

ONE SYDNEY HARBOUR NOISE AND VIBRATION ENVIRONMENTAL MANAGEMENT SUB PLAN

10/02/2022 | Issue No: 18



Document Issue Status				
Date	Document Issue (in numbers)	Purpose and Summary of Amendments	Reviewed by	Approved by
30/11/2016	2.0	General update including LLB GMR and legislative amendments.	Tracey Wallbridge	Brian Falls
15/09/2021	3.0	General update and revision for currency and to reflect updated WDC	Tracey Wallbridge	Ross Trethewy

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Project Revision Status				
Date	Project Revision (in numbers)	Purpose and Summary of Amendments	Reviewed by	Approved by
14/12/2020	14	Adopted LLB template as Basement nears completion.	Toby Pritchard	Sam Trickett David Elliott
07/03/2021	15	No Changes	Toby Pritchard	David Elliott Paul Allen
09/06/2021	16	No Changes	Toby Pritchard	David Elliott Nathan Smith
22/10/2021	17	Updated to Version 3	Toby Pritchard	Paul Allen
10/02/2022	18	Update to include R3 approval	Toby Pritchard	Paul Allen

1. SCOPE OF PROJECT AND SUB PLAN

Project Details	
Scope of the Sub Plan	This Noise and Vibration Environmental Management Sub Plan provides strategies and controls to manage noise and vibration during construction including structure, fit out and commissioning. It also describes processes for identifying activities that may have an impact on sensitive receivers and environments, and for the management of complaints, concerns and exceedances of established noise and/vibration levels. Refer to Section 1.1 and 3.1 of the Project EHS Management Plan for clarification on how the EHS Sub Plans form part of the Lendlease Building (LLB) EHS management system.
Objectives of the Sub Plan	• To minimise the impact of construction noise and vibration on the community. • To manage noise and vibration through proactive planning and the adoption of appropriate work methods and site management practices. • To meet or exceed standards and criteria for noise and vibration management. • To establish and maintain positive relationships with project stakeholders.
Scope of Works	This Sub Plan has been prepared in accordance with the recommendations from the '<i>Construction and Operational Noise Report</i>' by Wilkinson Murray dated July 2016 and based on consideration of the following scope of works: OSH Basement (SSD 6960) • Construction works of the basement inclusive of piling, ground slabs, services and waterproofing. Tower R1 (R4A SSD 6964) & R2 (R4B SSD 6965) & R3 (R5 SSD 6966) • Site establishment including [Hoardings], office and compound setup including waste management, material handling and storage areas; • Construction of the building and facade. • Internal fitout
Key Issues and Risks	The works described above have the potential to generate noise and vibration at levels, or at times, that may affect nearby residents, businesses and community facilities. The closest sensitive receivers to the site have been identified as: • 20m east of site, multilevel residential building at 38 Hickson Road • Childcare centres are located at 37 High Street in Millers Point, under the AON building in Kent Street, and within the T1 tower at Barangaroo South. • Commercial development is located approximately 20m east of the site at 30 Hickson Road • A number of finger wharves containing a mix of residential and commercial developments are 350m west of the construction area in Pyrmont, while residential areas in Balmain East are located approximately 400m west of the construction area The activities with the greatest potential to create noise and/or vibration include:

	• The loading and haulage of materials off-site; • The transport of materials to and from site on local roads; • Servicing of waste management and storage areas; • The use of hand tools, small generators and compressors; • Concreting works; and • Out of hours works. High or prolonged levels of construction noise and vibration can cause annoyance to local receivers, health impacts on the community and works, and damage to structures. The main risks associated with the works that will be conducted on this site are identified as • Noise affecting local residents' use of their property and resulting in complaints and negative comment; • Noise disrupting local events, the use of public facilities or educational programs and exams; • Vibration affecting medical equipment; • Noise affecting local businesses including cafes with outdoor areas; and • Noise occurring outside of normal or approved construction hours (without approval); • Vibration affecting structures or causing concerns/fright within the community. A noise assessment including background noise monitoring has been prepared for this project. The assessment concluded that noise impacts will be negligible and will pose a minor impact only to One Sydney Harbour. The recommendations of the assessment have been captured in this Sub Plan. The implementation of the control measures identified in the EHS Plan and this Sub Plan are intended to minimise the potential impacts of noise and vibration on the environment and local community.
Legislation, Approval and Guidelines	Federal/National: <i>Protection of the Environment Operations Act 1997 (NSW) (POEO Act)</i> The POEO Act is the key piece of environment protection legislation, and regulates activities via: • environment protection licencing, as per Schedule 1; • regulation of scheduled and non-scheduled activities; • environmental protection offences and penalties; and • establishment of a general duty to notify of environmental harm. <i>Protection of the Environment Operations (Noise Control) Regulation 2017 (NSW)</i> This regulation controls noise emissions from vehicles and vessels, and provides for inspection and testing of noise emissions. Australian Standard AS2436 (1981) Guide to Noise Control on Construction, Maintenance and Demolition Sites AS 1055.1-1997 Acoustics – Description and measurement of environmental noise – General Procedures AS 1055.2-1997 Acoustics – Description and measurement of environmental noise – Application to specific situations

