

Mr Kiersten Fishburn
Secretary
Department of Planning, Housing and Infrastructure
Locked Bag 5022
PARRAMATTA NSW 2124

Re: RNA Pilot Research & Manufacturing Facility – Out of Hours Work Request

Dear Ms Fishburn,

Reference is made to State Significant Development consent no.SSD-51811458. In accordance with condition of consent C6, a variation to the approved construction hours is sought to enable concrete finishing works related to a concrete pour of the project's mezzanine level.

Approved hours of construction are listed under condition C4 and C5 of the consent however, condition C6(e) enables a variation to be sought to these hours where justification is provided. The project has advised that owing to the length of curing time required for *greenstar* concrete, additional hours after 6pm are required to enable concrete finishing works to be undertaken. Details regarding the out of hours work request are provided below, and as attached.

Approval is sought for:

- Concrete finishing works related to the mezzanine concrete pour between 6pm and 9pm on Thursday 19 December 2024.
- In the case of inclement weather, a contingency date is requested for Tuesday 7 January 2024, 6pm to 9pm.

Should further information be required in relation to the above please do not hesitate to contact the undersigned of 0400 403 997 or at kathryn.saunders@health.nsw.gov.au

Sincerely,



Kathryn Sanders
Senior Advisor, Town Planning (Post Approval & Compliance)

List of Attachments:

Attachment 1: Health Infrastructure Internal OOHW Application (redacted)

**Attachment 2: RNA Pilot Research and Manufacturing Facility – Slab Finishing Works OOH
Construction Noise and Vibration Impact Statement, 6 December 2024**

Appendix 1: Out of Hours Work application


Item	Description	Information/ Comments
1	PROJECT NAME AND ADDRESS	RNA Pilot Research & Manufacturing Facility, 16 Herring Road, Macquarie Park (Lot 2000 in DP 1305792)
2	REF/ SSD APPROVAL NUMBER	SSD-51811458
3	DETAILED DESCRIPTION OF OOHW Provide a detailed description of construction methodology and list of plant/equipment	<p>Finishing of concrete floor slab following from concrete pour to the Mezzanine Level.</p> <p>Equipment in use will be:</p> <ul style="list-style-type: none"> Concrete power trowels Portable tower lighting <p>Concrete will have already been poured during day, only final finishing utilising power trowels is required to complete the slab finish, with works being completed under portable tower lighting.</p>
4	CONTRACTOR PERFORMING WORKS	Hindmarsh Construction Australia
5	LOCATION OF WORKS Attach site plan including proposed worksites	
6	START DATE Specified start and finish dates and times are required. Approval will not be granted for a blanket OOHW period	<p>19th December 2024</p> <p>7th January 2025 (Back up day only)</p>
7	FINISH DATE	19 th December 2024 (7 th January 2025 (Back up day only))
8	START TIME	6pm (works will commence 7am, noting 7am-6pm already approved under existing instrument)

