APPENDIX

F

Technical Assessments

Appendix F.4

Addendum noise and vibration impact assessment

EMM
creating opportunities

Birriwa Solar and Battery Project Amendment Report

Noise and Vibration Impact Assessment Addendum

Prepared for ACEN Australia Pty Ltd

August 2023

Birriwa Solar and Battery Project Amendment Report

Noise and Vibration Impact Assessment Addendum

ACEN Australia Pty Ltd

J210553 Birriwa Solar and Battery Project - Amendment Report - NVIA Addendum

August 2023

Version	Date	Prepared by	Reviewed by	Comments
V3	30 August 2023	Alex Dundon	Daniel Weston Nicole Armit Rachel Dodd	Final for submission to DPE

Approved by

Daniel Weston
Position
30 August 2023

Level 3 175 Scott Street
Newcastle NSW 2300

Executive Summary

ES1 Introduction

ACEN Australia Pty Ltd (ACEN) proposes to develop the Birriwa Solar and Battery Project, a large-scale solar photovoltaic (PV) electricity generation facility along with battery storage and associated infrastructure (the solar and battery energy storage system (BESS) project). The solar component of the project will have an indicative capacity of around 600 megawatts (MW) and will include a centralised BESS of up to 600 MW for a 2 hour duration (1,200 MWh). The BESS will enable energy from solar to be stored and then released during times of demand, as well as providing grid stability services and back-up capacity to ensure security of supply.

The project is in the localities of Birriwa and Merotherie, approximately 15 kilometres (km) southwest of the township of Dunedoo, New South Wales (NSW) (refer to Figure 1.1). The project is within the Central-West Orana (CWO) Renewable Energy Zone (REZ) and is within Mid-Western Regional and Warrumbungle Shire local government areas (LGA).

The Project is State significant development (SSD) pursuant to Schedule 1, Section 20 (electricity generating works) of State Environmental Planning Policy (Planning Systems) 2021. Project approval is sought under Division 4.7 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The development application and environmental impact statement (EIS) (application number SSD-29508870) were submitted to the NSW Department of Planning and Environment (DPE) and publicly exhibited from 14 October 2022 to 10 November 2022.

Following the public exhibition of the EIS, 92 submissions were received from the public, councils, and special interest groups. In addition, 14 government agencies provided advice on the project. A submissions report (EMM 2023a) has been prepared to respond to matters raised in these submissions and agency advice, as well as an amendment report (EMM 2023b). This noise and vibration assessment addendum is appended to the amendment report (Appendix F.4 of the amendment report) and should be read in conjunction with the amendment report.

ES2 Proposed amendments

In response to matters raised in submissions and outcomes of ongoing engagement with the local community, government agencies, project landholders, and other stakeholders, ACEN has made amendments to the project, as follows:

1. The addition of a temporary accommodation facility, on an adjacent property south-east of the original project study area presented in the EIS (refer to Figure 1.2) of the amendment report), to provide temporary accommodation for up to 500 construction staff during the construction phase of the project.

2. A refinement to the development footprint associated with the solar component of the project, to include the south-eastern corner (approximately 5 ha). This area was conservatively mapped as derived native grassland (DNG) of plant community type (PCT) 80 (and therefore a threatened ecological community) and previously excluded from the EIS and BDAR. Subsequently, this area has been surveyed by EMM ecologists since submission of the Environmental Impact Statement (EIS) and Biodiversity Development Assessment Report (BDAR), and is confirmed as low condition DNG of PCT 479 (rather than DNG of PCT 80), and therefore does not need to be avoided on the basis of ecological constraints.

The temporary accommodation facility will be suitable to accommodate up to 500 people (construction workforce). The accommodation facility will have the potential to expand, enabling capacity for up to 1,000 people subject to future approvals, to accommodate a workforce from future ACEN developments within the CWO REZ, if deemed required and subject to future accommodation needs.

This noise and vibration impact assessment report has been prepared to describe potential noise and vibration impacts of the proposed accommodation facility.