	State: Interim Construction Noise Guideline NSW EPA 2009 Local: Lendlease Requirements: • 4.13 Degradation or Pollution of the Environment • 4.15 Uncontrolled Release of Stored Energy (non-electrical)) • Lendlease Building Workplace Delivery Code (WDC) – Noise (environmental) and Noise (occupational) Guidelines: • <i>'Construction and Operational Noise Report'</i> by Wilkinson Murray dated July 2016
Summary of Site Controls	This Sub Plan must be read in conjunction with the Lendlease Global Minimum Requirements, Project Environmental Impacts and Hazards Assessment (IHRA), the Project EHS Plan, and the Lendlease Building Workplace Delivery Code. These documents detail Lendlease's approach and commitment to pro-active and responsible site management. Site specific controls, monitoring, reporting and performance measurements have been identified in this Sub Plan to minimise and where possible prevent, the impacts of construction noise and vibration on the environment and community. For the management of noise, these will include but are not limited to: • Performing and monitoring works in accordance with the project approval; • Restricting works to approved construction hours; • Assessing the potential impact of works that may be required or extend outside of approved construction hours (e.g. delivery of plant, large concrete pour) and seeking approval; • Selecting appropriately sized plant, equipment and tools for the work being performed (ie avoid oversized plant); • Retrofitting plant with noise reducing devices; • Inspecting plant for rattling or noisy components and removing off site as required; • Substituting noisy processes or plant with less noisy options; • Restricting the times and/or duration of noisy works; • Communicating with project neighbours on a regular basis and providing advanced notification of noisy works; and • Installing acoustic barriers or enclosures where they are deemed to be feasible and effective. For the management of vibration, these will include but not be limited to a practical and economical combination of measures such as: • The conduct of dilapidation surveys; • Substitution with an alternative process or plant; • Restricting times when vibration producing work is carried out;

- Performing works within nominated hours only;
- Establishing 'no work' buffer and monitoring zones;
- Consultation with affected residents.

Construction and demolition works will not be permitted within 50m of any heritage listed items, buildings or features of cultural significance, unless specialist advice has been sought and appropriate controls identified.

A Noise and Vibration Impact and Monitoring Environmental Management Diagram will be prepared prior to any site activities commencing (Appendix 1).

Construction stage noise and vibration management requirements will be included in relevant specifications, contract agreements, plant supply agreements, quality assurance documents, and subcontractor work method statements.

Site inspections, monitoring and reporting will be undertaken by Lendlease and subcontractors as detailed in the EHS Plan and the following implementation table.

