225-245 Martin Road, Bradfield –Bulk Earthworks, Rehabilitation and Quarrying - SSD-97711727

Noise and Vibration Impact Assessment

Goodman Property Services (Aust) Pty Limited

The Hayesbery
1-11 Hayes Road
Rosebery NSW 2018

Prepared by:

SLR Consulting Australia

SLR Project No.: 625.010786.00003

23 March 2026

Revision: v1.0

Making Sustainability Happen

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
v1.0	23 March 2026	Joseph Spagnol, Jason Rasquinha	Steven Luzuriaga	Steven Luzuriaga

Basis of Report

This report has been prepared by SLR Consulting Australia (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Goodman Property Services (Aust) Pty Limited (the 'Applicant') on behalf of Goodman Western Sydney Pty Limited as trustee for the Goodman Western Sydney Trust (the 'Owner'). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

Table of Contents

Tables

Figures

Appendices

Acronyms and Abbreviations

dBA	Decibel, A-weighted
DA	Development Application
DPHI	Department of Planning, Housing and Infrastructure
EPA	Environment Protection Authority
HNA	Highly Noise Affected. Relates to construction noise levels of ≥75 dBA and is the point above which there may be strong community reaction to construction noise levels
ICNG	*Interim Construction Noise Guideline* (DECC, 2009)
L_{Aeq}	The average noise level during a measurement period, such as the daytime or night-time
L_{AFmax}	The maximum noise level measured during a monitoring period, using 'fast' weighting (also known as the L_1 level)
L_{A90}	The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.
NCA	Noise Catchment Area
NML	Noise Management Level
Noise-intensive equipment	Construction equipment that is particularly noisy and causes annoyance. Includes items such as rockbreakers and concrete saws
NPfI	*Noise Policy for Industry* (NSW EPA, 2017)
NSW	New South Wales
NVIA	Noise and Vibration Impact Assessment
OOH	Out of Hours
OOHW	Out of hours Work
Other sensitive receivers	Non-residential sensitive receivers, including hospitals, educational facilities, place of worship, child care centres, outdoor recreation areas, etc
Proposal/Project	225-245 Martin Road, Bradfield
RBL	Rating Background Level. This is the background noise level measured at a particular location. The method for calculating the RBL is defined in the NSW *Noise Policy for Industry*
Realistic worst-case scenarios	Realistic worst-case construction scenarios have been developed to assess the potential impacts from the project. These scenarios are based on the noisiest items of equipment which would likely be required to complete the works
CNVG-R	Construction Noise and Vibration Guideline (Roads), (Transport for NSW)
RNP	*Road Noise Policy* (DECCW, 2011)
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environment Planning Policy
SLR	SLR Consulting Australia Pty Ltd
SPL / Lp	Sound Pressure Level
SSDA	State Significant Development Application
SWL / L_W	Sound Power Level
TfNSW	Transport for New South Wales

VDV	Vibration Dose Value
Worst-case impacts and noise levels	The worst-case (ie highest) impacts or noise levels predicted in this report
WSA	Western Sydney Aerotropolis
WSAPP	Western Sydney Aerotropolis Precinct Plan
WSIA	Western Sydney International Airport

Executive Summary

This Noise and Vibration Impact Assessment (NVIA) has been prepared by SLR Consulting Australia Pty Ltd for Goodman Property Services (Aust) Pty Ltd in support of State Significant Development Application (SSDA) No. 97711727 for works at 225–245 Martin Road, Bradfield. This SSDA will operate alongside related applications: SSDA 97688711 for the proposed warehouse development and Part 5 External Works Lead in Roads and Services.

For the noise assessment, the surrounding residential receivers were divided into three NCAs and minimum background noise levels were conservatively adopted for each NCA in line with NSW EPA *Noise Policy of Industry*. Predicted noise levels at the nearest residential receivers in two of the NCAs (i.e., those closest to the project site) and nearest industrial-type receivers exceed the Noise Management Levels for all of the identified work scenarios. The residential receivers adjacent to the northern boundary are expected to be 'Highly Noise Affected' (>75 dBA noise levels) when most works occur near the northern site boundary (e.g., preliminary works and earthworks).

Vibration monitoring has been recommended where works are identified within minimum working distances for cosmetic damage. The first few rows of receivers nearby the northern boundary of the site have the potential to fall within the minimum working distances for human comfort and may perceive vibration when vibratory rollers are in use nearby.

While the increase in construction traffic along Martin Road is predicted to result in a perceptible increase in road-traffic noise levels during the daytime, the resulting noise levels are expected to comply with the applicable *Road Noise Policy* (RNP) assessment criteria for residential receivers in NCA01 during both daytime and night-time periods.

The use of standard mitigation measures (such as those in Transport for NSW *Construction Noise and Vibration Guideline*) is considered sufficient to control the majority of the expected noise and vibration impacts. A Construction Noise and Vibration Management Plan (CNVMP) would need to be prepared prior to the commencement of works. This plan would review the impacts based on updated information about the works and identify how the impacts would be minimised through the use of all feasible and reasonable mitigation measures.

1.0 Introduction

1.1 Project Overview

This Noise and Vibration Impact Assessment (NVIA) has been prepared by SLR Consulting Australia (SLR) to address the site-specific Secretary's Environmental Assessment Requirements (SEARs) received in respect of the proposed State Significant Development Application (SSDA) No. 97711727. The proposed development includes Rehabilitation, Quarrying and Bulk Earthworks and is being undertaken by Goodman Property Services (Aust) Pty Ltd (Applicant) on behalf of Goodman Western Sydney Pty Limited as trustee for the Goodman Western Sydney Trust (Owner). The development is located at 225 – 245 Martin Road, Bradfield, 2556 (the Site).

This SSDA seeks approval for the following;

- Site Preparation works only (i.e. no buildings, retaining walls or other infrastructure works)
- Rehabilitation of areas disturbed by historic mining and brick-making operations under major project approval MP10_0014 and MP10_0033.
- Bulk Earthworks to the site to align with the Connecting to Country and Precinct Plan principles, including both the disturbed and undisturbed portions, to capture the following proposed works:
    - Rehabilitation of Pits 1 and 2 using predominantly on-site fill (Engineered fill import required).
    - Preparation of the remaining site area to Bulk Earthwork Levels (BEL) (not including detailed trimming) for the proposed industrial development as considered under SSDA 97688711.
- Quarrying and Export of Bringelly Shale and Clay from select areas of Pit 1 and 2 to rectify the previous approved pit designs to ensure they are geotechnically stable to suit the proposed industrial masterplan.
- Vegetation Removal of 6.97 Ha over land that is not certified under the Growth Centre SEPP.
    - Species being cleared involve species protected under both the BC Act and EPBC Act.
    - EPBC Act Referral completed on a precautionary measure given small amount of EPBC listed communities
- Demolition of any remaining structures on the site.
- Rehabilitation of identified and unidentified contamination and, if required, the construction of a containment cell in the proposed northeastern corner of the site (currently identified as Lot 55 of DP 3050). The containment cell is proposed to trigger Designated Development threshold due to the proposed upper limit storage volume of 100,000 m^3.
- Relocation of the Jemena Gas main, predominantly burdening Lot 3 of DP1278780
- If required through an Aboriginal Cultural Heritage Assessment Report (ACHAR), relocation and reburial of artefacts.

Additionally, this SSDA application seeks to rely on already existing authority approvals issued under MP10_0014 (subject to any applicable modifications). These are as follows:

- Mining Lease 1771
- Environmental Protection Licence 684
- Ground Water Access Licence WAL24346
- Ground Water Supply Works Approval No. 10WA109463

It is important to note that a number of the proposed activities being sought for approval under this SSDA have previously been assessed and approved under MP10_0014. The existing DA relates to approximately 70Ha of Net Developable Area (NDA), with the new portion of site, approximately 36ha NDA. Cumulatively the area is approximately 116ha NDA.

Related Applications/Activities

SSDA 97688711 – 14 warehouse buildings, Active Open Space and amenities precinct (including a café) and internal site infrastructure works

The SSDA seeks approval for the construction, fit-out (including office and standard warehouse racking) and operation of 14 warehouse buildings, Active Open Space and amenities precinct (including a café) and internal site infrastructure works.

This application assumes the bulk earthworks are completed under SSDA 97711727.

Part 5 Activity – External Works Lead in Roads and Services

The Applicant is proposing access to the Site via the following route, which will be upgraded to be in accordance with the Precinct Plan

- Part 1 - Martin Road / Elizabeth Drive intersection upgrades
    - It is expected that these works will be approved by way of amendment to the existing Part 5 approval by Transport for New South Wales ('TfNSW')
    - It is understood that Transport for NSW will construct the work with a target completion date of December 2029;
- Part 2 -4 - Martin Road / East West Collector Road / Lawson Road Upgrades
    - Further to Part 1, access to the site is proposed to be constructed concurrently as follows:
        - Part 2 – Access from the Martin Road / Elizabeth Drive intersection will continue down Martin Road and join the future East / West Collector road identified within the Precinct Plan through Lot 36 DP 3050.
            - The portion of road between the Intersection and the future East / West Collector Road will be upgraded with a temporary access strategy that is consistent with Condition DS5 of the Precinct Plan.
        - Part 3 – The East / West Collector road through Lot 36 DP 3050 is proposed to be delivered in ultimate form consistent with the Precinct Plan, connecting Martin Road and Lawson Road;
        - Part 4 – From the East / West Collector Road connection on Lawson Road, the portion of Lawson Road South through to the Site will be upgraded in ultimate form consistent with the Precinct Plan.

- It is expected that these works are completed by December 2029, based on a commencement date of June 2028

It is the Applicants expectation that the above-mentioned works (Part 1-4) are completed prior to the receipt of the first building Occupation Certificate (expected December 2029).

Notwithstanding the above, the Applicant notes that access to the site under SSD 97711727 will continue to be via Martin Road based on the intersection upgrades completed under MP10_0014.

1.2 Site Description

The Site is identified as 225-245 Martin Road, Bradfield and is shown in **Figure 1**. The key features of the Site are summarised in **Table 1**.

Figure 1 Aerial Photo of the Site

Source: Urbis

Table 1 Key Features of the Site

Description	Site Detail
Land Configuration	Lot 1 DP 1278780 Lot 2 DP 1278780 Lot 3 DP 1278780 Lot 55 DP 3050 Lot 56 DP 3050

Description	Site Detail
Existing land use(s)	The Site is currently an operational Quarry and historically had a Brickmaking Facility. The structures and hardstand areas used for the quarry operations are located in the central portion of the Site, connected by an internal road network. In addition, three pits are located along the southern and southeast portion of the Site.
Surrounding Land Use	Surrounding land uses include: **North:** Land to the north is predominantly characterised by a mix of rural, agricultural, landscape industries and, residential properties accessed by Lawson and Martin Roads. It is noted that several sites are subject to existing SSDAs for industrial / warehouse developments. Both Martin and Lawson Roads intersect with Elizabeth Drive, a major Arterial Road that provides access to the WSI site and the broader regional road network, including the M7, Northern Road and the future M12. **South:** The land to the south is currently rural, however is subject to the IPG Master Plan, which was approved on 11 July 2025. The approved Master Plan covers 184 hectares and aims to support over 12,400 jobs. Inghams Property Group has allocated around 625,467 sqm for employment space, focusing on advanced manufacturing, logistics, and community services. The plan includes a mix of industrial and commercial zones, a local centre, and accessible public green spaces near the Western Sydney International Airport. Further to the south-west of the site, is Bradfield City Centre, a 114-hectare planned urban development adjacent to Western Sydney International Airport. Designed to be a hub for innovation, advanced industries, and economic growth, it has the potential to create 20,000 jobs and provide 10,000 homes, including affordable housing. The Bradfield City Master Plan prioritises sustainability, integrating green spaces, climate-resilient infrastructure, and a commitment to achieving net-zero emissions. **East:** Further east of the Wianamatta-South Creek, which bounds the site, is the suburb of Kemps Creek. This land is characterised by a mix of open space, rural, agricultural, emerging urban development, and residential properties that are non-initial precincts under the WSAP, but intended for employment-generating uses **West:** To the immediate west of the Site, bound by Badgerys Creek, is Western Sydney International Airport (**WSI**). Located in Badgerys Creek, WSI is a major federal infrastructure project designed to accommodate Sydney's future aviation needs. Set to commence operations in 2026, WSI will initially handle 10 million passengers annually and operate 24/7. Badgerys Creek Road also travels in a north-south direction to the west of the site. It provides a north-south connection between Elizabeth Drive and the Northern Road.
Site Access and road network	The Site is currently accessible from Martin Road, which is located at the north-eastern boundary.

