Construction Noise and Vibration Management Plan

Sydney Terminal Building Revitalisation Project - Stage 1

CPRPTB006-GARTN-HRSCENEAP-PM-PLN-000028

Gartner Rose Pty Ltd
Level 3, 15 Blue Street
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Reference: 24265.1.2.R1R5
Issue Date: 29 July 2025

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Quality Management

Status	Date	Prepared	Checked	Authorised	Comments
Revision 0	5 June 2025	Joe McNamara	Olivia Madesta	Sam Demasi	-
Revision 1	23 June 2025	Joe McNamara	Sam Demasi	Sam Demasi	Comments from Transport
Revision 2	7 July 2025	Joe McNamara	Sam Demasi	Sam Demasi	Comments from ER
Revision 3	11 July 2025	Joe McNamara	Sam Demasi	Sam Demasi	Comments from ER
Revision 4	28 July 2025	Joe McNamara	Sam Demasi	Sam Demasi	Updated Scenarios
Revision 5	29 July 2025	Joe McNamara	Sam Demasi	Sam Demasi	Amended Works Description

This Report by VMS Australia Pty Ltd is prepared for Gartner Rose Pty Ltd and is based on the objective, scope, conditions and limitations as agreed. The Report presents only the information that VMS Australia Pty Ltd believes, in its professional opinion, is relevant and necessary to describe the issues involved. The Report should not be used for anything other than the intended purpose. All surveys, forecasts, projections, and recommendations contained in or associated with this report are made in good faith and on the basis of information supplied to VMS Australia Pty Ltd at the date of this report, and upon which VMS Australia Pty Ltd relied.

This report in its finalised version has been prepared and authorised by suitably qualified and experienced personnel from VMS Australia Pty Ltd, who hold memberships with the Australian Acoustical Society (AAS). Draft versions of this report may not be subject to this qualification.

VMS Australia Pty Ltd does not accept any liability or responsibility to any party with respect to the information and opinions contained in this report.

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1 Introduction

The Sydney Terminal Building Revitalisation Project (STBRP) was declared a State Significant Infrastructure (SSI) and was granted approval by the Minister of Planning on 17 November 2023 with conditions outlined in the *Sydney Terminal Building Revitalisation Condition of Approval*, Application No.: SSI-45421960 (CoA).

Transport for NSW (Transport) has engaged Gartner Rose Pty Ltd (the Contractor) as the Design and Construct Contractor for Stage 1 of STBRP (the Project).

In relation to noise and vibration, the proposed works are subject to Mitigation Measures and conditions as outlined in the *Sydney Terminal Building Revitalisation Submissions Report* issued by Transport, dated August 2023 (Submissions Report) and the CoA, respectively, including but not limited to the following:

Mitigation Measure NV02

"A Construction Noise and Vibration Management Plan (CNVMP) will be prepared and implemented as part of the CEMP. The plan will:

- *Identify nearby sensitive receivers*
- *Describe the activities, construction equipment and work hours that will be completed and quantify resulting impacts at sensitive receivers*
- *Include noise and vibration management criteria and relevant licence and approval conditions*
- *Include measures to manage noise and vibration and minimise the potential for impacts during construction, aligned with the results of community consultation, and consistent with the management approach and mitigation measures in the Construction Noise and Vibration Strategy (CNVS) (Transport for NSW, 2019), where reasonable and feasible*
- *Set out the requirements for noise and vibration monitoring*
- *Set out the procedures for handling complaints*
- *Provide details on how respite will be applied where ongoing high impacts are seen at certain receivers in accordance with the CNVS*
- *Include any requirements contained within the Central SSP study and supporting technical documents where applicable*

The CNVMP will consider cumulative construction impacts and the likelihood for 'construction fatigue' from consecutive projects in the areas that have substantial night-time work."

CoA D33

"Construction Noise and Vibration Impact Statements (CNVIS) must be prepared for work that may exceed the noise management levels, vibration criteria and/or ground-borne noise levels specified in Condition D29 and Condition D30 at any residence outside construction hours identified in Condition D24, or where receivers will be highly noise affected. The CNVIS must include specific mitigation measures identified for the affected sensitive land use(s) through consultation and the mitigation measures must be implemented for the duration of the work. A copy of the CNVIS must be provided to the ER prior to the commencement of the associated work. A copy/ies of CNVIS must be made available to the Planning Secretary upon request."

VMS Australia Pty Ltd (VMS) has been engaged by the Contractor to prepare a Construction Noise and Vibration Management Plan (CNVMP) (this document) to satisfy the requirements of Mitigation Measure NV02 and CoA D33. It is noted that CoA D33 refers to a 'Construction Noise and Vibration Impact Statement' (CNVIS). As the requirements of Mitigation Measure NV02 and CoA D33 are largely equivalent, this document sets out to satisfy both conditions and therefore, this CNVMP is considered adequate to satisfy the requirements of a CNVIS as per CoA D33.

Furthermore, it is noted that Mitigation Measure NV02 makes reference to the superseded *Construction Noise and Vibration Strategy* issued by Transport, dated 2019. This CNVMP applies the current *Construction Noise and Vibration Guideline* issued by Transport, dated September 2023 (CNVG).

Where the scope of works are to change such that Mitigation Measure NV02 and CoA D33 are not longer adequately addressed, this CNVMP will be revised to satisfy both conditions.

Specific acoustic terminology is used in this report. An explanation of common acoustic terms is provided in **Appendix A**.

CoA and Mitigations Measures relevant to Noise and Vibration are reproduced in **Table 1**.

Table 1 Project Compliance Management Summary

ID	Description	CNVMP Reference
Conditions of Approval		
C9	The Proponent must engage a suitably qualified and experienced person to prepare a Construction Noise and Vibration Monitoring Program (CNVMP). The program must be prepared in consultation with the City of Sydney Council and include, but not be limited to: a) noise and vibration monitoring at representative locations adjacent to construction activities (including at the most / worst affected residences) to confirm construction noise and vibration levels; b) noise monitoring during the day, evening and night-time periods throughout the construction period, covering the range of activities (including worst-case construction noise levels) being undertaken; c) method and frequency for reporting of monitoring result; d) procedures to identify and implement additional mitigation measures where results of monitoring indicate noise levels in excess of predicted noise levels and / or vibration levels in excess of vibration criteria; and	Addressed in Construction Noise and Vibration Monitoring Program (not this document).

	e) any consultation to be undertaken in relation to the monitoring program.	
C10	The Construction Noise and Vibration Monitoring Program (CNVMP) must be submitted to the ER for approval and be approved before the commencement of construction.	Addressed in Construction Noise and Vibration Monitoring Program (not this document).
C11	The approved Construction Noise and Vibration Monitoring Program (CNVMP) must be made publicly available before the commencement of construction and must be implemented for the duration of construction.	Addressed in Construction Noise and Vibration Monitoring Program (not this document).
C12	The results of the construction noise and vibration monitoring must be submitted to the Planning Secretary, and relevant regulatory agencies, for information in the form of a Construction Noise and Vibration Monitoring Report at the frequency identified in the relevant Construction Noise and Vibration Monitoring Program (CNVMP).	Addressed in Construction Noise and Vibration Monitoring Program (not this document).
D24	Work Hours Work must be undertaken during the following hours: (a) 7:00am to 6:00pm Mondays to Fridays, inclusive; (b) 8:00am to 6:00pm Saturdays; and (c) at no time on Sundays or public holidays.	**Section 4.1**
D25	Highly Noise Intensive Work Except as permitted by an EPL, highly noise intensive works that result in an exceedance of the applicable NML at the same receiver must only be undertaken: (a) between the hours of 8:00 am to 6:00 pm Monday to Friday; (b) between the hours of 8:00 am to 6:00 pm Saturday; and (c) if continuously, then not exceeding three (3) hours, with a minimum cessation of work of not less than one hour. For the purposes of this condition, 'continuously' includes any period during which there is less than one hour between ceasing and recommencing any of the work.	**Section 7.1**
D26	Construction Noise and Vibration Mitigation and Management Industry best practice construction methods must be implemented, where reasonably practicable, to ensure that noise levels are minimised. Practices must include, but are not limited to: (a) use of regularly serviced low sound power equipment; (b) early occupation and later release of construction sites; (c) scheduling of noisiest work during construction hours specified in Condition D25; (d) temporary noise barriers (including the arrangement of plant and equipment) around noisy equipment and activities such as rockhammering and concrete cutting; and (e) use of alternative construction and demolition techniques that achieve lower noise and vibration levels.	**Section 7.1**
D27	Variation to Work Hours Notwithstanding Conditions D24 and D25 work may be undertaken outside the hours specified in the following circumstances (a, b, c or d):	**Section 4.1**

(a) Safety and Emergencies, including:

(i) for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or

(ii) where it is required in an emergency to avoid injury or the loss of life, to avoid damage or loss of property or to prevent environmental harm.

On becoming aware of the need for emergency work in accordance with Condition D27(a), the ER and the Planning Secretary must be notified of the reasons for such work. Best endeavours must be used to notify all noise and/or vibration affected residents and owners/occupiers of properties identified sensitive land use(s) of the likely impact and duration of those work.

(b) Work that meets all of the following criteria:

(i) Work that causes LAeq(15 minute) noise levels:

- no more than 5 dB(A) above the rating background level at any residence in accordance with the ICNG, and
- no more than the 'Noise affected' NMLs specified in Table 3 of the ICNG at other sensitive land use(s); and

(ii) Work that causes LAmax noise levels no more than 15 dBA above the RBL at any residence during the night-time; and

(iii) Work that causes:

- continuous or impulsive vibration values, measured at the most affected residence no more than the preferred values for human exposure to vibration, specified in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006), or
- intermittent vibration values measured at the most affected residence that are no more than the preferred values for human exposure to vibration, specified in Table 2.4 of Assessing Vibration: a technical guideline (DEC, 2006).

(c) By Approval, including:

(i) where different construction hours are permitted or required under an EPL in force in respect of the SSI; or

(ii) work which is not subject to an EPL that is approved under an Out-of-Hours Work Protocol as required by Condition D28; or

(iii) negotiated agreements with directly affected residents and sensitive land use(s).

(d) By Activity, including:

(i) Deliveries and load out;

(ii) Installation of services (Internal only);

(iii) Roof construction – Grand Concourse;

(iv) Roof construction – Light Rail skylight;

(v) Demolition (Internal only – Eddy Avenue Plaza and Central Electric Building); and

(vi) Western forecourt strengthening.

The activities identified in Condition D27(d) are defined in Table 22, Appendix K in the documents listed in Condition A1.

	Note: Although the activities identified in Condition D27(d) permit works to occur outside the Work hours identified in Condition D24, these activities still need to be managed within the CEMP and CNVIS frameworks and any other relevant conditions.	
D28	Out-Of-Hours Work Protocol – Works Not Subject to an EPL An Out-of-Hours Work Protocol must be prepared to identify a process for the consideration, management and approval of Work which is outside the hours defined in Conditions D24, and that is not subject to an EPL. The Protocol must be approved by the Planning Secretary before commencement of Out-of-Hours Work and implemented for the duration of the Out-of-Hours Work. The Protocol must be prepared in consultation with the ER and must include: (a) justification as to why these Works need to be undertaken as Out-of-Hours Work; (b) identification of low, medium and high-risk activities and an approval process that considers the risk of activities, proposed mitigation, management, and coordination, including where: (i) the ER must review all proposed out-of-hours activities and confirm their risk levels, (ii) low and medium risk activities can be approved by the ER, and (iii) high risk activities that are approved by the Planning Secretary; (c) a process for the consideration of out-of-hours work against the relevant NML and vibration criteria; (d) a process for selecting, justifying and implementing mitigation measures for residual impacts in consultation with the community at each affected location, including respite periods. The measures must take into account the predicted noise levels (based off worst case scenarios and scenarios where mitigation measures will be implemented) and the likely frequency and duration of the out-of-hours works that sensitive land use(s) would be exposed to, including the number of noise awakening events; (e) procedures to facilitate the coordination of out-of-hours work including those approved by an EPL or undertaken by a third party, to ensure appropriate respite is provided; and (f) notification arrangements for affected receivers for approved out-of-hours work and notification to the Planning Secretary of approved low risk out-of-hours works. The Protocol must be submitted to and approved by the Planning Secretary before the commencement of out-of-hours work. The approved Protocol must be implemented for the duration of Work. This condition does not apply if the requirements of Condition D27 (a),(b), (c)(ii) or (d) are met, or if the Work is subject to an EPL or if a negotiated agreement is made with the impacted residents and sensitive land use(s). Notes: 1. If a certain activity or Work is regulated by the EPA via an EPL, the management of the activity or Work should not be co-regulated under the Protocol. The Protocol process should only be used if a certain activity or Work is not covered by an EPL. 2. The risk assessment(s) must be based on a risk assessment carried out in accordance with AS/NZS ISO 31000:2018 "Risk Management".	OOHW management recommendations outlined in **7.2.1** are to be considered in the preparation of a OOHW Protocol.

D29	Construction Noise Management Levels and Vibration Criteria Mitigation measures must be implemented with the aim of achieving the following noise management levels and vibration objectives: (a) construction 'Noise affected' NMLs established using the Interim Construction Noise Guideline (DECC, 2009); (b) vibration criteria established using the Assessing vibration: a technical guideline (DEC, 2006) (for human exposure); (c) Australian Standard AS 2187.2 - 2006 "Explosives - Storage and Use - Use of Explosives"DEl; (d) BS 7385 Part 2-1993 "Evaluation and measurement for vibration in buildings Part 2" as they are "applicable to Australian conditions"; and (e) the vibration limits set out in the German Standard DIN 4150-3: Structural Vibration- effects of vibration on structures (for structural damage). Work that exceeds the noise management levels and/or vibration criteria must be managed in accordance with the Noise and Vibration CEMP Sub-plan. Note: The ICNG identifies 'particularly annoying' activities that require the addition of 5 dB(A) to the predicted level before comparing to the construction NML.	**Section 4**
D30	Mitigation measures must be applied when the following residential ground-borne noise levels are exceeded: (a) evening (6:00 pm to 10:00 pm) — internal LAeq(15 minute): 40 dB(A); and (b) night (10:00 pm to 7:00 am) — internal LAeq(15 minute): 35 dB(A). The mitigation measures must be outlined in the Noise and Vibration CEMP Sub-plan, including in any Out-of-Hours Work Protocol, required by Condition D28.	**Section 4**
D31	Noise generating work in the vicinity of community, religious, educational institutions, noise and vibration-sensitive businesses and critical working areas (such as theatres, laboratories and operating theatres) resulting in noise levels above the NMLs must not be timetabled during sensitive periods, unless other reasonable arrangements with the affected institutions are made at no cost to the affected institution. Note: Sensitive periods are to be determined in consultation with the affected community, religious, educational institutions, noise and vibration-sensitive businesses, noting that these may change throughout construction.	**Section 7.1**
D32	At no time can noise generated by construction result in any employee not associated with the SSI working at a location near the SSI exceed the National Standard for exposure to noise in the occupational environment of an eight-hour (8hr) equivalent continuous A-weighted sound pressure level of LAeq,8h of 85 dB(A)	**Section 3.4** **Section 6.1**

D33	Construction Noise and Vibration Impact Statements (CNVIS) must be prepared for work that may exceed the noise management levels, vibration criteria and/or ground-borne noise levels specified in Condition D29 and Condition D30 at any residence outside construction hours identified in Condition D24, or where receivers will be highly noise affected. The CNVIS must include specific mitigation measures identified for the affected sensitive land use(s) through consultation and the mitigation measures must be implemented for the duration of the work. A copy of the CNVIS must be provided to the ER prior to the commencement of the associated work. A copy/ies of CNVIS must be made available to the Planning Secretary upon request.	This CNVMP meets the requirements of this condition. Therefore, this document is considered adequate to satisfy the requirement of a CNVIS in accordance with this condition.
D34	Construction Vibration Mitigation - Heritage Vibration testing must be undertaken before and during vibration generating activities that could result in damage to heritage items, to identify minimum working distances to prevent cosmetic damage. ln the event that the vibration testing and attended monitoring shows that the preferred values for vibration are likely to be exceeded, the construction methodology must be reviewed and, if necessary, additional mitigation measures implemented.	**Section 7.2.4**. Further addressed in Construction Noise and Vibration Monitoring Program.
D35	Advice from the Heritage Consultant nominated under Condition D10 must be sought on methods and locations for installing equipment used for vibration, movement and noise monitoring at heritage-listed structures.	**Section 7.2.4**. Further addressed in Construction Noise and Vibration Monitoring Program.
D36	Before installing at-property treatment at any heritage item identified in the documents listed in Condition A1 or identified as a result of Condition D34, the advice of the Heritage Consultant nominated under Condition D10 must be obtained and implemented to ensure any such work does not have an adverse impact on the heritage significance of the item.	No at-property treatment currently proposed.
Submissions Report		
NV02	A Construction Noise and Vibration Management Plan (CNVMP) will be prepared and implemented as part of the CEMP. The plan will: • Identify nearby sensitive receivers • Describe the activities, construction equipment and work hours that will be completed and quantify resulting impacts at sensitive receivers • Include noise and vibration management criteria and relevant licence and approval conditions • Include measures to manage noise and vibration and minimise the potential for impacts during construction, aligned with the results of community consultation, and consistent with the management approach and mitigation measures in the Construction Noise and Vibration Strategy (CNVS) (Transport for NSW, 2019), where reasonable and feasible • Set out the requirements for noise and vibration monitoring • Set out the procedures for handling complaints • Provide details on how respite will be applied where ongoing high impacts are seen at certain receivers in accordance with the CNVS • Include any requirements contained within the Central SSP study and supporting technical documents where applicable.	This document.

