2 Australia Ave Olympic Park

DA Acoustic Assessment - Stage 1a

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1 INTRODUCTION

This report presents an acoustic assessment for the proposed commercial development Stage 1a at 6 Australia Avenue, Sydney Olympic Park.

In this report we have:

- Conducted an assessment on the impact of traffic noise, Easter show activities noise, as well as train noise and vibration on the acoustic amenity of the proposed development.

- Determined the noise emission criteria from the proposed development based on on-site noise logging and NSW EPA Industrial Noise Policy.

- Outline the main noise sources during construction stage and setup the noise /vibration criteria based on the requirements of “Interim Construction Noise Guideline (DECC)” and “ Assessing Vibration: A Technical Guideline 2006”

The assessment is based on the architectural drawings DA1003 – DA1008 provided by architects Issue A.

2 SITE DESCRIPTION

The Masterplan of the development is located at the corner of Australia Ave and Herb Elliott Ave. The northern façade faces Herb Elliott Ave which is the two lane road with bus passby. The eastern façade faces Australia Ave which is a four lane road with medium traffic flows while the remaining facades are bounded by the existing commercial buildings.

The Olympic Park railway line is located across Australia Avenue to the east. A multi storey residential building under construction separates the site from rail line.

Stage 1a of the development is located at the south-eastern side of the site.

Aerial photo below shows the site and measurement locations.

Figure 1: Site Map and Measurement Locations

3 NOISE DESCRIPTORS

Traffic noise constantly varies in level, due to fluctuations in traffic speed, vehicle types, road conditions and traffic densities. Accordingly, it is not possible to accurately determine prevailing traffic noise conditions by measuring a single, instantaneous noise level.

To accurately determine the effects of traffic noise a 15-20 minute measurement interval is utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters. These parameters are used to measure how much annoyance would be caused by a particular noise source.

In the case of environmental noise three principle measurement parameters are used, namely L_{10}, L_{90} and L_{eq}.

The L_{10} and L_{90} measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement intervals.

The L_{10} parameter is commonly used to measure noise produced by a particular intrusive noise source since it represents the average of the loudest noise levels produced by the source.

Conversely, the L_{90} level (which is commonly referred to as the background noise level) represents the noise level heard in the quieter periods during a measurement interval. The L_{90} parameter is used to set the allowable noise level for new, potentially intrusive noise sources since the disturbance caused by the new source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the L_{90} level.

The L_{eq} parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the 15 minute period. L_{eq} is important in the assessment of traffic noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of traffic noise.

Current practice favours the L_{eq} parameter as a means of measuring traffic noise, whereas the L_{10} parameter has been used in the past and is still incorporated in some codes. For the reasons outlined above, the L_{90} parameter is not used to assess traffic noise intrusion.

4 NOISE INTRUSION ASSESSMENT

Site investigation indicated that the following external noise sources are potentially impacting on the project building:

- Existing traffic noise along Herb Elliott Ave with buses pass-by and carpark immediately across road.
- Train noise from the rail corridor across Australia Ave.
- Typical Event Noise.
- Plant such as Cooling Tower servicing commercial building adjacent to the project site.

4.1 INTERNAL NOISE CRITERIA

Recommended internal noise levels for the development are set out below. These levels are consistent with the recommended internal noise levels set out in Australia Standard *AS2107 (Recommended Noise Levels and Reverberation Times for Building Interiors).*

Table 1 – Recommended Internal Noise Levels – Commercial Space

Space	Criteria dB(A) $L_{eq\ (1hr)}$
General Office	45
Private Office	45
Meeting Room	40

4.1.1 Train Noise Criteria

Train noise intrusion into the project site shall comply with the requirements of the Department of Planning's document titled "Development near Rail Corridors and Busy Roads- Interim Guidelines".

