



NGH

NEOEN

Construction Noise and Vibration Management Plan

Culcairn Solar Farm

January 2024

Project Number: 23-0166



Document verification

Project Title:	Culcairn Solar Farm
Project Number:	23-0166
Project File Name:	Culcairn SF CNVMP Final_v2_20240108NS

Revision	Date	Prepared by	Reviewed by	Approved by
Draft v1.0	17/04/2023	Claire Hobbs	Jane Love	Jane Love
Draft v2.0	23/06/2023	Jane Love	Nicola Smith	Nicola Smith
Final v1.0	6/10/2023	Jane Love	Minor changes	
Final v2.0	8/01/2024	Jane Love	Nicola Smith	Nicola Smith

NGH Pty Ltd is committed to environmentally sustainable practices, including fostering a digital culture and minimising printing. Where printing is unavoidable, NGH prints on 100% recycled paper.



BEGA - ACT & SOUTH EAST NSW

Suite 11, 89-91 Auckland Street
 (PO Box 470) Bega NSW 2550
 T. (02) 6492 8333

BRISBANE

T3, Level 7, 348 Edward Street
 Brisbane QLD 4000
 T. (07) 3129 7633

CANBERRA - NSW SE & ACT

Unit 8, 27 Yallourn Street
 (PO Box 62) Fyshwick ACT 2609
 T. (02) 6280 5053

GOLD COAST

2B 34 Tallebudgera Creek Road
 Burleigh Heads QLD 4220
 (PO Box 424 West Burleigh QLD 4219)
 T. (07) 3129 7633

MELBOURNE

Level 14, 10-16 Queen Street
 Melbourne VIC 3000

NEWCASTLE: HUNTER & NORTH COAST

Level 1, 31-33 Beaumont Street
 Hamilton NSW 2303
 T. (02) 4929 2301

SUNSHINE COAST

Suite 101, Level 2/30 Main Drive
 Birtinya QLD 4575
 T. 13 54 93

SYDNEY REGION

Unit 17, 21 Mary Street
 Surry Hills NSW 2010
 T. (02) 8202 8333

TOWNSVILLE

Level 4, 67-75 Denham Street
 Townsville QLD 4810
 T. (07) 4410 9000

WAGGA WAGGA: RIVERINA & WESTERN NSW

35 Kincaid Street (PO Box 5464)
 Wagga Wagga NSW 2650
 T. (02) 6971 9696

WODONGA

Unit 2, 83 Hume Street
 (PO Box 506) Wodonga VIC 3690
 T. (02) 6067 2533

Table of contents

1.	Introduction.....	1
1.1.	Background.....	1
1.2.	The Project.....	1
1.3.	Environmental Management Strategy	3
2.	Purpose and objectives	4
2.1.	Purpose.....	4
2.2.	Objectives	4
3.	Planning	5
3.1.	Relevant legislation and guidelines.....	5
3.1.1.	Legislation	5
3.1.2.	Guidelines and standards	5
3.1.3.	Conditions of Approval.....	5
4.	Consultation.....	8
5.	Existing environment.....	10
5.1.	Sensitive receivers.....	10
5.2.	Background noise levels	12
6.	Noise and vibration criteria	13
6.1.	Interim Construction Noise Guidelines	13
6.2.	Road traffic noise criteria	13
6.3.	Vibration criteria	13
7.	Environmental aspects and impacts.....	14
7.1.	Construction activities	14
7.2.	Impacts.....	14
8.	Construction noise and vibration assessment	15
8.1.	Construction noise sources.....	15
8.2.	Construction noise assessment.....	15
8.3.	Weeamera Road construction noise assessment	16
8.4.	Road traffic noise assessment.....	16
8.5.	Vibration assessment.....	16
9.	Environmental mitigation and management measures.....	18
9.1.	Construction hours.....	18
9.1.1.	Standard construction hours	18
9.1.2.	Outside standard construction hours	18
9.2.	Noise management and mitigation measures	19

10. Compliance management	23
10.1. Roles and responsibilities	23
10.2. Training	23
10.3. Monitoring and inspections	23
10.3.1. Noise monitoring	23
10.4. Complaints resolution	24
10.5. Auditing	24
10.6. Reporting.....	24
10.6.1. Incident reporting	25
11. Review and improvement	26
11.1. Continuous improvement	26
11.2. CNVMP update and amendment.....	26
12. References	28

Figures

Figure 1-1 Approved Project layout.....	2
Figure 5-1 Nearby sensitive receivers	11

Tables

Table 3-1 Project conditions of approval and mitigation measures relevant to the CNVMP.....	5
Table 4-1 Consultation summary sensitive receivers.....	8
Table 5-1 Distance between the nearest residences to the Project.....	10
Table 5-2 Rating background noise level dB(A).....	12
Table 8-1 Potential impact from vibration to the two closest sensitive receivers	17
Table 9-1 Noise management and mitigation measures.....	19
Table 12-1 Noise Management Levels at residential receivers.....	A-I
Table 12-2 Noise Management Levels for the Project	A-I
Table 12-3 RNP Road Traffic Criteria, dB(A)	A-II
Table 12-4 Types of vibration	A-III
Table 12-5 DIN 4150-3 Structural Damage Criteria	A-IV
Table 12-6 Construction noise scenario plant	B-I
Table 12-7 Construction noise assessment Scenario 1	B-II
Table 12-8 Construction noise assessment Scenario 2	B-III
Table 12-9 Construction noise assessment Scenario 3	B-IV
Table 12-10 General plant and equipment for construction along Weeamera Road for the two scenarios	B-V

Construction Noise and Vibration Management Plan

Culcairn Solar Farm

Table 12-11 Highest predicted noise levels for scenario 1..... B-V

Table 12-12 Highest predicted noise levels for scenario 2..... B-VI

Acronyms and abbreviations

Term / Abbreviations	Definition / Expanded Text
AC	Alternate current
AS	Australian Standard
BESS	Battery Energy Storage System
CoA	Condition of Approval
CNVMP	Construction Noise and Vibration Management Plan
dB(A)	Decibels
DC	Direct current
DEC	Department of Environment and Conservation
DECC	Department of Environment and Climate Change
DECCW	Department of Environment, Climate Change and Water
DPE	Department of Planning and Environment
EIS	Environmental Impact Statement
EMS	Environmental Management System
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	Environmental Planning and Assessment Regulation 2021
EPA	Environment Protection Authority
EWMS	Environmental Work Method Statements
ICNG	Interim Construction Noise Guidelines
INP	Industrial Noise Policy
IPC	Independent Planning Commission
LAeq	Equivalent continuous noise level
LA (max)	the A-weighted maximum noise level
km	Kilometres
kV	Kilovolts
m	metres

Term / Abbreviations	Definition / Expanded Text
MW	Megawatt
NEM	National Electricity Market
NML	Noise Management Levels
NPfi	Noise Policy for Industry
NSW	New South Wales
POEO Act	<i>Protection of the Environment Operations Act 1997, NSW</i>
PV	Photovoltaic
RBL	Rating Background Level (background noise level)
RMS	Roads and Maritime Services (now Transport for NSW)
RNP	Road Noise Policy
SEA	Site Environmental Advisor
SSD	State Significant Development

1. Introduction

1.1. Background

Neoen Australia Pty Ltd (Neoen) (the Proponent) have approval for construction, operation and decommissioning of a 350 Megawatt (MW) alternating current (AC) / 402.5 MW direct current (DC), photovoltaic (PV) solar farm, referred to as Culcairn Solar Farm (the Project). The Project is located on rural land, approximately 4 kilometres (km) southwest of Culcairn, New South Wales (NSW).

The Project was assessed in an Environmental Impact Statement (EIS) in accordance with Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and Schedule 2 of the Environmental Planning and Assessment Regulation 2021 (EP&A Regulation). It is considered State Significant Development (SSD).

The Proponent received approval for the Project on 25 March 2021 from the Independent Planning Commission (IPC).