The site location and nearby sensitive receivers are shown in **Figure 2,** the proposed site layout is shown in **Figure 3**.

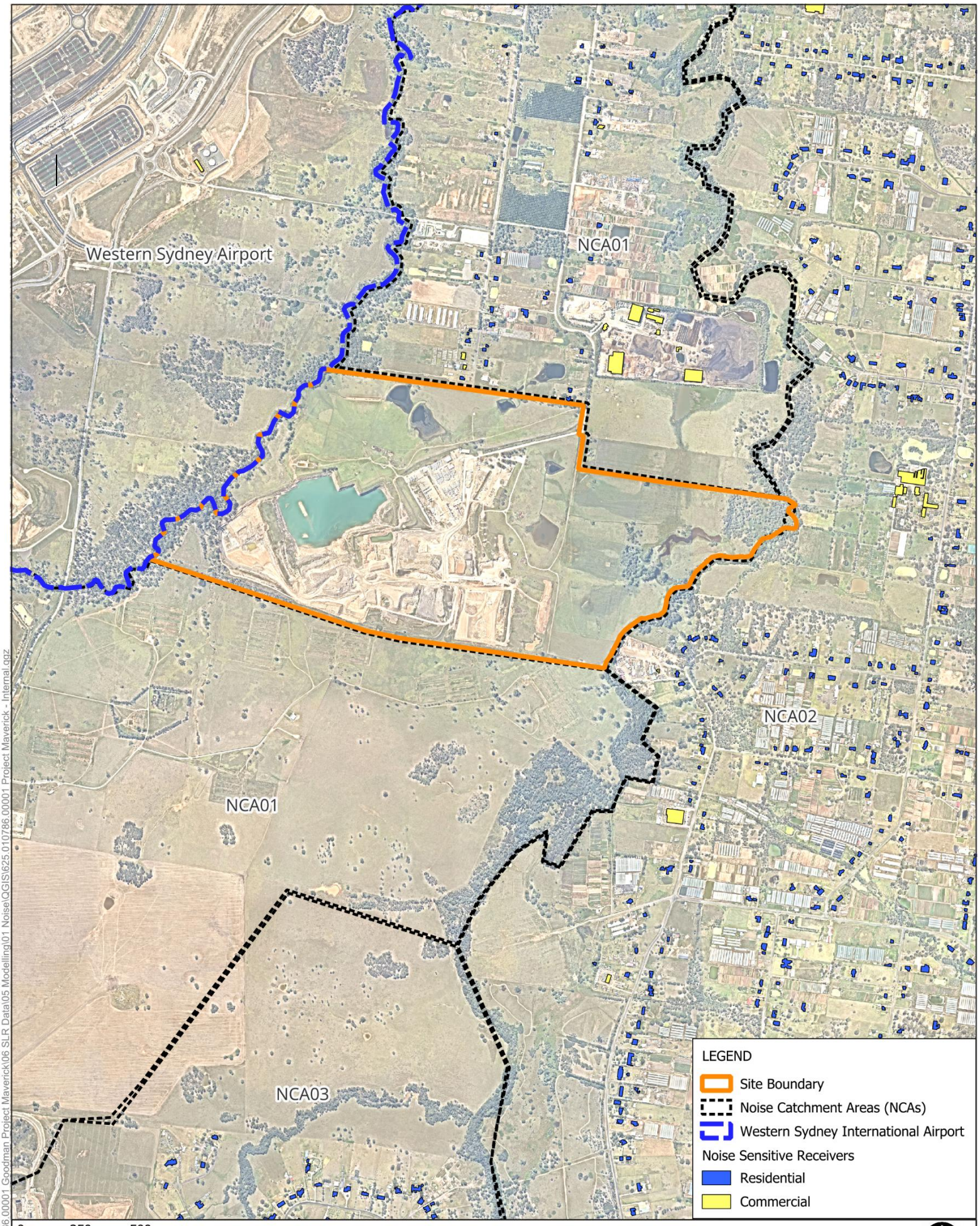
1.3 Overview of Report

SLR is suitably qualified to produce this noise and vibration impact assessment. SLR staff are members of the Australian Acoustical Society (AAS), and SLR is a member firm of the Association of Australasian Acoustical Consultants (AAAC).

This report assesses the potential construction noise and vibration impacts associated with the project.

The following report uses specialist acoustic terminology. An explanation of common terms is provided in **Appendix A**.

The site location and nearby sensitive receivers are shown in **Figure 2**, and the proposed bulk earthworks plan is shown in **Figure 3**.



Scale: Scale: 1:19,800
Coordinate System: GDA2020 / MGA zone 56

Drawn Date: 23-Mar-2026
Project Number: 625.010786.00003

SLR

Data Source:
Nearmap

Site Location and Sensitive Receivers

FIGURE 2

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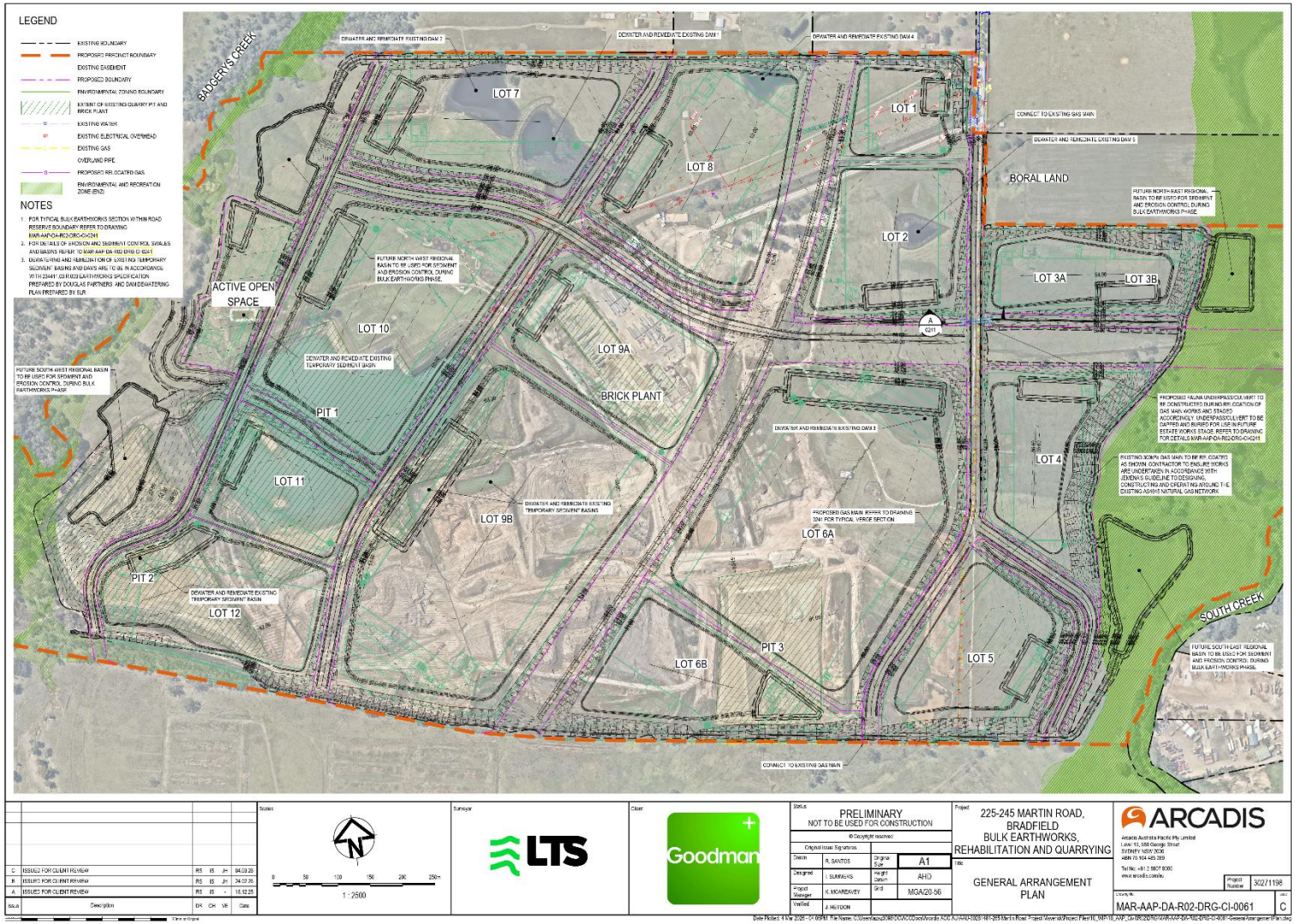
Figure 3 Proposed Bulk Earthworks Plan



1.4 Secretary's Environmental Assessment Requirements

The SEARS for SSD- 97711727 were issued by the DPHI on 26 November 2025. The requirements relevant to noise and vibration are shown in **Table 2**.

Table 2 Secretary's Environmental Assessment Requirements – SSD 97711727

Noise and Vibration	Where Addressed
2. Key Issues **Noise** – including a: - detailed assessment of the likely construction and off- site transport noise impacts of the development in accordance with the *Interim Construction Noise Guideline*, *NSW Noise Policy for Industry* and the *NSW Road Noise Policy* respectively; - detailed description of reasonable and feasible mitigation measures to minimise noise emissions; and - consideration of monitoring and management measures, in particular, real-time and attended noise monitoring.	Construction noise impacts: **Section 5.1** Off- site transport noise impacts: **Section 5.0** Mitigation and Management Measures: **Section 7.0** Monitoring and management measures **Section 7.1** and **Appendix C**

1.5 Government Agency Feedback on SSD- 97711727

Table 3 summarises SLR's response to feedback on SSD- 97711727 from Liverpool City Council, NSW EPA and NSW Health regarding noise and vibration impacts.

