16 February 2024
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NSW Department of Education
c/o MBB Group Pty Ltd
Level 4, 73 York Street, Sydney, NSW 200
Sydney
NSW 2000

Attention: Laura Goodall

Dear Laura

Noise Compliance Audit
Kingscliff Public School Redevelopment - SSD 8375620
Operational Stage 1 - Buildings 3 & 4

1 Introduction

Kingscliff Public School Redevelopment (SSD – 8375620) requires noise compliance testing as per the Development Consent. Conditions E10 and E11 of the Development Consent relate to the Operational Noise Limits for the site and a compliance audit that must be undertaken after each stage of the development.

Conditions E10 and E11 of the licence are reproduced below:

Operational Noise Limits

E10. The Applicant must ensure that noise generated by operation of the development does not exceed the noise limits in Noise and Vibration Impact Assessment (Ref: 2020400-2 R01F), dated 6 May 2021 and prepared by Acoustic Works.

E11. 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 identified in Noise and Vibration Impact Assessment (Ref: 2020400-2 R01F), dated 6 May 2021 and prepared by Acoustic Works. Should the noise monitoring program identify any exceedance of the recommended noise levels referred to above, the Applicant must 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.

The redevelopment completed Operational Stage 1 – Building 3 & 4 on 25 September 2023. To satisfy the Development Consent Waves Acoustic Consulting Pty Ltd (Waves Consulting) has been engaged directly by the NSW Department of Education to undertake noise compliance measurements for the site and determine if the applicable noise criteria have been satisfied.

2 Noise Limits

As per Conditions E10 and E11 the new AC plant associated with the development must not generate noise which exceeds the noise limits defined in the Noise and Vibration Impact Assessment (Ref: 2020400-2 R01 F), dated 6 May 2021 and prepared by Acoustic Works. The noise limits from the above report are reproduced below:

Table 1. Summary of the Applicable Noise Limits for the Kingscliff Public School

Receiver Area	Time Period	Noise Limit $L_{Aeq(15min)}$
R1	Day (0700 to 1800 hrs)	49
	Evening (1800 to 2200 hrs)	48
	Night (2200 to 0700 hrs)	43
R2, R3 & R4	Day (0700 to 1800 hrs)	47
	Evening (1800 to 2200 hrs)	48
	Night (2200 to 0700 hrs)	43

The nominated receiver areas and the new AC plant for the development are identified in Figure 1 below.

Figure 1. Summary of the Receiver Areas Surrounding the Kingscliff Public School

3 Noise Survey

A noise survey was undertaken during the afternoon of Monday 29 January 2024 to measure the noise emissions from the new AC equipment associated with the development. The measurements were performed using a calibrated Svan 977 Type 1 Sound Level Meter (Serial No. 45741) fitted with an environmental windshield. Wind speeds were less than 5 m/s and weather conditions were fair with no rain during all measurements.

Calibration of the Sound Level Meter was checked before and after the measurements. Drift in calibration did not exceed the allowable ±0.5 dB. All equipment carried current NATA / manufacturer calibration certificates.

The existing noise environment around the school is heavily influenced by road traffic noise moving along Sutherland Street, Orient Street and Viking Street. The noise from moving vehicles makes it very difficult to directly measure noise emissions from the Kingscliff School site at the nearest residential receivers.

Instead, noise measurements of the new AC equipment were undertaken at close proximity (< 3m). These noise measurements can then be used to calibrate a 3D noise model for the site and the surrounding area. From the calibrated noise model the noise levels are then calculated for each residential receiver to determine compliance with the noise limits.

3.1 Noise Survey Results

During the noise survey the operating conditions of the new AC equipment were as follows:

- All classrooms which are served by the AC equipment were at an internal temperature of at least 30^{o}C.
- The AC equipment was allowed more than 15-minutes to reach full operational load.
- The conditions of the test replicated full design load for each AC unit.

Table 2 below summarises the measured Sound Power Levels, L_W, for each AC unit (or combination of units) tested during the noise survey, with each AC unit at full design load.

