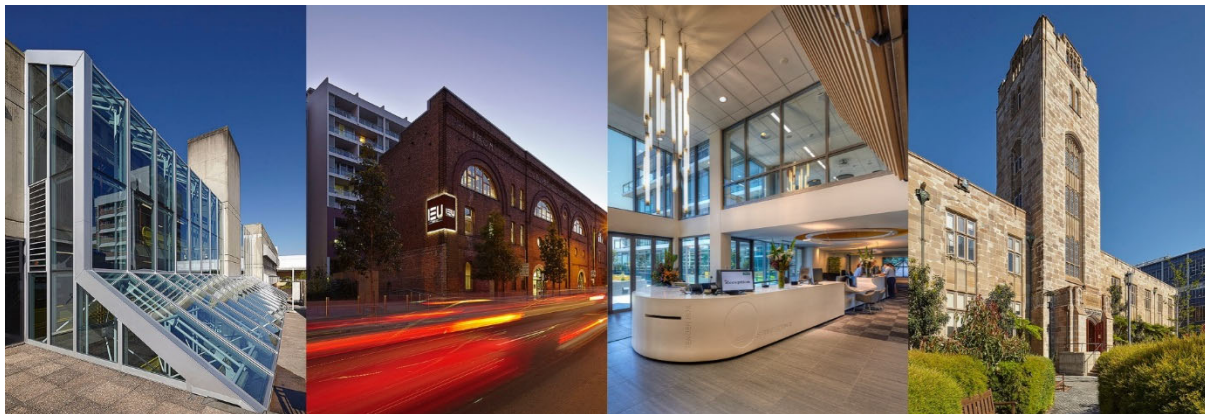


Noise and Vibration Management Plan

Project: UNSW Cliffbrook Estate Building CC3 Project

Belmadar Pty Ltd



Noise and Vibration Management Plan

Project: UNSW Cliffbrook Estate Building CC3 Project

Revision - 05

This NVMP was completed and reviewed by:

Name	Position	Date	Signature
Brett Drew	HSEQ Director	24/11/2021	
Linda Yazbek	Systems Manager	24/11/2021	

This NVMP reviewed and understood for responsibilities by:

Name	Position	Date	Signature
Brett Drew	Site Manager		
TBA	Site Engineer		

This NVMP was reviewed and approved by:

Name	Position	Date	Signature
Brett Drew	HSEQ Director	24/11/2021	

CONTROLLED DOCUMENT

Copies shall not be made without the written permission of the HSEQ Director or Systems Manager. This document is uncontrolled when printed

Contents

1.1. Purpose	4
1.2. Background	4
1.3. Structure of CNVMP	4
2.1. Legislation	5
2.2. Guidelines and Standards	5
2.3. Training	5
2.4. Monitoring	6
2.5. Consultation	7
2.6. Complaints Management	8
2.7. State Significant Development Requirements	8
3.1. Sensitive Receivers	9
3.2. Noise Catchment Areas	9
3.3. Background Noise Monitoring	9
4.1. Noise Criteria	10
5.1. Non-Residential Sensitive Receivers	12
6.1. Construction Vibration Goals	13
6.2. Heritage Structures	13
6.3. Other Buildings and Structures	13
6.4. Human Comfort and Amenity	13
8.1. Construction activities	15

1.

1. Introduction

1.1. Purpose

This Construction Noise and Vibration Management Plan (CNVMP) describes how Belmadar will minimise and manage noise and vibration impacts during construction Building CC3 UNSW Coogee Campus

1.2. Background

Belmadar assessed the potential noise and vibration impacts associated with construction and operation of the Project.

Belmadar concluded that there would be some minor noise and no vibration impacts during construction and the extent would vary depending on the type of activity in progress and the proximity to sensitive receivers. These impacts will be mitigated through the implementation of the construction noise and vibration mitigation measures provided in this CNVMP.