Table 2 – Internal Train Noise Criteria

Space	Recommended Max $L_{Aeq,1hr}$ dB(A)
Office	40

4.1.2 Green Star Criteria

Up to two points are awarded where 95% of the project's NLA does not exceed the 'Satisfactory' ambient internal noise levels in accordance with AS/NZS 2107:2000, as follows:

Building Services Design

- One point is awarded where, within the entire base building general office space, noise from the building services does not exceed 40dBA L_{eq}

Overall Building

- One point is awarded where within the base building office space, the sound level does not exceed 40dB(A) L_{eq} (assuming open plan offices).

4.2 EXTERNAL TRAFFIC NOISE INTRUSION

Traffic noise measurements have been conducted on site between 8am and 10am on the 25th March 2013.

Noise measurements were obtained using a Norsonic 140 Sound Level Analyser, set to A-weighted fast response. The sound level meter was calibrated before and after the measurements and no significant drift was recorded.

The measured traffic noise level has been presented below.

Table 3 – Measured Traffic Noise

Measurement Location	Measured Traffic Noise Level dB(A) L_{eq}
Along Herb Elliot Avenue, approximately 6m from the road	64

Traffic noise intrusion into the proposed development was assessed using the measured external noise levels reported in Section above. The assessment is based on the architectural drawings listed afore.

Calculations were performed taking into account the orientation of windows area barrier effects (where applicable), the total area of glazing, facade transmission loss and room sound absorption characteristics. In this way the likely interior noise levels can be predicted.

4.3 TYPICAL EVENT NOISE INTRUSION

Measured noise levels for various events which this office has been involved with are detailed in the table below. In all cases the measured event and location of the event is detailed. The noise levels detailed below have been used as the basis of the noise impact assessment on the future development.

Table 4 – Measured Event Noise Levels

Event	Location	Noise Level $L_{eq\ (15\ min)}$ dB(A)
Sydney Olympic Park – NRL Grand Final 2009	Olympic Boulevard within 100m of stadium	Up to 72
Music Concert at the SCG in 2007	Neighbouring properties on Moore Park Road within close proximity	Up to 73
Sporting Event (AFL Game) held at the SCG, 2008	Neighbouring properties on Moore Park Road within close proximity	Up to 70

4.4 TRAIN NOISE INTRUSION

Train noise measurements were conducted by this office along the rail line boundary across Australia Ave. Train noise was measured as SEL's. Based on the requirements of the RIC and SRA

the following calculated noise levels in Table 4 were determined from the measurement data and Event Train Time Table.

Table 5 - Measured /Predicted External Train Noise Levels

Measurement Location	Time of Day	Predicted Noise Levels $L_{Aeq,1hr}$ dB(A)
Rail Line boundary @5m distance from rail fence	Day (7am-10pm)	63
	Night (10pm-7am)	62

4.5 PLANT NOISE FROM NEIGHBOURING BUILDINGS

Plant noise from neighbouring buildings have been conducted on site between 10am and 11am on the 25th March 2013.

Noise measurements were obtained using a Norsonic 140 Sound Level Analyser, set to A-weighted fast response. The sound level meter was calibrated before and after the measurements and no significant drift was recorded.

Plant noises such as mechanical plant noise from nearby commercial developments were measured near the western boundary of Stage 2. Measured noise levels are presented below.

Table 6 – Measured Mechanical Plant Noise Level

Measurement Location	Measured Noise Levels $L_{eq\ (15\ min)}$ dB(A)
Western boundary	53

4.6 EVALUATION OF NOISE INTRUSION

Internal noise levels will primarily be as a result of noise transfer through the windows and doors, as these are relatively light building elements that offer less resistance to the transmission of sound. The walls are proposed to be heavy masonry elements that will not require upgrading.

The predicted noise levels through the windows, doors are discussed below. The predicted noise levels have been based on the expected level and spectral characteristics of the external noise, the area of building elements exposed to environmental noise, the absorption characteristics of the rooms and the noise reduction performance of the building elements.

Calculations were performed taking into account the orientation of windows, barrier effects (where applicable), the total area of glazing, facade transmission loss and the likely room sound absorption characteristics. In this way the likely interior noise levels can be predicted

The following recommended building structure is required to ensure that external noise intrusion into the project building fully comply with the requirements of Section 4.1.

