Greenacre Waste Facility State Significant Development Application SSD-67497708

Noise and Vibration Impact Assessment

Prepared for 4Pillars Environmental Consulting Pty Ltd

October 2025

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Version	Date	Prepared by	Reviewed by	Comments
1	30 July 2025	Jared Blackburn	Najah Ishac Phil Towler	Final
2	27 October 2025	Jared Blackburn	Phil Towler	Final

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Executive Summary

Aussie Skips Recycling Pty Ltd (Aussie Recycling) is proposing to upgrade the existing waste facility located at 13 Bellfrog Street, Greenacre (Lot 15/DP1133214) (the 'site').

The site is currently used for the receipt, storage and export of soils, aggregates, virgin excavated natural material (VENM) and other similar waste materials. The site is currently permitted to receive an annual combined throughput of waste material of 199,000 tonnes (t) in any 12-month period.

Aussie Recycling is proposing to lodge a new State Significant Development (SSD) application (SSD-67497708) seeking approval to construct and operate a materials recovery facility (MRF) on the site. The proposal includes minor demolition, alterations to existing site components, installation of a fixed waste processing plant and site infrastructure, construction of environmental conservation measures, and the ongoing operation of the MRF.

This Noise and Vibration Impact Assessment (NVIA) has assessed the potential impacts associated with construction, site operations and traffic generation at noise sensitive receivers, including the provision of operational noise contours and a detailed sleep disturbance assessment, in accordance with the relevant Secretary's Environmental Assessment Requirements (SEARs).

Existing background noise levels were established in accordance with Noise Policy for Industry (NPfI) procedures and validated with data from subsequent periods. These were used to establish Project Noise Trigger Levels (PNTLs) in accordance with NPfI procedures, as well as Noise Management Levels (NMLs) in accordance with the Interim Construction Noise Guideline (ICNG) procedure.

Details of assessment methodology and assumptions relevant to construction noise and vibration, operational noise and road traffic noise, as well as mitigation measures employed, are outlined in this report.

A summary of the assessment outcomes is provided as follows:

- Construction is proposed to be completed during standard daytime working hours only. Construction noise and vibration generated from construction is predicted to comply with relevant guidelines.
- An assessment of existing, approved operations against the PNTLs, that were established in accordance with NPfI methodology, is provided. Noise emissions from existing operations are predicted to comply with (i.e. are below) the relevant PNTLs at all assessment locations.
- For the proposed operations including the MRF enclosure, site noise contributions are predicted to comply with PNTLs at all assessment locations during the morning shoulder, evening and night periods.
- There is a residual exceedance of the PNTL of 2 dB during the day period at one assessment location only. Noise emissions from proposed operations at all other assessment locations are predicted to comply with PNTLs during the day. A feasible and reasonable assessment of the residual noise was competed in accordance with the NPfI. In accordance with Section 4.2 of the NPfI, a residual exceedance of 1 to 2 dB is considered negligible and does not warrant further mitigation.
- A scenario was modelled with the whole site enclosed. Whilst this does achieve a reduction in predicted noise levels, it is not considered to be a reasonable requirement in accordance with the NPfI, as there is only a negligible (up to 2dB) residual exceedance of PNTLs predicted at one assessment location during the day period only (least sensitive). Due to this residual exceedance being considered negligible, no further mitigation measures above those proposed (site operational limits and recycling plant building construction) are considered reasonable.
- A sleep disturbance assessment shows that predicted maximum noise levels are below (satisfy) the sleep disturbance screening criterion at all residential assessment locations.

- The potential for road traffic noise impacts on public roads due to project construction and operational traffic has been assessed in accordance with NSW Road Noise Policy (EPA 2011). Both operational and construction traffic noise satisfy the RNP criteria during all periods at all assessment locations.

TABLE OF CONTENTS

Appendices

Tables

Figures

1 Introduction

1.1 Background

Aussie Skips Recycling Pty Ltd (Aussie Recycling) is proposing to upgrade the existing waste facility located at 13 Bellfrog Street, Greenacre (Lot 15/DP1133214) (the 'site').

The site is currently used for the receipt, storage and export of soils, aggregates, virgin excavated natural material (VENM) and other similar waste materials. The site is currently permitted to receive an annual combined throughput of waste material of 199,000 tonnes (t) in any 12-month period.

Aussie Recycling is proposing to lodge a new State Significant Development (SSD) application (SSD-67497708) seeking approval to construct and operate a materials recovery facility (MRF) on the site. The proposal includes minor demolition, alterations to existing site components, installation of a fixed waste processing plant and site infrastructure, construction of environmental conservation measures, and the ongoing operation of the MRF.

The MRF will have two main buildings, a waste receival building and a processing building. These will be connected by an enclosed conveyor. There will be an open yard between these buildings to allow truck access for delivery of waste and dispatch of recovered products and residual waste.

4Pillars Environmental Consulting Pty Ltd (4Pillars) are engaged by Aussie Recycling to prepare an environmental impact statement (EIS) for the State Significant Development Application (SSDA) to modify the approved operations of the facility (SSD-67497708). 4Pillars has engaged EMM Consulting Pty Limited (EMM) on behalf of Aussie Recycling to prepare this noise impact assessment (NIA) to meet the requirements of the Secretary's Environmental Assessment Requirements (SEARs) for the SSDA (SSD-67497708), issued by the Department of Planning, Housing and Infrastructure (DPHI) on 6 March 2024.

1.2 Overview of the proposed modification

The MRF will accept and recycle, construction and demolition (C&D) waste, commercial and industrial (C&I) waste and non-putrescible municipal solid waste (MSW), including building and demolition (B&D) wastes such as brick, asphalt, concrete and metals. It is proposed that up to 199,000 t of waste will be accepted and processed in any 12-month period. It is proposed to amend the site's operating hours compared to those currently approved.

MRF operations will include:

- receipt of waste via heavy road vehicles
- storage of waste in the receival building
- handling of waste by the conveyor and mobile plant
- processing of waste, including sifting, picking and screening, using mobile plant and the fixed waste processing plant
- storage of recovered products and residual waste
- dispatch of recovered products and residual waste by heavy road vehicles
- ancillary activities including operation of a workshop, employee parking, overnight truck parking, equipment storage, maintenance, diesel fuel storage in a self-contained fuel tank, water treatment, waste sampling, quality assurance and use of the site's existing facilities.

All waste storage, handling and processing will be within the buildings and conveyor. No waste will be stored, handled or processed outside.

The proposal will allow a broader wider range of wastes to be accepted at the site (C&D, C&I and non-putrescible MSW). It will allow these wastes to be sorted on site to produce recovered products for further recycling, so reducing the amount of waste sent to landfill, as advocated by the NSW Environment Protection Authority's Draft NSW Waste and Circular Infrastructure Plan (EPA 2025). The proposal includes site changes to enhance the site's environmental measures, in particular, construction of a roof over the concrete yard so that all waste will remain under cover. The proposal will not increase existing operational footprint or the site's throughput over a year.

A summary of the approved and proposed hours is provided in Table 1.1.

The proposed facility layout is provided in Figure 1.1.

Table 1.1 Summary of approved and proposed hours

Approved hours	Proposed hours
• Monday to Friday: – Transporting: 6:00 am – 5:00 pm – Material handling and maintenance: 7:00 am – 5:00 pm • Saturday to Sunday: – Transporting and material handling: 7:00 am – 5:00 pm • Public holidays: no operations permitted	• Monday to Saturday: – Processing: 7:00 am – 6:00 pm – Transporting and material handling: 5:00 am – 10:00 pm – Workshop and low impact works*: 24-hour • Sunday and public holidays: – Processing: Nil – Transporting and material handling: 7:00 am – 6:00 pm – Workshop and low impact works: 24-hour

Note: *low impact activities include – cleaning of site and equipment, vehicle and plant machinery maintenance and sampling and testing of materials.

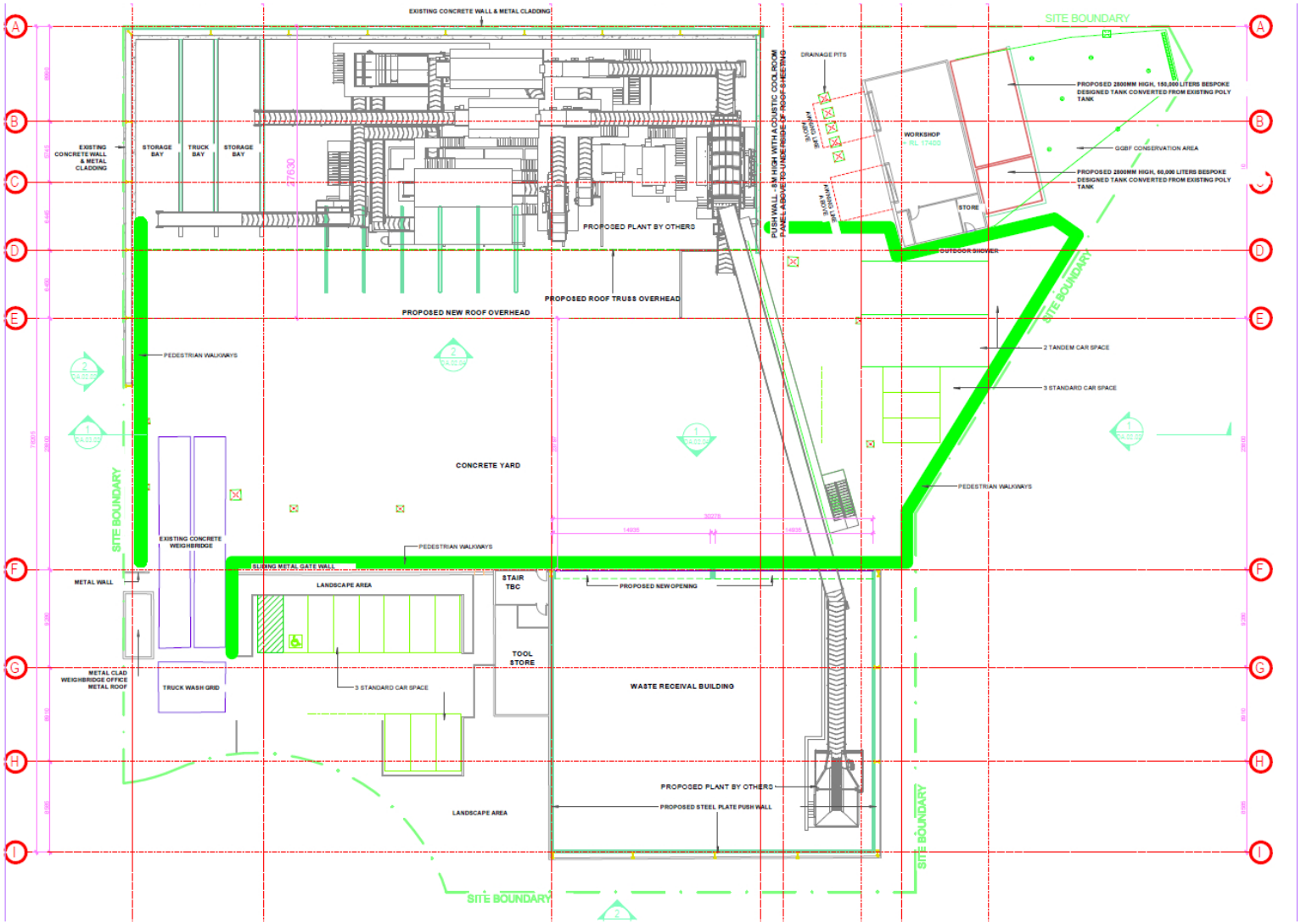

Figure 1.1 Indicative facility layout

1.3 Assessment requirements

The SEARs identify noise matters needed to be addressed as part of the EIS. The individual requirements relevant to the NIA and where they are addressed in this report is provided in Table 1.2.