1.3. Structure of CNVMP

This CNVMP is part of Belmadar's environmental management framework for the Project and is supported by other documents such as work procedures and risk assessments. Consultation for Preparation of the CNVMP

2. Legal, Training and Other Requirements

2.1. Legislation

Legislation relevant to noise and vibration management includes:

- Protection of the Environment Operations Act 1997 (POEO Act)
- Protection of the Environment Operations (Noise Control) Regulation 2008.
- State Significant Development Consent SSD 8126 2018

2.2. Guidelines and Standards

The main guidelines, standards and policy documents relevant to this CNVMP include:

- Interim Construction Noise Guideline (ICNG) (DECC 2009)
- Construction Noise and Vibration Guideline (CNVG) (RMS 2016)
- NSW Environmental Criteria for Road Traffic Noise (ECRTN) (EPA 1999)
- NSW Industrial Noise Policy (INP) (EPA 2000)
- Road Noise Policy (RNP) (EPA 2011)
- RTA Environmental Noise Management Manual (ENMM) (RTA 2001a)
- Environmental Noise Management Assessing Vibration: A Technical Guideline (DEC, 2006)
- German Standard DIN 4150 - Part 3 - Structural Vibration in Buildings - Effects on Structures
- Australian Standard AS2107 'Acoustics - Recommended design sound levels and reverberation times for building interiors'.
- AS 2436-2010 Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites, and
- British Standard 7385: Part 2 – Evaluation and measurement of vibration in buildings.

2.3. Training

All project personnel will receive training of noise and vibration monitoring management during site induction to ensure that responsibilities are understood and workers are competent to carry out the work in line with noise and vibration monitoring requirements. The Site Manager is responsible for coordinating noise and vibration monitoring training, forwarding training records and assessing the effectiveness of training at project level.

Project Induction

The Site Manager shall ensure that the Project Induction includes the noise and vibration risks and control strategies identified for the project. The following will be included during induction:

- Site Noise and Vibration objectives and goals
- Site Noise and Vibration rules and consequences for non-compliance
- Potential consequences of departure from these rules
- Emergency / incident response and management

Belmadar site Supervisors shall be inducted into the requirements of this plan and the requirements of Noise and Vibration Control Programs and other management controls relevant to the work they are managing.

Internal Training

The Site Manager shall ensure all workers performing duties required by this plan are properly trained. Where a need is identified, arrangements shall be made for the appropriate training to be provided. Training records from external providers are sent to the Systems Manager following the completion of training.

Training of Subcontractors

The Site Manager or nominee shall assess the Noise and Vibration control requirements of the subcontract package and, where considered necessary, ensure Subcontractors conduct specific Noise and Vibration training sessions (through toolbox meetings or external providers etc.).

All Subcontractor site employees shall attend the Project Induction that includes general awareness topics and the key Noise and Vibration issues for the project. It also includes information on emergency response actions. This daily risks associated with noise and vibration will be addressed in daily prestarts

2.4. Monitoring

The Site Manager shall ensure that the required monitoring and inspection activities for the project/area are implemented.

Noise and Vibration Monitoring

Specific Noise and Vibration monitoring requirements are generally the responsibility of the applicable subcontractor performing the work and Belmadar supervisors.

Where required, specialist consultants may be engaged to help establish monitoring systems and to train relevant personnel in the taking of samples, reading of instruments as well as analysis and recording of results.

Any Noise and Vibration or testing agencies used on the project shall be appropriately qualified for their applicable activity.

Inspection

Surveillance inspections are conducted by the Site Manager and/or Foremen as part of their daily routine, with significant issues recorded (Site Diary or Action Notice) as applicable for resolution.

The Site Manager or responsible Foreman will also conduct a HSEQ walk which includes a check of Noise and Vibration issues to confirm the controls are being implemented. Inspections are recorded on the checklist for follow up, with significant deficiencies raised as a non-compliance Notice (or electronic equivalent as applicable).

Monthly site walks to be conducted by HSEQ Director to monitor objectives and targets

2.5. Consultation

Pursuant to clause B35 Belmadar will consult with council if there is a requirement for the noise to exceed the construction noise management levels in accordance with the Interim Construction Noise Guideline published by the Department of Environment and Climate Change NSW. However, it is anticipated that the construction noise will not exceed the rating background level (RBL) + 10 dB at the nearest Residential Boundary.

The approved Acoustic Report for the Redevelopment of UNSW Cliff brook Campus has set the criteria for the project intrusiveness and amenity noise criteria at the front boundary of the nearest affected residence at 1 & 2 Gordons Avenue, and 10 Battery Street Coogee is shown in table below. This Noise and Vibration Management mitigates the risk of exceeding the noise levels at these residences.