4.6.1 Recommended Glazing

The following tables list the recommended glazing assemblies for this project to achieve the requirements regarding train and traffic noise intrusion. All the windows and external doors listed are required to be fitted with acoustic seals. (Mohair Seals are unacceptable).

The glazing thicknesses recommended are those needed to satisfy acoustic requirements and do not take into account other requirements such as structural, safety or other considerations. These additional considerations may require the glazing thickness to be increased beyond the acoustic requirement.

Table 7 – Recommended Glazing Thickness

facade	Designated Rooms	Recommended Glazing	Acoustic Seals
North	All	10mm	Yes
West	All	10mm	Yes
South	All	10mm	Yes
East	All	10mm	Yes

In addition to meeting the minimum glazing thickness requirements given, the design of the window mullions, perimeter seals and the installation of the windows/doors in the building openings shall not reduce the STC rating nominated in Table 8. Note that mohair type seals will not be acceptable for the windows requiring acoustic seals.

The window/door suppliers should provide evidence that the systems proposed have been tested in a registered laboratory with the recommended glass thicknesses and comply with the minimum listed STC requirements. Also, the glazing installer should certify that the window/doors have been constructed and installed in a manner equivalent to the tested samples.

Table 8 – Minimum STC/Rw Rating of Glazing (with Acoustic Seals)

Glazing Assembly	Minimum STC/Rw of Installed Window
10mm	33

4.6.2 Roof / Ceiling

The proposed concrete roof construction will be sufficient to control traffic and train noise intrusion.

4.6.3 External Walls

External walls composed of concrete or masonry elements would not require upgrading.

5 TRAIN VIBRATION ASSESSMENT

Trains induce ground borne vibration that is transmitted through the subsoil. This vibration can be perceptible close to railways.

5.1 OBJECTIVES

NSW Government Department of Planning "Development Near Rail Corridors and Busy Roads"- Interim Guideline recommends that habitable rooms should comply with the criteria in British Standard BS 6472:1992 "Evaluation of Human Exposure to Vibration in Buildings ".

5.1.1 Project criteria

British Standard BS 6472:1992 "Evaluation of Human Exposure to Vibration in Buildings (1Hz to 80Hz)" is recommended by NSW Government Department of Planning "Development Near Rail Corridors and Busy Roads"- Interim Guideline for Councils "Consideration of rail noise and vibration in the planning process" as this standard includes guidance for the assessment of human response to building vibration including intermittent vibrations such as that caused by trains.

Human response to vibration has been shown to be biased at particular frequencies which are related to the orientation of the person. This standard provides curves of equal annoyance for various orientations. These curves are applied as correction filters such that an overall weighted acceleration level is obtained. As the orientation of the resident is unknown or varying the weighting filter used is based on the combined base curve as given in ISO 2631 & Australian Standard 2670 "Evaluation of Human Exposure to Vibration and Shock in Buildings (1 to 80Hz)" which represents the worst case of the X, Y and Z axes. Filtered measurements are made in all three co-ordinate axes and the highest value axis used.

This standard assesses the annoyance of intermittent vibration by using the Vibration Dose Value (VDV). Alternatively the VDV may be estimated by the eVDV which is derived by a simpler calculation using an empirical factor. The VDV or eVDV is calculated for the "Daytime" (6am-10pm). The overall value is then compared to the levels in Table 9. For this project the aim will be for a low probability of adverse comment

Table 9 -– Vibration Dose Values (m/s1.75) above which various degrees of adverse comment may be expected in commercial buildings

Place	Low Probability of adverse comment	Adverse comment possible	Adverse comment probable
Commercial buildings 16hr day	0.4 to 0.8	0.8 to 1.6	1.6 to 3.2

5.2 RAIL TRAFFIC VIBRATION MEASUREMENTS

5.2.1 Measurement Positions

The rail vibration measurements were taken along the proposed eastern façade of the master plan which is the nearest façade to rail corridor. See Figure 1.

5.2.2 Time of Measurements

The manned measurements were carried out from 9am to 10am on 2nd December 2010.

