USYD A01 Ross Street Learning Hub

Construction Noise and Vibration Management Sub-Plan

Project No.	P03294
Revision	003
Issued	03 September 2026
Client	USYD

Issue and Revision Record

Revision	Date	Comments	Engineer	Reviewer
001	04.08.2026	Issued for Information	OK	TA
002	17.08.2026	Issued for Information	OK	TN
003	03.09.2026	Issued for Information	OK	TN
004				

Information has been based on our understanding of the documented project within the information provided.

The project design and construction team are required to review and consider the implications of these recommendations on their design for the project. The design team shall coordinate with any specific condensation, acoustic, wind, structural, safety, constructability, maintenance or architectural design requirement for this particular project.

E-LAB Consulting

e-lab.com.au

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We recognise the Traditional Custodians of the land on which the proposed development will be constructed. We respect their enduring cultural and spiritual connections to the land and waters, and celebrate their knowledge, kinship, and values. We acknowledge that these connections to the land and waters have existed for millennia and will continue into the future. We respect the Elders who have gone before, together with those of today for their guidance on our shared journey. We recognise that we are, and always will be, on Aboriginal land.

1. Introduction

This Construction Noise and Vibration Management Plan has been prepared for the new USYD A01 Ross Street Learning Hub. The approved development includes the construction of a new 5-storey teaching and learning building and ancillary works under SSD-57838709.

This Construction Noise and Vibration Management Plan provides:

- Identification of nearby noise sensitive receivers
- Determination of applicable guidelines and criteria for the noise and vibration generated during demolition
- A quantitative assessment of the airborne and ground-borne noise generated by the work for the proposed development and its impact on nearby receivers
- Strategies to mitigate the noise and vibration generated during the proposed stages of work
- Complaints handling and community liaison procedures

This report has been prepared with the following references:

- SSDA – Noise and Vibration Impact Assessment (NVIA), prepared by Acoustic Logic dated 3rd September 2024.
- Schedule of Draft Conditions and Responsibility Matrix for SSD-57838709 dated 10th November 2025
- FDC Tender Program – Rev B dated 28th May 2026.
- Construction Noise Strategy, Transport for NSW, 2013
- Interim Construction Noise Guideline (ICNG), NSW DECC, 2009
- Noise Policy for Industry (NPI), NSW EPA, 2017
- Assessing Vibration: A Technical Guideline, NSW DEC, 2006
- AS 2436:2010 Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites
- British Standard BS 5228: Part 1:1997 Noise and Vibration Control on Construction and Open Sites
- British Standard BS 7358:1993 Evaluation and Measurement for Vibration in Buildings – Part 2: Guide to Damage Levels from Ground-borne Vibration
- German Standard DIN 4150-Part 3 Structural vibration in buildings – Effects on structures

1.1 Development Consent

This report has been prepared to address condition B12 of the draft development consent, as provided in Table 1.

Table 1: Condition B12

Condition	Description	Section in Report
B12	***B12. The Construction Noise and Vibration Management Sub-Plan must address, but not be limited to, the following:***	
	(a) be prepared by a suitably qualified and experienced noise expert;	Section 1
	(b) describe procedures for achieving the noise management levels in EPA's Interim Construction Noise Guideline (DECC, 2009);	Section 7
	(c) describe the measures to be implemented to manage high noise generating works such as piling, in close proximity to sensitive receivers;	Section 7
	(d) include strategies that have been developed with the community for managing high noise generating works;	Section 7.3
	(e) include a complaints management system that would be implemented for the duration of the construction; and	Section 7.3
	(f) include a program to monitor and report on the impacts and environmental performance of the development and the effectiveness of the implemented management measures in accordance with the requirements of condition B23	Section 7.4[1]

Note 1: A monitoring program has been provided in Section 7.4 to reduce construction noise and vibration impacts to surrounding sensitive receivers. Note that Condition B23 refer to operational plant noise and is not relevant to construction noise and vibration, and has not been addressed in this CNVMSP.

1.2 Qualifications

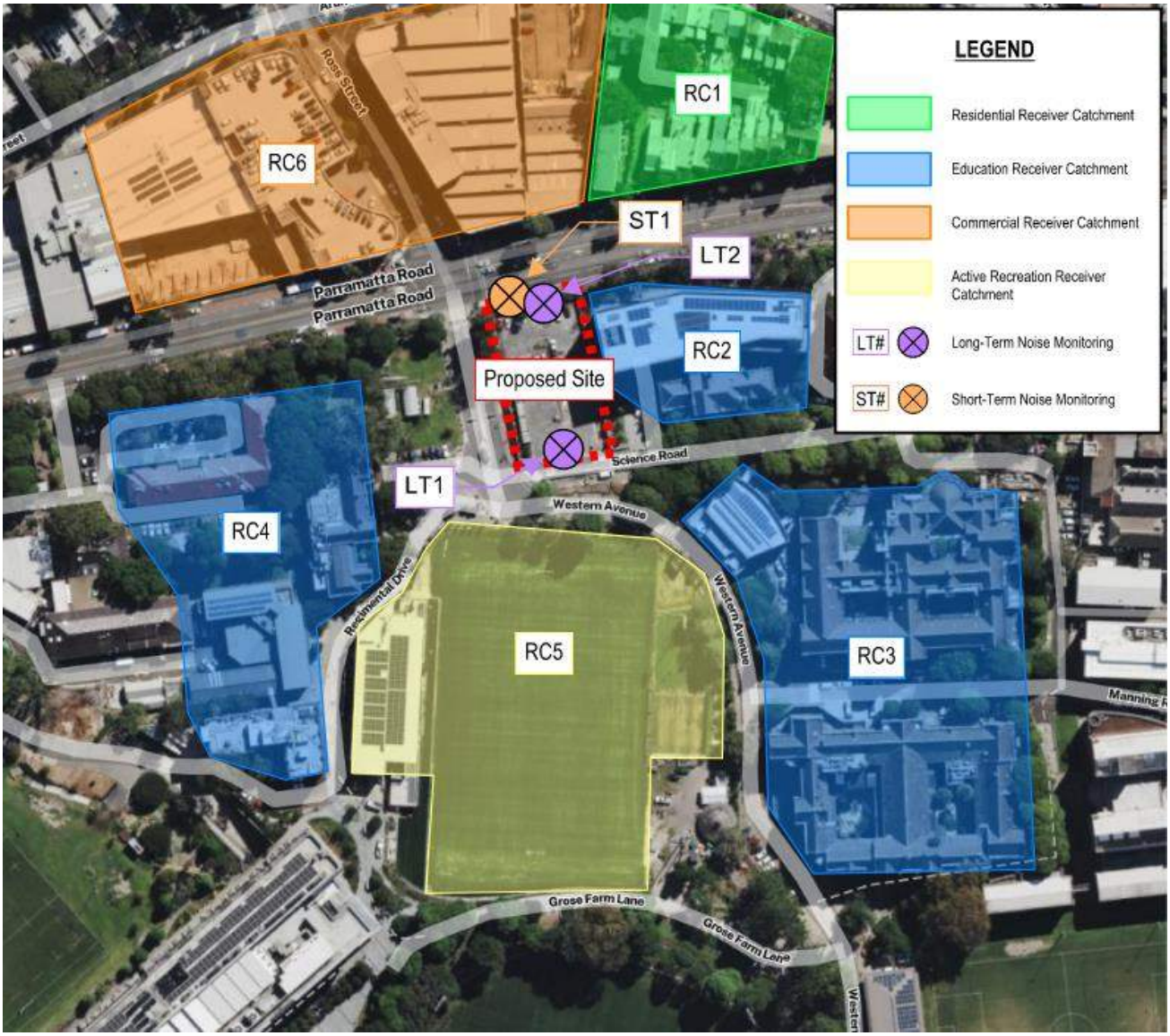
This Construction Noise and Vibration Management Sub Plan (CNVMSP) has been prepared by Teresa D Nguyen of E-LAB Consulting, a suitably qualified and experienced acoustics and vibration consultant. Teresa holds a Bachelor of Mechanical Engineering and has 11 years of experience in Acoustics. She is a member of the Australian Acoustical Society (AAS).