ES3 Existing conditions

The area around the proposed accommodation facility is consistent with the existing environment assessed within the noise and vibration impact assessment (NVIA) prepared for the project as part of the EIS. Surrounding land uses are predominantly rural and agricultural. Ambient noise levels would be controlled by natural elements and limited human activity including traffic and agricultural activities. There is one associated receiver (A4) at a distance of approximately 940 m from the accommodation facility development footprint. This associated residence has agreed to noise impacts under a landholder agreement with ACEN. The nearest non-associated residence (R37) is approximately 1.8 km from the accommodation facility development footprint. The non-associated residence (R37) is approximately 2.5 km from the accommodation facility infrastructure area and the associated residence (A4) is approximately 2.1 km from the accommodation facility infrastructure area.

Consistent with the NVIA prepared for the EIS, the minimum background noise thresholds of the *Noise Policy for Industry* (EPA 2017) have been adopted on the basis that land use is largely rural with limited traffic and industry.

ES4 Assessment of impacts

The objective of this NVIA addendum is to determine how the proposed amendment will impact on the existing acoustic amenity.

The amendments have been considered in two parts:

- noise and vibration impacts from construction activities
- noise and vibration impacts from operation of the camp during construction of the wider Birriwa project.

Based on distances of sensitive receivers from the proposed accommodation facility, noise and vibration impacts for both scenarios are predicted to comply with all relevant noise and vibration criteria, including the *Noise Policy for Industry (EPA 2017)* and the *Interim Construction Noise Guidelines*.

TABLE OF CONTENTS

Tables

Figures

1 Introduction

1.1 Background

ACEN Australia Pty Ltd (ACEN) proposes to develop the Birriwa Solar and Battery Project; a large scale solar photovoltaic (PV) electricity generation facility along with battery storage and associated infrastructure (the project). The solar component of the project will have an indicative capacity of around 600 megawatts (MW) and will include a centralised battery energy storage system (BESS) of up to 600 MW for 2 hour duration.

The project is in the localities of Birriwa and Merotherie, approximately 15 kilometres (km) southwest of the township of Dunedoo, New South Wales (NSW) (refer to Figure 1.1). The project is within the Central-West Orana (CWO) Renewable Energy Zone (REZ) and is within Mid-Western Regional and Warrumbungle Shire local government areas (LGA).

