Resonate

USYD Electrical Engineering Building – ETP Stage 1

Construction Noise and Vibration Management Plan

S180585RP5 Revision A

Friday, 1 March 19

Resonate

Document Information

Project	USYD Electrical Engineering Building ETP Stage 1	
Client	Laing O'Rourke Sydney	
Report title	Construction Noise and Vibration Management Plan	
Project Number	S180585	
Author	Julia Knight Acoustic Consultant p+61 2 8355 4888 m+61 478 011 492 julia.knight@resonate-consultants.com	
Reviewed by	Keith Hewett	

Revision Table

Report revision	Date	Comments
0	1 March 2019	Draft
A	1 March 2019	Issue

Glossary

A-weighting	A spectrum adaption that is applied to measured noise levels to represent human hearing. A-weighted levels are used as human hearing does not respond equally at all frequencies.
Daytime	Between 7 am and 6 pm as defined in the INP.
dB	Decibel—a unit of measurement used to express sound level. It is based on a logarithmic scale which means a sound that is 3 dB higher has twice as much energy. We typically perceive a 10 dB increase in sound as a doubling of loudness.
dB(A)	'A' Weighted sound level in dB.
Evening	Between 6 pm and 10 pm as defined in the INP.
Frequency (Hz)	The number of times a vibrating object oscillates (moves back and forth) in one second. Fast movements produce high frequency sound (high pitch/tone), but slow movements mean the frequency (pitch/tone) is low. 1 Hz is equal to 1 cycle per second. The human ear responds to sound in the frequency range of 20 to 20,000 Hz.
ICNG	New South Wales *Interim Construction Noise Guideline*
INP	New South Wales *Industrial Noise Policy*, 2000.
Intrusive Noise	Noise emission that when assessed at a noise-sensitive receiver (principally a residential premises boundary) is greater than 5 dB(A) above the background noise level.
L_{10}	Noise level exceeded for 10% of the measurement time. The L_{10} level is commonly referred to as the average maximum noise level.
L_{90}	Noise level exceeded for 90% of the measurement time. The L90 level is commonly referred to as the background noise level.
L_{eq}	Equivalent Noise Level—Energy averaged noise level over the measurement time.
L_{max}	Maximum measured sound pressure level in the time period.
mm/s	Millimetres per second—units of vibration velocity.
µm/s	Micrometres per second—units of vibration velocity.
Night-time	Between 10 pm on one day and 7 am on the following day as defined in the INP.
Rating Background Level (RBL)	Overall single-figure A-weighted background level representing an assessment period (Day/Evening/Night). For the short-term method, the RBL is simply the measured $L_{90,15min}$ noise level. For the long-term method, it is the median value of all measured background levels during the relevant assessment period.

Resonate

Table of Contents

1 Introduction 1
1.1 Objectives 1
2 Approval Condition requirements 2
2.1 Condition B20 2
3 Project and site description 3
3.1 Location 3
3.2 ETP development 4
3.2.1 Construction 4
3.2.2 Construction hours 5
3.3 Existing environment 6
3.3.1 Unattended monitoring 6
3.3.2 Attended Monitoring 7
3.4 Noise catchment areas 8
4 Construction noise and vibration criteria 10
4.1 Construction noise 10
4.1.1 Construction Noise Limits 10
4.1.2 Standard Working Hours 10
4.1.3 Noise Management Levels - Residential land uses 10
4.1.4 Noise Management Levels - Other sensitive land uses 11
4.1.5 Noise Management Levels 12
4.2 Construction vibration 13
4.2.1 Vibration Criteria 13
4.2.2 Cosmetic and structural damage 13
4.2.3 Human comfort 14
5 Construction noise and vibration assessment 16
5.1.1 Construction noise sources 16
5.1.2 Typical construction noise levels during Standard Works Hours 17
5.1.3 Typical construction noise levels during Saturday afternoon works 19
5.2 Construction vibration 20
6 Noise and vibration management measures 21
6.1 Noise and vibration management measures 21
6.2 Consultation 23
6.3 Complaint handling 24
7 Compliance management 25
7.1 Roles and responsibilities 25

7.2 Training 25
7.3 Monitoring and inspections 25

1 Introduction

The University of Sydney is proposing to develop an Engineering Technology Precinct (ETP) within the existing campus in Darlington, which will provide a new contemporary, flexible and collaborative facility. The proposed building will enable the Engineering and Technology faculty to expand its research and teaching facilities.

This Construction Noise and Vibration Management Plan (CNVMP) forms part of Laing O'Rourke's Development Consent Conditions for Application No. SSD 8636, dated 14th February 2019, under Section 4.38 of the Environmental Planning Act 1979, for the construction of the Electrical Engineering Building (the Project).

1.1 Objectives

This CNVMP has been prepared to fulfil the Consent Conditions, specifically Condition B20.

Condition B20 States the following:
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;
(b) describe procedures for achieving the noise management levels in EPA's Interim Construction Noise Guideline (DECC, 2009);
(c) outline how noise and vibration impacts would be monitored during construction
(d) describe the measures to be implemented to manage high noise generating works such as piling, in close proximity to sensitive receivers;
(e) include strategies that have been developed with the community for managing high noise generating works; and
(f) describe the community consultation undertaken to develop the strategies; and
(g) include a complaints management system that would be implemented for the duration of the construction.

The key objective of the CNVMP is to ensure that during the construction site works the noise and vibration impacts on sensitive receivers are minimised and within the scope permitted by the planning approval. This includes a target to minimise complaints from the community and stakeholders relating to noise and vibration. Where complaints are received, a comprehensive complaints management system is instigated to minimise impact on the local community.

To achieve this objective, Laing O'Rourke will undertake the following:

- Ensure appropriate controls and procedures are implemented during construction activities to avoid or minimise noise and vibration impacts and potential adverse impacts to neighbouring sensitive receivers.
- Ensure appropriate measures are implemented to address Condition B20 and other guidance for construction noise and vibration management relevant to building works in NSW.

2 Approval Condition requirements

2.1 Condition B20

This CNVMP is to satisfy the meeting of the requirements of Condition B20 of the Planning Approval dated 14th February 2019. The following table summarises the requirements of Condition B20 and where these have been addressed within this CNVMP.

Table 1 Condition B20 requirements

Reference		Where addressed
B20	The Construction Noise and Vibration Management Sub-plan must address, but not be limited to, the following	This CNVMP
B20 (a)	be prepared by a suitably qualified and experienced noise expert;	Contributors to this report have significant experience in the assessment of construction noise and vibration, and are Members of the Australian Acoustical Society.
B20 (b)	describe procedures for achieving the noise management levels in EPA's Interim Construction Noise Guideline (DECC, 2009);	Section 6.1
B20 (c)	outline how noise and vibration impacts would be monitored during construction	Section 7.3
B20 (d)	describe the measures to be implemented to manage high noise generating works such as piling, in close proximity to sensitive receivers;	Section 6.1
B20 (e)	include strategies that have been developed with the community for managing high noise generating works; and	Section 6.2, Appendix B
B20 (f)	describe the community consultation undertaken to develop the strategies; and	Section 6.3, Appendix C
B20 (g)	include a complaints management system that would be implemented for the duration of the construction.	Appendix C

3 Project and site description

3.1 Location

The ETP will be constructed on the Darlington campus. The site is bounded by the Mechanical Engineering Building and Seymour Centre to the north, the Peter Nicol Russell (PNR) Building to the south and the Engineering Link Building to the east. Figure 1 shows the proposed site location.

A number of noise and vibration-sensitive land uses are located in the immediate vicinity of the Stage 1 site as shown in Figure 1, with the most significant being existing University buildings. The nearest residential land uses are the Urbanest Darlington Student Accommodation to the west (represented by R1), the residences on the eastern side of Shepherd Street (represented by R4, R5 and R6) and the residences on the northern side of Cleveland Street (represented by R3).

The sensitive land uses are summarised in Table 2 alongside a description of the land use.

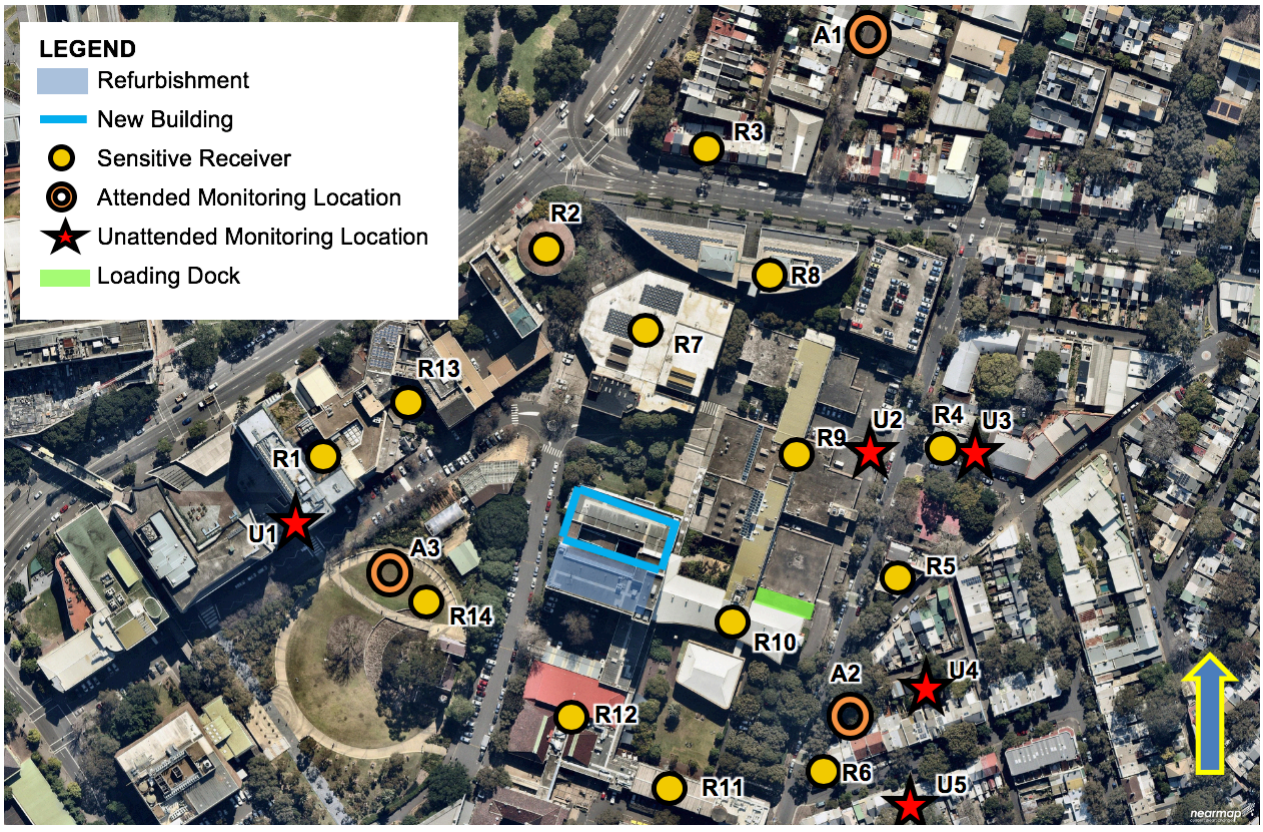

Figure 1 ETP site location

Table 2 Noise and vibration sensitive land uses

Reference (see Figure 1) and name	Description
Residential buildings	
R1 – Urbanest Darlington (student accommodation)	Residential land uses 80 m away or more from new building. Cleveland Street and Shepherd Street residences shielded by intervening buildings.
R2 – International House (student accommodation)	
R3 – Cleveland Street residences	
R4 – Shepherd Street residences north	
R5 – Shepherd Street residences south	
R6 – Calder Road residences	
University of Sydney buildings	
R7 – Seymour Centre	Performing Arts Centre within the University of Sydney, approximately 45 m north of the new building.
R8 – Warren Centre	Various University buildings associated with Engineering Faculty that surround the project site.
R9 – Mechanical Engineering	
R10 – Engineering Link Building	
R11 – Civil Engineering	
R12 – PNR Building	
R13 – Wentworth Building	Faculty of Architecture, Design and Planning
Recreational land uses	
R14 – Cadigal Green	Public recreation area. Includes heritage-listed Old School building on Maze Crescent.