	The CNVMP will consider cumulative construction impacts and the likelihood for 'construction fatigue' from consecutive projects in the areas that have substantial night-time work.	
NV03	Where noise impacts are predicted, the work will be scheduled within standard construction hours, where possible. If it is not possible then the activities will be completed as early as possible in each work shift. ~~Appropriate respite will be introduced in accordance with the CNVS~~.	**Section 4.1** **Section 7.1**
NV04	Specific consultation will be carried out with nearby sensitive health facilities, educational and place of worship receivers. Noise intensive work that is predicted to impact such receivers will be scheduled outside of particularly sensitive periods, such as exams or religious services, where possible. Hotels and temporary accommodation will be included in the consultation where predicted (night-time) noise impacts may affect the amenity of guests.	**Section 7.1**
NV05	Monitoring will be carried out at the start of new noise and vibration intensive activities to confirm that actual levels are consistent with the predictions and that appropriate mitigation measures from the CNVS have been implemented.	**Section 7.2.2** Further addressed in Construction Noise and Vibration Monitoring Program.
NV06	The following measures will be implemented for significant heritage fabric within the Sydney Terminal Building and Central Railway Stations Group heritage area, including the existing rail tunnels and infrastructure, where vibration-generating activities cannot take place without maintaining the safe working distances set out in the CNVS: • Dilapidation/condition surveys will be carried out before and after work. The survey will include details of any structurally elements that are found to be structurally unsounds and/or considered to be particularly sensitive to vibration • Where any structures are considered structurally unsound or particularly sensitive to vibration, the more stringent DIN 4150 (Deutsches Institute fur Normung, 1999) Group 3 guideline values will be applied • Attended vibration monitoring will be carried out at the start of any new vibration intensive work activity that cannot take place at a safe working distance to confirm the vibration levels produced by the equipment are appropriate • Further attended and/or unattended monitoring will be carried out where vibration intensive equipment is being used near structurally unsound infrastructure and/or locations particularly sensitive to vibration • The potential for vibration impacts on heritage structures will be reviewed during detailed design when construction planning is available to verify the assessment.	**Section 7.2.4** Further addressed in Construction Noise and Vibration Monitoring Program.
NV07	The following measures will be implemented to manage noise impacts within the project area: • Schedule noise intensive work for off-peak commuter times when the area is less busy	**Section 7.1**

	• Use the minimum practical size of equipment, including silenced compressors, generators, and dust extractors, where noisy work is required while the station is open • Use path controls, such as mobile hoarding, to isolate noise intensive activities from publicly accessible locations. This includes work within the Sydney Terminal Building and Eddy Avenue Plaza.	
NV08	Location and activity-specific noise and vibration impact assessments will be carried out where: • There is the potential to result in noise levels above 75dBA at any sensitive receiver • Work is scheduled outside of standard construction hours and likely to result in noise levels greater than the relevant NML • Activities that have the potential to exceed relevant criteria for vibration. The assessments will confirm the predicted impacts at the relevant receivers to help with the selection of appropriate management measures, consistent with the requirements of the CNVS.	**Section 6**

1.1 Information Relied On

- *Assessing Vibration: a technical guideline* issued by the Department of Environment and Conservation, dated February 2006 (Vibration Guideline)
- Australian Standard 1055:2018 *Acoustics - Description and Measurement of Environmental Noise* (AS1055)
- British Standard 6472-1992 *Guide to Evaluation of Human Exposure to Vibration in buildings* (BS6472)
- British Standard 7385.2-1993 *Evaluation and measurement for vibration in buildings* (BS7385)
- *Construction and Maintenance Noise Estimator (Roads)* (EMF-NV-TT-0067)
- *Construction Noise and Vibration Guideline* issued by Transport, dated September 2023 (CNVG)
- German Standard 4150-3 *Structural vibration - Effects of vibration on structures* (DIN4150)
- *NSW Road Noise Policy* issued by the Department of Environment, Climate Change and Water NSW, dated March 2011 (RNP)
- *Sydney Terminal Building Revitalisation Environmental Impact Statement*, dated February 2023, Application No.: SSI-45421960
- *Sydney Terminal Building Revitalisation Conditions of Approval*, dated August 2023, Application No.: SSI-45421960 (CoA)
- *Sydney Terminal Building Revitalisation Noise and Vibration Impact Assessment* issued by Transport, dated February 2023 (NVIA)
- *Sydney Terminal Building Revitalisation Submission Report* issued by Transport, dated August 2023 (Submissions Report)
- *Sydney Terminal Building Revitalisation Project Stage 1 Community Communication Strategy* prepared by the Contractor, dated 16 May 2025 (CCS)
- *Social Impact Management Plan* prepared by Gartner Rose dated 8 July 2025 (SIMP)

2 Overall Project Description

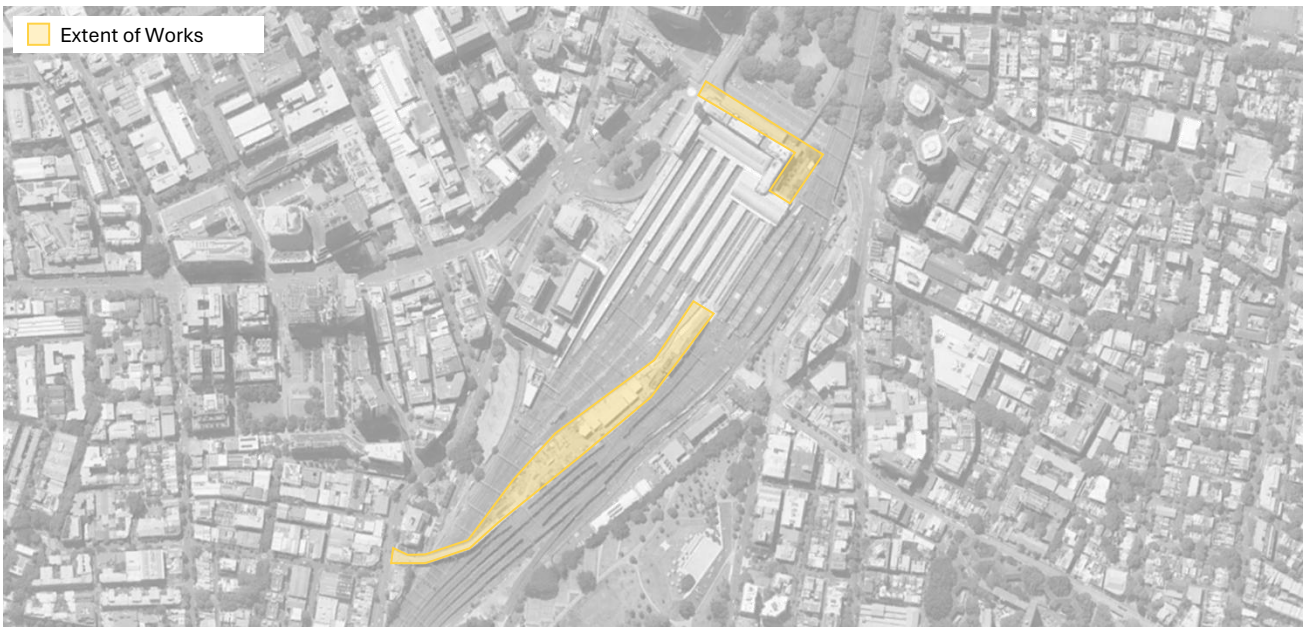
The STBRP incorporates the restoration and revitalisation of the Sydney Terminal Building at Central Station, located in the suburbs of Haymarket and Chippendale, in the City of Sydney local government area.

The Project is proposed to be delivered over three phases, summarised below and detailed in **Table 2**:

- Eddy Avenue Plaza:
  - Demolition of existing buildings and ramp.
  - Relocation of hydrant boosters.
  - Major excavation, installation of in-ground services.
  - Construction of new retail buildings, public plaza, lighting, and landscaping.
- Eastern Terrace:
  - Removal and installation of canopies (heritage-sensitive).
  - Installation of glass, steel, and balustrades.
  - Waterproofing, paving, and installation of lighting and CCTV.
- Eastern Avenue Colonnade:
  - Upgrades to paving, services, shopfronts, and ceilings.
  - Works staged in four (4) parts to minimise public disruption.
  - Installation of hard pavement, lighting, and street furniture.

A site plan outlining the extent of works and the locality of the Project with respect to the surrounding environment is presented in **Figure 1**.

Figure 1 Project Site Plan

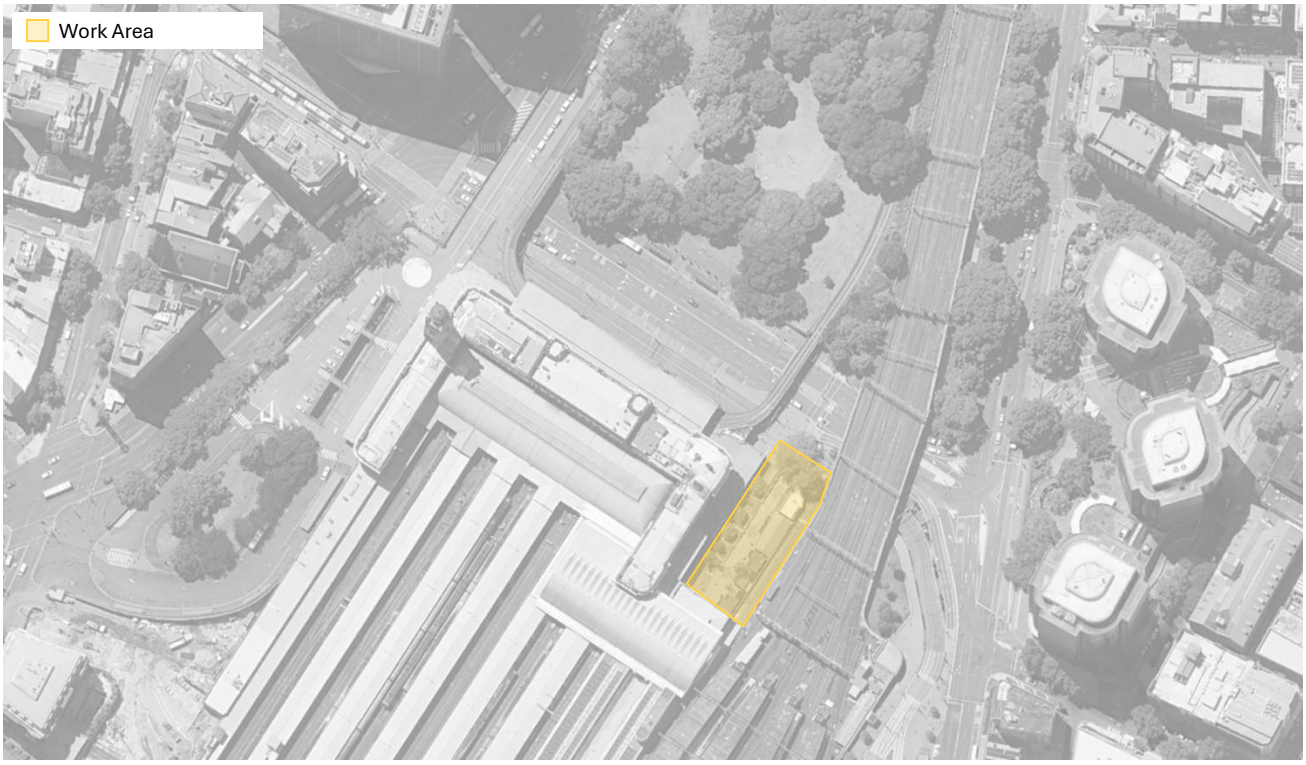


Source: Google Earth (Mark-up by VMS).

Table 2 Works Summary

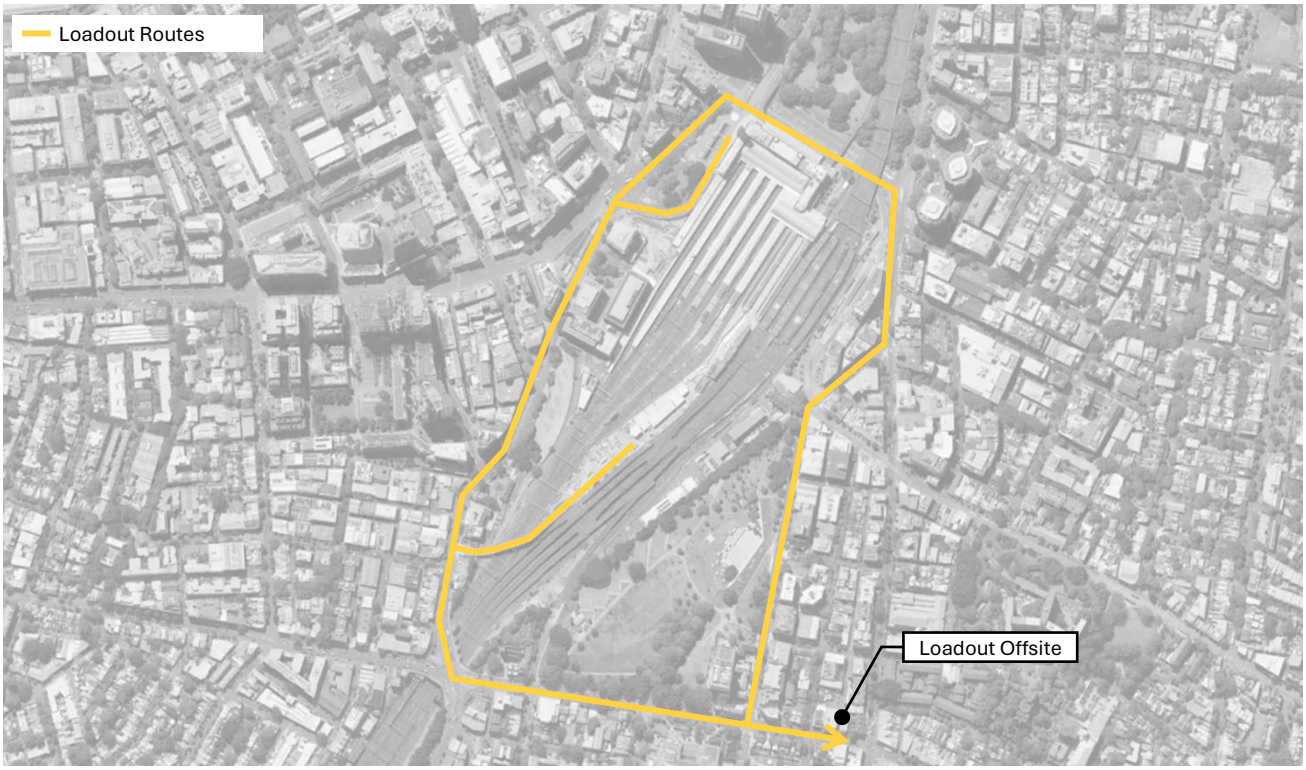
Phase	Date of Works	Works	Work Hours	Location	Work Description
Phase 1 Eddy Avenue Plaza	June 2025 to January 2026	Demolition and Trenching	7.00 am to 6.00 pm	Eddy Plaza **Figure 2**	Demolition of existing retail buildings, slabs, and plaza concrete pavement in plaza. Utility trenching/install in plaza (Fire Booster relocation). Progressive demolition of existing vehicle access ramp in plaza. Tree removal.
		Spoil Load Out to Sydney Yard	1.00 am to 5.00 am	Between Eddy Plaza and Sydney Yard **Figure 2** **Figure 3** **Figure 4**	Short-haul to Sydney Yard only.
		Spoil Load Out Offsite	4.00 am to 6.00 pm	Sydney Yard **Figure 3** **Figure 4**	From Sydney Yard to off-site tipping facility.
		Rock Anchors	7.00 am to 6.00 pm	Eddy Plaza **Figure 2**	Underpinning of Retaining Wall behind ramp.
		Form Reo Pour (FRP)	7.00 am to 6.00 pm	Eddy Plaza **Figure 2**	Retail building - foundations, base slab, services slab. Plaza - pavement.
				Sydney Yard **Figure 4**	Concrete pumped form Sydney Yard.
		Foundation and Civil Works	7.00 am to 6.00 pm	Eddy Plaza **Figure 2**	Place and compact material (foundation, subgrade, topsoil). Civil works including Stormwater pit and pipe installation, electrical pit and conduit installation, and associated utility works.
		Retail Building Construction	7.00 am to 6.00 pm	Eddy Plaza **Figure 2**	Craneage and lifting of Steel Frame components. Steel Frame assembly. Trades - plumbing, HVAC, electrical. Fit-out - carpentry, drywall, painting, glazing
Phase 2 Eastern Terrace	September 2025 to February 2026	Eastern Terrace Works	7.00 am to 6.00 pm	Eddy Plaza **Figure 2**	Setup crane with counter-weight trucks.
				Eastern Terrace **Figure 5**	Installation of Class-B Hoarding/Catch-Deck. Break-back of existing footings/connections for Awning Roof. Removal of existing Awning Roof. Construction of new footings/connections for Awning Roof. Installation of new Awning Roof Structure. Installation of new Roof Sheets. Removal of existing and installation of new pavers/tiling.
Phase 3 Colonnade (Eddy Plaza to Pitt St)	January 2026 to April 2026	Colonnade Works	7.00 am to 6.00 pm	Colonnade **Figure 6**	Install Class-A Hoarding. Pavement: Remove existing asphalt/concrete pavement. Place and compact new material - foundation/subgrade. FRP of new concrete pavement, kerb and driveway. Place new pavers. Shopfronts and ceiling: Refurbishment of existing shopfront facade. Refurbishment of existing colonnade ceiling. Installation of new pendant lighting and associated electrical works.