Table 1.2 Noise related SEARs

Requirement	Section addressed
Noise and vibration – including:	
a quantitative noise and vibration impact assessment undertaken by a suitably qualified acoustic consultant in accordance with the relevant NSW Environment Protection Authority (EPA) guidelines and Australian Standards which includes:	This report
the identification of impacts associated with construction, site emission and traffic generation at noise affected sensitive receivers, including the provision of operational noise contours and a detailed sleep disturbance assessment	Section 6
details of noise monitoring survey, background noise levels, noise source inventory and 'worst case' noise emission scenarios	Section 2 Appendix A Section 5
consideration of annoying characteristics of noise and prevailing meteorological conditions in the study area	Section 5.1
a cumulative impact assessment inclusive of impacts from other developments	Section 3.3.2
details and analysis of the effectiveness of proposed management and mitigation measures to adequately manage identified impacts, including a clear identification of residual noise and vibration following application of mitigation these measures and details of any proposed compliance monitoring programs.	Section 6 and Section 7

2 Existing environment

2.1 Assessment locations

The site is surrounded by industrial receivers on Bellfrog Street. The nearest residential assessment locations to site are located 110 metres (m) to the south and west of the yard at Juno Parade and Wentworth Street, Greenacre. Noise impacts have been predicted to these locations. These assessment locations are considered to represent the most exposed residences based on our observations, noise monitoring and modelling. These assessment locations are listed in Table 2.1 and are shown in Figure 2.1.

Table 2.1 Assessment locations

ID	Receptor type	Address	Easting (m, MGA56s)	Northing (m, MGA56s)
R1	Industrial	12 Bellfrog Street, Greenacre	321930	6246348
R2	Industrial	11 Bellfrog Street, Greenacre	321893	6246352
R3	Industrial	10 Bellfrog Street, Greenacre	321847	6246368
R4	Industrial	1-7 Bellfrog Street, Greenacre	321851	6246439
R16	Residential	21A Juno Parade, Greenacre	321945	6246286
R17	Residential	27 Juno Parade, Greenacre	321820	6246293
R18	Residential	54 Wentworth Street, Greenacre	321794	6246373
R19	Residential	30 Wentworth Street, Greenacre	321807	6246516
R20	Residential	20 Wentworth Street, Greenacre	321827	6246589
R21	Residential	25 Juno Parade, Greenacre	321907	6246268
R22	Residential	41 Juno Parade, Greenacre	321789	6246302
R23	Residential	54 Wentworth Street, Greenacre	321781	6246334

KEY

- Site boundary

Assessment location

- Industrial
- Residential
- Road traffic
- Unattended noise monitoring location

Existing environment

- Major road
- Minor road
- Named watercourse
- Cadastral boundary

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Source: EMM (2025); DCSSS (2024); GA (2009)

0 50 100 m

GDA2020 MGA Zone 56

N

Site locality and noise monitoring locations

13 Bellfrog Greenacre
Noise Impact Assessment
Figure 2.1

EMM
creating opportunities

2.2 Background noise survey

EMM completed unattended monitoring in December 2019 at one representative assessment location (NM1) as shown in Figure 2.1. 4Pillars commissioned additional background monitoring between the 18 to 27 July 2022 which recorded very similar results to the EMM monitoring in 2019. The results of the monitoring in 2022 are provided in Table 2.2. For this assessment, the monitoring conducted by EMM has been used.

Table 2.2 Summary of existing background and ambient noise 2022

Monitoring location	Period[1]	Rating background level (RBL), dBA	Measured $L_{Aeq,period}$ noise level[2], dBA
NM1	Day	47	52
	Evening	45	50
	Night	40	47

Noise monitoring was conducted in general accordance with the procedures described in Australian Standard AS 1055-1997 *Acoustics - Description and Measurement of Environmental Noise* and the Noise Policy for Industry (NPfI) (EPA, 2017). The long-term unattended measurement (as per the NSW EPA's Noise Policy for Industry (NPfI)) was carried out using one Svantek 977 environmental noise monitor (s/n 59682) from 4 to 16 December 2019. Calibration of instrumentation was checked prior to and following measurements. All equipment carried appropriate and current NATA (or manufacturer) calibration certificates. No calibration drift was recorded.

The noise logger was programmed to record statistical noise level indices continuously in 15-minute intervals, including the L_{Amax}, L_{A1}, L_{A10}, L_{A50}, L_{A90}, L_{A99}, L_{Amin} and the L_{Aeq}. Data affected by adverse meteorological conditions and by spurious and uncharacteristic events has been excluded from the analysis in accordance with methodologies provided in the NPfI. Meteorological data was obtained from the NSW Office of Environment and Heritage automated weather station in Chullora, approximately 3.2 kilometres (km) northwest from site.

Rating background levels (RBLs) have been established in accordance with NPfI methodology. A summary of existing background and ambient noise levels is provided in Table 2.3. Daily results are shown in Appendix A.

Table 2.3 Summary of existing background and ambient noise

Monitoring location	Period[1]	Rating background level (RBL), dBA	Measured $L_{Aeq,period}$ noise level[2], dBA
NM1	Morning shoulder	45	-
	Day	46	54
	Evening	45	53
	Night	39	49

Notes

1. Day: 7 am to 6 pm Monday to Saturday; 8 am to 6 pm Sundays and public holidays; Evening: 6 pm to 10 pm; Night: 10 pm to 7 am, Monday to Saturday and 10 pm to 8 am Sunday and public holidays; Morning shoulder 5am to 7am Monday to Saturday.
2. The energy averaged noise level over the measurement period and representative of general ambient noise.

3 Assessment criteria

3.1 Existing approval and EPL

The site currently operates under Environmental Protection Licence (EPL) 21389. The operational noise from the site will be assessed against updated noise limits established in accordance with the NPfI (EPA 2017), based on the background noise levels (see Table 2.3).

3.2 Construction noise criteria

3.2.1 Interim Construction Noise Guideline

The Interim Construction Noise Guideline (ICNG) (DECC 2009) provides guidelines for the assessment and management of noise from construction works.

Table 3.1 is an extract from the ICNG and provides construction noise management levels (NMLs) for residential receivers for both recommended standard construction hours and outside of these periods.

Table 3.1 ICNG residential noise management levels

Time of day	Management level $L_{Aeq,15minute}$	How to apply
Recommended standard hours: Monday to Friday 7:00 am to 6:00 pm Saturday 8:00 am to 1:00 pm No work on Sundays or public holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured $L_{Aeq,15minute}$ 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	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: • times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or 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.

Time of day	Management level $L_{Aeq,15minute}$	How to apply
Outside recommended standard hours	Noise affected RBL + 5 dB	• A strong justification would typically be required for works outside the recommended standard hours. • The proponent should apply all feasible and reasonable work practices to meet the noise affected level. • Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community.

Notes: 1. Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise affected residence.

Table 3.2 summarises noise management levels for non-residential land uses as defined in the ICNG.

Table 3.2 ICNG noise management levels at other land uses

Land use	Management level, $L_{Aeq,15\ minute}$
Industrial premises	External noise level 75 dB (when in use)
Offices, retail outlets	External noise level 70 dB (when in use)
Classrooms at schools and other educational institutions	Internal noise level 45 dB (when in use)
Hospital wards and operating theatres	Internal noise level 45 dB (when in use)
Places of worship	Internal noise level 45 dB (when in use)
Active recreation areas	External noise level 65 dB (when in use)
Passive recreation areas	External noise level 60 dB (when in use)

Source: ICNG (DECC 2009).

3.2.2 Sleep disturbance at residents

Construction is not proposed during night time hours (as defined in Table 3.1), hence no assessment of sleep disturbance is required for construction noise.

3.2.3 Project specific NMLs – residential

The ICNG provides guidelines for the assessment and management of noise from construction works.

In accordance with the ICNG and based on the RBLs presented in Table 3.3 presents the project specific construction noise management levels (NMLs) applicable to residential premises during the proposed work hours. The highly noise affected NML also applies to all residential receivers during standard hours.

Table 3.3 Project specific NMLs at residential locations

ID	Standard construction NMLs (RBL + 10dB) Day[1]	Highly affected noise level (dB) Day[1]
All	56	75

Notes: Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise affected residence.

3.2.4 Project specific NMLs – non-residential

Table 3.4 presents the project specific construction NMLs applicable to non-residential land uses as defined in the NSW ICNG and as relevant to the site (only industrial neighbours exist).

Table 3.4 Project specific NMLs at non-residential land uses

Land use	Noise management level (when in use), $L_{Aeq,15\ minute}$
Industrial premises	External noise level 75 dB (when in use)

3.3 Operational noise criteria

Noise limits for industrial sites or processes in NSW are normally derived in accordance with EPA guidelines (e.g. Noise Policy for Industry). Sometimes they are the project noise trigger level (PNTL, as per the NPfI) or, alternatively, they are noise levels that can be achieved at a specific site following the application of all feasible and reasonable noise management and mitigation measures.

The objectives of project noise trigger levels (PNTL) for industry are to protect the community from excessive intrusive noise and preserve amenity for specific land uses. It should be noted that the audibility of a noise source does not necessarily equate to disturbance at an assessment location.

To ensure these objectives are met, the EPA provides two separate noise trigger levels: intrusiveness and amenity. The fundamental difference being intrusiveness noise levels apply over 15 minutes in any period (day, evening or night), whereas the amenity noise levels apply to the entire assessment period (day, evening or night).

3.3.1 Intrusive noise levels

The intrusive noise trigger levels require that $L_{Aeq,15minute}$ noise levels from the site during the relevant operational periods (i.e. morning shoulder, day, evening and night) do not exceed the RBL by more than 5 dB. The NPfI recommends that the intrusive noise trigger level for evening be set at no greater than the intrusive noise level for daytime and that the intrusive noise level for night-time should be no greater than the intrusive noise level for day or evening.

Table 3.5 presents the intrusive noise level determined for the site based on the measured RBLs from unattended noise measurements. It is noted that intrusive noise levels are applicable at residential assessment locations only.

Table 3.5 Project intrusiveness noise levels – all residential assessment locations

Period[1]	Adopted RBL, dB	Project intrusiveness noise level dB, LAeq,15 minute
Morning shoulder	45	50
Day	46	51
Evening	45	50
Night	39	44

Note: Day: 7 am to 6 pm Monday to Saturday; 8 am to 6 pm Sundays and public holidays; Evening: 6 pm to 10 pm; Night: 10 pm to 7 am, Monday to Saturday and 10 pm to 8 am Sunday and public holidays; Morning shoulder 6am to 7am Monday to Saturday.

3.3.2 Amenity noise levels

The assessment of amenity is based on noise levels specific to the land use. The noise levels relate only to industrial noise and exclude road or rail noise. Where the measured existing industrial noise approaches recommended amenity noise level, it needs to be demonstrated that noise levels from new industry will not contribute to existing industrial noise such that amenity noise levels are exceeded.

To ensure that industrial noise levels (existing plus new) remain within the recommended amenity noise levels for an area, the project amenity noise level for new industrial developments is the recommended amenity noise level (outlined in Table 2.2 of the NPfI) minus 5 dB.

All residential assessment locations have been categorised in the NPfI "urban" amenity category given they share their boundaries with the industrial area and major roadways, and hence they are deemed to be in "an area with an acoustical environment that:

- is dominated by 'urban hum' or industrial source noise, where urban hum means the aggregate sound of many unidentifiable, mostly traffic and/or industrial related sound sources
- has through-traffic with characteristically heavy and continuous traffic flows during peak periods
- is near commercial districts or industrial districts
- has any combination of the above."

The corresponding project amenity noise levels for the site are given in Table 3.6. To ensure the project amenity noise $L_{Aeq,period}$ levels are comparable to the project intrusiveness $L_{Aeq,15min}$ noise levels, +3 dB has been added to the amenity noise levels as per the NPfI (EPA 2017) methodology.

Table 3.6 Project amenity noise levels

Assessment location	Indicative area	Time period[1]	Recommended amenity noise level, $L_{Aeq,period}$	Project amenity noise level dB, $L_{Aeq,period}$	Project amenity noise level dB, $L_{Aeq,15min}$
All residential	Urban	Day	60	55	58
		Evening	50	45	48
		Night	45	40	43

Source: NSW NPfI (EPA 2017).

Notes: 1. Day: 7 am to 6 pm Monday to Saturday; 8 am to 6 pm Sundays and public holidays; Evening: 6 pm to 10 pm; Night: 10 pm to 7 am.

3.3.3 Project noise trigger level

The project noise trigger level (PNTL) is the lower of the calculated intrusiveness or amenity noise levels. Taking account of the measured background noise levels, project intrusive noise levels and project amenity levels for residential assessment locations, a summary of the PNTLs for the assessment of noise from operations is presented in Table 3.7.