3.2 ETP development

The ETP will involve the construction of a ten-level new building on the footprint shown in Figure 1. The neighbouring building will be refurbished and linkages created between the two buildings. Landscaping will also occur around the Precinct area.

3.2.1 Construction

Construction of the ETP development is scheduled to commence in the first quarter of 2018 and be completed by mid-2020. The construction staging has been broadly summarised in Table 3.

Table 3 Anticipated construction schedule

Stage	Description	Approx. Start Date	Approx. End Date	Approx. Duration
Early Works (REF works)	Services diversions, initial demolition works (Engineering Walk) and vegetation clearance. Completed end of February 2019		Completed end of February 2019	
Demolition	Demolition of north tower		Completed 8 October 2018	
Bulk Excavation	Piling works and bulk excavation _	11 March 2019	4 April 2019	24 days
Substructure	Creation of substructure.	1 April 2019	21 June 2019	81 days
Superstructure	Creation of building Frame.	12 May 2019	6 April 2020	330 days
Internal fitout	Internal works and fitout of all levels. Will commence progressively as Level superstructures completed.	28 July 2019	20 Aug 2020	389 days
External works		5 January 2019	19 July 2020	200 days

3.2.2 Construction hours

The Development Approval Conditions state the following in relation to allowable construction hours:

C4. Construction, including delivery of materials to and from the site, may only be carried out between the following hours:

- *Between 7am and 6pm, Mondays to Fridays inclusive; and*
- *Between 7:30am and 3:30pm, Saturdays*
- *No work to be carried out on Sunday's or public holidays.*

C5. Activities may be undertaken outside of the hours in Condition C4 if required:

- *By the Police or a public authority for the delivery of vehicles, plant or materials; or*
- *In an emergency to avoid the loss of life, damage to property and/or to prevent environmental harm; or*
- *Where the works are inaudible at the nearest sensitive receivers; or*
- *Where a variation is approved in advance writing by the Secretary or her nominee if appropriate justification is provided for the works.*

C6. Notification of such activities must be given to affected residents before undertaking the activities or as soon as is practical afterwards.

C7. Rock breaking, rock hammering, sheet piling, pile driving and similar activities may only be carried out between the following hours:

- *9am to 12pm, Monday to Friday*
- *2pm to 5pm Monday to Friday; and*
- *9am to 12pm, Saturday*

3.3 Existing environment

The existing environment in the area immediately around the site is typical of an urban University campus, with a level of steady background noise from distant traffic and mechanical plant, with short-term noise from pedestrians and occasional vehicles on and around the campus. At the nearest residential uses, noise from local traffic on Shepherd Street and a mix of local and arterial traffic on Cleveland Street and City Road contribute to the ambient environment.

3.3.1 Unattended monitoring

Unattended noise monitoring conducted in accordance with the NSW Industrial Noise Policy (INP) has been used to establish existing conditions at the following locations around the site:

- U1: Urbanest student accommodation, Darlington – nearest residential-type land uses to the west of the site. Monitoring conducted from 12 to 19 March 2018.
- U2: Blackwattle Creek Lane entry – monitoring undertaken on University of Sydney land on western side of Shepherd Street. Monitoring conducted from 12 to 19 March 2018.
- U3: Residence at 130 Shepherd Street – residence to the east of the site. Monitoring was conducted from 10 to 17 August 2018, but due to battery failure of the noise logger data was only available from 10 to 13 August.
- U4: Residence at 32 Calder Street – residence to southeast of the site. Monitoring was conducted from 10 to 17 August 2018.
- U5: Residence at 41 Calder Street – residence to southeast of the site. Monitoring was conducted from 10 to 17 August 2018.

Table 4 Unattended monitoring results

Location[1]	Rating Background Level, dB(A) L_{90}[2]			Ambient noise level, dB(A) L_{eq}		
	Day 7 am–6 pm	Evening 6 pm–10 pm	Night 10 pm–7 am	Day 7 am–6 pm	Evening 6 pm–10 pm	Night 10 pm–7 am
U1: Urbanest Darlington	54	50	46	60	58	55
U2: Blackwattle Creek Lane	51	48	43	59	57	52
U3: 130 Shepherd Street	48	45	40	59	59	53
U4: 32 Calder Street	43	42	37	56	50	45
U5: 41 Calder Street	43	42	38	51	49	45

(1) Refer to Figure 1 for the location of the monitoring.

(2) The Rating Background Level is a measure of the typical minimum steady background noise level for each time of day.

The measured noise levels show quieter noise levels at night time, particularly in the Calder Road area to the southeast of the site where background noise levels are below 40 dB(A) at night. Noise levels were higher around the Urbanest Darlington site, with background noise levels of 46 dB(A) at night due to the proximity of this site to the Princes Highway / City Road.

Only three days of data were able to be obtained in August 2018 at 130 Shepherd Street due to battery failure of the noise monitoring equipment but the measurement results at that location were similar to the results of the longer monitoring period at the entry to Blackwattle Creek Lane (immediately across the road from 130 Shepherd Street) in

March 2018. The background noise levels were 3 dB lower at 130 Shepherd Street for all time periods, but this was attributed to the fact that the monitoring at 130 Shepherd Street occurred across the weekend rather than during the week. However, as a conservative approach, the ambient and background noise levels measured at 130 Shepherd Street have been adopted for residences in this area.

No unattended noise monitoring was able to be conducted to the north of the site (northern side of Cleveland Street) as no permission was obtained from landowners in this area. Supplementary attended monitoring was carried out in this area, as detailed in Section 3.3.2, and it has been assumed that the background noise levels in this area are equivalent to those measured at 130 Shepherd Street. This is considered a conservative approach as the northern residential areas is much closer to Cleveland Street and City Road.

3.3.2 Attended Monitoring

Attended monitoring was conducted at locations around the site on Wednesday, 8 November 2017 between 11:00 am and 1:00 pm. The monitoring was conducted during the study break prior to University exam period and therefore there were fewer pedestrians on campus at the time of the measurements than would be during teaching times.

The measured noise levels at each location are shown in Table 5, with the measurement locations shown on Figure 1.

Table 5 Attended monitoring results on Wednesday, 8 November 2017

Location	Measured noise level, dB(A)				Description
	L_{max}	L_{10}	L_{eq}	L_{90}	
Rose Street to north A1	79	56	53	50	15-minute measurement at 12:10 pm. Well-shielded from proposed development site. Road traffic noise contribution from Cleveland Street and City Road.
Rose Street to north A1	58	52	50	48	Short-term measurement at 12:30 pm with no local car movements. Controlled by steady background noise including mechanical plant noise.
Cnr of Boundary and Shepherd St A2	70	60	56	52	15-minute measurement at 11:15 am. Steady background noise from mechanical plant serving various University buildings, with short-term noise from car pass-bys.
Cadigal Green A3	67	58	55	52	15-minute measurement at 11:40 am. Steady background noise from mechanical plant serving various University buildings, with distant traffic from City Road.

The measurements indicate that there is a moderate level of existing noise in the environment during the daytime period, due largely to mechanical plant noise from the University of Sydney and local and distant traffic. Even without significant contribution from traffic noise, the measured background noise at Rose Street to the north (and further from the University) was 48 dB(A) L_{90} and controlled by mechanical plant from University uses.

Measurements at Location 1 and Location 2 were repeated on the morning of Friday, 17 November, in order to determine the typical noise environment between 6 am and 7 am which would be the earliest time that mechanical

plant on the ETP would be expected to operate. The measured noise levels at each location for this time period are shown in Table 6.

Table 6 Attended monitoring results on morning of Friday, 17 November 2017

Location	Measured noise level, dB(A)				Description
	L_{max}	L_{10}	L_{eq}	L_{90}	
Rose Street to north A1	75	55	52	49	15-minute measurement at 6:15 am. Well-shielded from proposed development site. Distant road traffic noise contribution from Cleveland Street and City Road.
Cnr of Boundary and Shepherd St A2	72	57	54	50	15-minute measurement at 6:40 am. Steady background noise from mechanical plant serving various University buildings, with short-term noise from car pass-bys.

The measurement results presented in Table 6 indicate that noise levels were not markedly different between the early morning and midday periods. The consistent level of background noise (L_{90}) demonstrated across both measurement periods is representative of the steady level of mechanical plant noise from various sources, including existing University of Sydney buildings.

3.4 Noise catchment areas

Based on the results of the noise monitoring conducted around the site, four noise catchment areas (NCAs) have been defined for the different residential land use areas around the University of Sydney. This includes the student accommodation uses at International House and Urbanest Darlington.

The NCAs have been defined as shown on Figure 2 and are broadly described as follows:

- NCA1: Student accommodation areas to west and northwest of site. Background noise environment established based on monitoring results from U1.
- NCA2: Residential areas to the north of the site and on the northern side of Cleveland Street. Background noise environment established based on monitoring results from U3.
- NCA3: Residential areas to the northeast of the site and on the eastern side of Shepherd Street and north of Ivy Street. Background noise environment established based on monitoring results from U3.
- NCA4: Residential areas to the east and southeast of the site, on the eastern side of Shepherd Street and south of Ivy Street. Background noise environment established based on monitoring results from U4.

Figure 2 Noise catchment areas

4 Construction noise and vibration criteria

4.1 Construction noise

Construction noise in New South Wales is assessed using the Department of Environment & Climate Change (now Environment Protection Authority) *Interim Construction Noise Guideline* (ICNG). The ICNG is also defined as the relevant guideline for construction noise by the Development Consent Conditions issued by DPE, dated 14th February 2019.

The ICNG aims to manage noise from construction works regulated by the EPA. It is also intended to provide guidance to other interested parties in the management of construction noise, and has therefore been adopted for this construction noise assessment. The ICNG prescribes $L_{eq,15min}$ Noise Management Levels (NML) for sensitive receivers as part of a quantitative construction noise assessment. Where the predicted or measured construction noise level exceeds these management levels, then all feasible and reasonable work practices should be implemented to reduce construction noise, and community consultation regarding construction noise is required to be undertaken.

4.1.1 Construction Noise Limits

Development Approval Condition C14. 14th February 2019.

C14. The development must be constructed to achieve the construction noise management levels detailed in the Interim Construction Noise Guideline (DECC, 2009). All feasible and reasonable mitigation measures must be implemented and any activities that could exceed the construction noise management levels must be identified and managed in accordance with the management and mitigation measures identified in the approved Construction Noise and Vibration Management Plan.

4.1.2 Standard Working Hours

The ICNG recommends standard working hours for construction as follows:

- Monday to Friday, 7 am to 6 pm
- Saturday, 8 am to 1 pm
- No work on Sundays or Public Holidays

To encourage work during the Standard Working Hours, and to reflect the lower impact of work at these times, the ICNG prescribes less stringent Standard Working Hours NMLs. Generally, the proposed working hours for the ETP align with the ICNG Standard Working Hours, with the exception of the period from 1 pm to 3:30 pm on Saturday afternoon. While this is generally a lower impact out of hours period, more stringent NMLs and noise management requirements will apply to work at this time.

It should be noted that the Standard Working Hours are only applicable to residential (or similar) land uses. At educational or commercial land uses, where evening amenity and sleeping is not a concern, the impact of construction noise is assessed based on the times that the land use operates.

The above standard working hours have been replaced by the allowable working hours prescribed in the Development Approval Conditions C4 to C7 see section 3.2.2.