Figure 2 Eddy Plaza Work Area



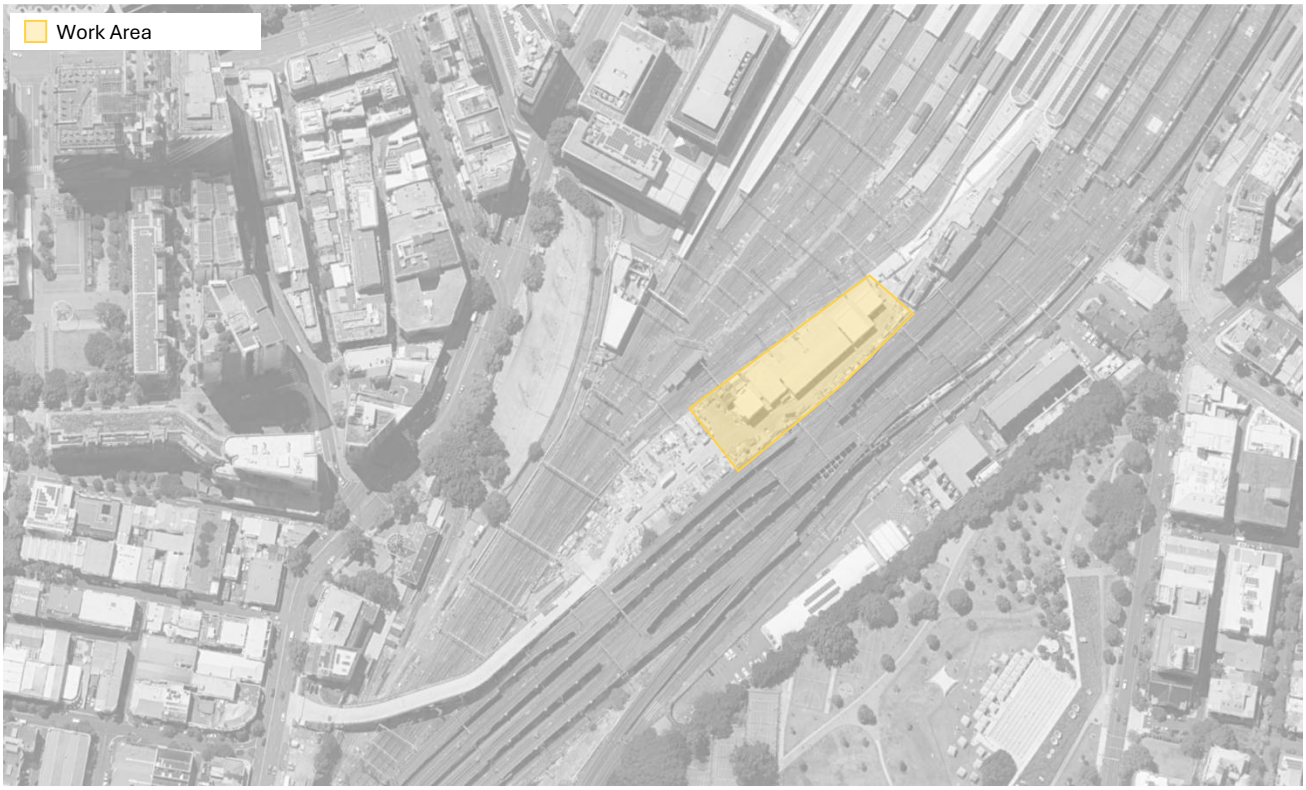
Source: Google Earth (Mark-up by VMS).

Figure 3 Loadout Routes



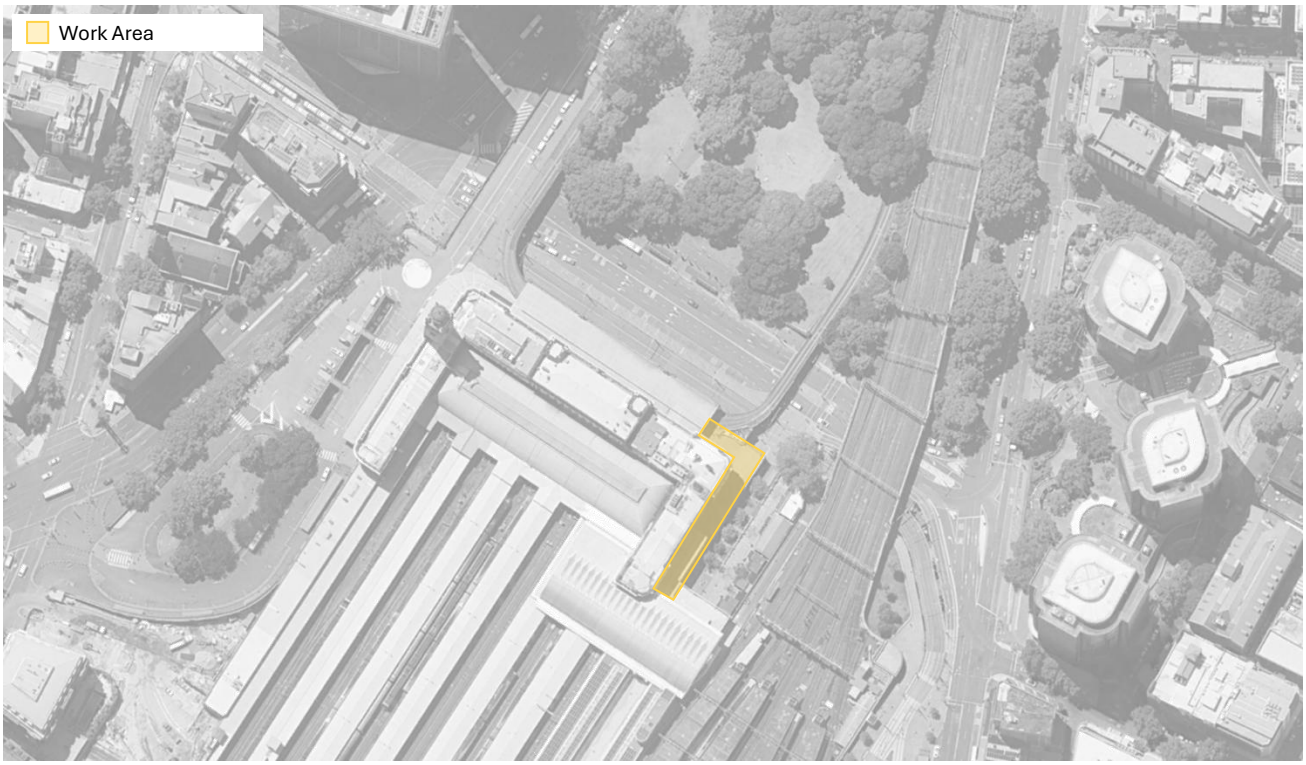
Source: Google Earth (Mark-up by VMS).

Figure 4 Sydney Yard Work Area



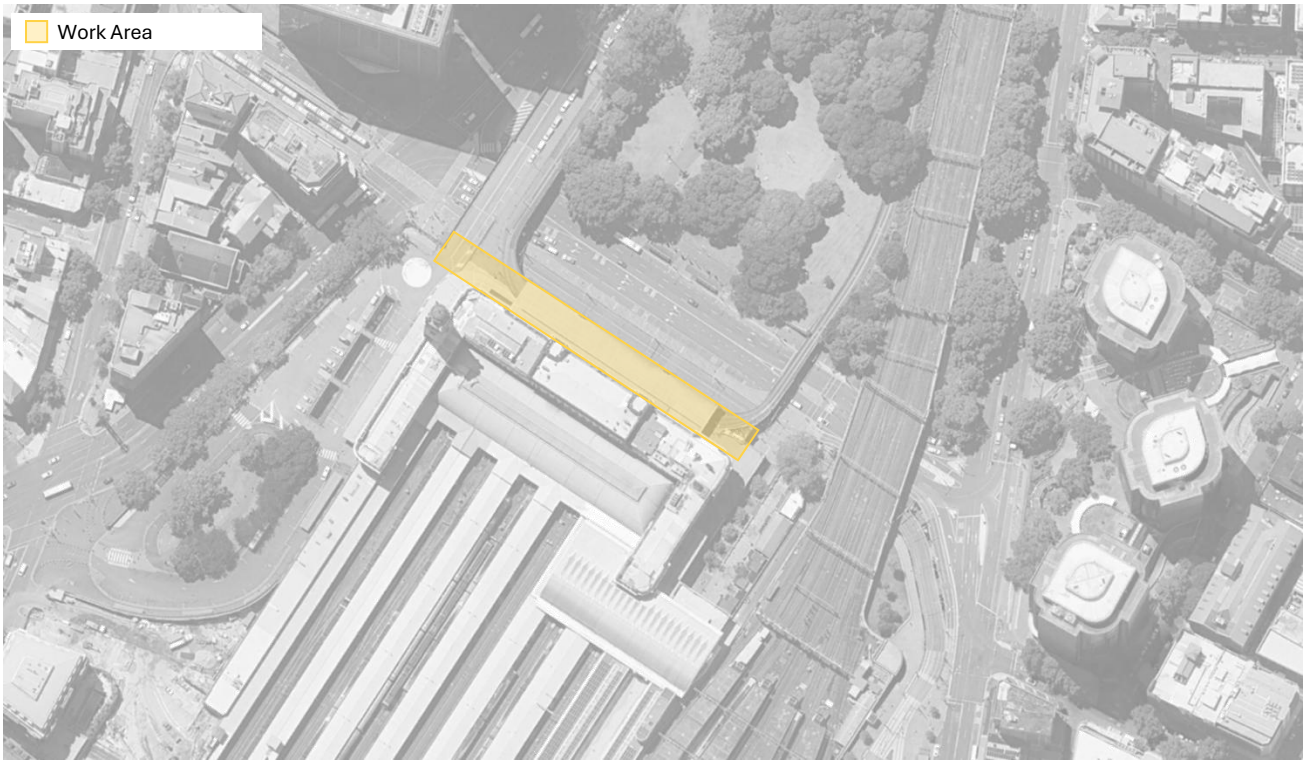
Source: Google Earth (Mark-up by VMS).

Figure 5 Eastern Terrace Work Area



Source: Google Earth (Mark-up by VMS).

Figure 6 Colonnade Work Area



Source: Google Earth (Mark-up by VMS).

3 Existing Noise Environment and Receivers

3.1 Noise Catchment Areas

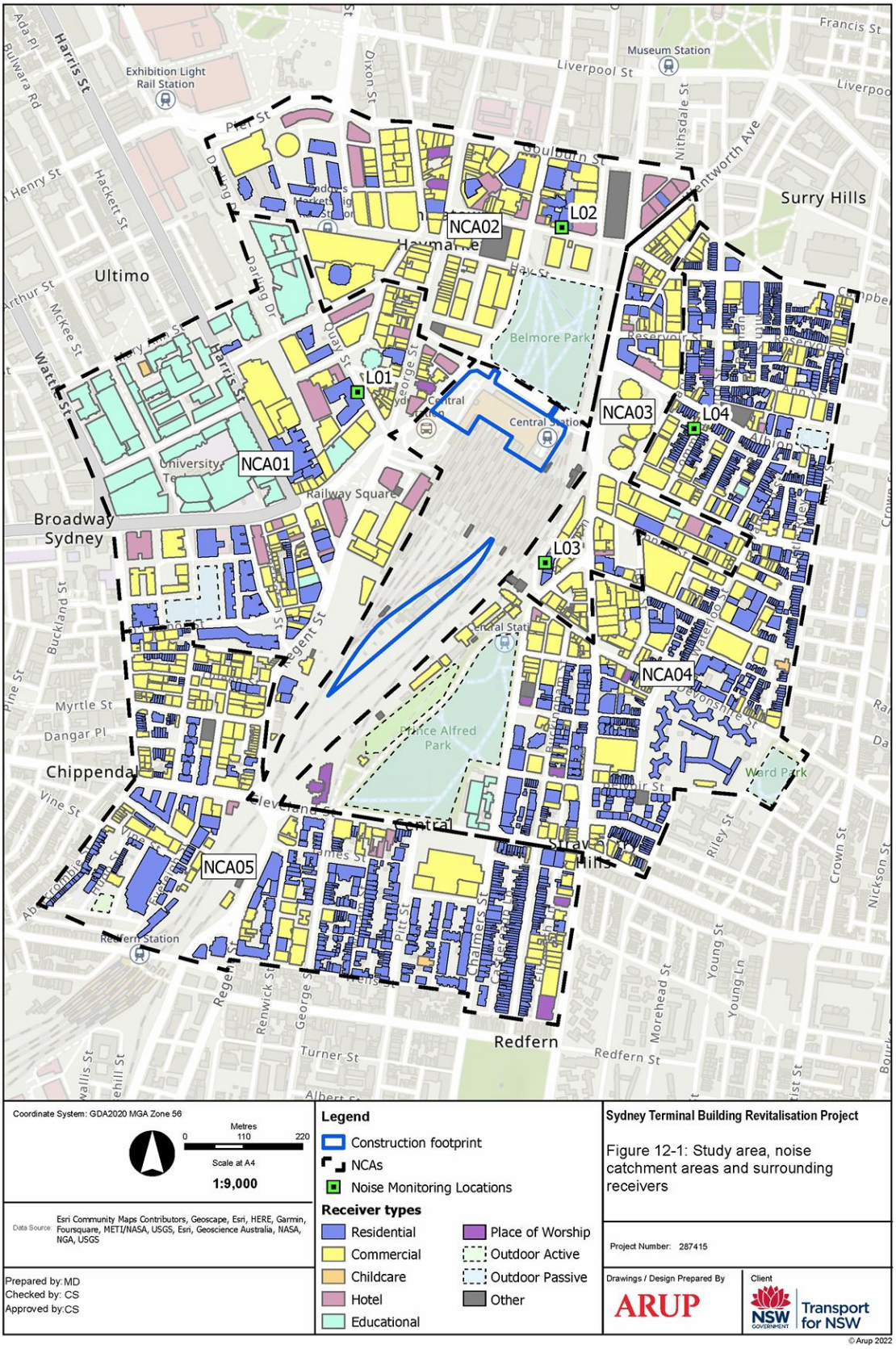
Five Noise Catchment Areas (NCAs) are established in the NVIA and are described in **Table 3** and presented in **Figure 7**.