5.2.3 Measurement Equipment

Svan 958 Analyser was used for the vibration measurements. The analyser was connected to four channel input module fitted with a Dytran model 3233A accelerometer.

5.2.4 Measurement Results: Vibration Dose Values

The maximum train passby ground vibration acceleration, the typical passby period (gained from both the noise and vibration measurements) and the estimated number of train passbys were used calculate the overall eVDV values for each period of the day. The results are presented in Table 10.

Table 10 - Vibration Dose Values

Testing Location	Time Period	Calculated eVDV $m/s^{1.75}$	Criteria eVDV $m/s^{1.75}$	Complies
Along Eastern facade	Day	0.02	0.4	Yes

6 PLANT NOISE EMISSION ASSESSMENT

6.1 UNATTENDED BACKGROUND NOISE MEASUREMENTS

An unattended noise monitor was set up at the rear of the site, to record the existing background noise levels. These noise measurements were from the 26th November to 2nd December 2010, with detailed noise data attached in Appendix 1.

Unattended noise monitoring was conducted using an Acoustic Research Laboratories Pty Ltd noise monitor. The monitor was programmed to store 15-minute statistical noise levels throughout the monitoring period. The noise monitors were calibrated at the beginning and the end of the measurement using a Rion NC-73 calibrator; no significant drift was detected. Measurements were taken on A-frequency weighting and fast time weighting.

The measured background noise levels dB(A)L_{90} for day, evening and night time periods are shown in the table below.

Table 11 - Measured Noise Levels

Location	Time	L_{90} dB(A)
Unattended noise monitor on site	Day (7am to 6pm)	52
	Evening (6pm to 10pm)	49
	Night (10pm to 7am)	46

6.2 NOISE EMISSION CRITERIA

Noise emissions from plant and equipment should comply with the provisions of the Protection of the Environment Operations Act 1997, EPA's Industrial Noise Policy and Noise Control Manual.

6.2.1 NSW EPA's Industrial Noise Policy

The NSW EPA's Industrial Noise Policy provides guidelines for assessing noise impacts from industrial developments. The recommended assessment objectives vary depending on the potentially affected receivers, the time of day, and the type of noise source. The EPA Industrial Noise Policy has two requirements which both have to be complied with, namely an amenity criterion and an intrusiveness criterion. In addition, in the EPA's Environmental Noise Control Manual states that noise controls should be applied with the general intent to protect residences from sleep arousal.

6.2.1.1 Intrusiveness Criterion

The guideline is intended to limit the audibility of noise emissions at residential receivers and requires that noise emissions measured using the L_{eq} descriptor not exceed the background noise level by more than 5 dB(A). Where applicable, the intrusive noise level should be penalised (increased) to account for any annoying characteristics such as tonality.

6.2.1.2 Amenity Criterion

The guideline is intended to limit the absolute noise level from all noise sources to a level that is consistent with the general environment.

The EPA's Industrial noise policy sets out acceptable noise levels for various localities. Table 2.1 on page 16 of the policy indicates 4 categories to distinguish different residential areas. They are rural, suburban, urban and urban/industrial interface.

Table 12 provides the recommended ambient noise levels for the urban residential receivers for the day, evening and night periods. For the purposes of this condition:

- Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays;
- Evening is defined as the period from 6pm to 10pm; and
- Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays.

Table 12 - INP Recommended Acceptable Noise Levels

Type of Receiver	Indicative Noise Amenity Area	Time of day	Recommended Acceptable Noise Level dB(A) L_{eq}
Residential	urban	Day	60
		Evening	55
		Night	45

If the existing amenity noise levels due to industrial noise are close to or above the recommended acceptable noise levels then operation of the site shall be designed to a lower level than the acceptable noise level.

If the existing amenity levels from industrial noise and other transportation noise sources are more than 2 dB(A) above the acceptable levels, and there is no prospect of these levels reducing in the future, then the amenity criterion is set at 10 dB(A) below the existing level. In practice, this prevents any audible increase in the existing noise level.

