

# Construction Noise Management Plan

Micro Solar Farm  
39 Hogans Lane  
Deniliquin, NSW

Prepared for: Chris Smith & Associates  
October 2023  
MAC231915-02RP1



## *Document Information*

# Construction Noise Management Plan

Micro Solar Farm

39 Hogans Lane

Deniliquin, NSW

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# 1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Chris Smith & Associates (CS&A), on behalf of Green Gold Energy Pty Ltd (Green Gold Energy) to prepare a Construction Noise Management Plan (CNMP) for the proposed Micro Solar Farm near Deniliquin, NSW (the project).

## 1.1 Purpose and Objectives

The Construction Noise Assessment (CNA) (MAC, 2023, Ref: MAC231915-01RP1V2) completed for the project Development Application (DA) identified potential noise impacts during its construction phases. This CNMP summarises the findings of the CNA and describes the noise mitigation and management measures that may be implemented to effectively manage construction noise emissions at off-site receivers. The CNMP Includes:

- Section 2: Description of the project, including project duration;
- Section 3: Identification of relevant noise policies and guidelines;
- Section 4: Description of the existing environment, including identification of sensitive receivers;
- Section 5: Construction noise management levels that noise emissions to sensitive receivers are assessed against;
- Section 6: Provides a summary of the predicted construction noise impacts relative to the relevant noise management levels;
- Section 7: Details the noise mitigation and management measures to be implemented to minimise construction noise emissions;
- Section 8: Describes the complaints management system;
- Section 9: Describes the noise monitoring programme, to be considered in the event of community complaints during sustained noise generating activities; and
- Section 10: Identifies the roles and responsibilities of Site personnel.

A glossary of terms, definitions and abbreviations used in this report is provided in **Appendix A**

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## 2 Project Description

Green Gold Energy proposes to establish a 4.95MW solar farm using photovoltaic (PV) technology at Lot 2 of DP778062 (39 Hogans Lane), Deniliquin, NSW (refer **Appendix B**). The project is located wholly within the Edwards River Council Local Government Area (LGA) and is subject to the Deniliquin Local Environmental Plan (LEP 2013).

### 2.1 Description of Proposed Construction Works

The project would consist of:

- 9,396 solar panels, mounted on single axis tracking arrays;
- 1.8m high chain mesh fence around the perimeter of the facility;
- landscaping around the perimeter of the proposal;
- new 22kV pole to connect to the overhead power line;
- one High Voltage Power Switchboard (HVSB); and
- one inverter station consisting of an inverter and transformer.

The construction of the project will comprise four key components, described as follows:

- Early Works – consisting of piling tests, road construction and upgrades for site access, including road widening and paving;
- Civil Works – consisting of land clearing, levelling and earthworks, internal road construction, drainage installation, laydown area preparation, fencing installation, site establishment, preparation of delivery station and inverter station, and vegetation screening/landscaping;
- Mechanical Works – consisting of foundation piling, tracker installation, module installation and delivery; and
- Electrical Works – consisting of solar cabling of aerials and conduit, DC main cabling via direct burial, MV cabling from inverter station to delivery station through direct buried, module connection, connection of junction boxes-inverters-delivery station, connection to grid and finally testing and commissioning.

## 2.2 Project Duration

The project construction is forecast to be approximately nine months, with all works to be undertaken during standard construction hours, defined in the ICNG as:

- Monday to Friday 7am to 6pm;
- Saturday 8am to 1pm; and
- No work on Sundays or public holidays.

Indicative construction staging is presented in **Table 1**.

Table 1 Indicative Construction Works and Staging		
Month	Stage	Site Works
1	Site Establishment	<ul style="list-style-type: none"><li>▪ Fencing;</li><li>▪ Planting of landscaping buffer;</li><li>▪ Construction of access track from the existing crossover on Hogans Lane to the site access gate;</li><li>▪ Construction of laydown area and car parking areas; and</li><li>▪ Setup of site amenities.</li></ul>
1-6	Deliveries	<ul style="list-style-type: none"><li>▪ Delivery of components and materials to site.</li></ul>
2	Pile Driving	<ul style="list-style-type: none"><li>▪ Pile driving tracking panel supports (4 weeks maximum duration).</li></ul>
2-7	Civil Works	<ul style="list-style-type: none"><li>▪ Installation of tracking panels, modules and cable string;</li><li>▪ Trenching and installation of underground DC cables and HV cables;</li><li>▪ Construction of concrete footings for inverter station and HVSB;</li><li>▪ Installation of inverter station and HVSB; and</li><li>▪ Installation of market meter, weather station, Supervisor Control and Data Acquisition system and security cameras.</li></ul>
7-9	Mechanical and Electrical Works	<ul style="list-style-type: none"><li>▪ HVSB connection, testing and commissioning.</li></ul>
9	Site Cleanup and Demobilisation	<ul style="list-style-type: none"><li>▪ Site cleanup and demobilisation.</li></ul>