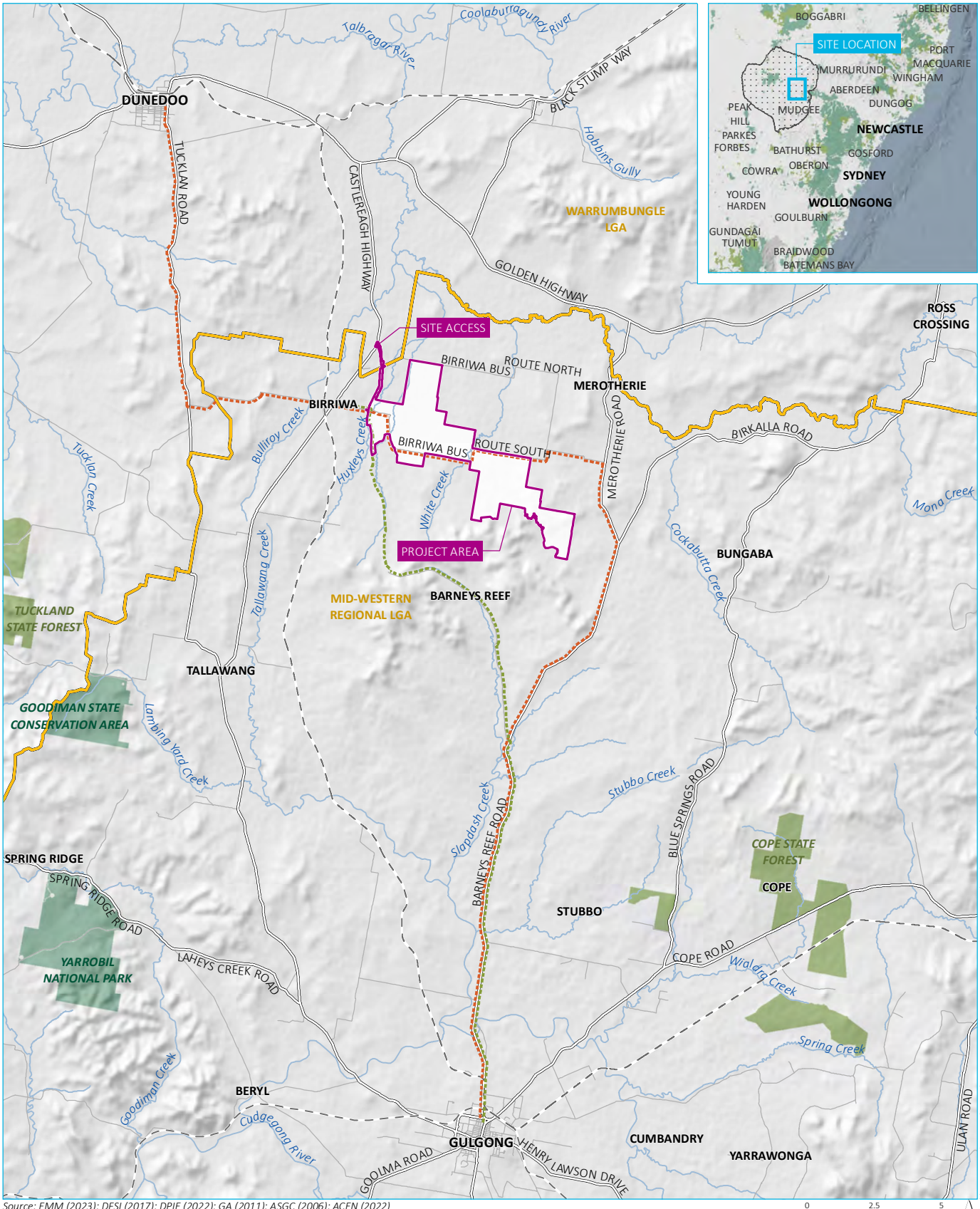
A Noise and Vibration Impact Assessment (NVIA) was previously completed for construction and operation of the project as part of the Environmental Impact Statement (EIS) (EMM 2022b). This noise and vibration impact assessment addendum (ANVIA) has been completed based on the proposed amendments to the EIS (EMM 2022a), being:

- The addition of a temporary accommodation facility for up to 500 construction staff during the construction phase of the project (Figure 1.2).
- A refinement to the development footprint due to reclassification of an area of grassland, which is not anticipated to result in a change in location of acoustically significant sources of noise or vibration.

Of these two amendments, only the construction of the temporary accommodation facility is anticipated to result in a change in noise and vibration impacts from the original EIS assessments.

This ANVIA is an addendum to the Birriwa Solar and Battery Project NVIA and will form part of (Appendix F.4) the Birriwa Solar and Battery Project Amendment Report.

This ANVIA outlines changes to the previous NVIA as a result of these amendments and provides a comprehensive assessment of the amended project's potential noise and vibration impacts.



Source: EMM (2023); DFSI (2017); DPIE (2022); GA (2011); ASGC (2006); ACEN (2022)

0 2.5 5 km

GDA 1994 MGA Zone 55

N

\\emmsvr1\EMM3\2021\210553 - Birriwa Solar and Battery Project\GIS\02_Maps_EIS\EIS002_RegionalLocation_20230809_07.mxd 30/08/2023

KEY

- Project area

Existing environment

- Rail line
- Major road
- Minor road
- Named watercourse
- Local government area
- Central West Orana Renewable Energy Zone (see inset)
- NPWS reserve
- State forest

