

Kane Constructions Pty Ltd

Multi-Storey Carpark, Westmead Hospital

Carpark Operational Noise Compliance

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Document Reference:	SYD2024-1131-R001D
Date	09/10/2024
Comments:	Final

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1 Introduction

Acuras Consultancy has been commissioned to conduct acoustic compliance measurements for the operation of the new Multi-Storey Carpark located at Westmead Hospital in accordance with the NSW Government Department of Planning, Industry and Environment conditions and Stantec Australia Pty Ltd 'Acoustic Report-Schematic Design', dated 15/06/2021 (Reference: 44311-1, Rev 007).

During our visit, we conducted short-term background noise level measurements adjacent to the receivers in the staff carpark. Short-term attended noise measurements were conducted in accordance with procedures in the EPA Noise Policy for Industry to assess the vehicle entry/movements noise into the new carpark during the busy morning peak period.

The environmental noise was dominated by vehicle movement in the carpark, traffic noise on the street, mechanical noise from other nearby buildings and people on the street.

The site and noise monitoring locations are shown in Figure 1.



Figure 1 – Site Location and Noise Monitoring Positions

2 Noise Criteria

The following standards, policies and conditions are applicable to this project:

- NSW Government Department of Planning, Industry and Environment (Application No: SSD-10434896), Development Consent Conditions E3 and E4
- NSW EPA “Noise Policy for Industry” (NPfI).
- Australian Standard AS 1055-2018: Acoustics – Description and measurement of environmental noise - General procedures.
- The sound analyser is Type 1 and comply with Australian standard AS1259.2: 1990.

Post Occupation (Part E) operation of the carpark is to comply with the Consent Conditions E3 and E4 as given below:

Operational Noise Limits

- E3. The Applicant must ensure that noise generated by operation of the development does not exceed the noise limits in Acoustics Report Ref: 44311-1, prepared by Stantec, dated 15.06.2021.
- E4. The Applicant must undertake short term noise monitoring in accordance with the *Noise Policy for Industry* where valid data is collected following the commencement of use of each stage of the development. The monitoring program must be carried out by an appropriately qualified person and a monitoring report must be submitted to the Planning Secretary within two months of commencement use of each stage of the development or other timeframe agreed to by the Planning Secretary to verify that operational noise levels do not exceed the recommended noise levels for mechanical plant and traffic noise identified in Acoustics Report Ref: 44311-1, prepared by Stantec and dated 15.06.2021. Should the noise monitoring program identify any exceedance of the recommended noise levels referred to above, the Applicant is required to implement appropriate noise attenuation measures so that operational noise levels do not exceed the recommended noise levels or provide attenuation measures at the affected noise sensitive receivers.

According to the Stantec report, Table 1 presents to the project limits for the operation of the carpark.

Table 1: Project Target Noise Levels - MSCP

Receiver	Period	PTNL dB(A)
Residential (R1)	Day	L _{Aeq,15min} 48
	Evening	L _{Aeq,15min} 43
	Night	L _{Aeq,15min} 38 L _{AF,max} 57
Medical exam rooms, Mental health wards and Sleep Clinic	All-Internal	L _{Aeq,noisest 1hr} 30
Office areas	All	L _{Aeq,period} 60

3 Results of Noise Measurements

This report presents results from acoustic tests conducted on the 3rd September 2024 between 7.30am to 8.30am. The background noise levels during the morning period are generally lower than during the middle of the day. The A/C system would most likely operate during the midday (when temperatures are higher) and when background noise levels are higher.

During our visit, the operational noise from vehicle movements within the carpark were taken at the following nominated locations (ground level):

- Location 1 (L1): Adjacent to the Ronald McDonald House.
- Location 2 (L2): Adjacent to the Westmead Hospital.
- Location 3 (L3): Adjacent to the Westmead Hospital.

Provided the noise levels at nearest affected locations, as nominated above comply with the project limits, noise levels at other residential receivers located along Redbank Rd, Barden St and Beamish St which are outside the Westmead site would also comply.

At the time of the visit, the A/C condensers located on the roof (above stairs) and adjacent to the Comms Rooms were not operating. The room temperature inside the comms rooms and lift shaft did not exceed the set temperature limits and thus the A/C condensers did not automatically turn on.

Based on the equipment specifications, the predicted operational sound level from the roof Package Unit (Daikin UAYQ90CY1A) and wall mount units (Dakin RKM71WVMA) is estimated to be inaudible (outside) at the nearest residential receiver at the Ronald McDonald House.

Table 2 presents the results of the attended short-term measured noise level (excluding the ambient noise) of vehicle movement in the multi-storey carpark at the nearest receiver locations.

Table 2: Measured Vehicle Noise Level at Receiver

Location	Time	Measured Noise Level at Location (Outside), L _{eq(15min)} dBA	Noise Limits, (Day Time) L _{eq(15min)} dBA	Complies (Yes/No)
L1	07:45-08:00	46	48	Yes
L2	08:00-08:15	51	60	Yes
L3	08:15-08:30	49	60	Yes

Based on the results of the measured noise levels, we confirm the operational noise from vehicles and A/C condensers for the carpark complies with the project noise limits.

4 Conclusion

Acoustic compliance measurements for the operation of the new Multi-Storey Carpark located at Westmead Hospital in accordance with the NSW Government Department of Planning, Industry and Environment conditions and Stantec Australia Pty Ltd 'Acoustic Report-Schematic Design', dated 15/06/2021 (Reference: 44311-1, Rev 007).

An environmental noise survey and project criteria for the new carpark site is detailed in the Stantec Australia Pty Ltd 'Acoustic Report-Schematic Design', dated 15/06/2021 (Reference: 44311-1, Rev 007). The limits are presented in Table 1.