Table 2. Summary of the Noise Survey Measurements

Equipment Location	Description	Overall L_{WA} (dB re 1pW)	Octave Band Centre Frequency (Hz) L_W (dB re 1 pW)							
			63	125	250	500	1000	2000	4000	8000
Adjacent to Orient Street	CU-04-A, CU-04-B & CU-04-C (each)	77	83	80	77	76	70	67	66	66
Adjacent to Sutherland Street	CU-03-A & CU-04-B (each)	76	80	73	74	75	68	66	67	60

3.2 Noise Model

Noise modelling of the site was undertaken using SoundPLAN v7.4 modelling software.

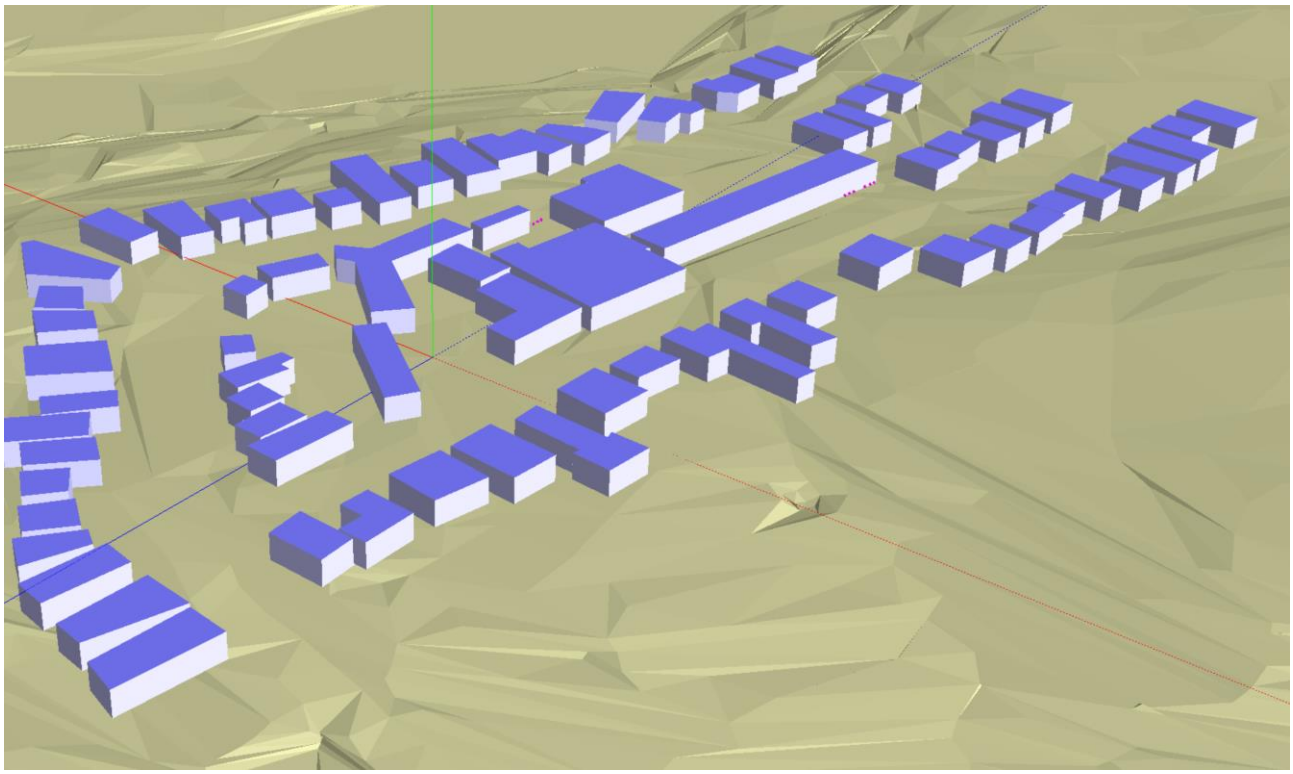
The noise model was constructed from a combination of aerial photography, existing ground topography and design masterplans for the development. The local terrain, design of the development, receiver buildings and structures have been digitised in the noise model to develop a three-dimensional representation of the operations of the development and surrounding environment. The parameters in Table 3 were defined in the noise model to calculate noise levels at sensitive receivers.

Table 3. Noise Model Parameters

Variable	Parameter
Calculation Standard	CONCAWE
Topography	Surrounding Area – 1 m resolution
Ground Absorption	0.5 (manly hard ground)
Receiver Height	1.5 m for ground floor, 4.5 for 1st floor

Figure 2 illustrates the 3D noise model created for this assessment.