6.2.2 Protection of the Environment Operations Act Regulation

Protection of the Environmental Operations regulation limits the noise levels associated within the operation of domestic air conditioning criteria during night time periods which is presented below:

Protection of the Environmental Operations (Noise Control) Regulation 2000-Sect 52

52 Air Conditioners

(1) A person must not cause or permit an air conditioner to be used on residential premises in such a manner that it emits noise that can be heard within a habitable room in any other residential premises (regardless of weather any door or window to that room is open):

(a) before 8 am or after 10 pm on any Saturday, Sunday or public holiday, or

(b) before 7 am or after 10 pm on any other day.

6.2.3 Noise Assessment Objectives

Table 13 provides a summary of the assessment criteria applicable to the subject premises at the neighbouring potentially affected residential properties based on noise monitoring conducted for the subject site. The intrusiveness and amenity criteria for this project have been determined using the EPA guidelines and the noise monitoring results.

Table 13 - Noise Objectives for Residential Receivers

Time of day	Measured Background Noise Level L_{90} dB (A)	Amenity Criteria L_{eq} dB (A)	Intrusiveness Criteria Background + 5 dB(A) L_{eq}dB (A)	Criteria for Residential Condensers	Noise Objective L_{eq} dB (A)	Sleep Disturbance Objective L_1 dB (A)
Day	52	60	57	N/A	57	N/A
Evening	49	55	54	N/A	54	N/A
Night	46	45	51	Inaudible within neighbouring premises	45	61

Noise associated with the operation of the development site should comply with the criteria set out in Table 13.

7 CONSTRUCTION NOISE AND VIBRATION ASSESSMENT

7.1 HOURS OF WORK

Section 2.2 of the EPA Interim Construction Noise Guideline lists the recommended standard hours of construction;

- Between 7:00 am and 6:00 pm, Mondays to Fridays;
- Between 8:00 am and 1:00 pm, Saturdays;
- No work on Sundays and public holidays.

7.2 CONSTRUCTION NOISE OBJECTIVES

The applicable guidelines and standards are:

- NSW EPA "*Interim Construction Noise Guideline*". This guideline nominates acceptable levels of noise emissions above the background noise level. For major construction projects within the recommended standard hours the guideline recommends a noise level of 10dB(A) above the background.

- Australian Standard 2436-1981 "Guide to Noise Control on Construction Maintenance and Demolition Site". In particular, the requirements stipulated in Section 3 of the standard will be followed.

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

7.2.1 EPA – Interim Construction Noise Guideline

The Interim Construction Noise Guideline outlines that the transmission of noise generated by various construction activities will primarily occur via two paths:

- Airborne Noise
- Ground-borne Noise

As no activity relating to excavation or demolition is part of the Stage 2 development works, ground-borne noise as a result of vibration transmitted through the ground into the structure, is unlikely to occur.

7.2.1.1 Airborne Noise Transmission Criteria for Residential Receivers

Table 2 of the Interim Construction Noise Guideline outlines the management levels for noise at residences depending on the hours of construction. The management levels are outlined in the table below.

Table 14 – Noise Management Levels for Residential Receivers

Time of Day	Management Level dB(A)$L_{eq(15mins)}$
Recommended standard hours: Monday to Friday(7am – 6pm); Saturdays (8am – 1am) and no works on Sunday or public holidays	Noise affected RBL* + 10dB=62 dB(A)
Outside recommended standard hours	Noise affected RBL* + 5dB

*** The RBL or rating background level is the overall single – figure background noise levels measured during the assessment period at the affected receiver boundary.**

7.2.1.2 Airborne Noise Transmission Criteria for Commercial/Industrial Receivers

This guideline also outlines the noise emission criteria from construction site to industrial and commercial premises.

"4.1.3 Commercial and industrial premises

Due to broad range of sensitivities that commercial or industrial land can have to noise from construction, the process of defining management levels is separated into three categories. The external noise levels should be assessed at the most affected occupied point of the premises:

- *Industrial premises: external $L_{Aeq(15min)}$ 75dB(A)*
- *Offices, retail outlets: external $L_{Aeq(15min)}$ 70dB(A)*
- *Other businesses that may be very sensitive to noise, where the noise level is project specific as discussed below.*

The proponent should assess construction noise levels for the project, and consult with occupants of commercial and industrial premises prior to lodging an application where required.