Time of Day	Intrusiveness Criterion	Amenity Criterion
Day	58 $L_{Aeq,15min}$ (53+5)	60 $L_{Aeq, Day}$
Evening	53 $L_{Aeq,15min}$ (48+5)	50 $L_{Aeq, Evening}$
Night	50 $L_{Aeq,15min}$ (45+5)	45 $L_{Aeq, Night}$

As such, in accordance with the requirement of SSD Condition B35(ii) Council is not required to be consulted at this stage as the noise levels are not anticipated to exceed the construction noise management levels specified in the EP&A Guidelines.

2.6. Complaints Management

All complaints shall be treated with respect and referred to the Project Manager for action. Incidents including complaints are summarized in the Belmadar Monthly Report. Complaints to be recorded on Procore “Observations” tab and closed out accordingly.

2.7. State Significant Development Requirements

The requirements State Significant Development B35 relevant to there listed in table 1.

Table 1 SSD requirements relevant to this CNVMP

Clause No.	Requirements
35	ii) be prepared in consultation with Council and all noise sensitive receivers where noise levels exceed the construction noise management level, in accordance with EPA guidelines;
	iii) describe the measures that would be implemented to ensure:
	iv) best management practice is being employed;
	iv) best management practice is being employed;
	v) compliance with the relevant conditions of this consent;
	vi) describe the proposed noise and vibration management measures in detail;
	vii) include strategies that have been developed to address impacts to noise sensitive receivers where noise levels exceed the construction noise management level, for managing high noise generating works;
	viii) describe the consultation undertaken to develop the strategies in v) above;
	ix) evaluates and reports on the effectiveness of the noise and vibration management measures; and
	x) include a complaints management system that would be implemented for the duration of the construction works

3. Existing Environment

As identified in Section 6.5.1 of the REF, the existing ambient noise environment surrounding the proposal¹ area is variable, with road traffic noise the primary contributor. The noise levels display a typical diurnal trend with noise levels during the night-time lower than the daytime and evening periods. This is characteristic of urban and suburban areas where the ambient noise environment is primarily influenced by road traffic.

3.1. Sensitive Receivers

The sensitivity of receivers to noise and vibration is dependent upon the occupancy type and the nature of the activities performed within the affected premises. Sensitivity to noise is a subjective response varying for different individuals and can depend on the existing noise environment.

There will be no sensitive receivers subject to this development as noise will not be ambient background noise.

3.2. Noise Catchment Areas

There are no noise catchment areas identified as noise will not be ambient background noise.

3.3. Background Noise Monitoring

Background noise monitoring will be not conducted as part of the noise assessment. The minor nature of the works to building CC3 will not exceed the ambient background noise.

4. Construction Noise and Vibration Criteria

4.1. Noise Criteria

The Project will implement all feasible and reasonable noise mitigation measures with the aim of achieving the construction noise management levels detailed in the Interim Construction Noise Guideline (ICNG) (DECC, 2009) during construction activities. The main objectives of the ICNG are to:

- Identify and minimise noise from construction works
- Focus on applying all 'feasible' and 'reasonable' work practices to minimise construction noise impacts
- Encourage construction during the recommended standard hours only, unless approval is given for works that cannot be undertaken during these hours
- Reduce time spent dealing with complaints at the project implementation stage, and
- Provide flexibility in selecting site-specific feasible and reasonable work practices to minimise noise impacts.

Feasible work practices are practical to implement, while reasonable work practices take into account the balance of costs and benefits and community views (ICNG, p3).

The SSD defines standard working hours for audible noise to be:

- Monday to Friday 9:00 am – 12:00 pm and 2:00 pm – 5:00pm
- Saturday 9 am to 12 pm, and
- No work on Sundays or Public Holidays.

These hours are consistent with the standard hours of operation for the Project defined in SSD 8126 2018.

Residential Receivers

The ICNG provides recommended Noise Management Levels (NMLs) for airborne construction noise at sensitive land uses. The ICNG works on the principle of a 'screening' criterion – if predicted or measured construction noise exceeds the ICNG NMLs then the construction activity must implement all 'feasible and reasonable' work practices to reduce noise levels.