Table 3.7 Project noise trigger levels

Assessment location	Period[1]	Intrusive noise level dB, $L_{Aeq,15minute}$	Amenity noise level dB, $L_{Aeq,15minute}$	Project noise trigger level (PNTL), dB(A)
All residential	Morning shoulder	50	-	50
	Day	51	58	51
	Evening	50	48	48
	Night	44	43	43

Note: Day: 7 am to 6 pm Monday to Saturday; 8 am to 6 pm Sundays and public holidays; Evening: 6 pm to 10 pm; Night: 10 pm to 7 am, Monday to Saturday and 10 pm to 8 am Sunday and public holidays; Morning shoulder 6am to 7am Monday to Saturday.

3.3.4 Sleep disturbance

The difficulty in establishing an absolute noise level criterion that would correlate to an acceptable level of sleep disturbance is acknowledged by relevant governing authorities.

Proposed operations will occur during the morning shoulder period (5:00 am to 7:00 am). Hence, an assessment of the potential for sleep disturbance is required.

The NPfI suggests that a detailed maximum noise level event assessment should be undertaken where night-time noise levels at a residential location exceed:

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

Guidance regarding potential for sleep disturbance is also provided in the NSW EPA's Road Noise Policy (RNP). The RNP calls upon a number of studies that have been conducted into the effect of maximum noise levels on sleep. The RNP provides the following conclusions from the research on sleep disturbance:

- maximum internal noise levels (L_{Amax}) below 50 to 55 dB are unlikely to awaken people from sleep, and
- one or two noise events per night, with maximum internal noise levels (L_{Amax}) of 65 to 70 dB, are not likely to affect health and wellbeing significantly.

It is commonly accepted by acoustic practitioners and regulatory bodies that a facade including a partially open window will reduce external noise levels by 10 dB. Therefore, external noise levels in the order of 60 to 65 dB calculated at the facade of a residence is unlikely to awaken people according to the RNP.

If noise levels greater than the screening criteria are identified, then additional analysis would consider factors such as:

- how often the events would occur
- the time the events would occur

- whether there are times of day when there is a clear change in the noise environment (such as during early morning shoulder periods)
- current scientific literature available regarding the impact of maximum noise level events at night.

Table 3.8 provides the noise level event screening criteria for the residential assessment locations.

Table 3.8 Sleep disturbance screening criteria at residences – night period

Assessment location	Adopted night RBL, dB	Maximum noise event screening criteria, dB	
		$L_{Aeq,15minute}$	L_{Amax}
All residential receivers	39	44	54

3.4 Road traffic noise

The principal guidance to assess the impact of road traffic noise on assessment locations is in the NSW Road Noise Policy (RNP) (EPA 2011). Table 3.9 presents the road noise assessment criteria for residential land uses (i.e. assessment locations), reproduced from Table 3 of the RNP for road categories relevant to the use of the site.

Truck routes will remain consistent with the existing operations, with all inbound and outbound trucks approaching and departing on Bellfrog Street/Wentworth Street. Bellfrog Street is a continuation of Wentworth Street which primarily serves industrial uses and do not have residences fronting them. These were historically classified as 'collector' roads or 'designated haulage routes for industry' by councils and previous incarnations of the EPA's road traffic noise policies in NSW. The RNP (the current EPA policy) notes that collector roads are now described as sub-arterial roads (refer to Table 2 of the RNP).

Table 3.9 Road traffic noise assessment criteria for residential land uses

Road category	Type of project/development	Assessment criteria – dBA	
		Day (7:00 am to 10:00 pm)	Night (10:00 pm to 7:00 am)
Freeway/arterial/ sub-arterial roads	Existing residences affected by additional traffic on existing freeway/arterial/sub-arterial roads generated by land use developments.	$L_{eq,\ 15hr}$ 60 (external)	$L_{eq,\ 9hr}$ 55 (external)

Additionally, the RNP states that where existing road traffic noise criteria are already exceeded, any additional increase in total traffic noise level should be limited to an increase of up to 2 dB.

In addition to meeting the assessment criteria in Table 3.9, any significant increase in total traffic noise at the relevant residential assessment locations must be considered. Residential assessment locations experiencing increases in total traffic noise levels above those presented in Table 3.10 should be considered for mitigation.

Table 3.10 Road traffic relative increase criteria for residential land uses

Road category	Type of project/development	Total traffic noise level increase – dBA	
		Day (7:00 am to 10:00 pm)	Night (10:00 pm to 7:00 am)
Freeway/arterial/ sub-arterial roads and transit ways	New road corridor/redevelopment of existing road/land use development with the potential to generate additional traffic on existing road.	Existing traffic $L_{eq,\ 15hr}$ +12 dB (external)	Existing traffic $L_{eq,\ 9hr}$ + 12 dB (external)

Appendix B of the RNP, states that noise levels shall be rounded to the nearest integer, whilst difference between two noise levels are to be rounded to a single decimal place.

3.5 Mitigating noise

Where noise levels above the PNTLs are predicted, all feasible and reasonable mitigation are to be considered for the project to reduce noise levels towards the PNTLs, before any residual impacts are determined and addressed.

The significance of the residual noise impacts is generally based around the human perception to changes in noise levels as explained in the glossary of the acoustic terms. For example, a change in noise level of 1 to 2 dB is typically indiscernible to the human ear. The characterisation of a residual noise impact of up to 2 dB above the PNTL is therefore considered negligible. The NPfI characterisation of residual noise impacts is outlined further in Table 3.11.

Table 3.11 Significance of residual noise impacts

If the predicted noise level minus the project noise trigger level is:	And the total cumulative industrial noise level is:	Then the significance of the residual noise level is:
≤ 2 dB	Not applicable	Negligible
≥ 3 but ≤5 dB	Less than recommended amenity noise level or Greater than recommended amenity noise level, but the increase in total cumulative industrial noise level resulting from development is ≤1 dB	Marginal
≥ 3 but ≤5 dB	Greater than recommended amenity noise level and the increase in total cumulative industrial noise level resulting from the development is >1dB	Moderate
> 5 dB	Less than or equal to recommended amenity noise level	Moderate
> 5 dB	Greater than recommended amenity noise level	Significant

Source: NPfI (NSW Government 2017).

4 Vibration criteria

4.1 Human comfort – Assessing vibration: a technical guideline

Environmental Noise Management – Assessing Vibration: a technical guideline (DEC 2006) is based on guidelines contained in BS 6472 – 2008, Evaluation of human exposure to vibration in buildings (1 to 80 Hz).

The Guideline presents preferred and maximum vibration values for use in assessing human responses to vibration and provides recommendations for measurement and evaluation techniques. At vibration values below the preferred values, there is a low probability of adverse comment or disturbance to building occupants. Where all feasible and reasonable mitigation measures have been applied and vibration values are still beyond the maximum value, it is recommended the operator negotiate directly with the affected community.

The guideline defines three vibration types and provides direction for assessing and evaluating the applicable criteria. Table 2.1 of the Guideline provides examples of the three vibration types and has been reproduced in Table 4.1.

Table 4.1 Examples of types of vibration (from Table 2.1 of the guideline)

Continuous vibration	Impulsive vibration	Intermittent vibration
Machinery, steady road traffic, continuous construction activity (such as tunnel boring machinery).	Infrequent: Activities that create up to three distinct vibration events in an assessment period, e.g. occasional dropping of heavy equipment, occasional loading and unloading. Blasting is assessed using ANZECC (1990).	Trains, intermittent nearby 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 these would be assessed against impulsive vibration criteria.

Intermittent vibration is representative of activities such as impact hammering, vibratory rolling or general excavation work (such as an excavator tracking) and, as such, is most relevant to this assessment.

Intermittent vibration (as defined in Section 2.1 of the Guideline) is assessed using the vibration dose concept which relates to vibration magnitude and exposure time.

Section 2.4 of the Guideline provides acceptable values for intermittent vibration in terms of vibration dose values (VDV) which requires the measurement of the overall weighted RMS (root mean square) acceleration levels over the frequency range 1 to 80 Hz. To calculate VDV, the following formula (refer Section 2.4.1 of the Guideline) was used:

$$VDV = \left[\int_0^T a^4(t)dt\right]^{0.25}$$

Where VDV is the vibration dose value in $m/s^{1.75}$, $a(t)$ is the frequency-weighted rms of acceleration in m/s^2 and T is the total period of the day (in seconds) during which vibration may occur.

The Acceptable Vibration Dose Values (VDV) for intermittent vibration are reproduced in Table 4.2.

Table 4.2 Acceptable vibration dose values (VDV) for intermittent vibration (m/s $^{1.75}$)

Location	Daytime		Night-time	
	Preferred value, m/s$^{1.75}$	Maximum value, m/s$^{1.75}$	Preferred value, m/s$^{1.75}$	Maximum value, m/s$^{1.75}$
Critical Areas	0.10	0.20	0.10	0.20
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

Notes: 1. Daytime is 7 am to 10 pm and night-time is 10 pm to 7 am.

2. These criteria are indicative only, and there may be a need to assess intermittent values against continuous or impulsive criteria for critical areas.

There is a low probability of adverse comment or disturbance to building occupants at vibration values below the preferred values. Adverse comment or complaints may be expected if vibration values approach the maximum values. The Guideline states that activities should be designed to meet the preferred values where an area is not already exposed to vibration.

4.2 Structural vibration criteria

Most commonly specified "safe" structural vibration limits are designed to minimise the risk of threshold or cosmetic surface cracks and are set well below the levels that have potential to cause damage to the main structure.

4.2.1 Australian Standard AS 2187.2 - 2006

In terms of the most recent relevant vibration damage criteria, Australian Standard AS 2187.2 - 2006 "*Explosives* - Storage *and Use* - *Use of Explosives*" recommends the frequency dependent guideline values and assessment methods given in BS 7385 Part 2-1993 *"Evaluation and measurement for vibration in buildings Part 2*" be used as they are "applicable to Australian conditions".

The standard sets guide values for building vibration based on the lowest vibration levels above which damage has been credibly demonstrated. These levels are judged to give a minimum risk of vibration induced damage, where minimal risk for a named effect is usually taken as a 95% probability of no effect.

Sources of vibration relevant to the project that are considered in the Standard include demolition, ground treatments (e.g. compaction), construction equipment, road traffic and industrial machinery.

The recommended limits (guide values) for transient vibration to ensure minimal risk of structural vibration to residential and industrial buildings are presented numerically in Table 4.3 and graphically in Figure 4.1.

Table 4.3 Transient vibration guide values - minimal risk of structural vibration

Line	Type of building	Peak component particle velocity in frequency range of predominant pulse	
		4 Hz to 15 Hz	15 Hz and above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Source: BS 7385 Part 2-1993.

The Standard states that the guide values in Table 4.3 relate predominantly to transient vibration which does not give rise to resonant responses in structures and low-rise buildings.

Where the dynamic loading caused by continuous vibration is such as to give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values in Table 4.3 may need to be reduced by up to 50%.

Sheet piling activities (for example) are considered to have the potential to cause dynamic loading in some structures (e.g. residences) and it may therefore be appropriate to reduce the transient values by 50%.

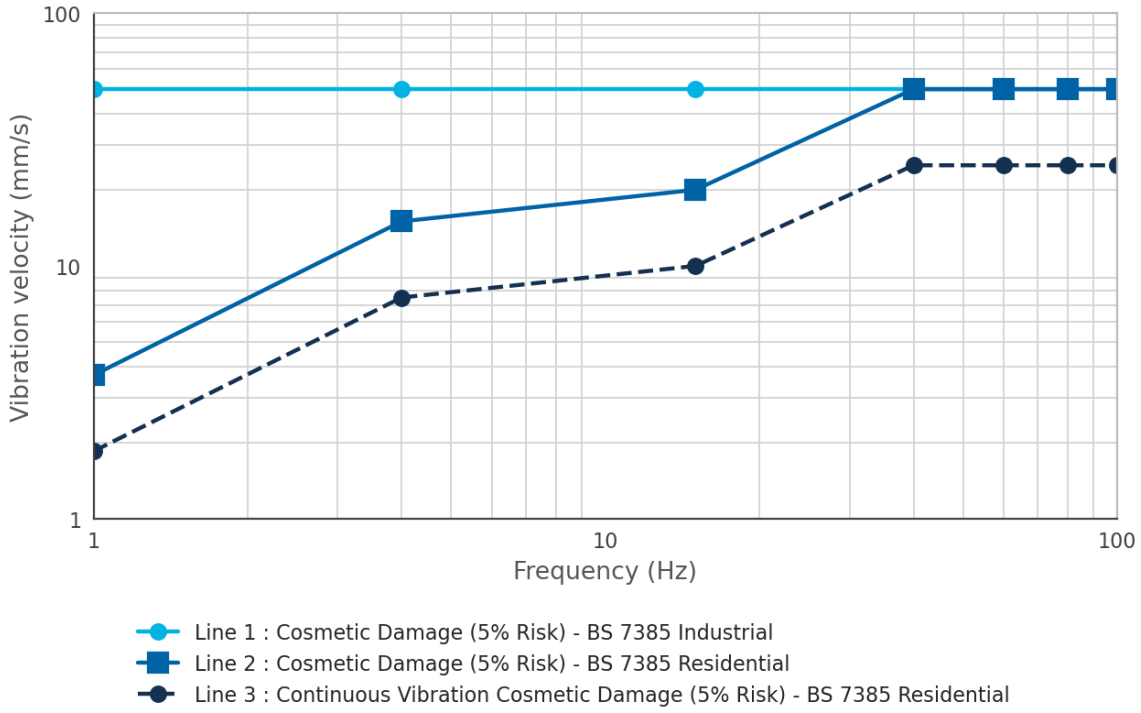

Figure 4.1 Graph of transient vibration guide values for structural vibration

In the lower frequency region where strains associated with a given vibration velocity magnitude are higher, the guide values for building types corresponding to Line 2 are reduced. Below a frequency of 4 Hz where a high displacement is associated with the relatively low peak component particle velocity value, a maximum displacement of 0.6 mm (zero to peak) is recommended. This displacement is equivalent to a vibration velocity of 3.7 mm/s at 1 Hz. The standard goes on to state that minor damage is possible at vibration magnitudes which are greater than twice those given in Table 4.3, and major damage to a building structure may occur at values greater than four times the tabulated values.