### 3 Noise Policy and Guidelines

This CNMP has been prepared in consideration of the following relevant policies and standards, providing a framework for monitoring, communication, management, reporting and auditing.

- NSW Environment Protection Authority (EPA) 2017, NSW Noise Policy for Industry (NPI);
- NSW Environment Protection Authority (EPA), Approved Methods for the measurement and analysis of environmental noise in NSW, 2022;
- Department of Environment and Climate Change (DECC) 2009, Interim Construction Noise Guideline (ICNG);
- Standards Australia AS 2436-2010 Guide to Noise Control on Construction, Maintenance and Demolition Sites; and
- Standards Australia AS 1055.1:1997 - Acoustics - Description and measurement of environmental noise - General Procedures.

The CNMP has also considered and applied the following additional policy, guidelines and standards where relevant:

- Standards Australia AS IEC 61672.1-2004 (AS61672) – Electro Acoustics - Sound Level Meters Specifications Monitoring or Standards Australia AS1259.2-1990 (AS1259) – Acoustics – Sound Level Meters – Integrating/Averaging as appropriate to the device; and
- Standards Australia AS/IEC 60942:2004/IEC 60942:2003 (IEC60942) – Australian Standard – Electroacoustics – Sound Calibrators.

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## 4 Existing Environment

### 4.1 Background Noise Environment

The locality of the project site is described as rural (primary production), with dominant noise sources including agricultural noise (ie farm machinery, irrigation pumps and livestock) and environmental noise (ie birds and insects).

### 4.2 Sensitive Receivers

**Table 2** presents a summary of nearest receivers to the project site, including receiver identification, address and coordinates (MGA 55). The locality plan identifying the position of the receivers is provided in **Appendix B**.

Table 2 Receiver Locations				
Receiver ID	Description	Receiver Type	MGA55 Coordinates	
			Easting	Northing
R1 <sup>1</sup>	39 Hogans Lane	Residential	321493	6066662
R2	31 Hogans Lane	Residential	321545	6066727
R3	335 Flanagans Lane	Residential	321586	6067061
R4	313 Flanagans Lane	Residential	321451	6067636
R5	146 McEwans Lane	Residential	321432	6067876
R6	Kygala Property, Flanagans Lane	Residential	322173	6066944
R7	463 Flanagans Lane	Residential	322896	6066942
R8	378 Aratula North Road	Residential	323383	6066234
R9	239 Aratula North Road	Residential	322828	6065472
R10	221 Aratula North Road	Residential	321937	6065273
R11	Beronghi Property, Hogans Lane	Residential	321334	6065834
R12	83 Hogans Lane	Residential	321491	6066282

Note 1: Project related receiver.

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## 5 Noise Criteria

### 5.1 Construction Noise Goals

Section 4 of the ICNG details the quantitative assessment method involving predicting noise levels and comparing them with the Noise Management Level (NML) as an indicator of the potential level of construction noise impact. **Table 3** provides the ICNG recommended LAeq(15min) NMLs and how they are to be applied.

**Table 3 Noise Management Levels**

Time of Day	Management Level LAeq(15min) <sup>1</sup>	How to Apply
Recommended standard hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or public holidays.	Noise affected  RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise.  Where the predicted or measured LAeq,15min is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level.  The proponent should also inform all potentially impacted residents of the nature of work to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected  75 dBA.	The highly noise affected level represents the point above which there may be strong community reaction to noise.  Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account times identified by the community when they are less sensitive to noise (such as before and after school for work near schools, or mid-morning or mid-afternoon for work near residences; and if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours.	Noise affected  RBL + 5 dB	A strong justification would typically be required for work outside the recommended standard hours.  The proponent should apply all feasible and reasonable work practices to meet the noise affected level.  Where all feasible and reasonable practices have been applied and noise is more than 5dBA above the noise affected level, the proponent should negotiate with the community.  For guidance on negotiating agreements see section 7.2.2.