2. Project Description

2.1 Site Description

For the purposes of this construction noise and vibration management plan, the site location and surrounding noise and vibration sensitive receivers are shown below in Figure 1.

Figure 1: Site Map identifying sensitive receivers and monitoring locations



See below in Table 2 for the description of the nearest noise-sensitive receivers.

Table 2: Sensitive receivers (external)

Receiver	Land Use	Description
RC1	Residential	Collection of low-rise residential buildings to the north-east of the site across from Paramatta Road.
RC2	Educational	Existing educational receivers immediately east of the project site.
RC3		Existing educational receivers to the south-east of the project site.
RC4		Existing educational receivers to the south-west of the project site.
RC5	Active Recreation	University Oval 2 and associated grandstand to the south of the site.
RC6	Commercial	Grouping of existing commercial developments north of the site across from Paramatta Road.

2.2 APPROVED HOURS OF WORK

For the purpose of this assessment, we have assumed that all works are to be conducted in-line with the Draft Development Consent for SSD-57838709 approved construction hours. See Condition C4 and C5 pertaining to typical construction hours as outlined below in Table 3:

Table 3: Approved hours of work

Day of the Week	Approved Hours of Work
Mondays to Fridays	7:00am to 6:00pm
Saturdays	8:00am to 1:00pm
Sundays, Public Holidays	No work permitted

See Condition C7 pertaining to construction hours for noisy works such as; rock breaking, rock hammering, sheet piling, pile driving and similar activities as outlined below in Table 4.

Table 4: Approved hours of work for noisy works

Day of the Week	Approved Hours of Work
Mondays to Fridays	9:00am to 12:00pm & 2:00pm to 5:00pm
Saturdays	9:00am to 12:00pm
Sundays, Public Holidays	No work permitted

3. Background and Ambient Noise Monitoring

Long-term noise monitoring was undertaken as part of the SSDA Noise and Vibration Impact Assessment prepared by Acoustic Logic. Monitoring was undertaken on 23rd October 2024. Monitoring location can be seen in the site map in Figure 1. The noise survey results have been provided below in Table 5 for reference.

Table 5: Summary of long-term background noise monitoring

Location	RBL – Day (7am to 10pm) - dB(A)
LT1 – Demountable village roof south, close to Science Road.	53
LT2 – Demountable village roof north, facing Paramatta Road	62

Further to this, short-term ambient noise monitoring was also undertaken as part of the SSDA Noise and Vibration Impact Assessment prepared by Acoustic Logic. The attended ambient noise results have been provided below in Table 6 for reference.

Table 6: Summary of short-term background noise monitoring

Location	Measured Ambient Noise Level dB(A) $L_{eq(15min)}$
ST1 – Paramatta Road, 3m from kerb	75

4. Project Noise & Vibration Criteria

4.1 Construction Noise Criteria

Airborne Noise – Residential Receivers

The airborne noise criteria for surrounding residential receivers have been extracted from Table 2 in the ICNG and is presented in Table 7 below.

Table 7: NSW ICNG construction noise criteria for surrounding residential receivers

Time of Day	Management Level $L_{Aeq,15min}$	How to apply
Recommended Standard Hours: Monday – Friday 7am – 6pm Saturday 8am – 1pm No work on Sundays or public holidays	Noise Affected RBL + 10dB	The noise-affected level represents the point above which there may be some community reaction to noise. ▪ Where the predicted or measured $L_{Aeq,15min}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. ▪ The proponent should also inform all potentially impacted residences of the nature of works to be carried out, the expected noise levels and duration as well as contact details.
	Highly Noise Affected 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. ▪ Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur in, taking into account: – Times identified by the community when they are less sensitive to noise (such as before and after school, for works near schools, or mid-morning or mid-afternoon for works near residences) – If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside Recommended Standard Hours	Noise Affected RBL + 5dB	▪ The proponent should apply all feasible and reasonable work practices to meet the noise affected level. ▪ Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community. ▪ For guidance on negotiating agreements see section 7.2.2 (of ICNG).

The airborne noise criteria for surrounding educational receivers have been extracted from Table 3 in the ICNG as well as the airborne noise criteria for commercial premises and is presented in Table 8 below.

Table 8: Noise at Educational institutions

Land Use	Management Level, $L_{Aeq,15min}$
Classrooms at schools and other educational institutions	Internal noise level - 45 dB(A)
Active Recreation areas (characterised by sporting activities and activities which generate their own noise or	External noise level - 65 dB(A)

focus for participants, making them less sensitive to external noise intrusion)	
Offices, retail outlets	External noise level - 70 dB(A)

Based on the above, the following noise management levels in Table 9 should be applied to the noise sensitive receivers identified in Figure 1.

Table 9: Project Specific Construction Noise Management Levels

Receiver	RBL dB(A) L_{90}	Noise management level dB(A) L_{Aeq}	Highly Noise Affected Level dB(A) L_{Aeq}
RC1	62	62 dB(A) + 10 dB = 72 dB(A)	75 dB(A)
RC2, RC3, RC4	-	**Teaching Spaces** 45 (internal) [1] 55 (external with operable windows) [2,3] **Non-Teaching Spaces (Offices, Admin, Reception, Lobby/Foyer, etc)** 70 (external)	N/A
RC5	-	65 dB(A)	N/A
RC6	-	70 dB(A)	N/A

Note 1: We note that the ICNG provides specific noise management levels for classrooms within schools, which would only be applicable to teaching spaces within USYD. For other uses such as offices or common areas, a 70dB(A) noise management level as per the ICNG is applied.

Note 2: A conservative estimate of the difference between internal and external noise levels is 10 dB for buildings other than residences.

