Noise Assessment

Majors Creek 1A Solar Farm and Battery Energy Storage System Ballalaba, NSW

Prepared for: EDPR Australia Pty Ltd
March 2026
MAC180781-32RP1V1

Muller Acoustic Consulting

Document Information

Noise Assessment

Majors Creek 1A Solar Farm and Battery Energy Storage System

Ballalaba, NSW

Prepared for: EDPR Australia Pty Ltd

Level 4, Marcus Clarke Street

Canberra ACT 2601

Prepared by: Muller Acoustic Consulting Pty Ltd

PO Box 678, Kotara NSW 2289

ABN: 36 602 225 132

P: +61 2 4920 1833

www.mulleracoustic.com

DOCUMENT ID	DATE	PREPARED	SIGNED	REVIEWED	SIGNED
MAC180781-32RP1V1	5 March 2026	Rod Linnett		Oliver Muller	

CONTENTS

1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by EDPR Australia Pty Ltd (EDPR) to prepare a Noise Assessment (NA) for the proposed Majors Creek 1A Solar Farm and Battery Energy Storage System (BESS) at Ballalaba, NSW (the project). This report presents the methodology and findings of the NA for the construction and operation of the project.

1.1 Purpose and Objectives

A NA is required as part of the environmental assessment to be submitted to Queanbeyan – Palerang Regional Council (QPRC) as part of the Development Application (DA). The purpose of the NA is to quantify potential environmental noise emissions associated with the construction and operation of the project. Where impacts are identified, the assessment includes recommendations for potential noise mitigation and management measures.

1.2 Scope of the Assessment

The NA includes the following key tasks:

- review construction and operating activities to identify key noise generating plant, equipment, machinery or activities proposed to be undertaken as part of the project;
- identify the closest and/or potentially most affected receivers situated within the area of influence to the project;
- determine project-specific construction Noise Management Levels (NMLs), and operational noise criteria;
- undertake 3D noise modelling to predict levels that may occur as a result of the construction and operation of the project at the closest and/or potentially most affected receivers;
- provide a comparison of predicted noise levels against relevant construction and operational criteria;
- assess the potential noise impacts associated with construction and operational aspects of the project;
- assess the potential noise impacts associated with road traffic noise during construction; and
- provide feasible and reasonable noise mitigation and management measures, and monitoring options, where criteria may be exceeded.

The assessment has been undertaken in accordance with the following documents:

- NSW Department of Environment and Climate Change (DECCW) – NSW Interim Construction Noise Guideline (ICNG), July 2009;
- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- NSW Department of Environment, Climate Change and Water (DECCW) – NSW Road Noise Policy (RNP), March 2011;
- Standards Australia AS 1055:2018 - Acoustics - Description and measurement of environmental noise - General Procedures; and
- International Standard ISO 9613:1996 - Acoustics - Attenuation of sound during propagation outdoors.

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

2 Project Description

2.1 Background

EDPR propose to construct and operate a 4.99 Megawatt (MW) Solar Farm and BESS using Photovoltaic (PV) technology at 873 Wallaces Gap Road, Ballalaba, NSW, approximately 7.5km southwest of the township of Majors Creek, NSW and 19km southwest of Braidwood, NSW.

2.2 Description of Proposed Construction Works

The project includes installation of groups of north aligned PV modules on mounting structures of 1.3m to 1.5m in height. Approximately 10,260 PV panels will be installed using a single axis tracking system, following the sun from east to west during the day. The PV mounting structure would comprise steel posts driven into the ground using a small pile driver. Additional support structures would be attached to the piles, which would then support the PV panels.

Where cabling of each PV array/module to inverters and substation is required to be underground, earthworks will primarily involve trenching. Other minor earthworks would be completed for the preparation of the site and in most cases a concrete slab would be required to support the ancillary infrastructure, BESS foundations and associated cabling connections. Most of the infrastructure would be pre-fabricated off-site, delivered and assembled on-site. Construction activities associated with the BESS would involve the placement of a skid based system at the appropriate location (by crane or crane truck) and is a negligible noise source/event.

It is anticipated that the project would be constructed over a three (3) month period during standard construction hours. Piling and mounting of panels would occur over multiple work areas simultaneously.

During the construction and operational phases, all vehicles would access the project site Wallaces Gap Road via Cooma Road from Braidwood.

During construction, traffic generated by the project would include employee and delivery vehicles. During the peak construction period, the traffic volume is expected to be up to a maximum of four (4) heavy vehicles (semi-trailers or B-doubles) per hour (with trucks typically accessing the site throughout the day, and generally between 10am and 2pm), and up to 40 light vehicles (25 to 30 on average) for worker transport per day.

2.3 Description of Proposed Operation

PV infrastructure on site will comprise of groups of PV panels installed in rows. The BESS and Inverters will be located centrally and connected by underground cables. The project will be contained solely within the site as shown in **Figure 1**. A detailed site layout is presented in **Appendix B**.

The project would operate 24 hours a day, seven days a week, with no permanent staff on site. During operation, the PV panels would generate electricity which would be fed into the power grid via the adjacent existing powerline with excess solar energy from the PV system being stored in the BESS for night-time usage.

Key noise emissions from the operation of the project are associated with the inverter and transformer(s). The BESS typically consists of containerised or skid based lithium-ion battery modules fitted with relevant switches and controllers. As this equipment generates heat, a Heating Ventilation and Air Conditioning (HVAC) system is required to provide cooling and is the primary noise source associated with the BESS. The HVAC system consists of an air conditioner, heat exchanger and ventilation fans. It is noted that emissions from these sources are anticipated to be acoustically insignificant compared to ambient background noise levels at assessed receivers.

When required, maintenance activities will occur during standard working hours (except for emergencies) and are expected to include:

- panel cleaning;
- repairs or replacement of infrastructure, as required; and
- land management including mowing to control vegetation as required.

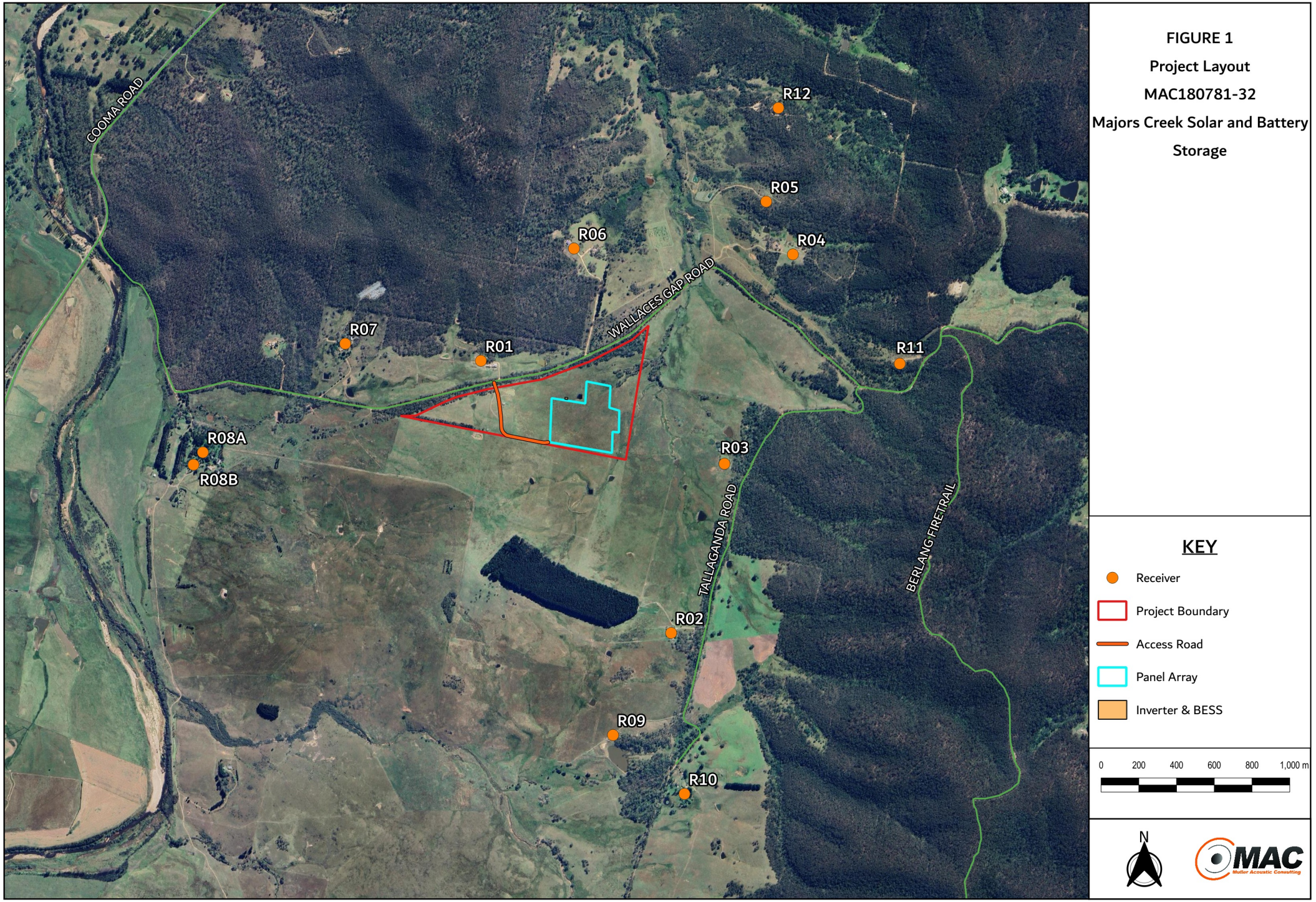
Typical noise sources associated with maintenance activities would include light vehicle movements on site and maintenance of equipment.

