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Romani Battery Energy Storage System

Noise Impact Assessment



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Noise Impact Assessment

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Keshav Dhayam

Managing Technical Consultant, Acoustics



Lucy Baker

Partner



Magaesh Naidu

Principal Technical Consultant, Acoustics

Environmental Resources Management
Australia Pty Limited
Level 14, 207 Kent Street
Sydney NSW 2000

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CONTENTS

EXECUTIVE SUMMARY	1
1. INTRODUCTION	3
1.1 PROJECT DESCRIPTION	3
1.2 OBJECTIVES	5
1.3 SCOPE OF WORKS	5
2. EXISTING NOISE ENVIRONMENT	6
3. NOISE POLICIES, GUIDELINES AND STANDARDS	7
3.1 NSW INTERIM CONSTRUCTION NOISE GUIDELINE	7
3.2 NSW NOISE POLICY FOR INDUSTRY	9
3.2.1 Project Intrusiveness Noise Level	9
3.2.2 Amenity Noise Levels and Project Amenity Noise Levels	10
3.2.3 Maximum Noise Level Event Assessment – Sleep Disturbance	11
3.3 NSW ROAD NOISE POLICY	11
4. PROJECT SPECIFIC MANAGEMENT LEVELS AND CRITERIA	12
4.1 CONSTRUCTION NOISE MANAGEMENT LEVELS	12
4.2 OPERATIONAL NOISE CRITERIA - PROJECT NOISE TRIGGER LEVELS (PNTLS)	12
4.3 ROAD TRAFFIC NOISE CRITERIA	14
5. CONSTRUCTION NOISE ASSESSMENT	15
5.1 NOISE MODELLING METHODOLOGY	15
5.2 CONSTRUCTION NOISE SOURCES	15
5.3 PREDICTED CONSTRUCTION NOISE LEVELS	16
5.4 CONSTRUCTION VIBRATION – SAFE WORKING DISTANCES	18
6. OPERATIONAL NOISE ASSESSMENT	19
6.1 METHODOLOGY	19
6.2 OPERATIONAL NOISE SOURCES	19
6.3 MODELLING RESULTS	22
6.4 CUMULATIVE IMPACTS	24
7. TRAFFIC NOISE ASSESSMENT	25
7.1 EXISTING ROAD TRAFFIC	25
7.2 CONSTRUCTION TRAFFIC NOISE	25
7.3 OPERATIONAL TRAFFIC NOISE	26
8. RECOMMENDATIONS	27
8.1 CONSTRUCTION	27

8.2	OPERATION	28
9.	CONCLUSION	29
10.	REFERENCES	30

APPENDIX A NOISE SENSITIVE RECEIVERS

APPENDIX B DRAFT CONSTRUCTION NOISE AND VIBRATION MANAGEMENT PLAN

APPENDIX C OPERATIONAL NOISE CONTOURS

LIST OF TABLES

TABLE 3-1	CONSTRUCTION NOISE MANAGEMENT LEVELS FOR RESIDENTIAL RECEIVERS	8
TABLE 3-2	MINIMUM ASSUMED RBLS AND PROJECT INTRUSIVENESS NOISE LEVELS	10
TABLE 3-3	AMENITY NOISE LEVELS	10
TABLE 4-1	CONSTRUCTION NOISE MANAGEMENT LEVELS	12
TABLE 4-2	NSW NPI CRITERIA - PNTLS	13
TABLE 4-3	RNP RESIDENTIAL ROAD TRAFFIC NOISE CRITERIA	14
TABLE 5-1	CONSTRUCTION NOISE SOURCES	15
TABLE 5-2	PREDICTED CONSTRUCTION NOISE LEVELS	17
TABLE 5-3	RECOMMENDED SAFE WORKING DISTANCES	18
TABLE 6-1	NOISE MODELLING PARAMETERS	19
TABLE 6-2	MODELLED NOISE SOURCES AND ASSUMPTIONS	20
TABLE 6-3	PREDICTED OPERATIONAL NOISE LEVELS	23
TABLE 6-4	NEAREST NOISE-GENERATING DEVELOPMENTS	24
TABLE 7-1	EXISTING ROAD TRAFFIC DATA	25

LIST OF FIGURES

FIGURE 1-1	PROJECT LOCALITY	4
FIGURE 6-1	LOCATION OF MODELLED OPERATIONAL NOISE SOURCES	21

ACRONYMS AND ABBREVIATIONS

Acronyms	Description
Applicant	Samsung C&T Renewable Energy Australia Pty Ltd (SREA)
BESS	Battery Energy Storage System
CNVMP	Construction noise and vibration management plan
dB(A)	dB(A) denotes a single number sound pressure level that includes a frequency weighting ("A-weighting") to reflect the subjective loudness of the sound level. The frequency of a sound affects its perceived loudness. Human hearing is less sensitive at low and very high frequencies, and so the A-weighting is used to account for this effect. An A-weighted decibel level is written as dB(A).
DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water
DECC	NSW Department of Environment and Climate Change (now DCCEEW)
DECCW	NSW Department of Environment, Climate Change and Water (now DCCEEW)
DPHI	NSW Department of Planning, Housing and Infrastructure
EPA	Environment Protection Authority
ICNG	Interim Construction Noise Guideline
L ₁₀	The noise level exceeded for 10 per cent of the time and is approximately the average of the maximum noise levels.
L ₉₀	The noise level exceeded for 90 per cent of the time and is approximately the average of the minimum noise levels. The L ₉₀ level is often referred to as the "background" noise level and is commonly used as a basis for determining noise criteria for assessment purposes.
L _{eq}	The 'equivalent continuous sound level', L _{eq} , is used to describe the level of a time-varying sound or vibration measurement. L _{eq} is often used as the "average" level for a measurement where the level is fluctuating over time. Mathematically, it is the energy-average level over a period (i.e., the constant sound level that contains the same sound energy as the measured level). When the dB(A) weighting is applied, the level is denoted dB L _{Aeq} . Often the measurement duration is quoted, thus L _{Aeq,15 min} represents the dB(A) weighted energy-average level of a 15-minute measurement.
L _{max}	The absolute maximum noise level in a noise sample.
NPI	Noise Policy for Industry
NSW	New South Wales
PNTL	Project Noise Trigger Level
Project	Romani Battery Energy Storage System (BESS)
RBL	The RBL is the overall single figure background level representing each assessment period (day, evening, and night) over the whole monitoring period (as opposed to over each 24-hour period used for the ABL). This is the level used for assessment purposes. It is the median value of: • All day assessment background levels over the monitoring period for the day; • All evening assessment background levels over the monitoring period for the evening; or • All night assessment background levels over the monitoring period for the night.
RMS	Roads and Maritime Services
RNP	Road Noise Policy
SEARs	Secretary's Environmental Assessment Requirements
SPL	Sound Pressure Level
SSD	State Significant Development
SWL	Sound Power Level

EXECUTIVE SUMMARY

This Noise Impact Assessment (NIA) has been prepared for the Romani Battery Energy Storage System (BESS) (the Project) situated at Booroorban, NSW, for Samsung C&T Renewable Energy Australia Pty Ltd (SREA or the Applicant).

The Project would involve the construction, operation, and decommissioning of a BESS and associated infrastructure. The BESS would have a storage capacity of 200 MW / 800 MWh and would connect to the electricity grid through the existing 220 kV transmission line (X5 transmission line) traversing the south of the Project area.

The Project is a State Significant Development (SSD) pursuant to Part 2.2, clause 2.6 and Schedule 1 of the *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP). This report supports a Development Application (DA) being prepared under Part 4, Division 4.7 of the *Environmental Planning and Assessment Act 1979*.

As per the project-specific Secretary's Environmental Assessment Requirements (SEARs) issued by the NSW Department of Planning, Housing and Infrastructure (DPHI) (SSD-67105475, dated 19 June 2025), the Environmental Impact Statement (EIS) must address the key issues relating to noise.

This NIA addresses the SEARs for the Project including:

- An assessment of the potential construction noise impacts of the development in accordance with NSW Department of Environment and Climate Change (DECC) (now NSW Department of Climate Change, Energy, the Environment and Water [DCCEEW])– *NSW Interim Construction Noise Guideline* (ICNG), July 2009;
- An assessment of operational noise impacts and cumulative noise impacts (considering other developments in the area) in accordance with the NSW Environment Protection Authority (EPA) – *Noise Policy for Industry* (NPI), October 2017; and
- An assessment of both operational and construction road traffic noise impacts in accordance with NSW Department of Environment, Climate Change and Water (DECCW) (now NSW Department of Climate Change, Energy, the Environment and Water [DCCEEW]) – *NSW Road Noise Policy* (RNP), March 2011.

The existing noise environment at identified noise sensitive receivers was established, and construction and operational noise management levels and assessment criteria were developed in accordance with the relevant NSW standards and guidelines, namely the NPI, ICNG and the RNP.

Applicable worst-case construction and operational assessment scenarios were developed based on project information outlined in this report. Construction and operational noise levels were predicted and compared to the established noise management levels and noise criteria to evaluate compliance.

The construction noise assessment concluded that the ICNG 'noise affected' management level is exceeded at R9 only for one construction scenario (CON 3 - General construction of infrastructure – Two small pile driving rigs at the site's boundary fronting a sensitive receiver and operating continuously for 15 minutes). The results were based on worst-case assumptions of construction activities at the Project boundary fronting sensitive receivers in the absence of any noise mitigation measures.

However, no exceedance of the ICNG 'highly noise affected' management level at any of the sensitive receivers is expected during construction. The main noise contributors are the small pile driving rigs. The duration of exceedances is variable due to the intermittent operation of construction equipment and the changing separation distances between noise sources and sensitive receivers. Noise management and control measures would be required to be implemented to mitigate impacts. The measures entail a combination of informing the community on operating duration of high noise emitting construction machinery, and the complaints' handling process. These measures are outlined in the draft construction noise and vibration management plan (CNVMP) for the Project (provided in Appendix B of this report). It is, however, noted that R9 is a residential dwelling which has been vacant for a prolonged time. The occupancy status of R9 should be reviewed during the construction period. Should R9 remain vacant, the noise management measures may not apply.

For the operational noise impact assessment, the NPI sets out the Project Noise Trigger Levels (PNTLs) that are used to assess the potential impacts of noise from industry and indicate the noise levels at which feasible and reasonable noise management measures should be considered.

The operational noise assessment indicates that with the incorporation of noise mitigation measures, all the identified sensitive receivers within 2 km of the Project boundary are predicted to achieve compliance with the NPI PNTLs. The noise mitigation measure applicable to this Project is the at-source mitigation measure of installing silencer kits as part of the Project design for all Medium Voltage (MV) transformers (MV Stations).

The nearest developments with the potential to contribute to the noise levels generated by the Project at the identified sensitive receivers were also identified. Compliance with the recommended amenity noise levels at the closest impacted noise sensitive receivers by this Project indicates that cumulative noise impacts are unlikely.