Note 3: For the FASS Lecture Theatre with no windows we have taken a conservative 30 dB reduction across the solid structural façade.

Further to the above, the following noise management levels in Table 10 should be applied to the residential noise sensitive receivers identified in Figure 1 for outside of recommended hours works. The noise management levels developed within Table 9 still apply for non-residential receivers. Noting that outside of recommended hours works are subject to approval from the Planning Secretary as per Draft Development Consent Condition C5.

Table 10: Outside of Recommended Hours for Residential Receivers

Receiver	RBL dB(A) L_{90}	Noise management level dB(A) L_{Aeq}	Highly Noise Affected Level dB(A) L_{Aeq}
RC1	62	62 dB(A) + 5 dB = 67 dB(A)	75 dB(A)

4.2 Construction Vibration Criteria

4.2.1 Human Comfort

The office of Environmental Protection Authority (EPA) developed a document, “Assessing vibration: A technical guideline” in February 2006 to assist in preventing people from exposure to excessive vibration levels from construction and operation of a development within buildings. The guideline does not however address vibration

induced damage to structures or structure-borne noise effects. Vibration and its associated effects are usually classified as continuous, impulsive or intermittent.

4.2.1.1 Continuous and Impulsive Vibration

Structural vibration in buildings can be detected by occupants and can affect them in many ways including reducing their quality of life and also their working efficiency. Complaint levels from occupants of buildings subject to vibration depend upon their use of the building and the time of the day.

Maximum allowable magnitudes of building vibration with respect to human response are shown in Table 11. It should be noted that the human comfort for vibration is more stringent than the building damage criteria.

Table 11: Preferred and maximum weighted RMS values for continuous and impulsive vibration acceleration (m/s^2) 1-80 Hz

Location	Assessment period[1]	Preferred values		Maximum values	
		z-axis	x- and y-axes	z-axis	x- and y-axes
Continuous vibration					
Residences	Daytime	0.010	0.0071	0.020	0.014
	Nigh time	0.007	0.005	0.014	0.010
Offices, schools, educational institutions and places of worship	Day- or night time	0.020	0.014	0.040	0.028
Workshops	Day- or night time	0.04	0.029	0.080	0.058
Impulsive vibration					
Residences	Daytime	0.30	0.21	0.60	0.42
	Night time	0.10	0.071	0.20	0.14
Offices, schools, educational institutions and places of worship	Day- or night time	0.64	0.46	1.28	0.92
Workshops	Day- or night time	0.64	0.46	1.28	0.92

Note 1: Daytime is 7:00am to 10:00pm and night time is 10:00pm to 7:00am

4.2.1.2 Intermittent Vibration Criteria

Disturbance caused by vibration will depend on its duration and its magnitude. This methodology of assessing intermittent vibration levels involves the calculation of a parameter called the Vibration Dose Value (VDV) which is used to evaluate the cumulative effects of intermittent vibration, as shown in Table 12. Various studies support the fact that VDV assessment methods are far more accurate in assessing the level of disturbance than methods which is only based on the vibration magnitude.

Table 12: Acceptable vibration dose values for intermittent vibration ($m/s^{1.75}$)

Location	Daytime[1]		Nighttime[1]	
	Preferred value	Maximum value	Preferred value	Maximum value
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80

Workshops	0.80	1.60	0.80	1.60

Note 1: Daytime is 7:00am to 10:00pm and night time is 10:00pm to 7:00am

4.2.2 Cosmetic Damage

Structural vibration thresholds are set to minimise the risk of cosmetic surface cracks and lie below the levels that have the potential to cause damage to the main structure. Table 13 presents guide values for building vibration, based on the vibration thresholds above which cosmetic damage has been demonstrated outlined within BS7385-Part 2:1993. These values are evaluated to give a minimum risk of vibration-induced damage, where minimal risk for a named effect is usually taken as 95% probability of no effect.

Table 13: Transient vibration guide values for cosmetic damage – BS 7385-2:1993

Type of Building	Peak Particle Velocity in frequency range of predominant pulse (PPV)	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures Industrial or light commercial type buildings	50mm/s	N/A
Unreinforced or light framed structures Residential or light commercial type buildings	15mm/s	20mm/s (50mm/s at 40Hz and above)

4.2.3 Structural Damage

Ground vibration criteria is defined in terms of the levels of vibration emission from the construction activities which will avoid the risk of damaging surrounding buildings or structures. It should be noted that human comfort criteria are normally expressed in terms of acceleration whereas structural damage criteria are normally expressed in terms of velocity.

Most specified structural vibration levels are defined to minimise the risk of cosmetic surface cracks and are set below the levels that have the potential to cause damage to the main structure. Structural damage criteria are presented in German Standard DIN4150-Part 3 "Structural vibration in buildings – Effects on structures" and British Standard BS7385-Part 2: 1993 "Evaluation and Measurement for Vibration in Buildings". Table 14 indicates the vibration limits presented in DIN4150-Part 3 to ensure structural damage doesn't occur.

Table 14: Guideline value of vibration velocity, vi, for evaluating the effects of short-term vibration – DIN4150-3

Line	Type of Structure	Vibration velocity, v_i, in mm/s			
		Foundation			Plane of floor of uppermost full storey
		At a frequency of			
		Less than 10Hz	10 to 50Hz	50 to 100Hz*	All Frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
3	Structures that, because of their particular sensitivity to vibration, do not	3	3 to 8	8 to 10	8

		correspond to those listed in lines 1 and 2 and are of great intrinsic value (e.g. buildings that are under a preservation order)	

*For frequencies above 100Hz, at least the values specified in this column shall be applied

5. Construction Noise Assessment

5.1 EXPECTED CONSTRUCTION EQUIPMENT

The noise sources likely to be associated with the works listed are presented in Table 15, based on FDC's Tender Program – Rev B dated 28th May 2026. The equipment noise levels have been extracted from AS2436:2010 "Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites" and the "Construction Noise Strategy, Transport for NSW, 2013".

These equipment noise levels are provided as sound power levels (in-line with the documents referenced above) and are the estimated sound power emitted by the equipment, which differs to the sound pressure level rated for equipment at a particular distance.

Table 15: Construction Equipment Noise Levels

Stages	Equipment	Sound Power Level - dB(A)	Usage in 15-minute period (mins)	Time corrected sound power level - dB(A) $L_{Aeq, 15min}$
Demolition	Power Tools	102	7.5	99
	Jackhammer	113	3	106
	Bobcat	107	10.5	105
	Excavators 32 tonne (up to 65 tonne)	110	6	106
	General Truck	108	6	104
Bulk Excavation & Piling	CFA Piling Rig	104	10.5	102
	Bobcat	107	10.5	105
	Excavators 32 tonne (up to 65 tonne)	110	6	106
	Excavator breaker	115	6	111
	Power Tools (Rattle Gun)	104	7.5	101
	General Truck	108	6	104
	Tower Crane	105	10.5	103
Structural & Façade Works	Power Tools	102	7.5	99
	Concrete pump	109	7.5	106
	Concrete Truck	108	7.5	105
	Mobile crane	110	2.4	102
	Generator	104	3	97
	General Truck	108	6	104
	Tower Crane	105	10.5	103

5.2 NOISE MODELLING AND ASSUMPTIONS

In order to assess the noise impact from the site during the demolition stage, a desktop noise model was prepared using commercial software SoundPLAN v9.0. The noise model represents the 'reasonable' worst case periods of construction activities, meaning that all the equipment of each stage is operating simultaneously during a 15-minute observation period.

