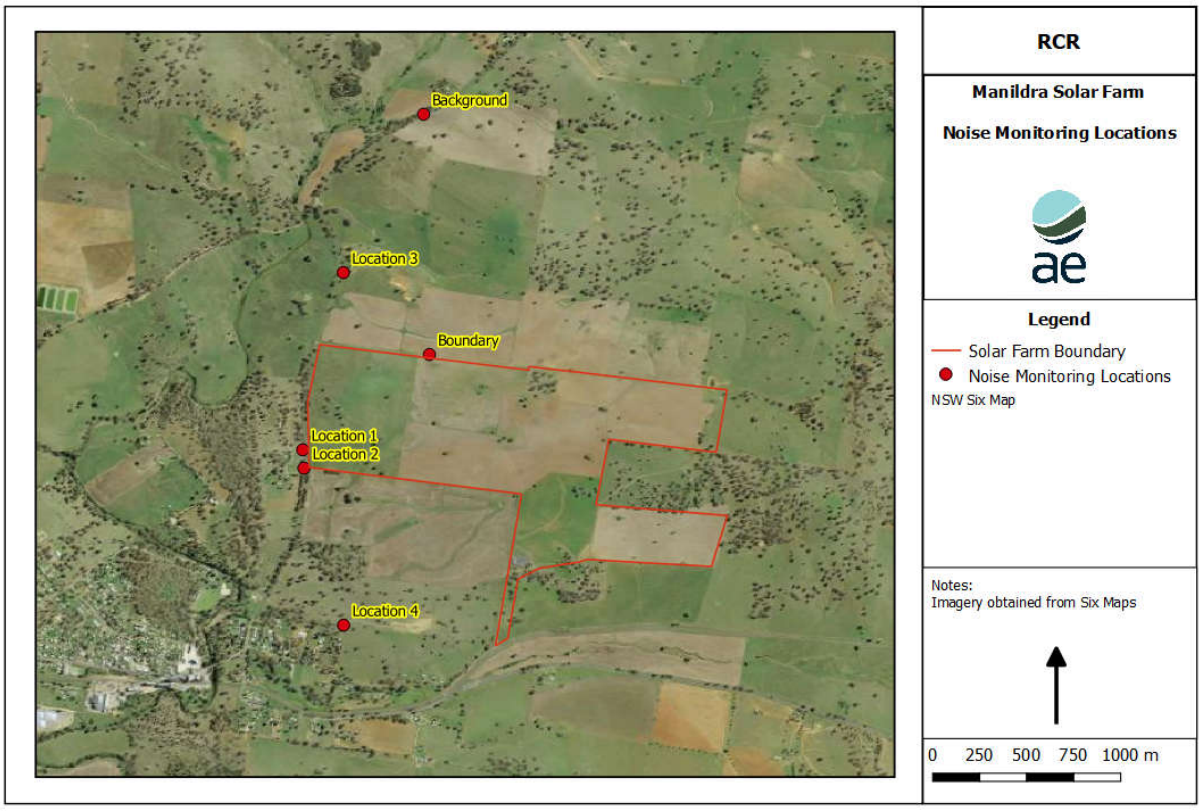


Figure 1: Noise Monitoring Locations

Noise monitoring was undertaken at four (4) sensitive receptors as well as one (1) background location representative of the area without the solar farm and one (1) location at the boundary of the solar farm. The noise monitoring was undertaken whilst the solar farm was operating at full capacity. AE personnel confirmed that the solar farm was not audible at any of the noise monitoring locations with the exception of the boundary of the Subject Site.

Table 1: Noise Monitoring Locations

Monitoring Location	Address	Distance to Solar Farm Boundary	Line of Sight to Solar Farm	Solar Farm Audible
1	1998 Packham Drive	540 m	Yes	No
2	2000 Packham Drive	535 m	Yes	No
3	1869 Packham Drive	680 m	Yes	No
4	29 Old Orange Road	1,000 m	Yes	No
Background	1722 Packham Drive	1,550 m	No	No
Boundary	1 m from the boundary of the solar farm and approximately 25 m from the first row of panels.	1 m	Yes	Yes

2.2 Monitoring Approach and Equipment

Attended noise monitoring was undertaken in accordance with AS 1055.1 "Acoustics— Description and measurement of environmental Noise Part 1: General procedures" and the NSW Noise Policy for Industry (EPA, 2017).

A NATA calibrated class 1 Sound Level Meter (SLM) was used for the assessment. The SLM was calibrated before and after the measurements with no calibration drift observed across the monitoring period. Table 2 provides a summary of the equipment utilised during the monitoring.