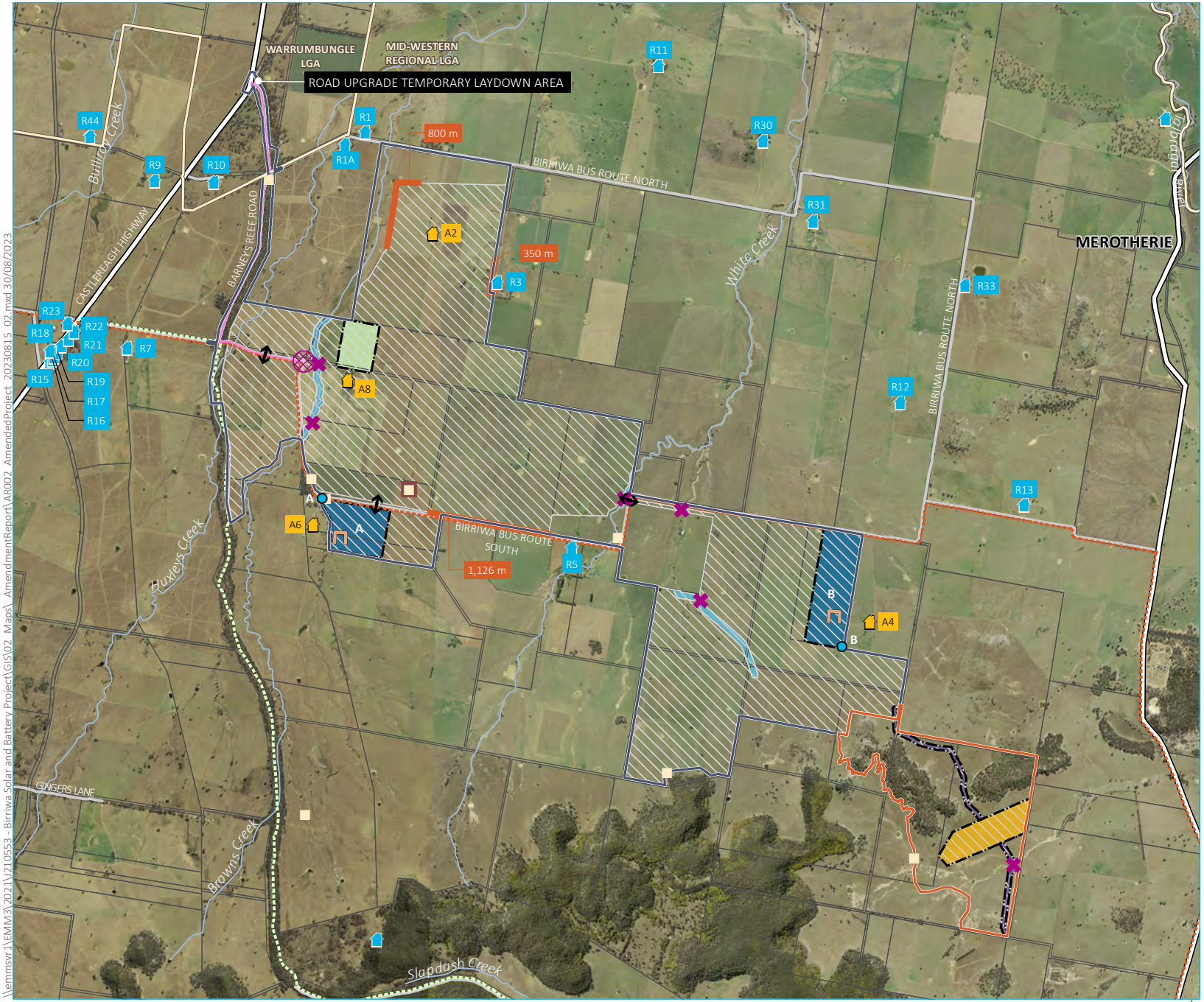
Central West Cycle (CWC) Trail

- CWC main route - Gulgong to Dunedoo
- CWC alternate route - Slap Dash Creek side trail