The assumptions that were made within the assessment include the following:

- The predicted noise levels represent the worst-case scenario for each receiver
- The predicted noise levels at the receivers have been assessed at a height of 1.5m above ground level in accordance with the assessment procedures of the ICNG.
- The predicted noise levels at the nearby sensitive receivers have been assessed with the noise mitigation measures provided in Section 7.1 which have been implemented.
- The noise levels have been assessed using neutral weather conditions.

5.3 PREDICTED NOISE LEVELS

The predicted noise levels have been presented in the below tables and have been assessed to the construction noise criteria established in Section 4.1, based on the movement of construction equipment around the project site. Construction noise contour maps are also provided in Appendix A.

Table 16: Predicted noise levels – Demolition works

ID	Receiver Type	Predicted Noise Level Range, LAeq,15min dB(A)	Noise Management Level LAeq,15min dB(A)	Noise Management Level Exceedance, dB	Exceeds Highly Noise Affected Level (YES/NO)
RC1	Residential	66	72	-	NO
RC2	Educational Offices	74	55 70	Up to 19 Up to 4	N/A
RC3	Educational	66	55 70	Up to 11 -	N/A
RC4	Educational	66	55 70	Up to 11 -	N/A
RC5	Active Recreation	67	65	Up to 2	N/A
RC6	Commercial	68	70	-	N/A

Table 17: Predicted noise levels – Bulk Excavation & Piling works

ID	Receiver Type	Predicted Noise Level Range, LAeq,15min dB(A)	Noise Management Level LAeq,15min dB(A)	Noise Management Level Exceedance, dB	Exceeds Highly Noise Affected Level (YES/NO)
RC1	Residential	68	72	-	NO
RC2	Educational Offices	75	55 70	Up to 20 Up to 5	N/A
RC3	Educational Offices	70	55 70	Up to 15 -	N/A
RC4	Educational Offices	68	55 70	Up to 13 -	N/A
RC5	Active Recreation	69	65	Up to 4	N/A
RC6	Commercial	70	70	-	N/A

Table 18: Predicted noise levels – Structural & Façade works

ID	Receiver Type	Predicted Noise Level Range, LAeq,15min dB(A)	Noise Management Level LAeq,15min dB(A)	Noise Management Level Exceedance, dB	Exceeds Highly Noise Affected Level (YES/NO)
RC1	Residential	67	72	-	NO
RC2	Educational Offices	74	55 70	Up to 19 Up to 4	N/A
RC3	Educational Offices	68	55 70	Up to 13 -	N/A
RC4	Educational Offices	66	55 70	Up to 11 -	N/A
RC5	Active Recreation	68	65	Up to 3	N/A
RC6	Commercial	68	70	-	N/A

6. Construction Vibration Assessment

Activities and machinery that are considered vibration intensive during the proposed demolition works include the following:

- Excavator mounted hammering during bulk-excavation
- Jackhammers

Safe working distances for vibration intensive plant and are quoted for both "cosmetic" damage (in accordance with BS 7385) and human comfort (in accordance with Assessing Vibration – a technical guideline), have been provided, based on the Transport for NSW's "Construction Noise Strategy (2013)". The recommended safe working distances for each of the plant listed above are provided in Table 19.

Table 19: Recommended safe working distances for vibration intensive plant

Activity	Safe Working Distance (metres)	
	Cosmetic Damage (BS 7385)	Human Response (OH&E Vibration Guideline)
Excavator Mounted Hydraulic Hammer (5 to 12 tonne)	2m	7m
Excavator Mounted Hydraulic Hammer (12 to 18 tonne)	7m	23m
Excavator Mounted Hydraulic Hammer (18 to 34 tonne)	22m	73m
Vibratory Roller (7 to 13 tonne)	15m	100m
Jackhammer	1m (nominal)	Avoid contact with structure

The approximate distances between sensitive receivers (as identified in Figure 1) to the project boundary where vibration intensive plant may be used during construction is provided in Table 20.

Table 20: Receiver distances from construction works

Receiver ID	Minimum distance from construction works
RC1	40m
RC2	Within 10m
RC3	40m
RC4	50m
RC5	20m
RC6	30m

We understand that mechanical demolition will be undertaken using excavators. On this basis, demolition works are expected to occur within the minimum setback distances identified in Table 19, and vibration impacts on adjacent structures and building occupants are considered likely. However, actual vibration levels are difficult to predict and will depend on:

- Ground composition
- Any physical connections between adjoining structures
- Structural condition and age of adjacent buildings
- Depth and stiffness of existing foundations

Accordingly, vibration monitoring should be carried out at the commencement of works to verify the safe working distances. If measured levels remain within the vibration limits outlined in Section 4.2, demolition may proceed in conjunction with the mitigation measures detailed in this report. If exceedances occur, additional reasonable and feasible mitigation measures must be implemented, along with continued vibration monitoring. Measures to prevent cosmetic damage to surrounding structures are provided in Section 7.1.2.

7. Noise and Vibration Management

7.1 PROJECT SPECIFIC RECOMMENDATIONS

Project specific recommendations and required mitigation methods have been listed below within Section 7.1. For general noise and vibration mitigation and management measures, refer to Section 7.2 of this report.

7.1.1 Noise

Intermittent exceedances of construction noise management levels are unavoidable due to the proximity of receivers which overlook the project site. Notwithstanding, the following noise management strategies shall be implemented;

- The contractor to use best endeavours to minimise the amount of noise intensive works
- The contractor to be in continual consultation with USYD ahead of all noise intensive works, so giving the best chance for USYD to reschedule classes to alternative locations when possible
- Construction equipment/machinery shall be suitably selected based on optimal size and power to minimise equipment sound power levels and associated noise emissions.
- Bored piles have been proposed for the shoring wall and main building piles in lieu of driven piles, greatly reducing vibration generation.
- The use of standard A-class/B-Class hoarding of the following materials and construction will suffice to mitigate the impact of the highest predicted noise levels.
    - The hoarding should be impervious of gaps and cracks which would compromise its performance
    - It should be comprised of acoustically suitable materials such as 15 mm plywood
    - Be a minimum of 2.1 to 2.4m high surrounding the site.
- Material drop zones shall be located internally within the site, behind perimeter hoarding and to maximise distance to nearby noise sensitive receivers.
- All demolition activities shall be undertaken in accordance with the DA approved construction hours.
- All truck operators are required to adhere to the following to minimise road traffic noise:
    - Engine brakes shall not be used near residences and built-up areas.
    - Reversing should be minimised as much as possible to reduce noise from reversing alarms.
    - Trucks are not to idle when near residential receivers. As much as feasible, engines should be switched off when not in use.
    - Vehicles to be fitted with straps, as opposed to chains to minimise noise impacts where possible.
    - Where night-time works are required and approved, trucks shall use broadband reversing alarms.