Table 3 Responses to Third Party Agency Feedback

Agency Comment	SLR Response
Liverpool City Council	
The proposed development may be a source of offensive noise and potentially impact upon human health and amenity. An acoustic report shall be prepared or reviewed and certified by a suitably qualified acoustic consultant and include a quantitative assessment of all noise and vibration generating sources during site preparation, bulk earthworks and site rehabilitation activities in accordance with the 'Interim Construction Noise Guideline' published by the Department of Environment and Climate Change NSW dated July 2009, Department of Environment and Conservation's 'Assessing Vibration: A Technical Guideline dated February 2006 and any relevant Environment Protection Licence conditions.	See **Section 5.1** for quantitative noise assessment based on ICNG and **Section 5.2** for quantitative vibration assessment based on Assessing Vibration: A Technical Guideline and CNVG.
Where necessary, the report shall also assess potential road traffic noise impacts in accordance with the 'NSW Road Noise Policy' prepared by the Department of Environment, Climate Change and Water NSW (DECCW NSW) dated March 2011.	See **Section 5.3**.
The acoustic report shall be prepared or reviewed and certified by a suitably qualified acoustic consultant who is a member of the Australian Acoustical Society or employed by an Association of Australasian Acoustical Consultants (AAAC) member firm. The report's cover or title page must confirm the consultant's membership with the Australian Acoustical Society or employment by an Association of Australasian Acoustical Consultants (AAAC).	**Section 1.3** states that SLR is suitably qualified to produce this noise and vibration impact assessment. SLR staff are members of the Australian Acoustical Society (AAS), and SLR is a member firm of the Association of Australasian Acoustical Consultants (AAAC) (AAAC - NSW)
NSW EPA	
Environmental impacts of the project 1.2. Identify all sensitive receivers likely to be affected by the development using clear maps/plans, including key landform areas, such as conservation areas and waterways.	Overview of nearest sensitive receivers discussed in **Section 1.6** and worst-case noise and vibration results are provided in **Section 5.0**.

Agency Comment	SLR Response
Identify all potential environmental emissions, assess the likely environmental impacts, and describe the proposed mitigation measures to minimise environmental pollution to achieve compliance with relevant environmental legislation, policies, and guidelines.	Worst-case noise and vibration results provided in **Section 5.0** based on assessments outlined in **Section 3.0**. Where impacts are expected, mitigation measures in **Section 7.0** are to be undertaken.
Construction Works 3.3. Construction noise associated with the proposed development should be assessed using the Interim Construction Noise Guideline (DECC, 2009). These are available at: https://www.epa.nsw.gov.au/your-environment/noise/industrial-noise/construction-noise	Overview of ICNG assessment details provided in **Section 3.1.1**, and results of this assessment are provided in **Section 5.1**.
NSW Health	
The noise assessment and any noise mitigation strategies need to consider the cumulative projected noise for the site, including the flight path noise. This noise assessment should be repeated throughout the lifecycle of the site and adjusted as airport flight volumes increase. The following rationale has been provided for the above recommendation: Noise pollution can significantly impact human health, contributing to disturbed sleep, increased stress, and cardiovascular issues. Therefore, the impact of operational and construction acoustic noise and vibration on workers and local residents should be assessed.	Construction noise is assessed under the ICNG. The guideline's framework aims to ensure that construction noise remains at acceptable levels and appropriate, feasible and reasonable mitigation management measures are in place to address potential impacts. The ICNG requires the assessment of 15-minute average noise levels across daytime, evening and night periods, as well as maximum night-time noise for sleep disturbance. This NVIA compares predicted worst-case construction noise levels against criteria based on existing noise conditions and land use. Where criteria are exceeded, feasible and reasonable mitigation and management measures have been outlined, in accordance with the ICNG. The ICNG excludes transportation noise, including aircraft noise. Hence, construction noise cannot be assessed cumulatively with aircraft noise under these frameworks. Aircraft noise is assessed separately using ANEF and ANEC, which calculate cumulative aircraft noise for an "average annual day" and do not support combined assessment with construction-related noise. The ICNG and ANEF/ANEC methodologies are incompatible due to different averaging periods, noise descriptors and assessment metrics. Any future changes in Western Sydney Airport operations will be assessed under aviation-specific guidelines, and no current framework requires a cumulative assessment of airport and industrial noise. This NVIA is based on high-level assumptions for approval purposes, with further assessments to occur during later stages to confirm compliance with Conditions of Approval requirements. Assessment of construction noise and vibration impacts on workers is not required at this stage and will be addressed when the CNVMP is developed.

1.6 Nearest Sensitive Receivers

Sensitive receivers in the area surrounding the project have been identified, and Noise Catchment Areas (NCAs) have been defined. These are summarised in **Table 4** and shown in **Figure 2**.

Table 4 NCAs and Sensitive Receivers

NCA	Description
NCA01	NCA01 lies to the north and south of the development within the Western Sydney Aerotropolis (the 'Aerotropolis') precinct. To the north and south of the development lies land rezoned as ENT - Enterprise under the *State Environmental Planning Policy (Western Sydney Aerotropolis)* (2020). The existing receivers in this area include rural residential and commercial properties located within the suburb of Badgerys Creek to the north of the site and Bradfield to the south. As development in the Aerotropolis progresses, these properties will be replaced by light industrial and commercial warehousing facilities. The nearest existing residential properties to the north are located approximately 10 m and 35 m from the site boundary, respectively. The closest residential property to the south is 270 Badgerys Creek Road, located approximately 1.5 km from the site boundary (see **Figure 2**). The nearest existing commercial receivers are located 180 m to the north and 1 km to the south of the site (see **Figure 2**). The nearest proposed developments to the north of the site in Badgerys Creek are located at 230 Martin Road (SSD – 65529236), 85 Martin Road (SSD – 74191717) and 125 and 145-175 Lawson Road (SSD – 81662708). The IPG Masterplan is located to the immediate south of the site.
NCA02	NCA02 includes residential and commercial receivers located to the east of the development, within the suburb of Kemps Creek. The nearest existing residential properties are located approximately 550 m to the north east of the site boundary along Braikfield Avenue and 150 m to the east of the site boundary along Victor Avenue (see **Figure 2**). The nearest existing commercial receivers are located 210 m to the east the site, along Victor Avenue (see **Figure 2**).
NCA03	NCA03 lies to the south of the development and falls within the Aerotropolis precinct and has been rezoned as 'Mixed Use'. This area will be a part of Bradfield, which is a dense urban precinct planned around the Bradfield Metro station and the Wianamatta-South Creek Corridor system. The existing receivers in this area are rural residential properties within Bradfield, located about 2 km south of the development. The future land use is intended to include mixed-use, high-density residential development. Although details of proposed mixed-use developments at the northern end of this NCA are unavailable, the nearest future residential areas will likely be approximately 1 km south of the site (see **Figure 2**).

2.0 Noise Environment

The acoustic environment surrounding the proposed development is expected to undergo significant transformation due to the commencement of operations at WSI, the development of the Aerotropolis, and the operation of new arterial roads. As such, the noise environment in the area that would form the Aerotropolis and the surrounding suburbs would be significantly altered.

In the short term, the noise environment near the existing residential receivers in the three nominated NCAs is expected to remain characteristic of rural areas. The NPfI describes the rural acoustical environment to be dominated by natural sounds, having little or no road traffic noise and generally characterised by low background noise levels. Based on a review of recent noise monitoring data for nearby developments, the NPfI minimum assumed Rating Background Noise Levels (RBLs) have been conservatively adopted. The review includes recent noise monitoring data from the Noise Impact Assessment for 85 Martin Road, Badgerys Creek (SLR report 610.032060.00002-v1.0, April 2025).

The minimum assumed RBLs are summarised in **Table 5**.

Table 5 Rating Background Noise Levels

NCA	NPfI Minimum Assumed[1] Rating Background Noise Level (RBL) in dBA		
	Day	Evening	Night
All NCAs	35	30	30

Note 1: The assessment periods are defined in the NPfI are: daytime which is 7 am to 6 pm Monday to Saturday and 8 am to 6 pm on Sundays and public holidays, the evening which is 6 pm to 10 pm, and the night-time which is 10 pm to 7 am on Monday to Saturday and 10 pm to 8 am on Sunday and public holidays.

Notwithstanding, it is expected that background noise levels will increase due to rapid development in the surrounding area.

3.0 Assessment Criteria

3.1 Construction Noise and Vibration Guidelines

The main guidelines used to assess construction impacts from the site are listed in **Table 6**. The guidelines aim to protect the community and environment from excessive adverse noise and vibration impacts as projects are constructed.

Table 6 Construction Noise and Vibration Guidelines

Guideline/Policy Name	Where Guideline Used
Interim Construction Noise Guideline (ICNG) (DECC, 2009)	Assessment of airborne construction noise impacts on sensitive receivers
AS2107:2016 Acoustics – Recommended design sound levels and reverberation times for building interiors	Provides recommended design sound levels for internal areas of occupied spaces
Road Noise Policy (RNP) (DECCW, 2011)	Assessment of road traffic impacts and sleep disturbance
BS 7385 Part 2-1993 Evaluation and measurement for vibration in buildings Part 2, BSI, 1993 (BS 7385-2)	Assessment of vibration impacts (structural damage) to non-heritage sensitive structures
DIN 4150-3:Part 3-2016 Structural vibration – Effects of vibration on structures, Deutsches Institute fur Normung, 1999 (DIN 4150-3)	Screening assessment of vibration impacts (structural damage) to heritage sensitive structures, where the structure is found to be unsound
Assessing Vibration: a technical guideline (DEC, 2006)	Assessment of vibration impacts on sensitive receivers
Construction Noise and Vibration Guideline (Roads) (CNVG) (Transport, 2023)	Assessment and management protocols for airborne noise and vibration impacts for road infrastructure projects
Noise Policy for Industry (NPfI) (NSW EPA, 2017)	Determination of assumed background noise levels, mitigation measures and sleep disturbance

3.1.1 Interim Construction Noise Guideline

The NSW *Interim Construction Noise Guideline* (ICNG) is used to assess and manage impacts from construction noise on residences and other sensitive land uses in NSW.

The ICNG contains procedures for determining project specific Noise Management Levels (NMLs) for sensitive receivers based on the existing background noise in the area. The 'worst-case' noise levels from construction are predicted and then compared to the NMLs in a 15-minute assessment period to determine the likely impact of the site.

The NMLs are not mandatory limits, however, where construction noise levels are predicted or measured to be above the NMLs, feasible and reasonable work practices to minimise noise emissions are to be investigated.

3.1.1.1 Residential Receivers

The ICNG approach for determining NMLs at residential receivers is shown in **Table 7**.

Table 7 ICNG NMLs for Residential Receivers

Time of Day	NML $L_{Aeq(15\ minute)}$	How to Apply
Standard Construction 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[1] + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise Where the predicted or measured $L_{Aeq(15\ minute)}$ 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 dBA	The Highly Noise Affected (HNA) 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 restructuring 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.
Outside Standard Construction Hours	Noise affected RBL[1] + 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 practises have been applied and noise is more than 5 dB above the noise affected level, the proponent should negotiate with the community.

Note 1: The RBL is the Rating Background Level and the ICNG refers to the calculation procedures in the NSW *Industrial Noise Policy* (INP). The INP has been superseded by the NSW EPA *Noise Policy for Industry*.

Work is recommended to be completed during standard construction hours where possible. More stringent requirements are placed on work that is required to be completed outside standard construction hours (ie during the evening or night-time), which reflects the greater sensitivity of communities to noise impacts during these periods.

Sleep Disturbance

Infrastructure projects often require certain work to be completed during the night-time. Where night work is located close to residential receivers, there is potential for sleep disturbance impacts.