For the purposes of assessing compliance, eight 15-minute measurements were undertaken at the location identified in Figure 1. During the measurement periods, all distinct extraneous noises (i.e. vehicle movements on Packham Drive) were removed and subjective observations of specific noises contributing to measured noise levels recorded.

Table 2: Instruments Used for Monitoring

Instrument Model	Serial Number	Last Lab Calibration Date	Pre-/Post Calibration (dB)
Norsonic 139	1392800	09/12/2016	94.0 / 94.0
Pulsar	70394	06/09/2018	-

2.3 Weather Conditions

Table 3 presents the weather conditions during the measurement period as recorded by the Bureau of Meteorology (BOM) at weather station 60801 (Orange Airport). Based on the available meteorological data and observations made during attended noise monitoring, the wind conditions were higher than ideal for noise monitoring. Where possible, on-site noise measurements were undertaken during periods of lower winds to minimise the influence of wind noise on the measurements.

Table 3: Weather Conditions during Monitoring Period

Date/Time	Temperature (°C)	Relative Humidity (%)	Wind		Rain (mm)
			Direction	Speed (m/s)[a)]	
15/12:00pm	17	64	NE	6.5	0
15/12:30pm	17	64	ENE	4.8	0
15/01:00pm	18	62	NE	6.1	0
15/01:30pm	19	63	ENE	5.6	0
15/02:00pm	18	60	NE	6.1	0
15/02:30pm	19	60	ENE	5.6	0
15/03:00pm	19	58	ENE	4.8	0
15/03:30pm	19	59	ENE	6.5	0

a) Wind speed adjusted for microphone height of 1.2 m.

3 NOISE MONITORING RESULTS

Table 4 provides the 15-minute noise monitoring results.

Table 4: Noise Monitoring Results

Location	Time Started	Noise Level dB(A), 15-minute						
		L_{AFmax}	L_{Aeq}	L_{AF1}	L_{AF10}	L_{AF50}	L_{AF90}	L_{AF99}
Background	3:27 PM	74	55	68	56	47	43	41
Boundary	3:02 PM	72	47	57	50	42	35	32
Location 1	1:00 PM	70	55	63	60	51	46	41
	1:18 PM	80	54	60	57	50	45	43
	Average	75	55	62	58	51	46	42
Location 2	1:45 PM	80	59	71	59	52	47	44
	2:01 PM	69	55	63	58	52	47	45
	Average	75	57	67	58	52	47	45
Location 3	2:24 PM	71	47	53	49	44	41	38
	2:40 PM	68	46	52	48	44	38	37
	Average	69	46	52	48	44	40	37
Location 4	12:21 PM	78	57	65	61	55	51	45
	12:37 PM	67	55	65	59	51	46	41
	Average	73	56	65	60	53	48	43

Review of the noise monitoring results in Table 4 and on-site observations, the following can be determined:

- Noise emissions from the solar farm were not audible at any of the monitoring locations except for the Subject Site boundary. Where a noise source is inaudible, it can be assumed that the component noise level for the source is at least 10 dB lower than the existing ambient noise levels. Based on this approach, the noise levels for locations 1 – 4, would be < 35 dB(A) at Location 1, < 37 dB(A) at Location 2, < 28 dB(A) at Location 3

and < 36 dB(A) at Location 4. However, given the $L_{A90,\ 15\text{-minute}}$ is 35 dB(A) at the boundary of the solar farm at a distance of 25 m from the first row of solar panels, and considering the minimum distance from the solar farm is 535 m to the nearest receptor, noise level from the solar farm is expected to be significantly lower than 35 dB(A) at the receptors; and

- The noise monitoring locations 1 – 4 are highly influence by other noise sources such as bird song and wind movement through nearby trees.

Overall, noise from the solar farm was determined to be inaudible at all nearby sensitive receptors. In addition, communication with residents of 1998 Packham Drive confirm that the solar farm is not audible at their residence.

Given the noise monitoring at the boundary of the solar farm was just barely audible, and the solar farm was inaudible at the sensitive receptors, noise from the solar farm is considered to be compliant with the requirements of Condition F1 of the approval.

4 DOCUMENT CONTROL

Table 5: Document Approval

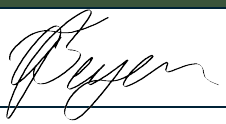
	Name	Position Title	Signature	Date
Author	Craig Beyers	Manager Consulting Services		29/10/2018

Table 6: Revision Register

Revision	Date	Name	Issued to	Comment
R_0	16/01/2018	Craig Beyers	D. Dyson	Initial release
R_0	29/10/2018	Craig Beyers	D. Dyson	Comments