Figure 2. 3D Noise Model Example – View from North-East



3.3 Noise Enhancing Meteorological Conditions

Noise model predictions were performed using noise enhancing meteorological conditions given in the NSW Noise Policy for Industry (NPI).

The noise enhancing meteorological conditions used in this assessment are given in Table 4 below. For all conditions the worst-case wind direction (source to receiver) for each receiver was assessed.

Table 4. Noise Enhancing Meteorological Conditions Used in the Noise Assessment

Period	Meteorological Parameters
Day / Evening	Stability categories A-D with light winds up to 3 m/s at 10 m AGL
Night	Stability category F with winds up to 2 m/s at 10 m AGL

Note 1. AGL = Above Ground Level.
Note 2. Stability categories are based on the Pasquill–Gifford stability classification scheme.
Note 3. Worst-case stability category D taken for Day / Evening periods.

This provides a conservative prediction of the potential noise impacts from the development at the surrounding sensitive receivers.

3.4 Corrections for Annoying Noise Characteristics

Where a noise source contains certain characteristics, such as tonality, intermittency, irregularity or dominant low-frequency content, there is evidence to suggest that it can cause greater annoyance than other noise at the same noise level. On the other hand, some sources may cause less annoyance where only a single event occurs for a limited duration.

The NPI identifies correction factors for annoying noise characteristics which must be applied to the predicted noise levels before assessing against the PNTLs. The proposed operational noise sources have been assessed against the NPI guidelines and no corrections for annoying characteristics were found to be necessary at this site.

4 Operational Noise Impacts

Noise modelling of the new AC equipment has been used to predict the worst-case noise emissions to the surrounding sensitive receivers. A selection of the predicted worst-case operational noise levels due to the new AC units are summarised and compared against the consent noise limits in Table 5 below.

Table 5. Worst-case Operational Noise Levels Compared to the Noise Limits

Receiver Address	Receiver Area	Day			Evening			Night		
		L_{Aeq}	Noise Limit	Ex[1]	L_{Aeq}	Noise Limit	Ex[1]	L_{Aeq}	Noise Limit	Ex[1]
30 Orient Street	R1	48	49	0	48	48	0	-	43	0
23 Orient Street	R2	43	47	0	43	48	0	-	43	0
5 Sutherland Street	R3	<20	47	0	<20	48	0	-	43	0
46 Sutherland Street	R4	42	47	0	42	48	0	-	43	0

Note: 1. Ex = Exceedance of the Noise Limits.

The results from Table 5 demonstrate that the noise emissions from the site to the surrounding environment satisfy the noise limits at all nearby residential receivers during the day and evening time periods when the new AC equipment is operational. During the night-time period the AC equipment would not be operational, so no noise emissions have been considered.

The Development Consent conditions E10 and E11 for the Operational Stage 1 have been satisfied at all nearby residential receivers. No mitigation measures are required as a result.

5 Summary of Compliance

Table 6 below summarises the compliance conditions associated with this assessment report and where they are addressed in the report.

Table 6. Summary of Compliance

Condition	Section / Page
E11. 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.	Section 3.1 Page 3
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 identified in Noise and Vibration Impact Assessment (Ref: 2020400- 2 R01F), dated 6 May 2021 and prepared by Acoustic Works.	Appendix A – Tom Cockings Acoustic Consultant CV
Should the noise monitoring program identify any exceedance of the recommended noise levels referred to above, the Applicant must 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.	Section 4 Page 6 (no mitigation measures necessary)

6 Conclusion

Waves Consulting has conducted a noise survey of the noise emissions from new AC equipment at the Kingscliff Public School development – for Operational Stage1, Buildings 3 & 4. This assessment has investigated the noise emissions from the site during full design load operations (ie worst-case noise emissions) on Monday 29 January 2024.

This noise compliance audit has demonstrated that the Conditions E10 and E11 (from the development consent) are satisfied at all nearby residential receivers during the day and evening periods when the new equipment is operational. Based on this audit the noise emissions from the Kingscliff Public School - Operational Stage1, Buildings 3 & 4 are fully compliant with the applicable noise limits. No further mitigation measures are required as a result.

I trust this letter provides sufficient detail for your current requirements. If you have any questions, please do not hesitate to contact me.