For work within standard construction hours, if after implementing all 'feasible and reasonable' work practices, the site still exceeds the NML, the ICNG does not require any further action as there is no further scope for noise mitigation.

The ICNG sets out management levels for noise at noise sensitive receivers, and how they are to be applied. Table 2 provides the ICNG's approach for determining appropriate construction NMLs ($L_{eq(15min)}$).

Table 2. Residential Noise Management Levels

Time of Day	Noise Management Level $L_{eq}(15min)$	Application
<p>Recommended standard hours: Monday to Friday - 7am to 6pm Saturday - 8am to 1pm No work on Sundays or Public Holidays</p>	<p>Noise affected RBL + 10 dB(A)</p>	<p>The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{eq}(15min)$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to minimise noise. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.</p>
	<p>Highly noise affected 75 dB(A)</p>	<p>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 proponent should consider respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. 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 2. If the community is prepared to accept longer period of construction in exchange for restrictions on construction times.</p>
<p>Outside recommended standard hours</p>	<p>Noise affected RBL + 5 dB(A)</p>	<p>A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5dB(A) above the noise affected level, the proponent should negotiate with the community.</p>

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

5. ICNG Sleep Disturbance Criterion

There will be no requirement to work out of the hours stipulated the SSD therefore assessing Sleep Disturbance Criterion is not required.

5.1. Non-Residential Sensitive Receivers

The project specific $L_{eq(15min)}$ NMLs for other non-residential noise sensitive receivers from the ICNG are provided in Table 3. Note that these NMLs only apply when a non-residential land use is in use.

Table 3 Noise management levels at non-residential sensitive receivers

Land use	Noise management level (when property is in use) $L_{eq(15 min)}$
Classrooms at schools and other educational institutions Hospitals and operating theatres Places of worship	45 dB(A) (internal noise level)
Active recreation areas (characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion)	65 dB(A) (external noise level)
Passive recreation areas (characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example reading, meditation)	60 dB(A) (external noise level)
Community centres	Depends on the intended use of the centre Maximum internal levels recommended in AS2107 for specific uses
Industrial premises	75 dB(A) (external noise level)
Offices, retail outlets	70 dB(A) (external noise level)
Other noise sensitive businesses	Investigation to determine suitable noise levels on project-by-project basis

Non-residential land uses for consideration as part of the Project include:

- All land abounding the boundary are residential. Non-residential consideration is not required for this project.

6. Vibration Criteria

6.1. Construction Vibration Goals

There will be no vibration criteria evaluation for Construction Vibration Goals on this project as there will be no demolition or earthworks.

6.2. Heritage Structures

There will be no vibration criteria evaluation for Heritage Structures on this project as there will be no demolition or earthworks.

6.3. Other Buildings and Structures

There will be no vibration criteria evaluation for Other Buildings and Structures for this project as there will be no demolition earthworks.

6.4. Human Comfort and Amenity

There will be no vibration criteria evaluation for human comfort and amenity on this project as there will be no demolition earthworks.

7. Environmental Aspects and Impacts

A risk management approach will be used to determine the severity and likelihood of the noise and vibration impacts of construction activities and to prioritise their significance. This process considered potential regulatory and legal risks as well the concerns of the community and other key stakeholders.

The objectives of the risk assessment were to:

- Identify activities, events or outcomes that have the potential to adversely affect the local environment and/or human health/property
- Qualitatively evaluate and categorise each risk item
- Assess whether risk issues can be managed by environmental protection measures
- Qualitatively evaluate residual risk with implementation of measures.

8. Noise and Vibration Impact Assessment

The key source of noise and vibration impacts will be from construction activities that use plant and equipment. There will be no plant and equipment for this project therefore an assessment is not required.

8.1. Construction activities

There will be no construction activity that will produce noise greater than the ambient background noise and there is no activity that will produce vibration.

9. Environmental Mitigation Measures

Specific mitigation measures to address impacts from construction noise and vibration are outlined in Table for Standard Hours work and in for Out of Hours Work (OOHW).

The mitigation measures are provided in various stages, depending on the predicted noise levels relative to the NMLs, in general accordance with the CNVG and as discussed in Section **Error! Reference source not found.** The standard feasible and reasonable mitigation measures for will be implemented at all times, with additional mitigation measures applied depending on the predicted exceedance of the relevant NMLs and the times of the works.