Table 3 Noise Catchment Areas

NCA	Description
NCA01	The closest receivers are generally commercial, but the NCA also includes several hotels and places of worship. Key receivers in the NCA are TAFE NSW Ultimo and University of Sydney, which occupy a large part of the NCA further to the west. The closest residences are in apartments around 150 metres away on Geroge Street. As they live close to Central Station it is often noisy due to the activity in the area.
NCA02	The closest receivers are generally commercial, but the NCA also includes Belmore Park directly to the north and the Capitol Theatre around 200 metres away. The closest residences are in apartments around 300 metres away on Campbell Street. Again, because these residents live close to Central Station and on a main road, it is often noisy due to the activity in the area.
NCA03	The closest receivers are generally commercial. The closest residences are in apartments around 150 metres northeast on Elizabeth Street and southeast on Chalmers Street. Their proximity to Central Station means they live in a noisy area.
NCA04	The feature of this NCA is the low-density residential housing setback from Central Station and shielded by high-rise buildings in NCA03. The closest residences are around 250 metres away and live in a quieter neighbourhood setting away from Central Station.
NCA05	This NCA is away from Central Station and closer to the Sydney Trains Yard construction compound. The closest residences are around 150 metres away from the Sydney Trains Yard and 600 metres from the main project area and are located in a quieter area because they are further away from the activity around the CBD and Central Station.

Source: NVIA.

Figure 7 Noise Catchment Areas



Source: NVIA.

3.2 Unattended Noise Monitoring

Unattended noise monitoring was conducted by ARUP between October and November 2022 with background levels presented in the NVIA.

A total of four locations were monitored as identified in **Table 4** and **Figure 7**, with background levels summarised in **Table 4**.

Background levels are referenced to establish airborne NMLs for residential receivers within each NCA in **Section 4.2**.

Table 4 Unattended Noise Monitoring Results

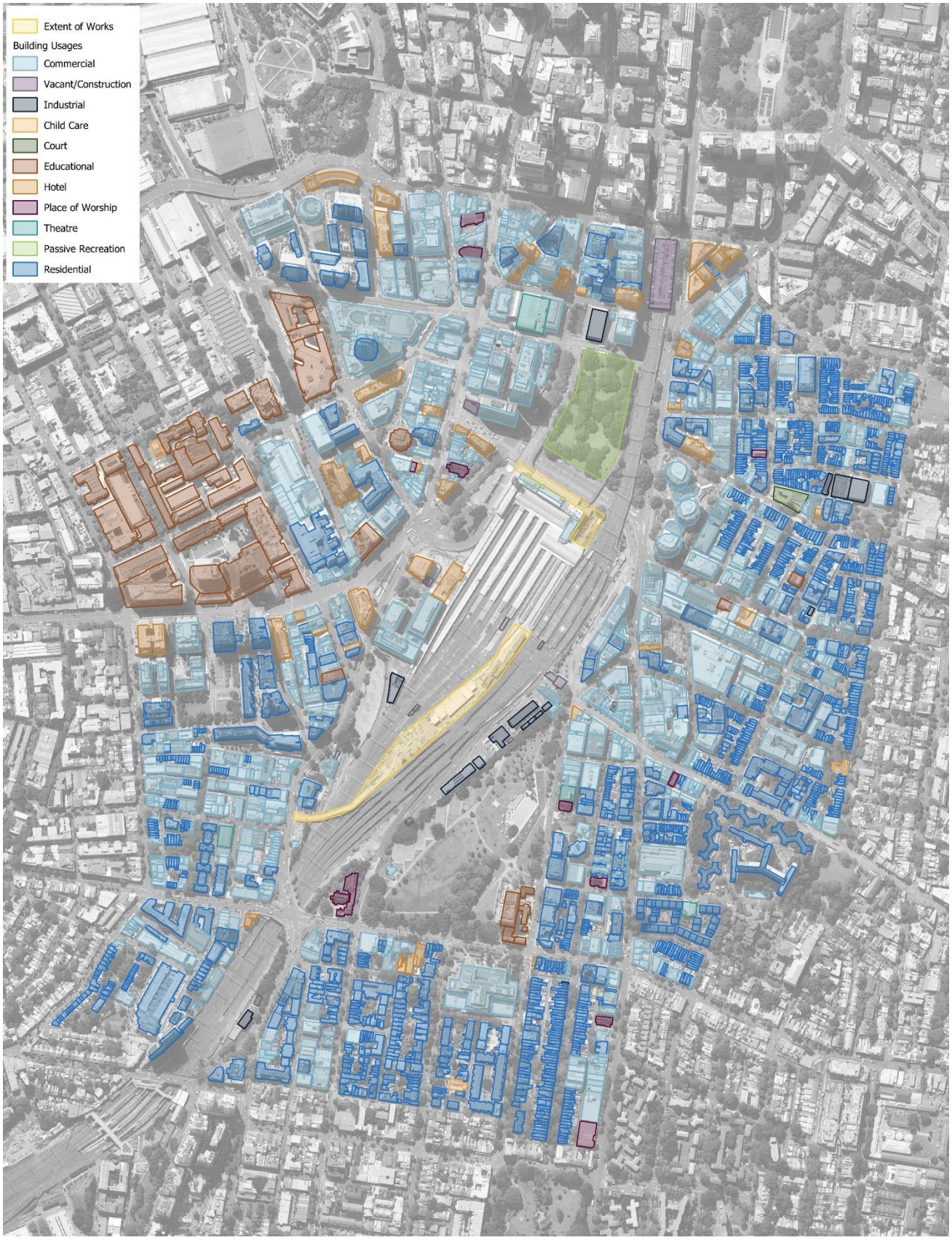
NCA	Address and Monitoring ID	Measured Noise Levels, dBA					
		Background Noise (RBL)			Average Noise (L_{eq})		
		Day	Evening	Night	Day	Evening	Night
NCA01	107-121 Quay Street, Haymarket (L01)	57	57	50	64	63	60
NCA02	303-321 Castlereagh Street, Haymarket (L02)	59	58	53	62	61	59
NCA03	38 Chalmers Street, Surry Hills (L03)	53	53	48	61	61	59
NCA04	201 Commonwealth Street, Surry Hills (L04)	50	49	44	59	57	55

Source: NVIA.

3.3 Receivers

Receivers identified in this CNVMP are presented in **Figure 8**. Acronyms for building usage are summarised in **Table 5**.

Figure 8 Surrounding Receivers



Source: Google Earth (Mark-up by VMS).

Table 5 Building Usages

Building Usage	Acronym
Residential	RES
Hotel	OHO
Commercial	COM
Educational	OED
Place of Worship	OPW
Vacant/Construction	GAR
Childcare	OCC
Industrial	IND
Theatre	OTH
Court	OCT
Passive Recreation	PRC

3.4 Non-SSI Employees

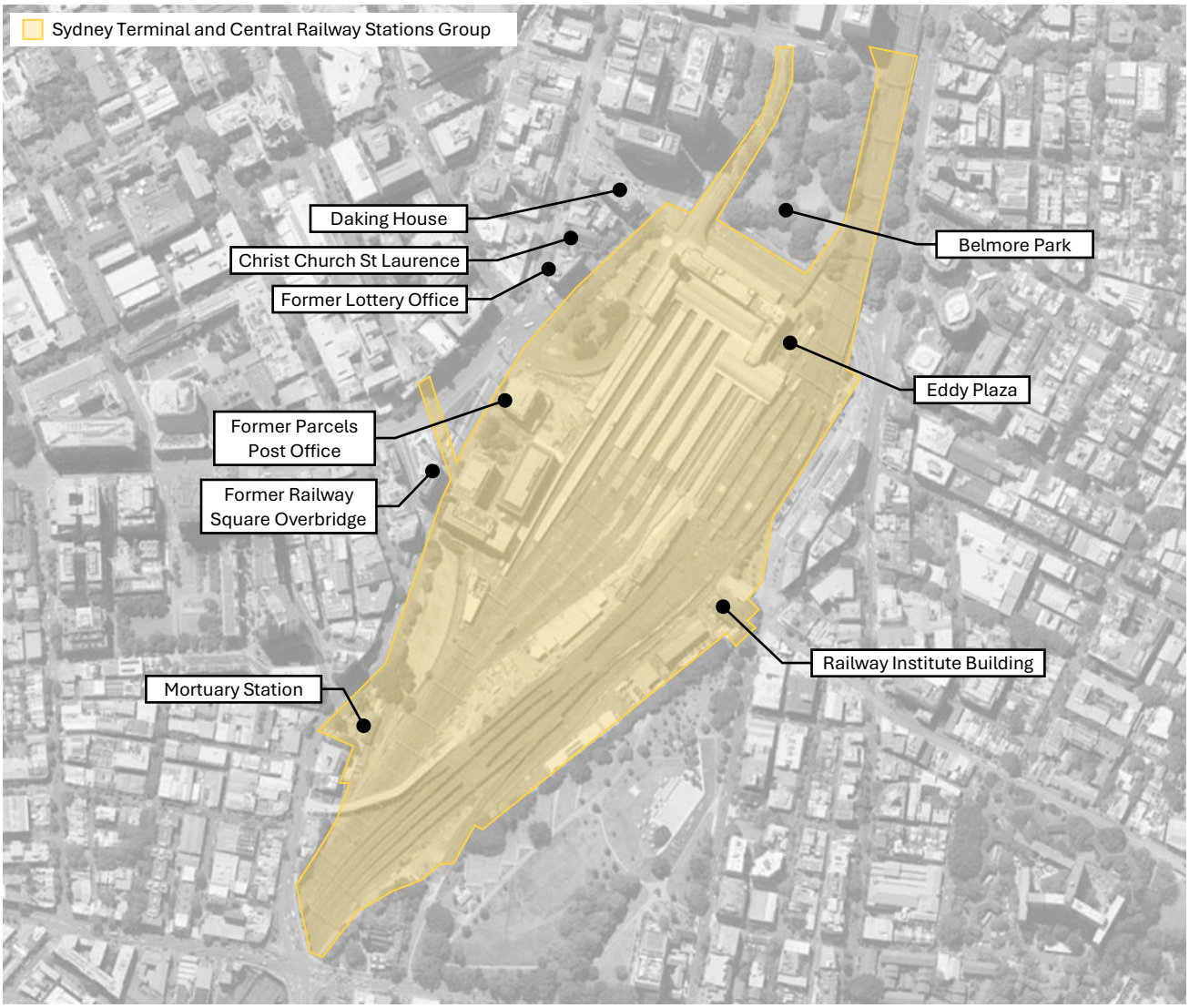
In accordance with CoA D32, potential impacts to employees not associated with the SSI working at locations in proximity to the Project are to be considered. Impacts to all such employees except for Sydney Trains personnel are captured through the assessment of noise and vibration impacts to receivers outlined in **Figure 8**.

Sydney Trains personnel have been indicated by the contractor to be no closer than 10 meters from work areas associated with the Project. It noted that in accordance with CoA D32, such receivers are subject to the National Standard for exposure to noise in the occupational environment which is measured over 8 hours. Therefore, it has been conservatively assumed that non-SSI employees may be located as close as 10 meters from works for an entire 8-hour period of continuous construction works.

3.5 Heritage Receivers

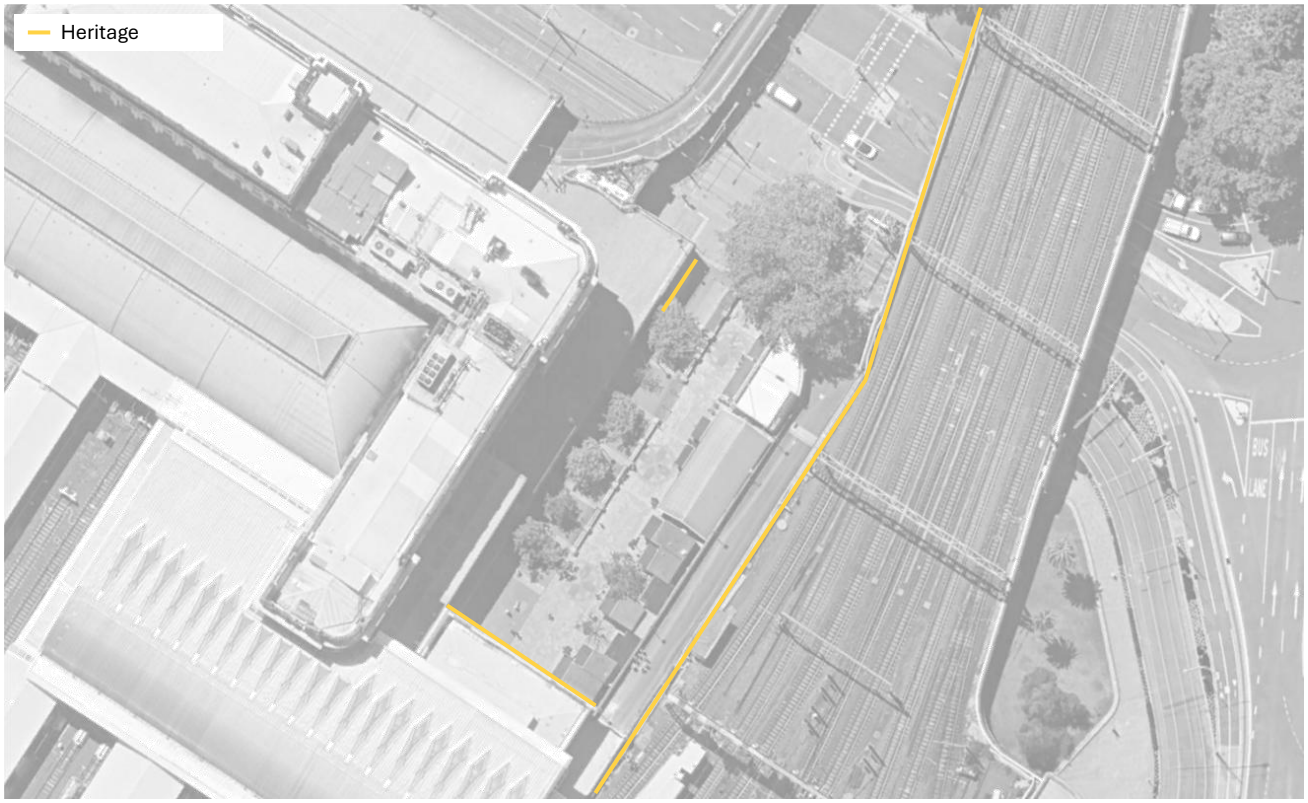
Heritage structures in proximity to works are illustrated in **Figure 9** and **Figure 10**.

Figure 9 Heritage Structures



Source: Contractor (Mark-up by VMS).

Figure 10 Heritage Structures - Eddy Plaza



Source: Google Earth (Mark-up by VMS).

4 Construction Noise and Vibration Management Levels

Commercial receivers located along the concourse will have minimal impact from ground-borne noise due to the distance (approx. 50 m) between vibration intensive works occurring within Eddy Plaza and the relatively high NMLs for these receivers. No other impacts to receivers are expected to be controlled by ground-borne noise. On this basis, ground-borne noise impacts are not further assessed.

4.1 Construction Hours

Standard construction hours are established in CoA D24 as reproduced below.

> *"Work Hours*
>
> *D24 Work must be undertaken during the following hours:*
>
> *(a) 7:00am to 6:00pm Mondays to Fridays, inclusive;*
>
> *(b) 8:00am to 6:00pm Saturdays; and*
>
> *(c) at no time on Sundays or public holidays."*

In accordance with the standard construction hours outlined in CoA D24 and the ICNG, project construction hours are outlined in **Table 6**.