Yours sincerely

Tom Cockings
Director | Acoustic Engineer

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Waves Acoustic Consulting Pty Ltd

APPENDIX A:
Tom Cockings – Director, Waves Consulting - CV

ACOUSTIC AND VIBRATION SPECIALISTS

Architectural | Construction | Expert Witness | Industrial | Monitoring & Measurement | Planning | Transport

TOM COCKINGS

Director | Acoustic Engineer

Qualifications

MSc (Hons) Physics
BSc (Hons) Physics

Memberships

Member Australian Acoustical Society (MAAS)

International Workshop Rail Noise (IWRN12) Committee Member

Australian Acoustical Society (NSW) Committee Member

"My passion is collaborating with others to combine the latest technology and acoustic design. Through this process we create innovative project solutions and products."

Background

Tom graduated in 2001 with a Bachelors and a Masters in Physics from the University of Nottingham in the UK. His acoustic consultancy experience began shortly after in London for a period of 4 years before emigrating to Australia.

Since 2005 Tom has been based in Sydney and over the last 20 years he has managed large acoustic businesses inside international companies. Most recently Tom was the acoustic lead for two of the largest and most complex infrastructure projects in Australian history: Westconnex Motorway and Sydney City Metro. He also managed the acoustic design input to Sydney's iconic Darling Harbour and Barangaroo projects. In these roles he delivered industry-leading acoustic designs for CBA and Westpac banks.

Consulting Experience

Tom has over 20 years of experience encompassing project management, consulting and collaborative research with industry and government authorities.

His skills include environmental noise assessments, planning and technical reports, road assessments, airports, rail noise and stations, hospitals, hotels, educational facilities, recording studios, tv studios, cinemas, scientific laboratories, specialist vehicle noise control and residential buildings.

Special Expertise

- Acoustic assessments for EIS / DA submissions with the department of planning and local consent authorities.
- Masterplan detailed design and advice.
- Transportation infrastructure noise and vibration assessments.
- Architectural and building acoustics.
- Specialist acoustic spaces (eg recording studios).
- Measurement, data analysis, R&D.
- Expert witness.

Project Experience

Planning / Industrial

- Data Centre, Wetherill Park, Noise and Vibration Impact Assessment.
- Data Centre, Kemps Creek, Noise and Vibration Impact Assessment.
- Data Centre, Macquarie Park, DA Noise and Vibration Impact Assessment.
- Data Centre Silverwater, NSW. Lead acoustic consultant for the DA submissions and detailed design.
- Data Centre Unanderra, NSW. Lead acoustic consultant for the DA submissions and detailed design.
- Dubbo Rail Maintenance Facility. EIS & NVMP Noise & Vibration Assessments.
- Thorley Quarry, Grafton, NSW. EIS Noise and Vibration Impact Assessment.
- Glenella Quarry, Cowra, NSW. EIS Noise and Vibration Impact Assessment.
- Revesby Resource Recovery Facility. Consent Modification Noise and Vibration Impact Assessment.
- Byron Bay Bio Energy Facility. EIS Noise and Vibration Impact Assessment.
- Tomago Resource Recovery Facility & Truck Parking Depot. EIS Noise and Vibration Impact Assessment.
- Toowoomba Landfill Development, Scrubby Mountain, QLD. EIS Noise and Vibration Impact Assessment.
- Bangus Quarry Landfill Development, Tumblong, NSW. EIS Noise and Vibration Impact Assessment.
- Cleanaway Container Recycling Facility, Blacktown. EPL Noise and Vibration Impact Assessment.
- Eco Logic Developments, Singleton Recycling Facility, McDougalls Hill, NSW. EIS Noise and Vibration Impact Assessment.
- Suez Recycling Facility, Queanbeyan. DA Noise and Vibration Impact Assessment.
- Cleanaway Recycling Facility, Moorebank. DA Noise and Vibration Impact Assessment.
- Kariong, Sand & Soil Supplies, Kariong. EIS Noise and Vibration Impact Assessment.
- Dump It Recycling Facility, Smithfield. DA Noise and Vibration Impact Assessment.
- 5R Solutions, Glass Recycling Facility. DA Noise and Vibration Impact Assessment.
- Traco Tyre Recycling Facility. DA Vibration Impact Assessment.
- Suez, Lucas Heights Leachate Plant. DA Noise Impact Assessment.
- Australia Post – 24hr distribution centre in Melrose Park, NSW. DA submissions and detailed design.
- Australia Post – 24hr distribution centre in Wollongong, NSW. DA submissions and detailed design.
- Oakdale West Estate Masterplan. Technical lead for the operational noise / vibration assessments as part of the DA submissions.
- Oakdale Central Masterplan. Technical lead for the operational and construction noise / vibration assessments as part of the DA submissions.
- Oakdale South Masterplan. Technical lead for the operational and construction