Modification Report 1 (SSD-10288 – Mod 1) was prepared and submitted to the Department of Planning and Environment (DPE) October 2023 and was determined on the 22 December 2023 with consolidated Conditions of Consent issued. The modification to the Project was for minor alignment revisions and widening of the Project's Development Footprint along Weeamera Road and at two creek crossings. The modification was also for minor amendments to the definitions and wording of Schedule 3 Condition 2 – Transport.

As part of the EIS a noise assessment was completed. The assessment concluded that generally noise impacts during construction would be within the accepted noise criteria. Exceedances would occur during standard working hours and would be temporary and intermittent during construction. Mitigation measures would further manage noise impacts to affected receivers and are outlined in Section 7. No further impacts or mitigation measures for noise were included in the Modification Report 1. This Construction Noise and Vibration Management Plan (CNVMP) is for the management of noise and vibration during construction and has considered measures required during operation or decommissioning of the solar farm.

1.2. The Project

The Project will involve the construction and operation of a ground-mounted PV solar tracking array generating approximately 350 MW AC / 402.5 MW DC of renewable energy. The power generated will be exported to the national electricity grid.

Key development and infrastructure components would include:

- Single axis tracker PV solar panels mounted on steel frames over most of the site (maximum tilt 4.2 metres in height)
- Underground and overground electrical conduits and cabling to connect the arrays to the inverters and transformers
- Systems of inverter units and voltage step-up throughout the arrays
- National Electricity Market (NEM) compliant metering arrangements for all energy exported to the grid as well as internal metering to measure battery and solar output
- On site substation, connecting to the existing 330 kilo volts (kV) Transgrid transmission line
- Site office and maintenance building, vehicle parking areas, material laydown area, internal access tracks and perimeter security fencing
- Site access track off Weeamera Road
- Road crossing and easement electrical crossing through underground and/or overhead lines, of Cummings Road and Schoffs Lane
- Vegetative screening at impacted visual receivers and at the intersection of public roads.

The approved Project layout is provided in Figure 1-1. Note, the approved Project layout includes a Battery Energy Storage System (BESS). The BESS is currently not proposed to be constructed and therefore not considered in this management plan.

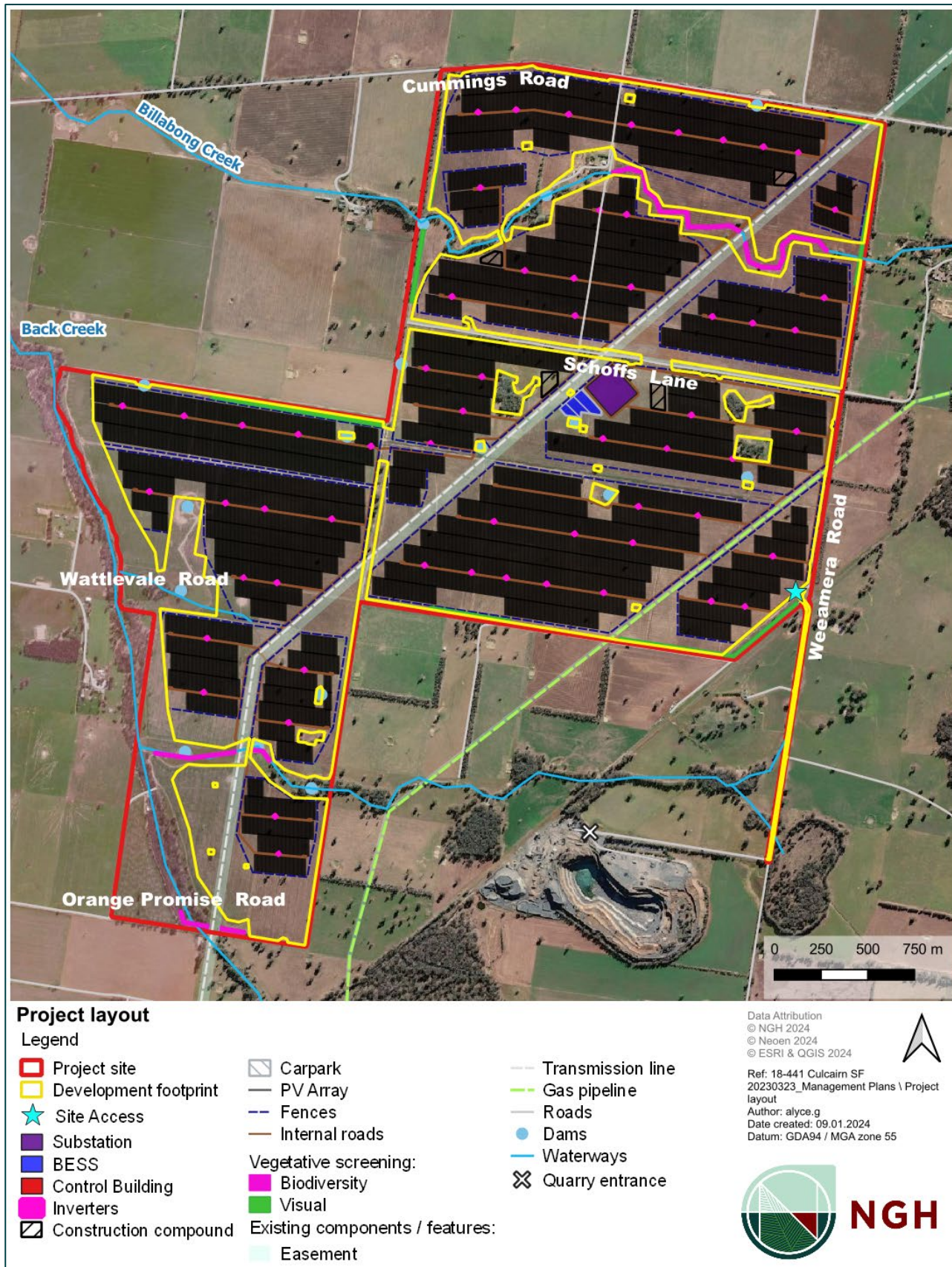


Figure 1-1 Approved Project layout

1.3. Environmental Management Strategy

The CNVMP is part of the Project's overall Environmental Management Strategy (EMS). Mitigation and management measures identified in this CNVMP will be incorporated into site or activity-specific Environmental Work Method Statements (EWMS).

When used concurrently, the overarching EMS, CNVMP and other subplans, procedures and EWMS form management guides that clearly identify the necessary environmental management actions for reference by Neoen's personnel and contractors.

The review and document control processes for this plan are described in the EMS.

2. Purpose and objectives

2.1. Purpose

The purpose of this CNVMP is ensure that impacts from construction related to noise and vibration are minimised and within the scope permitted by the approved Project.

2.2. Objectives

The key objective of the CNVMP is to ensure all conditions, mitigation measures and licence / permit requirements relevant to noise and vibration management are described, scheduled, and assigned responsibility as outlined in:

- The Project EIS (NGH, 2020)
- The Project Submissions Report (NGH, 2020)
- The Project Amendment Report (NGH, 2020)
- Modification Report 1 (NGH, 2023)
- DPE Consolidated Development Consent (determined 22 December 2023).

The Project will be carried out generally in accordance with the EIS and the Conditions of Approval (CoA), if there is any inconsistency between the documents the conditions of the consent will prevail.

3. Planning

3.1. Relevant legislation and guidelines

3.1.1. Legislation

Legislation relevant to the development and implementation of the CNVMP includes:

- *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act)
- Environmental Planning and Assessment Regulation 2021
- *Protection of the Environment Operations Act 1997* (NSW) (POEO Act)
- Protection of the Environment Operations (Noise Control) Regulation 2008.

How this legislation is relevant to the CNVMP and Project is outlined in Appendix B of the EMS.

3.1.2. Guidelines and standards

Guidelines and standards relevant to the development and implementation of the CNVMP include:

- NSW Interim Construction Noise Guideline (ICNG), (Department of Environment and Climate Change (DECC), 2009)
- Noise Policy for Industry (NSW Environment Protection Authority (EPA), 2017)
- NSW Road Noise Policy (RNP) (Department of Environment, Climate Change and Water (DECCW), 2011)
- Australian Standard 2436 – 2010 ‘Guide to Noise Control on Construction, Demolition and Maintenance Sites’
- Assessing Vibration: a Technical Guideline (NSW AV:ATG) (Department of Environment and Conservation, (DEC), 2006).