Item	Description	Information/ Comments																
9	FINISH TIME	9pm																
10	CATEGORY OF OOHW In accordance with the ICNG categories of works that may be required to be undertaken outside the recommended standard construction hours	OOHW Period 1																
11	JUSTIFICATION Provide full justification why the OOHW are required to be undertaken outside approved hours	<p>Due to the concrete slab for the mezzanine requiring greenstar/ESD concrete that has a longer curing time, concrete pour finishing takes longer and requires to be completed to achieve the structural finish to the slab pour.</p> <p>The floor slab to the mezzanine level is required to be completed in a single concrete pour to achieve a monolithic slab, as a safety in design measure to mitigate the risk of future leaks through mezzanine slab construction joints into the below biopharmaceutical laboratory environment.</p> <p>There is no alternative method available that will enable the mezzanine slab to be completed entirely within the SSD approved working hours.</p>																
12	CONSULTATION <ul style="list-style-type: none"> Attach evidence of support for the OOHW from the LHD Attach evidence of support from surrounding sensitive noise receivers (if received) 	<p>Macquarie University and campus stakeholders informed in MQU Precinct Partners Meeting held 9 December 2024 with no issues or feedback raised in relation to planned works.</p> <p>Nearest sensitive noise receivers (adjacent residents on Culloden Rd) to be notified in advance of works, subject to OOHW application approval.</p>																
13	CNVIS Refer to Section 3.1 of the HI OOHW Protocol for minimum requirements for a CNVIS <ul style="list-style-type: none"> Attach and reference CNVIS Description of high noise generating plant/equipment and construction scenarios 	Noise will be for concrete finishing including the following works equipment trowling, watering and use of portable tower lighting, please refer to appended CNVIS for complete assessment.																
Provide CNVIS noise predictions to the nearest and potentially worst-affected receivers.		<table border="1"> <thead> <tr> <th>Time of day - as defined in NSW Noise Policy for Industry (EPA) 2017</th> <th>Noisiest Plant/ Equipment/ Construction Scenario</th> <th>Receiver Type</th> <th>Construction Noise Level</th> <th>Attenuation</th> <th>Predicted Noise Level</th> <th>RBL</th> <th>Exceedance of RBL</th> </tr> </thead> <tbody> <tr> <td>Day OOHW</td> <td>Included in approved working hours</td> <td>Residential</td> <td></td> <td></td> <td></td> <td>47</td> <td></td> </tr> </tbody> </table>	Time of day - as defined in NSW Noise Policy for Industry (EPA) 2017	Noisiest Plant/ Equipment/ Construction Scenario	Receiver Type	Construction Noise Level	Attenuation	Predicted Noise Level	RBL	Exceedance of RBL	Day OOHW	Included in approved working hours	Residential				47	
Time of day - as defined in NSW Noise Policy for Industry (EPA) 2017	Noisiest Plant/ Equipment/ Construction Scenario	Receiver Type	Construction Noise Level	Attenuation	Predicted Noise Level	RBL	Exceedance of RBL											
Day OOHW	Included in approved working hours	Residential				47												

Item	Description	Information/ Comments
	Evening OOHW	Completion of concrete pours Residential 95 dB(A) SWL -37 57 dB(A) 15 min 47 Up to 10 dB(A) for works required to complete concrete pours
	Night OOHW	Completion of concrete pours Residential 95 dB(A) SWL -37 57 dB(A) 15 min 45 Up to 12 dB(A) for works required to complete concrete pours
	Identification of AMM requiring consideration (refer to Appendix 2 of the OOHW Protocol)	Letter Box
14	TRAFFIC Will the work require traffic control?	n/a
	Describe the location and nature of disruption to traffic proposed? (provide plan is required)	n/a
	Who is planning traffic control?	n/a
15	LIGHTING What lighting is to be provided for night work	Yes, portable tower lighting will be in place however will be positioned facing away from sensitive receivers, nearest sensitive receivers being 50m+ away from works area and behind multiple trees. Macquarie University Observatory has been informed of the planned evening works and no concerns were raised.
	Will light have impacts external to the work? If so, how will they be mitigated?	As noted above.
16	COMMUNICATION Is a Disruption Notice required? If so, attach a copy of the community notification	A disruption notice is not required as the works will not directly affect any Macquarie University stakeholder, however the stakeholders have been informed of the planned works in the MQU Precinct Partners Meeting held 9 December 2024 with no issues or feedback raised.
	Has one been issued?	n/a

Prepared by

Name: Reg Struwig

Signature: 

Comments:

Principal's Authorised Person approval

Name: Adrian Thompson

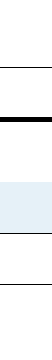
Signature: 

Comments:

HI SPD support for the submission of the application to the relevant approval authority

Name: Scott Lawlor

Title: HI Senior Project Director

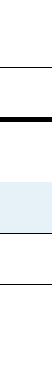
Signature: 

Comments:

HI Executive Director support for the submission of the application to the relevant approval authority

Name: Leisa Rathborne

Title: Executive Director Northern Region

Signature: 