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TOM COCKINGS

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"My passion is collaborating with others to combine the latest technology and acoustic design. Through this process we create innovative project solutions and products."

- noise / vibration assessments as part of the DA submissions.
- IBM Cumberland Forest. Consent conditions compliance monitoring and redesign.
- Optus Macquarie Park, NSW. Consent conditions compliance monitoring and redesign.

Roads

- The Northern Road Stage 4. Detailed Design Operational Noise Impact and Consistency Assessment.
- The Northern Road Stage 5. Detailed Design Operational Noise Impact and Consistency Assessment.
- The Northern Road Stage 6. Detailed Design Construction and Operational Noise Impact and Consistency Assessment.
- The Northern Road, Mersey Road to Glenmore Parkway. Technical Lead for the operational and construction noise / vibration working paper and EIS submission.
- Harbour Link – Preliminary Environmental Investigation (PEI), Operational and Construction noise.
- Bays Precinct - Preliminary Environmental Investigation (PEI), Operational and Construction noise.
- Westconnex M4E & M4 Widening. Project Director and Technical Lead for the operational and construction noise / vibration assessments, EIS and submission reports.
- M4 Smart Motorways. Project Director and Technical Lead for the operational and construction noise / vibration assessments and REF reports.
- King Georges Road Interchange Upgrade. Project Director and Technical Lead for the operational and construction noise / vibration assessments and REF reports.
- Northern Beaches Hospital Connectivity and Network Enhancements REF. Technical review and reporting.
- Pacific Highway Upgrade, Oxley Highway to Kundabung. Operational noise and vibration detailed design technical peer review.
- Alstonville Bypass – Operational noise wall remodelling and assessment technical peer review.
- Pacific Highway Upgrade, Bonville Bypass Operational noise and vibration assessments and community liaison required for the detailed design and construction of the upgrade project.

Rail

- Sydney Metro EIS. Project Director and Technical Lead for the operational and construction noise / vibration assessments, EIS and submission reports for Sydenham to Chatswood alignment.
- CBD Light Rail. Project Director and Technical Lead for the operational and construction noise / vibration assessments, EIS and submission reports.
- Western Sydney Freight Corridor. Operational compliance assessments and reporting.
- Melbourne to Brisbane Inland Rail. Technical peer review for the concept operational noise / vibration assessments.
- Epping to Thornleigh Third Track. Operational Noise and Vibration technical peer review.
- Lower Hunter Freight Corridor. Stakeholder consultation and preliminary viability studies.
- NWRL - technical peer review for funding partners associated with the North West Rail Alignment Project.

Architectural

- Vineyard Church, NSW. Detailed acoustic design for a 1500-person auditorium with a multipurpose requirement for live music events and oratory / sermons.
- The Dubbo Regional Theatre and Convention Centre. Tom was the lead consultant for the design, construction and commissioning of this 500 tiered seat theatre and 700 seat auditorium. The state-of-the-art venue boasts a comprehensive computerised sound and lighting control room, an acoustically optimised auditorium, theatre fly tower and hydraulic orchestra 'pit room'.
- Sydney Opera House – VAPS Project. Lead Acoustic consultant for the internal PA and EWIS systems. Mechanical system acoustic design and architectural consultation and design. Works included the review and investigation of the acoustic performance of the large stage door systems for the theatre.
- Australian Film, Television and Radio School, AFTRS. Detailed architectural acoustics and vibration control design. Spaces included: THX cinemas, recording studios, control rooms, television studios, radio broadcast studios, mixing and editing suites and classrooms.
- Hillsong Church Auditorium, Baulkham Hills. 3000+ person PA system investigation, design changes and modelling. Recording, mixing and editing

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