The above guidelines and standards outline how noise and vibration is to be measured and monitored, relevant criteria and recommended measures to reduce impacts.

3.1.3. Conditions of Approval

The Conditions of Approval (CoA) and mitigation measures relevant to the CNVMP are listed in Table 3-1. A cross reference is also included to indicate where the requirement is addressed in this plan.

Table 3-1 Project conditions of approval and mitigation measures relevant to the CNVMP

Reference number	Condition requirement	Document reference
Conditions of Approval		
Schedule 3 CoA16	<p>Unless the Planning Secretary agrees otherwise, the Applicant may only undertake road upgrades, construction, upgrading or decommissioning activities between:</p> <ul style="list-style-type: none"> (a) 7 am to 6 pm Monday to Friday (b) 8 am to 1 pm Saturdays (c) At no time on Sundays and NSW public holidays. <p>The following construction, upgrading or decommissioning activities</p>	Section 9.1

Reference number	Condition requirement	Document reference
	<p>may be undertaken outside these hours without the approval of the Planning Secretary:</p> <ul style="list-style-type: none"> • The delivery of materials as requested by the NSW Police Force or other authorities for safety reasons • Emergency work to avoid the loss of life, property and/or material harm to the environment. 	
<p>Schedule 3 CoA17</p>	<p>The Applicant must:</p> <ul style="list-style-type: none"> (a) Minimise the noise generated by any construction, upgrading or decommissioning activities on site in accordance with the best practice requirements outlined in the Interim Construction Noise Guideline (DECC, 2009), or its latest version (b) Ensure that the noise generated by the operation of the battery storage facility during the night does not exceed 35 dB(A) LA_{eq}15rrmt to be determined in accordance with the procedures in the NSW Noise Policy for Industry (EPA, 2017) at any non-associated residence. 	<p>This plan Battery is not currently proposed to be constructed as part of this Project.</p>
<p>Mitigation measures</p>		
<p>NS1</p>	<p>Works should be undertaken during standard working hours only. (Except for the connection to substation)</p> <ul style="list-style-type: none"> • Monday – Friday 07:00 to 18:00 • Saturday 08:00 to 13:00 • No work on Sundays or public holidays. 	<p>Section 9.1</p>
<p>NS2</p>	<p>A Construction Noise and Vibration Management Plan (CNVMP) would be prepared and implemented as part of the CEMP. The CNVMP would generally follow the approach in the Interim Construction Noise Guideline (ICNG) (DECC, 2009). The CNVMP would include the following:</p> <ul style="list-style-type: none"> • Acoustics-Description and Measurement of Environmental Noise-General Procedures • Noise measurements would be consistent with the procedures documented in AS1055.1-1997 Acoustics - Description and Measurement of Environmental Noise - General Procedures. Vibration measurements would be undertaken in accordance with the procedures documented in the OEH’s Assessing Vibration-a technical guideline (2006) and BS7385 Part 2-1993 Evaluation and measurement for vibration in buildings. 	<p>This plan</p>
<p>NS3</p>	<p>Operate plant in a conservative manner, which includes:</p> <ul style="list-style-type: none"> • Selection of the quietest suitable machinery • Avoidance of noisy plant working simultaneously where practical • Turning off plant and equipment that is not being used. Utilise 	<p>Section 9.2</p>

Reference number	Condition requirement	Document reference
	broadband reverse alarm in lieu of high frequency type.	
NS4	All staff on-site should be informed of procedures to operate plant and equipment in a quiet and efficient manner.	Section 9.2
NS5	Consult with R30, R31, R29, R24, R19, R33, R34, R14 and R09 during pre-construction to develop suitable mitigation measures.	Section 4
NS6	Regular inspection and maintenance of equipment to ensure that plant is in good condition.	Section 9.2
NS7	Complete a one-off noise validation monitoring assessment to quantify emissions and confirm emissions meet relevant criteria.	NA – this to be addressed in the Project Operational Plan. The purpose of the mitigation measure as outlined in the EIS was confirm the operational noise of the solar farm.
NS8	Where noise level exceedances cannot be avoided, then time restrictions and/or providing periods of repose for residents must be considered where feasible and reasonable. That is, daily periods of respite from noisy activities may also be scheduled for building occupants during construction hours.	Section 9.2
NS9	For receivers located within 300 metres of development infrastructure during maintenance activities including grass slashing, panel cleaning or major works/repairs: Receive a written notification letter which may consist of the details of the proposed works, anticipated noise impacts, and the time periods over which these will occur, at least two weeks prior to the commencement of works. Verification of noise and vibration levels following reasonable complaints should be undertaken within a period of 14 days from the commencement of activities.	NA – to be included Project Operational Plan

4. Consultation

In accordance with mitigation measure NS4, this CNVMP was provided to the following sensitive receivers, to develop suitable mitigation measures:

- R09
- R14
- R19
- R24
- R29
- R30
- R31
- R33
- R34

Table 4-1 outlines the results of the consultation.

Table 4-1 Consultation summary sensitive receivers

Receiver	Date	Consultation undertaken	Outcomes
R09	26/07/2023	In-person meeting that included discussion on what is expected during construction	No comment received to date on the CNVMP
	04/08/2023	Email follow-up about construction impacts and CNVMP provided	
R14	20/07/2023	CNVMP provided via email	Did not have any comments on the CNVMP, but want to stay updated impacts and their management during construction
	26/07/2023	In-person meeting held to discuss concerns about the construction period	
R19	26/07/2023	In-person meeting that included discussion on what is expected during construction	No comment received to date on the CNVMP
	04/08/2023	Email follow-up about construction impacts and CNVMP provided	
R24	26/07/2023	In-person meeting that included discussion on what is expected during construction	No comment received to date on the CNVMP
	04/08/2023	Email follow-up about construction impacts and CNVMP provided	
R29	26/07/2023	In-person meeting that included discussion on what is expected during construction	No comment received to date on the CNVMP
	04/08/2023	Email follow-up about construction impacts and CNVMP provided	
R30	29/09/2023	Phone call to discuss availability to provide MP in-person	No comment provided specifically on the CNVMP to date
	04/10/2023	MP provided in-person at the home	

Receiver	Date	Consultation undertaken	Outcomes
R31	26/09/2023	MP provided by email	No comment received to date on the CNVMP
R33	26/07/2023	In-person meeting that included discussion on what is expected during construction	No comment received to date on the CNVMP
	04/08/2023	Email follow-up about construction impacts and CNVMP provided	
R34	26/07/2023	In-person meeting that included discussion on what is expected during construction	No comment received to date on the CNVMP
	04/08/2023	Email follow-up about construction impacts and CNVMP provided	

5. Existing environment

5.1. Sensitive receivers

The Project is located in a rural setting, approximately 4 kilometres (km) south-west of the township of Culcairn. The surrounding land uses to the solar farm are primarily agriculture and associated rural dwellings. Noise sources in the locality generally consist of:

- Livestock grazing and management
- Spraying, cultivation, planting and harvesting of crops
- Transporting rural supplies and commodities
- Hay making and transport
- Quarrying and transport of materials
- Road traffic noise from Benambra Road, Weeamera Road, Cummings Road, Walbundrie Road and the Olympic Highway.

Noise levels from farm activities are likely to be concentrated at peak times during the year. Noise from adjacent quarry activities and road traffic are likely to be more continuous throughout the year.

There are 8 sensitive receivers within 1 km of the Project site boundary and 34 located within 3 km of the Project site (Figure 2-1). The distances between these residences from the Project site boundary and the internal substation are shown in Table 2-1.

The location of residences in relation to the Project are shown in Figure 2-1.