2. IMPLEMENTATION OF THE SUB PLAN

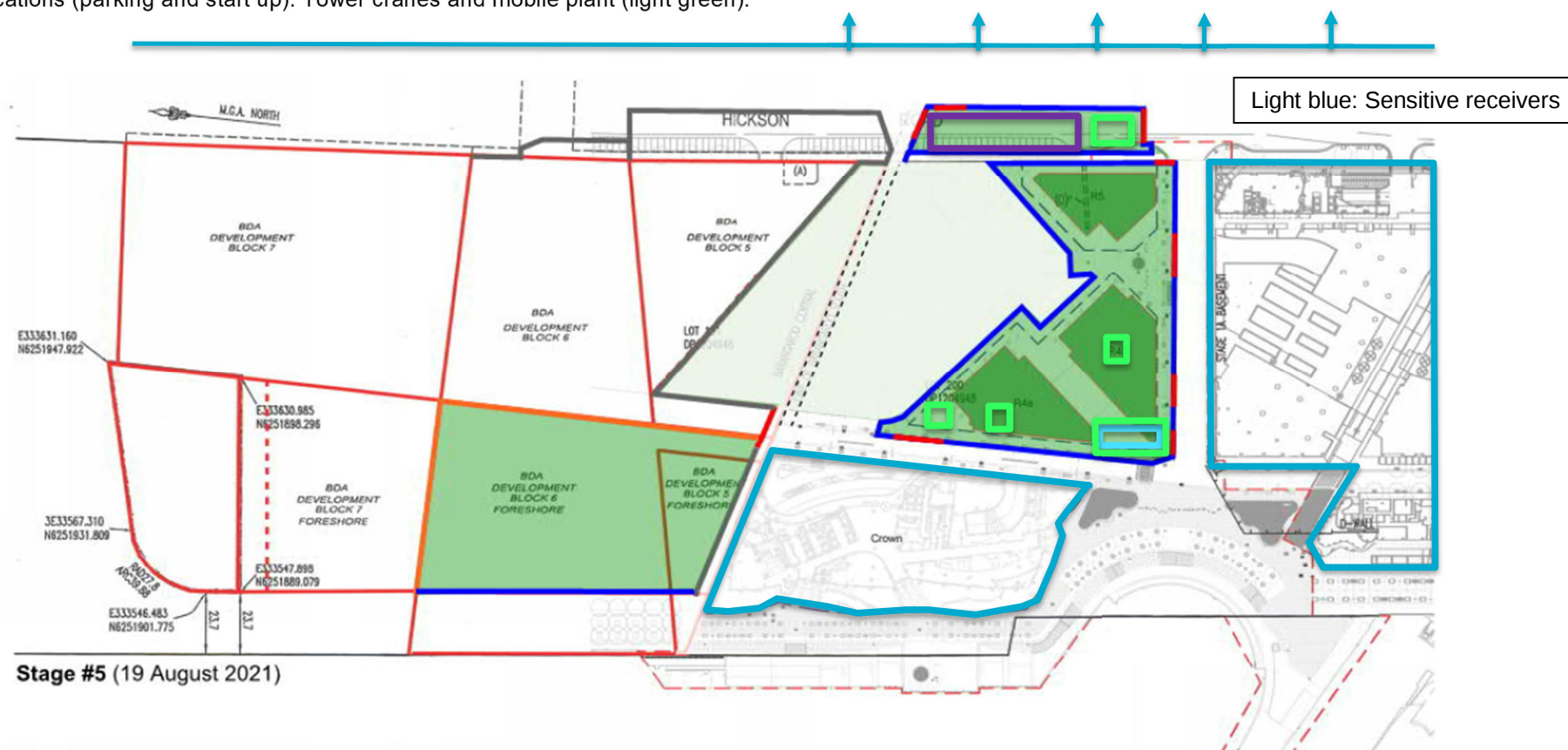
Control Measure	Timing	Methodology	Responsibility	Monitoring and Reporting	Performance Measurement
Planning and Site Establishment					
Identify requirements for environmental noise and vibration monitoring and document a program for pre and during construction assessment.	Prior to works commencing.	Engage a consultant to develop a construction noise monitoring program.	CM SM	Monitoring implemented and reviewed in a timely manner (as per consultant recommendations).	Exceedances of criteria.
Include information in the Site Induction about noise and vibration minimisation, management and monitoring.	Prior to works commencing	Include in induction package. Deliver induction material.	CM SM	WMSs prepared by subcontractors address noise and vibration minimisation, work hours, duration and the selection and use of plant.	Site induction delivered to all workers on site.
Address noise minimisation, management, plant noise assessment and maintenance as part of risk assessments, work planning and subcontractor engagement.	Prior to commencing works	WMSs prepared by major subcontractors to identify high noise and vibration generating activities, compliance with approved work hours, the duration of works, and the selection, inspection, substitution and use of appropriate plant.	SM Engineers	Discussion in planning sessions. Addressed in IHRA and WMS. Inspection of work activities. Noise monitoring results. Complaint numbers/type.	No complaints from the community. No work outside of hours without approval.
Prepare a Noise and Vibration Impact and Monitoring Environmental Management Diagram (EMD) in Appendix 1 identifying the location of potentially affected receivers and landuses, monitoring locations and work areas where high levels of noise will be generated.	Prior to works commencing	Plan works with consideration to sensitive receivers. Position noisy plant and equipment away from sensitive receivers and as far apart as practicable. Assess whether altering the orientation and/or location of the plant will reduce noise impacts.	CM SM	Diagram prepared and communicated. Diagram updated as works progress (min quarterly). Progress of works and change in risk identified and documented in the IHRA.	Sensitive receptors identified so that communication can be maintained.
Install a noise barrier/hoarding along project boundaries (where feasible and reasonable).	Prior to works commencing	Identify the location of project neighbours and assess the feasibility and benefits of installing a barriers/hoarding to reduce noise transmission.	CM SM	Noise monitoring results. Number of complaints.	No complaints. No exceedances of predicted levels.