Table 6 Project Construction Hours

Hour Commencing	12.00 am	1.00 am	2.00 am	3.00 am	4.00 am	5.00 am	6.00 am	7.00 am	8.00 am	9.00 am	10.00 am	11.00 am	12.00 pm	1.00 pm	2.00 pm	3.00 pm	4.00 pm	5.00 pm	6.00 pm	7.00 pm	8.00 pm	9.00 pm	10.00 pm	11.00 pm
Monday																								
Tuesday																								
Wednesday	OOHW							Standard											OOHW					
Thursday	Period 2							Hours											Period 1					
Friday																			Evening					
Saturday																								
Sunday									OOHW Period 1										OOHW					
Public Holiday									Day										Period 2					

As noted in **Table 2**, works are proposed to take place predominantly during standard construction hours except for spoil loadout activities which may take place during OOHW Period 2. These works are considered to fall under 'deliveries and load out', and therefore are permitted to take place outside of standard construction hours via CoA D27 (d) (i), notwithstanding CoA D24. These out of hours work are to be completed as early as possible in accordance with NV03.

Neverthelss, all potential impacts associated with standard and OOHW are assessed in accordance with the CNVG with consideration of the construction hours outlined in **Table 6**.

4.2 Airborne Noise from On-Site Works

Noise Management Levels (NML) for receivers potentially impacted by works are nominated in the NVIA and established based on the existing noise environment summarised **Table 4** and the construction hours outlined in **Table 6**. NMLs are reproduced in **Table 7**.

The Highly Noise Affected (HNA) level of 75 dBA defined in the CNVG as the level above which there may be strong community reaction to noise is also considered.

Table 7 Construction Noise Management Levels - Airborne Noise from On-Site Works

Receiver Type	Noise Management Level[1] - $L_{eq(15\ minute)}$ dBA				Sleep Disturbance - L_{max} dBA		HNA[2] - $L_{eq(15\ minute)}$ dBA
Residential Receivers	Standard Hours (RBL + 10 dBA)	OOH (RBL + 5 dBA)			Screening Level[6]	Awakening Reaction[7]	
		Day[3]	Evening[4]	Night[5]			
NCA01	67	62	62	55	65	75	75
NCA02	69	64	63	58	68	75	75
NCA03	63	58	58	53	63	75	75
NCA04	60	55	54	49	59	65	75
NCA05	60	55	54	49	59	65	75
Other Sensitive Receivers							
Hotel - Day and Evening	70						
Hotel - Night	60						
Commercial	70						
Industrial	75						
Educational	55						
Places of Worship	55						
Active Recreation	65						
Passive Recreation	60						

Note 1: Applied externally for residential receivers and external and when in use for other sensitive receivers.

Note 2: Applies during Standard Hours only.

Note 3: Daytime out of hours is defined as 7.00 am to 8.00 am Saturday, and 8.00 am to 6.00 pm on Sunday and public holidays.

Note 4: Evening hours are defined as 6.00 pm to 10.00 pm.

Note 5: Night hours are defined as 10.00 pm to 7.00 am on Saturday and 10.00 pm to 8.00 am on Sunday.

Note 6: Represents sleep disturbance screening level based on 52 dBA or RBL + 15 dB, whichever is greater.

Note 7: In accordance with the NVIA, the awakening reaction level is based on 55 dBA internal level with a 20 dB facade loss applied for buildings in NCA01, NCA02 and NCA03 (apartment buildings in a relatively high existing noise environment) and a 10 dB facade loss for open windows for receivers in NCA04 and NCA05 (includes low density residential receivers).

In accordance with CoA D32, an $L_{eq(8\ hour)}$ level of 85 dBA in accordance with the National Standard for exposure to noise in the occupational environment is applicable for any employee not associated with the SSI.

4.3 Construction Traffic Noise Criteria

Currently, there is no specific guideline to address the potential increase in the existing overall road traffic noise along the public road network from construction vehicles. In this regard, such noise is assessed with guidance from the RNP and from the CNVG.

In the first instance, the CNVG recommends determining whether noise levels will increase by more than 2 dBA due to construction traffic. Where increases are 2 dBA or less, no further assessment is required.

Where noise levels are likely to increase by more than 2 dBA, further assessment will be required considering the RNP criteria shown in **Table 8** which summarises road traffic noise criteria.

Both the daytime and night-time criteria are presented in **Table 8** and it should be noted that the daytime period, when considering road traffic noise, is defined as 7.00 am to 10.00 pm as defined in the RNP, and not to until 6.00 pm as defined in the CNVG.

Table 8 Construction Traffic Noise Criteria

Road Category	Land Use	Assessment Criteria[1] (dBA)	
		Daytime[2]	Night-time[2]
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments.	$L_{eq(1hour)}$ 55[3]	$L_{eq(1hour)}$ 50[3]
Freeway/arterial/ sub-arterial roads	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments.	$L_{eq(15hour)}$ 60[4]	$L_{eq(15hour)}$ 55[4]

Note 1: Applied externally to residential receivers only considering all road traffic noise sources.

Note 2: Daytime is defined as 7.00 am to 10.00 pm and night-time is defined as 10.00 pm to 7.00 am.

Note 3: Criteria assessed over a 1-hour period during the daytime and night-time periods.

Note 4: Criteria assessed over 15-hour period during the daytime and 9-hour period night-time period.

4.4 Construction Vibration Management Levels

The two main aspects considered relevant by VMS regarding construction vibration with reference to the NIVA are:

- Human comfort - Potential annoyance to the occupants of buildings due to vibration impinging on the structure.
- Cosmetic Damage - Potential damage to buildings and structures directly from vibration impinging on the structure.

For the management of human comfort, the NVIA refers to the EPA's Vibration Guideline with criteria provided for intermittent vibration based on a Vibration Dose Value (VDV) as reproduced in **Table 9**. To allow for the same vibration parameter to be used across human comfort and building damage, equivalent velocity levels (PPV, mm/s) are presented in **Table 9** with reference to the EPA's Vibration Guideline Criteria for continuous and impulsive vibration as outlined in the NVIA are also provided in **Table 10**. A range between preferred and maximum is provided where all reasonable and feasible mitigation measures should be implemented with the aim of meeting preferred values. In the event that maximum Vibration Management Levels (VMLs) are exceeded, Additional Mitigation Measures (AMM) are to be implemented in accordance with the CNVG.

Table 9 Human Comfort Vibration Management Levels - Intermittent

Place and Time	Preferred Value		Maximum Value	
	VDV[1]	PPV[2]	VDV[1]	PPV[2]
Residential buildings (day)	0.2 $m/s^{1.75}$	0.28 mm/s	0.4 $m/s^{1.75}$	0.56 mm/s
Residential buildings (night)	0.13 $m/s^{1.75}$	0.2 mm/s	0.26 $m/s^{1.75}$	0.4 mm/s
Offices, schools, educational institutions, places of worship (anytime)[3]	0.4 $m/s^{1.75}$	0.56 mm/s	0.8 $m/s^{1.75}$	1.1 mm/s
Workshops (anytime)[4]	0.8 $m/s^{1.75}$	1.1 mm/s	1.6 $m/s^{1.75}$	2.2 mm/s

Note 1: VDV management level.

Note 2: Continuous vibration management level.

Note 3: In the absence of specific levels, assumed by VMS to be used for commercial spaces.

Note 4: In the absence of specific levels, assumed by VMS to be used for industrial spaces.

Table 10 Human Comfort Vibration Management Levels - Continuous and Impulsive

Location	Assessment Period	Preferred Values		Maximum Values	
		z-axis	x- and y-axis	z-axis	x- and y-axis
Continuous Vibration					
Critical Working Areas	Day or night-time	0.0050 m/s^2	0.0036 m/s^2	0.010 m/s^2	0.0072 m/s^2
Residential	Daytime	0.010 m/s^2	0.0072 m/s^2	0.020 m/s^2	0.014 m/s^2
	Night-time	0.007 m/s^2	0.005 m/s^2	0.014 m/s^2	0.010 m/s^2
Offices, schools, educational institutions and places of worship	Day or night-time	0.020 m/s^2	0.014 m/s^2	0.040 m/s^2	0.028 m/s^2
Workshops	Day or night-time	0.04 m/s^2	0.029 m/s^2	0.080 m/s^2	0.058 m/s^2
Impulsive Vibration					
Critical working areas[1]	Day or night-time	0.0050 m/s^2	0.0036 m/s^2	0.010 m/s^2	0.0072 m/s^2
Residential	Daytime	0.30 m/s^2	0.21 m/s^2	0.60 m/s^2	0.42 m/s^2
	Night-time	0.10 m/s^2	0.071 m/s^2	0.20 m/s^2	0.14 m/s^2
Offices, schools, educational institutions and places of worship	Day or night-time	0.64 m/s^2	0.46 m/s^2	1.28 m/s^2	0.92 m/s^2
Workshops	Day or night-time	0.64 m/s^2	0.46 m/s^2	1.28 m/s^2	0.92 m/s^2

Source: NVIA

Note 1: Such as operating theatres or precision laboratories where sensitive operations are occurring. No such areas have been identified in the study area.

For the assessment of potential damage to buildings and structures, the NVIA considers German Standard DIN 4150-3:2016, *Structural vibration - Effects of vibration on structures* (**Table 11**), and British Standard BS 7385.2-1993 *Evaluation and measurement for vibration in buildings* (**Table 12**). DIN4150-3 provides more conservative maximum vibration values for short-term vibration and will be adopted in the first instance.

Table 11 Vibration Screening Criteria for Cosmetic Damage - DIN 4150

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

Note 1: At frequencies above 100 Hz, the guideline values for 100 Hz can be applied as minimum values.

Note 2: In the case of building types as in Line 3, it may be necessary to lower the relevant guideline value to prevent minor damage.

Table 12 Vibration Screening Criteria for Cosmetic Damage - BS 7385.2

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

Note: Values referred to are at the base of the building.

It is noted that in accordance with both BS 7385.2 and the NVIA, heritage buildings and structures should not be assumed to be more sensitive to vibration unless they are found to be structurally unsound following a building condition inspection. As per the NVIA, if heritage structures are found to be unsound, DIN 4150-3 may be applied.

To indicate compliance with the above vibration criteria, minimum working distances as outlined in Transport's *Construction and Maintenance Noise Estimator (Roads)* (EMF-NV-TT-0067) are applied (reproduced in **Table 13** below).

Table 13 Recommended Minimum Working Distances

Plant Item	Rating/Description	Minimum Working Distance		
		Cosmetic Damage		Human Response
		Light-framed structure (BS 7385)	Heritage and other sensitive structures (DIN 4150)	EPA's Vibration Guideline
Vibratory Roller	< 50 kN (Typically 1-2 tonnes)	5 m	14 m	15 m to 20 m
	< 100 kN (Typically 2-4 tonnes)	6 m	16 m	20 m
	< 200 kN (Typically 4-6 tonnes)	12 m	33 m	40 m
	< 300 kN (Typically 7-13 tonnes)	15 m	41 m	100 m
	> 300 kN (Typically 13-18 tonnes)	20 m	54 m	100 m
	> 300 kN (> 18 tonnes)	25 m	68 m	100 m
Small Hydraulic Hammer	(300 kg - 5 to 12t excavator)	2 m	5 m	7 m
Medium Hydraulic Hammer	(900 kg - 12 to 18t excavator)	7 m	19 m	23 m
Large Hydraulic Hammer	(1600 kg - 18 to 34t excavator)	22 m	60 m	73 m
Vibratory Pile Driver	Sheet piles	20 m	50 m	100 m
Pile Boring	≤ 800 mm	2 m (nominal)	5 m	7 m
Jackhammer	Handheld	1 m (nominal)	2 m	3 m
Profiler	Wirtgen W210	4 m	-	-
Asphalt Paver	Vogele Super 1800-3	1 m	-	-
Steel Drum Roller	Hamm HD70 (Oscillating Mode)	2 m	-	-
Steel Drum Roller	Hamm HD70 (Static Mode)	1 m	-	-

5 Construction Activities

5.1 On-Site Construction Activities

Table 14 provides the maximum L_{Aeq} sound power levels (SWL) from construction plant proposed as part of this CNVMP.

Considering the scope of works outlined in **Section 2**, Work Activities (WA), defined as a specific construction activity that takes place within a certain assessment period, are determined and presented in **Table 15**.

Worst-case scenarios, where a scenario captures all works which may potentially take place concurrently, composed of relevant work activities, and is assessed in this report to predict potential noise impacts to receivers, are developed in consultation with the Contractor and summarised in **Table 16**. A total of six (6) scenarios have been considered.

Table 14 Sound Power Levels of Construction Plant

Plant	Reference		SWL (L_{Aeq})
	Plant	Source	
40 kg Air Breaker	Jackhammer	CNVG	113
70 t City Crane	Crane - fixed	CNVG	113
150 t City Crane	Crane - fixed	CNVG	113
500 kg DPU Compactor	Compactor	CNVG	106
5 t Excavator	Excavator - tracked - 6 tonne	CNVG	95
13 t Excavator	Excavator - tracked - 10 tonne	CNVG	100
14 t Excavator	Excavator - tracked - 10 tonne	CNVG	100
18 t Excavator with Hammer[1]	Excavator - tracked + hydraulic hammer - 10 tonne	CNVG	118 + 5
17 t Excavator	Excavator - tracked - 20 tonne	CNVG	105
23 t Excavator	Excavator - tracked - 20 tonne	CNVG	105
20 kVA Generator	Generator - diesel/ petrol (6kW)	CNVG	103
100 kg Jumping Jack	Compactor	CNVG	106
10 t Smooth-Drum Roller	Roller - smooth drum	CNVG	107
10-Wheeler Agitator	Truck - concrete	CNVG	109
Angle Grinder[1]	Grinder	CNVG	105 + 5
Chainsaw[1]	Chainsaw - petrol	CNVG	114 + 5
Circular Saw[1]	Hand-held Circular Saw (Petrol - Cutting Concrete Blocks)	DEFRA[2]	107 + 5
Demo Saw[1]	Saw - concrete	CNVG	118 + 5
Drill Rig JUNJIN JD 1400E (with Auger Attachment)	Mini Piling Rig (5.4 t/auger 10 m deep x 450 mm diameter piles)	DEFRA[2]	104
EWP	Elevated work platform - scissor lift	CNVG	98
Flex-Drive Puddle Pump	Water Pump (4"")	DEFRA[2]	90
Flex-Drive Vibrator	Poker Vibrator	DEFRA[2]	97
Grout Mixer	Small Cement Mixer	DEFRA[2]	90
Grout Pump (10-bag)	Petrol Generator (2 t)	DEFRA[2]	84
Hammer (Hand Tools)	Lump Hammer	DEFRA[2]	96
Hiab Truck	Truck - medium rigid - 20 tonne	CNVG	103
Hiab Truck or Float Truck (Deliveries)	Truck - medium rigid - 20 tonne	CNVG	103
Lighting Tower (Diesel)	Lighting tower	CNVG	80
Motofog Dust Suppressor	Generator – diesel/ petrol (6kW)	CNVG	103

Plant	Reference		SWL (L_{Aeq})
	Plant	Source	
Pump Truck	Pump - concrete	CNVG	109
Rattle Gun[1]	Wrench - impact	CNVG	111 + 5
Semi Truck	Truck - medium rigid - 20 tonne	CNVG	103
Skid-Steer Loader	Loaders - skidsteer - 1 tonne	CNVG	110
TE80 Rotary Hammer Drill[1]	Hammer Drill	VMS Database	105 + 5
Tipper Truck	Truck - medium rigid - 20 tonne	CNVG	103
Trailer-mounted air compressor	Compressor	CNVG	109
Vac Truck	Truck - vacuum	CNVG	109
Vibrating Screed	Vibrating Screed	VMS Database	91

Note 1: 5 dBA penalty is applied to noise sources with special audible characteristics in accordance with the CNVG or where considered appropriate by VMS.

Note 2: Department of Environment, Food and Rural Affairs, United Kingdom.