Note 1: The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the construction noise management levels for noise assessment purposes and is the median of the ABL's.

### 5.1.1 Construction Noise Management Levels

Due to the rural nature of the locality and the likelihood of low ambient noise levels, the minimum assumed Rating Background Levels (RBL) of 35dBA for the daytime period and 30dBA for the evening and night-time periods have been adopted in accordance with NPI methodology.

The relevant NMLs for standard construction hours are presented in **Table 4**.

<b>Table 4 Construction Noise Management Levels</b>			
Receiver ID	Assessment Period <sup>1</sup>	Adopted RBL	NML
		dB LA90	dB LAeq(15min)
All residential	Standard Hours	35	45 (RBL+10dBA)

Note 1: Refer to **Section 2.2** for Standard Recommended Hours for Construction.

### 5.2 Construction Road Noise Criteria

Noise impact from increased construction traffic on the local road network is assessed against the NSW Road Noise Policy (RNP). In accordance with the RNP, Hogans Lane and Flanagans Lane are categorised as local roads. The relevant road traffic noise criteria are presented in **Table 5** for residential receivers.

<b>Table 5 Road Traffic Noise Assessment Criteria</b>			
Road category	Type of project/development	Assessment Criteria – dBA	
		Day (7am to 10pm)	Night (10pm to 7am)
Local roads	Existing residences affected by		
	additional traffic on local roads generated by land use developments	55dB LAeq(1hr)	50dB LAeq(1hr)

Additionally, the RNP states where existing road traffic noise criteria are already exceeded, any additional increase in total traffic noise level should be limited to 2dBA, which is generally accepted as the threshold of perceptibility to a change in noise level.

## 6 Noise Impact Assessment

### 6.1 Construction Noise Scenarios

Noise impact prediction is undertaken taking into account the construction staging and the noise emission data from plant and equipment used during each construction stage. Construction scenarios and noise emission data are summarised in **Table 6**.

Table 6 Construction Equipment Sound Power Levels, Lw dBA (re 10 <sup>-12</sup> Watts)						
Noise Source/Item	Lw/Item	Early Works	Piling Works	Installation	Testing	Clean-up
Ute mounted auger	102	✓				
Excavator	105	✓		✓		
Slasher / Mower	102	✓				
Concrete truck and pump	106	✓				
Water cart	101	✓		✓		
Delivery trucks	104	✓	✓			✓
Tele-handler	99			✓		
Compactor	106	✓		✓		
Grader	112	✓				
Piling rig (hydraulic)	113		✓			
Mobile crane/HIAB	98	✓		✓		
Hand tools/Power tools	102			✓	✓	
Waste truck (fortnightly)	104			✓	✓	✓
EWP	98				✓	
Light Vehicles	76	✓	✓	✓	✓	✓
<b>Total Fleet Lw</b>		<b>115</b>	<b>112</b>	<b>110</b>	<b>104</b>	<b>104</b>

## 6.2 Construction Noise Assessment

Construction noise levels were modelled to all identified receivers for typical construction activities during standard construction hours. **Table 7** summarises the predicted noise level range for each of the construction scenarios. It is noted that receiver R1 is a project-related receiver and was included for completeness purposes only.

**Table 7 Predicted Construction Noise Levels**

Receiver ID	Predicted Noise Level Range, dB LAeq(15min) <sup>1</sup>					NML Standard Hours
	Early Works	Piling Works	Installation	Testing	Cleanup	dB LAeq(15min)
R1 <sup>2</sup>	49 – 60	46 – 49	47 – 58	43	47	n/a
R2	47 – 53	41 – 49	41 – 45	39	39	45
R3	39 – 42	37 – 43	35 – 39	30	<30	45
R4	<30 – 32	31 – 34	up to 30	<30	<30	45
R5	up to 30	30 – 32	<30	<30	<30	45
R6	38 – 43	39 – 45	37 – 42	<30	<30	45
R7	<30 – 33	32 – 37	<30 – 33	<30	<30	45
R8	<30	<30 – 32	<30	<30	<30	45
R9	<30	30 – 33	<30	<30	<30	45
R10	up to 30	31 – 34	<30	<30	<30	45
R11	33 – 36	34 – 38	31 – 34	<30	<30	45
R12	42 – 46	39 – 48	37 – 44	34	31	45

Note: Predicted construction noise levels above the NMLs are highlighted and shown in **bold**.