4.1.3 Noise Management Levels - Residential land uses

The NMLs prescribed for residential land uses by the ICNG are presented in Table 7. The levels apply at the most exposed property boundary of the noise sensitive receiver at a height of 1.5 metres above ground level. The NMLs have also been adopted for the International House and Urbanest student accommodation sites around the site.

Table 7 Noise management levels for residential land uses

Time of day	NML, $L_{eq,15min}$	Application notes
Recommended Standard Working Hours	Noise affected: RBL + 10 dB(A)	May be some community reaction to noise. • Where the predicted or measured construction noise level exceeds the noise affected level, all feasible and reasonable work practices should be applied to meet the noise affected level. • All residents potentially impacted by the works should be informed of the nature of the works, the expected noise levels and duration, and provided with site contact details.
	Highly noise affected: 75 dB(A)	May be strong community reaction to noise. • Where construction noise is predicted or measured to be above this level, the relevant authority may require respite periods that restrict the hours that the very noisy activities can occur. • Respite activities would be determined taking into account times identified by the community when they are less sensitive to noise, and if the community is prepared to accept a longer period of construction to accommodate respite periods.
Outside recommended Standard Working Hours	Noise affected: RBL + 5 dB(A)	• 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 affected noise level. • Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the affected noise level, the proponent should negotiate with the affected community.

4.1.4 Noise Management Levels - Other sensitive land uses

The ICNG also prescribes NMLs for other sensitive land uses, including educational buildings and offices. The NMLs for relevant land uses are summarised in Table 8 and apply only when those land uses are in use.

For those receivers where an internal NML applies, it is common to assume an outdoor-to-indoor noise reduction of 25 dB(A). This is based on a standard commercial building facade with windows kept closed, such as at most University Buildings. Therefore, for this assessment, an external NML of 70 dB(A) $L_{eq,15min}$ will be used for the educational sensitive land uses surrounding the development site.

It is noted that as most of the surrounding buildings are University of Sydney land uses, no specific requirements are applied by the ICNG, which is intended to manage construction noise impacts between uses not managed by the same body. As the relevant uses around the ETP site are all managed by the University of Sydney, management of construction noise impacts on adjoining uses will be undertaken by the University. However, as good practice and to provide guidance to the University, the NMLs recommended by the ICNG have been adopted for the University of Sydney uses in this assessment.

Table 8 ICNG noise management levels for other sensitive land uses

Land use	NML $L_{eq,15min}$ (applies when property in use)
Classrooms at schools and other educational institutions	Internal noise level of 45 dB(A)
Passive recreation areas (characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation).	External noise level of 60 dB(A)
Offices, retail outlets	External noise level of 70 dB(A)

4.1.5 Noise Management Levels

Table 9 summarises the NMLs applicable to sensitive land uses around the ETP site during the construction phase. The NMLs are based on the background noise levels from unattended monitoring.

Table 9 Noise Management Levels applicable to ETP

Land use	NML for time period, dB(A)			
Noise Catchment Area (See section 3.4)	Standard Working Hours	Out of Hours Day[1] (Saturday afternoon & Sundays)	Out of Hours Evening[2]	Out of Hours Night[3]
NCA1 – student accommodation uses	64 (NML) 75 (Highly noise affected)	59	55	51
NCA2	58 (NML) 75 (Highly noise affected)	53	50	45
NCA3				
NCA4	53 (NML) 75 (Highly noise affected)	48	47	42
University of Sydney uses	70	70	70	70
Cadigal Green	60	60	60	60

(1) Any out of hours work occurring between 7 am and 6 pm.

(2) Any out of hours work occurring between 6 pm and 10 pm.

(3) Any out of hours work occurring between 10 pm and 7 am.

It is noted that the only works proposed outside of Standard Working Hours are from 1 pm to 3:30 pm on Saturday afternoons. However, NMLs for other periods are shown for information should this change in the future.

4.2 Construction vibration

Ground vibration generated by construction can have a range of effects on buildings and building occupants. The main effects are generally classified as:

- human disturbance – disturbance to building occupants: vibration which inconveniences or interferes with the activities of the occupants or users of the building
- effects on building structures – vibration which may compromise the condition of the building structure itself.

In general, vibration criteria for human disturbance are more stringent than vibration criteria for effects on buildings. Building occupants will normally feel vibration readily at levels well below those which may cause a risk of cosmetic or structural damage to a structure. However, it may not always be practical to achieve the human comfort criteria. Furthermore, unnecessary restriction of construction activities can prolong construction works longer than necessary, potentially resulting in other undesirable effects for the local community.

4.2.1 Vibration Criteria

Conditions C18, C19 and C20 from the Development Approval Conditions dated 14th February 2019 state the following:

C18. Vibration caused by construction at any residence or structure outside the site must be limited to:

- *For structural damage, the latest version of DIN 4150-3 (1992-02) Structural vibration – Effects of vibration on structures (German Institute for Standardisation, 1999); and*
- *For human exposure, the acceptable vibration values set out in the Environmental Noise Management Assessing Vibration: a technical guideline (DEC,2006) (as may be updated from time to time).*

C19. Vibratory compactors must not be used closer than 30m from residential buildings unless vibration monitoring confirms compliance with the vibration criteria specified in condition C18.

C20. The limits in C18 and C19 apply unless otherwise outlined in a Construction Noise and Vibration Management Plan (this plan), approved as part of the CEMP required by condition B18 of this consent.

Construction vibration criteria have therefore, been adopted from the following sources:

- Cosmetic and structural damage to buildings: German Standard DIN 4150-3[1]
- Human comfort: *Assessing Vibration – A Technical Guideline: DEC 2006* (the Vibration Guideline)

4.2.2 Cosmetic and structural damage

DIN 4150-3 summarises structural and cosmetic damage assessment criteria for different types of buildings, which are presented in Table 10, which are widely used for the assessment of construction vibration effects on buildings in Australia. The criteria are specified as Peak Particle Velocity (PPV) levels measured in any direction at or adjacent to the building foundation.

[1] German Standard DIN 4150-3, 1999, *Structural Vibration – Part 3: Effects of vibration on structures*.

Table 10 DIN 4150-3 vibration cosmetic and structural damage criteria

Structure type	Peak Particle Velocity (PPV), mm/s			
	Foundation of structure			Vibration at horizontal plane of highest floor at all frequencies
	<10 Hz	10-50 Hz	50-100 Hz	
Buildings used for commercial, industrial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
Dwelling and buildings of similar design and/or use	5	5 to 15	15 to 20	15
Structures that, because of their particular sensitivity to vibration, do not correspond to those listed in rows 1 and 2, and are of great intrinsic value (e.g. heritage-listed buildings)	3	3 to 8	8 to 10	8

With respect to the project site, the Old School building on Cadigal Green is heritage-listed and therefore subject to the most stringent vibration limits. It is approximately 50 m from the site.

DIN 4150-3 states that exposing buildings to vibration levels higher than that recommended would not necessarily result in damage. Rather, it recommends these values as maximum levels of short-term construction vibration at which experience has shown damage reducing the serviceability of structures will not occur due to vibration effects.

DIN 4150-3 is considered to be suitable for the assessment of both structural and cosmetic damage as it considers a reduction in serviceability of the structure is deemed to have occurred if cracks form in plastered surfaces of walls, existing cracks in the building are enlarged or partitions become detached from loadbearing walls or floors.

4.2.3 Human comfort

The ICNG recommends that vibration from construction works be assessed under *Assessing Vibration – a technical guideline* (the Vibration Guideline), consistent with the Development Consent Conditions issued by DPE. The vibration assessment criteria defined in the Vibration Guideline are for human comfort and represent goals that, where exceeded, require the application of all feasible and reasonable mitigation measures. Where the maximum value cannot be feasibly and reasonably achieved, the operator would need to negotiate directly with the affected community.

The Vibration Guideline defines vibration assessment criteria for continuous, impulsive and intermittent vibration. Vibration can be classified according to the following definitions:

- Continuous vibration: continues uninterrupted for a defined period. Applies to continuous construction activity such as tunnel boring machinery.
- Impulsive vibration: rapid build-up to a vibration peak followed by damped decay or the sudden application of several cycles of vibration at approximately the same magnitude providing that the duration is short. Applies to very occasional construction activities that create distinct events such as dropping of heavy equipment.
- Intermittent vibration: interrupted periods of continuous vibration (such as a drill) or repeated periods of impulsive vibration (such as a pile driver).

The majority of construction activities as part of the proposed works would be expected to be continuous or intermittent in nature.

Table 11 presents the management levels for continuous and impulsive vibration at different land uses. The management levels specified are as overall unweighted RMS vibration velocity levels. The Vibration Guideline

specifies the management levels as suitable for vibration sources predominantly in the frequency range 8-80 Hz as would be expected for construction vibration.

Table 11 RMS velocity management levels for continuous and impulsive vibration

Land use	Continuous vibration – RMS vibration velocity, mm/s		Impulsive vibration – RMS vibration velocity, mm/s	
	Preferred	Maximum	Preferred	Maximum
Critical areas[1]	0.1	0.2	0.1	0.2
Residences and hospital wards – daytime[2]	0.2	0.4	6.0	12.0
Residences and hospital wards – night time[3]	0.14	0.28	2.0	4.0
Offices, schools	0.4	0.8	13.0	26.0
Workshops	0.8	1.6	13.0	26.0

(1) Critical operating areas include hospital operating theatres and precision laboratories where sensitive operations are occurring.

(2) Daytime is defined by the Vibration Guideline to be 7 am to 10 pm.

(3) Night time is defined by the Vibration Guideline to be 10 pm to 7 am.

For intermittent vibration, the Vibration Dose Value (VDV) is used as the metric for assessment as it accounts for the duration of the source, which will occur intermittently over the assessment period. The VDV management levels at different land uses for intermittent vibration sources are presented in Table 12.

Table 12 VDV management levels for intermittent vibration

Land use	VDV – intermittent vibration, $m/s^{1.75}$	
	Preferred	Maximum
Critical areas[1]	0.1	0.2
Residences and hospital wards – daytime[2]	0.2	0.4
Residences and hospital wards – night time[3]	0.13	0.26
Offices, schools	0.4	0.8
Workshops	0.8	1.6

(1) Critical operating areas include precision laboratories where sensitive operations are occurring.

(2) Daytime is defined by the Vibration Guideline to be 7 am to 10 pm.

(3) Night time is defined by the Vibration Guideline to be 10 pm to 7 am.

5 Construction noise and vibration assessment

5.1.1 Construction noise sources

Table 13 summarises the assumed sound power levels (L_W) for the major construction noise sources which we expect would be on site during each phase of construction. The sound power levels have been based on data obtained from previous measurements conducted by Resonate and those within the UK Department for Environment, Food and Rural Affairs (DEFRA) *Update of noise database for prediction of noise on construction and open sites*. An overall sound power level for each phase has also been assumed based on the loudest typical source(s) operating for each works phase.

Early works and demolition has already been completed and therefore has not been assessed for the purposes of this CNVMP. Table 13 provides the typical plant items expected for the proposed construction activities.

Table 13 Construction noise source sound power levels

Stage	Typical plant items	Assumed sound power level, dB(A)
CC1 – Bulk Excavation	Bored piling rig	111
	Large excavator	111
	Crane	106
	Large truck	108
	Typical overall sound power level	**112**
CC1 – Substructure, in-ground services, crane pad and slab on ground	Crane	106
	Large excavator	111
	Pneumatic jackhammer	109
	Concrete truck	109
	Concrete pump	107
	Large truck	108
	Typical overall sound power level	**114**
CC2 - Superstructure	Concrete truck	109
	Concrete pump	107
	Crane	106
	General hand tools	98
	Large truck	108
	Typical overall sound power level	**111**
CC3 - Facade works	Crane	106
	General hand tools	98
	Large truck	108
	Typical overall sound power level	**107**

Stage	Typical plant items	Assumed sound power level, dB(A)
CC3 - Internal works and fitout	General hand tools	98
	Compressor	94
	Portable generator	95
	Typical overall sound power level	**84**[1]
CC4 - External landscape work areas	Large excavator	111
	Vibratory roller	107
	Concrete truck	109
	Concrete pump	107
	Large truck	108
	Chainsaw	114
	Typical overall sound power level	**112**

(1) Includes a 15 dB(A) indoor-to-outdoor reduction in noise levels for internal works.