Table 15 Work Activities

ID	Description	Work Hours	CNVG Assessment Period	Date of Works	Location	Concurrently Operating Equipment	
						Name	Number
WA1	Demolition and Trenching	Day (7.00 am to 6.00 pm)	Standard Hours	June 2025 to January 2026	**Figure 2**	23 t Excavator	1
						17 t Excavator	1
						18 t Excavator with Hammer	1
						Tipper Truck	1
						Hiab Truck	1
						Demo Saw	1
						Angle Grinder	1
						Rattle Gun	1
						TE80 Rotary Hammer Drill	1
						40 kg Air Breaker	1
						Circular Saw	1
						Chainsaw	1
						EWP (18 m Knuckle-boom or Scissor Lift)	1
						Motofog Dust Suppressor	1
						20 kVA Generator	1
						Vac Truck - 109	1
						Flex-Drive Puddle Pump	1
WA2	Spoil Load Out to Sydney Yard	Night (1.00 am to 5.00 am)	OOHW P2	June 2025 to January 2026	**Figure 2** **Figure 3** **Figure 4**	23 t Excavator	1
						17 t Excavator	1
						Tipper Truck	1
						Lighting Tower (Diesel)	1

ID	Description	Work Hours	CNVG Assessment Period	Date of Works	Location	Concurrently Operating Equipment	
						Name	**Number**
						20 kVA Generator	1
						Hiab Truck or Float Truck (Deliveries)	1
WA3	Spoil Load Out Offsite - Day	Day (7.00 am to 6.00 pm)	Standard Hours	June 2025 to January 2026	**Figure 3**	23 t Excavator	1
						17 t Excavator	1
						Tipper Truck	1
						Lighting Tower (Diesel)	1
						20 kVA Generator	1
WA4	Spoil Load Out Offsite - Night	Night (4.00 am to 7.00 am)	OOHW P2	June 2025 to January 2026	**Figure 3** **Figure 4**	23 t Excavator	1
						17 t Excavator	1
						Tipper Truck	1
						Lighting Tower (Diesel)	1
						20 kVA Generator	1
WA5	Rock Anchors	Day (7.00 am to 6.00 pm)	Standard Hours	June 2025 to January 2026	**Figure 2**	Drill Rig JUNJIN JD 1400E (with Auger Attachment)	1
						Trailer-mounted air compressor	1
						Grout Mixer	1
						Grout Pump (10-bag)	1
WA6	FRP	Day (7.00 am to 6.00 pm)	Standard Hours	June 2025 to January 2026	**Figure 2** **Figure 4**	**Within Eddy Plaza:**	
						Angle Grinder	1
						Rattle Gun	1
						Circular Saw	1
						Hammer (Hand Tools)	1
						Flex-Drive Vibrator	1
						Vibrating Screed	1
						Within Sydney Yard:	
						10-Wheeler Agitator	1
						Pump Truck	1
WA7	Foundation and Civil Works	Day (7.00 am to 6.00 pm)	Standard Hours	June 2025 to January 2026	**Figure 2**	Tipper Truck	1
						10 t Smooth-Drum Roller	1
						500 kg DPU Compactor	1
						100 kg Jumping Jack	1
						Skid-Steer Loader	1
WA8	Retail Building construction	Day (7.00 am to 6.00 pm)	Standard Hours	June 2025 to January 2026	**Figure 2**	150 t City Crane	1
						Semi Truck	1
						Angle Grinder	1
						Rattle Gun	1
						Circular Saw	1

ID	Description	Work Hours	CNVG Assessment Period	Date of Works	Location	Concurrently Operating Equipment	
						Name	**Number**
						Hammer (Hand Tools)	1
WA9	Eastern Terrace	Day (7.00 am to 6.00 pm)	Standard Hours	September 2025 to February 2026	**Figure 5**	Angle Grinder	1
						Rattle Gun	1
						TE80 Rotary Hammer Drill	1
						40 kg Air Breaker	1
						Circular Saw	1
						Demo Saw	1
						70 t City Crane	1
						Semi Truck	1
						EWP (11m Scissor Lift)	1
WA10	Colonnade	Day (7.00 am to 6.00 pm)	Standard Hours	January 2026 to April 2026	**Figure 6**	**Colonnade:**	
						13 t Excavator	1
						5 t Excavator	1
						18 t Excavator with Hammer	1
						Demo Saw	1
						Angle Grinder	1
						Rattle Gun	1
						TE80 Rotary Hammer Drill	1
						40 kg Air Breaker	1
						Circular Saw	1
						500 kg DPU Compactor	1
						100 kg Jumping Jack	1
						20 kVA Generator	1
						EWP (9 m Knuckle-boom or Scissor Lift)	1
						Vac Truck	1
						Flex-Drive Puddle Pump	1
						Within Sydney Yard:	
						10-Wheeler Agitator	1
						Pump Truck	1
						14 t Excavator	1
WA11	Deliveries	Day (7.00 am to 6.00 pm)	Standard Hours	June 2025 to April 2026	**Figure 2** **Figure 3** **Figure 4** **Figure 6**	Hiab Truck or Float Truck	1/15 min

Table 16 Scenarios

Scenario ID	Assessment Period	Description	Relevant Work Activities
S1	Standard Hours	**Phase 1 - Standard Hours**	
		Eddy Plaza - Demolition and Trenching	WA1
		Spoil Load Out Offsite - Day	WA2
		Deliveries	WA11
S2	OOHW P2	**Phase 1 - Night**	
		Spoil Load Out to Sydney Yard	WA2
		Spoil Load Out Offsite - Night	WA4
S3	Standard Hours	**Phase 2**	
		Eastern Terrace	WA9
		Deliveries	WA11
S4	Standard Hours	**Phase 3**	
		Colonnade	WA10
		Deliveries	WA11
S5	Standard Hours	**Phase 1 + Phase 2**	
		Retail Building Construction	WA8
		Eastern Terrace	WA9
		Deliveries	WA11
S6	Standard Hours	**Phase 2 + Phase 3**	
		Eastern Terrace	WA9
		Colonnade	WA10
		Deliveries	WA11

5.2 Construction Traffic along the Public Road Network

Considering that the works associated with the Project are a subset of those assessed in the EIS, construction traffic related to the Project is not expected to exceed the levels assessed in the EIS, which indicated compliance due to the high traffic flow in the surrounding areas and relatively low movements associated with the works, with encouragement to use public transport to commute to site. Therefore, no adverse noise impacts are expected from construction traffic associated with the Project.

6 Construction Noise and Vibration Assessment

6.1 Airborne Noise from On-Site Construction

Construction noise impact predictions have been undertaken using iNoise V2024.3 and include the following main inputs:

- Ground and air absorption.
- Natural shielding from topographical data obtained from SixMaps.
- Shielding from buildings.
- Typical construction octave band spectrum adjusted to consider the scenarios as per **Table 16**.

Noise impacts are assessed against project RBLs and NMLs, and the predicted number of exceedances above these levels for surrounding receivers for the relevant assessment periods are presented in **Table 17** to **Table 20**. Predicted noise impacts are summarised in **Appendix D**.

An assessment of noise impacts to non-SSI employees who may be located as close as 10 meters from works predicted maximum impacts of $L_{eq(8\ hour)}$ 78 dBA, below the level of 85 dBA in accordance with the National Standard for exposure to noise in the occupational environment.

Table 17 Number of Residential Receivers Where RBL is Exceeded - Standard Hours

Scenario	RBL Exceedance				HNA Exceedance
	5 to 10 dB	11 to 20 dB	21 to 30 dB	>30 dB	
S1	5	1	-	-	-
S3	3	-	-	-	-
S4	3	1	-	-	-
S5	3	1	-	-	-
S6	5	1	-	-	-

Table 18 Number of Residential Receivers Where RBL is Exceeded - OOHW P2

Scenario	RBL Exceedance			
	5 to 10 dB	11 to 20 dB	21 to 30 dB	>30 dB
S2	2	-	-	-

Table 19 Number of Non-Residential Receivers Where NML is Exceeded - Standard Hours

Scenario	NML Exceedance		
	0 to 10 dB	11 to 20 dB	>20 dB
S1	4	-	-
S3	2	-	-
S4	2	2	-
S5	3	-	-
S6	3	2	-

Table 20 Number of Non-Residential Receivers Where NML is Exceeded - OOHW P2

Scenario	NML Exceedance			
	0 to 5 dB	6 to 15 dB	16 to 25 dB	>25 dB
S2	-	-	-	-

6.2 Sleep Disturbance from On-Site Construction

The risk of potential sleep disturbance as a result of OOH works is assessed in accordance with the CNVG. Sleep disturbance impacts are assessed with an 8 dB correction to convert predicted impacts from L_{Aeq} to L_{Amax}.

Following this assessment, L_{max} levels up to 62 dBA are predicted at residential receivers during the night, which are below the sleep disturbance screening criteria outlined on **Table 7**. Therefore, works associated with the Project are not expected to result in sleep disturbance to nearby residential receivers.

6.3 Ground-Borne Vibration from On-Site Construction

With reference to the construction plant outlined in **Table 14**, plant identified as vibration intensive are presented in **Table 21** alongside recommended minimum working distances referenced from **Table 13**.

Table 21 Recommended Minimum Working Distances - Relevant Plant

Plant Item	Reference	Minimum Working Distance		
		Cosmetic Damage		Human Response
		Light-framed structure (BS 7385)	Heritage and other sensitive structures (DIN 4150)	EPA's Vibration Guideline
40 kg Air Breaker	Jackhammer - Handheld	1 m (nominal)	2 m	3 m
500 kg DPU Compactor	Vibratory Roller - 1-2 tonne[1]	5 m	14 m	15 m to 20 m
18 t Excavator with Hammer	Medium Hydraulic Hammer - 12 to 18t	7 m	19 m	23 m
10 t Smooth-Drum Roller	Vibratory Roller - 7-13 tonne	15 m	41 m	100 m
1 t Smooth-Drum Roller[2]	Vibratory Roller - 1-2 tonne	5 m	14 m	15 m to 20 m

Note 1: Vibratory roller minimum working distances adopted due to absence of data. Considered conservative. 500 kg DPU Compactor may be used within minimum working distances but should be accompanied by attended vibration monitoring or conducted following a vibration trial.

Note 2: Alternate equipment for 10 t Vibratory Roller.

With reference to **Table 21**, for the worst-case use of a 10 t Vibratory roller proposed to operate in Eddy Plaza (WA7 - Foundation and Civil Works), minimum working distances of 41 m and 15 m are to be adopted for heritage structures and non-heritage structures, respectively. If works are to take place within this distance, they should be accompanied by attended vibration monitoring or conducted following a vibration trial to prevent cosmetic damage.

The above is to also apply for other vibration intensive equiptment where Minimum Working Distances are exceeded with reference to **Table 21**.

Due to the confined work area in Eddy Plaza, Minimum Working Distances associated with a 10 t Vibratory roller are likely to be exceeded, and therefore, there is a risk of cosmetic damage requiring on-site monitoring. It is noted that Minimum Working Distances are also likely to be exceeded at the eastern retaining wall during potential hammering works associated with access ramp demolition. Where vibration levels exceed those listed in **Table 11** and **Table 12**, works will be required to cease and the advice of the appointed heritage consultant will be sought.

In addition to the above, works are likely to occur within the human response minimum working distances, applicable to commercial receivers operating within Eddy Plaza and along the Colonnade. Under the worst-case assumption that a vibratory 10 t Smooth-Drum Roller is to operate (advised otherwise), works are expected to take place within the human response minimum working distance for the following receivers:

- Commercial receivers in Eddy Plaza.
- Commercial receivers along the Eddy Avenue Colonnade.

Furthermore, as required via CoA C9 and D34, vibration monitoring at the nearest worst affected locations is to take place. Where any vibration intensive works are to take place within minimum working distances, risk of cosmetic damage to buildings will be assessed through vibration monitoring.

6.4 Cumulative Construction Noise and Vibration Impacts

Where other construction projects take place in the vicinity, i.e. in the same NCA, as the Project works, construction impacts to surrounding receivers may be accentuated or may lead to 'construction fatigue' due to cumulative impacts from the multiple construction projects. Therefore, it is valuable to identify any such cases, and where cumulative impacts are considerable, it is beneficial for projects working in the same NCA to coordinate their activities including the management of work with special audible characteristics and community engagement methods.

Regarding the Project works, a potential source of cumulative impacts is the construction of the Atlassian Central building at 8-10 Lee Street, Haymarket as illustrated in **Figure 11**.

Figure 11 Cumulative Construction Projects

These works are proposed to take place at least roughly 200 m from work areas identified in this project (**Figure 2**, **Figure 4**, **Figure 5**, and **Figure 6**).

Considering the minimal noise impacts associated with the Project and considerable distance between Project works and works associated with Atlassian Central, cumulative construction noise impacts are considered negligible.

At distances of 200 m, vibration impacts will have no cumulative contributions.

7 Mitigation Measures

In the first instance, all feasible and reasonable noise and vibration mitigation measures to reduce impact will be assessed. The mitigation will involve noise controls at the source and/or the path (between the source and receiver).

7.1 Standard Mitigation Measures

The following mitigation measures are outlined in the CoA:

- Use of regularly serviced low sound power equipment.
- Early occupation and later release of construction sites.
- Scheduling of noisiest work during construction hours specified in Condition D25.
- Temporary noise barriers (including the arrangement of plant and equipment) around noisy equipment and activities such as rock hammering and concrete cutting.
- Use of alternative construction and demolition techniques that achieve lower noise and vibration levels.
- Where highly noise intensive works or works with special audible characteristics as outlined in **Table 14** are to continuously (less than one hour between ceasing and recommencing any of the work) operate during an NML exceeding scenario, highly noise intensive works must not exceed three hours with a minimum cessation of work of not less than one hour.

- NML exceeding works in the vicinity of community, religious, educational institutions, noise and vibration-sensitive businesses and critical working areas (such as theatres, laboratories and operating theatres) should not be timetabled during sensitive periods, unless other reasonable arrangements with the affected institutions are made at no cost to the affected institution. Sensitive periods are to be determined in consultation with the affected receiver. Consultation is ongoing, with outcomes of this consultation to date listed in **Table 22** as provided by the Contractor. Works are to be timetables with consideration of the sensitive periods identified through consultation.
- In accordance with CoA D33, receivers exceeding NMLs outside construction hours are to be consulted regarding the determination of specific mitigation measures. Two such residential receivers are identified as outlined in **Table 18** and **Appendix D**. The following specific mitigation measure is proposed:
  - Scheduling of works outside of sensitive periods were reasonable.

  Consultation is currently undergoing with these residents. Details on scheduling of works are to be further refined. These residents are listed below:
  - 242-254 Elizabeth Street, Surry Hills.
  - 156-164 Chalmers St, Surry Hills.

Table 22 Consultation Outcomes to Date

Receiver	Address	Description	Details/Comments
Transport Lost Property Office	Shop 9 Eddy Ave	Transport for NSW	Potential to place a poster in office
YHA (Youth Hostel Australia)	11 Rawson Place Corner of Pitt and Rawson Place, Haymarket 2000	Hostel Accommodation	
IN Café Restaurant	11 Rawson Place, Haymarket	Cafe	
Wake Up	509 Pitt Street Haymarket	Hotel Accommodation	Guests can stay a max of 2 weeks
Christ Church St Lawrence	Office: Level 2, 812B George Street, Sydney	Church	Reception reported the area is always noisy and they provide ear plugs to guests that struggle with the current night time noise.
Mecure	818-820 George Street, Sydney	Hotel Accommodation	Not open overnight – consider the will be lightly impacted
The Central Project – My Foundation Youth Housing (TOGA)	2 Lee Street, Sydney	Youth Housing	Receptionist mentioned anecdotally that she stays on level 2 and can hear traffic overnight but it is not too disruptive.
28 Hotel	28-30 Regent Street, Chippendale 2008	Hotel Accommodation	Spoke with volunteer – Howard.

Sydney Dental Hospital	2 Chalmers Street, Surry Hills	Health/Medical Facility	Priest (Father Daniel Dries and Sarah) and family live in the rectory attached to the church, as well as an assistant Priest.
Wentworth Institute	302 Elizabeth Street, Surry Hills	Higher Education	

The following mitigation measures are outlined in the Submissions Report:

- Schedule noise intensive work for off-peak commuter times when the area is less busy
- Use the minimum practical size of equipment, including silenced compressors, generators, and dust extractors, where noisy work is required while the station is open
- Use path controls, such as mobile hoarding, to isolate noise intensive activities from publicly accessible locations. This includes work within the Sydney Terminal Building and Eddy Avenue Plaza.
- Spoil loadout works proposed to take place outside of standard construction hours are to be completed as early as possible in each work shift.