2.4 Receiver Review

Using aerial photography, geospatial information and other project design information, MAC has identified the following potentially noise sensitive receivers that may be affected by noise from operation or construction activities and project related road traffic. **Table 1** presents a summary of receiver identification, address, type and coordinates within the potential affectation area of the project. These are reproduced visually in **Figure 1**.

Table 1 Receiver Locations

Receiver	Receiver Type	Coordinates (GDA1994/MGA55)	
		Easting	Northing
R01	Rural Residential	740454	6059678
R02	Rural Residential	741463	6058235
R03	Rural Residential	741745	6059132
R04	Rural Residential	742108	6060242
R05	Rural Residential	741966	6060522
R06	Rural Residential	740947	6060273
R07	Rural Residential	739735	6059769
R08a	Rural Residential	738980	6059193
R08b	Rural Residential	738931	6059127
R09	Rural Residential	741154	6057694
R10	Rural Residential	741533	6057382
R11	Rural Residential	742675	6059663
R12	Rural Residential	742031	6061018


COOMA ROAD
WALLACES GAP ROAD
TALLAGANDA ROAD
BERLANG FIRETRAIL
R01
R02
R03
R04
R05
R06
R07
R08A
R08B
R09
R10
R11
R12
FIGURE 1
Project Layout
MAC180781-32
Majors Creek Solar and Battery Storage
KEY
Receiver
Project Boundary
Access Road
Panel Array
Inverter & BESS
0 200 400 600 800 1,000 m
N
MAC
Muller Acoustic Consulting

3 Noise Policy and Guidelines

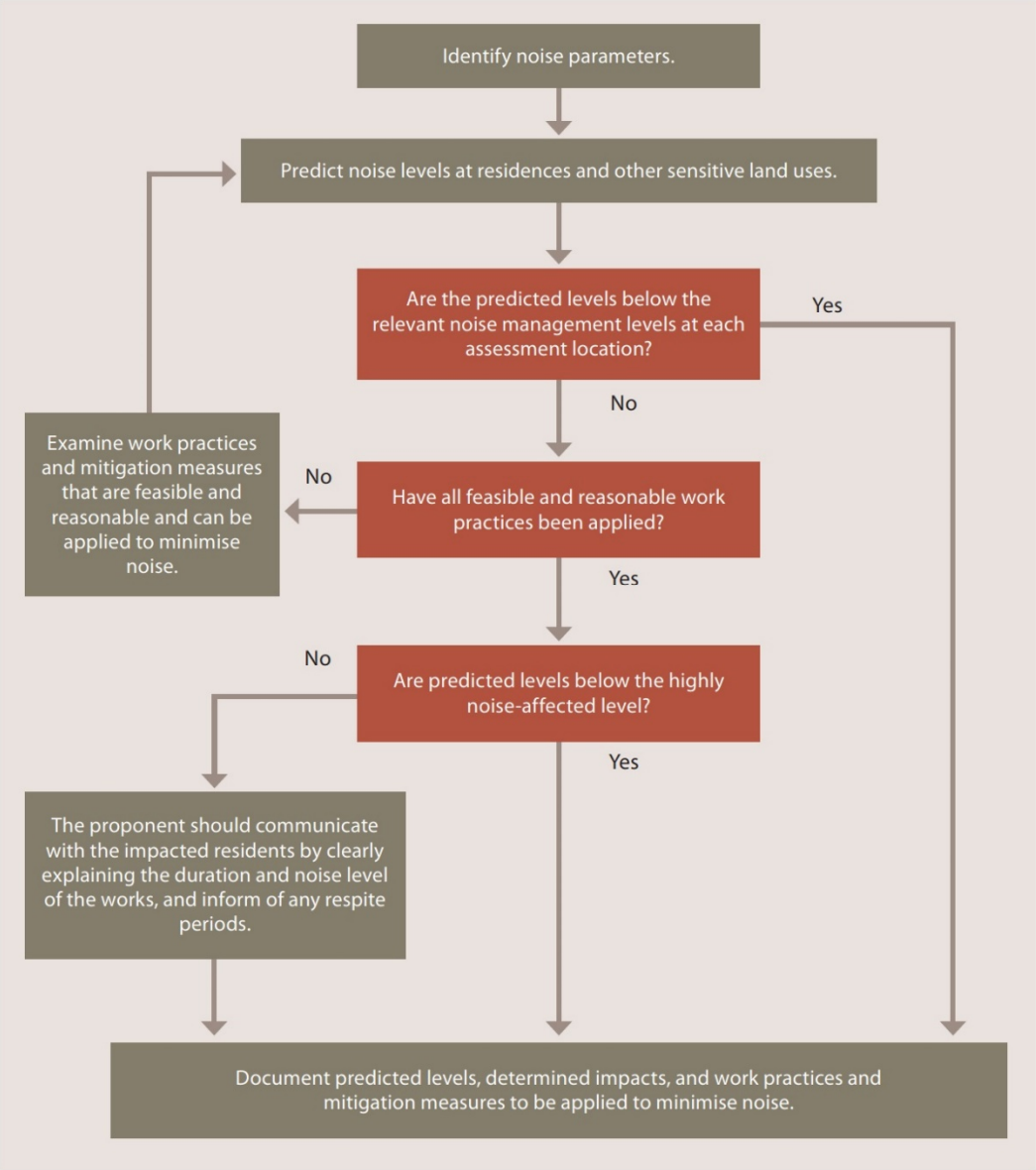
3.1 Interim Construction Noise Guideline

The ICNG sets out procedures to identify and address the impacts of construction noise on residences and other sensitive land uses. This section provides a summary of noise objectives that are applicable to the assessment. The ICNG provides two methodologies for the assessment of construction noise emissions:

- quantitative, which is suited to major construction projects with typical durations of more than three weeks; and
- qualitative, which is suited to short term infrastructure maintenance (< three weeks).

The qualitative assessment methodology is a more simplified approach that relies on noise management strategies. This study has adopted a quantitative assessment approach which is summarised in **Figure 2.** The quantitative approach includes identification of potentially affected receivers, derivation of the construction noise management levels, quantification of potential noise impact at receivers via predictive modelling and, provides management and mitigation recommendations.