5.1.2 Typical construction noise levels during Standard Works Hours

Typical worst-case construction noise levels have been predicted using a three-dimensional environmental noise model of the site and surrounds, developed in SoundPlan version 7.4 environmental noise modelling software, including:

- topography
- building structures
- ground absorption (ground assumed to be 50% absorptive and 50% reflective)
- air absorption
- attenuation with distance.

Predictions have been carried out based on the environmental noise prediction algorithms documented in ISO 9613-2:1996 *Acoustics - Attenuation of sound during propagation outdoors -- Part 2: General method of calculation.* This provides predictions typical of conditions where the receiver is downwind of the source or where there is a moderate ground-based temperature inversion.

It is important to note that these predictions are typical worst-case predictions as they assume that:

- The construction works are occurring at the nearest point to each receiver and that the receiver is located at the most exposed position (e.g. the nearest windows of Urbanest Darlington and International House).
- The noisiest construction sources are operating continuously for the entire 15-minute period. This will not occur at all times as equipment will regularly be stood down or idled while other activities are undertaken.

Typical worst-case predicted noise levels are shown in Table 14 for each sensitive-receiver location and each phase of works. Predicted noise levels that exceed the relevant Standard Work Hours NML are highlighted in **bold** type.

Table 14 Typical worst-case external construction noise levels for Standard Working Hours

Receiver	Typical worst-case external construction noise level for phase during Standard Working Hours, dB(A) L_{eq}					
	CC1 – Bulk Excavation	CC1 – Substructure	CC2 - Superstructure	CC3 - Facade works	CC3 - Internal works and fitout	CC4 - External landscape
R1 – Urbanest Darlington	63	**65**	62	58	35	63
R2 – International House	**66**	**68**	**65**	61	38	**66**
R3 – Cleveland Street residences	50	52	49	45	22	50
R4 – Shepherd Street residences north (NCA3)	53	54	52	48	24	53
R5 – Shepherd Street residences south (NCA4)	**55**	**57**	**54**	50	27	**55**
R6 – Calder Road residences (NCA4)	51	53	49	46	22	50
R7 – Seymour Centre	**72**	**74**	**71**	67	44	**72**
R8 – Warren Centre	62	64	61	57	34	62
R9 – Mechanical Engineering	**78**	**80**	**77**	**73**	50	**78**
R10 – Engineering Link Building	**80**	**82**	**79**	**75**	52	**80**
R11 – Civil Engineering	61	63	60	56	33	61
R12 – PNR Building	69	**71**	68	64	41	69
R13 – Wentworth Building	65	67	64	60	37	65
R14 – Cadigal Green	66	68	65	61	38	66

Based on the predictions, it can be seen that construction noise from the site is predicted to exceed the relevant Standard Working Hours NMLs at:

- The nearest residences to the east on Shepherd Street (in NCA4) during major works. This would affect the residences on Shepherd Street between Calder Lane and Ivy Street during noisy construction periods. Residences to the north of Ivy Street (represented by R4) and further to the south of Calder Lane (represented by R6) are not expected to be exposed to construction works above the standard hours NML.
- The University student accommodation sites during most external works (mainly International House).
- The Seymour Centre during most external works.
- Other Engineering Faculty uses during major external works, in particular areas of the Mechanical Engineering building and the Engineering Link building.

No residential land uses are predicted to be highly noise affected by construction works.

At other locations, no significant noise impacts are expected during the construction phase, particularly if work is only undertaken during standard working hours.

Recommendations for construction noise management are provided in Section 6.

5.1.3 Typical construction noise levels during Saturday afternoon works

Table 15 presents typical predicted construction noise levels and highlights NML exceedances for those works occurring outside of Standard Working Hours, on Saturday afternoons from 1 pm to 3:30 pm.

Table 15 Typical worst-case external construction noise levels for work outside of Standard Working Hours

Receiver	Typical worst-case external construction noise level for phase outside of Standard Working Hours, dB(A) L_{eq}					
	CC1 – Bulk Excavation	CC1 – Substructure	CC2 - Superstructure	CC3 - Facade works	CC3 - Internal works and fitout	CC4 - External landscape
R1 – Urbanest Darlington	**63**	**65**	**62**	58	35	**63**
R2 – International House	**66**	**68**	**65**	**61**	38	**66**
R3 – Cleveland Street residences	50	52	49	45	22	50
R4 – Shepherd Street residences north (NCA3)	53	**54**	52	48	24	53
R5 – Shepherd Street residences south (NCA4)	**55**	**57**	**54**	**50**	27	**55**
R6 – Calder Road residences (NCA4)	**51**	**53**	**49**	46	22	**50**

The predictions indicate that:

- Predicted worst-case construction noise levels exceed the NML for most work phases for Urbanest Darlington and International House.
- Predicted worst-case construction noise levels at the Cleveland Street residences are below the out of hours NML with the exception of noisy demolition works.
- Predicted worst-case construction noise levels at the northern Shepherd Street residences in NCA3 exceed the out of hours NML for the demolition and structure phases but the exceedance is 5 dB or below.
- Predicted worst-case construction noise levels at the southern Shepherd Street residences in NCA4 exceed the out of hours NML for most phases.
- It is expected that internal works and fitout can generally occur outside of Standard Hours without unduly impacting on residential land uses.

Recommendations for construction noise management for works outside of Standard Working Hours are provided in Section 6.

Note that the assessment of work outside of standard hours has not considered the commercial and educational land uses as the NMLs for these land uses remain the same regardless of the work hours. It is noted, however, that conducting works on a Saturday afternoon period from 1 pm to 3:30 pm would be expected to reduce the overall noise impact on neighbouring commercial and educational buildings as these uses are typically less sensitive (and often largely unoccupied) at these times.

5.2 Construction vibration

Table 16 summarises recommended safe working distances for key vibration-generating activities that would be expected during the construction phase, based on prior measurements conducted by Resonate. We understand that preliminary geotechnical studies have indicated that bored (CFA) piling will be able to be undertaken.

Table 16 Recommended safe working distances for key vibration generating activities

Plant	Rating	Typical safe working distance for occupant comfort, m		Typical safe working distance for building damage, m	
		Preferred vibration target	Maximum vibration target	Heritage structure	Commercial building
Vibratory roller	< 7t	≥ 35	≥ 20	≥ 10	≥ 2
	7t – 12t	≥ 50	≥ 30	≥ 15	≥ 5
	≥ 13t	≥ 75	≥ 40	≥ 20	≥ 10
Small hydraulic hammer	300 kg – 5 to 12T excavator	≥ 12	≥ 7	≥ 5	≥ 2
Medium hydraulic hammer	900 kg – 12 to 18T excavator	≥ 35	≥ 23	≥ 15	≥ 7
Large hydraulic hammer	1600 kg – 18 to 34T excavator	≥ 65	≥ 45	≥ 35	≥ 22
Excavator	Large excavator digging	≥ 25	≥ 15	≥ 5	≥ 1
Bored piling	≤ 800mm	≥ 20	≥ 10	≥ 2	≥ 1
Jackhammer	Handheld	–[1]	–[1]	≥ 3	≥ 1

Based on the safe working distances above, vibration impacts on buildings are not expected, including to the heritage-listed Old School building. Impacts on occupant comfort are likely to be limited to any vibratory compaction works and rock-breaking works occurring near to existing Engineering Faculty buildings and consultation should be undertaken with the users of these areas during vibration-intensive works. Recommendations are provided in Section 6 for the management of construction vibration from the works.

6 Noise and vibration management measures

This section outlines noise management measures that will be implemented as part of the construction works, including consultation and complaint handling procedures.

It may not be feasible to adopt all management measures at all times during construction, and identification of all reasonable and feasible mitigation methods will be conducted by the site supervisor and/or environmental representative on a regular basis during noisy works near sensitive land uses.

In relation to the implementation of mitigation measures, feasibility addresses engineering consideration regarding what is practical to build. Reasonableness relates to the application of judgment in arriving at a decision, taking into account the following factors:

- noise reduction achieved
- number of people or other uses benefited
- cost of the measure
- delay to schedule and whether the measure will prolong exposure to noise
- community views
- pre-construction noise levels at receivers.

While the management measures presented will not necessarily result in mitigating all noise impacts at all times, they are expected to reduce adverse impacts to levels most stakeholders should find acceptable considering the anticipated benefits of the completed project as a whole.

6.1 Noise and vibration management measures

The following noise management measures will be implemented throughout works where reasonable and feasible:

Table 17 Noise and vibration management measures (NVMM)

Reference	Details of management measures	Implementation		Responsibility
Implemented throughout external works		**PC[1]**	**C[2]**	
NVMM01	Works to be undertaken during Standard Working Hours where possible.	✓	✓	Construction Manager
NVMM02	Where works occur outside of Standard Working Hours, these will occur during the approved extended Saturday working hours – Condition C4.	✓	✓	Construction Manager
NVMM03	Although not anticipated, but should any rock breaking, rock hammering, sheet piling, pile driving or similar activities take place they must be undertaken during the following hours allowed by Condition C7. This is to provide respite times from very noisy or potentially annoying works: • 9am to 12pm, Monday to Friday • 2pm to 5pm Monday to Friday; and • 9am to 12pm, Saturday	✓	✓	Construction Manager

Reference	Details of management measures	Implementation		Responsibility
Implemented throughout external works		PC[1]	C[2]	
NVMM04	Vibratory compactors or other high vibration generating activities must not be used closer than 30m from residential buildings unless vibration monitoring confirms compliance with the vibration criteria specified in condition C18 of the consent and Section 4.2 of this plan.	✓	✓	Construction Manager
NVMM05	The induction of site staff will include a reference to potential noise impacts and the identification of noise-sensitive land uses.	✓		Construction Manager
NVMM06	'Toolbox talks' will include a reference to any noise management measures being implemented on site at the time.		✓	Site Supervisor
NVMM07	Where possible, schedule work breaks at same time as sensitive times for receivers. For example, break for lunch between 12 and 2 pm.		✓	Site Supervisor
NVMM08	Implement stakeholder notification and complaint response procedures as detailed in Section 6.2 and Section 0.	✓	✓	Community Relations Manager
NVMM09	Vehicle warning devices, such as horns, are not to be used as signalling devices.		✓	Site Supervisor Operators
NVMM10	No swearing or unnecessary shouting or loud stereos/radios on site.		✓	Site Supervisor
NVMM11	No unnecessary dropping of materials from height, throwing of metal items and slamming of doors.		✓	Site Supervisor
NVMM12	Site access and delivery points will be located as far away from residential and University receivers as possible.	✓	✓	Construction Manager
NVMM13	Truck movements will use arterial roads and be diverted away from residential streets where feasible.	✓	✓	Construction Manager
NVMM14	Traffic flow, parking and loading/unloading areas will be planned to avoid the need for reversing near sensitive receivers such as, on Shepherd Street.	✓	✓	Construction Manager Site Supervisor
NVMM15	Two way radios will be used at the minimum effective volume.		✓	Site Supervisor Operators
NVMM16	Quieter construction methods, such as bored (CFA) piling rather than driven piling, will be used where feasible and reasonable.	✓	✓	Construction Manager
NVMM17	Noise levels of plant and equipment will be considered in rental decisions and all plant and equipment will be selected not to exceed the levels provided in Appendix A.	✓	✓	Construction Manager

Reference	Details of management measures	Implementation		Responsibility
Implemented throughout external works		**PC[1]**	**C[2]**	
NVMM18	Simultaneous operation of noisy plant close together will be avoided where possible.		✓	Site Supervisor
NVMM19	The offset distance between plant and sensitive uses will be maximised.		✓	Site Supervisor
NVMM20	Plant used intermittently will be shut down or throttled down to a minimum in between use (No unnecessary idling).		✓	Site Supervisor
NVMM21	Plant emitting noise in a particular direction will be directed away from residences.		✓	Site Supervisor
NVMM22	Delivery vehicles will be fitted with straps rather than chains for unloading near sensitive areas, wherever possible.		✓	Site Supervisor Operators
NVMM23	Ensure that truck tailgates are cleared and locked at the point of unloading.		✓	Site Supervisor Operators
NVMM24	Locate plant and equipment to take advantage of barriers provided by existing site features and structures.		✓	Site Supervisor Operators
NVMM25	Mobile noise barriers shall be located around noisy activities where practicable		✓	Site Supervisor Operators
NVMM26	Implement mufflers/silencers on plant and equipment. 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.		✓	Site Supervisor Operators
NVMM27	Noise associated with packing up plant and equipment at the end of works will be minimised.		✓	Site Supervisor Operators

(1) Pre-construction – note that this may refer to prior to commencement of specific activities rather than prior to the commencement of all construction works.