Opportunities for other operation noise mitigation strategies through technology selection, localised equipment noise control among other options with equivalent or improved equipment noise mitigation performance may be considered in the detailed design phase.

Equipment selection and quantity are to adhere to the Sound Power Level (SWL) per plant item and quantity specified in the assessment. Should the SWL, location or quantity of the selected equipment change significantly, this assessment should be revised to incorporate the changes in design.

Construction and operational traffic noise impacts arising from additional traffic associated with the Project have been assessed. Construction and operational road traffic impacts are not expected at all sensitive receivers in accordance with the assessment methodology and criteria outlined in the RNP.

1. INTRODUCTION

This Noise Impact Assessment (NIA) has been prepared for the Romani Battery Energy Storage System (BESS) (the Project) at Booroorban, NSW, for Samsung C&T Renewable Energy Australia Pty Ltd (SREA or the Applicant).

The Project is a State Significant Development (SSD) pursuant to Part 2.2, clause 2.6 and Schedule 1 of the State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP). This report supports a development application (DA) being prepared under Part 4, Division 4.7 of the Environmental Planning and Assessment Act 1979.

As per the project-specific Secretary's environmental assessment requirements (SEARs) (SSD-67105475, dated 19 June 2024), the EIS must address the key issues relating to noise.

This NIA addresses the SEARs for the Project including:

- An assessment of the potential construction noise impacts of the development in accordance with NSW Department of Environment and Climate Change (DECC) (now NSW Department of Climate Change, Energy, the Environment and Water [DCCEEW])– *NSW Interim Construction Noise Guideline* (ICNG), July 2009;
- An assessment of operational noise impacts and cumulative noise impacts (considering other developments in the area) in accordance with the NSW Environment Protection Authority (EPA) – *Noise Policy for Industry* (NPI), October 2017; and
- An assessment of both operational and construction road traffic noise impacts in accordance with NSW Department of Environment, Climate Change and Water (DECCW) (now NSW Department of Climate Change, Energy, the Environment and Water [DCCEEW]) – *NSW Road Noise Policy* (RNP), March 2011.

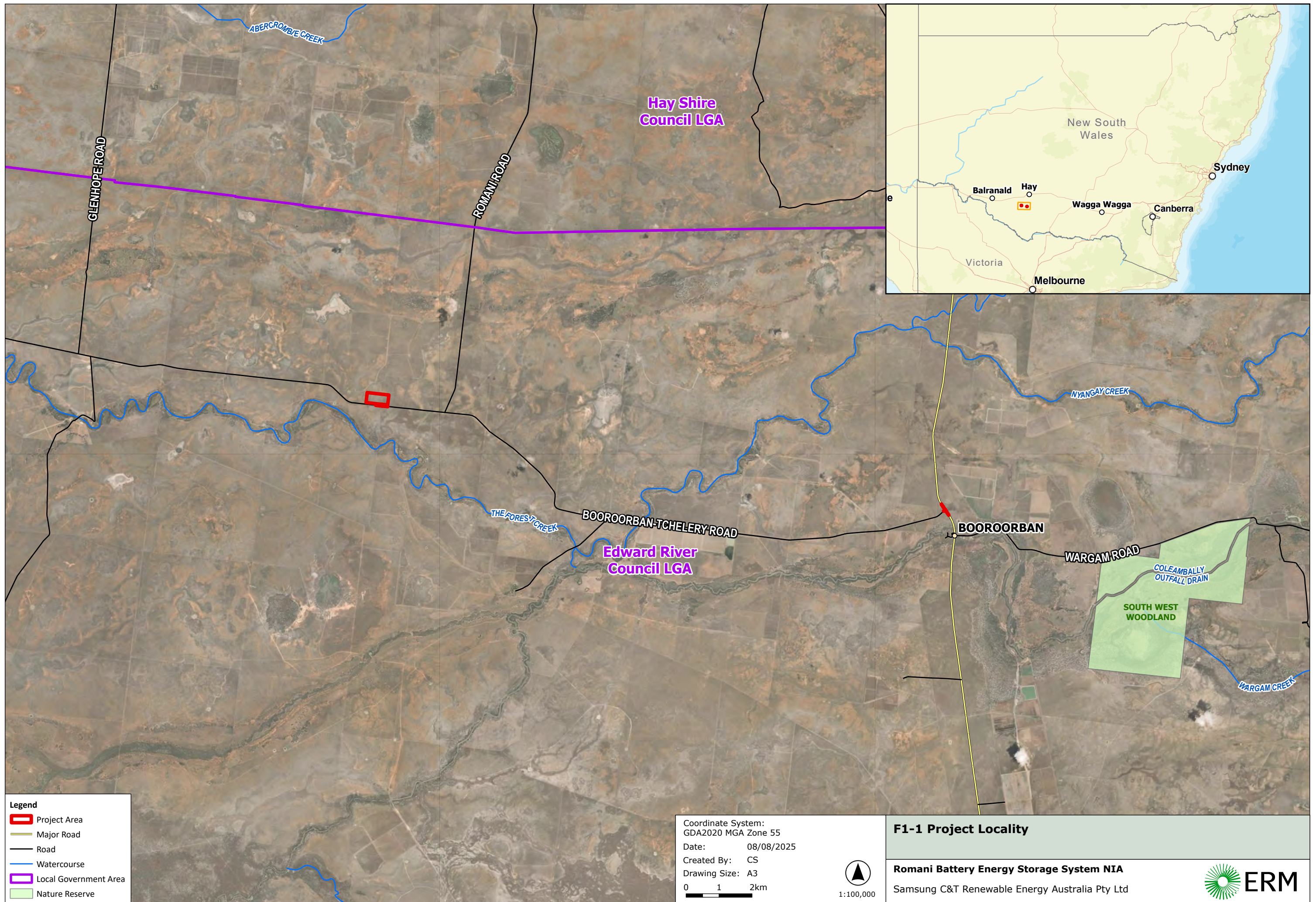
1.1 PROJECT DESCRIPTION

The Project situated north of Booroorban-Tchelery Road, Booroorban NSW. The Project is wholly located within the Edward River Council LGA. The Project area is approximately 21 ha over 2 freehold lots and is comprised land used for agricultural activities such as livestock grazing.

The Project will involve the construction, operation, and decommissioning of a BESS and associated infrastructure.

The BESS will have a storage capacity of 200 MW / 800 MWh and will connect to the electricity grid through the existing 220 kV transmission line (X5 transmission line) traversing the south of the Project area.

The Project locality is shown in **Figure 1-1**.



1.2 OBJECTIVES

The objectives of this report are to provide an assessment of potential noise and vibration impacts associated with the construction and operation of the Project, and to recommend feasible and reasonable noise mitigation and management measures. These mitigation and management measures are designed to ensure that the construction and operation of the Project are carried out in compliance with the noise assessment management levels and criteria established in this report.

The noise and vibration assessment was undertaken based on the design information, site and layout plans, equipment lists and manufacturers' specifications, and operating modes outlined in this report.

1.3 SCOPE OF WORKS

The scope of the assessment includes:

- Evaluation of the existing noise environment and identification of Noise Sensitive Receivers;
- Establishment of project-specific noise criteria in accordance with the ICNG, NPI and RNP at noise sensitive receivers for compliance assessment;
- Determining the extent of construction noise and vibration impacts (if any) associated with the construction of the proposed solar farm and BESS in accordance with the ICNG;
- Determining the extent of operational noise impacts (if any) associated with the operation of the proposed solar farm and BESS, and cumulative noise impacts (considering other developments in the area) in accordance with the NPI;
- Determining the extent of traffic noise impacts (if any) associated with the construction and operation of the proposed solar farm and BESS in accordance with the RNP;
- Recommendation of mitigation measures to be implemented on site to ensure compliance with the operational and construction project-specific noise criteria; and
- Preparation of a draft Construction Noise and Vibration Management Plan (CNVMP).

2. EXISTING NOISE ENVIRONMENT

Two Noise Sensitive Receivers (NSRs) within 2 km of the Project boundary have been identified, as shown in **Figure 6-1** and tabulated in **Appendix A**.

The noise environment in the vicinity of the Project and at noise sensitive receivers is best described as rural residential. Rural residential is described in the NPI (EPA, 2017) as an area with an acoustical environment that is dominated by natural sounds (such as foliage noise, birdsong and insect noise) having little or no road traffic noise (from Booroorban-Tchelery Road) and is generally characterised by low background noise levels. Settlement patterns (rural residential) would be typically sparse.

The background noise levels at the noise sensitive receivers within 2 km of the Project are expected to be similar to the minimum assumed Rating Background Levels (RBLs) specified in Table 2.1 of the NPI, as presented in **Table 3-2**.

The use of minimum assumed RBLs is reasonable in rural environments where there are no prominent noise sources associated with roads, rail and industrial plant influencing the noise environment at the receivers. It also allows for the strictest NPI Project Noise Trigger Levels (PNTLs) to be developed. The PTNLs applicable to the noise sensitive receivers are further discussed in **Section 4**.

It should be noted that R7 is classified as a holiday accommodation (temporary accommodation), being a caravan. Furthermore, it should also be noted that R9 is a residential dwelling which has been vacant for a prolonged period. The occupancy status of both R7 and R9 should be reviewed prior to the start of construction of the Project.

3. NOISE POLICIES, GUIDELINES AND STANDARDS

This assessment has been conducted in accordance with the following policies and guidelines:

- NSW Department of Environment and Climate Change (DECC) (now NSW Department of Climate Change, Energy, the Environment and Water [DCCEEW]) – *NSW Interim Construction Noise Guideline* (ICNG), July 2009;
- NSW Environment Protection Authority (EPA) – *Noise Policy for Industry* (NPI), October 2017; and
- NSW Department of Environment, Climate Change and Water (DECCW) (now NSW Department of Climate Change, Energy, the Environment and Water [DCCEEW]) – *NSW Road Noise Policy* (RNP), March 2011.

Further information regarding the application of the key policy and guidelines is provided below.

3.1 NSW INTERIM CONSTRUCTION NOISE GUIDELINE

The ICNG (DECC, 2009), presents an accepted method to assess construction noise impacts for a range of receiver types. It provides a set of recommended standard hours of construction, specifically:

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

Construction outside these hours might be undertaken in accordance with the ICNG for the following categories of work:

- The delivery of oversized plant or structures that police or other authorities determine require special arrangements to transport along public roads;
- Emergency work to avoid the loss of life or damage to property, or to prevent environmental harm; and
- Works where a proponent demonstrates and justifies a need to operate outside the recommended standard hours.

The ICNG encourages works to occur within the recommended standard hours of construction unless justification is provided. It focuses on minimising noise by managing construction noise impacts, rather than only on achieving numeric noise levels, and recognises that some noise from construction sites is inevitable.

The ICNG encourages organisations involved with construction, maintenance or upgrading works (e.g., large scale contractors or Government agencies) to develop best-practice techniques for managing construction noise and vibration and implementing feasible and reasonable mitigation measures.