Fatigue considerations are also addressed in the Standard and it is concluded that unless calculation indicates that the magnitude and number of load reversals is significant (in respect of the fatigue life of building materials) then the guide values in Table 4.3 should not be reduced for fatigue considerations.

In order to assess the likelihood of structural vibration, AS2187 specifies that vibration measurements should be undertaken at the base of the building and the highest of the orthogonal vibration components (transverse, longitudinal and vertical directions) should be compared with the criteria curves presented in Figure 4.1.

It is noteworthy that extra to the guide values nominated in Table 4.3, the Standard states that:

> Some data suggests that the probability of damage tends towards zero at 12.5 mm/s peak component particle velocity. This is not inconsistent with an extensive review of the case history information available in the UK.

Also that:

> A building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive.

A vibration screening criterion of 15 mm/s is recommended for structures surrounding the site for vibration inducing construction. This should be reduced to 7.5 mm/s (by 50%) if the vibration activity is continuous and has the potential to cause resonance effects in surrounding structures (e.g. sheet piling).

5 Noise assessment approach

5.1 Overview

This section presents the methods and base parameters used to model operational emissions from the existing and proposed site operations as well as the construction stages.

Operational and construction noise levels were predicted using DGMR Software proprietary modelling software, iNoise. The model allows prediction under the ISO9613-2 "*Acoustics – Attenuation of Sound during Propagation Outdoors – general method"* algorithm. This algorithm is accepted by the EPA. Features which affect the predicted noise level that are considered in the noise modelling include:

- equipment sound power levels and locations
- screening from structures
- receiver locations
- ground topography
- noise attenuation due to geometric spreading
- ground absorption
- atmospheric absorption.

The model was populated with 3-D topography of the project and surrounding area, extending beyond the assessment locations. Plant and equipment representing the range of proposed operational and construction scenarios was modelled at locations representing the worst-case noise levels.

5.2 Construction noise

5.2.1 Construction Stages

The following broad work stages have been assessed:

- Stage 1 – Demolition
- Stage 2 – Concreting Works
- Stage 3 – Structure Construction

Table 5.1 provides a summary of the plant and equipment and sound power levels for all stages modelled. Where available, sound power levels for equipment have been adopted from EMM measurement databases for similar activities/equipment.

For all stages, all equipment has been assumed to operate continuously over a 15-minute assessment period to represent a worst-case noise scenario. The adopted SWL per phase is noted in Table 5.1.

Table 5.1 Adopted stages and plant and equipment for construction operations

Scenario	Equipment/Activity	Number of items (per typical 15 minutes)	SWL per item, L_{aeq}	Total SWL, L_{aeq}	Adopted SWL per phase, L_{aeq}
Stage 1: Demolition	Excavator	1	109	109	119
	Dozer	1	106	106	
	Hydraulic Hammer	1	118	118	
	Watercart	1	106	106	
	Truck and dog	1	106	106	
Stage 2: Concreting Works	Concrete pump	1	106	106	111
	Concrete truck	1	106	106	
	Truck and dog	1	106	106	
Stage 3: Structure Construction	Franna crane	1	110	110	113
	Power hand tools	1	106	106	
	Truck and dog	1	106	106	
	Welder	1	101	101	

5.3 Operational noise

5.3.1 Site layout

The operational site layout is shown in Figure 1.1.

5.3.2 Mitigation measures

The following noise mitigations measures are already in place on site and have been adopted in the noise model:

- Barriers (approximately 4 m in height) constructed alongside the eastern and southern boundaries.
- All conveyors are enclosed.
- New processing building's ceiling to be internally lined with acoustically absorptive material such (such as Stratocell Whisper or perforated foil facing building blanket). It is recommended that where feasible, upper portions of the building walls be lined also, however this is not assumed in the model.

In addition to the above, the proponent will adhere to the operational equipment scenario limitations detailed in Section 5.3.3. The processing plant will only operate during the day period.

5.3.3 Plant and equipment

Acoustically significant fixed and mobile equipment items considered in the noise model are provided for the existing and proposed operations in Table 5.2. Equipment sound power levels have been taken from an EMM database of similar plant and equipment.

The scenarios detailed represent all equipment operating in a worst-case 15-minute period during each defined time period.

Table 5.2 Adopted plant and equipment for existing and proposed operations

Item (location)	Sound power level per item	Number of items operating during 15-minute period			
		Morning shoulder	Day	Evening	Night
Existing site operations					
Excavator	107	0	2	0	0
Front end loader	106 (stockpile management), 101 (loading haul truck)	0	1	0	0
Storage or changing over of skip bins	102	0	1	0	0
Trucks unloading material	108	0	4	0	0
Bobcat	104	0	1 (50%)	0	0
Heavy vehicles	105	10	6	0	0
Trucks idling	90	3	3	0	0
Proposed site operations – MRF enclosure					
Warehouse					
Front end loader	106	1	1	1	0
Excavator	107	1	1	0	0
Conveyor drive (covered)	85	1	1	0	0
Feeder	108	1	1	0	0
Heavy vehicle (tipping load)	108	1	1	1	0
Tipper truck (tipping load)	103	3	3	3	0
Workshop					
Rattle gun	99	1	1	1	1
Compressor	94	1	1	1	1
Welder	101	1	1	1	1
Processing plant					
Spaleck flip flow screen	109	0	1	0	0
SDS NIR Sorter	109	0	1	0	0
Eddy current separator	93	0	1	0	0
Picking station	107	0	1	0	0
Sindsifter DDS	112	0	1	0	0
Compressor	94	0	1	0	0

Item (location)	Sound power level per item	Number of items operating during 15-minute period			
		Morning shoulder	Day	Evening	Night
Excavator	107	1	1	1	0
Yard					
Bobcat sweeper	104	1	1	1	1
Forklift	92	1	1	1	1
Heavy Vehicle	105	1	1	1	0
Heavy Vehicle (idling)	90	1	1	1	0
Tipper truck	103	3	3	3	0
Conveyor	72/m	1	1	0	0
Water treatment plant	94	1	1	0	0

Notes: Utilisation percentage shown only if less than 100%

5.3.4 Site enclosure scenario

For comparison to the above operational scenario where the entire site is enclosed was modelled. Equipment and sound power levels from Section 5.3.3 were used in the scenario, with all equipment from the yard and recycling plant building assumed to be operating within the enclosure. The preliminary enclosure design is shown in Figure 5.1. Shed construction has been assumed as follows:

- Shed walls constructed of the following:
  - outer skin of 0.48 mm bmt sheet metal
  - 50 mm 32kg/m^3 (minimum) internal insulation lining walls with perforated foil facing inwards
- Shed roof constructed of the following:
  - outer skin of 0.48 mm bmt sheet metal
  - 50 mm 32kg/m^3 (minimum) internal insulation lining walls with perforated foil facing inwards
- Entry door located to the south at the current weighbridge location, assumed open 24/7.

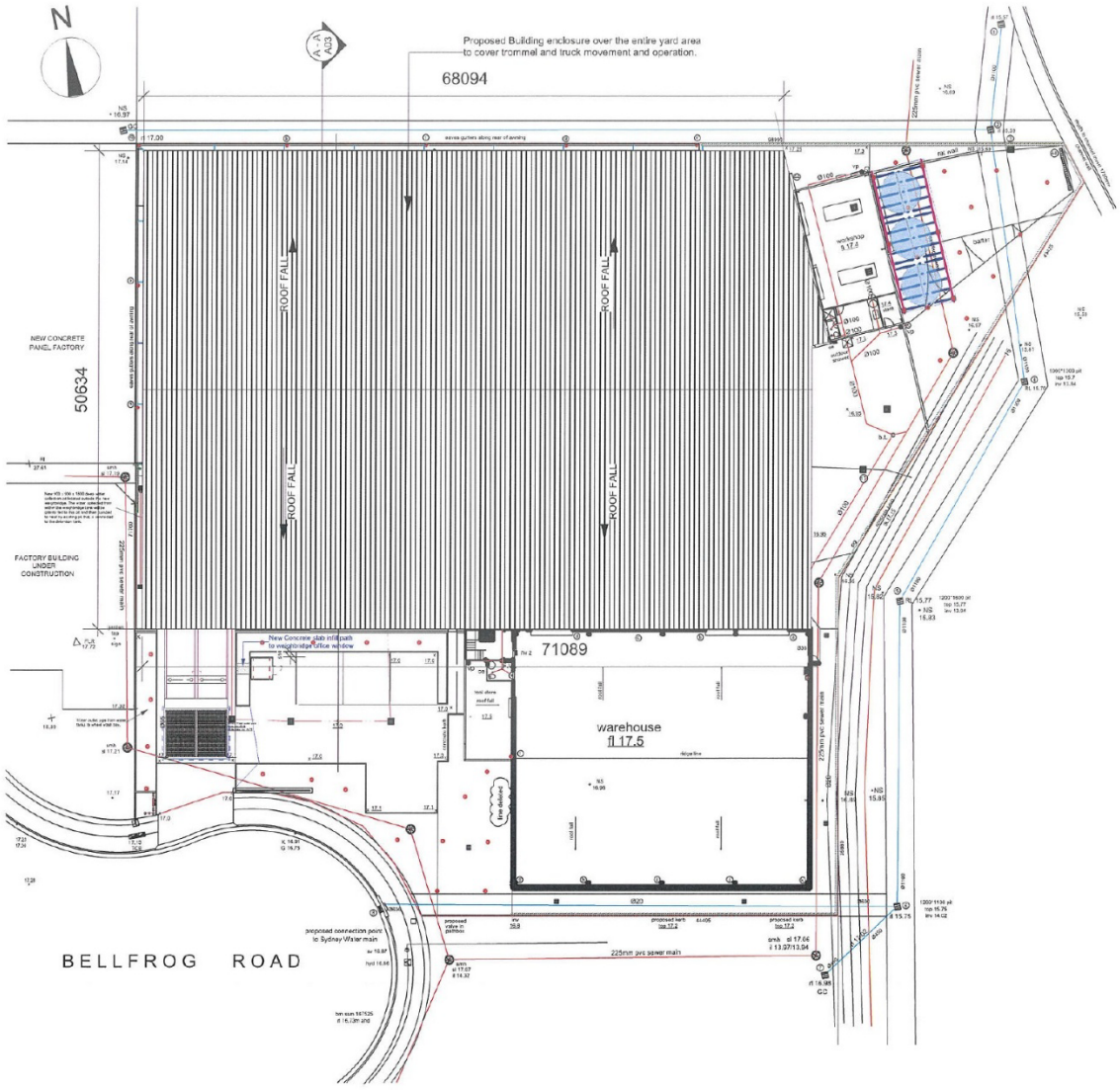

Figure 5.1 Site enclosure site layout

5.4 Sleep disturbance

A sound power level of 118 dB L_{amax} representing a truck's air brakes have been used to model potential L_{amax} sleep disturbance impacts at all residential assessment locations. All material unloading is to be performed in the warehouse on the southern side of site.