(2) Construction

6.2 Consultation

Laing O'Rourke has prepared a Community Communications Strategy (CCS) in consultation with project and community stakeholders. This is provided in Appendix B of this CNVMP. The CCS shall be adhered to at all times when communicating with the community.

If significant changes to works are proposed that would alter the noise impact on sensitive land uses, then additional consultation will be undertaken with respect to the proposed change at least one week prior to it occurring. This would include:

- The use of noisier plant or equipment than currently envisaged within this CNVMP, e.g. rock-breaking.
- Carrying out works outside of approved hours where there is no alternative.

6.3 Complaint handling

Laing O'Rourke has also developed a Complaints Management System (CMS) provided in Appendix C. This shall be adhered to at all times pre and during construction.

A project information telephone number and email address has been established and made available 24 hours to receive complaints. The project information line phone number will be posted on signs on the site boundary and on the project website.

The person receiving complaints will have the ability to implement reasonable and feasible measures to action the complaint. These measures may include modification of the work site or work practices, or a review of night activities. The complaint management procedure provided in the CMS shall be followed in the event of a complaint or enquiry.

Records of any noise and vibration complaint received during the works, and the action taken in response to the complaint, will be maintained throughout the works.

7 Compliance management

7.1 Roles and responsibilities

The Laing O'Rourke Project Team's organisational structure and overall roles and responsibilities are outlined in the Construction Environmental Management Plan (CEMP), of which this CNVMP forms a part. Specific responsibilities for the implementation of noise and vibration management measures are detailed in Section 5.2 of this CNVMP.

7.2 Training

All employees, sub-contractors and utility staff working on site will undergo site induction training relating to noise and vibration management issues, including:

- Existence and requirements of this CNVMP.
- Standard and extended working hours.
- Location of noise sensitive areas and receivers.
- General noise and vibration management measures.
- Complaints reporting.

7.3 Monitoring and inspections

Weekly inspections by the Site Manager or a suitably qualified representative will occur throughout construction.

Noise and vibration monitoring will also occur routinely during the works as detailed in Table 18.

Table 18 Noise and vibration monitoring plan

Situation	Monitoring requirements	Frequency, reporting and responsibility
Noise monitoring		
Attended monitoring to assess typical construction noise levels at the nearest residents on Shepherd Street. Where complaint is received and monitoring is considered an appropriate response to determine if noise levels exceed predicted construction noise levels documented in this CNVMP.	If monitoring cannot be undertaken at the nearest relevant sensitive receiver, a suitable representative location will be selected. The testing method includes: • Sound level meter configured for "Fast" time weighting and "A" frequency weighting. • Test environment free from reflecting objects where possible. Where noise monitoring is conducted within 3.5 metres of large walls or a building facade, then a reflection correction of up to -2.5 dB(A) will be applied to remove of increased noise due to sound reflections. • Tests will not be carried out during rain or when wind speed exceeds 5m/s. • Conditions such as wind velocity and direction, temperature, relative humidity and cloud cover will be recorded from the nearest Bureau of Meteorology station or on-site weather station/observations. • The monitoring period should be sufficient such that measured noise levels are representative of noise over a 15-minute period. • At a minimum L_{eq}, L_{max}, L_{10} and L_{90} levels will be measured and reported. The observations of the person undertaking the measurements will be reported including audibility of construction noise, other noise in the environment and any discernible construction activities contributing to the noise at the receiver.	Frequency On a minimum monthly basis for attended monitoring As required for complaints. Reporting Written reports of all noise monitoring will be maintained by LOR and submitted to key stakeholders on request. Responsibility Monitoring to be undertaken by LOR staff suitably experienced in carrying out noise monitoring. If deemed necessary, a suitably qualified acoustic consultant will undertake monitoring to resolve complaints.

Situation	Monitoring requirements	Frequency, reporting and responsibility
Spot checks of noisy plant to determine noise emission levels for: • assessing compliance against manufacturer specifications • assisting to assess accuracy of predictions • assessing quieter construction techniques where required.	Stationary test procedures according to AS 2012.1 Acoustics – Measurement of airborne noise emitted by earth-moving machinery and agricultural tractors – Stationary test condition. The testing method includes: • Sound level meter configured for "Fast" time weighting and "A" frequency weighting. • The test environment will be free from reflecting objects. • Tests will not be carried out during rain or when wind speed exceeds 5 m/s. • In accordance with *AS 2012.1*, a minimum of three measurement points will be defined at locations on the hemispherical surface around the plant with the radius determined by the basic length of the machine. • The A-weighted L_{eq} background noise at the measurement locations will be at least 6 dB and preferably 10 dB below the level with plant operating. • L_{eq} and L_{10} levels will be measured and reported.	Frequency On an as required basis during main works. Reporting Records of spot checks of noisy plant will be maintained by LOR. Responsibility Monitoring to be undertaken by LOR staff suitably experienced in carrying out noise monitoring.
Vibration monitoring		
If any works occur within safe working distances for damage to buildings, detailed in Section 5.2 or as per Development Consent Condition C19.	Continuous vibration monitoring conducted throughout works as follows: • Geophone installed at ground adjacent to building foundations or equivalent (or nearer) location if access not provided to the outside of the building. • Monitor to continuously record PPV vibration level in 15-minute (or shorter) intervals. • If PPV level exceeds 75% of the minimum DIN 4150-3 building damage limit, an alert will be sent to nominated site staff via email/SMS. This will include a Site Supervisor with suitable authority to stop work. • Upon receipt of an alert, work will STOP. • Necessary modifications will be made to work practices to reduce the vibration level and the works will continue as long as further alerts are not received. • Note that if the frequency of the vibration event is such that 75% of the DIN 4150-3 limit was not exceeded, then works will proceed with caution, and the alert level adjusted as appropriate.	Frequency If required and if works change such that works may occur in safe working distances for buildings. Reporting Records of logged vibration levels will be maintained by LOR. Responsibility Monitoring to be undertaken by a suitably qualified acoustic consultant.

Situation	Monitoring requirements	Frequency, reporting and responsibility
Vibration monitoring in response to a complaint, where this is considered an appropriate response.	Attended vibration monitoring will be conducted of the relevant activities as follows: • Geophone installed at ground adjacent to building foundations or equivalent (or nearer) location if access not provided to the outside of the building. • Monitor to continuously record PPV and/or VDV vibration levels generated by the activity. • Measured levels to be compared to human disturbance vibration goals and/or building damage limits as appropriate. If necessary following the vibration measurements: • Appropriate vibration management measures will be implemented. Continuous vibration monitoring will be considered if this is considered of benefit to address the complaint.	Frequency As required for complaints. Reporting Report detailing measurement results and any corrective actions to be provided to the complainant and relevant stakeholders. Responsibility A suitably qualified acoustic consultant will undertake monitoring to resolve complaints.

Appendix A—Typical plant sound power levels

Table A-1 summarises the assumed sound power levels (L_W) for the major construction noise sources which we expect would be on site during each phase. The sound power levels have been based on data obtained from previous measurements conducted by Resonate and those within the UK Department for Environment, Food and Rural Affairs (DEFRA) *Update of noise database for prediction of noise on construction and open sites*. An overall sound power level for each phase has also been assumed based on the loudest typical source(s) operating for each works phase.

Table A-1 Construction stage sound power levels

Plant item	Sound power level, dB(A)	Plant expected for scenario				
		Site establishment	Substructure	Superstructure and facade	Internal works and fitout	External landscaping
Large excavator	111	x	x			x
Vibratory roller	107	x				x
Concrete truck	109	x	x	x		
Concrete pump	107	x	x	x		
Large truck	108	x	x	x		x
Bored piling rig	111		x	x		
Crane / mobile crane	106		x	x		
Pneumatic jackhammer	109			x		
General hand tools	98			x	x	
Compressor	94				x	
Portable generator	95				x	
Grader	112					x
Paver	112					x
Typical worst-case sound power level per scenario, dB(A)[1]		**112**	**114**	**111**	**84[2]**	**113**

(1) Based on typical loudest plant item, or combination of plant items, operating.

(2) Includes a 15 dB(A) indoor-to-outdoor reduction in noise levels for internal works.

Appendix B – Community Communications Strategy

Engineering and Technology Precinct (ETP) – Stage 1
Community Communication Strategy

Document and revision history

Document details	
Title	Community Communication Strategy
Client	University of Sydney
Client reference no.	USYDCON/2016/184
Document Number	K33-LOR-PRM-PLN-00007
Laing O'Rourke contract no.	K33

Revisions

Revision	Date	Description	Prepared by	Approved by
01	9 Jan 18	Post Contract Award	Philip Barkman	James Last
02	31 Jan 19	Align with draft Conditions of Approval	Susan Allton	
03	12 Feb 19	Document title change and incorporation of CIS comments	Susan Allton	Joe Thompson

Management reviews

Review date	Details	Reviewed by

Controlled:	YES	Copy no.:	Uncontrolled:	NO

Terms and definitions

The following terms, abbreviations and definitions are used in this plan.

Term	Definition
EMS	Environmental Management System
The Strategy	(This) Community Communication Strategy
Laing O'Rourke	Laing O'Rourke Australia Construction Pty Limited

Table 1: Terms and definitions

Distribution

The master 'controlled' document will be retained in Aconex, the Laing O'Rourke Document Management System, where it can be accessed by personnel as necessary.

All paper copies of the Plan will be considered as 'uncontrolled' unless they have been allocated a 'copy number' in a colour other than black.

The University of Sydney will be provided with a copy for approval in conjunction with the submission of the Strategy.

Issue, Revision and Re-issue

The initial issue of this Strategy has been reviewed by Laing O'Rourke's Regional Environmental Manager to ensure it meets the requirements of the current Environmental Management System (EMS) and policy, contract, specifications and standards. The Strategy is approved for use on the project by the Project Leader. Evidence of initial review and approval is by signatures on the cover sheet.

This Strategy is to be submitted to the University of Sydney representative prior to the proposed commencement of work on site. In conjunction with the submission of the Strategy, Laing O'Rourke will coordinate and facilitate an initial communication workshop with representatives from the University of Sydney and Laing O'Rourke if it is deemed to be required. This workshop will discuss the contents and application of the Strategy to facilitate its approval and agree the proposed management measures and controls.

Revisions of this Strategy may be required throughout the duration of the project to reflect changing circumstances or identified opportunities for improvement.

Revisions may result from:

- Management Review
- Changes to the Company's standard system
- Audit (either internal or by external parties)
- Client complaints or non-conformance reports.