The ICNG lists five categories of work that might need to be undertaken outside of Standard construction hours:

- The **delivery of oversized equipment or structures** that require special arrangements to transport on public roads
- **Emergency work** to avoid the loss of life or damage to property, or to prevent environmental harm
- **Maintenance and repair of public infrastructure** where disruption to essential services or considerations of worker safety do not allow work within standard hours
- **Public infrastructure work** that shortens the length of the project and is supported by the affected community

- Work where a proponent demonstrates and justifies **a need to operate outside the recommended standard hours**.

The potential for sleep disturbance from maximum noise level events during the night-time period from the project is required to be considered. The NSW *Noise Policy for Industry* (NPfI) defines the sleep disturbance screening level as 52 dBA L_{Amax} or the prevailing background level plus 15 dB, whichever is greater.

Where the sleep disturbance screening level is exceeded, further assessment is required to determine whether the 'awakening reaction' level of L_{Amax} 65 dBA (external) would be exceeded and the likely number of these events. The awakening reaction level is the level above which residents are likely to be awoken from sleep.

3.1.1.2 Other Sensitive' Land Uses

The ICNG NMLs for 'other sensitive' non-residential land uses identified in the study area the are shown in **Table 8**.

Table 8 Construction NMLs at 'Other Sensitive' Land Uses

Land Use	Noise Management Level $L_{Aeq(15\ minute)}$ (dBA) (applied when the property is in use)	
	Internal	External
ICNG 'Other Sensitive' Receivers		
Commercial	n/a	70

3.1.1.3 NML Summary

The construction NMLs are summarised in **Table 9**. Out of hours NMLs would be applicable to works undertaken outside the ICNG standard construction hours.

As noted in **Section 2.0**, the noise environment within the WSA and surrounding suburbs will change significantly due to the commencement of operations at Western Sydney International Airport, the development of the WSA, and the construction of new arterial roads. In the short term, however, the noise environment near residential receivers in the three nominated NCAs is expected to remain characteristic of rural areas. Accordingly, the NPfI minimum assumed background noise levels have been conservatively applied when determining the NMLs.

Table 9 Construction Noise Management Levels

Receiver Type	Measured RBL[1] (dBA)			NML $L_{Aeq(15\ minute)}$ (dBA)				Sleep Disturbance Screening Level[2] L_{Amax} (dBA)
				Standard Construction Hours (RBL+10dB)	Out of Hours (RBL+5dB)			
	Day	Eve.	Night	Day	Day	Eve.	Night	Night
Residential (all NCAs)	35[3]	30[3]	30[3]	45	40	35	35	52
Industrial	n/a			75 when in use				n/a
Commercial	n/a			70 when in use				n/a

Note 1: RBL = Rating Background Level.

Note 2: Sleep disturbance screening level is RBL+15 dB or 52 dBA, whichever is higher.

Note 3: NPfI minimum assumed background noise levels.

3.2 Construction Traffic Noise Guidelines

The potential impacts from construction traffic associated with the project when travelling on public roads are assessed under the NSW EPA *Road Noise Policy* (RNP) and Transport's *Construction Noise and Vibration Guideline (Roads)* (CNVG).

An initial screening test is first applied to evaluate if existing road traffic noise levels are expected to increase by more than 2.0 dB as a result of construction traffic. Where this is considered likely, further assessment is required using the RNP road traffic noise assessment criteria for residential land uses shown in **Table 10**.

Table 10 RNP Criteria for Assessing Construction Traffic on Public Roads

Road Category	Type of Project/Land Use	Assessment Criteria (dBA)	
		Daytime (7 am – 10 pm)	Night-time (10 pm – 7 am)
Freeway/ arterial/ sub-arterial roads	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{Aeq(15hour)}$ 60 (external)	$L_{Aeq(9hour)}$ 55 (external)
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	$L_{Aeq(1hour)}$ 55 (external)	$L_{Aeq(1hour)}$ 50 (external)

3.3 Construction Vibration Guidelines

The effects of vibration from construction works can be divided into three categories:

- Those in which the occupants of buildings are disturbed (human comfort)
- Those where building contents may be affected (building contents)
- Those where the integrity of the building may be compromised (structural or cosmetic damage).

3.3.1 Human Comfort Vibration

People can sometimes perceive vibration impacts when vibration generating construction works are located close to occupied buildings.

Vibration from construction works tends to be intermittent in nature and the EPA's *Assessing Vibration: a technical guideline* (2006) provides criteria for intermittent vibration based on the Vibration Dose Value (VDV). The 'preferred' and 'maximum' VDVs for human comfort impacts are shown in **Table 11**.

Table 11 Vibration Dose Values for Intermittent Vibration

Building Type	Assessment Period	Vibration Dose Value[1] ($m/s^{1.75}$)	
		Preferred	Maximum
Critical Working Areas (eg operating theatres or laboratories)	Day or night-time	0.10	0.20
Residential	Daytime	0.20	0.40
	Night-time	0.13	0.26
Offices, schools, educational institutions and places of worship	Day or night-time	0.40	0.80
Workshops	Day or night-time	0.80	1.60

Note 1: The VDV accumulates vibration energy over the daytime and night-time assessment periods and is dependent on the level of vibration as well as the duration.

3.3.2 Effects on Building Contents

People perceive vibration at levels well below those likely to cause damage to building contents. For most receivers, the human comfort vibration criteria are the most stringent and it is generally not necessary to set separate criteria for vibration effects on typical building contents.

Exceptions to this can occur when vibration sensitive equipment, such as electron microscopes, are located in buildings near to construction works. No such items of equipment have been identified in the project area.

3.3.3 Structural and Cosmetic Damage Vibration

If vibration from construction works is sufficiently high it can cause damage to structural elements of affected buildings. The levels of vibration required to cause cosmetic damage tend to be at least an order of magnitude (10 times) higher than those at which people can perceive vibration.

Examples of damage that can occur includes cracks or loosening of drywall surfaces, cracks in supporting columns and loosening of joints. Structural damage vibration limits are contained in British Standard BS 7385-2 and German Standard DIN 4150-3.

BS 7385-2

British Standard BS 7385-2 recommends vibration limits for transient vibration judged to give a minimal risk of vibration induced damage to affected buildings. The limits for residential and industrial buildings are shown in **Table 12**.

Table 12 BS 7385-2 Transient Vibration Values for Minimal Risk of Damage

Group	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	

Group	Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
		4 Hz to 15 Hz	15 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

Note 1: Where the dynamic loading caused by continuous vibration may give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values may need to be reduced by up to 50%.

For heritage buildings, the standard states that *"a building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive".*

DIN 4150-3

German Standard DIN 4150-3 also provides guideline vibration limits for different buildings. Damage is not expected to occur where the values are complied with and the values are generally recognised to be conservative. The DIN 4150-3 values for buildings and structures are shown in **Table 13**.

Table 13 DIN 4150-3 Guideline Values for Short-term Vibration on Structures

Group	Type of Structure	Guideline Values Vibration Velocity (mm/s)				
		Foundation, All Directions at a Frequency of			Topmost Floor, Horizontal	Floor Slabs, Vertical
		1 to 10 Hz	10 to 50 Hz	50 to 100 Hz	All frequencies	All frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40	20
2	Residential buildings and buildings of similar design and/or occupancy	5	5 to 15	15 to 20	15	20
3	Structures that, because of their particular sensitivity to vibration, cannot be classified as Group 1 or 2 **and** are of great intrinsic value (eg heritage listed buildings)	3	3 to 8	8 to 10	8	20[1]

Note 1: It may be necessary to lower the relevant guideline value markedly to prevent minor damage.

3.3.4 Minimum Working Distances for Vibration-Intensive Works

Minimum working distances for typical vibration-intensive construction equipment are provided in the Transport for NSW *Construction Noise and Vibration Guideline* (CNVG) and are shown in **Table 14.** The minimum working distances are for both cosmetic damage (from BS 7385-2 and DIN 4150-3) and human comfort (from the NSW EPA Vibration Guideline). They are based on empirical data which suggests that where works are further from receivers than the quoted minimum distances then impacts are not considered likely.

Table 14 Recommended Minimum Working Distances from Vibration-Intensive Equipment

Plant Item	Rating/Description	Minimum Distance		
		Cosmetic Damage		Human Response (NSW EPA Guideline)
		Residential and Light Commercial (BS 7385-2)	Heritage Items (DIN 4150-3, Group 3)	
Vibratory Roller	<50 kN (1–2 tonne)	5 m	11 m	15 m to 20 m
	<100 kN (2–4 tonne)	6 m	13 m	20 m
	<200 kN (4–6 tonne)	12 m	25 m	40 m
	<300 kN (7–13 tonne)	15 m	31 m	100 m
	>300 kN (13–18 tonne)	20 m	40 m	100 m
	>300 kN (>18 tonne)	25 m	50 m	100 m
Small Hydraulic Hammer	300 kg (5 to 12 t excavator)	2 m	5 m	7 m
Medium Hydraulic Hammer	900 kg (12 to 18 t excavator)	7 m	15 m	23 m
Large Hydraulic Hammer	1,600 kg (18 to 34 t excavator)	22 m	44 m	73 m
Vibratory Pile Driver	Sheet piles	2 m to 20 m	5 m to 40 m	20 m
Piling Rig – Bored	≤ 800 mm	2 m (nominal)	5 m	4 m
Jackhammer	Hand held	1 m (nominal)	3 m	2 m

Heritage-listed buildings and structures should be considered on a case-by-case basis but as noted in BS 7385-2 should not be assumed to be more sensitive to vibration, unless structurally unsound. If a building were to be found in the study area which is more sensitive to vibration or deemed structurally unsound, then a PPV of 2.5 mm/s would apply in accordance with DIN 4150-3. Otherwise, the thresholds recommended in BS 7385-2 apply.

For all other heritage items (non-buildings), a heritage consultant could be engaged to determine appropriate thresholds, mitigation or management strategies to eliminate the risk of vibration-induced damage

3.3.5 Buried Pipework and Utilities

A review of the General Arrangement and Staging Plan (Drawing ref: MAR-AAP-DA-R02-DRG-CI-0061, dated 24 February 2026) indicate the following assets are buried in the vicinity of the construction work areas:

- Sydney Water owned water supply pipelines near the northern boundary of the site
- Jemena Gas owned gas pipeline

The proposed construction work will be undertaken in accordance with the asset owner's guidelines to ensure there are no adverse vibration impacts to the utilities. At this stage specific details relating to the construction works are unknown and an assessment of vibration impacts on these assts would need to be conducted when preparing the Construction Noise and Vibration Management Plan (CNVMP).

4.0 Assessment Methodology

4.1 Construction Noise and Vibration Assessment Methodology

A noise model of the study area has been used to predict noise levels from the proposed construction work to all surrounding receivers. The construction noise model uses the ISO 9613 algorithm in SoundPLAN software.

Local terrain, receiver buildings and structures were digitised in the noise model to develop a three-dimensional representation of the construction sites and surrounding areas.

4.1.1 Construction Activities

Representative scenarios have been developed to assess the likely construction impacts from the earthworks and rehabilitation project scope. These scenarios are shown in **Table 15**.

The noise assessment uses 'realistic worst-case' scenarios to determine the impacts from the noisiest 15-minute period that are likely to occur for each work scenario, as required by the ICNG.

The sound power levels for the construction equipment used in each scenario is presented in **Appendix B**.