Figure 2 Quantitative Assessment Processes for Assessing and Managing Construction Noise



Source: Department of Environment and Climate Change, 2009.

3.1.1 Standard Hours for Construction

Table 2 summarises the ICNG recommended standard hours for construction works.

Table 2 Recommended Standard Hours for Construction

Daytime	Construction Hours
Monday to Friday	7am to 6pm
Saturdays	8am to 1pm
Sundays or Public Holidays	No construction

These recommended hours do not apply in the event of direction from police, or other relevant authorities, for safety reasons or where required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.

Construction activities are anticipated to be undertaken during standard construction hours.

3.1.2 Out of Hours Construction

Works conducted outside of recommended standard hours are considered Out of Hours work (OOH). The ICNG suggests that any request to vary the hours of construction activities as identified above shall be:

- considered on a case-by-case basis or activity-specific basis;
- accompanied by details of the nature and need for activities to be undertaken during the varied construction hours;
- accompanied by written evidence that activities undertaken during the varied construction hours are strongly justified;
- appropriate consultation with potentially affected receivers and notification of the relevant regulatory authorities has occurred; and
- all practicable and reasonable mitigation measures will be put in place.

3.1.3 Construction Noise Management Levels

Section 4 of the ICNG (DECC, 2009) details the quantitative assessment method involving predicting noise levels and comparing them with the NML and are important indicators of the potential level of construction noise impact. **Table 3** reproduces the ICNG Noise Management Level for residential receivers. The NML is determined by adding 10dB (standard hours) or 5dB (OOH) to the Rating Background Level (RBL) for each specific assessment period.

Table 3 Noise Management Levels

Time of Day	Management Level LAeq(15min)[1]	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 + 10dB	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 75dBA	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 + 5dB	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.

3.1.4 Construction Sleep Disturbance

Section 4.3 of the ICNG (DECC, 2009) states that a sleep disturbance assessment is required where construction activities are planned to occur for more than two consecutive nights. Given that construction activities are anticipated to occur during standard construction hours, sleep disturbance has not been considered in this assessment.

3.2 Noise Policy for Industry

The EPA released the Noise Policy for Industry (NPI) in October 2017 which provides a process for establishing noise criteria for consents and licenses enabling the EPA to regulate noise emissions from scheduled premises under the Protection of the Environment Operations Act 1997.

The objectives of the NPI are to:

- provide noise criteria that is used to assess the change in both short term and long-term noise levels;
- provide a clear and consistent framework for assessing environmental noise impacts from industrial premises and industrial development proposals;
- promote the use of best-practice noise mitigation measures that are feasible and reasonable where potential impacts have been identified; and
- support a process to guide the determination of achievable noise limits for planning approvals and/or licences, considering the matters that must be considered under the relevant legislation (such as the economic and social benefits and impacts of industrial development).

The policy sets out a process for industrial noise management involving the following key steps:

1. Determine the Project Noise Trigger Levels (PNTLs) (ie criteria) for a development. These are the levels (criteria), above which noise management measures are required to be considered. They are derived by considering two factors: shorter-term intrusiveness due to changes in the noise environment; and maintaining the noise amenity of an area.
2. Predict or measure the noise levels produced by the development with regard to the presence of annoying noise characteristics and meteorological effects such as temperature inversions and wind.
3. Compare the predicted or measured noise level with the PNTL, assessing impacts and the need for noise mitigation and management measures.

4. Consider residual noise impacts - that is, where noise levels exceed the PNTLs after the application of feasible and reasonable noise mitigation measures. This may involve balancing economic, social and environmental costs and benefits from the proposed development against the noise impacts, including consultation with the affected community where impacts are expected to be significant.

5. Set statutory compliance levels that reflect the best achievable and agreed noise limits for the development.

6. Monitor and report environmental noise levels from the development.

3.2.1 Project Noise Trigger Levels (PNTL)

The policy sets out the procedure to determine the PNTLs relevant to an industrial development. The PNTL is the lower (ie, the more stringent) of the **Project Intrusiveness Noise Level** (PINL) and **Project Amenity Noise Level** (PANL) determined in accordance with Section 2.3 and Section 2.4 of the NPI.

3.2.2 Rating Background Level (RBL)

The RBL is a determined parameter from noise monitoring and is used for assessment purposes. As per the NPI, the RBL is an overall single figure background level representing each assessment period (day, evening and night) over the noise monitoring period.

For low noise environments, such as rural environments, minimum assumed RBLs apply within the NPI and can be adopted in lieu of completing background noise measurements. This is considered the most conservative method for establishing noise criteria for a project. The minimum assumed RBLs are as follows:

- Minimum Day RBL = 35dBA;
- Minimum Evening RBL = 30dBA; and
- Minimum Night RBL = 30dBA.

Due to the rural nature of the locality, the PINLs for the Project have been determined based on the minimum RBL+5dBA.

3.2.3 Project Intrusiveness Noise Level (PINL)

The PINL ($LA_{eq(15min)}$) is the RBL + 5dB and seeks to limit the degree of change a new noise source introduces to an existing environment. Hence, when assessing intrusiveness, background noise levels need to be measured.

3.2.4 Project Amenity Noise Level (PANL)

The PANL is relevant to a specific land use or locality. To limit continuing increases in intrusiveness levels, the ambient noise level within an area from all combined industrial sources should remain below the recommended Amenity Noise Levels specified in Table 2.2 (of the NPI). The NPI defines two categories of Amenity Noise Levels:

- **Amenity Noise Levels (ANL)** – are determined considering all current and future industrial noise within a receiver area; and
- **Project Amenity Noise Level (PANL)** – is the recommended level for a receiver area, specifically focusing the project being assessed.

Additionally, Section 2.4 of the NPI states: "to ensure that industrial noise levels (existing plus new) remain within the recommended Amenity Noise Levels for an area, a PANL applies for each new source of industrial noise as follows":

PANL for new industrial developments = recommended **ANL** minus 5dBA.

The following exceptions apply when deriving the PANL:

- areas with high traffic noise levels;
- proposed developments in major industrial clusters;
- existing industrial noise and cumulative industrial noise effects; and
- greenfield sites.

Where relevant this assessment has considered influences of traffic with respect to Amenity Noise Level (ie areas where existing traffic noise levels are 10dB greater than the recommended ANL).

The recommended Amenity Noise Levels as per Table 2.2 of the NPI are reproduced in **Table 4**.

Table 4 Amenity Noise Levels

Receiver Type	Noise Amenity Area	Time of day[1]	Recommended Amenity Noise Level dB LAeq(period)
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	5dB above the recommended Amenity Noise Level for a residence for the relevant noise amenity area and time of day
School Classroom	All	Noisiest 1-hour period when in use	35 (internal) 45 (external)
Hospital ward			
- internal	All	Noisiest 1-hour	35
- external	All	Noisiest 1-hour	50
Place of worship - internal	All	When in use	40
Passive Recreation	All	When in use	50
Active Recreation	All	When in use	55
Commercial premises	All	When in use	65
Industrial	All	When in use	70

Notes: The recommended Amenity Noise Levels refer only to noise from industrial noise sources. However, they refer to noise from all such sources at the receiver location, and not only noise due to a specific project under consideration. The levels represent outdoor levels except where otherwise stated.

Types of receivers are defined as rural residential; suburban residential; urban residential; industrial interface; commercial; industrial – see Table 2.3 and Section 2.7 of the NPI.

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

3.2.5 Maximum Noise Assessment Trigger Levels

The potential for sleep disturbance from maximum noise level events from a project during the night-time period needs to be considered. The NPI considers sleep disturbance to be both awakenings and disturbance to sleep stages.