		Consider type of work, times and duration.			
Design the site entry and internal roads to regulate truck movements and maximise vehicle entry and exit in a forward direction (to reduce beeper noise).	Prior to works commencing	Address in site setup design. Include this requirement in the Traffic Management Plan.	CM SM	Continuous monitoring of traffic movements during construction.	No complaints from adjoining residents or authorities.
During Construction – Work Hours					
Comply with approved work hours. 7.00 am to 7.00 pm Monday to Friday. 7.00 am to 5.00 pm on Saturdays. - No work on Sundays or Public Holidays. Provide advanced notification to potentially affected community stakeholders of out of hour's work/deliveries and high noise or vibration activities.	At all times. Prior to works commencing	Identify and communicate approved work hours/days. Plan works and complete within approved hours. Provide notification to the community of works required outside of hours. Prepare appropriate information and distribute to the community at least 3 days prior to the works occurring.	CM SM Engineer	Documented approval received for work outside of approved hours. Monitoring of work outside of approved hours.	Timely approval of work outside of hours. No complaints. No work outside of approved hours without prior impact assessment and approval from the relevant regulatory authority. No fines. Positive relationship established with project neighbours.
Rock breaking, rock hammering, sheet piling, pile driving and similar activities may only be carried out between the following hours: 9.00 am to 12.00 pm Monday to Friday. 2.00 pm to 5.00 pm Monday to Friday. 9.00 am to 12.00 pm, Saturday.	At all times.	Identify and communicate approved work hours/days. Plan works and complete within approved hours.	CM SM Engineer	Documented approval received for work outside of approved hours. Monitoring of work outside of approved hours.	Timely approval of work outside of hours. No complaints. No work outside of approved hours without prior impact assessment and approval from the relevant regulatory authority. No fines. Positive relationship established with project neighbours.
If work needs to be performed due to unforeseen circumstances (e.g. concrete pour) outside the hours nominated, consent from the DPI&E (NSW)	At all times	Prior notice and approval from the DPI&E must be sought.	GF	Continuous as required.	No complaints from public or adjoining residents or authorities.

Department of Planning, Industry and Environment) must be obtained.					
During Construction - Plant and Equipment					
Establish a Plant and Equipment Register with details of approved equipment, noise compliance certificates and relevant restrictions/conditions of use (ie vibration generation), if applicable.	Prior construction	Subcontractor to address in WMS and submit Plant & Equipment Register or service records. Refer to Appendix 2 for guidance.	SM GF	Included in subcontractor work method statements. Sub-contractor audit.	All operators licensed. No inappropriate use of plant or equipment.
Operate plant and equipment in a proper and efficient manner and avoid unnecessary idling or engine noise.	At all times	WMS prepared by subcontractor to address proper operation of plant and equipment and education of operators.	SM	Ongoing inspection of operators and operations.	All operators are licensed. No inappropriate use of plant or equipment.
Ensure plant is fitted with silencers, acoustical enclosures or other noise attenuation measures (as per manufacturers specs).	At all times	Subcontractor to address the risk based selection of appropriate plant and equipment in WMS. Include requirement in subcontracts. Subcontractor to submit Plant & Equipment Register or service records.	SM/ Foreman	Ongoing inspection of operators, activities and plant. Daily surveillance of noise levels.	All operators are licensed. No inappropriate use of plant or equipment.
Ensure that vibratory compactors are not used closer than 30 metres from residential buildings unless vibration monitoring confirms compliance with specified criteria.	At all times	Included in subcontractor tenders. Subcontractor to submit Plant & Equipment Register or service records. 'Buffer zones' clearly marked out to prevent entry of plant. Refer to Appendix 3 for guidance.	SM Foreman	Ongoing surveillance.	All operators licensed. No inappropriate use of plant or equipment.
Turn off vehicles and plant when not in use and avoid queuing and idling outside the site, particularly prior to the construction start time.	At all times	Address in site induction. Subcontractors to address in WMS and communicate to all personnel.	SM Foreman	Daily surveillance Weekly inspection checklist.	No complaints from local community.