Table 5-1 Distance between the nearest residences to the Project

Residence	Distance (metres) to Project boundary	Residence	Distance (metres) to Project boundary
R09	499	R24	343
R14	213	R32	958
R17	629	R33	121
R19	250	R34	297

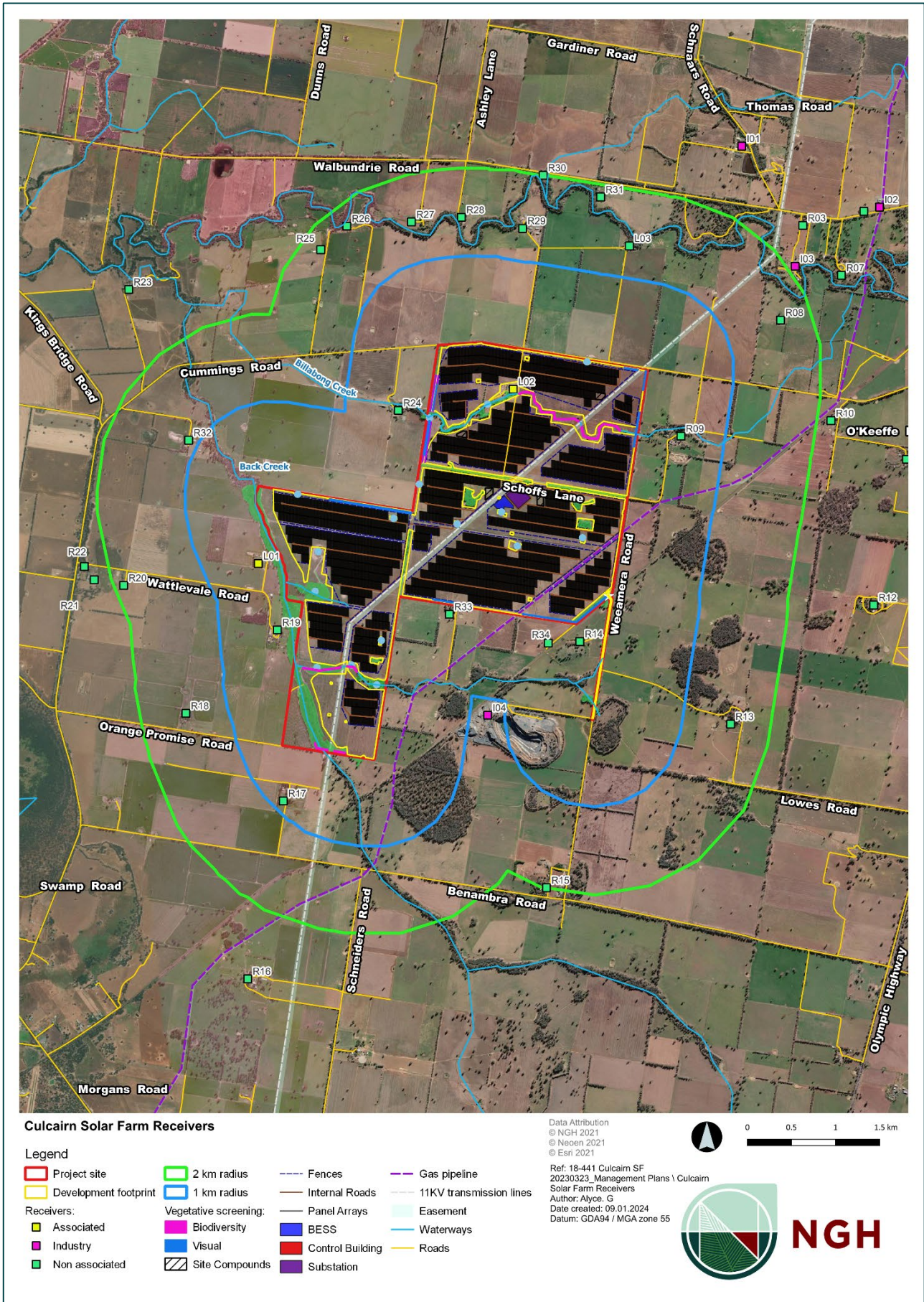


Figure 5-1 Nearby sensitive receivers

5.2. Background noise levels

Assessment criteria and noise management levels (NMLs) for construction noise have been derived from the existing noise environment of the area in accordance with the Noise Policy for Industry (NPfI) (NSW EPA, 2017). Table 2.3 of the NPfI (NSW EPA, 2017) has been used to describe the minimum Rating Background Noise Level (RBL) of the area surrounding the Project.

Based on the identified receivers, existing environment, and land zoning on and adjacent to the Project site, the noise environment is classified as rural. The RBL adopted for all receiver locations within the assessment are described in Table 5-2. However, it is anticipated that during certain periods of the year the background noise levels will exceed the levels described in the NPfI guideline. As such, potential noise impacts to sensitive receivers are likely to be conservatively predicted, representing a worst-case scenario.

Table 5-2 Rating background noise level dB(A)

Time of day	Applicable Rating Background Noise Level, dB(A)
Day	<40
Evening	<35
Night	<30

6. Noise and vibration criteria

6.1. Interim Construction Noise Guidelines

The NSW Interim Construction Noise Guideline (ICNG) (DECC, 2009) deals with managing construction noise impacts. According to the guideline, a quantitative assessment of noise impacts is warranted when works are likely to impact an individual or sensitive land use for more than three weeks in total. The construction of the Culcairn Solar Farm will be 8-12 months and therefore meets the requirements of a quantitative assessment.

The ICNG specifies noise targets, or 'noise management levels' (NML), for residences and other noise sensitive receivers. The RBL, an overall single-figure background noise level, (refer to Section 5.2) is used when determining the NML. Residential receivers are considered 'noise affected' where construction noise levels are greater than the NMLs. The NMLs and adopted NMLS for the Project are outlined in Appendix A.

6.2. Road traffic noise criteria

Noise impact from the potential increase in traffic on the surrounding road network due to construction has been assessed in accordance with the NSW Road Noise Policy (RNP) (DECCW, 2011). How the criteria have been applied to this Project is outlined in Appendix A.

6.3. Vibration criteria

Vibration from construction activities associated with the Project could potentially impact on the amenity of the occupants of dwellings or buildings located close to the Project. Generally, vibration impact can be summarised into two categories:

- Effect on human comfort
- Structural or cosmetic damage to buildings.

The vibration criteria are outlined in Appendix A.

7. Environmental aspects and impacts

7.1. Construction activities

A variety of construction activities that have the potential to generate noise will be undertaken as part of the Project. These activities include, but are not limited to:

- Site establishment
- Earthworks and vegetation clearing
- Construction of access tracks
- Construction of inverter stations and substation
- Trenching for underground cabling
- Pile driving and assembling of frames and panels
- Landscaping.

7.2. Impacts

The potential for noise and vibration impacts on sensitive receivers or structures will depend on a number of factors. Typically, these might include:

- The type of equipment in use
- The number of equipment simultaneously in use
- Ground condition
- Topography and other physical barriers
- Proximity to sensitive receivers
- The condition of sensitive receivers
- Hours/duration of construction work
- Proximity of heavy traffic areas.

8. Construction noise and vibration assessment

8.1. Construction noise sources

Construction noise impacts will likely be from the operation of construction equipment. Several key activities on the site that are likely to produce the most noise include:

- Earthworks for internal roads and laydowns (Scenario 1)
- Pile driving for solar panel frames (Scenario 2)
- Assembly of frames and panels (Scenario 3).

The Project activities above use readily available construction equipment. As such, noise levels associated with that equipment and activity are understood and have been modelled. A computer model was used to quantify Project noise emissions at neighbouring receivers for typical construction activities and operations (including road noise). The NSW Roads and Maritime Services (RMS) construction noise calculator was used to predict noise impacts. Plant and equipment were modelled at various locations and representative of realistic construction conditions for assessed scenarios.

Construction activities during Scenarios 1, 2 and 3 are expected to represent a worst-case scenario for noise generated from the site. Appendix B outlines the plant, sound power levels and quantity per each scenario. It is noted that predictive modelling of construction noise impacts examined during these three scenarios of highest noise impact conservatively assume all plant will be operating simultaneously (worst-case scenario). However, it is likely that construction scenarios will occur across the site at different locations concurrently and intermittently. Noise levels at receivers during construction are likely to be less than predicted.