Where night-time noise levels from a development/premises at a residential location exceed the following criteria, a detailed maximum noise level event assessment should be undertaken:

- $L_{Aeq(15min)}$ 40dB or the prevailing RBL plus 5dBA, whichever is the greater, and/or
- L_{Amax} 52dB or the prevailing RBL plus 15dBA, whichever is the greater.

A detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period. Other factors that may be important in assessing the impacts on sleep disturbance include:

- how often the events would occur;
- the distribution of likely events across the night-time period and the existing ambient maximum events in the absence of the development;
- whether there are times of day when there is a clear change in the noise environment (such as during early morning shoulder periods); and
- current understanding of effects of maximum noise level events at night.

3.3 Road Noise Policy

The road traffic noise criteria are provided in the Department of Environment, Climate Change and Water NSW (DECCW), Road Noise Policy (RNP), 2011. The policy sets out noise criteria applicable to different road classifications for the purpose of quantifying traffic noise impacts. The road traffic noise criteria are provided in the RNP and are presented in **Table 11**.

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.

Table 5 Road Traffic Noise Assessment Criteria			
Road category	Type of project/development	Assessment Criteria – dBA	
		Day (7am to 10pm)	Night (10pm to 7am)
Freeways/arterial/ sub-arterial Roads	Existing residences affected by additional traffic on freeways/arterial/sub-arterial roads generated by land use developments	60dB LAeq(15hr)	55dB LAeq(9hr)
Local roads	Existing residences affected by additional traffic on local roads generated by land use developments	55dB LAeq(1hr)	50dB LAeq(1hr)
School Classrooms	Proposed road projects and traffic generating developments	40dB LAeq(1hr) (internal) when in use	N/A
Hospital Wards		35dB LAeq(1hr) (internal)	35dB LAeq(1hr) (internal)
Places of Worship		40dB LAeq(1hr) (internal)	40dB LAeq(1hr) (internal)
Open Space (active use)		60dB LAeq(1hr)	N/A
Open Space (passive use)		55dB LAeq(1hr)	N/A
Isolated Residences in commercial or industrial zones		Refer to AS2107 for internal levels	
Mixed Use development		Each component to be considered separately	
Childcare Facilities		Sleeping rooms 35dB LAeq(1hr) (internal) Indoor play areas 40dB LAeq(1hr) (internal) Outdoor play areas 55dB LAeq(1hr) (external)	

4 Noise Assessment Criteria

Background noise monitoring has not been conducted for this project and hence, the minimum assumed RBLs of 35dBA for the daytime period and 30dBA for the evening and night-time periods have been adopted in accordance with NPI methodologies.

4.1 Construction Noise

The relevant NMLs for standard construction hours are presented in **Table 6**.

Table 6 Construction Noise Management Levels

Receiver Type	Assessment Period[1]	Adopted RBL dB L_{A90}	NML dB $L_{Aeq(15min)}$
Urban Residential	Standard Hours	35	45 (RBL+10dBA)
Suburban Residential	Standard Hours	35	45 (RBL+10dBA)
Rural Residential	Standard Hours	35	45 (RBL+10dBA)
Educational	When in use	N/A	45 (internal) 55 (external)[2]
Hospital Wards	When in use	N/A	45 (internal) 55 (external)[2]
Place of Worship	When in use	N/A	45 (internal) 55 (external)[2]
Active Recreation Areas	When in use	N/A	65 (external)
Passive Recreation Areas	When in use	N/A	60 (external)
Industrial Premises	When in use	N/A	75 (external)
Community Centres	When in use	N/A	Refer to AS2107 for maximum internal levels and specific use
Commercial Premises	When in use	N/A	70 (external)

Note 1: See Table 2 for Standard Recommended Hours for Construction.

Note 2: External level based on 10dB with windows open for adequate ventilation (ICNG).

4.2 Construction Vibration

Department of Environment and Conservation (DEC) 2006, *Assessing Vibration: A Technical Guideline* (the guideline) provides guidance on determining effects of vibration on buildings occupants. The guideline does not address vibration induced damage to structures, blast induced vibration effects or structure borne noise effects.

The Construction Noise & Vibration Strategy (CNVS, V4.2 Transport for NSW, 2020) sets out safe working distances to achieve the human response criteria for vibration. The key vibration generating source proposed to be used is small pile driver used to drive the piles into the ground on which the PV mounting structures are mounted and vibratory roller for road construction. The CNVS sets a safe working distance of 50m for a hammer piling rig to achieve the residential human response criteria for continuous vibration. Therefore, as the nearest non-project related receivers to the project are greater than 50m from the project boundary, human exposure to vibration is anticipated to be minimal. Furthermore, where the human response criteria are satisfied, the structural or cosmetic criteria for sensitive receivers will be achieved. Therefore, vibration impacts are not considered to be a significant issue and have not been considered further in this assessment.

4.3 Operational Noise

4.3.1 Project Intrusiveness Noise Levels

The PINLs are presented in **Table 7** and have been determined based on the RBLs +5dBA.

Table 7 Project Intrusiveness Noise Levels

Receiver	Period[1]	Adopted RBL dB $L_{A90(period)}$	PINL dB $L_{Aeq(15min)}$
All Residential Receivers	Day	35	40
	Evening	30	35
	Night	30	35

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

4.3.2 Project Amenity Noise Levels

The PANL for residential receivers and other receiver types (ie non-residential) potentially affected by the project are presented in **Table 8.**

Table 8 Amenity Noise Levels and Project Amenity Noise Levels

Receiver Type	Noise Amenity Area	Assessment Period[1]	Recommended ANL dB $LA_{eq(period)}$	ANL dB $LA_{eq(period)}$[2]	PANL dB $LA_{eq(15min)}$[3]
Residential	Rural	Day	50	45	48
		Evening	45	40	43
		Night	40	35	38

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 2: Project Amenity Noise Level equals the Amenity Noise Level as there is no other industry in the area.

Note 3: Includes a +3dB adjustment to the amenity period level to convert to a 15-minute assessment period as per Section 2.2 of the NPI.

4.3.3 Project Noise Trigger Levels

The PNTLs are the lower of either the PINLs or the PANLs. **Table 9** presents the derivation of the PNTLs in accordance with the methodologies outlined in the NPI. For this assessment the night-time PNTL of 35dB $LA_{eq(15min)}$ is the limiting criteria for residential receivers.

Table 9 Project Noise Trigger Levels

Catchment	Assessment Period[1]	PINL dB $LA_{eq(15min)}$	PANL dB $LA_{eq(15min)}$	PNTL dB $LA_{eq(15min)}$
Residential Receivers (Rural)	Day	40	48	40
	Evening	35	43	35
	Night	35	38	35

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

4.4 Maximum Noise Assessment Trigger Levels

The maximum noise trigger levels shown in **Table 10** are based on night-time RBLs and trigger levels as per Section 2.5 of the NPI. The trigger levels will be applied to transient noise events that have the potential to cause sleep disturbance.

Table 10 Maximum Noise Trigger Level

Residential Receivers	
52dB L_{Amax} or RBL + 15dB	
Trigger	52
RBL 30+15dB	45
Highest	**52**

Note: Monday to Saturday; Night 10pm to 7am. On Sundays and Public Holidays Night 10pm to 8am.

Note: NPI identifies that maximum of the two values is to be adopted which is shown in bold font.

4.5 Road Traffic Noise

It is acknowledged that the functional classification of roads connecting to arterial roads such as major highways are 'Collector Roads' in accordance with the Roads and Maritime Noise Criteria Guideline (April 2015). However, the Road Noise Policy does not provide separate noise criteria for Collector Roads but applies the sub-arterial category to all roads that are not classified as local roads and hence, the 'sub arterial road' category has been adopted for Collector Roads. The relevant road traffic noise criteria are presented in **Table 11** for residential receivers.