The ICNG is suitable to quantitatively assess potential noise emissions and impacts associated with Project construction. The ICNG assessment methodology has been adopted to develop project-specific construction noise management levels, assess potential impacts, and recommend any necessary mitigation, management measures.

Table 3-1 details the ICNG construction noise management levels guidance for residential receivers.

TABLE 3-1 CONSTRUCTION NOISE MANAGEMENT LEVELS FOR RESIDENTIAL RECEIVERS

Time of day	Management Level, L_{eq} (15min), dB(A)	How to apply
Recommended standard hours (SH): - Monday to Friday: 7am to 6pm; - Saturday: 8am to 1pm; and - No work on Sundays or public holidays.	Noise affected Rating Background Level (RBL) + 10 dB(A)	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{eq, 15 \text{ minute}}$ 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 dB(A)	The highly noise affected level represents the point above which there may be a 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, considering: - Times identified by the community when they are less sensitive to noise (e.g., before and after school for works near schools); - Mid-morning or mid-afternoon for works near residences; - If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours (OOH): All other times including Public Holidays.	Noise affected Rating Background Level (RBL) + 5 dB(A)	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.

3.2 NSW NOISE POLICY FOR INDUSTRY

Responsibility for the control of noise emissions in NSW is typically vested in Local Government and the NSW Environment Protection Authority (EPA). The NPI (EPA, 2017) provides a framework and methodology for deriving criteria for project consent and environment protection licence conditions.

The criteria, referred to as the Project Noise Trigger Levels (PNTLs), are defined in Section 2.1 of the NPI and considers the lowest of the intrusive or amenity residential receiver criterion so that the most stringent threshold is set concerning existing industrial noise in the area. PNTLs are established with due regard to the requirements of the NPI for all identified residential. PNTLs for all associated assessment periods (Day, Evening and Night) are provided as noise sources are expected to be present during all these periods.

3.2.1 PROJECT INTRUSIVENESS NOISE LEVEL

The NPI states:

"The intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (represented by the L_{Aeq} descriptor), measured over a 15-minute period, does not exceed the background noise level by more than 5 dB when beyond a minimum threshold. This intrusiveness noise level seeks to limit the degree of change a new noise source introduces to an existing environment."

The intrusiveness noise level is determined as follows:

$$L_{Aeq, 15min} \leq \text{Rating Background Noise Level} + 5 \text{ dB}$$

RATING BACKGROUND NOISE LEVEL AND PROJECT INTRUSIVE NOISE LEVEL

The Rating Background Level (RBL) is the single-figure background L_{90} level representing each assessment period (day/evening/night) over the whole monitoring period (as opposed to over each 24-hour period used for the assessment background level).

For this assessment, noise monitoring was not conducted as it was deemed appropriate to apply the minimum RBL as per the NPI given the rural location of the site. As such, the minimum intrusiveness noise levels were adopted, providing a conservative assessment of operational noise of the Project. The project intrusiveness noise levels are summarised in **Table 3-2**.

TABLE 3-2 MINIMUM ASSUMED RBLs AND PROJECT INTRUSIVENESS NOISE LEVELS

Time of day	Minimum assumed RBL, in dB(A)	Minimum project intrusiveness noise levels, in $L_{Aeq,15min}$ dB(A)
Day	35	40
Evening	30	35
Night	30	35

3.2.2 AMENITY NOISE LEVELS AND PROJECT AMENITY NOISE LEVELS

To limit continuing increases in noise levels from application of the intrusiveness level alone, the ambient noise level within an area from all industrial noise sources combined should remain below the recommended amenity noise levels specified in Table 2.2 of the NPI, where feasible and reasonable. The recommended amenity noise levels will protect against noise impacts such as speech interference, community annoyance and sleep disturbance. The receivers are all classified as rural residential and their corresponding noise amenity levels are given in **Table 3-3**.

TABLE 3-3 AMENITY NOISE LEVELS

Receiver/ Noise Amenity Area	Assessment Period	Recommended Amenity Noise Level, L_{eq} dB(A)
Residential Rural	Day	50
	Evening	45
	Night	40

Note:

- Day-time period is from 7am to 6pm (Monday to Saturday) and 8am to 6pm (Sundays and Public Holidays);
- Evening period is from 6pm to 10pm; and
- Night-time period is from 10pm to 7am (Monday to Saturday) and 10pm to 8am (Sundays and Public Holidays).

The recommended amenity noise levels represent the objective for total industrial noise at a receiver location, whereas the project amenity noise level represents the objective for noise from a single industrial development at a receiver location.

To ensure that industrial noise levels (existing plus new) remain within the recommended amenity noise levels for an area, a project amenity noise level applies for each new source of industrial noise as follows:

***Project amenity noise level for industrial developments =
Recommended amenity noise level minus 5 dB(A)***

3.2.3 MAXIMUM NOISE LEVEL EVENT ASSESSMENT – SLEEP DISTURBANCE

The potential for sleep disturbance from maximum noise level events from the development during the night-time period needs to be considered. Sleep disturbance relates to both awakenings and disturbance to sleep stages.

A detailed maximum noise level event assessment should be undertaken where the subject development night-time noise levels at a residential location exceed:

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

The night-time noise levels subject to a detailed maximum noise level event assessment are therefore $L_{Aeq,15min}$ 40 dB(A) and/or L_{AFmax} 52 dB(A).

The 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 extent of impacts on sleep include:

- How often high noise events will occur;
- The distribution of likely events across the night-time period and the existing ambient maximum events in the absence of the subject 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 scientific literature available at the time of the assessment regarding the impact of maximum noise level events at night.

3.3 NSW ROAD NOISE POLICY

The RNP (DECCW, 2011) outlines the range of measures needed to minimise road traffic noise and its impacts. It is intended for use by acoustics specialists as well as:

- Road project proponents;
- Determining authorities and regulators involved in the approval and construction of road projects and land use developments that generate additional traffic on existing roads; and
- City and transport planners and policymakers dealing with issues such as route corridors, heavy vehicle transport and building codes.

The RNP aims to identify the strategies that address the issue of road traffic noise from existing roads, new road projects, road redevelopment projects and new traffic-generating developments.

The RNP provides guidance, criteria, and procedures for assessing noise impacts from existing, new, and redeveloped roads and traffic generating developments. The assessment of road traffic noise impacts on residences near public roads is assessed under the RNP. In this case, the RNP is considered the suitable document to qualitatively assess potential noise emissions and impacts associated with construction and operational road traffic.

The RNP details noise assessment criteria for various road categories and land uses. Road access to the Project will be via Booorooban-Tchelery Road, which is unclassified.

4. PROJECT SPECIFIC MANAGEMENT LEVELS AND CRITERIA

4.1 CONSTRUCTION NOISE MANAGEMENT LEVELS

Construction works are expected to occur only during the recommended standard daytime hours as defined in **Section 2.1**. The project-specific construction noise management levels (NMLs) for works within the recommended standard hours for construction are presented in **Table 4-1** below.

These NMLs have been established with due regard to the requirements of the ICNG for all identified residential and other sensitive non-residential receivers.

For this assessment, noise monitoring was not conducted and instead the minimum RBLs as stated in the NPI policy summarised in **Table 4-2** were applied. This provides a conservative construction noise assessment for the Project.

TABLE 4-1 CONSTRUCTION NOISE MANAGEMENT LEVELS

Receiver Type and Time of Day	Daytime Rating Background Level (RBL), dB(A)	Noise Affected Management Level, $L_{eq}(15 \text{ min})$, dB(A)	Highly Noise Affected Management Level, $L_{eq}(15 \text{ min})$, dB(A)
Residence - Recommended Standard Hours	35	45	75

4.2 OPERATIONAL NOISE CRITERIA - PROJECT NOISE TRIGGER LEVELS (PNTLS)

PNTLS have been determined in **Table 4-2** and are the more stringent level between the project intrusiveness noise level and the project amenity noise criteria for all assessment periods.

TABLE 4-2 NSW NPI CRITERIA - PNTLS

Receiver	Assessment period ^a	Project Intrusiveness Noise Level ^b L _{Aeq,15min} dB(A)	NPI Amenity Noise Level L _{Aeq,period} dB(A)	Project Amenity Noise Level L _{Aeq,15min} dB(A) ^{c,d}	Project Noise Trigger Level L _{Aeq,15min} dB(A)	Sleep Disturbance L _{Amax}
Residential	Day	40	50	48	40	-
	Evening	35	45	43	35	-
	Night	35	40	38	35	52

Notes:

^a Day-time period is from 7am to 6pm (Monday to Saturday) and 8am to 6pm (Sundays and Public Holidays; Evening period is from 6pm to 10pm and Night-time period is from 10pm to 7am (Monday to Saturday) and 10pm to 8am (Sundays and Public Holidays).

^b Based on RBL as noted in **Table 4-2**.

^c These levels have been converted to L_{Aeq, 15 minute} using the following: L_{Aeq, 15 minute} = L_{Aeq, period} + 3 dB (Reference: *Section 2.2* of the NPI).

^d To account for the existing industrial noise sources, '-5 dB' was applied to the Project Amenity Noise Level (Reference: *Section 2.4* of the NPI).

Table 4-2 shows that the PNTLs are dictated by the project intrusiveness noise levels for all assessment periods and are applicable to the operational noise assessment.

By meeting the PNTLs at the identified sensitive receivers, the noise levels at all other receivers located further away from the Project are expected to comply with the noise criteria of the NPI.

If the night-time PNTL of $L_{Aeq,15min}$ 35 dB(A) at the identified receivers is met, a detailed maximum noise level event assessment is not required.

4.3 ROAD TRAFFIC NOISE CRITERIA

The RNP criteria applicable to the nearest residences affected by additional road traffic due to the Project are presented in **Table 4-3**.

TABLE 4-3 RNP RESIDENTIAL ROAD TRAFFIC NOISE CRITERIA

Road Category	Type of Project/Land Use	Assessment Criteria – dB(A)	
		Day 7am to 10pm	Night 10pm to 7am
Local roads (Romani Road & Booroorban- Tchelery Road)	Existing residences affected by additional traffic on existing local roads generated by land use developments.	$L_{Aeq,1hr}$ 55 (external)	$L_{Aeq,1hr}$ 50 (external)

Note: The assessment criteria for external noise levels apply at 1 metre from the façade of any affected residential receiver.

Additionally, for land use developments generating additional traffic, the RNP states the following:

For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding 'no build option'.

It should be noted that the RNP is applicable to a permanent road traffic scenario. The usage of the RNP for construction, which is temporary, is considered conservative.

5. CONSTRUCTION NOISE ASSESSMENT

5.1 NOISE MODELLING METHODOLOGY

Conservative predictions of construction noise have been established through the calculation of the geometrical dispersion of noise with the assumption of flat topography, no acoustic shielding and no ground absorption effects.