5.5 Road traffic noise

5.5.1 Overview

Truck routes will remain consistent with the existing operations, with all inbound trucks approaching the site from the north along from Wentworth Street into Bellfrog Street and will depart site back in the same direction.

The RTN assessment has considered all project – related traffic volumes associated with the operational activities and construction activities.

5.5.2 Existing traffic volumes

Existing average daily traffic movements for Bellfrog Street were established from traffic surveys conducted in August 2022 as summarised in Table 5.3. The daytime surveys include the existing operational site traffic as the site was operational during the survey.

Table 5.3 Annual average daily traffic volumes

Road segment	Day 7am to 10pm				Night 10pm to 7am			
	LV	HV	Total	HV%	LV	HV	Total	HV%
Bellfrog Street	1704	621	2325	36	301	110	411	37

Notes: LV = Light vehicles.

HV = Heavy vehicles.

5.5.3 Projected traffic volumes

The predicted peak daily traffic generation for operation of the site is 382 truck movements per day for operations. As construction is only occurring during standard day time hours, only the day time traffic levels have been calculated for construction. From peak hour data, traffic engineers provided extrapolated daily data for noise assessment purposes.

5.5.4 Methodology

The US EPA Federal Highways (FHWA) method was used in the assessment of road traffic noise due to the relatively low traffic flows (<200 vehicles per hour) as the RTN calculation procedure is more sensitive to low traffic volumes compared to other algorithms.

The existing road traffic noise levels have been assessed by calculating existing traffic at representative residential assessment locations (RT1 and RT2) using FHWA methods. These locations are displayed in Figure 2.1 and while do not front the haulage route, do have rear or side facades exposed to Bellfrog or Wentworth Streets. The following parameters have been adopted:

- a vehicle speed for the portion of Bellfrog Street adjacent to RT1 of 50 km/h (as signposted)

- a vehicle speed for portion of Wentworth Street adjacent to RT2 of 50 km/h (as signposted)
- no additional buildings or other intervening objects that will act like a noise barrier between the road and the noise assessment point are proposed
- a façade reflection has been added to predicted noise levels in accordance with the RNP.

6 Impact assessment

6.1 Construction noise

In accordance with procedures outlined in Section 5, a prediction construction noise levels at each sensitive receiver is provided in Table 6.1 below for each stages of construction, along with comparison to NMLs. The levels presented for each assessment location represents the energy-average noise level over a 15-minute period and assumes all plant and activities operating concurrently in accordance with scenarios outlined in Section 5.1 under ISO9613 noise enhancing conditions.

Predicted site noise $L_{Aeq,15min}$ contributions are below NMLs at all assessment locations for all stages. No receivers have been identified to be highly noise affected by the works.

Notwithstanding the findings, provided in Section 7 is a summary of mitigation measures that could be considered to minimise noise on the local community.

Table 6.1 Predicted construction noise levels stage 1 -3, dB $L_{Aeq,15min}$

ID	NML day	Stage 1 prediction	Stage 1 NML exceedance	Stage 2 prediction	Stage 2 NML exceedance	Stage 3 prediction	Stage 3 NML exceedance
R1	75	65	0	57	0	59	0
R2	75	65	0	57	0	59	0
R3	75	54	0	46	0	48	0
R4	75	56	0	48	0	50	0
R16	56	43	0	35	0	37	0
R17	56	45	0	37	0	39	0
R18	56	53	0	45	0	47	0
R19	56	45	0	37	0	39	0
R20	56	47	0	39	0	41	0
R21	56	44	0	36	0	38	0
R22	56	50	0	42	0	44	0
R23	56	56	0	48	0	50	0

Notes: 1. Light grey shading indicates 1–2 dB exceedance of PNTL

2. Dark grey shading indicates more than a 2 dB exceedance of PNTL

6.2 Construction vibration

The Transport for NSW Construction Noise and Vibration Guideline (2023) presents minimum working distances for typical construction equipment for both structural and human comfort impacts. Table 6.2 presents the minimum working distances for equipment relevant to this project.

Table 6.2 Recommended minimum working distances for vibration intensive plant

Plant Item	Rating/Description	Minimum working distance	
		Structural vibration (BS 7385)	Human comfort (Assessing Vibration: A technical guideline)[1]
Small hydraulic hammer	300 kg on 5 t to 12 t excavator	2 m	7 m
Medium hydraulic hammer	900 kg hammer on 12 t to 18 t excavator	7 m	23 m
Large hydraulic hammer	1600 kg hammer on 18 t to 34 t excavator	22 m	73 m

Source: Construction Noise and Vibration Guideline (TfNSW 2023)

Notes: 1. Safe work distances relate to continuous vibration. For most construction activity, vibration emissions are intermittent in nature. The minimum working distances are therefore conservative.

Regardless of the hydraulic hammer size, all residential sensitive assessment locations are beyond the minimum working distances, hence no vibration impacts are predicted.

6.3 Operational noise

6.3.1 Single point predictions

In accordance with procedures outlined in Section 5, prediction of single point operational noise levels are provided in Table 6.4 for all proposed periods, along with comparison to PNTLs. The levels presented for each assessment location represents the energy-average noise level over a 15-minute period and assumes all plant and activities operating concurrently in accordance with scenarios outlined in Section 5.1 under ISO9613 noise enhancing conditions. Also provided, are the predicted noise levels from existing operations for comparison.

For existing operations, the predicted $L_{Aeq,15min}$ contributions are below PNTLs at all assessment locations. This aligns with the compliance monitoring as per EPL 21389 which recorded no exceedances, which was conducted by 4Pillars during 2023 and 2024. For the proposed operations, the predicted site noise $L_{Aeq,15min}$ contributions are below PNTLs at most assessment locations with the exception being the receiver R23 during the day period. For this period, the predicted noise level exceeds the PNTL by 2dB. In accordance with Section 4.2 of the NPfI, a residual exceedance of 1–2 dB is considered negligible and does not warrant further mitigation. Regardless, a discussion of feasible and reasonable mitigation measures to reduce noise to within PNTLs, as required by the NPfI, is provided in Section 7. In accordance with Section 4.2 of the NPfI, a residual exceedance of 1-2 dB is considered negligible and does not warrant further mitigation

Table 6.5 provides the results for the proposed full enclosed scenario. The predicted $L_{Aeq,15min}$ contributions are below PNTLs at all assessment locations.

Table 6.3 Existing approved operations

ID	PNTLs					Predicted noise levels					Exceedance				
	MS	Day	Eve	Night	L_{Amax}	MS	Day	Eve	Night	L_{Amax}	MS	Day	Eve	Night	L_{Amax}
R1	75	75	N/A	N/A	N/A	55	58	N/A	N/A	N/A	0	0	N/A	N/A	N/A
R2	75	75	N/A	N/A	N/A	55	60	N/A	N/A	N/A	0	0	N/A	N/A	N/A
R3	75	75	N/A	N/A	N/A	41	47	N/A	N/A	N/A	0	0	N/A	N/A	N/A
R4	75	75	N/A	N/A	N/A	36	46	N/A	N/A	N/A	0	0	N/A	N/A	N/A
R16	50	51	N/A	N/A	N/A	34	38	N/A	N/A	N/A	0	0	N/A	N/A	N/A
R17	50	51	N/A	N/A	N/A	27	39	N/A	N/A	N/A	0	0	N/A	N/A	N/A
R18	50	51	N/A	N/A	N/A	42	44	N/A	N/A	N/A	0	0	N/A	N/A	N/A
R19	50	51	N/A	N/A	N/A	25	37	N/A	N/A	N/A	0	0	N/A	N/A	N/A
R20	50	51	N/A	N/A	N/A	24	36	N/A	N/A	N/A	0	0	N/A	N/A	N/A
R21	50	51	N/A	N/A	N/A	31	39	N/A	N/A	N/A	0	0	N/A	N/A	N/A
R22	50	51	N/A	N/A	N/A	34	46	N/A	N/A	N/A	0	0	N/A	N/A	N/A
R23	50	51	N/A	N/A	N/A	39	47	N/A	N/A	N/A	0	0	N/A	N/A	N/A

Notes: 1. Light grey shading indicates 1–2 dB exceedance of PNTL

2. Dark grey shading indicates more than a 2 dB exceedance of PNTL

Table 6.4 Proposed operations – MRF enclosure

ID	PNTLs					Predicted noise levels					Exceedance				
	MS	Day	Eve	Night	L_{Amax}	MS	Day	Eve	Night	L_{Amax}	MS	Day	Eve	Night	L_{Amax}
R1	75	75	N/A	N/A	N/A	62	65	62	51	N/A	0	0	0	0	N/A
R2	75	75	N/A	N/A	N/A	61	65	61	54	N/A	0	0	0	0	N/A
R3	75	75	N/A	N/A	N/A	49	52	49	41	N/A	0	0	0	0	N/A
R4	75	75	N/A	N/A	N/A	48	52	48	40	N/A	0	0	0	0	N/A
R16	50	51	48	43	54	40	43	40	32	47	0	0	0	0	0
R17	50	51	48	43	54	40	43	40	33	42	0	0	0	0	0
R18	50	51	48	43	54	48	51	48	35	54	0	0	0	0	0
R19	50	51	48	43	54	39	42	39	31	39	0	0	0	0	0
R20	50	51	48	43	54	36	39	35	28	37	0	0	0	0	0
R21	50	51	48	43	54	40	44	40	33	44	0	0	0	0	0
R22	50	51	48	43	54	46	51	46	38	45	0	0	0	0	0
R23	50	51	48	43	54	47	53	47	41	46	0	2	0	0	0

Notes: 1. Light grey shading indicates 1–2 dB exceedance of PNTL

Table 6.5 Proposed operations site enclosure scenario

ID	PNTLs					Predicted noise levels					Exceedance				
	MS	Day	Eve	Night	L_{Amax}	MS	Day	Eve	Night	L_{Amax}	MS	Day	Eve	Night	L_{Amax}
R1	75	75	N/A	N/A	N/A	62	66	61	50	N/A	0	0	0	0	N/A
R2	75	75	N/A	N/A	N/A	59	64	58	49	N/A	0	0	0	0	N/A
R3	75	75	N/A	N/A	N/A	50	52	48	32	N/A	0	0	0	0	N/A
R4	75	75	N/A	N/A	N/A	44	47	42	29	N/A	0	0	0	0	N/A
R16	50	51	48	43	54	38	40	36	22	47	0	0	0	0	0
R17	50	51	48	43	54	38	41	36	22	42	0	0	0	0	0
R18	50	51	48	43	54	47	50	46	34	54	0	0	0	0	0
R19	50	51	48	43	54	35	40	33	23	39	0	0	0	0	0
R20	50	51	48	43	54	29	35	28	19	37	0	0	0	0	0
R21	50	51	48	43	54	38	40	36	21	44	0	0	0	0	0
R22	50	51	48	43	54	39	43	38	24	45	0	0	0	0	0
R23	50	51	48	43	54	44	46	42	28	46	0	0	0	0	0

Notes: 1. Light grey shading indicates 1–2 dB exceedance of PNTL

6.3.2 Noise contours

Predicted $L_{Aeq,15min}$ operational noise contours representing the proposed morning shoulder, day, evening and night operations under ISO9613 noise enhancing conditions are provided in Appendix B. The contours depict the extent of noise exposure surrounding the site including the identified reference assessment locations.

6.4 Sleep disturbance

Table 6.3, Table 6.4 and Table 6.5 present the predicted L_{Amax} noise levels at all residential assessment locations.

The predicted L_{Amax} noise levels show that the sleep disturbance screening criteria will be satisfied at all residential assessment locations during the proposed morning shoulder transporting and material handling activities (which will not occur withing the remainder of the night period) operations. The proposed night time activities (workshop and low impact works) will not generate maximum noise levels as high as trucks

6.5 Road traffic noise

Based on existing traffic volumes (Section 5.5) and projected site generation, a summary of the calculated existing and future road traffic noise levels is presented in Table 6.6 for construction traffic noise and Table 6.7 for operational road traffic noise.

Table 6.6 Construction traffic noise calculations – Bellfrog Street

Assessment location	Period[2]	Approximate distance of residential façade from nearest carriageway	Existing movements[3]	Existing plus proposed construction project movements[3]	RNP Criteria[1] L_{Aeq}	Noise level increase due to the project, $L_{Aeq, 15hr}$
			Calculated level, $L_{Aeq, period}$	Predicted level, $L_{Aeq, period}$		
RT1	Day (15 hour)	60 m	48.3	49.5	60	1.2
RT2	Day (15 hour)	6 m	66.6	67.8	60	1.2

Notes: 1. Bellfrog Street is a sub-arterial road and is assessed as $L_{Aeq,15hr}$ 60 dBA.