Note 1: Noise levels from construction activities vary due to their position across the project site with respect to surrounding receivers.

Note 2: Project related receiver.

The results of the CNA indicate that noise levels during construction have potential to exceed the NMLs at up to two residential receivers during early works (ie installation of boundary fencing and construction of the access road), and piling works.

The noise levels are predicted to be up to 8dB above the NML at R2 (NW of the project site), and up to 3dB above the NML at R12 (SW of the project site). Construction noise levels are predicted to satisfy the highly noise affected criteria of 75dBA LAeq(15min) for all activities.



### 6.3 Construction Road Noise Assessment

Forecast construction traffic movements comprise up to 40 light vehicle movements per day (20 light vehicle movements during the AM and PM busy hour), and a total of 10 heavy vehicle movements per day. Existing traffic volumes on Flanagans Lane and Hogans Lane are considered to be negligible (<50 vehicle movements per day).

A review of aerial imagery identified that the closest residential receiver along the transport route is 31 Flanagans Lane, approximately 35m from the road. Predicted noise levels from project related construction traffic are presented in **Table 8**.

Table 8 Predicted Construction Road Traffic Noise Levels				
Road Name	Offset Distance to Receiver	Predicted Noise Level	RTN Criteria	Compliance Achieved
Flanagans Lane	35m	39dB LAeq(1hr)	55dB LAeq(1hr)	✓

Results demonstrate that project construction traffic noise levels would comply with the relevant RNP criteria.

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## 7 Noise Mitigation for Construction Activities

The primary objective of the NMP is to minimise noise impacts on surrounding receivers through the implementation of feasible and reasonable noise mitigation measures. The project construction manager may adopt the following hierarchical strategy to achieve this objective:

- ensure that construction activities meet construction NMLs within the allowable hours of works as far as practicable;
- where noise levels are above relevant NMLs, implement reasonable and feasible best practice noise controls to minimise noise emissions and/or exposure duration at affected receivers; and
- where the use of best practice noise controls does not adequately address exceedance of NMLs, adopt alternative measures to minimise impacts on the community.

The ICNG and Standards Australia AS 2436-2010 “*Guide to Noise Control on Construction, Maintenance and Demolition Sites*” sets out numerous practical recommendations to assist in mitigating construction noise emissions. These recommendations include operational strategies, source noise control strategies, noise barrier control strategies, and community consultation.

### 7.1 Mitigation and Management Measures

Standard mitigation measures that apply in the management of potential noise impacts on sensitive receivers are provided in **Table 9**. The standard mitigation measures shall be applied and implemented where reasonable and feasible.

**Table 9 Standard Mitigation Measures**

Mitigation Measure	Project Phase
All works will be carried out during standard construction hours:	
<ul style="list-style-type: none"> <li>Monday to Friday 7am to 6pm;</li> <li>Saturday 8am to 1pm; and</li> <li>No work on Sundays or public holidays</li> </ul>	Construction
Notify potentially affected residences with project progress, proposed/upcoming	Preconstruction
potentially noise generating works, its duration and nature and complaint procedure	Construction
Provide toolbox meetings, training and education to drivers and contractors visiting the site during construction so they are aware of the location of noise sensitive receivers and to be cognisant of any noise generating activities	Construction
Signage is to be placed at the front entrance advising truck drivers of their requirement to minimise noise both on and off-site	Preconstruction
Selection of the quietest suitable machinery available for each activity	Preconstruction
Use localised mobile screens/hay bale stacks or construction hoarding around piling rig/plant to act as barriers between construction works and receivers, particularly where equipment is near the site boundary and/or a residential receiver including areas in constant or regular use (eg unloading and laydown areas)	Preconstruction Construction (piling works)
All vehicles and equipment will be regularly serviced, as per manufacturer's specifications and maintained in proper working order.	Construction
Minimise noisy plant/machinery working simultaneously where practicable	Construction
Operating plant in a conservative manner (no over-revving), shutdown when not in use, and be parked/started at farthest point from relevant assessment locations	Construction
Minimise impact noise through good work practices	Construction
Utilise a broadband reverse alarm in lieu of the traditional high frequency type reverse alarm	Construction

The overall efficacy of the mitigation and management measures is dependent on the measures implemented and how effectively they are implemented. Through the implementation of the recommended measures, it is anticipated that construction noise levels could be reduced 10dBA or more.