Table 11 Road Traffic Noise Assessment Criteria

Road category	Type of project/development	Assessment Criteria – dBA	
		Day (7am to 10pm)	Night (10pm to 7am)
Freeways/arterial/ sub-arterial Roads	Existing residences affected by additional traffic on freeways/arterial/sub-arterial roads generated by land use developments	60dB $L_{Aeq(15hr)}$	55dB $L_{Aeq(9hr)}$
Local roads	Existing residences affected by additional traffic on local roads generated by land use developments	55dB $L_{Aeq(1hr)}$	50dB $L_{Aeq(1hr)}$

5 Modelling Methodology

A computer model using DGMR (iNoise, Version 2024) noise modelling software was used to quantify noise emissions from the project. iNoise is an intuitive and quality assured software for industrial noise calculations in the environment. 3D noise modelling is considered industry best practice for assessing noise emissions from projects.

The model incorporated a three-dimensional digital terrain map giving all relevant topographic information used in the modelling process. Additionally, the model uses relevant noise source data, ground type, attenuation from barrier or buildings and atmospheric information to predict noise levels at the nearest potentially affected receivers. Where relevant, modifying factors in accordance with Fact Sheet C of the NPI have been applied to calculations.

The model calculation method used to predict noise levels was in accordance with ISO 9613-1 'Acoustics - Attenuation of sound during propagation outdoors. Part 1: Calculation of the absorption of sound by the atmosphere' and ISO 9613-2 'Acoustics - Attenuation of sound during propagation outdoors. Part 2: General method of calculation' including corrections for meteorological conditions using CONCAWE[1]. The ISO 9613 standard from 1996 is the most used noise prediction method worldwide. Many countries refer to ISO 9613 in their noise legislation. However, the ISO 9613 standard does not contain guidelines for quality assured software implementation, which leads to differences between applications in calculated results. In 2015 this changed with the release of ISO/TR 17534-3. This quality standard gives clear recommendations for interpreting the ISO 9613 method. iNoise fully supports these recommendations. The models and results for the 19 test cases are included in the software.

5.1 Construction Assessment Methodology

Construction activities are proposed to be progressive (trenching, piling and assembly) and will occur at several locations simultaneously. Noise emissions were modelled for the following three (3) scenarios:

- earthworks involving trenching for cabling;
- piling of panel supports; and
- assembly of the panels.

[1] Report no. 4/18, "the propagation of noise from petroleum and petrochemical complexes to neighbouring communities", Prepared by C.J. Manning, M.Sc., M.I.O.A. Acoustic Technology Limited (Ref.AT 931), CONCAWE, Den Haag May 1981

It is envisaged that all three (3) construction scenarios have the potential to occur simultaneously at up to two key locations across the site. Noise emission data and assumptions used in this assessment are summarised in **Table 12**. All significant noise generating construction activities will be limited to standard construction hours. Where low intensity construction activities are required to be undertaken outside standard construction hours, such as cabling, minor assembly, use of hand tools etc, they will be managed such that they are not audible at any residential receivers.

Table 12 Construction Equipment Sound Power Levels, Lw dBA re 10^{-12} W

Noise Source/Item	Utilisation %	Quantity	Lw/Item	Total Lw
Trenching & Earthworks (per team)				
Backhoe	80	1	104	103
Light vehicle	25	2	76	73
Total – Trenching & Earthworks				**103**
Piling (per team)				
Impact driver	90	1	101	114
Tele-handler	50	1	106	103
Total – Piling				**114**
Assembly (per team)				
Tele-handler	50	1	106	103
Hand tools/Power tools	50	1	102	99
Total – Assembly				**104**

5.2 Operational Assessment Methodology

For this assessment, noise predictions were modelled for a worst-case operational scenario over a 15-minute period based on all equipment operating simultaneously at the maximum sound power levels referenced in **Table 13.** Noise emission data used in modelling for this assessment were obtained from manufacturers data or the MAC database. Where relevant, modifying factors in accordance with Section 3.3 and Fact Sheet C of the NPI have been applied to calculations.

Table 13 Operational Equipment Sound Power Levels, Lw dBA (re 10^{-12} Watts)

Noise Source/Item per site	Activity	Quantity	Lw/Item	Total Lw
2.5MW Inverter[1]	Constant (100%)	2	75	78
BESS & HVAC System[1]	Constant (100%)	4	83	83
PV Panel Tracking Motor[2]	All tracking motors in operation 1 minute per 15-minute period	114	50	59
PV Panel Tracking Motor[2]	All tracking motors resetting 2 minutes per 15-minute period	114	50	62

Note 1: Modifying factor penalty of +5dB added for low frequency (<160Hz) and/or tonality.

5.2.1 Meteorological Analysis

Noise emissions can be influenced by prevailing weather conditions. Light stable winds (<3m/s) and temperature inversions have the potential to increase noise at a receiver.

Fact Sheet D of the NPI provides two options when considering meteorological effects:

- adopt the noise enhancing conditions for all assessment periods without an assessment of how often the conditions occur – a conservative approach that considers a source to receiver winds for all receivers and F class temperature inversions with wind speeds up to 2m/s at night; or
- determine the significance of noise enhancing conditions. This requires assessing the significance of temperature inversions (F and G Class stability categories) for the night-time period and the significance of light winds up to 3m/s for all assessment periods during stability categories other than E, F or G.

Standard meteorological conditions and noise-enhancing meteorological conditions as defined in Table D1 of the NPI are reproduced in **Table 14**.

Table 14 Standard and Noise-Enhancing Meteorological Conditions

Meteorological Conditions	Meteorological Parameters
Standard Meteorological Conditions	Day/evening/night: stability categories A–D with wind speed up to 0.5m/s at 10m AGL.
Noise Enhancing Meteorological Conditions	Daytime/evening: stability categories A–D with light winds (up to 3 m/s at 10m AGL). Night-time: stability categories A–D with light winds (up to 3m/s at 10m AGL) and/or stability category F with winds up to 2m/s at 10 m AGL.

A detailed analysis of the significance of noise enhancing conditions has not been undertaken and hence, the (worst case) NPI noise enhancing meteorological conditions have been applied to the noise modelling assessment and are presented in **Table 15**.

Table 15 Modelled Meteorological Parameters

Assessment Condition[1]	Temperature	Wind Speed[2]/ Direction	Relative Humidity	Stability Class[2]
Day	20°C	3m/s all directions	50%	D
Evening	10°C	3m/s all directions	50%	D
Night	10°C	2m/s all directions	50%	F

Note 1: Day 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening 6pm to 10pm; Night - the remaining periods.

Note 2: Implemented using CONCAWE meteorological corrections.

5.3 Road Traffic Noise Assessment Methodology

Due to the low traffic volume generated by the project over a typical day during the construction phase, road traffic noise calculation methods such as Calculation of Road Traffic Noise (CRTN - ISBN 0 11 550847 3) by Department of Transport (UK) 1988 or Traffic Noise Model (TNM) by the United States Department of Transport, Federal Highway Administration are not considered appropriate as they are primarily intended to calculate noise emissions from motorways and highways. Whilst each method has a low volume correction, the project traffic volume is out of the scope of these methods. Therefore, road traffic noise has been calculated using the Traffic Noise Model (TNM) by the United States Department of Transport, Federal Highway Administration Low Volume Calculation Tool at an offset distance of 15m for receivers along the transport route using the parameters presented in **Table 16.**

Table 16 Road Traffic Noise Modelling Parameters

Noise Source/Item	Movements/hr	Speed, km/h	Source Height, m[1]
Heavy Vehicle (rigid, semi-trailer or B-double)	8	50	1.5
Light Vehicle	20	50	0.75

Note 1: Height above ground level.

6 Noise Assessment Results

6.1 Construction Noise Assessment

Noise levels were predicted to all identified receivers at 1.5m above ground level for typical construction activities for standard construction hours. **Table 17** summarises the predicted noise level range and maximum predicted noise level for each of the construction scenarios (trenching, piling and assembly) at identified receivers.