The noise predictions consider the sound power level of the equipment operating continuously for a 15-minute period. It should be noted that the construction noise levels at any receiver depend on the type and duration of construction activity being undertaken and are expected to be variable over the total construction program.

Under a worst-case noise scenario, the construction noise sources are assumed to be at the boundary of the site fronting the nearest sensitive receivers, representing the shortest separation distance between noise source and receiver.

5.2 CONSTRUCTION NOISE SOURCES

The following typical construction noise sources and their sound power levels are anticipated for the project and are listed in **Table 5-1**.

TABLE 5-1 CONSTRUCTION NOISE SOURCES

Equipment	Sound Power Level per unit, dB(A)*
Small Pile Driving Rig	114
Crane	110
Drum Roller	109
Padfoot Roller	109
Wheeled Loader	109
Dump Truck	108
Excavator	107
Bulldozer	108
Scraper	116
Grader	107
Chain Trencher	104
Water Truck	104
Telehandler	98
Forklift	90
Tub Grinder/ Mulcher 40-50 hp	116

*Note: *The sound power levels provided in the above table are based on AS 2436:2010 (Standards Australia, 2010) and the Transport for New South Wales Construction Noise and Vibration Guideline (TfNSW, 2016).*

The following worst-case construction noise scenarios were assessed:

1. **CON 1** - Site preparation and establishment - A drum roller and a padfoot roller at the site's boundary fronting a sensitive receiver and operating continuously for 15 minutes;
2. **CON 2** - Delivery of infrastructure – Two cranes at the site's boundary fronting a sensitive receiver and operating continuously for 15 minutes; and
3. **CON 3** - General construction of infrastructure – Two small pile driving rigs at the site's boundary fronting a sensitive receiver and operating continuously for 15 minutes.

5.3 PREDICTED CONSTRUCTION NOISE LEVELS

Predicted worst-case and unmitigated $L_{Aeq,15min}$ noise levels for all individual construction machinery/equipment and above-mentioned construction scenarios at the nearest sensitive receivers (within 2 km of the site's boundary where construction noise impacts may be present) have been presented in **Table 5-2**.

The following findings have been summarised from the results:

- The ICNG 'noise affected' management level is exceeded at:
 - R9 only for construction scenario CON 3. It should be noted that R9 is impacted only when occupied;
- No exceedance of the ICNG 'highly affected' management level at any of the sensitive receivers is expected for all construction scenarios; and
- The main noise contributors are the drum roller, the padfoot roller, the cranes and the small pile driving rigs, as defined in the worst-case construction noise scenarios.

It should be noted that the predicted noise levels and the duration of any exceedances are variable due to the intermittent operation of construction equipment and the changing separation distances between mobile construction noise sources and sensitive receivers. A construction noise and vibration management plan (CNVMP) is required as per standard practice for construction in NSW and in-principal noise and vibration mitigation measures are discussed in **Section 8.1**. As per the SEARs for this Project, a draft CNVMP is provided in **Appendix B**.

Furthermore, it should also be noted that R9 is a residential dwelling which has been vacant for a prolonged period. The occupancy status of R9 should be reviewed prior to the start of construction. Should R9 remain vacant during the construction period, more specifically when the two piling rigs are operating, it is reasonable to not consider R9 as a noise sensitive receiver.

TABLE 5-2 PREDICTED CONSTRUCTION NOISE LEVELS

Sensitive Receiver ID	Equipment ^a															Scenario ^b		
	Small pile driving rig	Crane	Drum roller	Padfoot roller	Wheeled loader	Dump truck	Excavator	Bulldozer	Scraper	Grader	Chain trencher	Water truck	Telehandler	Forklift	Tub Grinder/Mulcher	CON 1	CON 2	CON 3
R9	43	39	38	38	38	37	36	37	45	36	33	33	27	19	45	41	42	46
R7	41	37	36	36	36	35	34	35	43	34	31	31	25	17	43	39	40	44

Notes:

The Noise Affected Management Level is $L_{Aeq(15\text{ min})}$ 45 dB(A), and the Highly Noise Affected Management Level is $L_{Aeq(15\text{ min})}$ 75 dB(A)

Noise Affected Management Level exceedances are shown in **bold** font. Important to note that these exceedances are only when the specific machinery is operating, or stated construction scenario is occurring.

^a Predicted noise levels for equipment are for the operation of a single equipment item at the Solar Farm boundary fronting each assessed Sensitive Receiver

^b Construction scenarios CON 1, CON 2 and CON 3 are defined in **Section 5.2**.

5.4 CONSTRUCTION VIBRATION – SAFE WORKING DISTANCES

Safe working distances for vibration causing plant, which may be used during the construction activities, have been taken from the Transport for New South Wales Construction Noise Strategy (TfNSW, 2016) and are summarised in **Table 5-3**.

TABLE 5-3 RECOMMENDED SAFE WORKING DISTANCES

Plant Item	Rating/Description	Safe Working Distance, in metres	
		Cosmetic Damage (BS 7385 ¹)	Human Response (AS 2670)
Vibratory Roller	<50kN (1-2t)	5	15 to 20
Vibratory Roller	<100kN (2-4t)	6	20
Vibratory Roller	<200kN (4-6t)	12	40
Vibratory Roller	<300kN (7-13t)	15	100
Small Hydraulic Hammer	300kg – 5 to 12t excavator	2	7
Medium Hydraulic Hammer	900kg – 12 to 18t excavator	7	23

The safe working distances for typical vibration causing plant in construction range from 7 to 100 metres to trigger a human response. There is no vibration sensitive receiver within this range and therefore vibration impacts are not expected from the project.

¹ BS 7385 -2: 1993 Guide to damage levels from ground borne vibration

6. OPERATIONAL NOISE ASSESSMENT

6.1 METHODOLOGY

Noise modelling has been undertaken using the CONCAWE algorithm (Manning, 1981), as implemented within SoundPLAN 9.1. The noise modelling takes into consideration the sound power levels of the proposed site equipment, and applies adjustments for attenuation from geometrical dispersion, acoustic shielding from intervening ground topography, ground effects, meteorological effects, and atmospheric absorption.

The main noise modelling parameters are summarised in **Table 6-1**.

TABLE 6-1 NOISE MODELLING PARAMETERS

Modelling Aspect	Parameter
Software	SoundPLAN 9.1
Outdoor Noise Propagation Algorithm	CONCAWE incorporating the ISO 171534-3 (improved method selected)
Ground Absorption Factor	0.5 (50% acoustically hard ground and 50% acoustically soft ground)
Topographical contours	10 m intervals
Receiver height	1.5 m
CONCAWE Meteorological Inputs	- Daytime/Evening: Stability category D with wind speed of 3m/s - Night-time: Stability category F with wind speed of 2m/s

6.2 OPERATIONAL NOISE SOURCES

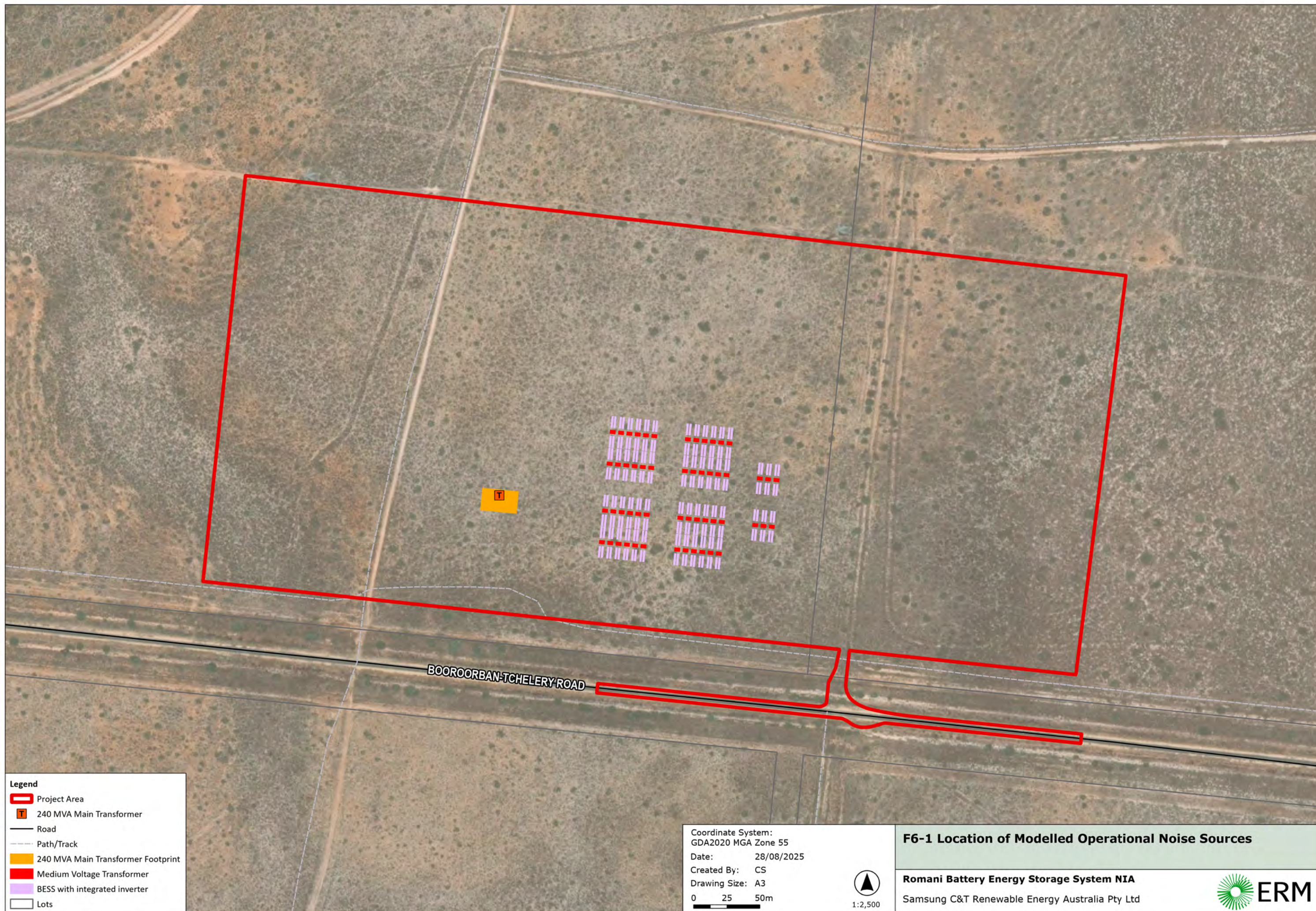
Table 6-2 summarises the noise sources and modelling assumptions for this assessment. The locations of all modelled noise sources are displayed in **Figure 6-1**.