2. Day is 7 am to 10 pm (15 hours).

3. Existing road traffic noise levels calculated using FHWA methodology. Existing road traffic noise levels include existing site operational traffic.

The proposed construction traffic noise satisfies the RNP criteria at RT1 during the expected construction hours. The existing road traffic noise exceeds the RNP criteria at RT2 during the day period by 7 dB. In accordance with the RNP, as the existing road traffic noise levels already exceed the $L_{Aeq, period}$ criteria, future increases in road traffic noise due to the construction should be limited to 2 dB. The noise level increase due to the project is within 2dB. Therefore, no further mitigation is considered warranted.

Table 6.7 Operational traffic noise calculations – Bellfrog Street

Assessment location	Period[2]	Approximate distance of residential façade from nearest carriageway	Existing movements[3]	Existing plus proposed construction project movements[3]	RNP Criteria[1] L_{Aeq}	Noise level increase due to the project, $L_{Aeq, 15hr}$
			Calculated level, $L_{Aeq, period}$	Predicted level, $L_{Aeq, period}$		
RT1	Day (15 hour)	60 m	48.3	50.0	60	1.7
	Night (9 hour)		43.0	43.7	55	0.7
RT2	Day (15 hour)	6 m	66.6	68.4	60	1.7
	Night (9 hour)		61.3	62.1	55	0.7

Notes: 1. Bellfrog Street is a sub-arterial road and is assessed as $L_{Aeq, 15hr}$ 60 dBA.

2. Day is 7:00 am to 10:00 pm (15 hours), night is 10:00 pm to 7:00 am (9 hours).

3. Existing road traffic noise levels calculated using FHWA methodology. Existing road traffic noise levels include existing site operational traffic.

The existing and proposed operational road traffic noise satisfies the RNP criteria at RT1 during both the day and night periods. The existing road traffic noise exceeds the RNP criteria at RT2 during both the day and night periods by 7 dB and 6 dB respectively. In accordance with the RNP, as the existing road traffic noise levels already exceed the $L_{Aeq, period}$ criteria, future increases in road traffic noise due to the proposed modification should be limited to 2 dB. The noise level increase due to the project is within 2 dB for both the day and night periods. Therefore, no further feasible and reasonable mitigation is considered warranted.

7 Noise management and mitigation

7.1 Construction management and mitigation

7.2 Noise

The EPA's NSW ICNG requires that construction noise levels are assessed against NMLs. Where noise levels are above the NMLs, all feasible and reasonable noise mitigation must be considered. The predictions described earlier demonstrate that proposed construction on site will satisfy the NSW EPA management levels. Nonetheless, good practice measures are provided for consideration.

7.2.1 Work hours

All activities are proposed during standard hours of work as defined in the ICNG. Notwithstanding, out of hours construction will only proceed where a strong justification is provided (e.g. the need for a Road Occupancy License), in all cases work during least sensitive time periods will be prioritised as far as practicable.

7.2.2 Work practices

Work practice methods include:

- regular reinforcement (such as at toolbox talks) of the need to minimise noise and vibration
- regular identification of noisy activities and adoption of improvement techniques
- avoiding the use of portable radios, public address systems or other methods of site communication that may unnecessarily impact upon nearby residents
- where possible, avoid the use of equipment that generates impulsive noise
- minimise the movement of materials and plant and unnecessary metal-on-metal contact
- the use of local noise barriers and/or noise blankets (e.g. echobarrier)
- minimise truck movements
- schedule respite periods for intensive works as determined through consultation with potentially affected neighbours (e.g. a daily respite period for a minimum of one hour at midday).

7.2.3 Plant and equipment

Additional measures for plant and equipment include:

- where possible, choose quieter plant and equipment based on the optimal power and size to most efficiently perform the required tasks
- movement alarms and beepers to be replaced with non-tonal level varying quackers or equivalent
- operate plant and equipment in the quietest and most efficient manner
- regularly inspect and maintain plant and equipment to minimise noise and vibration level increases, to ensure that all noise and vibration reduction devices are operating effectively.

7.2.4 Quantifying noise reductions

Approximate noise reductions provided by some of these measures are provided in Table 7.1.

Table 7.1 Relative effectiveness of various forms of noise control

Noise control	Nominal noise reduction possible, in total A-weighted sound pressure level, dB
Increase source to receiver distance[1]	Approximately 6 dB for each doubling of distance
Reduce equipment operating times or turn off idling machinery[2]	Approximately 3 dB per halving of operating time
Operator training on quiet operation[2]	Up to 3 to 5 dB
Screening (e.g. noise barrier)[1]	Normally 5 dB to 10 dB, maximum 15 dB
Enclosure (e.g. shed/building)[1]	Normally 15 dB to 25 dB, maximum 50 dB
Silencing (e.g. exhaust mufflers) [1]	Normally 5 dB to 10 dB, maximum 20 dB

Notes: 1. Sourced from AS2436-2010.

2. Based on EMM's measurement experience at construction and mining sites

7.3 Operational noise

7.3.1 Management measures

The site shall be operated in accordance with proposed plans, configuration and assumptions presented in Section 5.3 including:

- hours of operation
- regularly inspect and maintenance of plant and equipment to minimise noise level increases, to ensure that all noise reduction devices are operating effectively.

7.3.2 Mitigation measures

The following mitigation measures are to be implemented and maintained:

- the existing noise wall (approximately 4.5 m in height) alongside the eastern and southern boundary of site
- all conveyors are enclosed
- new recycling plant building's ceiling to be internally lined with acoustically absorptive material such (such as Stratocell Whisper or perforated foil facing building blanket). It is recommended that where feasible, upper portions of the recycling plant building walls be lined also.

Table 7.2 provides a summary of additional mitigation measures explored for the site and an assessment of their feasibility and reasonableness.

Table 7.2 Assessment of mitigation measures feasibility and reasonableness

Mitigation option	Feasible?	Reasonable?	Adopted? Justification
Mitigation at source			
Operational limitations as per proposed scenarios in Section 5.3.1 – including maximum loads, truck movements and deliveries per 15-minute period	Yes	Yes	Yes These scenarios represent practical operations that could occur during each period and are unlikely to be sustained for long periods. These restrictions are not unreasonable given the production requirements and current operations.
Construction of procesing building over processing plant	Yes	Yes	Yes The construction of the processing building internally lined with absorptive acoustic material is considered a feasible and reasonable measure, given the predicted noise levels, minimal impact to site operations and cost involved.
Further operational limitations during evening and night periods	Yes	No	No Further operational restrictions will be too limiting on the site. As noise predictions satisfy all evening, night and morning shoulder PNTLs at all locations and only one location with a negligible 2 dB exceedance during the day remains, this is not necessary. Hence, this is not considered reasonable.
Fully enclose site	Yes	No	No Enclosing the site is not reasonable, given the extended impacts on operations, excessive cost and the fact that the residual exceedance of PNTLs is negligible, at only one assessment location and during the day only.
Mitigation in the transmission path to the receiver			
Raising and extending noise barriers	Yes	No	No An extension on the noise barrier on the eastern and southern boundary would not provide any further benefits as tested via the 3D modelling completed.
Mitigation at the receiver			
Offer acoustic treatments/mechanical ventilation upgrades to receivers with residual exceedances	Yes	No	No Given the negligible residual exceedance and the road traffic noise exposure already present for these residences providing at-receiver acoustic treatments are not considered reasonable.

8 Conclusion

4Pillars has engaged EMM on behalf of Aussie Recycling to prepare this NIA to meet the requirements of the SEARs for the State Significant Development Application (SSD-67497708).

The assessment has been prepared in accordance with the methodologies outlined in the ICNG, NPfI and RNP, as well as other relevant guidelines and standards.

Typical worst case noise levels from construction and operations were predicted using a 3-D computer noise model of the site which were then used to assess against NMLs and PNTLs. Key findings of the assessment are described below:

- Predicted construction site noise $L_{Aeq,\ 15min}$ contributions are below NMLs at all assessment locations for all stages. No receivers have been identified to be highly noise affected by the proposed construction works.
- For existing operations, the predicted $L_{Aeq,\ 15min}$ contributions are below PNTLs at all assessment locations which aligns with the compliance monitoring conducted by 4Pillars during 2023 and 2024, which confirmed no exceedances of the EPL noise limits. For the proposed operations, the predicted site noise $L_{Aeq,\ 15min}$ contributions are below PNTLs at most assessment locations with the exception being the receiver R23 during the day period. For this period, the predicted noise level exceeds the PNTL by 2 dB. A feasible and reasonable assessment of the residual noise was competed in accordance with the NPfI. In accordance with Section 4.2 of the NPfI, a residual exceedance of 1 to 2 dB is considered negligible and does not warrant further mitigation.
- A sleep disturbance assessment (Section 6.4) shows that predicted L_{Amax} noise levels are below (satisfy) the sleep disturbance screening criterion at all residential assessment locations.
- The potential for road traffic noise impacts on public roads due to project construction and operational traffic has been assessed in accordance with relevant NSW Road Noise Policy (EPA 2011). Both operational and construction traffic noise satisfy the RNP criteria during all periods at all assessment locations.
- As all sensitive assessment locations are beyond the minimum working distances, no vibration impacts are predicted.

Appendix A
Daily logger charts

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EMM Logger Report

Monitoring ID: 39 Juno Parade, Greenacre

Address: 39 Juno Parade, Greenacre

Description: NM1

Background Levels

	Day[1] (dB)	Evening[2] (dB)	Night[3] (dB)
L_{A90} Background Noise Level	46	45	39
L_{Aeq} Ambient Noise Levels	54	53	49

Notes

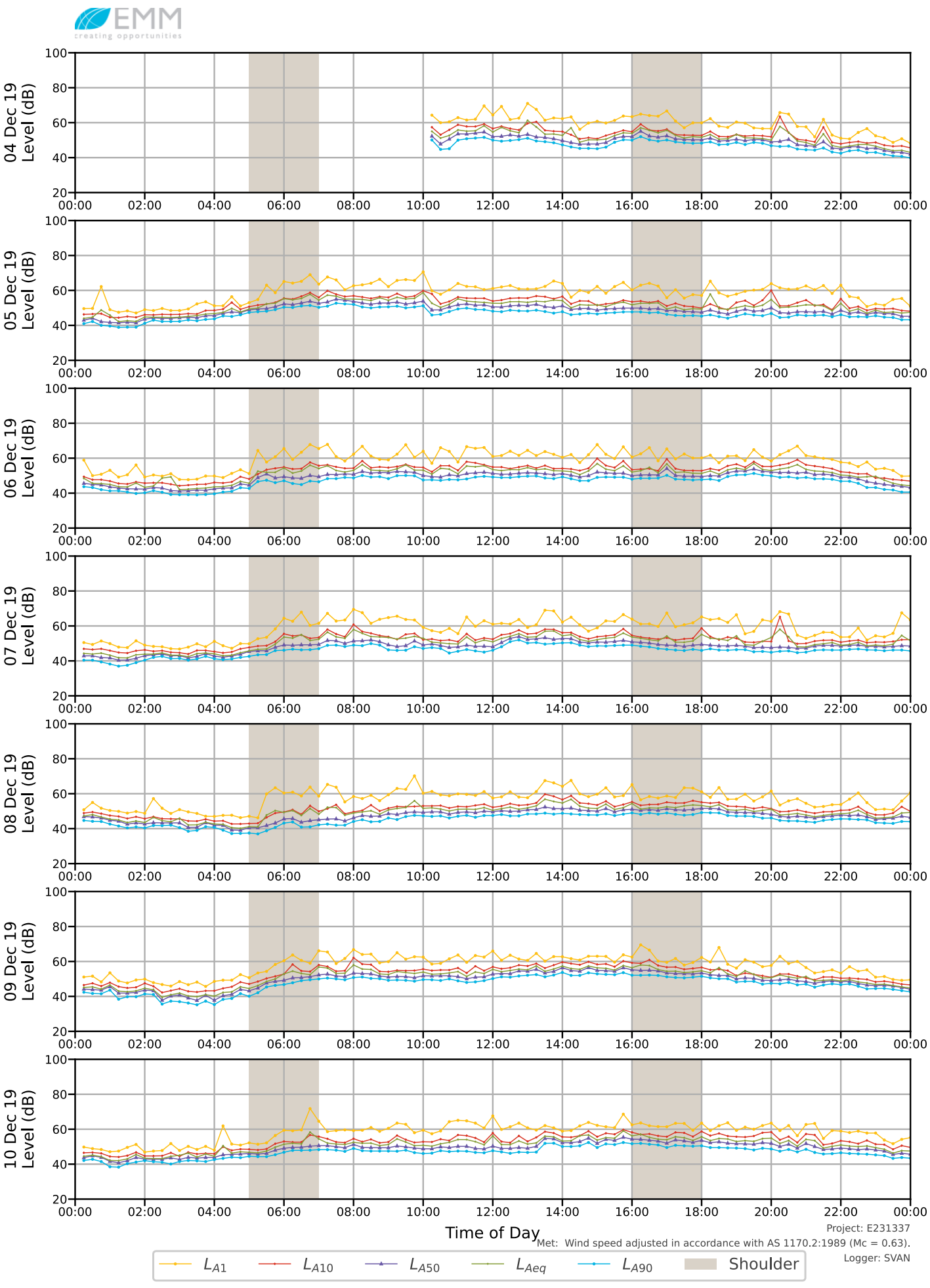
1: Day is the period from 7 am to 6 pm Monday to Saturday or 8 am to 6 pm on Sundays and public holidays.