7.1.2 Vibration

There may be exceedances of the human comfort criteria due to the proximity of works to nearby occupied spaces. Notwithstanding, the following vibration management strategies shall be implemented:

- Where feasible, physical links from the structure to adjoining buildings will be broken prior to vibration intensive works (i.e. through concrete saw or similar equipment to minimise vibration generation).
- Use of lower vibration generation items/small capacity plant where the structure permits.
- Break-up of slabs/asphalt and other materials into smaller pieces to minimise vibration generation at material drop zones. Where feasible, material to be broken down to less than 300mm pieces to minimize vibration and impact during material handling. This will reduce the weight to less than 70kg.
- Use of material hoist to prevent dropping of heavy materials over long distances.

7.2 GENERAL ACOUSTIC RECOMMENDATIONS FOR CONSTRUCTION

According to AS 2436 – 2010 "Guide to noise and vibration control on construction, demolition and maintenance sites" the following techniques could be applied to minimise the spread of noise and vibrations to the potential receivers.

7.2.1 Noise

If a process that generates significant noise levels cannot be avoided, the amount of noise reaching the receiver should be minimised. Two ways of achieving this are to either increase the distance between the noise source and the receiver or to introduce noise reduction measures such as screens. Practices that will reduce noise from the site include:

- Increasing the distance between noise sources and sensitive receivers.
- Reducing the line-of-sight noise transmission to residences or other sensitive land uses using temporary barriers (stockpiles, shipping containers and site office transportables can be effective barriers).
- Constructing barriers that are part of the project design early in the project to introduce the mitigation of site noise.
- Installing purpose-built noise barriers, acoustic sheds and enclosures.
- Where certain construction equipment or plant allows, introduce the use of silencing devices. This could involve; engine shrouding or equipment exhaust silencers for example.
- Ensure tools and machinery are correctly maintained to complete tasks efficiently.
- Shut off equipment when not in use.
- Drilling pilot holes prior to drilling larger holes.

Physical methods to reduce the transmission of noise between the site works and residences, or other sensitive land uses, are generally suited to works where there is longer-term exposure to the noise. A few of these methods have been introduced below.

7.2.1.1 Screening

On sites where distance is limited, screening of noise may be beneficial or even the only way to reduce construction noise impacts on the nearby receivers. Below, screening options for various situations have been introduced. Constructing and utilising these screening methods should be taken into account already during the planning stages.

Temporary buildings: One option to introduce screening is to position structures such as stores, storage piles, site offices and other temporary buildings between the noisiest part of the site and the nearest dwellings. Due to shielding provided by these buildings, some of the noise emission from the site can be reduced. If the buildings are occupied, however, sound insulation measures may be necessary to protect site workers inside the buildings.

Hoarding: Another way of implementing screening is to build hoarding that includes a site office on an elevated structure. This option offers superior noise reduction when compared with a standard, simple hoarding. The acoustic performance is further enhanced when the hoarding is a continuous barrier.

Equipment operating 24h: When it comes to water pumps, fans and other plant equipment that operate on a 24-hour basis, they may not be an irritating source of noise during the day but can be problematic at night. They should therefore be effectively screened by either situating them behind a noise barrier or by being positioned in a trench or a hollow in the ground. Again, generated reverberant noise must be minimised and adequate ventilation should be ensured.

General remarks:

In many cases, it is not practical to screen earthmoving operations effectively, but it may be possible to partially shield a construction plant at the early stages of the project with protective features required to screen traffic noise.

The usefulness of a noise barrier will depend upon its length, its height, its position relative to the source and the receiver, and the material of which it is made. A barrier designed to reduce noise from a moving source should extend beyond the last property to be protected by at least ten times the shortest distance from the said property

to the barrier. A barrier designed to reduce noise from a stationary source should, where possible, extend beyond the direct line of sight between the noise source and the receiver by a distance equal to ten times the effective barrier height, which is the height above the direct line between source and receiver.

If the works are already predominantly located within nominally closed structures, careful consideration should be given to reducing noise breakout at any openings.

7.2.1.2 Reversing and warning alarms

Community complaints often involve the intrusive noise of alarms commonly used to provide a safe system of work for vehicles operating on a site. Beeper reversing alarm noise is generally tonal and may cause annoyance at significant distances from the work site.

There are alternative warning alarms capable of providing a safe system of work that are equal to or better than the traditional "beeper", while also reducing environmental noise impacts. The following alternatives should be considered for use on construction sites as appropriate:

- Broadband audible alarms incorporating a wide range of sound frequencies (as opposed to the tonal-frequency 'beep') are less intrusive when heard in the neighbourhood.
- Variable-level alarms reduce the emitted noise levels by detecting the background noise level and adjusting the alarm level accordingly.
- Proximity alarms that use sensors to determine the distance from objects, such as people or structures, and generate an audible alarm in cabin for the driver.
- Spotters or observers.

The above methods should be combined, where appropriate.

7.2.2 Vibration

Vibration can be more difficult to control than noise, and there are few generalizations that can be made about its control. It should be kept in mind that vibration may cause disturbance by causing structures to vibrate and radiate noise in addition to perceptible movement. Impulsive vibration can, in some cases, provide a trigger mechanism that could result in the failure of building components that had previously been in a stable state.

During the demolition works and the erection of new structures, some vibrations (transmitted through the structure from the demolition sites) are expected, being more of a concern for the surrounding sensitive receivers. Vibrations can also trigger annoyance, which might get elevated into action by occupants of exposed buildings, and should therefore be included in the planning of communication with impacted communities.

It should be remembered that failures, sometimes catastrophic, can occur as a result of conditions not directly connected with the transmission of vibrations, e.g. the removal of supports from retaining structures to facilitate site access. BS 7385-2 provides more information on managing ground-borne vibration and its potential effects on buildings. Where site activities may affect existing structures, a thorough engineering appraisal should be made at the planning stage.

General principles of seeking minimal vibration at receiving structures should be followed in the first instance. Predictions of vibration levels likely to occur at sensitive receivers are recommended when they are relatively close, depending on the magnitude of the source of the vibration or the distance associated. Relatively simple prediction methods are available in textbooks, codes of practice and standards, however, it is preferable to assess site transmission and propagation characteristics between source and receiver locations through measurements.