TABLE 6-2 MODELLED NOISE SOURCES AND ASSUMPTIONS

Location (Refer to Figure 6-1)	Plant Item	Sound Power Level per Plant Item, L _{Aeq} (15 min) dB(A)	Sound Power Level Reference	Quantity	Assumptions
240 MVA Main Transformer (Orange Box Marked with a 'T')	High Voltage Transformer	93	As advised by client	1	- Reference data – Sound Power Level of 93 dB(A). - Source modelled at a height of 5.0m.
BESS with integrated Inverter (Purple Boxes)	BESS with integrated Inverter	93 (100% Duty - Day) 88 (60% Duty - Evening/Night)	Manufacturer's data reference – As advised by client	216	- Reference data – Sound Power Level of 93.1 dB(A) for 100% Duty. - Reference data – Sound Power Level of 87.7 dB(A) for 60% Duty. - Source modelled at a height of 3.3m.
Medium Voltage Transformer (Red Boxes)	Medium Voltage Transformer	86	Manufacturer's data reference – SMA Solar Tech SC 3800 UP-XT (with silencer kit)	54	- Reference data – Sound Power Level of 85.9 dB(A) with silencer kit (Maximum rated power). - Dimensions are specified at 2.8m (W) x 2.3m (H) x 1.6m (D).

The locations of the modelled noise sources are displayed in **Figure 6-1**.

The noise mitigation measure of installing silencer kits for the MV Stations has been incorporated into the Project design as a commitment by the Applicant as discussed in **Section 8.2**, with the aim of achieving compliance with the assessment criteria. All noise predictions presented hereinafter have considered the implementation of MV Station silencer kits.



Legend

- Project Area
- 240 MVA Main Transformer
- Road
- Path/Track
- 240 MVA Main Transformer Footprint
- Medium Voltage Transformer
- BESS with integrated inverter
- Lots

Coordinate System:
GDA2020 MGA Zone 55
Date: 28/08/2025
Created By: CS
Drawing Size: A3
0 25 50m



F6-1 Location of Modelled Operational Noise Sources

Romani Battery Energy Storage System NIA
Samsung C&T Renewable Energy Australia Pty Ltd



6.3 MODELLING RESULTS

The predicted operational noise levels have been compared with the PNTLs (presented in **Section 4.2**).

Predicted operational noise levels at the nearest NSRs within 2 km of the Project boundary for the day, evening and night-time noise enhancing meteorological conditions as required by the NPI are shown in **Table 6-3**. Noise prediction values at NSRs beyond 2km of the Project boundary are too low to be quantifiable.

The noise contours displaying the predicted noise levels for the day, evening and night periods for noise-enhancing meteorological conditions are provided in **Appendix C**.

The predicted noise levels indicate compliance with the relevant PNTLs at all assessed NSRs based on the modelled noise sources' assumptions presented in **Table 6-2**.

TABLE 6-3 PREDICTED OPERATIONAL NOISE LEVELS

Sensitive Receiver ID	Receiver Category	Distance to Project Boundary, in metres	Assessment Criteria, PNTLs in $L_{Aeq,15\text{ min}}$, dB(A) Day / Evening / Night-time	Predicted Operational Noise Level for Noise Enhancing Meteorological Conditions* in, $L_{Aeq,15\text{ min}}$, dB(A)		
				Day	Evening	Night-time
R7	Holiday Accommodation	1820	53 / 48 / 43	35	30	30
R9	Rural Residential	1450	40 / 35 / 35	38	33	33

Note:

* Day/Evening: stability categories A–D with light winds up to 3 m/s at 10 m AGL.

** Night: stability categories A–D with light winds up to 3 m/s at 10 m AGL and/or stability category F with winds up to 2 m/s at 10 m AGL.

6.4 CUMULATIVE IMPACTS

The Project is located within the South West REZ, which is proposed to house a number of large-scale electricity generating and storage developments. Consequently, the planned number of renewable energy projects and other SSD projects in the area may lead to cumulative impacts at sensitive receivers.

The nearest developments, within 5 km, with the potential to contribute to the noise levels generated by the Project at the identified sensitive receivers are listed in **Table 6-4**.

TABLE 6-4 NEAREST NOISE-GENERATING DEVELOPMENTS

Development	Brief Description	Distance from the Project	Status as of June 2025
Project Energy Connect NSW – Eastern Section	540 kilometers of new transmission lines, a new substation at Dinawan, and upgrading existing substations	1 km	Prepare EIS
West Nyangay Solar Farm	800 MW of solar capacity	1 km	Prepare EIS
The Plains Wind Farm	188 WTGs, with 7.2 MW capacity each	4 km north-east	EIS Submitted in April 2024

Noise impact assessments for the nearest developments are noted to be under preparation as of June 2025. In line with similar projects and development consent approvals, it is expected that the noise impacts from these developments will be assessed in accordance with the NPI (EPA, 2017) to address cumulative noise impacts that consider this Project.

The NPI's project amenity noise level is specifically used for addressing cumulative noise impacts and has already been considered in the development of the PNTLs for this Project. The predicted noise levels for the Project indicate compliance with the PNTLs as well as project amenity noise levels and therefore, also demonstrate that cumulative impacts are unlikely. The nearest noise-generating projects are expected to also achieve the NPI project amenity noise levels to address cumulative noise impacts that consider this project.

7. TRAFFIC NOISE ASSESSMENT

This section assesses noise impacts from noise generated by additional traffic associated with Project construction and operation.

7.1 EXISTING ROAD TRAFFIC

Existing road traffic data, relevant to this assessment, for Romani Road and Booororban-Tchelery Road near the proposed site access was obtained from the Project's Traffic Impact Assessment (Amber, 2025), and are as follows:

TABLE 7-1 EXISTING ROAD TRAFFIC DATA

Parameter	Romani Road	Booororban-Tchelery Road
Posted speed limit	100 km/hr	100 km/hr
Heavy vehicle traffic percentage	20.0%	12.5%
Average Weekday traffic - 24hr	6 vehicles	15 vehicles
Average Weekday traffic – AM Peak Day (11am)	1 vehicle	2 vehicles
Average Weekday traffic - PM Peak (12pm)	1 vehicle	2 vehicles

Source: Section 2.3 of the Project's Traffic Impact Assessment (Amber, 2025).

Overall, the data indicates that both roads currently accommodate a relatively low level of traffic for its road classification and is able to accommodate an increase in vehicle traffic.

7.2 CONSTRUCTION TRAFFIC NOISE

As stated in the Project's Traffic Impact Assessment (Amber, 2025), the peak hour for construction traffic will occur at the start and end of the day when workers are transported to and from the Project area. Most workers will typically arrive on-site between 6am and 7am and depart between 5pm and 7pm. Workers generally have staggered finish times which results in the evening peak hour construction traffic being less pronounced.

The anticipated daily peak construction traffic volume provided in the Project's Traffic Impact Assessment (Amber, 2025) are up to 54 light vehicles trips and 56 heavy vehicles trips.

All the assessed noise sensitive receivers (as identified in **Appendix A**) are located more than 300 m away from either Romani Road or Booororban-Tchelery Road. Traffic noise impacts at receivers located more than 300 m away from a road traffic noise source is negligible, therefore no construction traffic noise impacts are expected at the noise sensitive receivers.

General best practice noise control measures have been provided in **Section 8.1**, to ensure noise impacts to residents and other noise sensitive receivers surrounding the site are minimised.

7.3 OPERATIONAL TRAFFIC NOISE

The Project's Traffic Impact Assessment (Amber, 2025) notes the following on operational traffic:

During operation the BESS is expected to generate a minimal level of traffic associated with maintenance and operation services. The BESS is expected to be operated by 3-5 full time maintenance personnel accessing the Project Area each day, which would result in a negligible change to the traffic environment. There would also be occasional light commercial vehicles delivering parts to the Project Area but only as required for maintenance.

Based on the above, traffic noise impacts at sensitive receivers during the operational stage of the Project are expected to be negligible.

8. RECOMMENDATIONS

This section presents recommended construction and operational noise mitigation and management measures. All recommendations are based on the predicted noise levels and evaluation of the magnitude and extent of potential impacts identified in **Section 5.3** (for construction) and **Section 6.3** (for operation) of this report.

They are designed to ensure that, where feasible, reasonable, and practical to implement, construction and operational noise emissions are maintained within acceptable levels at all receivers. These recommendations also provide a general reassurance that suitable safeguards and provisions for monitoring are documented in this report to manage construction and operational noise.

8.1 CONSTRUCTION

Based on the findings presented in **Section 5.3**, the ICNG 'noise affected' management level is exceeded at R9 only for CON 3 (General construction of infrastructure – Two small pile driving rigs at the site's boundary fronting a sensitive receiver and operating continuously for 15 minutes) only. The results are based on worst-case assumptions of construction activities at the Project boundary fronting sensitive receivers in the absence of any noise mitigation measures.

It is noted that R9 is a residential dwelling which has been vacant for a prolonged time. The occupancy status of R9 should be reviewed during the construction period. Should R9 remain vacant, the noise management measures below may not apply.

Although construction noise may be audible and there is likely to be some degree of adverse impact during sensitive periods (socialising or relaxing), as is typical with construction projects near residential receivers, by incorporating the noise control measures provided in this section, the noise impact to residents and other noise sensitive receivers surrounding the site can be managed.

The highest construction noise impact will be experienced for a short duration when activities are closest to the receivers. As the activities move further away from the receivers, the noise levels are expected to be lower to the predicted noise levels in **Table 5-2**.

The following construction noise control measures are recommended to enable compliance with the 'noise affected' management levels:

- Noise generating work and activities should be (as proposed) limited (where possible) to the ICNG recommended standard hours (i.e., 7am to 6pm Monday to Friday and 8am to 1pm Saturdays and no work on Sundays or public holidays);
- Where an equipment item (the small pile driving rigs) operates close to the Project Boundary and these works are anticipated to generate high levels of noise e.g., > 45 dB(A) at a sensitive receiver as per **Table 5-2**, potential respite periods, e.g., three hours of work, followed by one hour of respite should be applied. Respite should be implemented if it is the preference of the affected receivers and if they are feasible and reasonable, and practical, to implement during the works. In some circumstances respite may extend the duration of works and inadvertently increase noise impacts; hence due care should be taken when considering this management measure;

- Appropriate plant, equipment and/or machinery for each task should be selected and efficient work practices to minimise the total construction period and the number of noise sources on the site should be adopted;
- Unnecessary noise due to idling engines should be avoided. High engine speeds should be avoided when equipment can be powered down and lower engine speeds are feasible;
- All plant, equipment and/or machinery used on the site should be in suitable condition, with particular emphasis on exhaust silencers, covers on engines and inspection of squeaking or rattling components. Excessive noise-generating machines should be repaired or removed from the site;
- Reversal alarms shall be replaced with broadband “squash duck” motion alarms, where feasible;
- If any validated noise complaints are received, operator attended noise validation and compliance measurements should be undertaken to measure and compare the site noise level contributions to the NMLs presented in this report. All site noise levels should be measured and quantified in the absence of any influential noise sources not associated with the Project. If the measured site noise levels are above the NMLs presented in this report, further mitigation and/or management measures should be considered;
- Unattended noise monitoring systems shall be established at selected worst-affected sensitive receivers (if the premises are occupied) depending on the different activities and stages of construction when such details are finalised. The results shall be used to improve the noise mitigation and management measures for the Project so that best practice noise control is continually implemented; and
- As per standard practice for any construction activities in NSW, a Construction Noise Management and Vibration Plan (CNVMP) containing noise mitigation and management measures shall be created for the construction phase of this Project. A Draft CNVMP is provided in **Appendix B**.