Regional location

Birriwa Solar and BESS Project
Amendment Report
Noise and Vibration Impact Assessment Addendum
Figure 1.1

EMM creating opportunities



KEY

- Solar and BESS study area
- Accommodation facility study area
- Develoment footprint
- Road upgrade corridor
- Restricted development area
- Potential public road crossing location

Project layout

- Potential creek crossing point (refer to inset below for indicative design)
- Connection point (option A or B)
- Indicative noise wall location
- Landscape screen planting
- Proposed access point to the project
- Proposed operational infrastructure area including substation, operational facility and BESS (option A or B)
- Birriwa accommodation facility
- Access track
- Temporary construction compound

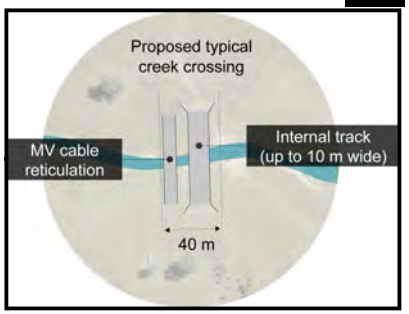
Existing environment

- Dwelling not associated with the project
- Dwelling associated with the project
- Aboriginal heritage site (to be salvaged)
- Aboriginal heritage site (to be avoided)
- Major road
- Minor road
- Named watercourse
- Cadastral boundary
- Local government area boundary

Central West Cycle (CWC) Trail

- CWC main route - Gulgong to Dunedoo
- CWC alternate route - Slap Dash Creek side trail

INSET



Amended project

Source: EMM (2023); DFSI (2017, 2023); GA (2011); ACEN (2023)

0 1 2 km

GDA 1994 MGA Zone 55

N

Birriwa Solar and BESS Project
Amendment Report
Noise and Vibration Impact Assessment Addendum
Figure 1.2

EMM creating opportunities

\\emmsvr1\EMM3\2021\P210553 - Birriwa Solar and Battery Project\GIS\02 Maps\ AmendmentReport\AR002 AmendedProject 20230815 02.mxd 30/08/2023

1.2 Project description

1.2.1 Project overview

i Accommodation facility components

The proposed accommodation facility infrastructure area will comprise of prefabricated demountable units that will be delivered to site. The final design and layout of the accommodation facility will be confirmed during detailed design; however, all components will sit within the development footprint identified for the accommodation facility. It is proposed that the construction workforce will be accommodated in industry standard four-bed units that feature four self-contained bedrooms with ensuite bathroom facilities. Up to 125 four-bed units will be installed, to accommodate 500 people. A small number of two-person executive style modules may also be installed. Other facilities, such as kitchen, dining room, licensed social area, gymnasium, recreation area, medical centre and laundry, will be provide through communal infrastructure.

The accommodation facility will be designed to be scaleable to meet demand as construction of the project progresses. Communal infrastructure that can accommodate up to 500 people, readily upgradable to 1,000 people if required for future projects and subject to future approvals, will be installed alongside 125 four-bed units.

Communal facilities will include:

- kitchen and dining hall
- recreational facilities such as a gymnasium
- BBQ facilities
- licensed social area
- laundry and linen store facilities
- medical centre.

ii Accommodation facility access

No change will occur to the project's primary vehicle access route as described and assessed in the EIS, which will be via the Castlereagh Highway, Barneys Reef Road and Birriwa Bus Route South. The primary vehicle access point on Barneys Reef Road will provide access to the development footprint of the project.

The accommodation facility will be accessed from the primary vehicle access route of the project through to a new internal access track between the solar and BESS project and the accommodation facility.

An internal emergency access track will be constructed south of the accommodation facility infrastructure area, suitable for emergency vehicles. This will enable an alternative emergency access to the public road network, directed towards the south-eastern corner of the property. For further clarity, it is noted that this track is not intended for general access purposes.