The effectiveness of the measures should be evaluated throughout the construction period, and further measures implemented where required.

## 8 Enquiries and Complaints Management

The project site will implement a complaints management system to consider and respond to community complaints in an appropriate and timely manner. The complaints management system will:

- provide a readily accessible contact point;
- give complaints a fair hearing;
- have a documented complaints process, including an escalation procedure so that if a complainant is not satisfied there is a clear path to follow;
- provide a quick response, including call back as soon as possible; and
- keep a register of any complaints, including details of the complaint, such as date, time, person receiving complaint, complainant's contact number, person referred to, description of the complaint and documented response.

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## 9 Noise Monitoring Programme

In the event of significant community concern, and/or receipt of a formal complaint, where construction activities are anticipated to result in elevated noise emissions for a sustained period of time, the Applicant may consider a noise monitoring programme to guide, manage, quantify and control noise emissions from construction activities.

The objectives of the noise monitoring programme are as follows:

- assess construction noise levels against project NMLs;
- identify potential construction noise sources and their relative contribution to noise impacts;
- outline the methodologies to be adopted for monitoring construction noise, including justification for monitoring intervals or triggers, weather conditions, monitoring location selection and timing; and
- incorporate noise management and mitigation strategies outlined in this plan.

The attended noise monitoring will be undertaken by an independent, suitably qualified and experienced noise specialist in accordance with 'Approved Methods for measurement and analysis of environmental noise' (EPA, 2022).

The operator will quantify site noise emissions and determine the  $L_{Aeq}(15min)$  noise contribution from the construction activities as well as the overall level of ambient noise. Information to be recorded for all operator attended monitoring will include:

- the operator's name;
- monitoring location and recording interval (date and time);
- meteorological conditions (ie temperature, cloud cover and wind speed and direction);
- statistical noise level descriptors together with notes identifying the dominant noise sources, including overall ambient noise levels;
- instrument make, model, serial number and calibration details; and
- a brief description of activities at the Site wherever possible.

In the event of an exceedance of the relevant NMLs, the Construction Manager shall be promptly informed of the margin of exceedance and the source of emission so that an appropriate response can be made with respect to conformance.

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## 10 Roles and Responsibilities

All project personnel, including subcontractors have a role in ensuring that the management and mitigation measures set out in this CNMP are implemented. Key roles and responsibilities are summarised in **Table 10**.

**Table 10 Roles and Responsibilities**

Role	Responsibility
Construction Manager	<ul style="list-style-type: none"><li>▪ Manage the delivery of the project including overseeing the implementation of noise management measures;</li><li>▪ Ensure that appropriate resources are available for the implementation and maintenance of the noise management measures;</li><li>▪ Ensure that standard construction hours are adhered to;</li><li>▪ Ensure that appropriate awareness programs (ie toolbox talks, inductions) are developed and implemented;</li><li>▪ Ensure that community complaints are investigated and responded to;</li><li>▪ Coordinate noise monitoring, if required; and</li><li>▪ Undertake review of management measures, if required.</li></ul>
Construction Personnel	<ul style="list-style-type: none"><li>▪ Follow mitigation measures when undertaking site work; and</li><li>▪ Report and/or manage any unnecessary noise emissions.</li></ul>

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## 11 References

- NSW Environment Protection Authority (EPA), Approved Methods for the measurement and analysis of environmental noise in NSW, 2022;
- Muller Acoustic Consulting Pty Ltd (MAC), 2023, Construction Noise Assessment – Micro Solar Farm, 39 Hogans Lane, Deniliquin, NSW;
- NSW Environment Protection Authority (EPA) 2017, NSW Noise Policy for Industry (NPI);
- Standards Australia AS 1055:2018 (AS 1055) – Acoustics – Description and Measurement of Environmental Noise; and
- Standards Australia AS/NZS IEC 61672:2019 (AS 61672) – Electro Acoustics - Sound Level Meters Specifications Monitoring.