Table 15 Construction Scenarios and Equipment

Scenario	Works Activity	Equipment
W.01	Preliminary Works	Dozer, excavator (20T), electric hand tools, mobile crane, truck, petrol chainsaw, chipper and light vehicles (4WD)
W.02	Demolition Works	Skidsteer (1T), excavator (20-30T) with hydraulic hammer, and truck (30T truck and dog)
W.03	Pit Rehabilitation Works	Dozer, dump truck, excavator (20T), water cart, grader and wheeled loader
W.04	Earthworks - Typical	Excavator (20T), grader, mobile crane, truck (30T truck and dog), light vehicles (4WD) and water cart
W.05	Earthworks - Peak and Contamination Screening	Excavator (20T), grader, mobile crane, truck (30T truck and dog), light vehicles (4WD), water cart, bored piling rig, dump truck, vibratory roller (18T), screening machine and front-end loader (23T)
W.06	Containment Cell Construction	Front-end loader (23T), liner deployment system, skidsteer (1T), dump truck and light vehicles (4WD)
W.07	Gas Services Relocation	Excavator (20T), vacuum truck, front-end loader (23T), vibratory roller (18T), pipe welder, tipper truck (23T) and light vehicles (4WD)

4.1.2 Hours of Construction

Construction activities for the project would only be undertaken during the following construction hours:

- 7:00 am to 6:00 pm, Mondays to Saturdays
- At no time on Sundays or Public Holidays.

It should be noted that works undertaken between 7:00 am and 8:00 am on Saturday and 1:00 pm and 6:00 pm on Saturday are considered daytime out of hours works in accordance with the ICNG.

4.1.3 Construction Traffic

Construction traffic would travel along Elizabeth Drive and access the development from the north via Martin Road until December 2029. Subsequently, access to the site would be via the upgraded Lawson Road (Part 5 Activity – External Works Lead in Roads and Services, see **Section 1.1**)

The existing traffic and expected construction traffic volumes are shown in shown in **Table 16** and **Table 17**.

Table 16 Traffic Volumes – Existing

Road	Existing Traffic volumes[1]			
	Daytime (7am to 10pm)		Night-time (10pm to 7am)	
	Light	Heavy	Light	Heavy
Martin Road	355[2]	296[2]	85[2]	41[2]
Elizabeth Drive (west of Salisbury Avenue)	10,225[3]	2,204[3]	2,244[3]	348[3]

Note 1: Data includes both north and south-bound traffic.

Note 2: It is understood that current 24-hour traffic data for Martin Road is not available. Hence, the data from Wilkinson Muray report 17199-M3 (version B) *CSR Advanced Manufacturing Hub Noise Impact Assessment – MOD 3*, dated March 2019 has been used. This data was measured in August 2018.

Note 3: Data taken from Aecom report 60641411 – *Elizabeth Drive – East Upgrade* (Revision 4), dated September 2023.

Table 17 Traffic Volumes – Construction

Road	Proposal Traffic volumes[1,2]			
	Daytime (7am to 10pm)		Night-time (10pm to 7am)	
	Light	Heavy	Light	Heavy
Martin Road and Elizabeth Drive	254	474	60	12

Note 1: Data includes both north and south-bound traffic.

Note 2: Development-related traffic volumes provided by the project team.

5.0 Noise and Vibration Assessment

5.1 Construction Noise

The following summary is based on the predicted construction noise impacts at the most-affected receivers in each NCA and is generally representative of the worst-case situation where construction equipment is at the closest point to each receiver.

The following assessment shows the predicted noise impacts based on the exceedance of the NML, as per the categories in **Table 18**.

Table 18 Exceedance Bands and Impact Colouring

Exceedance of NML	Subjective Classification[2]	Impact Colouring
No exceedance	Negligible	
1 to 10 dB	Low impact	
11 dB to 20 dB	Moderate impact	
>20 dB	High impact	
Highly Noise Affected[1]	Highly Noise Affected	**HNA**

Note 1: Greater than 75 dBA at residential receivers

Note 2: The subjective response would vary and depends on the period in which the impacts occur (ie people are generally more sensitive to impacts during the evening and night-time).

A summary of the predicted range of construction noise levels in each NCA for residential receivers is shown in **Table 19**. The range shows the average and the maximum worst-case noise level of all receivers in a NCA (i.e., worst-case for a receiver set back from the work and worst-case for the closest front-row receiver).

A summary of the predicted worst-case construction noise impacts in each NCA for residential receivers is shown **Table 20** for standard construction hours and daytime Out-of-F.

Table 19 Predicted Construction Noise Levels

NCA	Receiver Type	NML $L_{Aeq(15\ minute)}$ (dBA)		Predicted $L_{Aeq(15\ minute)}$ Construction Noise Impact (dBA)[1]						
		Standard Hours	Daytime OOH[1]	W.01 Preliminary Works	W.02 Demolition Works	W.03 Rehabilitation Works	W.04 Earthworks - Typical	W.05 Earthworks – Peak and Contamination Screening	W.06 Containment Cell Construction	W.07 Gas Services Relocation
NCA01	Residential	45	40	35-87	29-55	28-49	27-85	31-91	27-87	33-89
NCA02	Residential	45	40	36-63	30-48	25-42	25-56	28-62	28-58	34-60
NCA03	Residential	45	40	32-36	27-31	26-34	25-29	29-35	24-31	30-33
All	Industrial	75		36-67	29-48	26-41	25-49	29-50	28-59	34-65

Note 1: OOH – Out of hours (see **Table 7** and **Table 9**).

Table 20 Predicted Worst-Case Construction Noise Exceedances (Standard Hours)

NCA	Receiver Type	NML $L_{Aeq(15\ minute)}$ (dBA)	Predicted $L_{Aeq(15\ minute)}$ Construction Noise Impact (dBA)[1]						
			W.01 Preliminary Works	W.02 Demolition Works	W.03 Rehabilitation Works	W.04 Earthworks - Typical	W.05 Earthworks – Peak and Contamination Screening	W.06 Containment Cell Construction	W.07 Gas Services Relocation
Standard Hours - Monday to Friday – 7 am to 6 pm, Saturdays – 8 am to 1 pm									
NCA01	Residential	45	HNA			HNA	HNA	HNA	HNA
NCA02	Residential	45							
NCA03	Residential	45							
All	Industrial	75							
Daytime Out of hours - Saturdays – 7 am to 8 am, 1 pm to 6pm									
NCA01	Residential	40	HNA			HNA	HNA	HNA	HNA
NCA02	Residential	40							
NCA03	Residential	40							
All	Industrial	75							

Based on the assumptions outlined in this section, it is predicted that work related to 'W.01 – Preliminary Works' undertaken during standard hours and also daytime OOH may result in the largest number of impacts when noise-intensive equipment is operated near sensitive receivers. The worst-case predicted noise contour map for 'W.01 – Preliminary Works' for standard hours is shown in **Figure 4**.

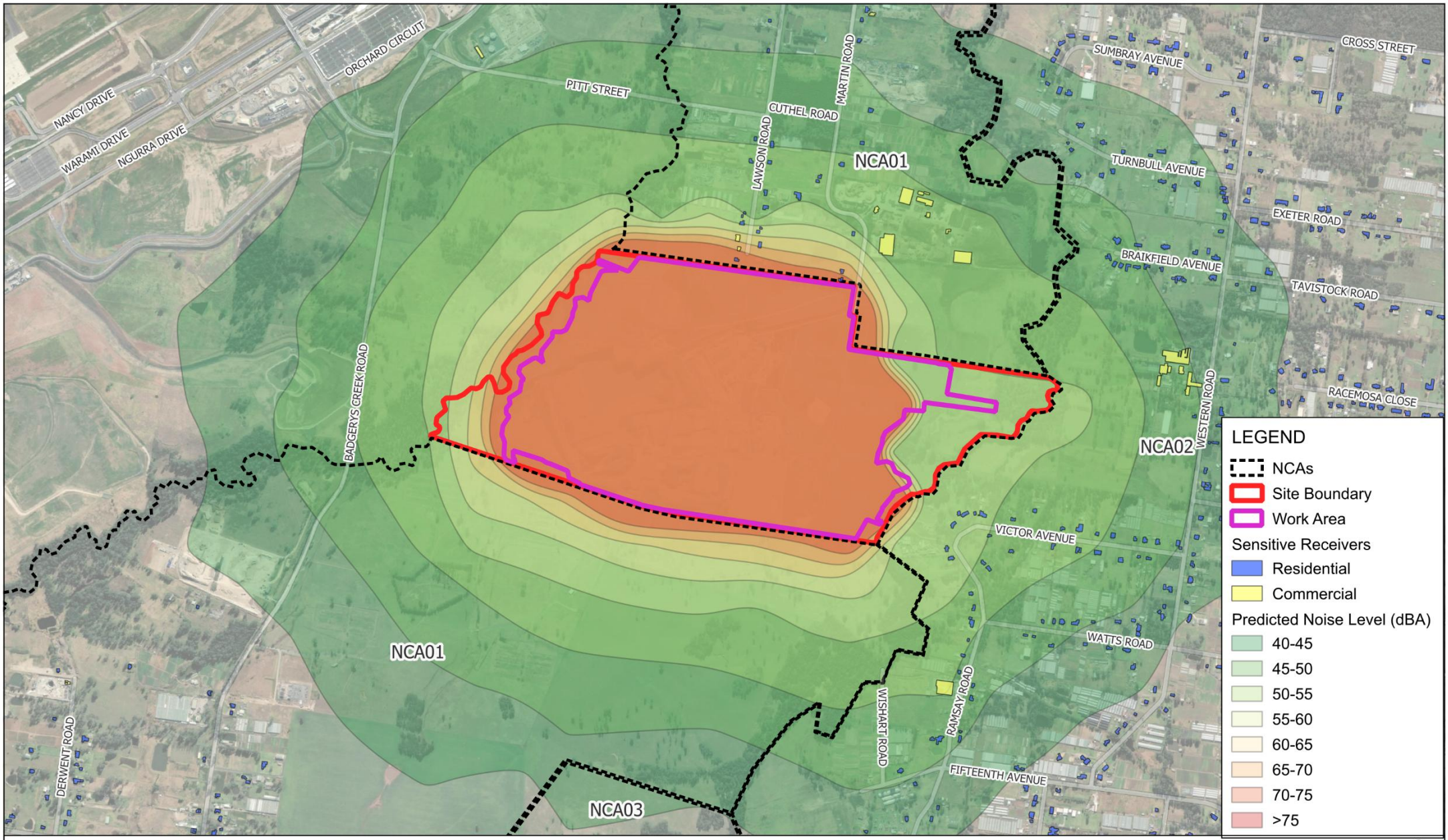
The predicted construction noise levels above show the following:

- Noise levels during construction are expected to comply with the NMLs at the residential receivers in NCA03 and at all industrial receivers during standard hours and daytime OOH periods.
- During standard hours, the following impacts are predicted at the nearest receivers in NCA02:
    - Low impacts (i.e. exceedances of up to 10 dB) are predicted for W.02, and negligible impacts (no exceedance) are expected for W.03
    - Moderate noise impacts (i.e. exceedances of up to 20 dB) are predicted during all works, except W.02 and W.03.
- During daytime OOH works, the following impacts are predicted at the nearest receivers NCA02:
    - Low impacts (i.e. exceedances of up to 10 dB) are predicted during W.02 and W.03.
    - Moderate noise impacts (i.e. exceedances of up to 20 dB) are predicted during W.04, W.06 and W.07
    - High impacts (i.e. exceedances greater than 20 dB) are predicted during W.01 and W.05.
- Low to moderate impacts are predicted in NCA01 during W.02 and W.03 at the receivers closest to the northern site boundary during both standard hours and daytime OOH periods.
- During both standard hours and daytime OOH, the worst-case impacts are expected to occur at the receivers located to the immediate north of the site in NCA01.
    - High impacts (i.e. exceedances greater than 20 dB) are predicted to occur at the nearest receivers during work scenarios W.01, W.04 through W.07.
    - The nearest residential receivers are predicted to be highly noise affected (i.e., >75 dBA) during work scenarios W.01, W.04 through W.07.