In Section 3, Table 2 presents the results of the attended short-term measured noise level (excluding the ambient noise) of vehicle movement in the multi-storey carpark at the nearest receiver locations.

In conclusion, based on the results of the measured noise levels, we confirm the operational noise from vehicles and A/C condensers for the carpark complies with the project noise limits given in the Stantec acoustic report and in accordance with NSW Government Department of Planning, Industry and Environment Conditions E3 and E4.

Appendix A – Acoustic Terminology

Decibel, dB: A dimensionless unit which denotes the ratio between two quantities that are proportional to power, energy or intensity. One of these quantities is a designated reference by which all other quantities of identical units are divided. The sound pressure level in decibels is equal to 10 times the logarithm (to the base 10) of the ratio between the pressure squared divided by the reference pressure squared. The reference pressure used in acoustics is 20 micro Pascals.

A-WEIGHTING: A measure of sound pressure level designed to reflect the response of the human ear, which does not respond equally to all frequencies. To describe sound in a manner representative of the human ear's response it is necessary to reduce the effects of the low and high frequencies with respect to medium frequencies. The resultant sound level is said to be A-weighted, and the units are in decibels (dBA). The A-weighted sound level is also called the noise level.

Sound Pressure Level, L_p (dB), of a sound: 20 times the logarithm to the base 10 of the ratio of the r.m.s. sound pressure to the reference sound pressure of 20 micro Pascals. Sound pressure level is measured using a microphone and a sound level meter, and varies with distance from the source and the environment.

Ambient Noise/Sound: All noise level present in a given environment, usually being a composite of sounds from many sources far and near. Traffic, HVAC, masking sound or even low-level background music can contribute to ambient level of noise or sound.

Percentile Level - L_{90} , L_{10} , etc: A statistical measurement giving the sound pressure level which is exceeded for the given percentile of an observation period, e.g. L_{90} is the level which is exceeded for 90% of a measurement period. L_{90} is commonly referred to as the "background" sound level.

Background Noise (L_{90}): The sum total of all unwanted residual noise generated from all direct and reflected sound sources in a space that can represent an interface to, or interfere with good listening and speech intelligibility.

Rating Background Level – RBL: Method for determining the existing background noise level which involves calculating the tenth percentile from the L_{A90} measurements. This value gives the Assessment Background Noise Level (ABL). Rating Background Level is the median of the overall ABL.

$L_{AEQ,T}$: Equivalent continuous A-weighted sound pressure level. The value of the A-weighted sound pressure level of a continuous steady sound that, within a measurement time interval T, has the same A-weighted sound energy as the actual time-varying sound.

Appendix B – Curriculum Vitae

<p>Qualifications</p>	<p>Bachelor of Engineering, Mechanical University of Wollongong, Wollongong, NSW</p>
<p>Affiliations</p>	<p>Member of Australian Acoustic Society (MAAS) Member ID: M1014</p>
<p>Professional Experience</p>	<p>2013 July - Present Acouras Consultancy Sydney, NSW</p> <p>Principal Consultant/Owner</p> <ul style="list-style-type: none"> • Building acoustic assessment and design (DA, CC & OC). This includes assessment of noise impact from traffic and aircraft noise intrusion, inter-tenancy noise insulation (BCA). <ul style="list-style-type: none"> • Aircraft noise assessments (AS 2021). • Part F5 BCA - wall D_{ntw}/STC/Rw rating, floor IIC/L_{nTw} rating. • Assessment of external building construction. • On site inspection. • Compliance tests in accordance with BCA. • Assessment and control of mechanical services noise and ventilation systems. <ul style="list-style-type: none"> • Internal noise level criteria (AS 2107). • GreenStar IEQ-12 Acoustics. • Ventilation noise analysis. • Knowledge of local and state, noise and vibration regulations/guidelines and standards: <ul style="list-style-type: none"> • Department of Planning guideline for Developments Near Rail Corridors and Busy Roads. • Rail Infrastructure Noise Guideline. • EPA RNP, INP, ICNG, NGLG. • Protection of the Environment Operations Act (Noise Control). • Office of Liquor and Gaming noise policy (entertainment noise). • State Environmental Planning Policy (Infrastructure) 2007 Clause 102. • DECCW Construction Noise Guideline. • DECCW Assessing Vibration – a technical guide. • AS 2436 “Guide to noise and vibration control on construction, demolition and maintenance sites. • On site/field of noise and vibration investigation, measurements and compliance testing.

	<p>2002 May – 2013 June</p> <p>VIPAC Engineers and Scientists Lane Cove, NSW</p> <p>Senior Consulting Engineer, Acoustic & Vibration</p> <ul style="list-style-type: none"> • Traffic noise and Rail noise and vibration assessments: • Field noise and vibration monitoring and compliance testing. • Construction noise and vibration: <ul style="list-style-type: none"> • Installation of onsite noise and vibration monitoring. • Noise impact studies for industrial, commercial and residential developments. • Aircraft noise assessments (AS 2021). • Building Acoustics, such as Part F5 BCA - wall D_{ntw}/STC/Rw rating, floor IIC/L_{nTw} rating. • Mechanical noise assessment: • Design meetings, compliance testing and site inspections. • On site noise and vibration level measurements.
	<p>1999 April – 2002 May</p> <p>ACOUSTIC LOGIC CONSULTANCY Rosebery, NSW</p> <p>Project Engineer, Acoustic</p> <ul style="list-style-type: none"> • Building acoustics. • Environmental acoustics. • Noise and vibration analysis. • Site compliance testing and inspections.
	<p>1999 January – March</p> <p>GATAM CONSULTANTS Ermington, NSW</p> <p>Graduate, HVAC</p> <ul style="list-style-type: none"> • Heat Load Analysis • Site inspections.