Comments:



RNA Pilot Research and Manufacturing Facility – Slab Finishing Works

Out of Hours Construction Noise and Vibration Impact Statement

Hindmarsh Construction Australia Pty Ltd
Level 27/100 Miller St
North Sydney NSW 2060

Report Reference: 240258 – RNA Pilot Research and Manufacturing Facility – Slab Finishing Works – Out of Hours Construction Noise and Vibration Impact Statement – R0
Date: 6 December 2024

Revision: R0

Project Number: 240258



DOCUMENT CONTROL

Project Name:	RNA Pilot Research and Manufacturing Facility – Slab Finishing Works
Project Number:	240258
Report Reference:	240258 – RNA Pilot Research and Manufacturing Facility – Slab Finishing Works – Out of Hours Construction Noise and Vibration Impact Statement – R0
Client:	Hindmarsh Construction Australia Pty Ltd

Revision	Description	Reference	Date	Prepared	Checked	Authorised
1	R0	For issue	06/12/24	MA	BW	BW

PREPARED BY:

Pulse White Noise Acoustics Pty Ltd
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Phone: 1800 4 PULSE

This report has been prepared by Pulse White Noise Acoustics Pty Ltd with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Hindmarsh Construction Australia Pty Ltd.

Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of Hindmarsh Construction Australia Pty Ltd. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from Pulse White Noise Acoustics.

This report remains the property of Pulse White Noise Acoustics Pty Ltd until paid for in full by the client, Hindmarsh Construction Australia Pty Ltd.

Pulse White Noise Acoustics disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.



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1 INTRODUCTION

On behalf of Health Infrastructure, Hindmarsh are currently constructing the single storey RNA (Ribonucleic Acid) Pilot Research and Manufacturing Facility. The project was assessed as a State Significant Development (SSD-51811548) and approval granted, with conditions, on the 29 February 2024.

Hindmarsh are currently pouring the mezzanine concrete slab. Due to the project sustainability (Greenstar), and to achieve the required structural finish requirements, the concrete has a longer curing time than typical works. This work cannot be completed within the approved construction standard working hours; hence Hindmarsh are applying to complete the works during Outs of Hours Work (OoHW).

This report provides a Construction Noise and Vibration Impact Statement CNVIS to assess the likely noise and vibration impacts of the works and recommend appropriate noise management and mitigation measures.

1.1 Scope of report

This report is based on the projects Construction Noise and Vibration Sub Plan. This plan has not considered vibration criteria for out of hours works, so the applicable criteria is also included.

The scope of this CNVIS includes:

- details of the nature and scope of each activity and work, including details of times, vehicles, plant and equipment to be used to undertake that activity or work
- detailed analysis to justify the scheduling and duration of each activity and work outside the approved construction hours, including taking into account:
 - the predicted impact on noise sensitive receivers of any activities and works undertaken outside the hours; and
 - the preference that high noise impact works be undertaken during the day
- detailed analysis to justify use of the selected construction and work methods, plant and equipment compared to alternatives taking into consideration noise and vibration impacts
- a table showing details of the noise and vibration mitigation measures for each activity and work, including respite periods, proposed to be adopted to minimise noise and vibration impacts on surrounding noise sensitive receivers in each locality
- a table showing for each activity and work in each noise catchment
 - the address of each of the potentially worst-affected noise sensitive receiver(s)
 - the RBL for each of the relevant noise sensitive receivers
 - NMLs as described in Section 4 of the ICNG
 - the predicted $L_{Aeq,15min}$ noise level, incorporating any 5 dB correction for particularly annoying activities as listed on page 16 of the ICNG
 - the level of the NML exceedance
- a diagram showing the location of noise and vibration monitoring locations in relation to each of the most affected noise sensitive receivers for each activity and work in each noise catchment
- A GIS overlay map showing the level and extent of noise impacts on noise affected receivers for worse case scenarios
- A plain English discussion interpreting the noise modelling results in a meaningful way, including an assessment on sleep disturbance
- An assessment of vibration impacts