The presented impacts would only be expected to occur when noisy work is being completed close to the most affected receivers. When work is in other areas of the site, or when less noise-intensive equipment is being used, the noise levels and impacts are expected to reduce accordingly.

The assessment is generally considered conservative as the calculations assume several items of construction equipment are in use at the same time within individual scenarios. In reality, there would frequently be periods when construction noise levels are much lower than the worst-case levels predicted, as well as times when no equipment is in use, and no noise impacts occur.

Feasible and reasonable construction noise mitigation measures should be applied where exceedances of the NMLs are predicted. Construction noise mitigation and management measures are discussed in **Section 7.0**.



0 200 400 m

Scale: 1:21,596
Coordinate System: GDA2020 / MGA zone 56

Drawn Date: 24-Feb-2026
Project Number: 625.010786

SLR

Data Source:
ESRI World Imagery

Noise Contour Map
W.01 - Preliminary Works

FIGURE 4

5.2 Construction Vibration

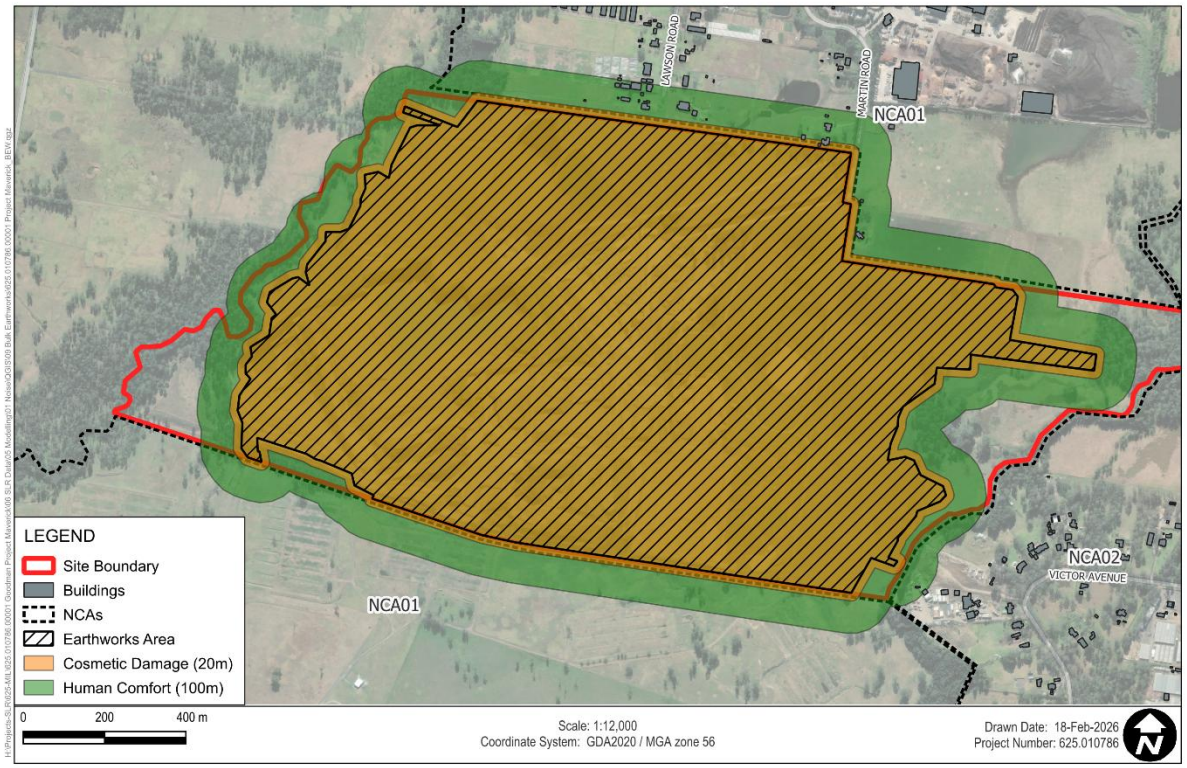
The major potential sources of vibration from the proposed construction activities would likely be during:

- W.02 – Demolition Works (large hydraulic hammer)
- W.05 – Earthworks – Peak and Contamination Screening (bored piling rig)
- W.05 – Earthworks – Peak and Contamination Screening (18T vibratory roller)
- W.07 – Gas Services Relocation (18T vibratory roller)

Vibration offset distances have been determined from the CNVG-R minimum working distances for cosmetic damage and human comfort (see **Table 14**).

The greatest risk of vibration impacts would occur where an 18T vibratory roller is in use along the project boundary; the minimum working distances are shown in **Figure 5**.

Figure 5 Construction Vibration Minimum Working Distances – Vibratory Roller (18 tonne, W.05)



5.2.1 Building Cosmetic Damage

Figure 5 shows that one residential receiver to the north of the site (227 Martin Road, Badgerys Creek) has the potential to fall within the cosmetic damage minimum working distance when a vibratory roller (18 tonne) is in use at the northern boundary of the site during W.05 – Earthworks – Peak and Contamination Screening. The main dwelling structure, in addition to shed structures, may be at risk of cosmetic damage if vibratory rollers are used within the minimum working distances.

Building cosmetic damage is not expected from the other sources of vibration.

Offset distances from specific vibration-intensive plant to the nearest receivers should be confirmed before commencing vibration-intensive work during construction. Feasible and reasonable construction vibration mitigation measures should be applied where vibration-intensive work is required within the minimum working distances (e.g., smaller, less vibration-intensive equipment).

5.2.2 Human Comfort Vibration Assessment

Figure 5 shows that the following receivers have the potential to be within the human comfort minimum working distance when vibratory rollers (18 tonne) are in use during W.05 – Earthworks – Peak and Contamination Screening at:

- 227 Martin Road, Badgerys Creek
- 201 Martin Road, Badgerys Creek
- 245 Lawson Road, Badgerys Creek
- 255 Lawson Road, Badgerys Creek

These receivers are located adjacent to the northern boundary of the site. The occupants of the buildings north of the site may be able to perceive vibration impacts at times when a vibratory roller (18 tonne) is in use nearby. Where impacts are perceptible, they would likely only be apparent for relatively short durations when vibration-intensive equipment is in use.

The buildings at Lot 54 of DP 3050 and 230 Martin Road, Badgerys Creek (northeast of the site) are known to be unoccupied, therefore no impacts are expected in relation to human comfort.

Feasible and reasonable construction vibration mitigation measures should be applied where vibration-intensive works are required within the minimum working distances. Construction vibration mitigation and management measures are discussed in **Section 7.0**.

5.3 Construction Traffic

Construction traffic would travel along Elizabeth Drive and access the development from the north via Martin Road. The proposed construction traffic route to and from the site passes residential receivers along Martin Road and Elizabeth Drive. A summary of the predicted change in traffic noise levels is shown in **Table 21**.

Table 21 Construction Traffic Assessment – Change in Noise Level

Road Name	Vehicle type[1]	Existing Traffic Volumes[2]		Construction Traffic Volumes[2]		Change in Noise Level (dBA)	
		Day (7 am – 10 pm)	Night (10 pm – 7 am)	Day (7 am – 10 pm)	Night (10 pm – 7 am)	Day (7 am – 10 pm)	Night (10 pm – 7 am)
Martin Road	LV	355	85	254	474	4.0	1.4
	HV	296	41	60	12		
Elizabeth Drive	LV	10,225	2,244	254	474	0.8	0.1
	HV	2,204	348	60	12		

Note 1: LV= Light Vehicle, HV= Heavy Vehicle

Note 2: Existing traffic and project traffic volumes are presented in **Section 4.1.3**.

Development-related construction traffic is predicted to negligibly increase road traffic noise on Elizabeth Drive during the daytime and night-time and on Martin Road during the night-

time. As per the RNP, differences in noise levels of up to 2 dBA are considered imperceptible, and impacts are considered unlikely along Elizabeth Drive.

The increase in noise levels from additional construction traffic on Martin Road during the daytime is predicted to be perceptible (ie >2.0 dB), given the large number of construction vehicles accessing the development relative to the low existing traffic volumes along Martin Road. Therefore, as required by the RNP, an assessment of noise impacts has been conducted based on the RNP base criteria (see **Table 10**). The assessment is presented in **Table 22**.

As per the NSW Road Network Categorisation, Martin Road is classified as a 'local road'; however, it is also an approved B-Double route that services heavy vehicle traffic from various commercial/industrial developments, including traffic generated by the existing quarrying/rehabilitation operations on the subject site. Based on the RNP, it has been designated a 'principal haulage route', as heavy vehicles accessing nearby industrial operations must use it in the absence of arterial roads. As such, Martin Road functions as an arterial/sub-arterial road; therefore, the arterial/sub-arterial noise criteria are applied.

Table 22 Construction Traffic Assessment – RNP Base Criteria

Receiver Type	Assessment Criteria (dBA)[1]		Predicted Noise Level (Existing and Construction Traffic) (dBA)	
	Daytime $L_{Aeq(15hour)}$ (7 am – 10 pm)	Night Time $L_{Aeq(9hour)}$ (10 pm – 7 am)	Daytime $L_{Aeq(15hour)}$ (7 am – 10 pm)	Night Time $L_{Aeq(9hour)}$ (10 pm – 7 am)
Residential receivers along Martin Road	60 (external)	55 (external)	59	51

The above assessment shows that the road traffic noise levels from increased traffic due to the proposed construction works are predicted to comply with the assessment criteria at the residential receivers along Martin Road in NCA01 during the daytime and night-time periods.

A revised traffic assessment will be completed as part of the CNVMP once updated traffic information becomes available, with any additional mitigation or management measures to be confirmed accordingly.

6.0 Cumulative Impacts

The NSW Government *Cumulative Impact Assessment Guidelines for State Significant Projects* requires that the potential combined effect of cumulative impacts on all nearby industrial developments be considered when assessing potential noise impacts from state significant projects.

Cumulative impacts can be caused by the compounding effects of multiple projects in an area, and by the accumulation of effects from past, current and future activities as they arise.

Cumulative construction noise impacts can occur where multiple work activities are being completed near a particular receiver at the same time.

The construction work associated with the development has the possibility of interacting with the construction activities of other projects, including but not limited to the following:

- 230 Martin Road (SSD – 65529236)
- 85 Martin Road (SSD – 74191717)
- 125 and 145-175 Lawson Road (SSD – 81662708)
- 475 Badgerys Creek Road, Bradfield (SSD – 76913969) (Part of the IPG masterplan).