Revisions will be reviewed and approved by the Project Leader prior to issue. Updates to this Plan are numbered consecutively and transmitted to holders of controlled copies.

Contents

Distribution....2
Issue, Revision and Re-issue....2
1. Introduction....4
1.1 Scope of work....4
1.2 Project objectives....4
2. Purpose....4
3. About the Stakeholders....5
3.1 Stakeholder Analysis....5
3.2 Project Phases and Stakeholder Impacts....7
4. Management Approach....7
4.1 Communication Objectives....7
4.2 Communication Principles....8
5. Stakeholder Management Tools....8
5.1 Communication Tools....8
5.2 Engagement Tools and Strategies....11
6. Risk and Issues Register....11
7. Roles and Responsibilities....12
7.1 Stakeholder and Communication Manager....12
7.2 Project Leader....12
8. Procedures and Protocols for Information Dissemination and Feedback....13
8.1 University and Community Notifications Procedure....13
8.2 Contacts/Enquires Procedure....13
8.3 Complaints Management Procedure....14
8.4 Escalation and Dispute Resolution Procedure....14
8.5 Media Protocol....15
8.6 Privacy....15
9. Monitoring and Reporting....15
9.1 Reports to the University of Sydney....15
9.2 Audits....16
9.3 Review....16

1. Introduction

This Strategy forms part of the suite of project management plans developed for the Engineering and Technology Precinct (ETP) – Stage 1 project. It outlines the key management systems, procedures and controls that Laing O'Rourke will use to:

- Achieve all project objectives
- Deliver the University of Sydney (the University) value for money
- Give certainty of delivering the project on schedule
- Provide innovative solutions that align with the overall project objectives
- Achieve exceptional and demonstrable outcomes in safety, whole of life, environment, sustainability and quality.

1.1 Scope of work

The University is transforming its Engineering and Technology Precinct into an environment that fosters scholarship at the highest standard possible and delivers a positive experience to all of its staff, students and stakeholders. Therefore the ETP Stage 1 works involve delivering high-quality infrastructure that accommodates maximum research opportunities while being flexible enough to respond to new education pathways in the future.

Stage 1 works relate to a new Micro Engineering Building which will incorporate ~11,000m² of new space and ~6,000m² of refurbished facilities. The building will include research and teaching labs, office areas and teaching spaces and be connected to the existing Electrical Engineering Building.

The project also involves the associated demolition works of part of the Electrical Engineering building and infrastructure upgrades, as well as staging and decanting works in adjacent buildings.

1.2 Project objectives

The University's objectives for the project are to deliver:

- An improved reputation as an innovative and modern engineering faculty
- Fit-for-purpose research facilities
- Increased research productivity and quality
- An enhanced student learning experience and quality of learning resources, such as learning spaces, computer labs, and teaching labs
- Iconic engineering innovations in design, construction and operation
- Improved integration between research and teaching
- Lower (rate of increase) of operating and maintenance costs
- Improved safety and security processes.

2. Purpose

Laing O'Rourke is a trusted delivery partner committed to working closely with the University of Sydney to deliver timely and meaningful community and stakeholder engagement strategies. The team recognises the importance of positive community and stakeholder relations to the successful delivery of the project.

Through this Strategy, the team has identified how effective communication will minimise the impacts of construction on stakeholders and the surrounding community. This is based on the team's understanding that a key project challenge is mitigation of the impacts of the works on the surrounding neighbourhood and adjacent campus buildings. In conjunction with CIS, Laing O'Rourke will ensure that the local community and university stakeholders are engaged with the project and well informed about works before construction starts and throughout delivery.

We understand that often the first point of contact the local community and wider public has for this project, is through our workforce. We will ensure that all members of our team have sufficient training to understand the potential sensitivity around contact with the public, and to be able to respond in an appropriate manner to any approaches.

We recognise that this project comes with significant responsibilities. This Strategy ensures all members of the community and adjacent campus are aware of the project and can participate in relevant project aspects. It also ensures that those most affected by the work receive timely information and the consideration they need.

The team will implement a proactive approach to risk identification and issues management to ensure that, where possible, potential issues are avoided or minimised.

This Strategy provides the broad approach for managing communications and stakeholder relations for the project. It will primarily complement the Construction Management Plan, and will be updated as required to ensure it reflects the University of Sydney's current strategy.

This Strategy includes:

- An overview of the stakeholder groups including those consulted during the design phase and who will be consulted during construction phase
- A management approach that articulates the communication and consultation objectives and principles
- Management strategies including communication and engagement tools and activities
- Roles and responsibilities which identify key personnel with accountability for managing stakeholder communication and relationships
- Procedures and mechanisms for information dissemination and stakeholder feedback
- An enquiries and complaints management system

Underpinning this Strategy is a stakeholder scan. This was undertaken to identify key project stakeholders and assess the project impact and areas of interest/concern for those stakeholders. This data has been used to identify the appropriate tools to be used in communicating and engaging with these stakeholders.

3. About the Stakeholders

3.1 Stakeholder Analysis

A comprehensive scan of all stakeholders has been undertaken to inform the development of the Strategy. The following provides an overview/description of key stakeholder groups, their issues and potential areas of interest and proposed communication and engagement strategies.

Stakeholder group	Potential project concerns and issues	Mitigations
User groups	Lack of quality input into the design process, and teaching, learning and research facilities that are not fit for purpose.	• Conduct extensive user group consultation in the ECI phase for production of the schematic design • Continue extensive user group consultation throughout the 30%, 70% and 100% design milestones.

Stakeholder group	Potential project concerns and issues	Mitigations
ETP project governance	An improved reputation as an innovative and modern engineering faculty; fit-for-purpose research facilities; increased research productivity and quality; enhanced student learning experience and quality of learning resources; iconic engineering innovations in design, construction and operation; improved integration between research and teaching; lower (rate of increase) of operating and maintenance costs; improved safety and security processes and value for money.	• Focus on the project objectives at every milestone throughout the design and delivery processes • Apply leading-edge global experience in design and engineering methodologies to produce an iconic building • Obtain input from Laing O'Rourke's EnEx.G.
University buildings and users of adjoining buildings in the ETP	Construction impacts, such as timetable changes, noise, dust, vibration, disruption to routines, extra construction traffic and reduced parking.	• Apply our experience in working in dynamic operating environments • Deliver transparent and timely information to potentially impacted stakeholders through a variety of communication channels • Actively mitigate construction noise and dust as described in our Environmental and Waste Management Plan (EWMP). • Actively mitigate construction traffic issues as described in our Traffic Management Control Plan (TMP)
Internal and external approval authorities	Detailed and timely information is necessary to provide approve in the required timeframes.	• Work collaboratively to establish relationships early with internal and external approval authorities, so a partnership approach leads to streamlined approvals.
University staff based in the ETP's J03 building	Disruption, having to move locations and move equipment.	• Provide clear information through our Staging and Decanting Plan • Manage stakeholders required to move, providing appropriate lead times and decanting resources.
University students based in the ETP	Changes to timetables, especially at the last minute.	• Keep students informed of temporary changes to their learning environments via a project-specific app and the University's Timetables department • Provide timely information through mediums such as noticeboards, posters, SMS alerts, website updates.
Broader university community	Construction impacts including noise, dust, parking limitations and construction traffic route	• As outlined in our EWMP and Traffic Management Control Plan (TMCP), Laing O'Rourke has determined mitigation solutions which will minimise impacts on the amenity of the wider University community. • We will proactively inform via a variety of communication channels
Adjacent residents in Shepherd Street	Construction impacts including noise, dust, parking limitations and construction route	• As outlined in our EWMP and Traffic Management Plan (TMCP), Laing O'Rourke has determined mitigation solutions which will minimise impacts on the amenity of the wider University community ie construction vehicle route does not use Shepherd Street • We will proactively inform via a variety of communication channels including emails and CIS notifications through CIS letterbox drops

3.2 Project Phases and Stakeholder Impacts

One of the key elements of an effective communication strategy, in the context of a construction or development project, is a schedule of activities that reflects the construction programme. Each phase of the construction programme will have varying impacts and risks. This is particularly pertinent to the university community. Managing these issues will require the implementation of targeted stakeholder communication and engagement strategies that reflect the construction activities as the project progresses. The following provides an overview of key project milestones.

Timing	Key activities
Site Establishment	
Jun-Aug 18	Project Newsletter CIUG (Construction Interface User Group) Information/Fact Sheets Key Message and FAQs
Demolition	
Jun – Oct 18	Clear Communication of Activities Updating ETP Project App Site Signage and Hoardings Student Updates - notices Email Alerts CIUG - Weekly Progress and Upcoming Works CIS notifications to residents
Construction	
Feb 19 – Aug 20	(as per demolition)

4. Management Approach

4.1 Communication Objectives

The communication objectives of this Strategy are to:

- Deliver the project with minimum disruption and impact on the surrounding community
- Comply with the relevant conditions of approval
- Deliver messaging consistent with the various communities in consultation with the CIS Community Engagement Manager, the ETP Project Team, USYD Engineering Department and the FEIT (Faculty of Engineering and Information Technology) marketing and communications team
- Effectively manage any issues in a proactive, honest and transparent manner to minimise complaints
- Ensure that all members of the University community are aware and kept up to date on the works being performed
- Ensure all issues raised by members of the University and local community are dealt with in a timely manner

- Position the project positively within the University and local community

4.2 Communication Principles

The following principles will be adhered to in all communication activities undertaken by the team:

- Transparency – communication will be honest, open and transparent at all times
- Timely – information will be provided in a timely manner to ensure project impacts are managed appropriately and that key stakeholders have an appropriate amount of time to respond to any issues as they may arise
- Inclusive – project information and engagement activities will be conducted in a manner that ensures all stakeholders can contribute in a meaningful way. This includes using plain English and a range of alternative communication tools. The team recognises the diversity of the Australian community and will ensure Indigenous Australians, people of non-English speaking backgrounds, people with disabilities and other culturally diverse groups are included and represented
- Proactive – communication and engagement activities will be conducted using a proactive approach which may include taking a leading role in issues identification and management, fast response time (that is, above the required response time) to enquiries and complaints responses
- Legacy – the team will ensure that, where possible, initiatives undertaken will leave a positive legacy for the local and broader community
- Respect for privacy – the team will adhere to all relevant legislative requirements in relation to the protection of privacy. This relates specifically to local community members and members of the broader public.

5. Stakeholder Management Tools

5.1 Communication Tools

Laing O'Rourke will liaise and work collaboratively with the CIS Community Engagement Manager and ETP (FEIT) communication and marketing team.

Proven and effective consultation and engagement initiatives and tools will be used to inform all stakeholders of the ETP precinct about the project. The engagement method and consultation tools will be tailored to suit the target audience. Early consultation with the CIS Community Engagement Manager and ETP (FEIT) Marketing and Communications team will determine the communication channels and approved content. The elements which make up the overall communications strategy for the ETP Stage 1 will include, but not be limited to, the following tools and processes.