1.2.2 Construction

The accommodation facility will be operational for the duration of the project construction phase, which is anticipated to be approximately 28 months, unless approved for use by future ACEN developments in the CWO REZ.

The construction of the accommodation facility will generally include the following overlapping stages (some of which may be undertaken in parallel):

- Establishment of internal access tracks for the project.
- Public road upgrades including public road crossings for the project.
- Site establishment including security fencing, and bushfire asset protection zones for the project.
- Minor earthworks including levelling for the prefabricated demountable units for the accommodation facility.
- Construction of the accommodation facility including: delivery and construction of prefabricated demountable units, and utility infrastructure for a capacity of approximately 500 people. The demountable units may be constructed in stages of up to the 500-person capacity as construction of the project progresses.
- Construction of the solar and BESS project including the construction of temporary ancillary facilities.
- Construction of the solar and BESS project including the PV modules, BESS and substation installation.
- Commissioning and testing of the solar and BESS project.

Proposed construction hours are consistent with those proposed within the previous NVIA. Plant and equipment required for construction will include items listed in Table 1.1.

The majority of plant and equipment will be delivered to site on rigid and semi-trailer low-loaders. Construction materials will be delivered via rigid concrete agitators, truck and dog, and semi-trailer dump trucks.

Table 1.1 Typical construction plant and equipment

Construction phase	Plant type
Site establishment and earthworks	• Front end loaders • Dump trucks • Road trucks • Water trucks • Excavators • Graders • Compactors and rollers • Light vehicles • Scissor lifts • Franna cranes
Construction and commissioning works	• Front end loaders • Dump trucks • Road trucks • Water trucks • Concrete trucks and pumps • Excavators • Graders • Compactors and rollers • Scrapers • Backhoe • Concrete saws and grinders • Light vehicles • Scissor lifts • Franna cranes • Mobile cranes • Generators • Welding equipment • Compressors
Demobilisation	• Road trucks • Water trucks • Concrete saws and grinders • Excavators • Franna cranes • Backhoes • Compactors and rollers

There are no proposed amendments to construction traffic from the previous NVIA.

2 Existing environment

The area around the proposed accommodation facility is consistent with the existing environment assessed within the previous NVIA. Surrounding land uses are predominantly rural and agricultural uses. Ambient noise levels would be controlled by natural elements and limited human activity including traffic and agricultural activities. There is one associated receiver at a distance of approximately 940 m from the accommodation development footprint. This associated residence has agreed to noise impacts under a landholder agreement with ACEN. The nearest non-associated residence is approximately 1.8 km from the accommodation facility development footprint.

Consistent with the previous NVIA, the minimum background noise thresholds of the Noise Protocol for Industry have been adopted on the basis that land use is largely rural with limited traffic and industry. The minimum thresholds in the NPfI are:

- day 35 dB
- evening 30 dB
- night 30 dB.

3 Assessment criteria

There are no changes to the assessment criteria for non-associated residences from the NVIA prepared for the EIS. Table 3.1 provides *Interim Construction Noise Guideline* (ICNG) noise management levels (NML) which apply to residential assessment locations.

Table 3.1 ICNG construction noise management levels for residences

Time of day	NML $L_{Aeq,15min}$	Application
Recommended standard hours: Monday to Friday 7:00 am to 6:00 pm, Saturday 8:00 am to 1:00 pm, 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 $L_{eq(15\text{-}min)}$ 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 works 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: 1. times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences) 2. 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 works 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 5 dBA above the noise-affected level, the proponent should negotiate with the community. • For guidance on negotiating agreements see Section 7.2.2 of the ICNG.

4 Assessment method

Assessment of the proposed amendments is consistent with the approach taken within the previous NVIA. Operational and construction noise levels were predicted using a computer-generated model using SoundPlan 8.2 modelling software with the CONCAWE algorithm. The model was based on the topography and surrounding areas as used for the previous NVIA as part of the EIS.