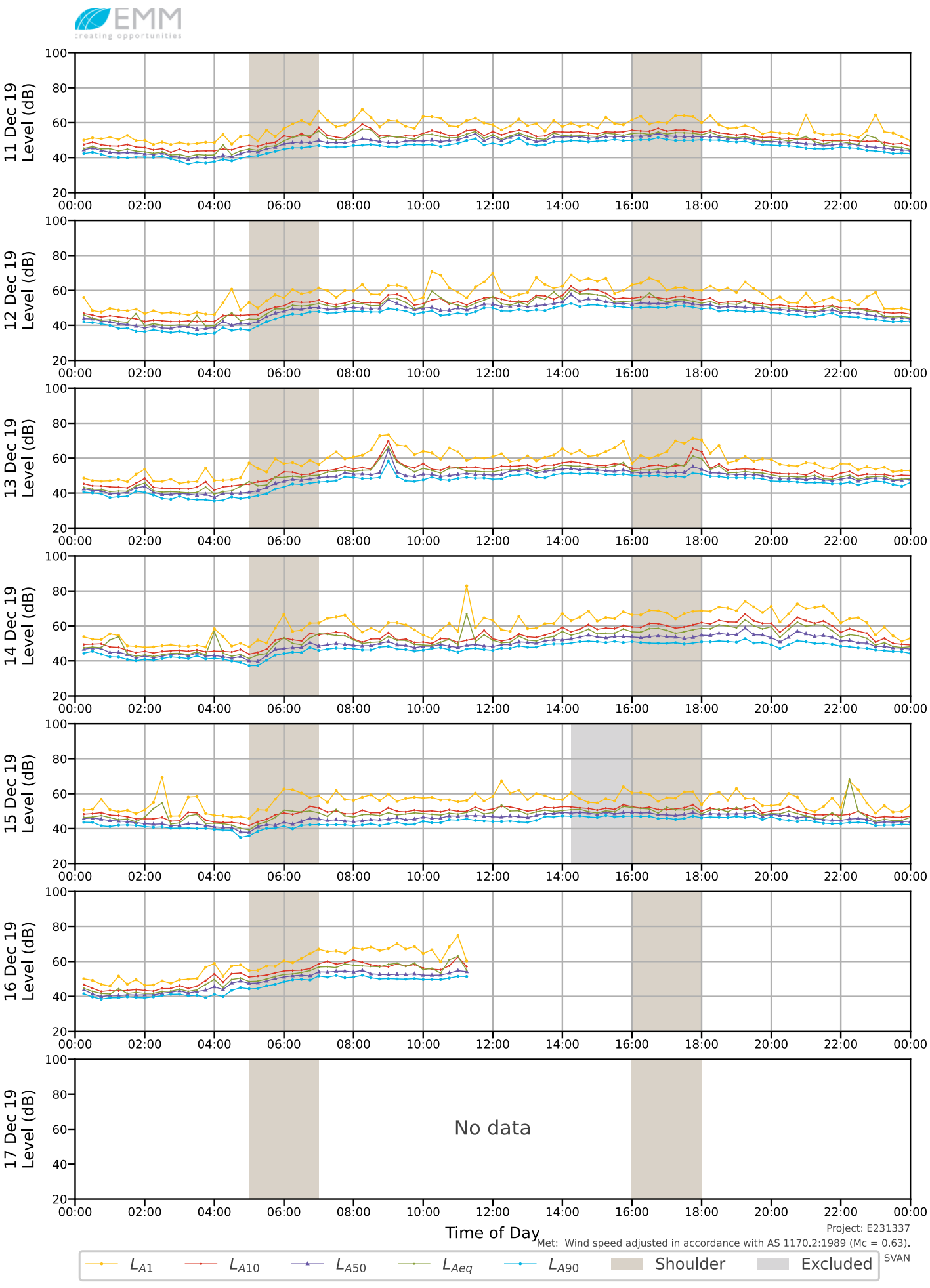
2: Evening is the period from 6 pm to 10 pm.

3: Night is the remaining period.

Shoulder Levels

	Start	End	Level (dB)
Morning Shoulder	05:00	07:00	41
Evening Shoulder	16:00	18:00	46


EMM creating opportunities
04 Dec 19 Level (dB)
05 Dec 19 Level (dB)
06 Dec 19 Level (dB)
07 Dec 19 Level (dB)
08 Dec 19 Level (dB)
09 Dec 19 Level (dB)
10 Dec 19 Level (dB)
100
80
60
40
20
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00
Time of Day
Project: E231337
Met: Wind speed adjusted in accordance with AS 1170.2:1989 (Mc = 0.63).
Logger: SVAN
L_{A1}
L_{A10}
L_{A50}
L_{Aeq}
L_{A90}
Shoulder


EMM creating opportunities
11 Dec 19 Level (dB)
12 Dec 19 Level (dB)
13 Dec 19 Level (dB)
14 Dec 19 Level (dB)
15 Dec 19 Level (dB)
16 Dec 19 Level (dB)
17 Dec 19 Level (dB)
100
80
60
40
20
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
00:00
No data
Time of Day
Project: E231337
Met: Wind speed adjusted in accordance with AS 1170.2:1989 (Mc = 0.63).
SVAN
L_{A1}
L_{A10}
L_{A50}
L_{Aeq}
L_{A90}
Shoulder
Excluded

Appendix B
Operation noise contours

EMM
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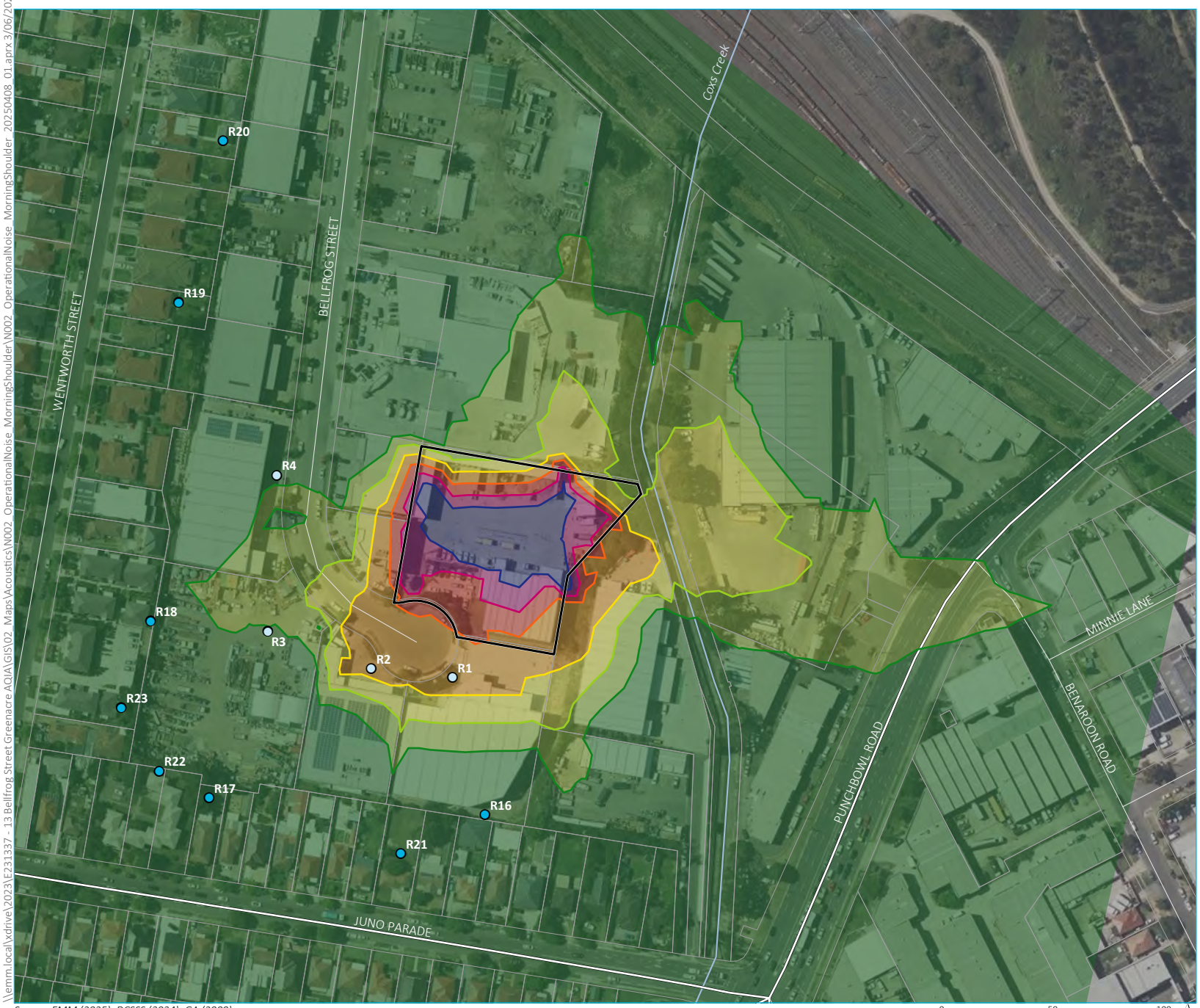


KEY

- Site boundary

Assessment location

- Industrial
- Residential

Operation noise contour - morning shoulder (dB)

- < 50
- 50 - 55
- 55 - 60
- 60 - 65
- 65 - 70
- 70 - 75
- > 75

Existing environment

- Major road
- Minor road
- Named watercourse
- Cadastral boundary

Source: EMM (2025); DCSSS (2024); GA (2009)

