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Iglu II, 80-88 Regent Street, Redfern

Preliminary Construction Noise and Vibration Impact Assessment and Management Plan

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1 INTRODUCTION

Acoustic Logic Consultancy (ALC) have been asked to provide comment on potential noise and vibration impacts arising from the proposed excavation and construction activities associated with the '*Iglu II*' student accommodation development at 80-88 Regent Street, Redfern.

We note that a construction program and methodology of proposed works is not available at this early stage (this is not typically undertaken prior to project approval) and as such, a detailed noise and vibration impact assessment cannot be undertaken at this point.

It is recommended that a detailed construction noise and vibration impact assessment be carried out after project approval, when construction program and methodology is finalised, to determine the level of impact on surrounding properties from the proposed activities and develop a relevant management plan. As such, only an indicative analysis is possible at this stage and as outlined below.

2 SITE DESCRIPTION / AFFECTED PROPERTIES

The subject site is located at 80 – 88 Regent Street, Redfern. It is bounded by Regent Street to the east, Marian Street to the south, William Lane to the west and '*Iglu I*' to the north. Regent Street is a major sub-arterial road, with high volumes of traffic. Marian Street and William Lane are local roads with low volumes of traffic.

It is proposed to construct a new 18-storey student accommodation development, with ground level retail and 17 levels of accommodation facilities. The proposal will operate as an integrated campus with the adjoining Iglu facility at 66 Regent St, Redfern, which commenced operation in early 2018.

Surrounding properties are as follows;

- Double storey mixed-use properties to the south, across Marian Street, at 90-92 Regent Street, Redfern. We have assumed ground level commercial tenancy and level 1 residential tenancy.

- Multi-storey mixed-use properties to the west, across William Lane, at 9 Gibbons Street and 161 Redfern Street, Redfern.

As detailed in section 1, a detailed construction programme and methodology is not available at this stage. It is assumed that the construction methodology will be similar to that used for the 'Iglu I' project and this is summarised below;

- Materials will be removed from the site using trucks, during recommended standard hours of construction as detailed in the NSW EPA Interim Construction Noise Guideline (ICNG).

- Minor excavation for footings. As was the case with adjoining '*Iglu I*' project, this is predominantly envisaged to occur in clay. This is likely to be carried out using excavators.

- Construction works will predominantly include delivery of materials, erection of the building, the use of concrete pumps and internal works.

Figure 1 – Site Description (source: SixMaps)

3 CONSTRUCTION NOISE AND VIBRATION CRITERIA

The development consent for the *'Iglu I'* (SSD 6724) outlines requirement for compliance with City of Sydney council legislation for any construction noise and vibration impacts, including hours of work. This will also be adopted for the subject proposal.

3.1 NOISE CRITERIA

3.1.1 City of Sydney Council – *Code of Practice for Construction Hours/Noise within the Central Business District – 1992*

This guideline requires that the $L_{A\ avg\ max}$ noise levels emitted from construction activities on the subject site, measured over a 15-minute interval period, not exceed the noise goals detailed in the table below. The noise goals are aimed at minimising adverse impacts to the surrounding sensitive receivers, given the close proximity and high density of properties with the Sydney CBD and immediate surrounds.

Table 1 – City of Sydney Council Construction Noise Criteria

Day	Time Zone	Category	Noise Criteria dB(A)$L_{A\ avg\ max}$
Monday to Friday	07:00 to 08:00 08:00 to 19:00	1 1	Background + 5dB(A) Background + 10dB(A)
Saturday	07:00 to 08:00 08:00 to 19:00	1 1	Background + 5dB(A) Background + 10dB(A)

The Code also mentions that the guidelines for control of construction noise as outlined in AS2436 shall be applied, where appropriate.

3.1.2 Australian Standard 2436-2010 "*Guide to Noise Control on Construction Maintenance and Demolition Site*"

The Australian Standard AS2436 states that where all reasonable and available measures have been taken to reduce construction noise, mitigation strategies may be put in place to reduce levels noise levels to within a reasonable and acceptable level.

For the control and regulation of noise from construction sites AS2436:1981 *"Guide to noise control on construction, maintenance and demolition sites"* nominates the following:

- That reasonable suitable noise criterion is established,
- That all practicable measures be taken on the building site to regulate noise emissions, including the siting of noisy static processes to locations of the site where they can be shielded, selecting less noisy processes, and if required regulating construction hours, and
- The undertaking of noise monitoring where non-compliance occurs to assist in the management and control of noise emission from the construction site.

The guideline reflects on feasible and reasonable mitigation strategies, management controls and public liaising in the effort to reach realistic comprises between construction sites and potential noise affected receivers.