APPENDIX 1: ENVIRONMENTAL MANAGEMENT DIAGRAM (EMD)

- Project Office (purple).
- Perimeter hoardings and dust controls: Blue (external facing hoardings), Orange (internal facing hoardings), Red (access gate). *Sourced from: OSH R1 review logistics and material handling*
- Stabilised site access: The entire site is stabilised with 2 x loading zones adjacent road networks.
- Waste management and material storage areas (odour): Remaining bin locations (light blue).
- Plant locations (parking and start up): Tower cranes and mobile plant (light green).



APPENDIX 2: TYPICAL NOISE LEVELS OF MAJOR PLANT

Item	Typical Plant or Equipment	Max Noise Level (at 7 metres)
Bulldozer	Caterpillar D7, D9	88
Bulldozer	Caterpillar D10	93
Front End Loader	Wheeled	90
Jack Hammers	With silencing bags	85
Air Track Drill	800 CFM Compressor	96
Scraper	Caterpillar 631	89
Scraper	Caterpillar 651	85
Grader	Caterpillar 16	85
Compactor	Caterpillar 825	85
Compactor	Vibrating Plate	92
Vibratory Roller	10-12 Tonne	89
Water Cart		88
Dump Trucks	35 Tonne	96
Excavator	Kato 750	86
Rock Breaker	Hydraulic on Kato 750	97
Truck		80
Crane	Truck Mounted	85
Compressor	600 CFM	75
Compressor	1500 CFM	80
Backhoe		88
Spreader	Asphalt, concrete	70
Asphalt Truck		92
Asphalt Paver		89
Tip Truck		83
Generator	Diesel	79
Spraying Machine		75
Mechanical Broom		83
Piling Hammer	For piles and casing	93
Concrete truck		83
Concrete Pump		84
Concrete Vibrators		80
Drill	Air	85
Drill	Pneumatic	85
Welders		85

APPENDIX 3: GUIDELINE FOR ROLLER USE NEAR STRUCTURES

Roller Class & Weight Range	Centrifugal Force Range	Example of Rollers	Distance from Building A B	Remarks
Very Light Less than 1.25 tonnes	10-20kN	Coates 32RD tandem Davleco 32CR tandem	3m --	Maintenance and patching rollers. Generally not restricted for normal
Light 1 to 2 tonnes	20-50kN	Coates 42RD tandem Pannell 54T drawn	5m --	Generally not restricted for normal road use.
Medium 2 to 4 tonnes	50-100kN	Coates 66Tdrawn Davleco 66 drawn	6m 12m	
Medium-Heavy 4 to 6 tonnes	100-200kN	Coates 72Tdrawn Davleco 72 drawn Pacific V12 drawn Raypo Rascal 400	12m 24m	Not advised for city and suburban streets.
Heavy 7 to 11 tonnes	200-300kN	Coates 78Tdrawn Pacific V24D drawn Raypo Rascal 600	25m 50m	Restricted. Not advised built-up areas.
Very Heavy 12 tonnes and over	Over 300kN	Coates 96Tdrawn Pacific V36D drawn	25m 50m	Restricted to major construction areas away from structures and buildings.

APPENDIX 4: NOISE MANAGEMENT LEVELS

The table below presents the applicable noise management levels for construction activities measured as $L_{Aeq}(15 \text{ min})$ at surrounding receivers.

Location		Noise Management Levels, L_{Aeq} – dBA				Maximum Noise Level, L_{Aeq} – dBA
Sensitive Receiver	Associated Construction Monitoring Location	Day	Evening	Night	Saturday (extended)	
Hickson Road Residences	Southern end of The Bond	63	58	54	55	75
High Street Residences	Northern end of The Bond	57	49	46	50	75
Balmain East Residences	Illoura Reserve, Balmain East	59	50	45	51	75
Darling Island & Sydney Wharf Residences	-	57	49	44	55	75
Residential Building R8	-	63	58	54	56	75
All Commercial Properties		70	70	70	70	75
Schools / Preschools		55*	-	-	-	75
Parks / Outdoor Play Areas		65	-	-	65	75

*The external noise goal of 55dBA is based on a 10dB reduction through an open window.