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# Appendix A – Glossary of Terms

A number of technical terms have been used in this report and are explained in **Table A1**.

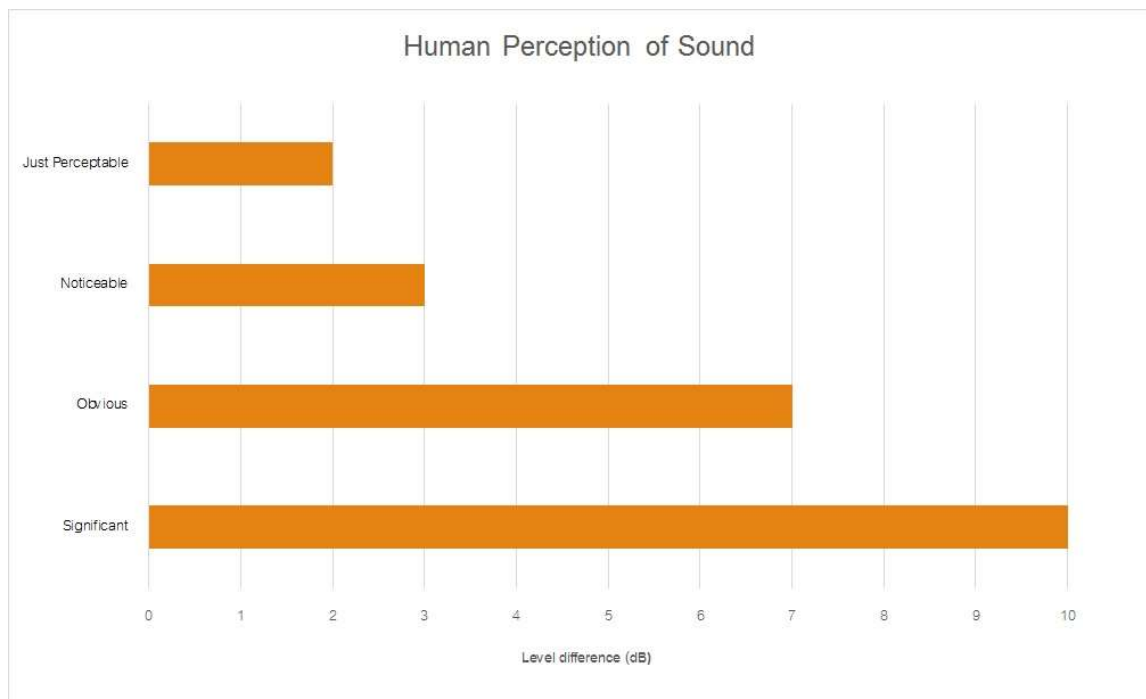
Table A1 Glossary of Acoustical Terms	
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured L90 statistical noise levels.
Ambient Noise	The total noise associated with a given environment. Typically, a composite of sounds from all sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to sound.
Background Noise	The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is usually represented by the LA90 descriptor
dBA	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
dB(Z), dB(L)	Decibels Z-weighted or decibels Linear (unweighted).
Extraneous Noise	Sound resulting from activities that are not typical of the area.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A sound level which is exceeded 10% of the time.
LA90	Commonly referred to as the background noise, this is the level exceeded 90% of the time.
LAeq	Represents the average noise energy or equivalent sound pressure level over a given period.
LAmx	The maximum sound pressure level received at the microphone during a measuring interval.
Masking	The phenomenon of one sound interfering with the perception of another sound. For example, the interference of traffic noise with use of a public telephone on a busy street.
RBL	The Rating Background Level (RBL) as defined in the NPI, is an overall single figure representing the background level for each assessment period over the whole monitoring period. The RBL, as defined is the median of ABL values over the whole monitoring period.
Sound power level (Lw or SWL)	This is a measure of the total power radiated by a source in the form of sound and is given by $10 \cdot \log_{10} (W/W_0)$ . Where W is the sound power in watts to the reference level of $10^{-12}$ watts.
Sound pressure level (Lp or SPL)	the level of sound pressure; as measured at a distance by a standard sound level meter. This differs from Lw in that it is the sound level at a receiver position as opposed to the sound 'intensity' of the source.

Table A2 provides a list of common noise sources and their typical sound level.

**Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA**

Source	Typical Sound Pressure Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom (night with windows closed)	20
Threshold of hearing	0

**Figure A1 – Human Perception of Sound**



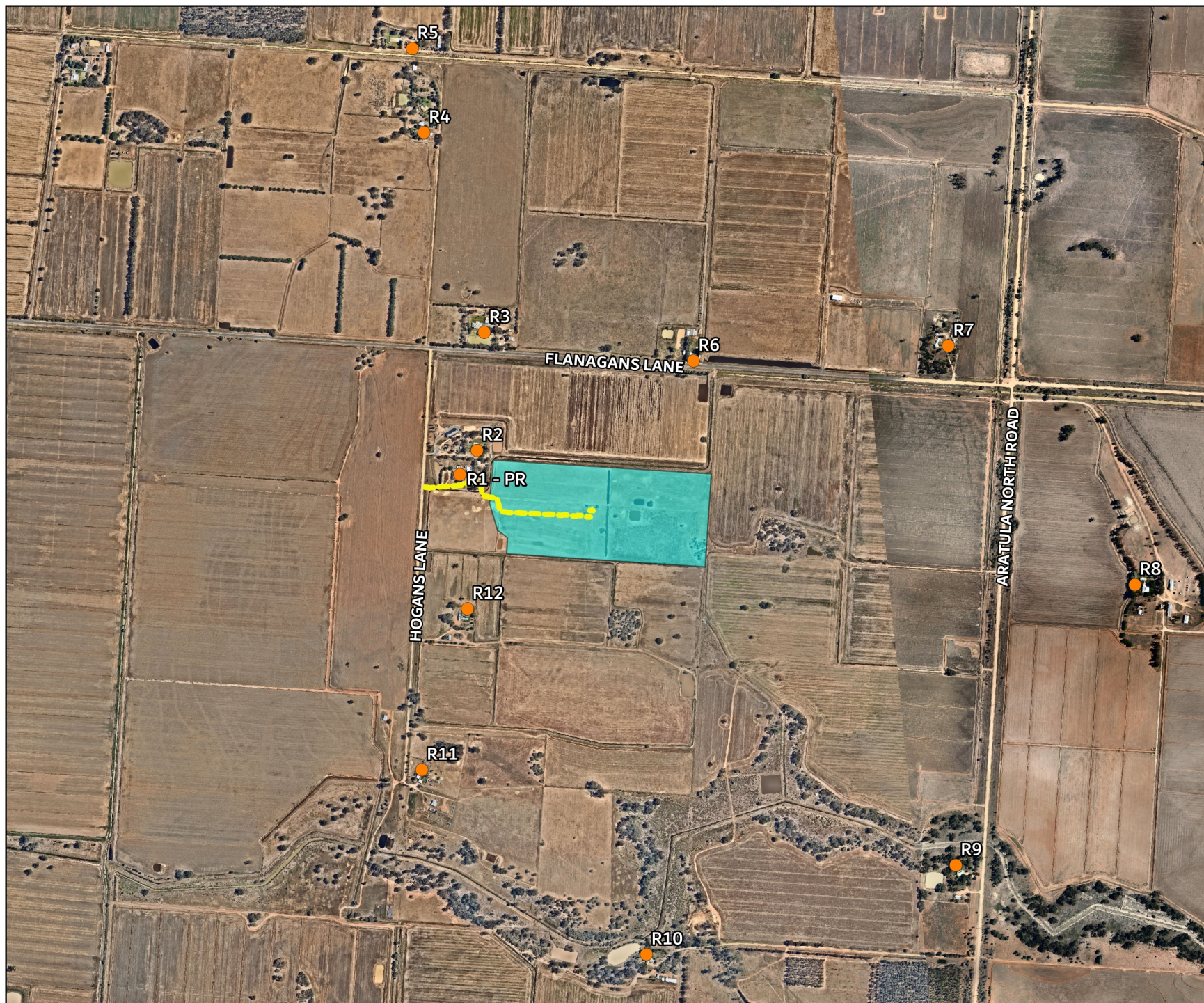
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## Appendix B – Site / Receiver Map



Appendix B  
Receiver Map  
MAC231915-02  
Deniliquin Micro Solar Farm



**KEY**

- Project Site
- Access Road
- Residential Receivers





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