8.2 OPERATION

Based on the assessment presented in **Section 6**, the predicted operational noise levels indicate compliance with the relevant PNTLs based on the modelled noise sources’ assumptions presented in **Table 6-2**, and with the incorporation of the following noise mitigation measures:

- Silencer kits are required to be installed for all MV Stations – A Sound Power Level of 85.9 dB(A) is to be achieved for each plant item.

9. CONCLUSION

This NIA has assessed potential construction and operational noise impacts associated with the Romani BESS for SREA.

The existing noise environment at identified Noise Sensitive Receivers (NSRs) was established, and construction and operational noise management levels and assessment criteria were developed in accordance with the relevant NSW standards and guidelines, namely the NPI, ICNG and the RNP.

Applicable worst-case construction and operational assessment scenarios were developed based on project information outlined in this report. Construction and operational noise levels were predicted and compared to the established noise management levels and criteria to evaluate compliance.

The construction noise assessment concluded that the ICNG 'noise affected' management level is exceeded at NSR R9 only for construction scenario, CON 3 only. The results were based on worst-case assumptions of construction activities at the Project boundary fronting sensitive receivers in the absence of any noise mitigation measures. However, no exceedance of the ICNG 'highly noise affected' management level at any of the sensitive receivers is expected during construction. Noise management and mitigation measures will be required to be implemented in the Construction Noise and Vibration Management plan (CNVMP) for the Project and would be adapted as required if the closest receivers are not occupied. It is, however, noted that R9 is a residential dwelling which has been vacant for a prolonged time. The occupancy status of R9 should be reviewed during the construction period. Should R9 remain vacant, the noise management measures may not apply.

The operational noise assessment indicates that with the incorporation of noise mitigation measures, all the identified sensitive receivers within 2 km of the Project boundary are predicted to achieve compliance with the NPI PNTLs. The noise mitigation measure applicable to this Project is the at-source mitigation measure of installing silencer kits as part of the Project design for all Medium Voltage (MV) transformers (MV Stations).

The predicted noise levels for the Project indicate compliance with the PNTLs as well as project amenity noise levels and therefore, also demonstrate that cumulative impacts due to the Project are unlikely.

Opportunities for other mitigation strategies through technology selection, localised equipment noise control among other options with equivalent or improved noise impact mitigation performance may be considered in the detailed design phase.

Equipment selection and quantity are to adhere to the Sound Power Level (SWL) per plant item and quantity specified in the assessment. Should the SWL, location or quantity of the selected equipment change significantly, this assessment should be reviewed to incorporate the changes in design.

Construction and operational traffic noise impacts arising from additional traffic associated with the Project have been assessed. Construction and operational road traffic impacts are not expected at all sensitive receivers in accordance with the assessment methodology and criteria outlined in the RNP.

10. REFERENCES

- Amber. (2025). Romani BESS, Booroorban, Traffic Impact Assessment (Report Ref.: 964 rep 250530 draft, dated 30 May 2025).
- DECC. (2009). NSW Department of Environment & Climate Change (DECC) (now NSW Department of Climate Change, Energy, the Environment and Water [DCCEEW]), Interim Construction Noise Guideline (ICNG).
- DECCW. (2011). NSW Department of Environment, Climate Change and Water (DECCW) (now NSW Department of Climate Change, Energy, the Environment and Water [DCCEEW]), Road Noise Policy (RNP).
- EPA. (2017). NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI).
- Manning, C. J. (1981). The Propagation of Noise from Petroleum and Petrochemical Complexes to Neighbouring Communities, CONCAWE Report No. 4/81.
- Standards Australia. (2010). AS 2436 Guide to noise and vibration control on construction, demolition and maintenance sites.
- TfNSW. (2016). Construction Noise and Vibration Guideline .
- TfNSW. (2016). Construction Noise Strategy 7TP-ST-157/3.0.



APPENDIX A NOISE SENSITIVE RECEIVERS



Noise Sensitive Receiver (NSR) ID	Type of Property	Co-ordinates (Reference System: UTM GDA94 Zone 55, in metres)		Distance from Project Boundary, in metres
		Easting	Northing	
R2	Residence	279967	6144729	6000
R3	Residence	282284	6146040	7680
R4	Residence	282335	6145667	7360
R7	Temporary (Caravan)	279638	6134677	1820
R9	Residence	278876	6134744	1446



APPENDIX B DRAFT CONSTRUCTION NOISE AND
VIBRATION MANAGEMENT PLAN

B1. INTRODUCTION

As per the project-specific Secretary's Environmental Assessment Requirements (SEARs) issued by the Department of Planning and Environment (DPE) (SSD-67105475, dated 19 June 2025), a Draft Construction Noise and Vibration Management Plan (CNVMP) has been prepared in advance of the detailed design, to demonstrate the framework for noise management during construction of the Project.

The Draft CNVMP will be updated prior to implementation and summarises the noise mitigation measures that can provide feasible and reasonable controls to reduce noise impacts at Sensitive Receivers.

The content of this Draft CNVMP has been duplicated from the sections relevant to construction noise from the main report.

B2. EXISTING NOISE ENVIRONMENT AND SENSITIVE RECEIVERS

The noise environment in the vicinity of the Project and at noise sensitive receivers is best described as rural residential. Rural residential is described in the NSW Environment Protection Authority (EPA), *Noise Policy for Industry* (NPI), as an area with an acoustical environment that is dominated by natural sounds (such as foliage noise, birdsong and insect noise) having little or no road traffic noise (from Denman Road) and is generally characterised by low background noise levels. Settlement patterns (rural residential) would be typically sparse.

The background noise levels at the nearest Sensitive Receivers to the Project are expected to be similar to the minimum assumed Rating Background Levels (RBLs) specified in Table 2.1 of NPI. The use of minimum assumed RBLs is reasonable in rural environments where there are no prominent noise sources associated with roads, rail and industrial plant influencing the noise environment at the receivers.

The nearest sensitive receivers within 2 km of the Project boundary have previously been identified above in **Appendix A**.

It should be noted that R7 is classified as a holiday accommodation (temporary accommodation), being a caravan. Furthermore, it should also be noted that R9 is a residential dwelling which has been vacant for a prolonged period. The occupancy status of both R7 and R9 should be reviewed prior to the start of construction of the Project.

B3. NSW INTERIM CONSTRUCTION NOISE GUIDELINE

The Interim Construction Noise Guideline (ICNG) presents an accepted method to assess construction noise impacts for a range of receiver types. It provides a set of recommended standard hours of construction, specifically:

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

Construction outside these hours might be undertaken in accordance with the ICNG for the following categories of work:

- The delivery of oversized plant or structures that police or other authorities determine require special arrangements to transport along public roads;
- Emergency work to avoid the loss of life or damage to property, or to prevent environmental harm; and
- Works where a proponent demonstrates and justifies a need to operate outside the recommended standard hours.

The ICNG encourages works to occur within the recommended standard hours of construction unless justification is provided. It focuses on minimising noise by managing construction noise impacts, rather than only on achieving numeric noise levels, and recognises that some noise from construction sites is inevitable.

The ICNG encourages organisations involved with construction, maintenance or upgrading works (e.g., large scale contractors or Government agencies) to develop best-practice techniques for managing construction noise and vibration and implementing feasible and reasonable mitigation measures.

The ICNG is suitable to quantitatively assess potential noise emissions and impacts associated with Project construction. The ICNG assessment methodology has been adopted to develop project-specific construction noise management levels, assess potential impacts, and recommend any necessary mitigation, management measures.

Table B3-1 details the ICNG construction noise management levels guidance for residential receivers.

TABLE B3-1 CONSTRUCTION NOISE MANAGEMENT LEVELS FOR RESIDENTIAL RECEIVERS

Time of day	Management Level, L_{eq} (15min), dB(A)	How to apply
Recommended standard hours (SH): - Monday to Friday: 7am to 6pm - Saturday: 8am to 1pm - No work on Sundays or public holidays	Noise affected Rating Background Level (RBL) + 10 dB(A)	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{eq, 15 \text{ minute}}$ 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 dB(A)	The highly noise affected level represents the point above which there may be a 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, considering: - Times identified by the community when they are less sensitive to noise (e.g., before and after school for works near schools); - Mid-morning or mid-afternoon for works near residences; - If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours (OOH): All other times including Public Holidays	Noise affected Rating Background Level (RBL) + 5 dB(A)	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.

B4. CONSTRUCTION NOISE MANAGEMENT LEVELS

Construction works are expected to occur only the recommended standard daytime hours. The project-specific construction noise management levels (NMLs), for works within the recommended standard hours for construction, are presented in **Table B4-1** below.

These NMLs have been established with due regard to the requirements of the ICNG for all identified residential and other sensitive non-residential receivers.

For this assessment, noise monitoring was not conducted and instead the minimum RBLs as stated in the NPI were applied. This provides a conservative construction noise assessment for the Project.

TABLE B4-1 CONSTRUCTION NOISE MANAGEMENT LEVELS

Receiver Type and Time of Day	Daytime Rating Background Level (RBL), dB(A)	Noise Affected Management Level, $L_{eq}(15 \text{ min})$, dB(A)	Highly Noise Affected Management Level, $L_{eq}(15 \text{ min})$, dB(A)
Residence - Recommended Standard Hours	35	45	75

B5. CONSTRUCTION NOISE ASSESSMENT

B5.1 MODELLING METHODOLOGY

Conservative predictions of construction noise have been established through the calculation of the geometrical dispersion of noise with the assumption of flat topography, no acoustic shielding and no ground absorption effects.

The noise predictions consider the sound power level of the equipment operating continuously for a 15-minute period. It should be noted that the construction noise levels at any receiver depend on the type and duration of construction activity being undertaken and are expected to be variable over the total construction program.

Under a worst-case noise scenario, the construction noise sources are assumed to be at the boundary of the site fronting the nearest sensitive receivers, representing the shortest separation distance between noise source and receiver.

B5.2 CONSTRUCTION NOISE SOURCES

The following typical construction noise sources and their sound power levels are anticipated for the project and are listed in **Table B5-1**.