8.2. Construction noise assessment

Construction noise impacts during construction Scenarios 1, 2 and 3 scenarios (discussed above) were used to predict the likely impact of noise at adjacent residential receivers. The full assessment results per receiver are provided in Appendix B. The assessment determined:

- Construction works will occur in a rural environment with a low level of background noise.
- No residences are expected to be Highly Noise Affected (>75dB(A)) during any of the Scenarios
- During Scenario 1, the works are likely to generate an exceedance of the NMLs for five of the 14 sensitive receivers including R14, R19, R29, R31 and R33. The exceedances range from four dB(A) above the NML (R19) to 13 dB(A) above the NML (R33).
- During Scenario 2, the works are likely to generate an exceedance of the NMLs for three of the 14 sensitive receivers including R14, R31 and R33. The exceedances range from three dB(A) above the NML (R14) to 11 dB(A) above the NML (R33).
- During Scenario 3, the works are likely to generate an exceedance of the NMLs for one (R33) of the 14 sensitive receivers. The NML is exceeded by three dB(A).

It is noted that the construction noise assessment was undertaken as part of the EIS, when infrastructure was still proposed north of Cummings Road. Post submission of the EIS, the Project Layout was revised to remove the Project from north of Cummings Road. Therefore during construction of these three scenarios, it is unlikely that noise impacts will occur to receivers along Billabong Road including R29 and R31 (refer to Figure 5-1).

Overall, the noise impacts are expected to be temporary and intermittent during the construction of the solar farm. The maximum continuous duration that will affect residents and is likely to be experienced under a worst-case construction noise (e.g., from internal road construction) is two to three hours. Plant operators will stop for scheduled lunch and rest breaks. In addition, construction activities, especially earth works, move location during the day. Construction activities will move progressively around the site as work stages are

completed. As such, impacts at any one receiver, from a worst-case construction noise will typically last less than several hours over a period of 2-3 weeks.

8.3. Weeamera Road construction noise assessment

A 1.4 km section of Weeamera Road will require upgrading for construction traffic between the left turn to the Boral Quarry (south) and the construction access (north). Road upgrade activities will increase the width of this section of Weeamera Road from a 5.5 metre unsealed pavement to a 6 metre side sealed pavement allowing for two heavy vehicles to pass concurrently.

The predicted noise level for the work was calculated using construction scenarios in the Roads and Maritime Services' Construction Noise Estimator. The construction will involve two 'worst case' scenarios and include:

- Scenario 1 – Clearing and grubbing.
- Scenario 2 – Bulk earthworks.

Appendix B outlines the plant, sound power levels and quantity for both scenarios.

A distance-based assessment was used for each scenario for each sensitive receiver in the vicinity of the road upgrades. Receiver distances vary from 270 metres from R14 to 1992 metres at R15. The predicted noise levels were modelled for construction work occurring during standard hours of work. The assessment determined:

- Weeamera Road construction works for the Project will be during standard hours of work. Construction noise predictions assume most plant items will be operating simultaneously for construction of the road upgrade. Simultaneous operation of all plant is unlikely and as a result any predictions are conservative.
- For Scenario 2 it is predicted that there will be an exceedance of the NML for R14. There will be no exceedance for the other receivers identified within the vicinity of the road works. Construction noise will move along the length of the works on a regular basis as works progress. As such sensitive receivers will be exposed to noise above the NMLs for short periods of time during road construction.

8.4. Road traffic noise assessment

The site will be accessed from Weeamera Road via Benambra Road and the Olympic Highway to prevent unnecessary traffic travelling past residents on the Benambra Road. Major access and transport/haulage route is east of the Project from Olympic Highway, west along Benambra Road and north along Weeamera Road. Vehicle access to the site will generally be confined to the standard hours of construction. Exceptions will occur as staff arrive and leave the site, before and after shifts. Additionally, the delivery of large components may take place outside normal working hours. However, this will be avoided where practicable.

Overall, the additional traffic associated with the construction of the solar farm will be a small component of the existing traffic loads on local and state roads. No substantive increased collision risk, damage to road infrastructure, noise or dust impacts, disruption to existing services or reduced level of service is expected to accompany construction.

The Project EIS (NGH 2020) predicts construction road traffic noise levels will satisfy the NSW Road Noise Policy (RNP) criteria for assessed residences.

8.5. Vibration assessment

Based on the plant items to be used onsite during the construction phase including graders, dump trucks, rollers, water cart, piling and other vehicles, vibration generated by construction plant is considered low risk (refer to Table 8-1) for impacting human comfort or building conditions.

Table 8-1 Potential impact from vibration to the two closest sensitive receivers

Receiver	Distance (m) from site (approximate)	Type of receiver	Level of risk for potential impact	Monitoring required
R33	121	Residential	Very low	Not Required
R14	213	Residential	Very low	Not required

9. Environmental mitigation and management measures

9.1. Construction hours

9.1.1. Standard construction hours

Construction activities for the Project will be undertaken during the following standard construction hours:

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

9.1.2. Outside standard construction hours

The following construction, upgrading or decommissioning activities may be undertaken outside the standard construction hours outlined above without the approval of the Planning Secretary:

- The delivery of materials as requested by the NSW Police Force or other authorities for safety reasons
- Emergency work to avoid the loss of life, property and/or material harm to the environment.

Any other activities outside the standard construction hours will require approval from Neoen and the Planning Secretary.

9.2. Noise management and mitigation measures

Table 9-1 Noise management and mitigation measures

ID	Measure	Resources required	Timing	Responsibility	Reference
General					
NVMP1	Training will be provided to all Project personnel, including relevant sub-contractors on noise management practices and the requirements from this plan through inductions, toolboxes and targeted training.	Training materials	Pre-construction Construction	Site Environmental Advisor (SEA)	Good practice
NVMP2	All staff onsite should be informed of procedures to operate plant and equipment in a quiet and efficient manner.	Site induction Training materials Toolboxes	Pre-construction Construction	SEA All Staff	NS4
Consultation and compliant management					
NVMP4	Consultation will be undertaken with R30, R31, R29, R24, R19, R33, R34, R14 and R09 during pre-construction to ensure suitable mitigation measures are developed for implementation during construction.		Pre-construction Construction	Project Manager	NS5
NVMP5	All complaints, including those related to property damage, will be managed in accordance with the Community Communication Strategy	Community Communication Strategy	Pre-construction Construction	SEA Construction Manager Neoen	Best practice
Management of hours of operation					
NVMP6	Unless the Planning Secretary agrees otherwise, the standard construction work hours are:		Construction	Site supervisor	CoA16

ID	Measure	Resources required	Timing	Responsibility	Reference
	<ul style="list-style-type: none"> a) 7 am to 6 pm Monday to Friday; b) 8 am to 1 pm Saturdays; and c) At no time on Sundays and NSW public holidays. 	Training materials			NS1
NVMP7	<p>The following construction or upgrading activities may be undertaken outside the standard construction hours without the approval of the Planning Secretary:</p> <ul style="list-style-type: none"> • The delivery of materials as requested by the NSW Police Force or other authorities for safety reasons • Emergency work to avoid the loss of life, property and/or material harm to the environment. 	Training materials	Construction	SEA Site supervisor	CoA16
NMP8	Where works are approved to occur outside the standard construction hours, the number of plant and equipment operating at one time will be reduced.	Personnel and trained and experienced supervision	Construction	Site supervisor	Best Practice
Plant and behavior controls					
NVMP9	Where possible equipment selected will be with the lowest noise rating that meets task requirements.	Procurement Availability of plant and equipment	Pre-construction Construction	Site Supervisor	ICNG
NVMP10	Minimise operating loud machinery conjunctively.		Pre-construction Construction	Site Supervisor	ICNG
NVMP11	Regular inspection and maintenance of equipment to ensure that plant is in good condition.	Pre-start book Maintenance records	Construction	Sub-contractor Plant foreman	NS6