  Note: At the time of preparation of this report, approval has been granted for this site.
- Internal infrastructure works for the subject site (SSD – 97688711)
- Lead-in roads and services works for the subject site (Part 5 activity)

There is potential for cumulative construction impacts if construction works for other projects occurs at the same time as the development, however, this would be addressed in their respective Construction Noise and Vibration Management Plans.

Since construction scenarios and equipment for projects in the area would generally require similar items of equipment to the project, concurrent construction work could theoretically increase the worst-case noise levels in this report by around 3 dB (i.e., a logarithmic adding of two sources of noise at the same level). The likelihood of worst-case noise levels at any individual receiver being generated by works on different projects at the same time is, however, considered low and rather than increase construction noise levels, the impact of concurrent work would generally be limited to a potential increase in the duration and annoyance of noise impacts on the affected receivers.

As such, cumulative construction impacts are not likely to significantly alter the predictions in this report, and no specific mitigation is expected to be required.

The potential cumulative impacts from the project and other projects would continue to be considered as the project progresses (eg during the preparation of the CNVMP), when detailed construction planning is developed.

7.0 Mitigation and Management Measures

The impacts during the construction of the project are predicted to be typical of major construction works near sensitive receivers. No works outside of standard construction hours are currently proposed.

The use of standard mitigation measures to minimise the impacts is considered sufficient to control the majority of the impacts. Examples of measures that could be applied to the work are provided in the Transport for NSW *Construction Noise and Vibration Guideline* (see **Appendix C**).

A CNVMP would be prepared before any work begins. This would identify all potentially impacted receivers, assess the potential noise and vibration impacts from the site and provide details regarding how the impacts would be minimised through the use of all feasible and reasonable mitigation measures. The CNVMP would also contain procedures for handling complaints, should they occur, and detail any compliance monitoring requirements.

7.1 Monitoring

7.1.1 Construction Noise Monitoring

Equipment and methods should comply with AS 1055:2018 *Acoustics — Description and measurement of environmental noise*. The statistical parameters to be measured should be the L_{Amin}, L_{A90}, L_{A10}, L_{A1}, L_{Amax} and L_{Aeq} evaluated over consecutive 15-minute periods.

Further details and requirements for construction noise monitoring are to be outlined in the CNVMP.

Real-time and/or Attended Monitoring

Real-time unattended noise monitoring is currently being undertaken as per GDM01-003 *Badgerys Creek Quarry Noise Management Plan*. It is understood that noise monitoring locations will be relocated closer to the site boundary adjacent to the sensitive receivers once the proposed works begin. Monitoring may be required at additional locations and will be confirmed during the preparation of the CNVMP.

Noise monitoring should be conducted (as appropriate) when noise-intensive works are being undertaken near sensitive receivers that are most likely to be impacted by works.

Attended Monitoring in Response to Complaints

Attended noise monitoring could be undertaken in response to any formal complaints as appropriate following an initial investigation into the complaint.

7.1.2 Construction Vibration Monitoring

7.1.2.1 Cosmetic Damage Monitoring

Based on the assessment in **Section 5.2.1**, vibration monitoring may be required at the main structure or sheds at 227 Martin Road, Badgerys Creek, for vibratory roller (18T) works during W.05 – Earthworks – Peak and Contamination Screening.

Appropriate vibration monitoring alarm thresholds should be set depending on the structure type. Guidance for alarm thresholds could be based on the information provided in **Section 3.3**.

Further details and requirements of construction vibration monitoring are to be outlined in the CNVMP.

8.0 Conclusion

SLR has been engaged to assess the potential construction noise emissions associated with the proposed earthworks and rehabilitation works at 225–245 Martin Road, Bradfield. The potential impacts from the project have been assessed against the relevant NSW policy/guidelines.

Exceedances of the standard and out of hours daytime Noise Management Levels are predicted at the nearest receivers during all works, however, this would only be expected to occur when noisy work is being completed close to the site boundary nearest to these receivers. Receivers which are closest to the northern boundary of the site are expected to be 'Highly Noise Affected' for all works except 'W.02 – Demolition Works' and 'W.03 – Rehabilitation Works'. Construction activities for the project would only be undertaken during standard daytime (7 am to 6 pm on Mondays to Saturdays) and daytime out of hours periods (7 am to 8 am and 1 pm to 6 pm on Saturdays).

The nearest receivers to the north of the site have the potential to fall within the minimum working distances (cosmetic damage and human comfort) when vibration-intensive equipment is operating near the northern site boundary. Offset distances from the specific vibration-intensive plant to the nearest receivers should be confirmed before commencing vibration-intensive works during construction.

While the increase in construction traffic along Martin Road is predicted to result in a perceptible increase in road-traffic noise levels during the daytime, the resulting noise levels are expected to comply with the applicable RNP assessment criteria for residential receivers in NCA01 (north of the site) during both daytime and night-time periods.

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Standard mitigation and management measures have been recommended to address the construction noise impacts from the development. This includes the preparation of a Construction Noise and Vibration Management Plan (CNVMP) before any work begins. Based on the predicted levels and indicative mitigation measures, the proposal is considered appropriate from an acoustic standpoint.

Appendix A Acoustic Terminology

225-245 Martin Road, Bradfield –Bulk Earthworks, Rehabilitation and Quarrying - SSD-97711727

Noise and Vibration Impact Assessment

Goodman Property Services (Aust) Pty Limited

SLR Project No.: 625.010786.00003

23 March 2026

1. Sound Level or Noise Level

The terms 'sound' and 'noise' are almost interchangeable, except that 'noise' often refers to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure. The human ear responds to changes in sound pressure over a very wide range with the loudest sound pressure to which the human ear can respond being ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or LP are commonly used to represent Sound Pressure Level. The symbol LA represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2 x 10^{-5} Pa.

2. 'A' Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an 'A-weighting' filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4,000 Hz), and less sensitive at lower and higher frequencies. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dB or 2 dB in the level of a sound is difficult for most people to detect, whilst a 3 dB to 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels.

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 m	Very noisy
90	Construction site with pneumatic hammering	
80	Kerbside of busy street	Loud
70	Loud radio or television	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	Quiet to very quiet
30	Inside bedroom	
20	Recording studio	Almost silent

Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as 'linear', and the units are expressed as dB(lin) or dB.

3. Sound Power Level

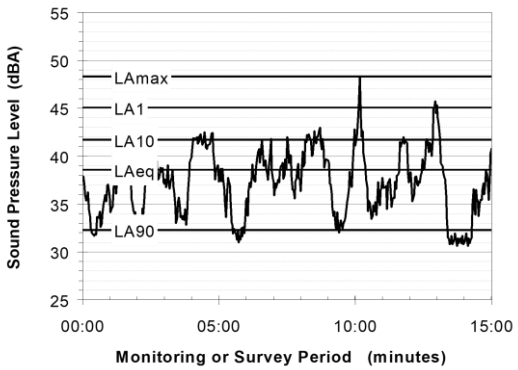
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit 10^{-12} W.

The relationship between Sound Power and Sound Pressure is similar to the effect of an electric radiator, which is characterised by a power rating but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

4. Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels LAN, where LAN is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the LA1 is the noise level exceeded for 1% of the time, LA10 the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

LA1 The noise level exceeded for 1% of the 15 minute interval.

LA10 The noise level exceeded for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

LA90 The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

LAeq The A-weighted equivalent noise level (basically, the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

5. Frequency Analysis

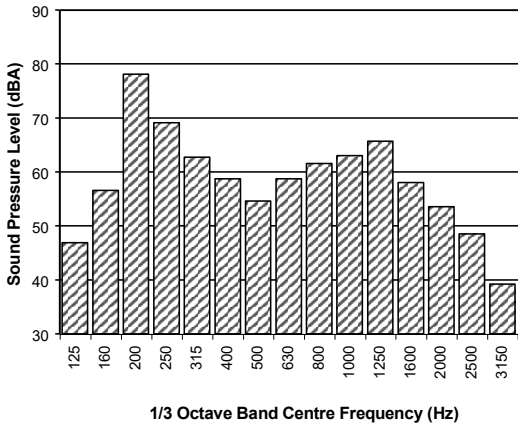
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal.

The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (three bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)

The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.



6. Annoying Noise (Special Audible Characteristics)

A louder noise will generally be more annoying to nearby receivers than a quieter one. However, noise is often also found to be more annoying and result in larger impacts where the following characteristics are apparent:

- **Tonality** - tonal noise contains one or more prominent tones (ie differences in distinct frequency components between adjoining octave or 1/3 octave bands), and is normally regarded as more annoying than 'broad band' noise.
- **Impulsiveness** - an impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.
- **Intermittency** - intermittent noise varies in level with the change in level being clearly audible. An example would include mechanical plant cycling on and off.
- **Low Frequency Noise** - low frequency noise contains significant energy in the lower frequency bands, which are typically taken to be in the 10 to 160 Hz region.

7. Vibration

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity. These may be expressed in terms of 'peak' velocity or 'rms' velocity.

The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as 'peak particle velocity', or PPV. The latter incorporates 'root mean squared' averaging over some defined time period.

Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements (ie vertical, longitudinal and transverse).

The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated. A vibration level V, expressed in mm/s can be converted to decibels by the formula 20 log (V/Vo), where Vo is the reference level (10^{-9} m/s). Care is required in this regard, as other reference levels may be used.

8. Human Perception of Vibration

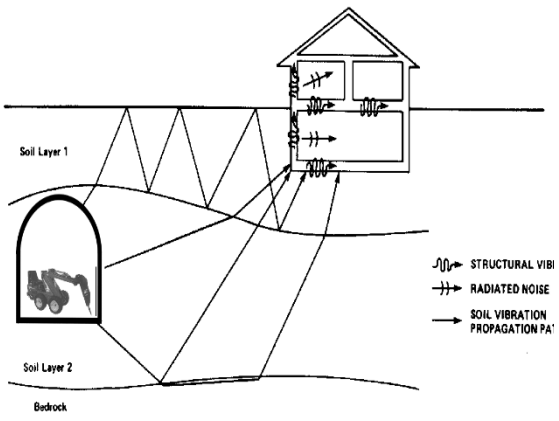
People are able to 'feel' vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as 'normal' in a car, bus or train is considerably higher than what is perceived as 'normal' in a shop, office or dwelling.

9. Ground-borne Noise, Structure-borne Noise and Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed 'structure-borne noise', 'ground-borne noise' or 'regenerated noise'. This noise originates as vibration and propagates between the source and receiver through the ground and/or building structural elements, rather than through the air.

Typical sources of ground-borne or structure-borne noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

The following figure presents an example of the various paths by which vibration and ground-borne noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.



The term 'regenerated noise' is also used in other instances where energy is converted to noise away from the primary source. One example would be a fan blowing air through a discharge grill. The fan is the energy source and primary noise source. Additional noise may be created by the aerodynamic effect of the discharge grill in the airstream. This secondary noise is referred to as regenerated noise.