Based on these criteria the following procedure will be used to assess noise emissions:

- Predict noise levels produced by typical construction activities at the sensitive receivers.
- Adopt management conditions as per AS 2436 in the event of a non-compliance.

3.2 VIBRATION CRITERIA

Vibration caused by any proposed activities on site, at any residence or structure outside the subject site, will be assessed against the following provisions:

- For structural damage vibration, German Standard DIN 4150-3 *Structural Vibration: Effects of Vibration on Structures; and*
- For human exposure to vibration, the evaluation criteria presented in NSW Environmental Protection Authority (EPA) "*Assessing Vibration: A Technical Guideline*" guideline.

The criteria and the application of this standard are discussed in separate sections below.

3.2.1 Structure Borne Vibrations

German Standard DIN 4150-3 (1999-02) provides vibration velocity guideline levels for use in evaluating the effects of vibration on structures. The criteria presented in DIN 4150-3 (1999-02) are presented in Table 2.

It is noted that the peak velocity is the absolute value of the maximum of any of the three orthogonal component particle velocities as measured at the foundation, and the maximum levels measured in the x- and y-horizontal directions in the plane of the floor of the uppermost storey.

Table 2 – DIN 4150-3 (1999-02) Safe Limits for Building Vibration

TYPE OF STRUCTURE		PEAK PARTICLE VELOCITY (mms^{-1})			
		At Foundation at a Frequency of			Plane of Floor of Uppermost Storey
		< 10Hz	10Hz to 50Hz	50Hz to 100Hz	All Frequencies
1	Buildings used in commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8

3.2.2 Assessing Amenity (Human Comfort)

The NSW Environment Protection Authority's (EPA) publication "*Assessing Vibration: A Technical Guideline*" (Feb 2006), outlines vibration criteria to assess the effects on human exposure to vibration from industry, transportation and machinery. This will ensure the amenity of tenants within surrounding residential properties is not adversely impacted.

This document classifies vibrations in buildings into continuous (with magnitudes varying or remaining constant with time), impulsive (such as shocks) or intermittent (with the magnitude of each event being either constant or varying with time). Criteria stipulated in this publication is based on the type of vibrations generated by the source.

Criteria relevant to the proposed excavation and construction activities on site are detailed below.

Table 3 – EPA Recommended Human Comfort Vibration Criteria

		RMS acceleration (m/s^2)		RMS velocity (mm/s)		Peak velocity (mm/s)	
Place	**Time**	**Preferred**	**Maximum**	**Preferred**	**Maximum**	**Preferred**	**Maximum**
Continuous Vibration							
Residences	Daytime	0.01	0.02	0.2	0.4	0.28	0.56
Offices		0.02	0.04	0.4	0.8	0.56	1.1
Workshops		0.04	0.08	0.8	1.6	1.1	2.2

Table 4 – EPA Recommended Human Comfort Vibration Criteria (continued)

		RMS acceleration (m/s^2)		RMS velocity (mm/s)		Peak velocity (mm/s)	
Place	**Time**	**Preferred**	**Maximum**	**Preferred**	**Maximum**	**Preferred**	**Maximum**
Impulsive Vibration							
Residences	Daytime	0.3	0.6	6.0	12.0	8.6	17.0
Offices		0.64	1.28	13.0	26.0	18.0	36.0
Workshops		0.64	1.28	13.0	26.0	18.0	36.0

Note 1: Continuous vibration relates to vibration that continues uninterrupted for a defined period (usually throughout the daytime or night-time), e.g. continuous construction or maintenance activity. (DECC, 2006)

Note 2: Impulsive vibration relate to vibration that builds up rapidly to a peak followed by a damped decay and that may or may not involve several cycles of vibration (depending on frequency and damping), with up to three occurrences in an assessment period, e.g. occasional loading and unloading, or dropping of heavy equipment. (DECC, 2006)

4 EXISTING AMBIENT ENVIRONMENT AND CONSTRUCTION NOISE OBJECTIVES

4.1 BACKGROUND NOISE MONITORING

Existing background noise levels in the area was previously measured by this office using two unattended noise monitors installed on site. Section 6.1 of the DA acoustic report (reference: 20180922.1/2108A/R0/YK) outlines the measured ambient noise levels on site and this is summarised below.

Table 5 – Measured Rating Background Noise Levels

Location	Rating Background Noise Level dB(A)$L_{90(period)}$		
	Daytime (7am – 6pm)	**Evening (6pm – 10pm)**	**Night (10pm – 12am)**
Level 1 of the commercial property at 88 Regent Street, Redfern	56	52	45

4.2 CONSTRUCTION NOISE OBJECTIVES

Construction noise objectives applicable to the development have been determined based on the measured background noise level on site and the construction noise criteria detailed in Table 1 of this report. These are presented in the table below.