The following mitigation measures are outlined in the SIMP:

- Works will be conducted within standard construction hours wherever possible.
- High-impact noise works will be undertaken after 9:00 am wherever possible.
- Periods of respite for high-impact works will be provided wherever possible for rough sleepers and impacted businesses.
- During construction phases involving higher impact works, community notices will be distributed to surrounding businesses and residents to inform them of upcoming activities.
- Demolition works will be carried out using the quietest machinery available, where practicable.
- Equipment will be turned off when not in use and will be inspected regularly to ensure it is functioning efficiently.
- Community notices and website updates will be issued to actively keep the community informed about construction progress.
- Toolbox talks and similar communication tools will be used to educate contractors on noise and vibration expectations for the project.
- A complaint management process will be maintained throughout construction.
- Hoardings will be constructed to serve as noise barriers at street level.
- Schedule noisy works to occur outside of afternoon/ evening peak time, as well as the morning where possible.
- The Project is conscious that there are number of vulnerable communities including rough sleepers who use space during night. The Project is committed to minimise noise and light pollution, particularly during Out of Hours Works.
- The Project will provide notice to rough sleepers in the area of upcoming works and the impact to the area through poster notifications and verbal messages prior to changed site conditions.

- The Project will continue to work with organisations such as City of Sydney, Homes NSW, Mission Australia and St Vincent de Paul to work with rough sleepers and vulnerable communities who use the station Precinct.
- Review of the NSW Department of Communities and Justice Protocol for Homeless People in Public places as well as appropriate training (i.e. toolbox talk) for construction staff on the Protocol and its application.
- Appropriate notification of work commencing, particularly noisy works or any proposed night work, if areas will be blocked due to hoarding communicated through support services such as those listed in the table and / or directly to rough sleepers if appropriate.
- OOHW will be minimised to deliveries only wherever possible to reduce construction noise and to reduce the impact on rough sleepers. Respite periods will be provided where possible if additional works are required.

Additionally, the following Standard Mitigation Measures are to be implemented where reasonable:

- Avoiding any unnecessary noise when carrying out manual operations and when operating plant.
- Avoiding/limiting simultaneous operation of noisy plant and equipment.
- Switching off any equipment not in use for extended periods.
- Vehicles' engines would be switched off whilst being loaded or unloaded, including delivery trucks.
- Avoiding deliveries at night/evenings wherever practicable.
- Ensuring truck drivers are informed of designated vehicle routes, parking locations and acceptable delivery hours for the site.
- Minimising talking loudly, no swearing or unnecessary shouting, or loud stereos/radios onsite, no dropping of materials from height where practicable, no throwing of metal items and slamming of doors.
- Directing noise-emitting plant away from sensitive receivers.
- Regularly inspecting and maintaining plant to avoid increased noise levels from rattling hatches, loose fittings, etc.
- Using non-tonal reversing/movement alarms such as broadband (non-tonal) alarms or ambient noise-sensing alarms for all plant used regularly onsite (greater than one day), and for any out of hours work.
- Use of quieter and less vibration intensive construction methods where feasible and reasonable.
- Selection of quieter plant and processes to reduce noise.
- Implement a complaint handing procedure as further detailed in **Section 7.2.3**.
- Noise and Vibration Monitoring in accordance with CoA C9.
- If rough sleepers are located in the vicinity of works, they may be impacted by construction noise. If identified the contractor should notify rough sleepers when OOHW are to be carried out, the duration of the works and the noise levels anticipated during the work. Where appropriate it may be suitable to seek advice from the NSW Department of Family & Justice Services.
- During the extent of these works, the Contractor shall coordinate with any nearby projects to ensure the cumulative noise and vibration impacts of both this Project and surrounding projects do not adversely impact receivers.

7.2 Additional Mitigation Measures

In line with the CNVG, AMMs for airborne noise and ground-borne vibration are identified based on the exceedance above RBL, NML, and HNA levels, and risk of vibration impact. The description of each AMM in accordance with the CNVG is reproduced in **Table 23**. The CNVG identifies the level of impact that triggers consideration of each measure, which includes a description of their applicability to the Project works.

Table 23 Additional Mitigation Measures

Measure	Description
Periodic Notification (PN)	For each Transport project, a notification is produced and distributed to stakeholders via letterbox drop or distributed to the project postal and/or email mailing lists. The same information will be published on the Transport corporate website (Transport Projects) or equivalent. Periodic notifications provide an overview of current and upcoming work across the project and other topics of interest. The objective is to engage, inform and provide project-specific messages. Advanced warning of potential disruptions (e.g., traffic changes or noisy works) can assist in reducing the impact on stakeholders. The approval conditions for projects specify requirements for notification to sensitive receivers where work may impact them. Content and length are determined on a project-by-project basis and must be approved by Transport prior to distribution. Most projects distribute notifications monthly. Each notification is graphically designed within a branded template. In certain circumstances media advertising may also be used to supplement Periodic Notifications, where considered effective. Periodic Notification may be advised by the Transport Community Engagement Team in cases where AMMM are not triggered as shown in Tables 9 to 11, for example where community impacts extend beyond noise and vibration (traffic, light spill, parking, etc.). In these circumstances the Transport Community Engagement Team will determine the community engagement strategy on a case-by-case basis.
Verification Monitoring (V)	Verification monitoring of noise and/or vibration during construction may be conducted at the affected receiver(s) or a nominated representative location (typically the nearest receiver where more than one receiver has been identified). Monitoring can be in the form of either unattended logging (i.e., for vibration provided there is an immediate feedback mechanism such as SMS capabilities) or operator attended surveys (i.e., for specific periods of construction noise). Verification must be undertaken by suitably qualified, trained and experienced personnel using appropriate equipment and methodology, with reference to AS1055. Refer to EPA's guideline 'Approved methods for the measurement and analysis of environmental noise in NSW' for additional guidance on personnel, methodology and equipment requirements. The purpose of monitoring is to confirm that: • Construction noise and vibration from the project are consistent with the predictions in the noise assessment. • Mitigation and management of construction noise and vibration is appropriate for receivers affected by the work. Where noise monitoring finds the actual noise levels exceed those predicted in the noise assessment then immediate refinement of mitigation measures may be required and the CNVMP amended. See Section 7.4 of the CNVG for more details.

Measure	Description
Specific Notification (SN)	Specific notifications are in the form of a personalised letter or phone call to identified stakeholders no later than seven calendar days ahead of construction activities that are likely to exceed the noise objectives. In addition to Specific Notifications and letters communications representatives from the contractor would visit identified stakeholders at least 48 hours ahead of potentially disturbing construction activities and provide an individual briefing. • Letters may be letterbox dropped, hand distributed or emailed. • Phone calls provide affected stakeholders with personalised contact and tailored advice, with the opportunity to provide comments on the proposed work and their specific needs. • Individual briefings are used to inform stakeholders about the impacts of noisy activities and mitigation measures that will be implemented. Individual briefings provide affected stakeholders with personalised contact and tailored advice, with the opportunity to comment on the project. • Specific notifications are used to support periodic notifications, or to advertise unscheduled or high impact work and must be approved by Transport prior to implementation/distribution. Where impacts have already been captured in a Periodic Notification, a Specific Notification may not be required.
Respite Offer (RO)	The purpose of a project specific respite offer is to provide residents subjected to lengthy periods of noise or vibration respite from an ongoing impact. The offer could comprise pre- purchased movie tickets, bowling activities, meal vouchers or similar offers designed to provide residents with a short break from impact of construction activity outside of their home. This measure is determined on a case-by-case basis and may not be applicable to all Transport projects.
Alternative Accommodation (AA)	Alternative accommodation options may be provided for residents living near construction activities likely to incur unreasonably high impacts. Alternative accommodation will be determined on a case-by-case basis and should provide a like-for-like replacement for permanent residents, including provisions for pets, where reasonable and feasible.
Alternative Construction Methodology (AC)	Where the vibration assessment identifies that the proposed construction method has a high risk of causing structural damage to buildings near the work, the proponent needs to consider alternative construction options to achieve compliance with the VMLs for building damage. For example, replace large rock breaker with smaller rock breakers or rock saws.
Respite Period (RP)	OOHW during evening and night periods will be restricted so receivers are impacted for no more than three consecutive evenings and no more than two consecutive nights in the same NCA in any one week, except where there is Duration Reduction. A minimum respite period of four evenings/five nights shall be implemented between periods of consecutive evening and/or night work. Strong justification must be provided where it is not reasonable and feasible to implement these period restrictions (e.g. to minimise impacts to rail operations), and approval must be given by Transport through the OOHW Approval Protocol (Section 5). Note: this management measure does not apply to OOHW Period 1 – Days (See Table 1).

Measure	Description
Duration Reduction (DR)	Where Respite Periods (see management measure above) are counterproductive to reducing noise and vibration impacts to the community, it may be beneficial to increase the number of consecutive evenings and/or nights through Duration Reduction to minimise the duration of the activity. This measure is determined on a project-by project basis and may not be applicable to all Transport projects. Impacted receivers must be consulted and evidence of community support for the Duration Reduction must be provided as justification for the Duration Reduction. A community engagement strategy must be agreed with and implemented in consultation with Transport Community and Stakeholder Engagement Representatives.

7.2.1 Airborne Noise Additional Mitigation Measures

Refer to **Table 24** regarding Airborne noise AMMs applicable to this assessment.

Table 24 AMM Matrix - Airborne Construction Noise

Construction Hours	Additional Mitigation Measures				
	Exceedance - dBA				HNA - dBA
	RBL: 5-10 NML: n/a NML OOH: 0-5	RBL: 11 to 20 NML: 0-10 NML OOH: 6-15	RBL: 21 to 30 NML: 11-20 NML OOH: 16-25	RBL: >30 NML: >20 NML OOH: >25	Impact >75
Standard Hours Monday to Friday 7.00 am to 6.00 pm Saturday 8.00 am to 6.00 pm	-	-	PN, V	PN, V	PN, V, SN
OOHW Period 1 Monday to Friday 6.00 pm to 10.00 pm Saturday 7.00 am to 8.00 am 6.00 pm to 10.00 pm Sunday/Public Holiday 8.00 am to 6.00 pm	-	PN, RP[1], DR[1]	PN, V, SN, RO, RP[1], DR[1]	PN, V, SN, RO, RP[1], DR[1]	-
OOHW Period 2 Monday to Saturday 12.00 am to 7.00 am 10.00 pm to 12.00 am Sunday/Public Holiday 12.00 am to 8.00 am 6.00 pm to 12.00 am	PN	PN, V, SN, RO[2], RP, DR	PN, V, SN, RO[2], RP, DR	PN, V, SN, RO[2], RP, DR, AA	-

Note 1: Respite periods and duration reduction are not applicable when works are carried out during OOHW Period 1 Day only (i.e. Saturday 7.00 am-8.00 am, Sundays/Public Holidays 8.00 am-6.00 pm)

Note 2: Respite offers during OOHW Period 2 are only applicable for evening periods on Sundays and Public Holidays 6.00 pm-10.00 pm, and may not be required if a respite offer has already been made for the immediately preceding OOHW Period 1

The AMMs outlined in **Table 24** are triggered with consideration of the exceedance categories outlined in **Table 17** to **Table 20**.

For standard hours works, AMMS are triggered during S4 and S6 where exceedances fall within the 11-20 dBA above NML category for two non-residential receivers, namely the commercial receivers along the Colonnade and Belmore Park. Exceedances are associated with the use of demo saws and hammers during Colonnade works and trigger Periodic Notification (PN) and Verification Monitoring (V) AMMS. Verification monitoring is to take place during the commencement of worst-case Colonnade works, this being works involving the use of either or both demo saws and hammers. Monitoring requirements are further detailed in the Construction Noise and Vibration Monitoring Program.

For OOHW, AMMs are triggered during OOHW Period 2 - S2 during the night which involves spoil loadout to Sydney yard and offsite. Exceedances fall within the 5-10 dBA above RBL category and therefore can be adequately addressed with Periodic Notification (PN).

Periodic Notification requirements for relevant affected receivers are adequately addressed via the CCS.

7.2.2 Monitoring of Noise

At the start of new noise and vibration intensive activities, i.e. the start of any works exceeding NML captured in a new scenario as per **Table 16**, and to satisfy the Verification Monitoring AMMS triggered during S4 and S6, monitoring is to be carried out to confirm that actual levels are consistent with the predictions and that appropriate mitigation measures from the CNVG have been implemented. Noise monitoring shall be undertaken by suitably qualified persons in accordance with Transport (and EPA) requirements in order to confirm that the noise levels in the community are consistent with the predictions in this CNVMP, and that appropriate mitigation is in place or otherwise required.

Operator attended measurements are preferred and are to be undertaken at the nearest and/or highest impacted sensitive receivers at the time of the survey. Where background noise levels are too high to distinguish construction noise, an alternative location may be selected. The final monitoring location will depend on the works being undertaken and their location to nearby receivers (particularly residential) at the time of the survey. During the survey, and to assist in monitoring compliance, the L_{90}, L_{10}, L_{eq} and L_{max} noise descriptors will be recorded. Notes and photos to confirm events associated with the works or otherwise (such as local noise sources) should be taken where permitted.

Alternatively, where feasible, unattended monitoring may be undertaken which shall include real-time monitoring data (with real-time alerts if required). Monitors are to be installed at locations representative of highest potential impacts. Such locations may fall within private land and therefore the final location(s) are to be determined based on suitability and permission to access private land.

In addition to the above, all noise monitoring is to be conducted in accordance with the Construction Noise and Vibration Monitoring Program.

7.2.3 Operator-Attended Plant and Equipment Noise Audits

Internal compliance auditing of plant and equipment noise emissions would be undertaken via operator-attended measurements of a representative selection of plant and equipment used on-site to confirm that the operating noise levels comply with the sound power levels in **Table 14**.

In line with recent Transport projects, it is sensible to first target plant and equipment that appear to be noisier than expected and those assumed to have a noise level of 105 dBA or greater, when measured over a 15-minute period, using the L_{eq} descriptor.

During the measurements, it is also recommended to capture the range of maximum noise levels L_{max} and compare its arithmetic average against the L_{eq}. This difference can be compared and verified against the assumed 8 dB increase from L_{eq} to L_{max} for typical maximum noise level events.

7.2.4 Ground-Borne Vibration Additional Mitigation Measures

Relevant ground-borne vibration AMMs are presented in **Table 25**.

Table 25 AMM Matrix - Ground-Borne Vibration

Construction hours	Receiver perception	Trigger	Additional management measures
Standard Hours Monday to Friday 7.00 am to 6.00 pm Saturday 8.00 am to 6.00 pm	Human disturbance (Human Response)	Within relevant minimum working distance	PN, V, RO
	Building Damage (Cosmetic Damage)	Within relevant minimum working distance	V, AC

As determined in **Section 6.3**, works are likely to take place within minimum working distances for both cosmetic damage and human response. Ground-borne vibration AMMs may be applied as follows:

- Human Response
  - Periodic Notification (PN) - adequately addressed via CCS.
  - Verification Monitoring (V) - to be conducted with consideration of CoA C9.
  - Respite Offer (RO) - Not relevant. Only applicable for residential receivers. Only commercial receivers triggered.
- Cosmetic Damage
  - Verification Monitoring (V) - to be conducted with consideration of CoA C9 and D34.
    - Vibration monitoring at the nearest worst affected locations is to take place. Where any vibration intensive works are to take place within minimum working distances, risk of cosmetic damage to buildings will be assessed through vibration monitoring.
    - Minimum working distances must also be established for heritage items in accordance with CoA D34.
  - Alternative Construction Methodology (AC) - where vibration levels outlined in **Table 11** and **Table 12** are exceeded, works must cease and alternative construction methods must be adopted.
  - In addition to the abovementioned AMMs, where works may lead to damage to heritage items, Vibration testing must be undertaken before and during vibration generating activities to identify minimum working distances and prevent cosmetic damage.

All vibration monitoring is to be conducted in accordance with the Construction Noise and Vibration Monitoring Program.

Advice should be sought from the Heritage Consultant nominated under Condition D10 on methods and locations for installing equipment used for vibration, movement and noise monitoring at heritage-listed structures.