Table 17 Predicted Construction Noise Levels

Receiver ID	Predicted Noise Level Range dB $LA_{eq(15min)}$[1]	Highest Predicted Noise Level dB $LA_{eq(15min)}$	NML Standard Hours dB $LA_{eq(15min)}$	Compliance Achieved
R01	33 - 43	43	45	✓
R02	<30 - 34	34	45	✓
R03	34 - 44	44	45	✓
R04	<30- 35	35	45	✓
R05	<30- 34	34	45	✓
R06	<30- 38	38	45	✓
R07	<30- 32	32	45	✓
R08a	<30	<30	45	✓
R08b	<30	<30	45	✓
R09	<30	<30	45	✓
R10	<30	<30	45	✓
R11	<30- 32	32	45	✓
R12	<30	<30	45	✓

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

Noise levels are expected to satisfy the construction NMLs at all identified receivers. Hence, noise impacts from construction are expected to be negligible.

6.2 Operational Noise Assessment

Noise levels were predicted at each assessed receiver at a height of 1.5m above ground level during worst case noise enhancing meteorological conditions during tracker reset. Table 18 summarises the predicted operational noise levels which are demonstrated to comply with the PNTLs at all identified receivers. Hence, noise impacts from operation of the project are expected to be negligible.

Table 18 Predicted Operational Noise Levels – During Tracker Reset

Receiver ID	Predicted Noise Level dB $LA_{eq(15min)}$ Normal Operations Day/ Eve/ Night	Limiting Night PNTL dB $LA_{eq(15min)}$[1]	Compliance Achieved
R01	<30 / <30 / <30	35	✓
R02	<30 / <30 / <30	35	✓
R03	<30 / <30 / <30	35	✓
R04	<30 / <30 / <30	35	✓
R05	<30 / <30 / <30	35	✓
R06	<30 / <30 / <30	35	✓
R07	<30 / <30 / <30	35	✓
R08a	<30 / <30 / <30	35	✓
R08b	<30 / <30 / <30	35	✓
R09	<30 / <30 / <30	35	✓
R10	<30 / <30 / <30	35	✓
R11	<30 / <30 / <30	35	✓
R12	<30 / <30 / <30	35	✓

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

6.3 Maximum Noise Level Assessment

A detailed maximum noise level assessment is not required as predicted noise levels for night-time operations do not exceed the maximum noise trigger levels of 40dB $LA_{eq(15min)}$ and there are no operational noise sources that generate significant maximum noise events.

6.4 Road Traffic Noise Assessment

During construction, traffic generated by the project include employee/subcontractor and delivery vehicles. The traffic volume over a typical day for standard construction hours is expected to be up to a maximum of four (4) heavy vehicles (semi-trailers or B-doubles) per hour and up to 40 light vehicles for worker transport per day.

The transport route for all vehicles to access the project site would be via Cooma Road and Wallaces Gap Road to the project site. Therefore, it has been assumed that the closest residential receivers along the transport route are 15m from the road to represent a potential worst case assessment scenario.

Predicted noise levels from project related construction traffic has been calculated using the methodology described in **Section 5.3** and the parameters presented in **Table 16**. The results presented in **Table 19** show the calculated noise levels as $L_{Aeq(1hr)}$ for local roads and $L_{Aeq(15hr)}$ for arterial/sub arterial roads to align with RNP categories and assessment periods.

Table 19 Predicted Construction Road Traffic Noise Levels

Road Type/Name	Offset Distance to Receiver	Predicted Noise Level	RTN Criteria	Compliance Achieved
Arterial, Sub Arterial and Collector Roads	15m	46dB $L_{Aeq(15hr)}$	60dB $L_{Aeq(15hr)}$	✓
Local Roads	15m	49dB $L_{Aeq(1hr)}$	55dB $L_{Aeq(1hr)}$	✓

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

Existing road traffic flows on surrounding arterial and sub-arterial road are not available. The project proposes to add up to additional 40 light vehicles per day and 45 heavy vehicles over a three (3) month construction period, which would be considered a negligible increase to existing traffic flows resulting in a negligible increase in road traffic noise for these road classifications.

Therefore, it is concluded that project related road traffic noise levels would satisfy the relevant RNP criteria at any residential receiver along the proposed transport routes and not increase existing noise levels by more than 2dB.

This page has been intentionally left blank

7 Discussion and Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Assessment for a proposed 5 Megawatt (MW) Solar Farm (Majors Creek 1A) and Battery Energy Storage System near Majors Creek, NSW.

The results of the Noise Assessment demonstrate that construction noise levels will satisfy applicable construction noise management levels at all receivers.

The results of the Noise Assessment demonstrate that emissions from the project would satisfy the operational Project Noise Trigger Levels at all identified receivers.

Furthermore, sleep disturbance is not anticipated, as there are no operational noise sources that generate significant maximum noise events and noise emissions from the project are predicted to satisfy the EPA maximum noise level criteria.

Road traffic noise emissions associated with the project construction are anticipated to satisfy the relevant Road Noise Policy criteria at all receivers along the proposed transportation route.

A qualitative assessment of potential vibration impacts has been completed. Due to the nature of the works proposed and distances to potential vibration sensitive receivers, vibration impacts from the project would be negligible.

Based on the Noise Assessment results, the project satisfies the relevant requirements of the Interim Construction Noise Guideline, Noise Policy for Industry and the Road Noise Policy, resulting in negligible noise impacts.

This page has been intentionally left blank

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

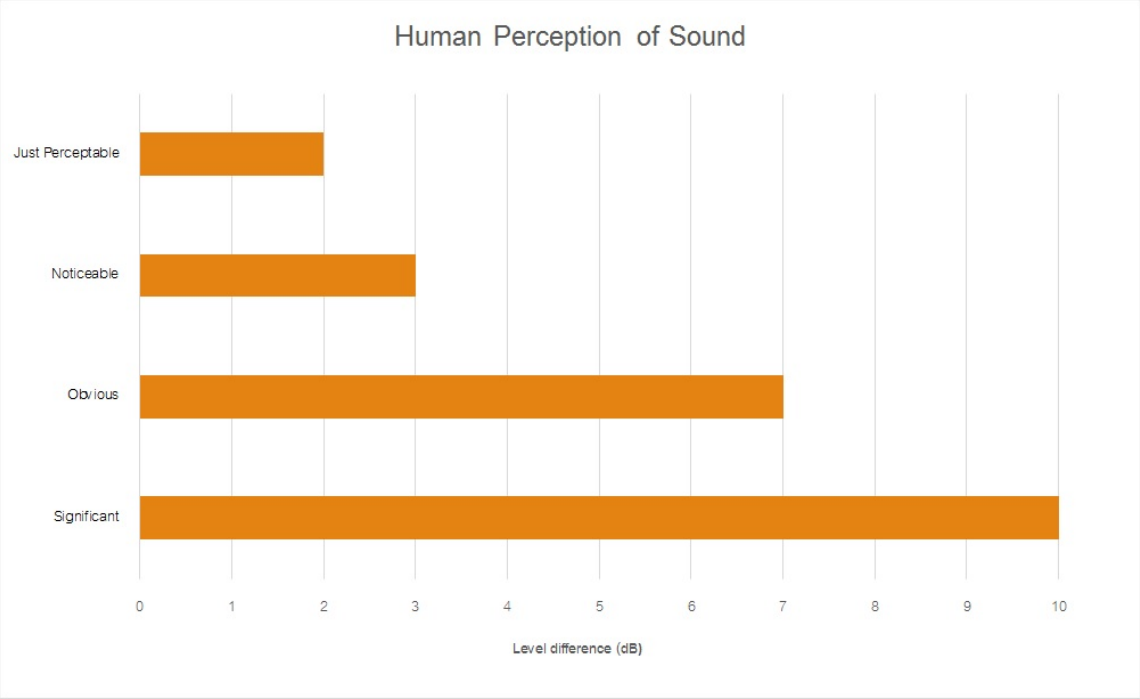
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for 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.
LAmax	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.log10 (W/Wo). 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