4.1 Construction noise

The construction noise impact assessment has adopted sound power levels from the EMM noise database and the UK Department of Environment, Food and Rural Affairs (DEFRA) for plant and equipment items used for similar works. Plant and equipment items, sound power levels and quantities adopted in the noise modelling are summarised in Table 4.1.

The assumed list of plant and equipment for each construction scenario that is provided in Table 4.1 are representative of a worst-case period of construction in an active works area. However, due to the practicalities of constructing a project of this nature, the plant and equipment quantities may vary from time -to -time to cater for the requirements of the project's construction. If the actual fleet of plant and equipment required varies significantly from that assumed within Table 4.1, a risk assessment of the proposed works will be undertaken to determine the likelihood of noise impacts on surrounding residential assessment locations.

A Construction Environmental Management Plan (CEMP) is expected to be developed as part of the project and will include the risk assessment protocol and detail the management and mitigation measures to be implemented during construction consistent with best practice requirements.

It is anticipated that noise impacts during decommissioning will be similar in nature to delivery and construction of the accommodation facility. Impacts along access tracks will primarily be in phase 1 only with construction and commissioning works restricted to the accommodation facility infrastructure area in phase 2.

4.2 Construction vibration

Safe working distances for typical items of vibration intensive plant are listed in Table 4.2 (consistent with those shown in the NVIA). The safe working distances are quoted for both "Cosmetic Damage" (refer British Standard BS 7385) and "Human Comfort" (refer British Standard BS 6472-1).

Table 4.1 Construction plant and equipment for typical worst-case scenario

Description	Equipment	Quantity	Item $L_{Aeq,15min}$	Overall $L_{Aeq,15min}$
Phase 1 – Site establishment and earthworks	Dozer	2	110	120
	Grader	1	104	
	Excavator	2	107	
	Roller	1	116	
	Bobcat	2	103	
	Front End Loader	1	107	
	Road truck (deliveries)	2	106	
	Concrete truck	2	106	
	Drilling Rig SM 14	1	106	

Table 4.1 Construction plant and equipment for typical worst-case scenario

Description	Equipment	Quantity	Item $L_{Aeq,15min}$	Overall $L_{Aeq,15min}$
	Light vehicle	4	76	
Phase 2 – Construction and commissioning works	Road truck (deliveries)	2	106	114
	Light vehicle	4	76	
	Crane	2	106	
	Forklift	2	106	
	Hand tools	2	80	

Table 4.2 Recommended safe working distances for vibration intensive plant

Plant Item	Rating/Description	Safe working distance	
		Cosmetic damage (BS 7385)	Human response (BS 6472)
Medium hydraulic hammer	(900 kg – 12 to 18t excavator)	7 m	23 m
Large hydraulic hammer	(1600 kg – 18 to 34t excavator)	22 m	73 m
Vibratory pile driver	Sheet piles	2 m to 20 m	20 m
Pile boring	≤ 800 mm	2 m (nominal)	N/A
Vibratory Rollers	<50 kN (typically 1–2 tonnes)	5 m	15 to 20 m
	<100 kN (typically 2–4 tonnes)	6 m	20 m
	<200 kN (typically 4–6 tonnes)	12 m	40 m
	<300 kN (typically 7–13 tonnes)	15 m	100 m
	>300 kN (typically 13–18 tonnes)	20 m	100 m
	>300 kN (>18 tonnes)	25 m	100 m

4.3 Operational noise and vibration

Operational noise sources within the accommodation facility are primarily related to mechanical and electrical plant for the accommodation facility. There will also be noise due to activity of the workforce returning to the accommodation facility daily.

5 Impact assessment

5.1 Construction noise

In accordance with the procedures used in the previous NVIA, prediction of construction noise levels is provided in Table 5.1 for the potential worst impact (i.e. Phase 1 site establishment and earthworks). The construction noise level presented for each assessment location represents the energy-average noise level over a 15 minute period and assumes all plant operating concurrently.

Construction works will be undertaken during standard hours of 7:00 am to 6:00 pm Monday to Friday and 8:00 am to 6:00 pm Saturday.