Guidance for measures available for the mitigation of vibration transmitted can be sought in more detailed standards, such as BS 5228-2 or policy documents, such as the NSW DEC *Assessing Vibration: A technical guideline*. Identifying the strategy best suited to the control of vibration follows a similar approach to that of noise: avoidance, control at the source, control along the propagation path, control at the receiver, or a combination of these. It is noted that vibration sources can include stationary plants (pumps and compressors), portable plants (jackhammers and pavement vibrators), mobile plants, pile-drivers, tunnelling machines and activities, and blasting, amongst others. Unusual ground conditions, such as a high water-table, can also cause a difference to expected or predicted results, especially when considering the noise propagated from piling.

7.3 COMPLAINT HANDLING PROCEDURES AND STAKEHOLDER LIAISON

7.3.1 Stakeholder Consultation to be Undertaken

The contractor shall directly contact the stakeholders and adjacent noise sensitive receivers and provide them with the following information:

- The contact details for a nominated representative in order to make noise / vibration complaints
- Explain the timeframe for the construction works and the proposed activities, i.e. the proposed start / stop dates of work and a description of the noise producing equipment that will be used
- Notify the noise sensitive receivers and relevant local / state authority in a timely manner should there be any need for an extension to the proposed arrangements
- A specification notification protocol that reaches facilities managers and relevant faculty administrators ahead of high-impact activities so that staff and students in scheduled classes are notified in advance.
- Continual consultation with USYD ahead of all noise intensive works, so giving the best chance for USYD to reschedule classes to alternative locations when possible
- Provide them with a copy of this report as approved by the relevant local / state authority
- Provide real-time noise and vibration monitoring data feeds accessible to the site manager (and USYD if preferred) so corrective action can happen within the same period not just retrospective reporting
- Where noise is demonstrated as being compliant with criteria, this should not limit the proponent in undertaking further additional reasonable and feasible steps to reduce noise emissions.

7.3.2 Complaint Handling Procedures and Stakeholder Liaison

To assist in the management of noise and vibration complaints various procedures are to be followed. These include:

- Clearly visible signage identifying any key personnel along with their contact details to be erected along the perimeter of the building site including:
    - A 24-hour contact name, phone number and email address provided for the resident to address any complaint. The signage will declare; “For any enquiry, complaint or emergency relating to this site at any time please contact...”
- Relevant local / state authority should be notified of the nature and details of complaints received (time, complainant etc.) and what remedial action has taken place, if any
- Have a documented complaints process, including an escalation procedure so that if a complaint is not satisfied there is a clear path to follow
- Call back as soon as possible to keep people informed of action to be taken to address noise problems. Call back at night time only if requested by the complainant to avoid further disturbance
- Implement all feasible and reasonable measures to address the source of the complaint
- A register is to be kept by the contractor to keep a record of complaints and detail any information associated with them. The contents of the register will include:
    - The name and the address of the complainant
    - Time and date of the complaint
    - The nature of the complaint (Noise/Vibration)
    - Subsequent details
    - Remedial action undertaken

The contents of the register will be maintained and updated on a monthly basis with any new complaint without delay. The complaints will be reported to both the relevant local / state authority and the Contractor. The investigation of the complaint and any remedial actions will be performed by the builder and/or client representative on a monthly basis.

7.4 NOISE & VIBRATION MONITORING STRATEGY

7.4.1 General Methodology

Noise and vibration levels should be monitored from time to time to ensure that noise generated as a result of remediation and construction activities does not disturb local businesses and residents.

Monitoring may be in the form of regular checks by the builder or indirectly by an acoustic consultant engaged by the builder and in response to any noise or vibration complaints. Where noise and vibration criteria are being exceeded or in response to valid complaints, noise and / or vibration monitoring should be undertaken. This would be performed inside the premises of the affected property and on site adjacent to the affected receivers.

Monitoring is to be undertaken by an experienced noise and vibration monitoring professional or an acoustic consultant. The results of any noise or vibration monitoring are to be provided to the relevant party or person in a timely manner allowing the builder to address the issue and respond to the complaints.

Noise and vibration monitoring can take two forms:

- Short-term monitoring
- Long-term monitoring

Both of these approaches are elaborated below.

7.4.2 Short-term Monitoring

Short-term monitoring consists of attended monitoring when critical stages of the construction are occurring. This normally provides real-time assistance and guidance to the subcontractor on site, telling them when the noise and vibration criteria are exceeded. Thus, the selection of alternative methods on construction or equipment selection is allowed in order to minimise noise and vibration impacts.

7.4.3 Long-term Monitoring

Similarly to short-term monitoring, long-term monitoring provides real-time alerts to the builder / site manager when the noise and vibration criteria are exceeded. Instead of someone being on site measuring, noise and vibration loggers are used.

Typically, the noise and vibration loggers stay on site for a period of several months for the critical construction stages of the project, such as the demolition and excavation phases.

Both methodologies are complementary and normally used simultaneously providing a significant amount of data via the long-term monitoring but also providing information on the sources of noise and vibration generating exceedances via the short-term or attended monitoring.

7.4.4 Noise & Vibration Monitoring Program

Noise and vibration monitoring is to be carried out for the two nearest receiver within USYD being the Social Sciences Building (A02), specifically the SSB Lecture Theatre and the RD Watt Building. A noise monitor and vibration monitor is proposed to be installed on the external façade wall of the SSB lecture theatre nearest to the site. A noise monitor and vibration monitor is proposed to be installed externally to the RD Watt Building to minimise potential damage to the heritage aspects of the building.

The monitoring programme is to be carried out at the nominated receiver locations during the most noise / vibration intensive periods during each construction phase as agreed with the Acoustic Engineer, Head Contractor and University of Sydney.

Locations shall be discussed and agreed between the Acoustic Engineer, Contractor and the University prior to start of works and shall be reviewed regularly as construction works progress.

As construction vibration levels drop further away from the works zone, monitors will be rationalised where possible.