During construction, the proponent should regularly update the occupants of the commercial and industrial premises regarding noise levels and hours of work."

7.2.2 Australian Standard 2436-1981 "Guide to Noise Control on Construction Maintenance and Demolition Site"

Where compliance with EPA requirements cannot be achieved, noise emissions must be managed in accordance with the principles outlined in AS 2436:

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

7.2.3 Summary of Applicable Guidelines

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

- For commercial receivers surrounding the subject site, a noise level of 70 dB(A) is allowed during recommended standard hours.
- For residential receivers surrounding the subject site, a noise level of 62 dB(A)L_{eq} at these receiver is allowed during recommended standard hours.
- If noise levels exceed the project specific noise goal at sensitive receiver locations, investigate and implement all practical and cost effective techniques to limit noise emissions.
- If the noise goals are still exceeded after applying all practical engineering controls to limit noise emissions investigate management controls and other techniques to mitigate noise emissions.

7.3 CONSTRUCTION VIBRATION CRITERIA

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

- For structural damage vibration, German Standard DIN 4150-3 *Structural Vibration: Effects of Vibration on Structures; and*
- For human exposure to vibration, Department of Environment and Conservation NSW "Assessing Vibration: A Technical Guideline" (Feb 2006) is based on the guidelines contained in BS 6472:1992 *Guide to Evaluate Human Exposure to Vibration in Buildings (1Hz to 80Hz)* for low probability of adverse comment.

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

7.3.1 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 3.

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 15 – 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

7.3.2 Assessing Amenity

Department of Environment and Conservation NSW "Assessing Vibration: A Technical Guideline" (Feb 2006) is based on the guidelines contained in BS 6472:1992. This guideline provides procedures for assessing tactile vibration and regenerated noise within potentially affected buildings.

The recommendations of this guideline should be adopted to assess and regulate vibration within the excavation/construction site.

Table 16 – EPA Recommended 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
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

7.4 CONSTRUCTION PHASE

The construction associated with the proposed Stage 1a development include construction of the project building. Demolition and excavation do not form part of the Stage 1a works and will be undertaken in accordance with the Stage 1 Project Approval.

There are several sources associated with the construction phases of the project building have the potential to increase the noise and vibration levels at nearest residential /commercial receivers.

No builders have been engaged on this project at this stage and no detailed construction work method or equipment are available at this stage.

The main noise producing activities will be that attributed to the forming and pouring of the concrete floor slabs, and crane operation. These would be managed by placing the plant as far as practicable from the sensitive receivers. It is expected that the adopted noise guidelines will generally be achieved during this phase except during louder activities such as stripping out of formwork which will occur from time to time.

Detailed noise and vibration management assessment and control plan shall be carried out at CC stage to ensure the noise and vibration levels comply with the criteria in Section 7.2 and 7.3.

8 CONCLUSION

Potential environmental noise impacts onto the proposed commercial development Stage 1a at 2 Australia Avenue, Olympic Park have been assessed. Our findings are:

- The internal noise levels of the proposed development will fully comply with the requirement of AS2107-2000 and Development Near Rail Corridors and Busy Roads – Interim Guidelines with the recommended acoustic treatments in Section 4.6 of this report.
- Train vibration measurements indicated that train induced ground borne vibration fully comply with the requirements of British Standard BS 6472:1992 "Evaluation of Human Exposure to Vibration in Buildings which is recommended by NSW SEPP.
- External noise emission criteria have been setup in Section 6 based on the requirements of NSW EPA Industrial Noise Policy and Protection of Environment Operation Act Regulation.
- Construction noise and vibration criteria have been setup in Section 7 of this report based on the requirements of "Interim Construction Noise Guideline (DECC)" and "Assessing Vibration: A Technical Guideline 2006". Detailed construction noise and vibration management plan shall be carried out at CC stage.

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

Yours faithfully,

Acoustic Logic Consultancy Pty Ltd
Johnny Zhang