Table 5.1 Predicted construction noise levels

Assessment location	Classification	Predicted construction noise level, dB $L_{Aeq,15min}$	Compliant with 45 dB $L_{Aeq,15min}$ daytime standard construction hours?	Compliant with 40 dB $L_{Aeq,15min}$ daytime non-standard construction hours (i.e. Saturday 1:00 pm to 6:00 pm)?
A4	Associated residential	31	Yes	Yes
R5	Residential	<30	Yes	Yes
R12	Residential	<30	Yes	Yes
R13	Residential	<30	Yes	Yes
R34	Residential	<30	Yes	Yes
R37	Residential	<30	Yes	Yes
R39	Residential	<30	Yes	Yes

The results of the modelling demonstrate predictions comply with the construction NML for all assessment locations during daytime standard construction hours and daytime non-standard construction hours.

5.2 Construction vibration

The nearest non-associated residence is located approximately 2.5 km from the accommodation facility infrastructure area is located, and 1.8 km from the accommodation facility development footprint, where the proposed construction activities are likely to produce significant vibration levels. These assessment locations are well beyond the safe working distances for structural damage and human response. Vibration impacts from construction at residential assessment locations are considered unlikely.

5.3 Operational noise and vibration

During operation, noise emissions from the worker accommodation facility will primarily be related to light vehicle movements, site servicing requirements, equipment deliveries, waste collection, and occupant noise while on site. While each of these sources is likely to be minimal, due to the size of the camp, cumulative emissions may be higher. However, it is not expected that noise emissions during operation of the camp will exceed those during construction of the camp, and therefore it is expected that operational noise emissions will achieve NPfI criteria, and noise impacts at nearby associated and non-associated noise sensitive receivers are highly unlikely.

6 Conclusion

This NVIA addendum has been prepared to support an amendment to the Birriwa Solar and Battery Project at Birriwa, NSW. It refers to the previously completed NVIA submitted as part of the EIS for the project.

Noise and vibration impacts from construction and operation of the accommodation facility are predicted to be negligible and satisfy all relevant NSW noise and vibration criteria.

References

EMM 2023a *Birriwa Solar and Battery project: submissions report, August 2023*

EMM 2023b *Birriwa Solar and Battery project: amendment report, August 2023*

EMM 2022a *Birriwa Solar and Battery project Environmental Impact Assessment (EIS)*

EMM 2022b *Birriwa Solar and Battery project noise and vibration impact assessment*

Noise Policy for Industry (EPA 2017)

Assessing Vibration: a technical guideline (EPA 2006)

Interim Construction Noise Guideline (DECC 2009)

BS 6472-1:2008 Guide to evaluation of human exposure to vibration in buildings: Vibration sources other than blasting (British Standards 2008)

BS 7385-2:1993 Evaluation and measurement for vibration in buildings: Guide to damage levels from groundborne vibration (British Standards 1993)

Australia

SYDNEY
Ground floor, 20 Chandos Street
St Leonards NSW 2065
T 02 9493 9500

NEWCASTLE
Level 3, 175 Scott Street
Newcastle NSW 2300
T 02 4907 4800

BRISBANE
Level 1, 87 Wickham Terrace
Spring Hill QLD 4000
T 07 3648 1200

CANBERRA
Level 2, Suite 2.04
15 London Circuit
Canberra City ACT 2601

ADELAIDE
Level 4, 74 Pirie Street
Adelaide SA 5000
T 08 8232 2253

MELBOURNE
188 Normanby Road
Southbank VIC 3006

PERTH
Level 9, Suite 9.02
109 St Georges Terrace
Perth WA 6831

Canada

TORONTO
2345 Yonge Street, Suite 300
Toronto ON M4P 2E5

VANCOUVER
60 W 6th Ave Suite 200
Vancouver BC V5Y 1K1

linkedin.com/company/emm-consulting-pty-limited

emmconsulting.com.au