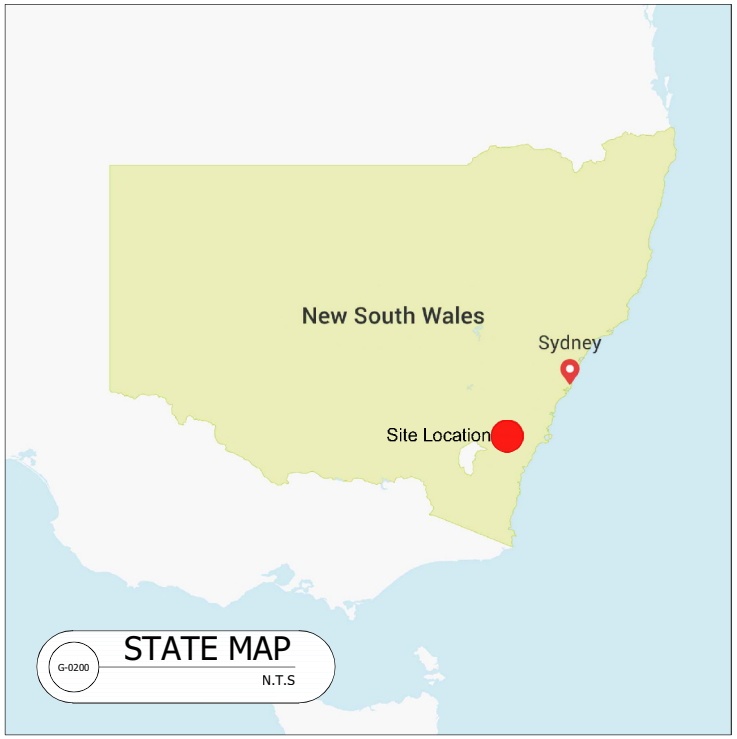
Source	Typical Sound Pressure Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom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

Figure A1 – Human Perception of Sound

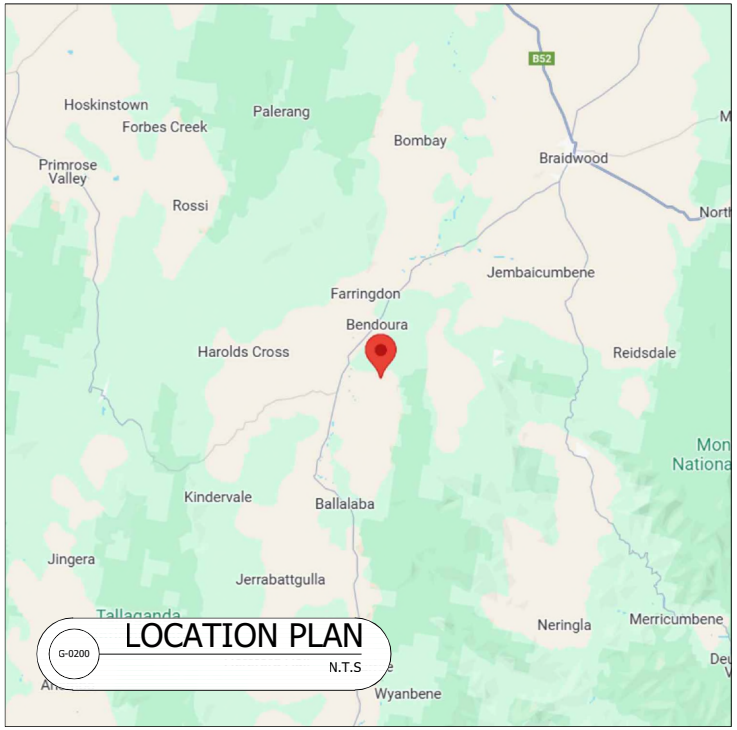


This page has been intentionally left blank

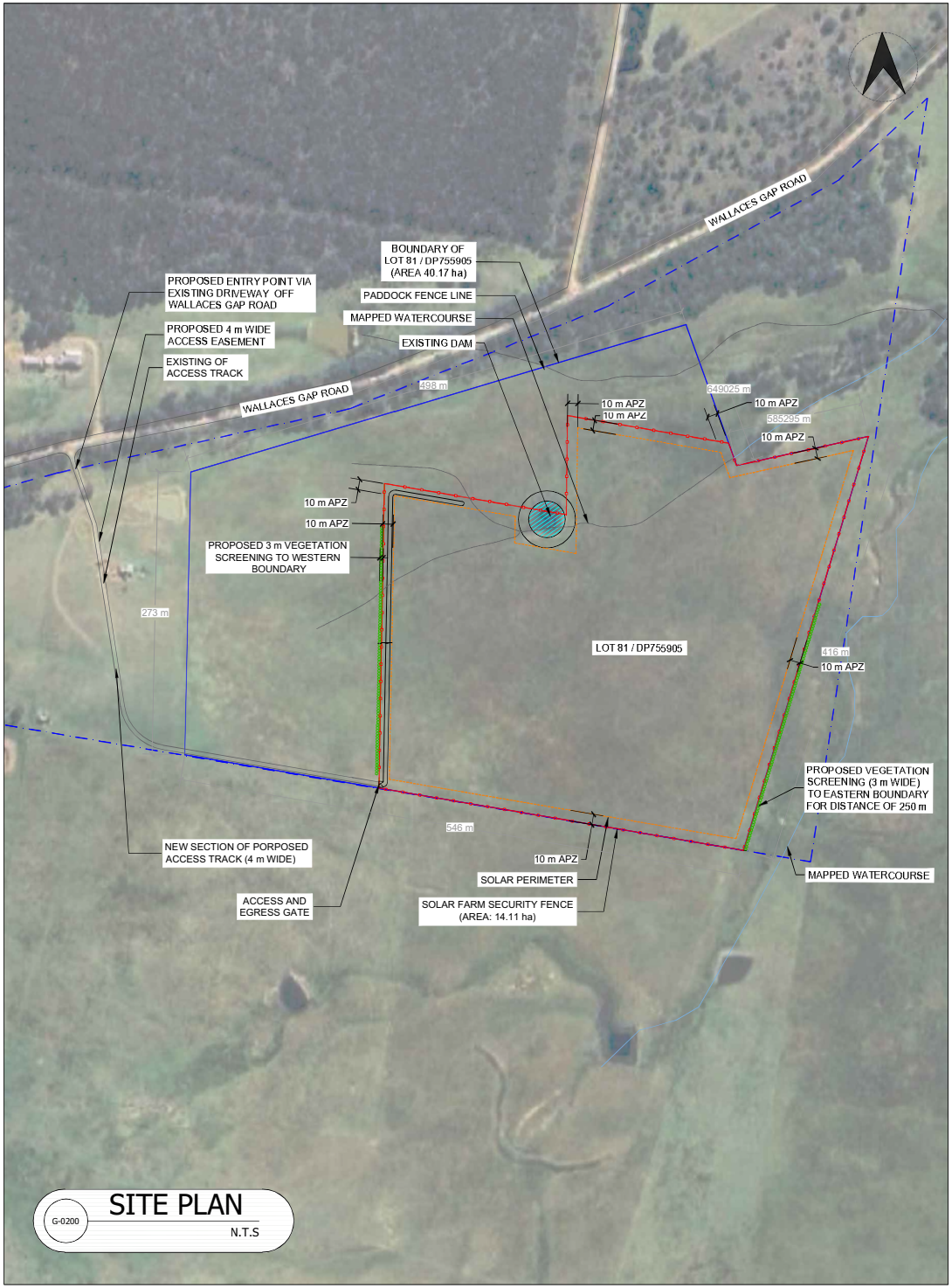
Appendix B – Project Layout



G-0200 **STATE MAP** N.T.S



G-0200 **LOCATION PLAN** N.T.S



G-0200 **SITE PLAN** N.T.S

edp Renewables

EDPR Australia Pty Ltd
GPO Box 1429, Canberra ACT 2601
www.edp.com | ABN: 38 633 420 309