Appendix B Construction Noise Sources

225-245 Martin Road, Bradfield –Bulk Earthworks, Rehabilitation and Quarrying - SSD-97711727

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Equipment	Total SWL LAeq(15 minute)	Articulated Dump Truck (23T)	Chainsaw - petrol (4-5hp)[1]	Crane - Mobile	Crane (mobile)	Dozer (CAT D9)	Excavator - Tracked (20 T)	Excavator - Tracked (30T)	Excavator 20-30T+ hydraulic hammer[1]	Grader	Hand tools (electric)	Light Vehicle - 4WD	Loader - Front-end (23T)	Loader - skidsteer (1 tonne)	Piling Rig - Bored	Roller – Vibratory[1]	Truck - Dump	Truck - truck and dog (30 T)	Truck - Vacuum	Tub Grinder/Mulcher (40-50hp)	Water Cart	Welding Equipment
Sound Power Level[2]		109	114	113	106	116	105	110	122	113	102	103	112	110	112	109	110	107	109	120	107	110
Estimated utilisation in assessment period (%)		25	33	50	100	50	50	50	30	50	25	25	100	100	50	100	25	33	100	100	100	100
Scenario																						
W.01 - Preliminary Works	122		X	X		X	X				X	X						X		X		
W.02 - Demolition Works	122								X					X				X				
W.03 - Pit Rehabilitation Works	118					X	X			X			X				X				X	
W.04 - Earthworks - Typical	114				X			X		X		X						X			X	
W.05 - Earthworks - Peak and Contamination Screening	120				X	X		X		X		X		X	X	X	X	X			X	
W.06 - Containment Cell Construction	116				X							X	X	X			X					
W.07 - Gas Services Relocation	118	X						X				X	X			X			X			X

Note 1: Equipment classed as 'annoying' in the ICNG and considers a 5 dB correction.

Note 2: Sound power level data is taken from SLR measurement database, DEFRA noise database and TfNSW Construction and Vibration Guideline.

Appendix C CNVG Mitigation Measures

225-245 Martin Road, Bradfield –Bulk Earthworks, Rehabilitation and Quarrying - SSD-97711727

Noise and Vibration Impact Assessment

Goodman Property Services (Aust) Pty Limited

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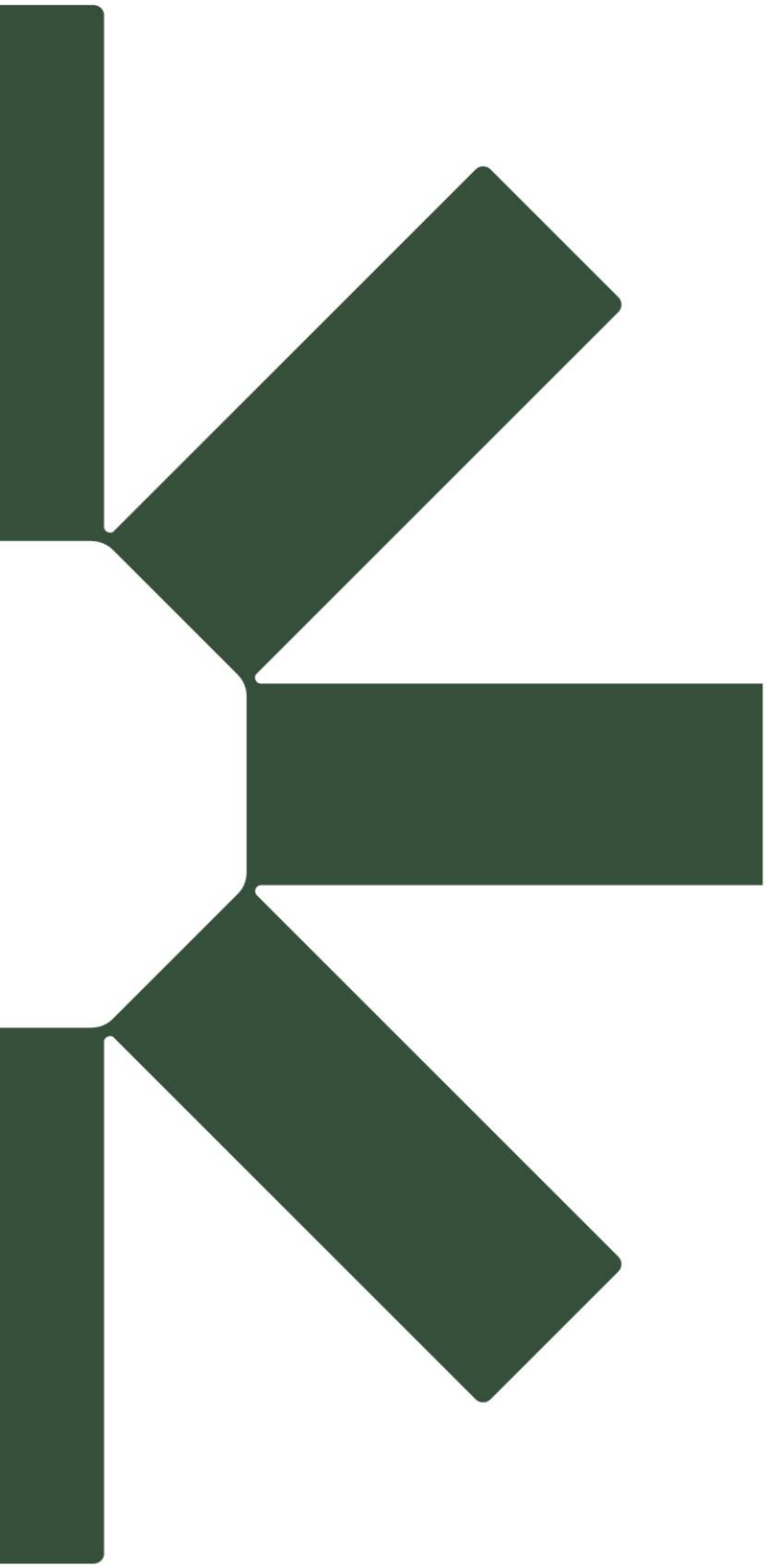
23 March 2026

CNVG Standard Mitigation and Management Measures

Action Required	Applies To	Details
Management measures		
Implementation of any project specific mitigation measures required.	Airborne noise	Implementation of any project specific mitigation measures required.
Implement community consultation or notification measures.	Airborne noise Ground-borne noise and vibration	Notification detailing work activities, dates and hours, impacts and mitigation measures, indication of work schedule over the night-time period, any operational noise benefits from the works (where applicable) and contact telephone number. Notification should be a minimum of 7 calendar days prior to the start of works. For projects other than maintenance works more advanced consultation or notification may be required. Please contact Communication and Stakeholder Engagement for guidance. Website (If required) Contact telephone number for community Email distribution list (if required) Community drop-in session (if required by approval conditions).
Site inductions	Airborne noise Ground-borne noise and vibration	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: • all project specific and relevant standard noise and vibration mitigation measures • relevant licence and approval conditions • permissible hours of work • any limitations on high noise generating activities • location of nearest sensitive receivers • construction employee parking areas • designated loading/unloading areas and procedures • site opening/closing times (including deliveries) • environmental incident procedures.
Behavioural practices	Airborne noise	No swearing or unnecessary shouting or loud stereos/radios on site. No dropping of materials from height, throwing of metal items and slamming of doors.
Verification	Airborne noise Ground-borne noise and vibration	Where specified under Appendix C of the CNVG a noise verification program is to be carried out for the duration of the works in accordance with the Construction Noise and Vibration Management Plan and any approval and licence conditions.
Attended vibration measurements	Ground-borne vibration	Where required attended vibration measurements should be undertaken at the commencement of vibration generating activities to confirm that vibration levels are within the acceptable range to prevent cosmetic building damage.
Update Construction Environmental Management Plans	Airborne noise Ground-borne noise and vibration	The CEMP must be regularly updated to account for changes in noise and vibration management issues and strategies.
Building condition surveys	Vibration Blasting	Undertake building dilapidation surveys on all buildings located within the buffer zone prior to commencement of activities with the potential to cause property damage

Action Required	Applies To	Details
Source controls		
Construction hours and scheduling	Airborne noise Ground-borne noise and vibration	Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods.
Construction respite period during normal hours and out of hours work	Ground-borne noise and vibration Airborne noise	See Appendix C of the CNVG for more details on the following respite measures: • Respite Offers (RO) • Respite Period 1 (R1) • Respite Period 2 (R2) • Duration Respite (DR)
Equipment selection.	Airborne noise Ground-borne noise and vibration	Use quieter and less vibration emitting construction methods where feasible and reasonable. For example, when piling is required, bored piles rather than impact-driven piles will minimise noise and vibration impacts. Similarly, diaphragm wall construction techniques, in lieu of sheet piling, will have significant noise and vibration benefits. Ensure plant including the silencer is well maintained.
Plant noise levels.	Airborne-noise	The noise levels of plant and equipment must have operating Sound Power or Sound Pressure Levels compliant with the criteria in Appendix H of the CNVG. Implement a noise monitoring audit program to ensure equipment remains within the more stringent of the manufacturers specifications or Appendix H of the CNVG.
Rental plant and equipment.	Airborne-noise	The noise levels of plant and equipment items are to be considered in rental decisions and in any case cannot be used on site unless compliant with the criteria in Table 2 of the CNVG.
Use and siting of plant.	Airborne-noise	The offset distance between noisy plant and adjacent sensitive receivers is to be maximised. Plant used intermittently to be throttled down or shut down. Noise-emitting plant to be directed away from sensitive receivers. Only have necessary equipment on site.
Plan worksites and activities to minimise noise and vibration.	Airborne noise Ground-borne vibration	Locate compounds away from sensitive receivers and discourage access from local roads. Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site. Where additional activities or plant may only result in a marginal noise increase and speed up works, consider limiting duration of impact by concentrating noisy activities at one location and move to another as quickly as possible. Very noise activities should be scheduled for normal working hours. If the work cannot be undertaken during the day, it should be completed before 11:00pm. Where practicable, work should be scheduled to avoid major student examination periods when students are studying for examinations such as before or during Higher School Certificate and at the end of higher education semesters. If programmed night work is postponed the work should be re-programmed and the approaches in this guideline apply again.
Reduced equipment power	Airborne noise Ground-borne vibration	Use only the necessary size and power.

Action Required	Applies To	Details
Non-tonal and ambient sensitive reversing alarms	Airborne noise	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work. Consider the use of ambient sensitive alarms that adjust output relative to the ambient noise level.
Minimise disturbance arising from delivery of goods to construction sites.	Airborne noise	Loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers. Select site access points and roads as far as possible away from sensitive receivers. Dedicated loading/unloading areas to be shielded if close to sensitive receivers. Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible. Avoid or minimise these out of hours movements where possible.
Engine compression brakes	Construction vehicles	Limit the use of engine compression brakes at night and in residential areas. Ensure vehicles are fitted with a maintained Original Equipment Manufacturer exhaust silencer or a silencer that complies with the National Transport Commission's 'In-service test procedure' and standard.
Path controls		
Shield stationary noise sources such as pumps, compressors, fans etc.	Airborne noise	Stationary noise sources should be enclosed or shielded where feasible and reasonable whilst ensuring that the occupational health and safety of workers is maintained. Appendix D of AS 2436:2010 lists materials suitable for shielding.
Shield sensitive receivers from noisy activities.	Airborne noise	Use structures to shield residential receivers from noise such as site shed placement; earth bunds; fencing; erection of operational stage noise barriers (where practicable) and consideration of site topography when situating plant.
Receptor control		
Structural surveys and vibration monitoring	Ground-borne vibration	Pre-construction surveys of the structural integrity of vibration sensitive buildings may be warranted. At locations where there are high-risk receptors, vibration monitoring should be conducted during the activities causing vibration.
See Appendix C of the CNVG for additional measures	Airborne noise Ground-borne vibration	In some instances, additional mitigation measures may be required.



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