Tool	Description and targeted stakeholders
Advice to stakeholders: • Digital Engineering, augmented reality and virtual reality	• Digital Engineering (DE) is a powerful new way to communicate with stakeholders and the community and will be used to increase project awareness. DE creates a data-rich virtual environment that clearly demonstrates construction methodologies, timeframes and potential impacts, enabling more effective communication. • Augmented reality allows the project to be visualised within the physical world through use of a mobile device such as a smartphone or tablet with an integrated camera. Static, flat communications are transformed into dynamic and engaging representations of the project, with a high degree of interactivity and information. • Virtual reality allows the user to stand inside the digital model and be totally immersed and fully present within the space. This technology allows end users and other project stakeholders to better examine the end results of the project as well as different options and configurations

Tool	Description and targeted stakeholders
	• A DE station will enable stakeholders to access the digital model including model visualisations, fly-throughs, animations and other movie simulations.
Advice to stakeholders: • Digital and social media	• Digital media will be used to promote greater community awareness for the project and inform the community of significant milestones and events, in accordance with the University's social media policies. Existing University social media could be used to advise students and other users of upcoming impacts • Announcements and posts will be coordinated with the CIS communication team. Posts could be shared in conjunction with wider University community stakeholders such as the colleges and student union, including the use of shared hash tags to improve cut-through messaging.
Advice to stakeholders: • Project information line and email address	• A free 1800 phone number and email address for the wider University and student community will allow them to obtain information about the project. These will be promoted on all project materials and publications. • Phone calls and email inquiries will be acknowledged and responded to in relation to University communications protocols. Such responses will be managed by Laing O'Rourke and will require CIS input. • All inquiries and responses Laing O'Rourke manages will be recorded by our Stakeholder and Communication Manager in a project stakeholder database.
University/project website	• The University website (or dedicated project page within the website) will contain details about the project. The University website uses language consistent with University writing guidelines and all content provided for upload will continue with this style. • Laing O'Rourke will provide updates about construction activities including scope, impacts, engagement including activities or events, especially any community and stakeholder consultation, video and photography. • Prepared file uploads such as PDFs, images or video files showing time-lapse of the build, will adhere to accessibility and safety guidelines, including provision of a transcript for any video provided.
Intranet	• CIS has a regular page on the intranet to update students and staff on works being undertaken across the precinct. Laing O'Rourke will work with the CIS Community Engagement Manager to provide weekly updated material during construction.
SMS updates	• SMS updates (which could be distributed through a database) may be used to advise students, staff and neighbours of changes to working times and access conditions on the bordering Blackwattle Creek Lane and Maze Crescent which may impact on the community.
Project construction newsletter for internal and adjoining community stakeholders Hard copy and email version	• Project construction newsletters (approved by the CIS Community Engagement Manager) will be published to advise nearby stakeholders, including residents in Shepherd Street and other surrounding residential areas, of information on the project scope and benefits, progress updates, upcoming works and impacts, project-related issues upcoming works and any planned out-of-hours works or any variations to pedestrian or traffic egress. • Notifications will be published in a format that will be appropriate to display on noticeboards and also be suitable to email to stakeholders via the CIS email notification template.
ETP Project App	• Designed to specifically meet the needs of student stakeholders, the Project App will rely on DE imagery with virtual reality and augmented reality technology so stakeholders may be updated regularly on progress, the finished look and feel of the project as well as practicalities such as room changes for lectures in key milestone points such as the exam period (June 2018) when no exams will be scheduled in J03 on Level 2 due to the staging of the renovation works.
Door knocks	• Door knocking staff rooms in the adjacent university buildings and residents will be undertaken before construction activities start to discuss upcoming works and provide general information on the project. Their details could be added to the project email database to receive newsletters. If University staff are not at home when door knocking is undertaken, a calling card will be left with contact details.
1800 project contact number and dedicated email address	• On award, Laing O'Rourke in consultation with the CIS Community Engagement Manager will establish a 1800 project contact phone number and email address which will be widely communicated in the footer of all construction notifications and other communication materials.
Contact cards	• A stakeholder information card, containing the project information line, email and website details, will be provided to all project staff to be passed on to members of the wider University community who may have

Tool	Description and targeted stakeholders
	questions about the project.
Site hoarding/ temporary fencing/ site project signs	• In consultation with and on approval from the CIS Communication team, site hoarding, temporary fencing and site project signs provide an opportunity to display project information and progress.
Photography	• Video, still and time-lapse photography will capture project progress and key milestones. This material will be used for public information such as newsletters and the website, as well as provide a record of the work. All images will be reviewed by the University communication team prior to publication.
Community noticeboard	• The University communication team may consider providing a space for project information and updates to be displayed in an Engineering and Technology Precinct Noticeboard in digital format.
Key messages and FAQs	• Key messages and FAQs will be prepared and agreed to ensure consistency in responding to project enquiries.
Artists impressions and photographs, including time-lapse	• Artist's impressions and other representative images, photographs and time-lapse recordings of the project at various stages of development will be incorporated into project communications to show project progress and the benefits of the completed development • Diagrammatic and graphic representations will also be used as a tool to support wayfinding, traffic movements and pedestrian access around the project site during construction.
University branding guidelines	• Laing O'Rourke will adhere to the University's communication approval process including branding guidelines and application of the University logo. Approvals will be managed in advance through the CIS project team.
Site signage and hoardings	• Project site signage and hoardings will include the required details and we will work collaboratively with the CIS Community Engagement Manager and the Faculty of Engineering and Information Technology (FEIT) marketing and communications team to integrate our company site signage guidelines with the University's requirements.
Stakeholder database	• All stakeholder interactions will be recorded in the stakeholder database and reported on as required. The database will assist in the dissemination of information and management and tracking of communication and stakeholder activities.
Issues register	• Logging of all issues/reasons for approaching the project team about the project will be recorded in the stakeholder database. This will facilitate accurate reporting of all issues and provide a snapshot of emerging trends which may in turn inform communications and meaningful stakeholder engagement.
Presentations, meetings, on site meetings and briefings	• Presentations, and briefings will be held with key stakeholders and wider University community members to provide updates on project progress, upcoming project works and impacts, and other project-related information as required and organised by the CIS Community Engagement Manager and the Laing O'Rourke team. Meetings and briefings will be held on an as-needs basis and outcomes documented in the stakeholder database.
University engagement events	• Laing O'Rourke will actively pursue opportunities to work with the ETP and wider University community to improve local amenity; for example, this may include involvement in Orientation Days and student union projects and events.
Staff news and initiatives	• University staff will be included in many of the tools listed above; however, it may be pertinent that Laing O'Rourke contributes to specifically organised staff engagement events at the recommendation of the FEIT or CIS communication team.
Student updates	• Key stakeholders such as the electrical engineering students will be updated through many different communication channels. Laing O'Rourke will develop the Project App with students in mind as this is a communication channel they are most likely to relate to.
Email alerts	• Where stakeholders will be affected by construction works, Laing O'Rourke will provide timely advice to the CIS EFT so an email alert can be issued to the affected personnel. This procedure will also be used for any emergency communications, as required.
Weekly progress and upcoming works – CIS excel spreadsheet	• ETP communication team members will be invited to the weekly team progress meetings (Construction Interface User Group - CIUG) where the look-ahead programme for the upcoming week will be discussed. There will also be a six to eight-week look-ahead programme (updated weekly) so the communications for

Tool	Description and targeted stakeholders
distributed Uni wide	all project stakeholders can be planned in advance in consultation with the ETP communications team.
Disabled access service consultation	• Aligned to Laing O'Rourke's Diversity and Inclusion Policies, we will consult Disability Services to ensure impacts are mitigated for disabled stakeholders should the construction works impact on established disabled access.

5.2 Engagement Tools and Strategies

Engagement tools are used to seek input from stakeholders into the project. Input may be sought on the management of impacts, landscaping, urban design elements and other project aspects that are negotiable. General feedback regarding the project may also be sought through the use of engagement tools and strategies. It is important that input from stakeholders is sought only in relation to those elements of the project in which stakeholders are able to influence the outcome, rather than elements that are fixed or not-negotiable. Examples of elements of a project that may not be negotiable often relate to the conditions of approval and user requirements.

Tool	Description	Frequency	Target Group
User Groups Forums / Workshops	Forums / workshops (as distinct from briefings) are used as a means to gather information / input from project stakeholders. Where possible, the team will use interactive consultative forums to gain input on relevant aspects of the project. This may include on design elements / features, targeted employment initiatives or targeted economic development activities. These will be conducted with agreement from the University of Sydney	As required during the project. Usually in the early project phases.	This would include University stakeholders.
Individual Community Meetings / Interviews	Where needed (for example if a complaint is received) and if approved by CIS, Laing O'Rourke will conduct one-to-one meetings to resolve issues or minimise impacts.	As required.	Local residents/ university community.
University site visits and events	Site visits and events are a way to generate interest in a project, promote outcomes, activities and provide information about progress. In this instance, site visits and events will be approved by the University of Sydney and be coordinated by the team as required. The team is also interested in using this strategy with students, local community members and other stakeholders, subject to approval by the University of Sydney.	As required / approved.	University stakeholders.
Construction events – Welcome to Country and smoking ceremony		Soon after project approval	University stakeholders and benefactors

6. Risk and Issues Register

Communications personnel will take a proactive approach to the identification and management of risks. This includes notifying the University of Sydney of any potential and actual issues as they arise in a timely manner, while also providing suggested mitigation strategies and draft responses where required.

To ensure risks and issues are managed and tracked for the project duration, Laing O'Rourke and CIS will maintain a risk and issues register based of the one provided in *Schedule 3 Volume 9 Project Risks Rev B.* This includes assessing the level of risk and the notification timeframe to the University of Sydney.

7. Roles and Responsibilities

7.1 Stakeholder and Communication Manager

Laing O'Rourke's Project Stakeholder and Communication Manager will maintain primary responsibility for the implementation of this Community Communication Strategy through the Project Leader.

Specific roles and responsibilities to be undertaken by communication personnel (CIS, Engineering Department and Laing O'Rourke) include:

- Coordinating activities, key messages and collateral with the University of Sydney and other local projects
- Ensuring key project messages are agreed with the University of Sydney and used consistently across the project
- Implementing targeted communication and engagement strategies that are consistent with documented protocols, procedures and the agreed approach. This includes responding to inquiries and complaints and providing onsite support as required
- Maintaining positive relationships with the local community, community groups and the University stakeholders
- Taking a proactive approach to managing issues and advising the University of Sydney of them in a timely manner to ensure they do not escalate
- Taking a proactive approach to managing media issues if they arise and referring them to the University's Head of Media and Marketing and CIS Director
- Implementing other engagement strategies as agreed
- Preparing information on the project for the University of Sydney including project updates, web information, e-newsletters and others as required
- Providing input to the team induction to ensure all team members are aware of their responsibilities in relation to the University stakeholders, media and the local residents. This includes delivering a component that specifically addresses these issues
- Working in a collaborative way with the Environmental Manager to ensure the team's sustainability and environmental targets are met
- Attend the University of Sydney interface meetings (where required) and other site based project meetings as required
- Provide project updates and reports on communication and stakeholder activities to the University of Sydney as required.

7.2 Project Leader

The Project Leader is responsible for overseeing all communication and stakeholder engagement activities. The Project Leader will ensure adherence with the University of Sydney's requirements and maintain relationships with high level stakeholders including:

- Representatives from the University of Sydney
- Representatives with service providers / utilities
- Key team personnel (including sub-contractors and consultants)
- Other local projects.

8. Procedures and Protocols for Information Dissemination and Feedback

The following provides an overview of all information procedures relating to the project. These will be tailored to meet the CIS's communication requirements where required.

8.1 University and Community Notifications Procedure

University and community members impacted by project works will be issued with a written notification prior to the commencement of works. The notification will be distributed via email notification and letterbox drop and include residents/businesses identified in the stakeholder scan (and discussed above).

The distribution of notifications will be coordinated with the University of Sydney and other projects (as relevant). Where appropriate (for example, if the construction programme necessitates significant changes to established mitigation strategies), the notification will include 'door knocking' affected stakeholders to advise them of the project impacts and provide face-to-face information regarding the works. This may take place at the time of the written notification or one week prior to the commencement of works. Where stakeholders cannot be contacted in this way, an email will be sent including the project's 1800 contact information or a contact calling card will be left.

Notifications will include information regarding:

- Time of works
- Date of works (duration)
- Specific information regarding likely impacts - for example, traffic, visual amenity, noise and dust
- Mitigation strategies (where relevant)
- Project 1800 number an email
- Project website

All notifications will be recorded in the project's database.