DRG TITLE

SITE PLAN

STATUS

DEVELOPMENT APPLICATION

REVISION REGISTER

NO.	DATE	DESCRIPTION	BY
01	15/05/2025	FINALIZE GA PLAN	LC
02	21/05/2025	UPDATE GA PLAN	LC
03	04/06/2025	UPDATE GA PLAN	LC
04	07/08/2025	UPDATE GA PLAN	LC
05	08/08/2025	DA DRAWING PACK	LC
06	24/10/2025	DA DRAWING PACK	LC
07	03/02/2026	DA DRAWING PACK	LC
08	12/02/2026	DA DRAWING PACK	LC
09	17/02/2026	DA DRAWING PACK	LC

PROJECT

MAJORS CREEK 1A

SITE ADDRESS

873 WALLACES GAP ROAD, BALLALABA NSW 2622

NOTES

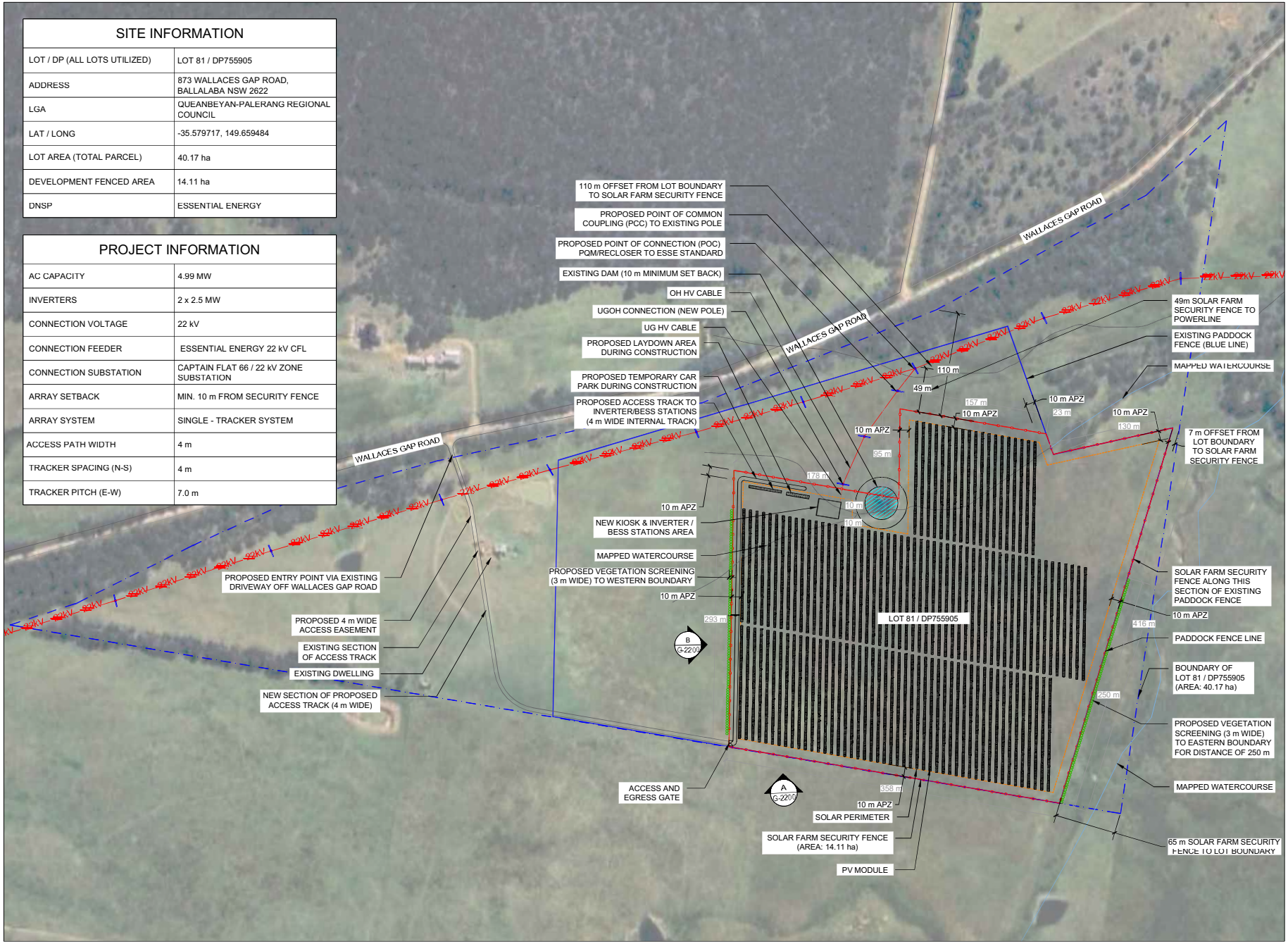
CLIENT

EDPR AUSTRALIA

DSN: LC	DWN: LC
CHKD: JJ/AN	APPR: JJ
ORIG DATE: 15/05/2025	SCALE: NTS
REV DATE: 17/02/2026	
SHEET SIZE: A3	PAGE NO.: 2 OF 14
DRG NO.: G-0200	REV NO.: 09

SITE INFORMATION	
LOT / DP (ALL LOTS UTILIZED)	LOT 81 / DP755905
ADDRESS	873 WALLACES GAP ROAD, BALLALABA NSW 2622
LGA	QUEANBEYAN-PALERANG REGIONAL COUNCIL
LAT / LONG	-35.579717, 149.659484
LOT AREA (TOTAL PARCEL)	40.17 ha
DEVELOPMENT FENCED AREA	14.11 ha
DNSP	ESSENTIAL ENERGY

PROJECT INFORMATION	
AC CAPACITY	4.99 MW
INVERTERS	2 x 2.5 MW
CONNECTION VOLTAGE	22 kV
CONNECTION FEEDER	ESSENTIAL ENERGY 22 kV CFL
CONNECTION SUBSTATION	CAPTAIN FLAT 66 / 22 kV ZONE SUBSTATION
ARRAY SETBACK	MIN. 10 m FROM SECURITY FENCE
ARRAY SYSTEM	SINGLE - TRACKER SYSTEM
ACCESS PATH WIDTH	4 m
TRACKER SPACING (N-S)	4 m
TRACKER PITCH (E-W)	7.0 m



G-0300

GENERAL ARRANGEMENT PLAN

EDPR Australia Pty Ltd
GPO Box 1429, Canberra ACT 2601
www.edp.com | ABN: 38 633 420 309

DRG TITLE
GENERAL ARRANGEMENT PLAN

STATUS
DEVELOPMENT APPLICATION

REVISION REGISTER

NO.	DATE	DESCRIPTION	BY
01	15/05/2025	FINALIZE GA PLAN	LC
02	21/05/2025	UPDATE GA PLAN	LC
03	04/06/2025	UPDATE GA PLAN	LC
04	07/08/2025	UPDATE GA PLAN	LC
05	08/08/2025	DA DRAWING PACK	LC
06	24/10/2026	DA DRAWING PACK	LC
07	03/02/2026	DA DRAWING PACK	LC
08	12/02/2026	DA DRAWING PACK	LC

PROJECT
MAJORS CREEK 1A

SITE ADDRESS
873 WALLACES GAP ROAD, BALLALABA NSW 2622

NOTES

CLIENT
EDPR AUSTRALIA

DSN: LC	DWN: LC
CHKD: JJ/AN	APPR: JJ
ORIG DATE: 15/05/2025	SCALE 1:4000
REV DATE: 12/02/2026	
SHEET SIZE A3	PAGE NO. 3 OF14
DRG NO. G-0300	REV NO. 08

Muller Acoustic Consulting Pty Ltd
PO Box 678, Kotara NSW 2289
ABN: 36 602 225 132
Ph: +61 2 4920 1833
www.mulleracoustic.com

MAC
Muller Acoustic Consulting