TABLE B5-1 CONSTRUCTION NOISE SOURCES

Equipment	Sound Power Level per unit, dB(A)*
Small Pile Driving Rig	114
Crane	110
Drum Roller	109
Padfoot Roller	109

Equipment	Sound Power Level per unit, dB(A)*
Wheeled Loader	109
Dump Truck	108
Excavator	107
Bulldozer	108
Scraper	116
Grader	107
Chain Trencher	104
Water Truck	104
Telehandler	98
Forklift	90
Tub Grinder/ Mulcher 40-50 hp	116

*Note: *The sound power levels provided in the above table are based on AS 2436:2010 (Standards Australia, 2010) and the Transport for New South Wales Construction Noise and Vibration Guideline (TfNSW, 2016).*

The following worst-case construction noise scenarios were assessed:

1. **CON 1** - Site preparation and establishment - A drum roller and a padfoot roller at the site's boundary fronting a sensitive receiver and operating continuously for 15 minutes;
2. **CON 2** - Delivery of infrastructure – Two cranes at the site's boundary fronting a sensitive receiver and operating continuously for 15 minutes; and
3. **CON 3** - General construction of infrastructure – Two small pile driving rigs at the site's boundary fronting a sensitive receiver and operating continuously for 15 minutes.

B5.3 PREDICTED CONSTRUCTION NOISE LEVELS

Predicted worst-case and unmitigated $L_{Aeq,15min}$ noise levels for all individual construction machinery/equipment and above-mentioned construction scenarios at the nearest sensitive receivers (within 2 km of the site's boundary where construction noise impacts may be present) have been presented in **Table B5-2**.

The following findings have been summarised from the results:

- The ICNG 'noise affected' management level is exceeded at:
 - R9 only for construction scenario CON 3. It should be noted that R9 is impacted only when occupied;
- No exceedance of the ICNG 'highly affected' management level at any of the sensitive receivers is expected for all construction scenarios; and
- The main noise contributors are the drum roller, the padfoot roller, the cranes and the small pile driving rigs, as defined in the worst-case construction noise scenarios.

It should be noted that the predicted noise levels and the duration of any exceedances are variable due to the intermittent operation of construction equipment and the changing separation distances between mobile construction noise sources and sensitive receivers.

Furthermore, it should also be noted that R9 is a residential dwelling which has been vacant for a prolonged period. The occupancy status of R9 should be reviewed prior to the start of construction. Should R9 remain vacant during the construction period, more specifically when the two pilling rigs are operating, it is reasonable to not consider R9 as a noise sensitive receiver.

TABLE B5-2 PREDICTED CONSTRUCTION NOISE LEVELS

Sensitive Receiver ID	Equipment ^a															Scenario ^b		
	Small pile driving rig	Crane	Drum roller	Padfoot roller	Wheeled loader	Dump truck	Excavator	Bulldozer	Scraper	Grader	Chain trencher	Water truck	Telehandler	Forklift	Tub Grinder/ Mulcher	CON 1	CON 2	CON 3
R9	43	39	38	38	38	37	36	37	45	36	33	33	27	19	45	41	42	46
R7	41	37	36	36	36	35	34	35	43	34	31	31	25	17	43	39	40	44

Notes:
The Noise Affected Management Level is $L_{Aeq(15\text{ min})}$ 45 dB(A), and the Highly Noise Affected Management Level is $L_{Aeq(15\text{ min})}$ 75 dB(A)
Noise Affected Management Level exceedances are shown in **bold** font. Important to note that these exceedances are only when the specific machinery is operating, or stated construction scenario is occurring.
^a Predicted noise levels for equipment are for the operation of a single equipment item at the Solar Farm boundary fronting each assessed Sensitive Receiver
^b Construction scenarios CON 1, CON 2 and CON 3 are defined in **Section 5.2**.

B6. CONSTRUCTION VIBRATION – SAFE WORKING DISTANCES

Safe working distances for vibration causing plant, which may be used during the construction activities, have been taken from the Transport for New South Wales Construction Noise Strategy (TfNSW, 2016) and are summarised in **Table B6-1**.

TABLE B6-1 RECOMMENDED SAFE WORKING DISTANCES

Plant Item	Rating/Description	Safe Working Distance, in metres	
		Cosmetic Damage (BS 7385 ¹)	Human Response (AS 2670)
Vibratory Roller	<50kN (1-2t)	5	15 to 20
Vibratory Roller	<100kN (2-4t)	6	20
Vibratory Roller	<200kN (4-6t)	12	40
Vibratory Roller	<300kN (7-13t)	15	100
Small Hydraulic Hammer	300kg – 5 to 12t excavator	2	7
Medium Hydraulic Hammer	900kg – 12 to 18t excavator	7	23

The safe working distances for typical vibration causing plant in construction range from 7 to 100 metres to trigger a human response. There is no vibration sensitive receiver within this range and therefore vibration impacts are not expected from the project.

B7. CONSTRUCTION TRAFFIC NOISE

As stated in the Project's Traffic Impact Assessment, the peak hour for construction traffic will occur at the start and end of the day when workers are transported to/from the Project area. Most workers will typically arrive on-site between 6am and 7am and depart between 5pm and 7pm. Workers generally have staggered finish times which results in the evening peak hour being less pronounced.

The anticipated daily peak construction traffic volume provided in the Project's Traffic Impact Assessment are up to 54 light vehicles trips and 56 heavy vehicles trips.

All the assessed noise sensitive receivers (as identified in **Appendix A**) are located more than 300 m away from either Romani Road or Boooroorban-Tchelery Road. Traffic noise impacts at receivers located more than 300 m away from a road traffic noise source is negligible, therefore no construction traffic noise impacts are expected at the noise sensitive receivers.

General best practice noise control measures are provided below, to ensure noise impacts to residents and other noise sensitive receivers surrounding the site are minimised.

¹ BS 7385 -2: 1993 Guide to damage levels from ground borne vibration

B8. NOISE MITIGATION MEASURES

Based on the findings presented in this report, the ICNG ‘noise affected’ management level is exceeded at R9 only for CON 3 (General construction of infrastructure – Two small pile driving rigs at the site’s boundary fronting a sensitive receiver and operating continuously for 15 minutes) only. The results were based on worst-case assumptions of construction activities at the Project boundary fronting sensitive receivers in the absence of any noise mitigation measures.

It is noted that R9 is a residential dwelling which has been vacant for a prolonged time. The occupancy status of R9 should be reviewed during the construction period. Should R9 remain vacant, the noise management measures below may not apply.

Although construction noise may be audible and there is likely to be some degree of adverse impact during sensitive periods (socialising or relaxing), as is typical with construction projects near residential receivers, by incorporating the noise control measures provided in this section, the noise impact to residents and other noise sensitive receivers surrounding the site can be managed.

A CNVMP would generally follow the approach in the Interim Construction Noise Guideline (ICNG), including the strategies to manage noise provided in ‘*Appendix C Audible alarms on mobile plant*’ of the ICNG.

Table B8-1 summarises the mitigation measures to be implemented during the construction of the Project.

TABLE B8-1 NOISE MITIGATION MEASURES

Subject	Measures Summary
Scheduling	Works should be undertaken during standard working hours only, as specified in the ICNG (DECC, 2009): - Monday to Friday: 7am to 6pm; - Saturday: 8am to 1pm; and - No work on Sundays or public holidays.
	Construction outside these hours might be undertaken as follows: - In accordance with the ICNG; - For activities that are inaudible at Non-associated dwellings (dwellings without an agreement with The Applicant with respect to the management of noise for the Project); and - With agreement by DPHI.
	Where an equipment item operates close to the Project Boundary, or where noise level exceedances cannot be avoided (generate high levels of noise e.g., > 45 dB(A) at a Sensitive Receiver), then consideration may be given to implementing time restrictions and/or providing periods of respite for affected receivers, where feasible and reasonable. In some circumstances respite may extend the duration of works and inadvertently increase noise impacts; hence due care should be taken when considering this management measure.
Equipment	- Selection of the quietest plant, equipment and/or machinery for each construction activity, where practicable; - Efficient work practices to minimise the total construction period and the number of noise sources onsite should be adopted; - Unnecessary noise due to idling engines should be avoided;

Subject	Measures Summary
	• High engine speeds should be avoided when equipment can be powered down and lower engine speeds are feasible; • All plant, equipment and/or machinery used onsite should be in suitable condition, with particular emphasis on exhaust silencers, covers on engines and inspection of squeaking or rattling components. Excessive noise-generating machines should be repaired or removed from the site; • Reversal alarms shall be replaced with broadband “squash duck” motion alarms, where feasible; • Any equipment not in use for extended periods during construction should be turned off; • Vehicles and equipment should be regularly serviced according to manufacturers’ instructions and maintained in proper working order; • Simultaneous operation of noisy equipment should be avoided where practical; and • Where practical, noisy equipment should be positioned behind structures that act as barriers to sensitive receivers, or at the greatest distance from sensitive receivers, or oriented to directed noise emissions away from sensitive receivers.
Training	All construction workforce should receive inductions prior to commencing on site. Inductions may occur via toolbox meetings, training and/or education, and should inform staff of: • Procedures to operate plant and equipment in a quiet and efficient manner; • Location of nearest sensitive receivers; • Standard construction hours; • Relevant approval conditions; and • Incidents and complaints handling procedures.
Sensitive receivers consultation	Affected sensitive receivers should be consulted with prior to the commencement of works that are expected to exceed noise criteria. Consultation activities should discuss: • The details of proposed works; • The anticipated noise impacts; • The time periods over which these works would occur; and • To identify any management measures required to minimise impact at affected sensitive receivers.

B9. COMPLIANCE MANAGEMENT

B9.1 COMPLAINTS

Any complaints received from the community regarding noise should be addressed in accordance with the complaints handling procedures (to be developed at a later stage) to be provided for the Project.

If any validated noise complaints are received from the community, attended noise compliance measurements should be undertaken to measure and compare the site noise level contributions to the NMLs presented in this report.