8. Conclusion

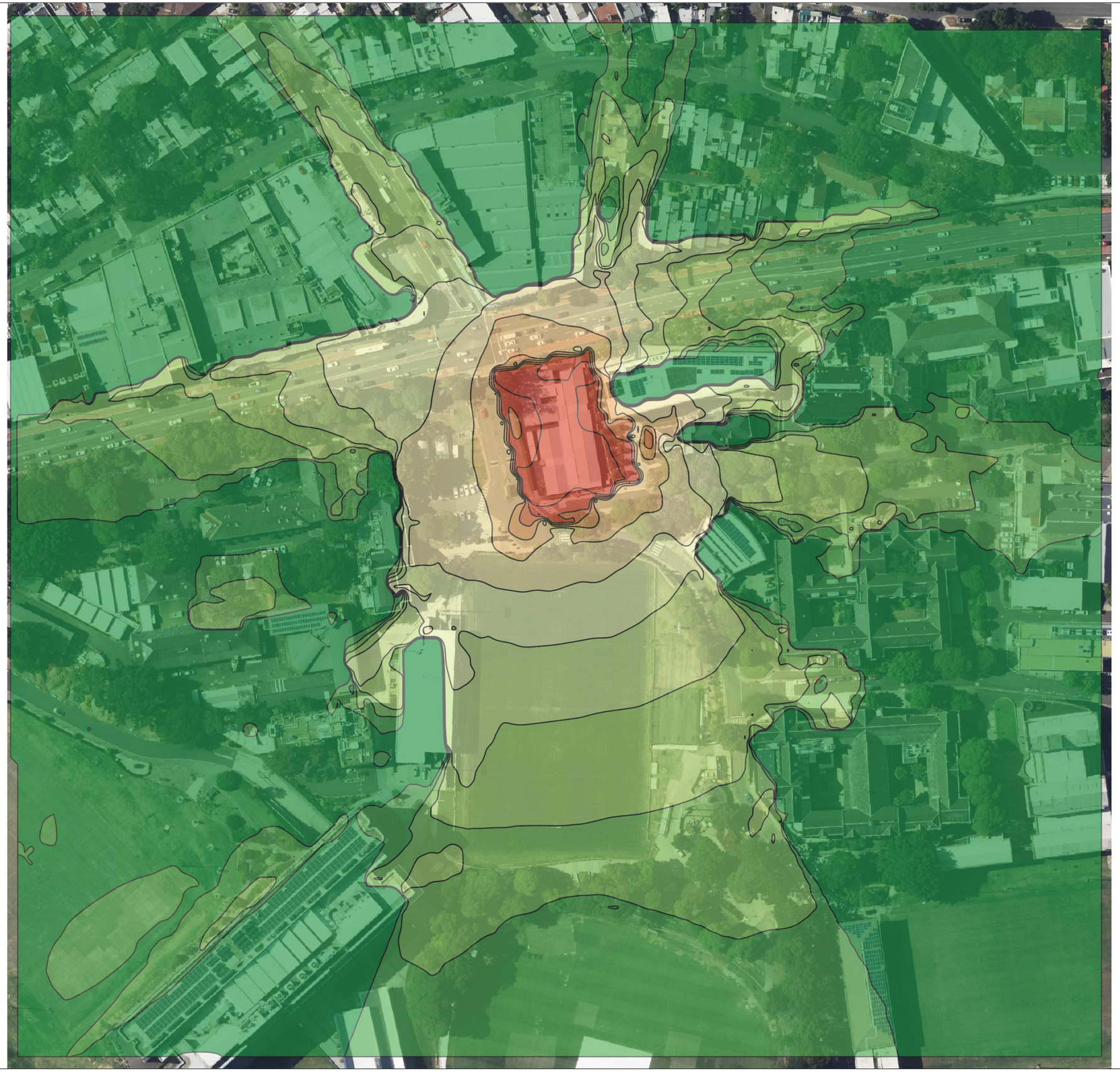
A Construction Noise and Vibration Management Plan has been provided for the works associated with the new USYD A01 Ross Street Education Building under SSD-57838709.

The details of the noise and vibration modelling and assessment undertaken to predict the impacts on sensitive receivers have been presented in Sections 5 and 6.

To reduce the noise and vibration impacts on the sensitive receivers, noise and vibration management strategies have been proposed in Section 7. Vibration monitoring strategies have been proposed to ensure the risk of exceeding vibration limits on sensitive equipment is minimised. Furthermore, the verification of safe working distances through attended noise measurements and/or long-term noise monitoring will ensure on-going vibration impacts are within safe limits.

The information presented in this report shall be reviewed if any modifications to the features of the development specified in this report occur, including and not restricted to selection of equipment/machinery and modifications to the construction program.

Appendix A Construction Noise Contour Map



E-LAB CONSULTING

ISSUE	DATE	STATUS
1	04/08/2026	FOR INFORMATION

LEGEND

Predicted Noise Level, $L_{Aeq,15min}$ dB(A)

- < 50
- 50 - 53
- 53 - 56
- 56 - 59
- 59 - 62
- 62 - 65
- 65 - 68
- 68 - 71
- 71 - 74
- 74 - 77
- 77 - 80
- > 80