ID	Measure	Resources required	Timing	Responsibility	Reference
NVMP12	Where noise level exceedances cannot be avoided, then time restrictions and/or providing periods of repose for residents must be considered where feasible and reasonable. That is, daily periods of respite from noisy activities may also be scheduled for building occupants during construction hours.	Program Site plan Community Communication Strategy	Construction	Site supervisor	NS8
NVMP13	Maximise the distance between noisy plant and nearby sensitive receivers	Program Site plan	Construction	Site supervisor	Best Practice
NVMP14	Throttle down or shut down plant used intermittently and direct noise-emitting plant away from sensitive receivers	Training materials	Construction	Site supervisor Plant operator	Best Practice
NVMP15	Preference will be given to hydraulic and electric powered plant over combustion engine or pneumatic powered plant, when possible.	Procurement Availability of plant and equipment	Pre-construction Construction	Site supervisor	Best Practice
NVMP16	Avoid dropping materials from height.	Training materials	Construction	All site workers Site supervisor	Best Practice
NVMP17	Avoid when possible the use of engine compression brakes	Procurement	Construction	Site supervisor	Best Practice
NVMP18	All equipment will be selected to minimise noise emissions. Equipment will be fitted with appropriate silencers and be in good working order. Machines found to produce excessive noise compared to normal industry expectations will be removed from the site or stood down until repairs or modifications can be made.	Procurement Availability of plant and equipment	Construction	Site supervisor	Best Practice
NVMP19	Use of broadband reversing alarms, or “quackers”, on mobile equipment in accordance with the relevant health and safety	Procurement	Construction	Site supervisor	Best Practice

ID	Measure	Resources required	Timing	Responsibility	Reference
	regulations				
NVMP20	Workers should avoid shouting, minimise talking loudly, and avoid slamming vehicle doors near sensitive receivers.	Training materials	Construction	All site workers	Best Practice
Traffic and access					
NVMP21	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site	Traffic Management Plan Site plan	Construction	Site supervisor	Best Practice
NVMP22	Keep truck drivers informed of designated vehicle routes, parking locations, acceptable delivery hours or other relevant practices (for example, minimising the use of engine brakes, and no extended periods of engine idling)	Traffic Management Plan Driver induction	Pre-construction Construction	Construction Manager	RNP ICNG
NVMP23	Where possible, amalgamate deliveries to reduce traffic numbers and congestion.	Traffic Management Plan Driver induction	Pre-construction Construction	Construction Manager	RNP ICNG
Monitoring					
NVMP24	Noise monitoring in response to a complaint will be undertaken in accordance with Section 10.3.	Section 10.3	Pre-construction Construction	SEA	Best practice

10. Compliance management

10.1. Roles and responsibilities

Section 4.8 of the EMS describes the roles and responsibilities of Neoen's Project team in relation to environmental management. Specific responsibilities for the implementation of environmental controls are detailed in Section 9.2 of this plan.

10.2. Training

All employees, contractors and utility staff working on site will undergo site induction training that includes construction noise management issues. The induction training will address elements related to noise management including:

- Existence and requirements of this sub-plan
- Relevant legislation
- Standard construction hours
- The process for seeking approval for out of hours works, including consultation
- Location of noise sensitive areas
- Complaints reporting
- General noise management measures
- Specific responsibilities to minimise impacts on the community and built environment from noise associated with the works.

Further details regarding staff induction and training are outlined in Section 7 of the EMS.

10.3. Monitoring and inspections

Requirements and responsibilities in relation to monitoring and inspections are documented in Section 10 of the EMS. This includes weekly inspection and fortnightly inspection with Neoen to monitoring compliance with this management plan. Any corrective actions identified during these inspections will be implemented.

10.3.1. Noise monitoring

Noise monitoring will be undertaken in response to a complaint. All monitoring will include operator-attended noise monitoring and be undertaken in accordance with the relevant Australian Standards and EPA guidelines including:

- AS 1055.1 – 1997 Acoustics – Description and measurement of environmental noise – General procedures
- AS/NZS IEC 61672.1 – 2019 Electroacoustics – Sound level meters, Part 1: Specifications
- NSW Noise Policy for Industry (NPfI) (EPA, 2017)

All acoustic instrumentation used for monitoring under this plan will have current NATA or manufacturer calibration certificates.

The noise monitoring results will be compared to the criteria provided in Table 12-2. If an exceedance is found it will be reported to Neoen and the mitigation measures are to be reviewed by a Noise Consultant to see if any additional measures can be implemented. Any additional measures will result in an update of this CNVMP in accordance with Section 11.2. All complaints will be managed in accordance with the complaints resolution process outlined below.

10.4. Complaints resolution

The aim of the complaints resolution process is to respond promptly to complaints, identify any feasible and reasonable measures that may further reduce impacts following a complaint, and to provide feedback to the community on the above process within a reasonable timeframe.

Neoen will:

- Take prompt and direct actions to develop good relations with people living and working in the vicinity of a construction site at the beginning of a Project and this will be maintained throughout the Project, as this is of paramount importance.
- Keep people living and working in the vicinity of a construction site informed of progress.
- Appoint a person to liaise with the community who is adequately trained and experienced in such matters.

The complaints resolution process should implement the following noise elements:

- Establishment of a complaints mechanism for the community via either telephone or email.
- Notification of the relevant Project contact details through the community consultation process.
- Take all complaints seriously and deal with them expeditiously.
- Assess whether the issue can be resolved easily and take immediate action if possible.
- If not, ensures that the appropriate consultation has been undertaken for the activity.
- Ensures the on-site inspections of the CNVMP have been carried out regularly for the activity.
- Assesses the construction site and activities to determine whether there is any reason to believe the noise exposure of receivers is higher than anticipated.
- Undertake monitoring of noise levels where exceedances are report to have occurred, with the aim of establishing if the exposure of receivers is higher than the NML presented in Table 12-2.
- Take remedial action i.e., review and implement any additional measures if required
- Advise of complainant of action taken.
- Maintain a record of the above to enable review by an independent authority such as EPA or DPE.

The compliant procedure is further outlined in Section 8.3 of the EMS.

10.5. Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of environmental controls, compliance with this sub plan, infrastructure approval and other relevant approvals, licences, and guidelines. Audit requirements are detailed in Section 10.3 of the EMS.

10.6. Reporting

Reporting requirements and responsibilities are documented in Section 10.4 of the EMS.

Details on incident reporting is included in Section 9.3 of the EMS. Environmental incidents relating to noise and vibration incidents may include but not be limited to:

- Exceedances of noise and vibration criteria
- Potential damage to structures, buildings, and heritage items

The Contractor will promptly advise Neoen on events that are non-conforming with the CoAs and mitigation measures. Neoen will advise the Department of Planning and Environment (DPE) accordingly for any notifiable non-conformances.

10.6.1. Incident reporting

In accordance with Condition 7 of Schedule 4 of the Development Consent, the Planning Secretary must be notified in writing via the Major Projects website immediately after Neoen becomes aware of an incident.

Written notification of an incident must:

- a) Identify the development and application number
- b) Provide details of the incident (date, time, location, a brief description of what occurred and why it is classified as an incident)
- c) Identify how the incident was detected
- d) Identify when the applicant became aware of the incident
- e) Identify any actual or potential non-compliance with conditions of consent
- f) Describe what immediate steps were taken in relation to the incident
- g) Identify further action(s) that will be taken in relation to the incident
- h) Identify a project contact for further communication regarding the incident.

As per Appendix 7 of the CoA (Incident Notification and Reporting Requirements), within 30 days of the date on which the incident occurred or as otherwise agreed to by the Planning Secretary, the Applicant must provide the Planning Secretary and any relevant public authorities (as determined by the Planning Secretary) with a detailed report on the incident addressing all requirements below, and such further reports as may be requested.

The Incident Report must also include:

- a) A summary of the incident
- b) Outcomes of an incident investigation, including identification of the cause of the incident
- c) Details of the corrective and preventative actions that have been, or will be, implemented to address the incident and prevent recurrence
- d) Details of any communication with other stakeholders regarding the incident.

All written requirements of the Planning Secretary or relevant public authority, which may be given at any point in time, to address the cause or impact of an incident must be complied with, within any timeframe specified by the Planning Secretary or relevant public authority.