Table 6 – Construction Noise Objectives

Location	Time zone	Rating Background Noise Level dB(A)$L_{90(period)}$	Construction Noise Objective dB(A) $L_{A\ avg\ max}$
Boundary of any surrounding affected receiver	7am to 8am	56	61
	8am to 6pm	56	66

5 POTENTIAL IMPACTS AND RECOMMENDATIONS

Potential noise and vibration impacts are reviewed below.

5.1 NOISE IMPACTS

Noise impacts on surrounding properties will be dependent on the activity and where on the site the activity is undertaken. As excavation works are predominantly proposed to occur in clay, piling or rock breaking operations are not envisaged. Excavator operation is likely to be the loudest typical noise generating activity on this project. Operation of these machinery near the southern and western boundaries will have greatest impact on the adjacent sensitive receivers (refer section 2).

A preliminary analysis indicates:

- Excavation – Excavators (with bucket attachment) are likely to be the highest noise generating machinery during these works. This machinery typically generates sound power levels of approximately 108 – 114dB(A). Noise levels of between 75 -81dB(A) can be expected at the façade of the adjoining properties to the west and south, indicating transitory exceedances of the construction noise objectives (Table 6), with the higher noise levels generated when working with 5m of the western and southern property boundaries. However, both these activities are transitory and can be moved to other parts of the site, resulting in reduced impacts.

- During the construction works, it is the use of hand tools (jackhammers, concrete saws and angle grinders) and concrete pumps which are the loudest typical activities (sound power levels are expected to range from approximately 105 – 115dB(A)$L_{eq(15min)}$). It should be noted that a majority of these works are largely intermittent and will not all occur at the same time. Noise levels of between 70-85dB(A) can be expected at the façade of the adjoining properties to the west and south, indicating intermittent exceedances of the construction noise objectives. As the building shell construction progresses, a majority of these works will be shielded by this shell, with the higher noise levels predicted only when works are carried out on the upper levels.

Noise impacts can be minimised using the following:

- Appropriate selection of equipment and process – e.g. substituting concrete or rock breaking with alternative measures such as sawing and lifting the slab pieces entailing:
    - Making saw cuts to break up the slab;
    - Using a muncher or pulveriser to break up the slab pieces.
- Practical positioning of static plant (particularly concrete pumps).
- Use of screens or enclosures (typically only feasible for static plant).
- Developing a detailed schedule of noisy operations and enforcing community notification procedures.
- Following community consultation, introducing respite periods to reduce impact on the operation of surrounding commercial tenancies.

- Commencing all noisy operations (excavation, hammering, cutting, grinding) after 8am and enforcing pre-determined respite periods.

Detailed construction noise planning is typically undertaken after engagement of a builder and a construction program is prepared (i.e. – after DA stage) and therefore, detailed planning is not possible at this stage.

In light of the above, we recommend:

- On completion of the construction program, acoustic review of proposed construction activities and plant/methods should be undertaken to identify work items likely to exceed council guidelines.

- For those activities, likely to generate high noise levels, the analysis should Identify where on the site these activities are likely to result in high noise levels. This will then assist in determining the likely time period for which high noise levels will occur, which will in turn help in formulating relevant respite periods or relocating these activities temporarily.

- Identify feasible acoustic controls or management techniques (use of screens, scheduling of noisy works, notification of adjoining land users, respite periods) when excessive levels may occur.

- For activities where acoustic controls and management techniques still cannot guarantee compliant noise levels, implement a notification process whereby nearby development is made aware of the time and duration of noise intensive construction processes.

Through adoption of the above, noise impacts on nearby development can be suitably managed to prevent excessive impact.

5.2 VIBRATION IMPACTS

Minor excavation for footings predominantly in clay is only envisaged at this stage. As no rock breaking or piling operations are proposed, it is unlikely that there will be any vibration impacts from the proposed activities to the nearest affected properties to the south and west.

6 CONCLUSION

This report presents a preliminary analysis of the potential noise and vibration impacts arising from the excavation and construction activities associated with the '*Iglu II*' student accommodation development at 80-88 Regent Street, Redfern

- There is likely to be transitory exceedances during the excavation stage, especially when works are carried out within 5m of the western and southern property boundaries. Intermittent exceedances are also expected during the construction/internal fitout stage, primary from hammering, sawing and grinding operations. Indicative noise management measures are detailed in section 5.1.

We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

Yogendra Kalkunte