The following works methods may be adopted during Eddy Plaza Foundation and Civil Works to mitigate vibration impacts:

- Use of 100 kg Jumping Jack in risk areas, i.e. in proximity to heritage items.
- Use of a 1 t Smooth-Drum Roller instead of the proposed 10 t Smooth-Drum Roller. Note, minimum working distances are still applicable for the 1 t roller as per **Table 21**, where works within these distances should be accompanied by attended vibration monitoring or conducted following a vibration trial.
- Operation of the 10 t Smooth-Drum Roller with no vibration (static mode).
- Non-vibratory demolition methods to substitute use of excavator with hammer.

7.3 Complaints Handling

Complaints will be handled by the Contractor in accordance with the following:

- The Contractor will be responsible for responding to complaints and enquiries received regarding the Project, with support from Transport.
- All complaints and enquiries will be recorded in Transport's Consultation Manager database and will be updated in the Project's Complaints Register.
- The Project's Complaints Register will be available to the Project's ER, noting that any personal details of complainants will not be provided to the ER unless otherwise agreed to or requested by the complainant.
- Complaints will be communicated to Transport and the ER within 24 hours or the next working day.
- In accordance with CoA B9, the Complaints Register will be provided to the Planning Secretary upon request, within the timeframe stated in the request.
- Complaints Handling is further detailed in the *Sydney Terminal Building Revitalisation Project Stage 1 Community Communication Strategy* prepared by the Contractor, dated 16 May 2025.

8 Conclusion

A Construction Noise and Vibration Management Plan for works associated with Stage 1 of STBRP has been completed by VMS Australia Pty Ltd.

Considering worst-case construction scenarios, the assessment concludes the following:

- Noise impacts associated with construction airborne noise from site works are predicted to exceed NMLs at residential and/or commercial receivers during all proposed Standard and OOH works.
- Verification monitoring is triggered during S4 and S6 at the below non-residential receivers. Verification monitoring is to take place during the commencement of worst-case Colonnade works, this being works involving the use of either or both demo saws and hammers which are indicated to control noise impacts. Monitoring requirements are further detailed in the Construction Noise and Vibration Monitoring Program.
    - Colonnade Commercial Receivers
    - Belmore Park

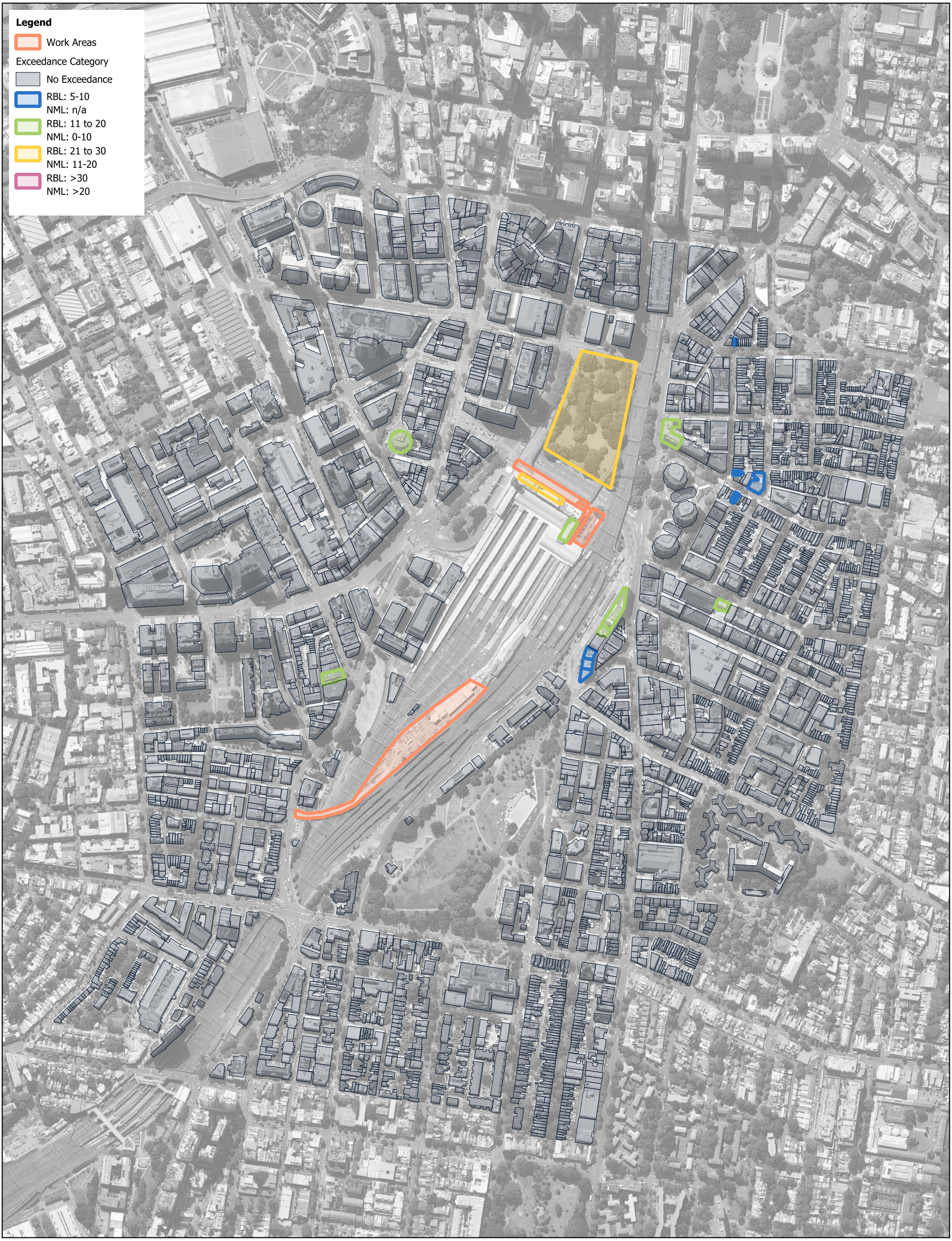
- Remaining Noise impacts can be adequately addressed in accordance with the CNVG with the application of Periodic Notifications. These requirements are met with the implementation of the CCS.
- Construction vibration management levels may be exceeded during the operation of the following vibration intensive equipment:
  - 40 kg Air Breaker
  - 500 kg DPU Compactor
  - 18 t Excavator with Hammer
  - 10 t Smooth-Drum Roller
  - 1 t Smooth-Drum Roller
- Where the above works take place within the minimum working distances outlined in **Table 21** (likely when operating in Eddy Plaza), mitigation measures as outlined in **Section 7.2.4** are to be applied.
- Worst-case Standard Hours and OOH Period 2 impacts are illustrated in **Appendix B** and **Appendix C**, respectively.

Glossary of Noise and Vibration Terminology

Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Power	Sound Power is the rate at which sound energy is emitted, reflected, transmitted, or received, per unit time. Unlike sound pressure, sound power is neither room-dependent nor distance-dependent.
Sound Pressure Level (SPL)	The sound level is the sound pressure relative to a standard reference pressure of 20µPa ($20x10^{-6}$ Pascals) on a decibel scale.
Sound Power Level (SWL)	The Sound Power Level is the sound power relative to a standard reference pressure of 1pW ($20x10^{-12}$ Watts) on a decibel scale. The SWL of a simple point source may be used to calculate the SPL at a given distance (r) using the following formula: $SPL = SWL - 10 \times Log_{10}(4 \times \pi \times r^2)$ Note that the above formula is only valid for sound propagation in the free-field (see below).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1/s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20µPa.
A-weighting (dBA)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
$L_{eq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level during the period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. L_{90} can be considered to be the "average minimum" noise level and is often used to describe the background noise.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m.
Fast/Slow Time Weighting	Averaging times used in sound level meters.
Octave Band	A range of frequencies whose upper limit is twice the frequency of the lower limit.
$D_{nT,w}$	The single number quantity that characterises airborne sound insulation between rooms over a range of frequencies.
R_w	Single number quantity that characterises the airborne sound insulating properties of a material or building element over a range of frequencies.
Reverberation	The persistence of sound in a space after a sound source has been stopped.
PPV	The particles of a medium are displaced from their random motion in the presence of a vibration wave. The greatest instantaneous velocity of a particle during this displacement is called the Peak Particle Velocity (PPV) and is typically measured in the units of mm/s.
Hertz (Hz)	The unit of Frequency (or Pitch) of a sound or vibration. One hertz equals one cycle per second. 1 kHz = 1000 Hz, 2 kHz = 2000 Hz, etc.
Acceleration	Acceleration is defined as the rate of change of Velocity of a particle over a period of time and is typically measured in the units of m/sec^2.
Vibration Dose Value (VDV)	When assessing intermittent vibration, it is necessary to use the vibration dose value (VDV), a cumulative measurement of the vibration level received over an 8-hour or 16-hour period. The VDV formulae uses the RMS Acceleration raised to the fourth power and is known as the Root-mean-quad method. This technique ensures the VDV is more sensitive to the peaks in the acceleration levels. VDVs are typically measured in the units of $m/s^{1.75}$.

Appendix B

Impact Map - Worst-Case Standard Hours



Project No.:	24265.1
Date:	28/07/2025
Drawn by:	JM
Scale:	1:6,000
Sheet Size:	@A4

0 100 200 m

Sydney Terminal Building Revitalisation Project - Stage 1

CNVIS Additional Mitigation Measures

Assessment Scenario: Worst-Case Day

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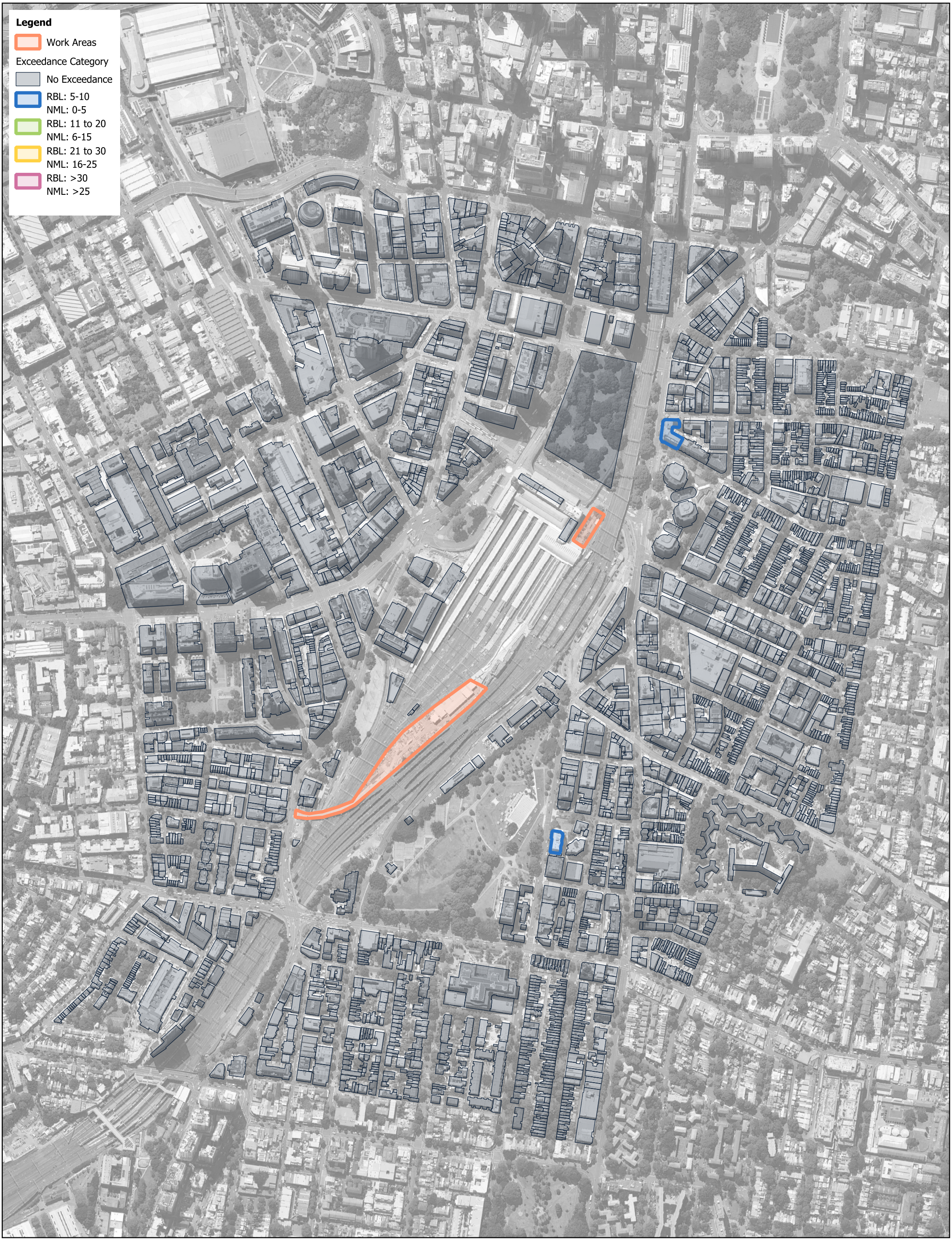
Appendix C

Impact Map - Worst-Case OOH Period 2



Project No.:	24265.1
Date:	28/07/2025
Drawn by:	JM
Scale:	1:6,000
Sheet Size:	@A4

0 100 200 m

Sydney Terminal Building Revitalisation Project - Stage 1

CNVIS Additional Mitigation Measures

Assessment Scenario: Worst-Case Night

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Appendix D

Noise Impacts

Building ID	Address	Usage	NCA	Predicted Noise Levels Where Construction RBLs or NMLs are Exceeded and AMM Category (dBA)																							
				RBL: 5-10 NML: n/a NML OOH: 0-5						RBL: 11 to 20 NML: 0-10 NML OOH: 6-15						RBL: 21 to 30 NML: 11-20 NML OOH: 16-25						RBL: >30 NML: >20 NML OOH: >25					
				S1	S2	S3	S4	S5	S6	S1	S2	S3	S4	S5	S6	S1	S2	S3	S4	S5	S6	S1	S2	S3	S4	S5	S6
354	CLARION 22/38 CHALMERS ST, SURRY HILLS 2010	RES	NCA03	59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
355	CLARION 26/38 CHALMERS ST, SURRY HILLS 2010	RES	NCA03	61	-	-	-	60	59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
402	EXCELSIOR 1109/242-254 ELIZABETH ST, SURRY HILLS 2010	RES	NCA03	-	54	62	-	-	-	66	-	-	64	64	66	-	-	-	-	-	-	-	-	-	-	-	-
454	10/17 RANDLE ST, SURRY HILLS 2010	RES	NCA03	59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
541	3/35-37 ALBION ST, SURRY HILLS 2010	RES	NCA04	-	-	-	56	-	56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
543	SALVATION ARMY 56-58 ALBION ST, SURRY HILLS 2010	RES	NCA04	59	-	58	57	60	59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
778	88 CAMPBELL ST, SURRY HILLS 2010	RES	NCA04	-	-	-	56	-	56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
817	PRINCES GARDENS 27/156-164 CHALMERS ST, SURRY HILLS 2010	RES	NCA04	-	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1347	60 MARY ST, SURRY HILLS 2010	RES	NCA04	56	-	56	-	57	56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9999	BELMORE PARK	PRC	NCA02	-	-	-	-	-	-	64	-	66	-	67	-	-	-	-	74	-	75	-	-	-	-	-	-
64	39-47 REGENT ST, CHIPPENDALE 2008	OED	NCA01	53	-	-	-	-	-	-	-	-	56	-	56	-	-	-	-	-	-	-	-	-	-	-	-
148	SHOP 4 LEVEL 187-189 THOMAS ST, HAYMARKET 2000	OED	NCA01	-	-	-	-	-	-	-	-	-	58	-	58	-	-	-	-	-	-	-	-	-	-	-	-
427	SHOP 5 17-51 FOVEAUX ST, SURRY HILLS 2010	OED	NCA03	-	-	-	53	-	-	56	-	56	-	57	58	-	-	-	-	-	-	-	-	-	-	-	-
356	DENTAL HOSPITAL 2-18 CHALMERS ST, SURRY HILLS 2010	COM	NCA03	-	-	-	-	-	-	72	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9997	Eddy Plaza West Commercial Receivers	COM	NCA02	-	-	66	-	-	66	77	-	-	-	72	-	-	-	-	-	-	-	-	-	-	-	-	-
9998	Colonnade Commercial Receivers	COM	NCA02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	90	-	90	-	-	-	-	-	-