Non-compliances

Non-compliances will be reported in accordance with Section 10.4 of the EMS, and the Planning Secretary (DPE) must be notified in writing via the Major Projects website within seven days after the Applicant becomes aware of any non-compliance.

A non-compliance notification must identify:

- The development and the application number for it,
- Set out the condition of consent that the development is non-compliant with,
- The way in which it does not comply
- The reasons for the non-compliance (if known) and
- What actions have been, or will be, undertaken to address the non-compliance.

It should be noted that as per the requirements of Schedule 4, Condition 10, a non-compliance which has been notified as an incident, does not need to also be notified as a non-compliance.

11. Review and improvement

11.1. Continuous improvement

Continuous improvement of this Plan will be achieved by the ongoing evaluation of environmental management performance against environmental policies, objectives and targets for the purpose of identifying opportunities for improvement.

The continuous improvement process will be designed to:

- Identify areas of opportunity for improvement of environmental management and performance
- Determine the cause or causes of non-conformances and deficiencies
- Develop and implement a plan of corrective and preventative action to address any non-conformances and deficiencies
- Verify the effectiveness of the corrective and preventative actions
- Document any changes in procedures resulting from process improvement
- Make comparisons with objectives and targets.

11.2. CNVMP update and amendment

A document review process ensures that environmental documentation including this CNVMP is updated as appropriate for the specific works that are occurring on-site. Reviews of the CNVMP are expected to be triggered as relevant, by:

- Independent Environmental Audit
- Internal audits
- Additional environmental aspects and risks
- Environmental near misses and incidents
- Project stage change between construction, operation, and decommissioning.

Should the document review process identify any issues or items within the documents that are either redundant or in need of updating, it is the responsibility of the Neoen Project Manager or delegate to prepare the revised documents.

In accordance with Condition 2 of Schedule 4 of the Development Consent, within 1 month, unless otherwise agreed with the Planning Secretary, of:

- The submission of an incident report under Condition 7 of Schedule 4
- The submission of an audit report under Condition 11 of Schedule 4
- Any modification to the conditions of this consent.

The Neoen Project Manager or delegate must review, and if necessary revise the strategies, plans, and programs required under the Development Consent to the satisfaction of the Planning Secretary.

Where this review leads to revisions in any such document, then within four weeks of the review, the revised document will be submitted to the Planning Secretary for review and approval, unless otherwise agreed with the Planning Secretary.

In accordance with Condition 3 of Schedule 4 and agreement of the Planning Secretary, revised strategies, plan or programs may be prepared without undertaking consultation with all parties nominated under the applicable condition in this approval.

Only the Neoen Project Manager, or delegate, has the authority to change any of the environmental management documentation.

In addition, the processes described in Section 11 of the EMS may result in the need to update or revise this Plan. This will occur as needed.

A copy of the updated plan and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure – refer to Section 12.2 of the EMS.

12. References

- ANZEC. (1990). Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration. Australian and New Zealand Environment Council.
- BSi. (1993). Evaluation and measurement for vibration in buildings - Part 2: Guide to damage levels from groundborne vibration. Retrieved from British Standard Institution:
<https://www.alexandriava.gov/uploadedFiles/special/WaterfrontPlan/info/measurementforbuildingvibrations.pdf>
- DEC. (2006). Environmental Noise Management: A technical guideline. Department of Environment and Conservation.
- DEC. (2006). Assessing Vibration: a Technical Guideline (NSW AV:ATG). Department of Environment and Conservation.
- DECC. (2009). Interim Construction Noise Guideline. Department of Environment and Climate Change.
- DECCW. (2011). NSW Road Noise Policy. Department of Environment, Climate Change and Water.
- DPE. (2021). Development Consent SSD 10288. Prepared by the NSW Government Planning and Environment.
- EPA. (2017). Noise policy for industry. Retrieved from Environmental Protection Authority:
[https://www.epa.nsw.gov.au/your-environment/noise/industrial-noise/noise-policy-for-industry-\(2017\)](https://www.epa.nsw.gov.au/your-environment/noise/industrial-noise/noise-policy-for-industry-(2017))
- NGH. (2020). Culcairn Solar Farm EIS. Report prepared for Neoen.
- NGH. (2020). Culcairn Solar Farm, Response to Submissions. Report prepared for Neoen
- NGH. (2023). Modification 1 Report - *Culcairn Solar Farm*. NGH Pty Ltd.

Appendix A Noise and Vibration Criteria

A.1 Interim Construction Noise Guidelines

A1.1 Noise management levels for residences

The ICNG specifies noise targets, or ‘noise management levels’ (NML), for residences and other noise sensitive receivers (Table 4-1). The RBL, an overall single-figure background noise level, (refer to Section 5.2) is used when determining the NML. Residential receivers are considered ‘noise affected’ where construction noise levels are greater than the NMLs identified in Table 12-1.

Table 12-1 Noise Management Levels at residential receivers

Time of day	Management Level
Recommended standard hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or public holidays	Noise affected Rating Background Level + 10dB(A)
	Highly noise affected 75dB(A) ¹
Outside recommended standard hours	Noise affected Rating Background Level + 5dB(A)

¹Residences receiving noise levels over 75 dB(A) during standard working hours are considered highly noise affected irrespective of the rating background level.

A1.2 Adopted noise management levels for the Project

NMLs for the Project have been determined in accordance with the ICNG (DECC, 2009) and are summarised in Table 12-2. NMLs are based on the RBLs outlined in Table 5-2.

Table 12-2 Noise Management Levels for the Project

Location	Time of day	RBL dB(A)	NML dB(A)
All receivers	Day	40	50
	Evening	35	40
	Night	30	35
	Highly noise affected	NA	75

A.2 Road traffic noise criteria

Noise impact from the potential increase in traffic on the surrounding road network due to construction has been assessed in accordance with the NSW 'Road Noise Policy' (RNP) (DECCW, 2011). The RNP sets out criteria to be applied to types of road and land uses (refer to Table 12-3). Traffic utilising Benambra Road between Weeamera Road and Olympic Highway is dominated by heavy vehicle movements associated with Hurricane Hill Quarry. The Olympic Highway located about 3.5 km to the east of the Project is a major transport route in the region. The traffic noise on the Olympic Highway contributes to the noise character of the area.

Table 12-3 RNP Road Traffic Criteria, dB(A)

Road Category	Road name	Type of Project/Land Use	Assessment Criteria dB(A)	
			Day 7am-10pm	Night 10pm-7am
Freeway/arterial/sub-arterial roads	Olympic Highway	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	55 dBA LAeq (15 hr) external	55 dBA LAeq (9 hr) external
Local roads	Benambra Road Schneiders Road Walbundrie Road Weeamera Road	Existing residences affected by additional traffic on existing local roads generated by land use developments	55 dBA LAeq (1 hr) external	50 dBA LAeq (1 hr) external

A.3 Vibration criteria

Vibration from construction activities associated with the Project could potentially impact on the amenity of the occupants of dwellings or buildings located close to the Project. Generally, vibration impact can be summarised into two categories:

- Effect on human comfort
- Structural or cosmetic damage to buildings.

A3.1 Human comfort criteria

Human comfort vibration criteria is addressed in the ICNG and refers to Section 2.5 of the document Assessing Vibration: A Technical Guideline (NSW AV:ATG) (DEC, 2006).

The NSW AV:ATG outlines vibration limits in relation to human comfort. Criteria in this guideline are based on the British Standard BS6472-1992 Evaluation of human exposure to vibration in buildings (1-80Hz).

Vibration sources are defined as continuous, impulsive or intermittent. Table 12-4 provides a definition and examples of each type of vibration.