NOTES

PROJECT
A01 ROSS STREET TEACHING & LEARNING HUB

PROJECT NO.
P03294

ARCHITECT
BVN

CLIENT
USYD

SCALE
NTS

STATUS
FOR INFORMATION

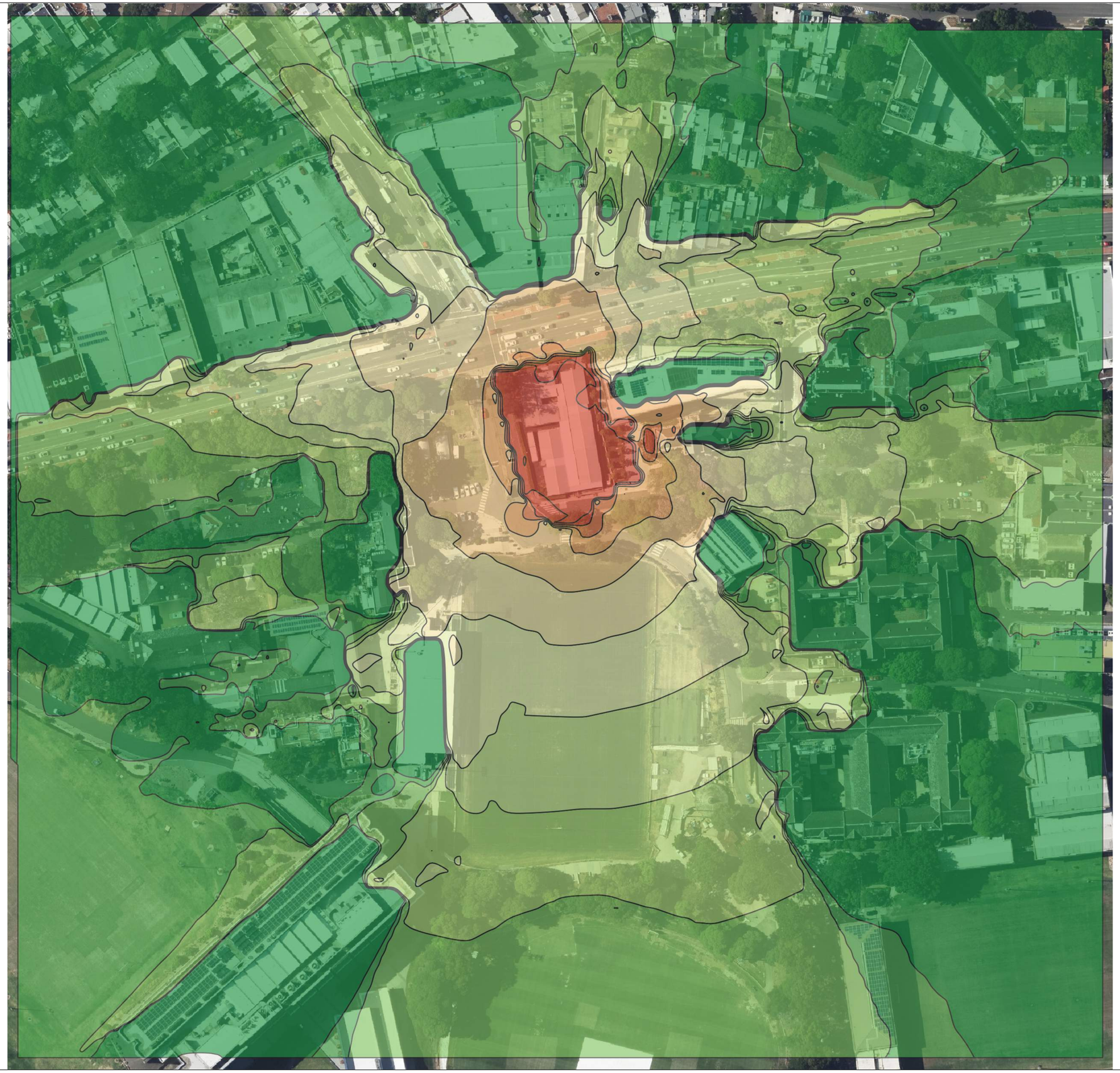
DRAWING
CONSTRUCTION NOISE CONTOUR MAP

DEMOLITION WORKS

DISCIPLINE
ACOUSTICS AND VIBRATION

DRAWING NUMBER
AC-DWG-100-01-01

REVISION
001



E-LAB CONSULTING

ISSUE	DATE	STATUS
1	04/08/2026	FOR INFORMATION

LEGEND

Predicted Noise Level, $L_{Aeq,15min}$ dB(A)

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NOTES

PROJECT
A01 ROSS STREET TEACHING & LEARNING HUB

PROJECT NO.
P03294

ARCHITECT
BVN

CLIENT
USYD

SCALE
NTS

STATUS
FOR INFORMATION

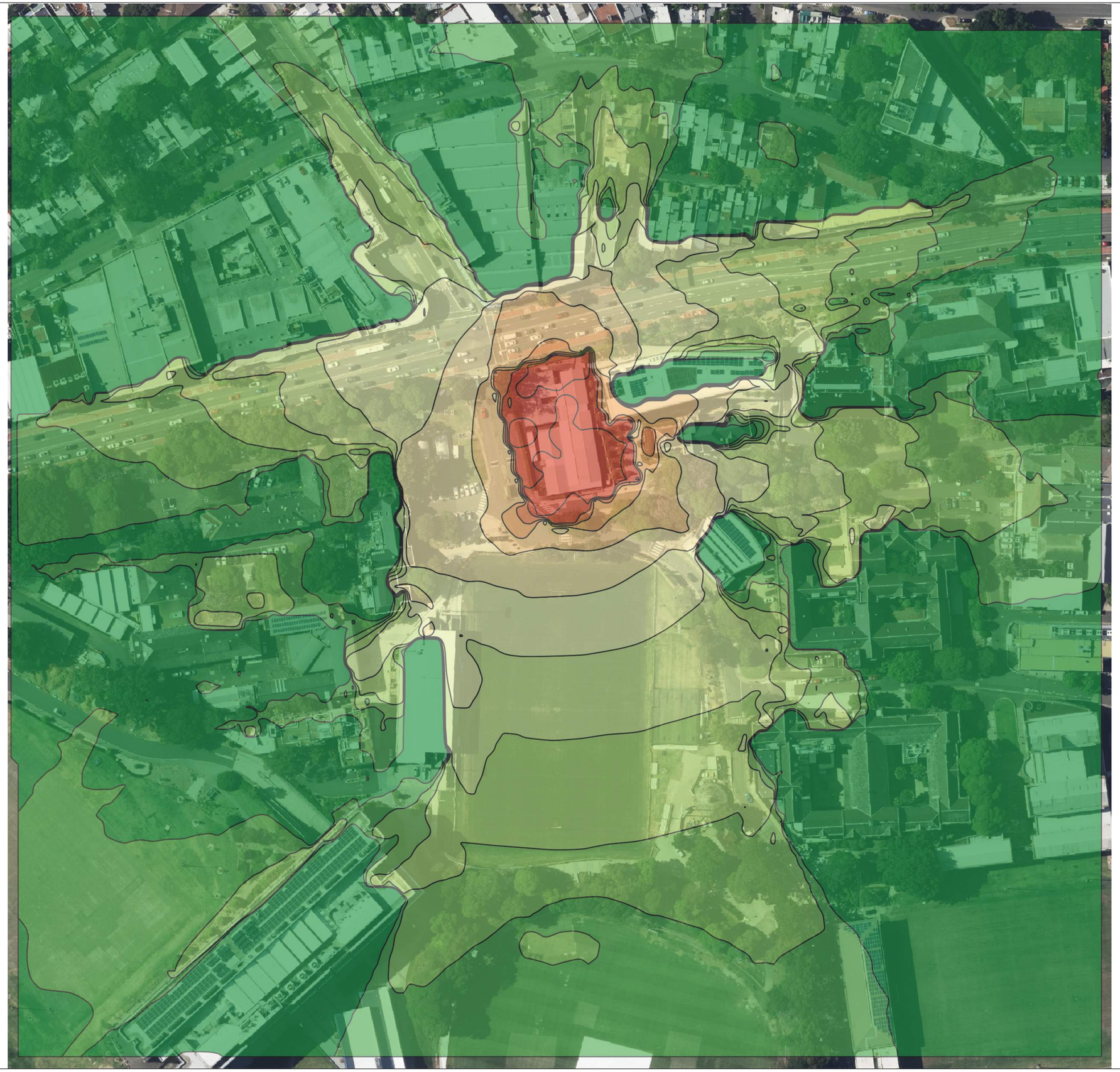
DRAWING
CONSTRUCTION NOISE CONTOUR MAP

BULK EXCAVATION & PILING WORKS

DISCIPLINE
ACOUSTICS AND VIBRATION

DRAWING NUMBER
AC-DWG-100-02-01

REVISION
001



E-LAB CONSULTING

ISSUE	DATE	STATUS
1	04/08/2026	FOR INFORMATION

LEGEND

Predicted Noise Level, $L_{Aeq,15min}$ dB(A)

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NOTES

PROJECT
A01 ROSS STREET TEACHING & LEARNING HUB

PROJECT NO.
P03294

ARCHITECT
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USYD

SCALE
NTS

STATUS
FOR INFORMATION

DRAWING
CONSTRUCTION NOISE CONTOUR MAP

STRUCTURAL & FACADE WORKS

DISCIPLINE
ACOUSTICS AND VIBRATION

DRAWING NUMBER	REVISION
AC-DWG-100-03-01	001

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