0 50 100 m

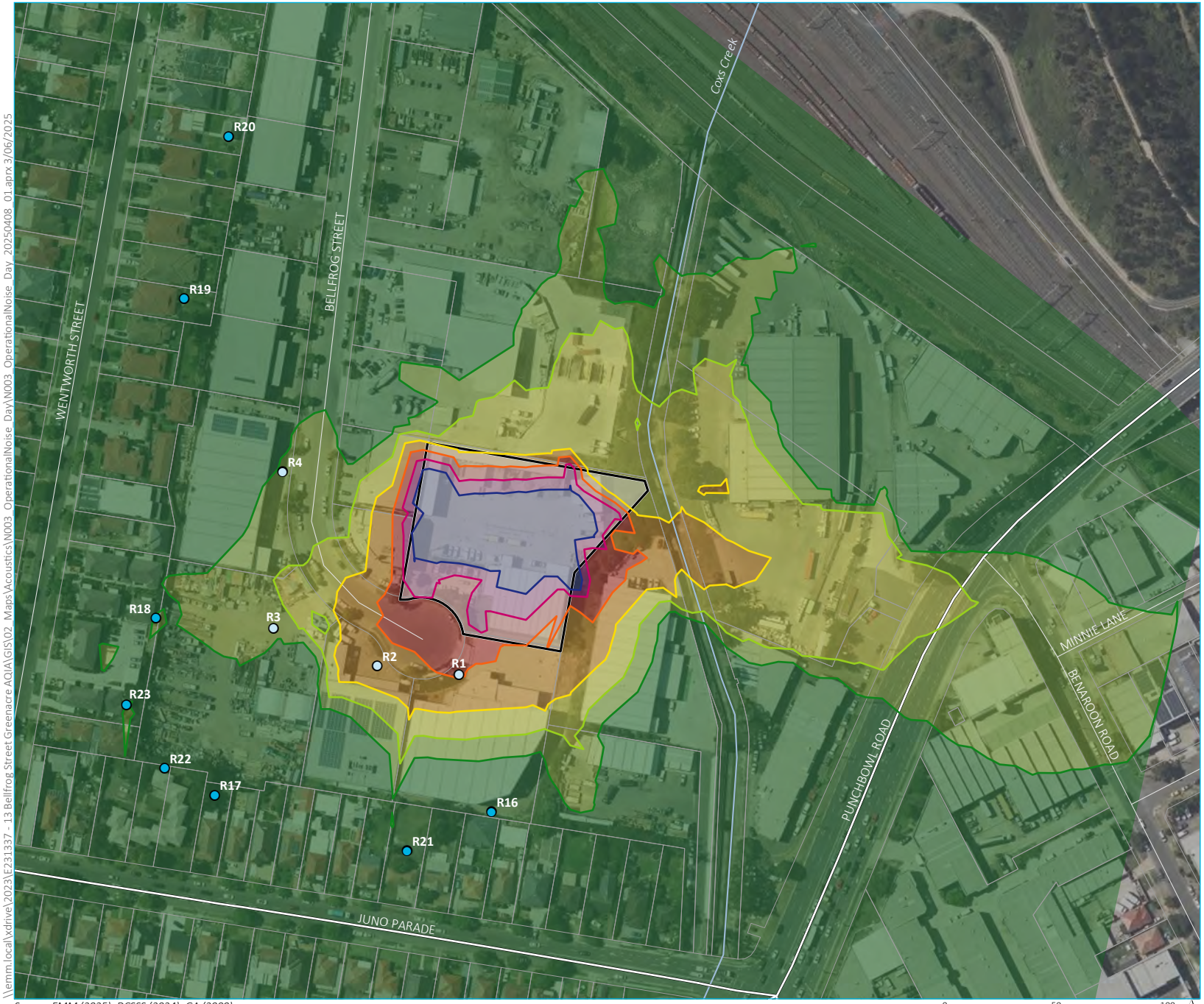
GDA2020 MGA Zone 56

N

Operation noise contours – morning shoulder

13 Bellfrog Greenacre
Noise Impact Assessment
Figure B.1

EMM creating opportunities



KEY

- Site boundary

Assessment location

- Industrial
- Residential

Operation noise contour - day (dB)

- < 51
- 51 - 55
- 55 - 60
- 60 - 65
- 65 - 70
- 70 - 75
- > 75

Existing environment

- Major road
- Minor road
- Named watercourse
- Cadastral boundary

\\emm.local\xdrive\2023\E231337 - 13 Bellfrog Street Greenacre AQIA\GIS\02_Maps\Acoustics\N003_OperationalNoise_Dav\N003_OperationalNoise_Day_20250408_01.aprx 3/06/2025

Source: EMM (2025); DCSSS (2024); GA (2009)

0 50 100 m

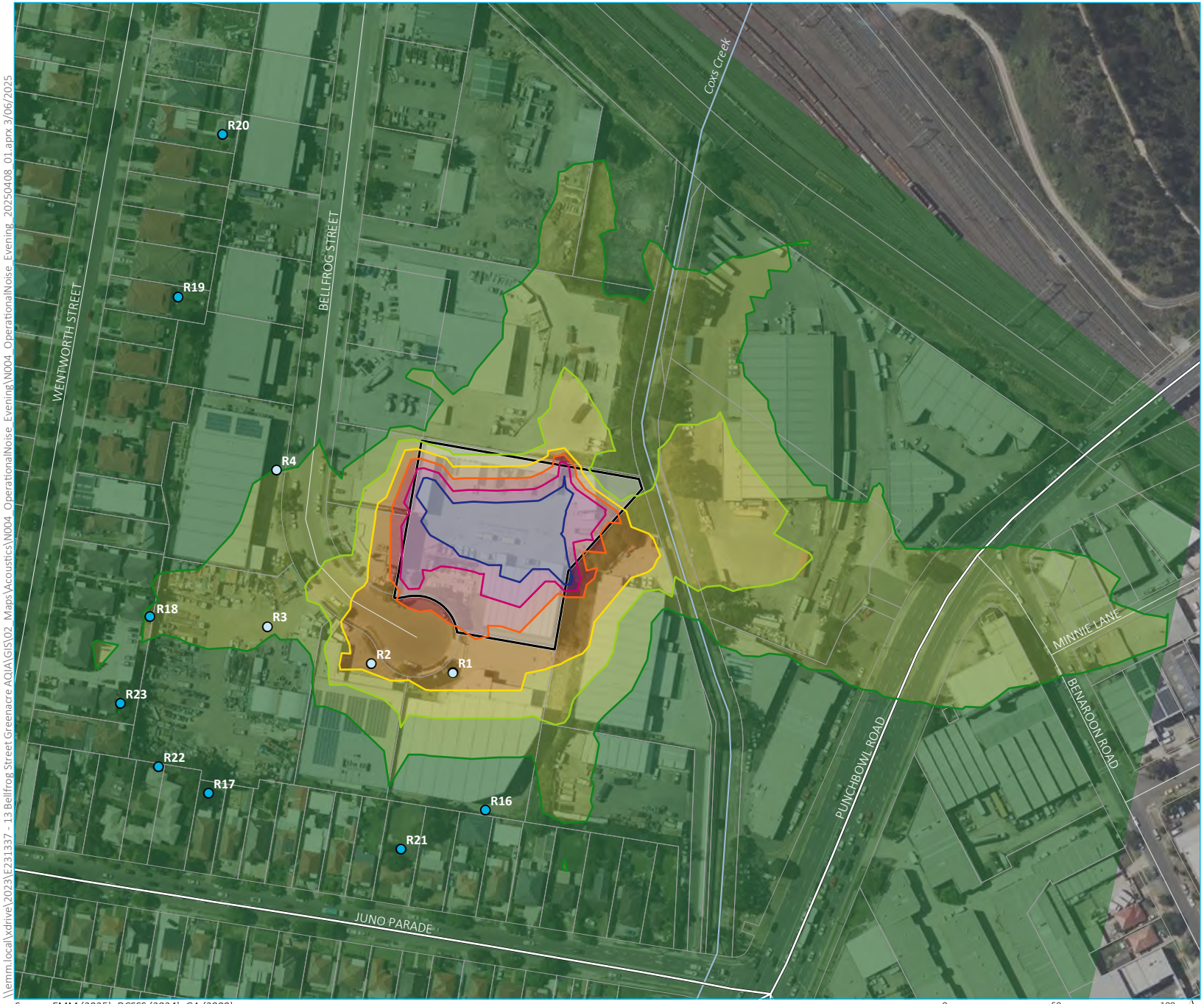
GDA2020 MGA Zone 56

N

Operation noise contours – day

13 Bellfrog Greenacre
Noise Impact Assessment
Figure B.2

EMM
creating opportunities



KEY

- Site boundary

Assessment location

- Industrial
- Residential

Operation noise contour - evening (dB)

- < 48
- 48 - 55
- 55 - 60
- 60 - 65
- 65 - 70
- 70 - 75
- > 75

Existing environment

- Major road
- Minor road
- Named watercourse
- Cadastral boundary

\\emm.local\xdrive\2023\E231337 - 13 Bellfrog Street Greenacre AQIA\GIS\02_Maps\Acoustics\N004_OperationalNoise_Evening\N004_OperationalNoise_Evening_20250408_01.aprx 3/06/2025

Source: EMM (2025); DCSSS (2024); GA (2009)

0 50 100 m

GDA2020 MGA Zone 56

N

Operation noise contours – evening

13 Bellfrog Greenacre
Noise Impact Assessment
Figure B.3

EMM
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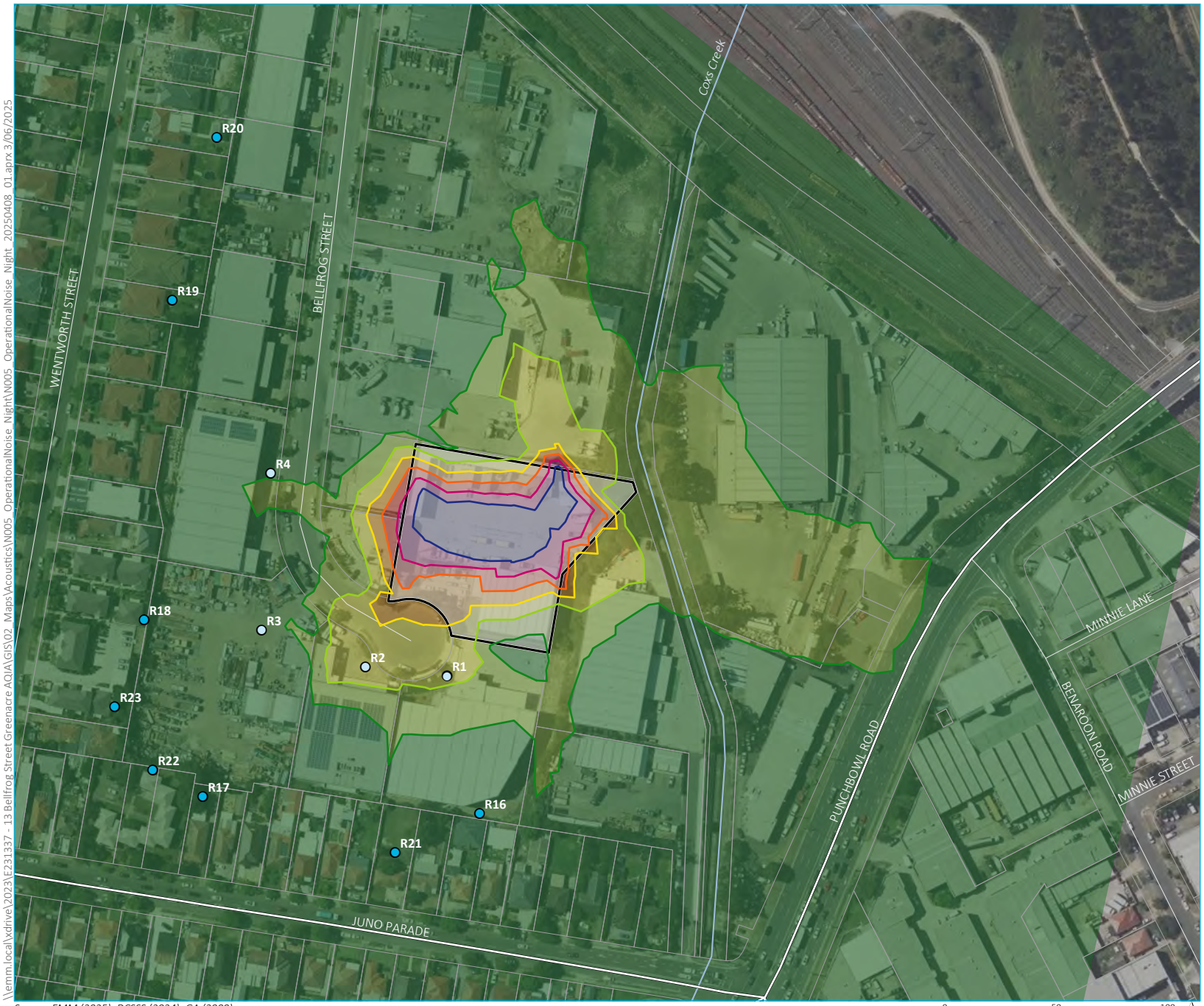

KEY

- Site boundary

Assessment location

- Industrial
- Residential

Operation noise contour - night (dB)

- < 43
- 43 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- 65 - 70
- > 70

Existing environment

- Major road
- Minor road
- Named watercourse
- Cadastral boundary

\\emm.local\xdrive\2023\E231337 - 13 Bellfrog Street Greenacre AQIA\GIS\02_Maps\Acoustics\N005_OperationalNoise_Night\N005_OperationalNoise_Night_20250408_01.aprx 3/06/2025

Source: EMM (2025); DCSSS (2024); GA (2009)

0 50 100 m

GDA2020 MGA Zone 56

N

Operation noise contours – night

13 Bellfrog Greenacre
Noise Impact Assessment
Figure B.4

EMM
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