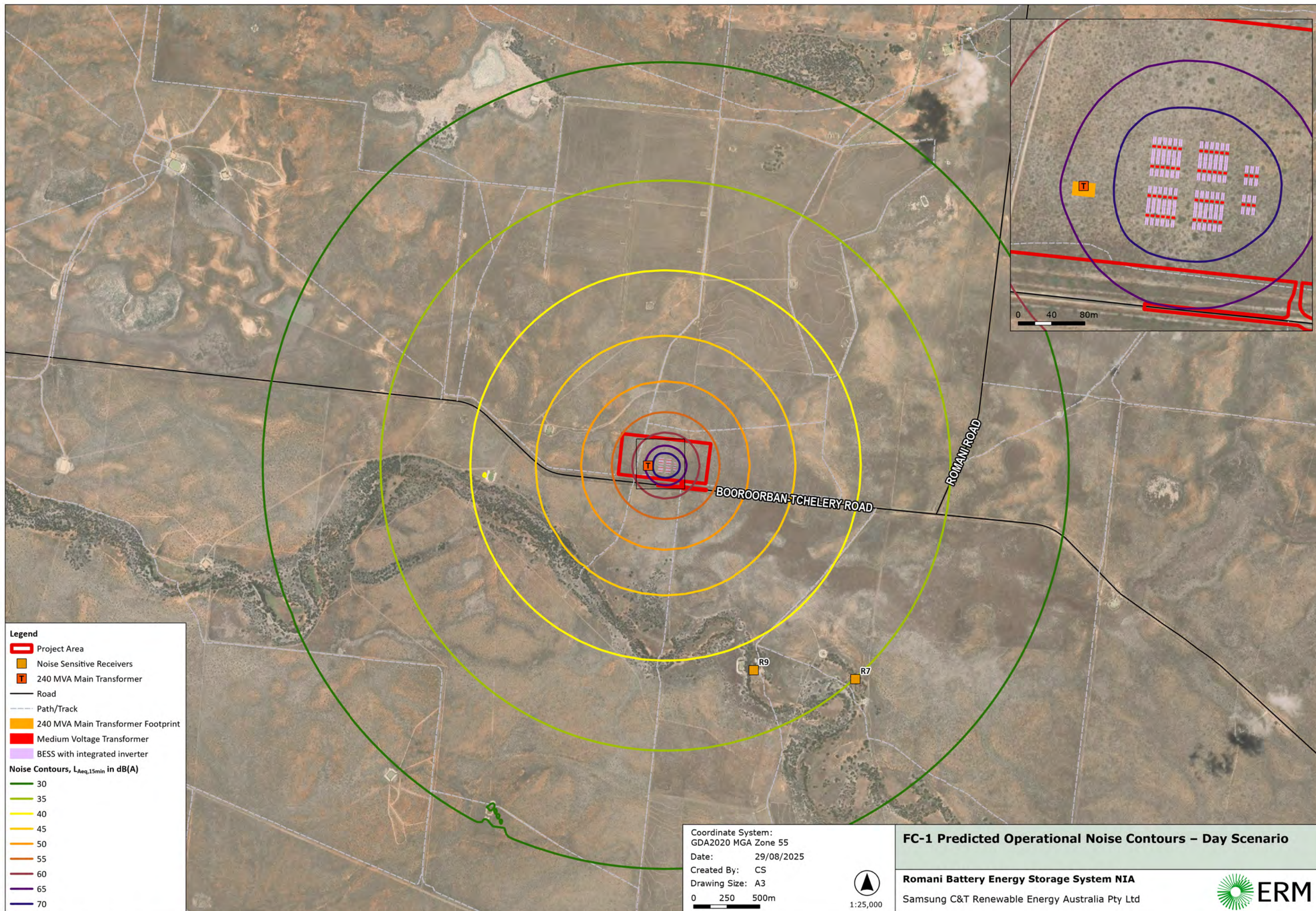
All site noise levels should be measured and quantified in the absence of any influential noise sources not associated with the Project. If the measured site noise levels are above the NMLs presented in this report, further mitigation and/or management measures should be considered.

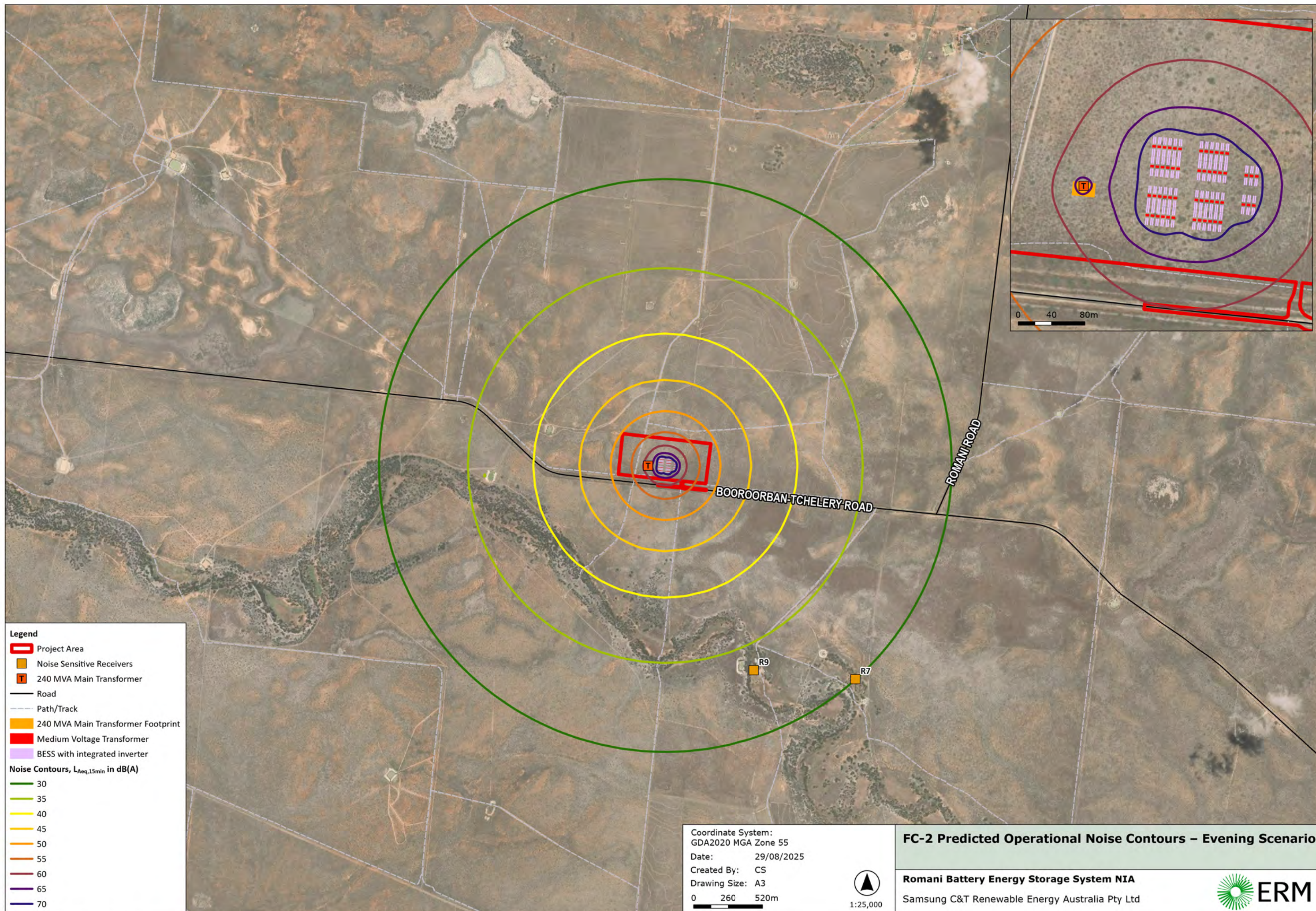
B9.2 MONITORING AND REPORTING

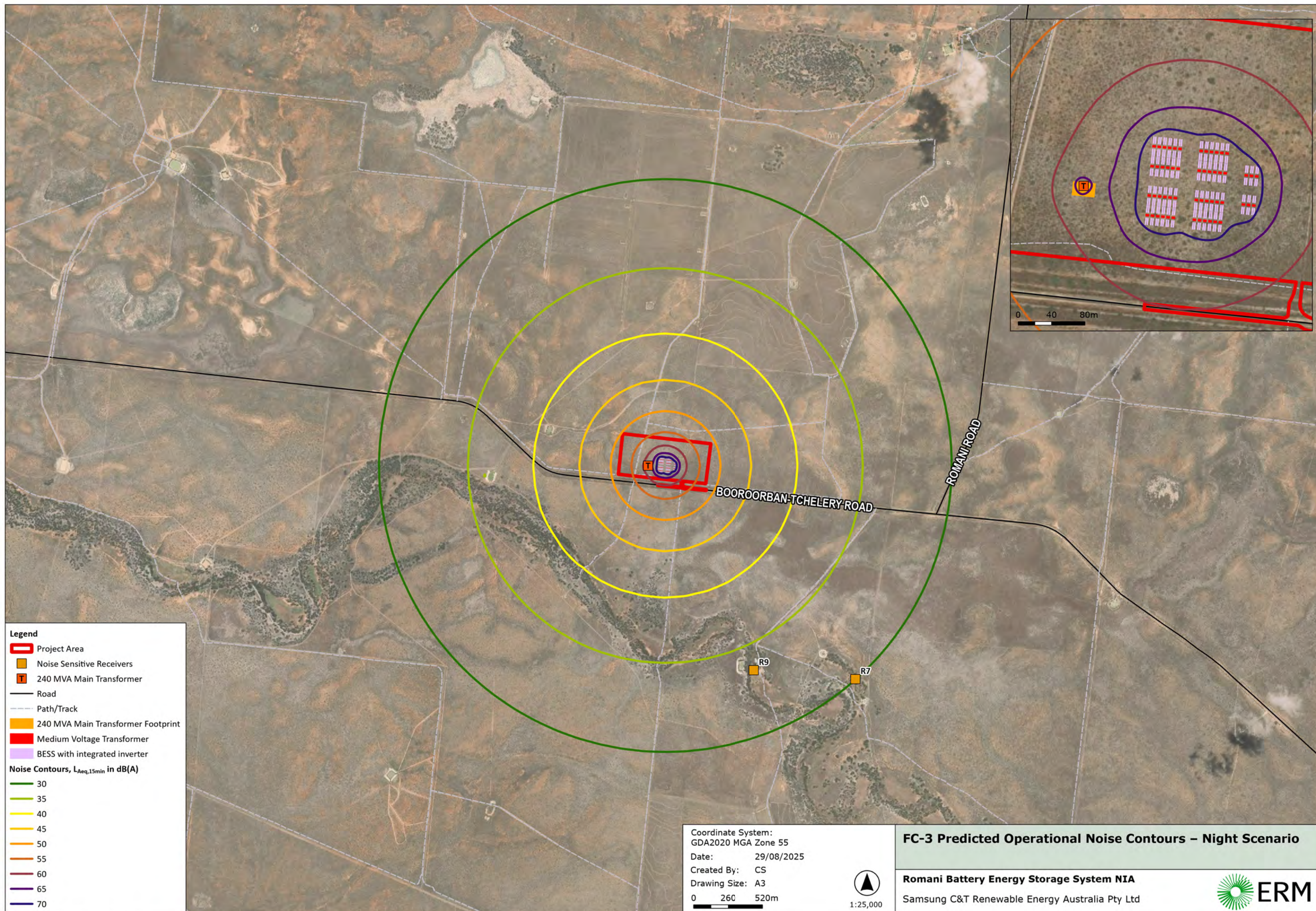
Unattended noise monitoring systems should be established at selected worst-affected sensitive receivers depending on the different activities and stages of construction when such details are finalised. The results should be used to improve the noise mitigation and management measures for the Project so that best practice noise control is continually implemented.



APPENDIX C OPERATIONAL NOISE CONTOURS









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ERM Sydney

Level 14, 207 Kent Street
Sydney NSW 2000 Australia

Telephone +61 2 8584 8888

Facsimile +61 2 9299 7502

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