8.2 Contacts/Enquires Procedure

It is anticipated that community members and University stakeholders will contact the project team using a number of methods including email, 1800 project number and verbal/face-to-face inquiries. After CIS approval, Laing O'Rourke communication personnel will respond promptly at all times to such inquires. Complaints will also be logged on the project database. Where an immediate response is not possible, (eg. due to the need to source relevant information from personnel within the project team), communication personnel will record the enquirer's details and advise them that a response will be provided within 24 hours (or earlier if possible).

Where a written response is required, Laing O'Rourke communication personnel will provide the University of Sydney with a draft response. It is anticipated that the University of Sydney would provide approval for the response within 24 hours or as agreed (see proposed Approvals Protocol provided below for suggested timeframes).

Communication personnel will ensure that the enquirer is satisfied with the response provided and close the action on the database. If the enquirer is not satisfied with the response, communications personnel should further attempt to resolve the inquiry. If a satisfactory resolution is not reached, communications personnel should refer the inquiry to the Project Leader and advise the University of Sydney.

Information to be recorded on the database should include:

- Date and time of contact/inquiry
- Name of inquirer (if agreed by the inquirer)
- Inquirer's contact details (if agreed by the inquirer)
- Nature and location of inquiry (for example, information request)
- Proposed follow up action/s (for example immediate verbal response, letter, other). This may require one or more actions
- Content of response
- Status of the inquiry (open/closed).

8.3 Complaint Management Procedure

Laing O'Rourke has developed a Complaints Management System and Procedure and a Complaints and Enquiries Register as an adjunct to this section of the Strategy.

Complaints may be received by the project team in a number of ways including email, project 1800 number and verbal/face-to-face. It is the responsibility of communication personnel to respond to all complaints in a timely manner that is consistent with the conditions of approval and the University of Sydney requirements.

In all instances, a complaint will be logged on the database and the University of Sydney will be advised. This will occur on the day that the complaint is received and within one hour of receipt of the complaint (this includes a draft response if required).

After advising CIS, Laing O'Rourke communication personnel will follow up with the complainant immediately where possible. If the complaint cannot be resolved immediately, communication personnel will liaise with the University of Sydney to identify an appropriate resolution strategy. This includes a proposed draft response which will be provided within one hour of receipt of the complaint.

Communication personnel will ensure the complaint is closed (resolved) in the shortest timeframe possible.

Information to be recorded on the database should include:

- Date and time of complaint
- Name of complainant (if agreed by the complainant)
- Complainant's contact details (if agreed by the complainant)
- Nature and location of complaint matter (for example, noise impacts)
- Proposed follow up action/s (for example immediate verbal response, letter, other). This may require one or more actions
- Content of response
- Status of the complaint (open / closed).

8.4 Escalation and Dispute Resolution Procedure

If a complainant states they remain unsatisfied with the actions and resolutions proposed or undertaken, a process of mediation will be adopted as follows:

1. The client, CIS, will be actively engaged to assist the Project Leader in resolving the matter
2. The complainant will be invited to attend a meeting with CIS (Project Manager and other CIS staff as required), the Laing O'Rourke Project Leader and Communication and Stakeholder Engagement Manager

3. If the matter cannot be resolved at stage 2, then the CIS Project Team will determine the matter and advise all parties

4. Notes will be taken at all stages

8.5 Media Protocol

The Laing O'Rourke Communication team recognises that no interaction is to take place with the media unless specifically approved or agreed by the University of Sydney. Where required, communication personnel will provide relevant information to the University of Sydney to respond to media inquiries, requests for information and/or advertisements.

As part of the project induction, all personnel will be instructed that no communication is to take place with the media and that any media contacts/requests are to be referred immediately to CIS and Laing O'Rourke's Communication and Stakeholder Engagement Manager.

The Communication and Stakeholder Engagement Manager will seek approval from the University of Sydney to publish any project information, advertisements or promotional activities. This is consistent with the approvals protocol which is detailed above.

As part of the reporting process, the Communication and Stakeholder Engagement Manager will provide the University of Sydney with information/issues that may attract media attention.

8.6 Privacy

Laing O'Rourke will comply with the requirements of the Privacy and Personal Information Act 1998. All inquirers (including complainants) will be asked for permission to record their personal details. Information will only be noted with their consent.

This will be managed through the project database which is used to record and track all stakeholder communications.

Regular reports from the database will not include personal details. Confidentiality will also be preserved in the event of complaints against personnel.

9. Monitoring and Reporting

9.1 Reports to the University of Sydney

Laing O'Rourke will provide CIS with daily reports on complaints, issues arising and risks.

Laing O'Rourke will provide CIS with a monthly report that includes:

- A summary of all contacts received and made by the team and of and communication activities undertaken. This will include all emails, phone enquiries, face-to-face enquiries, meetings and others as relevant
- A summary of all complaints received including actions taken to resolve the complaint and current status (open/closed). NOTE: Communication personnel will provide daily reports to the University of Sydney regarding any complaints or issues received including actions taken to resolve issues or complaints
- A summary of all communication/stakeholder engagement activities undertaken including letter-box drops, publication of Facts Sheets and other collateral, meetings held (this includes stakeholder meetings undertaken by communications personnel and other team members) and other activities as relevant

- A summary of any project issues - potential, emerging or other and analysis of their status and potential for escalation. Proposed issues management strategy/ies would also be included as relevant. Issues may relate to the community, media, environment, safety or other project areas. While these are not the direct responsibility of communications personnel to manage or resolve, communication personnel will maintain responsibility for reporting these issues to the University of Sydney
- Information regarding any activity /issue that may attract media attention

When and as required, communications personnel will provide the University of Sydney with other written reports and /or presentations including for Working Group meetings, Interface meetings and other meetings undertaken by the University of Sydney.

9.2 Audits

Laing O'Rourke understands the University of Sydney may audit the Community Relations Plan and associated strategies to ensure that communication and stakeholder engagement strategies are current and effective.

9.3 Review

Communications personnel will review the Community Communication Strategy as required to ensure it is current and effective.

If agreed by the University of Sydney, Laing O'Rourke and/or University communication personnel will undertake confidential surveys with key stakeholders (local residents and University stakeholders) to ensure the level of information and support is of an appropriate standard.

Appendix C – Complaints Management System

Engineering and Technology Precinct (ETP)
Complaints and Enquiries Management System and Procedure

Document and revision history

Document details	
Title	Complaints and Enquiries Management System and Procedure
Client	University of Sydney
Client reference no.	USYDCON/2016/184
Document Number	K33-LOR-PRM-PRO-00001
Laing O'Rourke contract no.	K33

Revisions

Revision	Date	Description	Prepared by	Approved by
1	22 January 2019	Draft Condition of Approval	Susan Allton	Joe Thompson

Management reviews

Review date	Details	Reviewed by

Controlled:	No	Copy no.:	Uncontrolled:

Contents

1. Overview 3
2. Oversight of Complaints Management System 3
3. What is a Complaint 3
4. What is an Enquiry 3
5. Response Method and Timing for Complaints and Enquiries 3
6 Complaints Management Process 4
7. Complaints and Enquiries Recording 5
8. Escalation and Dispute Resolution Procedure 5
9. Privacy 5
10. Appendix A – Complaints and Enquiries Register 6

1. Overview

The complaints management system will operate for the duration of construction of the Engineering and Technology Precinct Stage 1 Project within the University of Sydney's Darlington campus. The system is consistent with the University's Campus and Infrastructure Services Complaints Management Guidelines. The database type will be agreed with the client, CIS.

It will include a complaints register which records the number of complaints received, the number of people affected in relation to a complaint, the nature of the complaint, how the complaint was addressed, and the extent of resolution with or without mediation.

The complaints register will be available to the client and the NSW Department of Planning and Environment upon request.

The complaints management system incorporates a complaints and enquiries procedure and a toll-free telephone number and email address all dedicated to the Engineering and Technology Precinct Stage 1 project.

Funding to implement and operate the complaints management system will be by agreement with the client.

2. Oversight of Complaints Management System

Overall responsibility for compliance of the system lies with Laing O'Rourke's (LORAC's) Project Communications and Stakeholder Engagement Manager. This includes receipt of complaints and enquiries through the dedicated 1800 line and email address, and overseeing timely responses.

The project toll-free phone number is 1800 951 161.

The project email is unisydetp@laingorourke.com.au

This contact information will be included on site signage and notifications to University stakeholders and local residents.

Inductions for all project staff and subcontractors will include the complaints/enquiries handling process plus details of issues for sensitive receivers/stakeholders.

3. What is a Complaint

A complaint is any communication from a project stakeholder/neighbour or member of the public which expresses dissatisfaction with our work or actions. Responding to complaints must be prompt. Addressing complaints within the project can serve to improve project methodologies and mitigations to avoid future complaints.

Environmental related complaints will be responded to by the project's environmental team with client input as required.

4. What is an Enquiry

An enquiry is a question, query, request for information or clarification or comment from a project stakeholder/neighbour or member of the public.

5. Response Method and Timing for Complaints and Enquiries

CATEGORY	METHOD	RESPONSE AND TIMING
Complaint	Phone	24 hour

		take details respond within 2 hours
	Email	Respond within 2 hours of viewing
	Face to face	Take details Respond within 2 hours
Enquiries	Phone	Respond within 24 hours
	Email	Respond email within 5 working days
	Face to face	Immediately if possible. Otherwise take details and provide to Project's Communications and Stakeholder Engagement Manager Response within 5 working days
Emergencies	However received	Immediate response Call appropriate emergency services/on-site staff

6 Complaints Management Process

Complaint received

Allocated project team member acknowledges complaint with stakeholder

Can complaint be closed out immediately?

NO

YES

Respond to Stakeholder

Record and close out in register

Assess and adjust site procedures if required

Project team member investigates with relevant site personnel

Both confirm actions to resolve with project management if required

Allocated project team member replies to stakeholder

Allocated team member records and closes out complaint in database, including any reporting requirements

Assess and adjust site procedures if required

7. Complaints and Enquiries Recording

Complaints and enquiries will be recorded capturing the following information:

- Name, address and contact details of complainant/enquirer
- Date and time complaint/enquiry received
- Channel by which complaint/enquiry received (eg 1800 no., email, post, in person, etc)
- Description of complaint/enquiry including any supporting material eg photo
- Location of complaint/enquiry
- Description of first action response (ie what the project will do to address matter)
- Any further required actions/follow up and timeframe – record these with date and time
- Was complaint/enquiry project related or unrelated – if unrelated, complainant/enquirer informed and complaint/enquiry not included in the tally for the project
- Status of complaint/enquiry (open or closed)
- Note if complainant was satisfied with response
- If complainant was unsatisfied, what further resolution or mediation would be required

8. Escalation and Dispute Resolution Procedure

If a complainant states they remain unsatisfied with the actions and resolutions proposed or undertaken, a process of mediation will be adopted as follows:

1. The client, CIS, will be actively engaged to assist the Project Leader in resolving the matter
2. The complainant will be invited to attend a meeting with CIS (Project Manager and other CIS staff as required), the LORAC Project Leader and the LORAC Project Communication and Stakeholder Engagement Manager
3. If the matter cannot be resolved at stage 2, then the CIS Project Team will determine the matter and advise all parties
4. Notes will be taken at all stages

9. Privacy

The project's complaints management system will function in line with current regulatory level of privacy requirements.

10. Appendix A – Complaints and Enquiries Register

UNIVERSITY OF SYDNEY - ETP STAGE 1 BUILDING - COMPLAINTS AND ENQUIRIES REGISTER

COMPLAINT	ENQUIRY	NAME OF STAKEHOLDER	CONTACT DETAILS	DATE & TIME RECEIVED	METHOD OF RECEIPT	DESCRIPTION OF MATTER	LOCATION OF MATTER	DESCRIPTION OF RESPONSE	SWHB PROJECT RELATED Y/N	MORE ACTION REQUIRED	STATUS - OPEN/CLOSED	STAKEHOLDER SATISFIED Y/N