Noise mitigation measures for OOHW are also provided in accordance with the Out of Hours Work Approval Procedure in Appendix C.

Due to the nature of the works, which will require significant OOHW, some measures recommended by the CNVG will need to be adapted for this Project. The CNVG recommends a limit on OOHW of six nights per month where Respite Period 1 and/or Respite Period 2 are triggered. This will not be possible for this Project, although the impact on particular residences will be minimised by programming noisy works to avoid continuous OOHW outside each residence. As works progress along the alignment and occur more than 150 m from a residence, it is likely that compliance will be able to be achieved with the Night NMLs. This will be considered in the programming of OOHW.

The vibration mitigation measures are to be implemented where works are occurring within the safe working distances for human response identified in Section **Error! Reference source not found.** and in accordance with the CNVG.

10. Working Hours

In accordance with the SSD, work times are defined as follows:

- Standard hours: works carried out between 9 am to 12 pm and 2pm to 5pm Monday to Friday, and 9 am to 12 pm on Saturdays;

Table 4 Standard Hours noise and vibration mitigation measures

ID	Mitigation Measure	Timing		Responsibility
		PC ¹	C ²	
NOISE: Standard Working Hours measures applied at all times				
NVMM1	Undertake works during Standard Hours. Where works must occur outside of Standard Hours, approval from the appropriate authorities is required in accordance with the SSD 2018	✓	✓	Construction Manager
NVMM2	Implement a complaints handling procedure for noise and other construction related complaints in accordance with Section 2.5	✓	✓	Community Relations Manager
NVMM3	Ensure all mobile construction equipment have non-tonal reversing alarms.	✓	✓	Foreman, Operators
NVMM4	Plan and conduct works in a manner to minimise the reversing of vehicles with audible reversing alarms.		✓	Construction Manager, Foreman
NVMM5	Trucks will travel via internal haul roads and major roads where practicable to minimise use of local roads.		✓	Foreman
NVMM6	Site compounds, access points and roads will be positioned as far as practicable away from residential receivers. Equipment within site compounds will be oriented as positioned as far as possible from sensitive receivers, to take advantage of natural shielding and shielding provided by buildings.		✓	Foreman
NVMM7	Ensure that truck tailgates are cleared and locked at the point of unloading.		✓	Foreman, Operators
NVMM8	Use two way radios at the minimum effective volume. Avoid slamming of doors, shouting and whistling.		✓	Foreman, Operators
NVMM9	Utilise quieter work methods and equipment, including the use of mufflers and silencers where practicable.		✓	Construction Manager
NVMM10	Noise levels generated by plant and equipment will be considered in rental decisions, with noise levels to be compliant with Appendix A and Table 2 of the CNVG.	✓	✓	Construction Manager
NVMM11	Vehicle warning devices, such as horns, are not to be used as signalling devices.		✓	Foreman, Operators
NVMM12	Undertake regular maintenance of plant and equipment, including silencers, to ensure that noise emissions do not increase over time. Servicing, refuelling and warm-up to be undertaken during standard construction hours.		✓	Foreman, Operators

ID	Mitigation Measure	Timing		Responsibility
		PC ¹	C ²	
NVMM13	Turn vehicles and machinery off when not in use.		✓	Foreman, Operators
NVMM14	Only necessary equipment, of an appropriate size and power, will be on site.		✓	Construction Manager
NVMM15	The use of engine compression brakes near residential areas will be limited.		✓	Foreman, Operators
VIBRATION				
VIBRATION: Standard Hours Works occurring within safe working distances for human comfort				
NVMM16	Undertake works during standard construction hours. Where works must occur outside of standard hours, assess Out of Hours works in accordance with the <i>Out of Hours Work Approval Procedure</i> provided in Appendix C.	✓	✓	Construction Manager
NVMM17	Implement a hot line and complaints handling procedure for vibration and other construction related complaints.	✓	✓	Community Relations Manager
NVMM18	Restrict construction traffic speed to 20 km/h across the site, or 40 km/h for haul roads. Signpost the speed limit.		✓	Foreman
NVMM19	Restrict construction traffic to designated roadways.		✓	Foreman
NVMM20	Run plant that has high and low vibration operating settings on the lowest effective vibration setting, including static rolling where feasible.		✓	Foreman