Table 12-4 Types of vibration

Type of Vibration	Definition	Examples
Continuous	Continues uninterrupted for a defined period (usually throughout the day-time and/or night-time)	Machinery, steady road traffic, continuous construction activity (such as tunnel boring machinery).
Impulsive	A rapid build-up to a peak followed by a damped decay that may or may not involve several cycles of vibration (depending on frequency and damping). It can also consist of a sudden application of several cycles at approximately the same amplitude, providing that the duration is short, typically less than 2 seconds	Infrequent: Activities that create up to 3 distinct vibration events in an assessment period, e.g. occasional dropping of heavy equipment, occasional loading and unloading.
Intermittent	Can be defined as interrupted periods of continuous or repeated periods of impulsive vibration that varies significantly in magnitude	Trains, nearby intermittent construction activity, passing heavy vehicles, forging machines, impact pile driving, jack hammers. Where the number of vibration events in an assessment period is three or fewer, this will be assessed against impulsive vibration criteria.

A3.2 Building Damage

In relation to structural damage, the German Standard DIN 4150-3 : 1999-02 - 'Structural vibration - Effects of vibration on structures', provides recommended maximum levels of vibration for structures, with an aim to reduce the likelihood of building damage caused by vibration. The standard also presents recommended maximum limits over a range of frequencies measured in any direction at the foundation or in the plane of the uppermost floor.

The minimum 'safe limit' of vibration at low frequencies for buildings are presented in DIN 4150.3 and are applied to this Project as outlined in Table 12-5.

Table 12-5 DIN 4150-3 Structural Damage Criteria

Group	Type of Structure	Vibration Velocity, mm/s			
		At Foundation at Frequency of			Plane of Floor uppermost Storey
		1 to 10 Hz	10 to 50 Hz	50 to 100 Hz	All Frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 - 40	40 - 50	40
2	Dwellings and buildings of similar design and/or use	5	5 - 15	15 - 20	15
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Group 1 or 2 and have intrinsic value (e.g. buildings under a preservation order)	3	3 - 8	8 - 10	8
Note:	At frequencies above 100 Hz, the values given in this column may be used as minimum values				

Appendix B Construction Noise Assessment

B.1 Construction noise sources

The plant and equipment modelled for the three construction noise scenarios and their sound power levels and quantities are outlined in Table 12-6.

Table 12-6 Construction noise scenario plant

Scenario 1		Scenario 2		Scenario 3	
Earthworks for internal roads and laydowns	Sound power level ((dB)A) at 7 m	Piling of panel support	Sound power level ((dB)A) at 7 m	Assembly of frames and panels	Sound power level ((dB)A) at 7 m
Grader (x1)	88	Front end loader (x1)	66	Front end loader (x1)	66
Excavator (x1)	85	Dump or road truck (x1)	85	Light vehicle (x1)	63
Water cart (x1)	82	Piling rig (x1)	87	Power generator 5 kVA (x1)	78
Vibratory roller (x1)	84	Light vehicle (x1)	63	Power hand tools (x1)	60
Dump Truck (x1)	85	Power hand tools (x2)	80		

B.2 Construction noise assessment results

Three construction noise scenarios were used to predict the likely impact of noise at adjacent residential receivers. The predicted noise level for each scenario was calculated for each residential receiver (Table 12-7 to Table 12-9).

Table 12-7 Construction noise assessment Scenario 1

Receiver ID	Address	Distance (m) to site boundary	Highest Predicted Noise Level dB(A)	NML Standard Hours dB (A)	Above NML?
R30	591 Walbundrie Road Culcairn	355	49	50	No
R31	511 Walbundrie Road Culcairn	129	62	50	Yes
R29	586 Cummings Road Culcairn	228	55	50	Yes
R28	679 Walbundrie Road Culcairn	934	36	50	No
R24	725 Cummings Road Walla Walla	343	49	50	No
R32	1061 Cummings Road Walla Walla	958	35	50	No
R19	216 Wattlevale Road Walla Walla	250	54	50	Yes
R17	932 Benambra Road Walla Walla	629	41	50	No
R33	Weeamera Road Culcairn	121	63	50	Yes
R34	Weeamera Road Culcairn	297	51	50	Yes*
R14	299 Weeamera Road Culcairn	213	56	50	Yes
R09	379 Cummings Road Culcairn	499	44	50	No
R08	Olympic Highway Culcairn	809	38	50	No
R03	279 Walbundrie Road Culcairn	986	35	50	No

Note: * Exceedances of ≤ 2 dB(A) are not perceptible.

Table 12-8 Construction noise assessment Scenario 2

Receiver ID	Address	Distance (m) to site boundary	Highest Predicted Noise Level dB(A)	NML Standard Hours dB (A)	Above NML?
R30	591 Walbundrie Road Culcairn	355	46	50	No
R31	511 Walbundrie Road Culcairn	129	60	50	Yes
R29	586 Cummings Road Culcairn	228	52	50	Yes*
R28	679 Walbundrie Road Culcairn	934	33	50	No
R24	725 Cummings Road Walla Walla	343	47	50	No
R32	1061 Cummings Road Walla Walla	958	33	50	No
R19	216 Wattlevale Road Walla Walla	250	51	50	Yes*
R17	932 Benambra Road Walla Walla	629	39	50	No
R33	Weeamera Road Culcairn	121	61	50	Yes
R34	Weeamera Road Culcairn	297	49	50	No
R14	299 Weeamera Road Culcairn	213	53	50	Yes
R09	379 Cummings Road Culcairn	499	42	50	No
R08	Olympic Highway Culcairn	809	35	50	No
R03	279 Walbundrie Road Culcairn	986	32	50	No

Note: * Exceedances of ≤ 2 dB(A) are not perceptible.

Table 12-9 Construction noise assessment Scenario 3

Receiver ID	Address	Distance (m) to site boundary	Highest Predicted Noise Level dB(A)	NML Standard Hours dB (A)	Above NML?
R30	591 Walbundrie Road Culcairn	355	39	50	No
R31	511 Walbundrie Road Culcairn	129	52	50	Yes*
R29	586 Cummings Road Culcairn	228	45	50	No
R28	679 Walbundrie Road Culcairn	934	26	50	No
R24	725 Cummings Road Walla Walla	343	39	50	No
R32	1061 Cummings Road Walla Walla	958	25	50	No
R19	216 Wattlevale Road Walla Walla	250	44	50	No
R17	932 Benambra Road Walla Walla	629	31	50	No
R33	Weeamera Road Culcairn	121	53	50	Yes
R34	Weeamera Road Culcairn	297	41	50	No
R14	299 Weeamera Road Culcairn	213	46	50	No
R09	379 Cummings Road Culcairn	499	34	50	No
R08	Olympic Highway Culcairn	809	28	50	No
R03	279 Walbundrie Road Culcairn	986	25	50	No

Note: * Exceedances of ≤ 2 dB(A) are not perceptible.

B.3 Weeamera Road construction noise assessment

Table 12-10 General plant and equipment for construction along Weeamera Road for the two scenarios

Construction equipment	Sound pressure level @ 7m dB(A)	No. of units
Scenario 1 – Clearing and grubbing		
Utility vehicles	63	2
Chainsaw	89	1
Excavator 5T	76	1
Excavator 12T	80	1
Scenario 2 – Bulk earthworks		
Water Cart	82	2
Tip Truck	85	2
Front-end Loaders	88	1
Utility vehicles	63	2
Rollers	84	2
Grader	88	2

The predicted noise levels for receivers for scenario 1 is provided in Table 12-11 and for scenario 2 in Table 12-12. The predicted noise levels were modelled for construction work occurring during standard hours of work.

Table 12-11 Highest predicted noise levels for scenario 1

Receiver ID	Distance (m) to Weeamera Road works	Highest Predicted Noise Level dB(A)	NML Standard Hours dB (A)	Above NML?
R09	1950	22	50	No
R13	1524	26	50	No
R14	270	50	50	No
R15	1992	22	50	No
R33	1791	24	50	No
R34	639	38	50	No

Table 12-12 Highest predicted noise levels for scenario 2

Receiver ID	Distance (m) to Weeamera Road works	Highest Predicted Noise Level dB(A)	NML Standard Hours dB (A)	Above NML?
R09	1950	28	50	No
R13	1524	32	50	No
R14	270	56	50	Yes
R15	1992	28	50	No
R33	1791	29	50	No
R34	639	44	50	No