-
- details of the feasible and reasonable Standard Noise Mitigation Measures AND Additional Mitigation Measures to be adopted in accordance with the requirements outlined in Appendix 2 at any noise sensitive receiver outside the approved construction hours
 - Details of how and when noise affected receivers as defined on page of 12 the ICNG will be notified of the proposed OOHW, and include a copy of the notification
 - Details of an appropriate noise and vibration monitoring program
 - A discussion of the complaints handling management system relating to the OOHW

2 EXISTING ENVIRONMENT

The Project site is located at 16 Herring Road, Macquarie Park. The development site is a part of a larger lot that is legally described as Lot 70 DP127681 (formerly Lot 220 DP1266103). The development site is bound by gymnasium Road 9private, MQU-owned internal campus road) to the south-west, Cullen Road to the north-west and Talavera Road to the north-east. The area to be developed is known as Lot B04 under the Macquarie University Concept Plan (MP06_0016).

Development surrounding the development site includes:

- To the north-east: The Macquarie University Observatory is located directly adjacent to the site. Beyond this, development comprises a series of buildings associated with the Faculty of Science and Engineering, Macquarie University.
- To the North-west: Culloden Road adjoins the development site to the north-west. Existing development further to the north-west, on the opposite side of Culloden Road, includes a multi dwelling student accommodation development (MQU Village) and residential buildings.
- To the south-east: a cricket pitch is located directly to the south-east of the development site and that main part of the Macquarie University Campus is located beyond this.
- To the south-west: Gymnasium Road adjoins the development site to the south-west. On the opposite side of the Gymnasium Road is the Royal Institute for Deaf and Blind Children Centre of Excellence.

Presented below in Figure 1 is an illustration of the land zoning throughout the project area. The most sensitive receivers are located directly opposite the site.

Figure 1 Land zoning





2.1 Ambient noise environment

Background noise logging was previously undertaken by Arup, as part of their Noise and Vibration Impact Assessment submitted as part of the SSD Application, report reference 289887-00 AC01, Issue8 (dated 6 July 2023).

Presented below in Table 1 is a summary of the noise logging results undertaken by Arup.

Table 1 Measured ambient noise levels, dB(A)

ID	Address	Rating background level			Ambient noise level, $L_{Aeq,period}$		
		Daytime	Evening	Night	Daytime	Evening	Night
L1	Macquarie University Observatory	47	47	45	61	56	59



3 NOISE CRITERIA

3.1 Construction noise

The EPA’s Interim Construction Noise Guideline (ICNG) provides guidance on appropriate construction noise management levels that should be adhered to on construction projects throughout NSW. This guideline identifies that potential impacts from construction noise are determined based on time of day of the noise, the increase in site noise above background noise, the duration of the event, and any adverse characteristics of the noise.

The ICNG identifies a quantitative assessment approach which is applicable to this project. The quantitative assessment method involves predicting noise levels at sensitive receivers and comparing them with site specific Noise Management Levels (NMLs). The NML affectation categories for receivers have been reproduced from the guideline and are listed in Table 2.

Table 2 Construction noise management levels – residential receivers

Receiver type	Time of day	Noise management level $L_{Aeq(15minute)}^{1,2}$	How to apply
Residential	Approved working hours of the project, including: Monday-Friday 7am-6pm and Saturday 8am-1pm	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq(15minute)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
		Highly noise affected 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. Times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences). 2. If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
	Outside recommended standard hours	Noise affected RBL + 5 dB	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 noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dB above the noise affected level, the proponent should negotiate with the community.



The ICNG also provides NMLs for non-residential land uses. Unlike residential receivers, these criteria are fixed levels, independent of local background noise levels. Presented below in Table 3 are NMLs for non-residential land uses.

Table 3 Construction noise management levels – other receivers

Land use	Location applied	Noise management level, $L_{Aeq,15min}$
Classrooms and other educations institutions	Internal noise level	45 dB(A)
Hospital wards and operating theatres	Internal noise level	45 dB(A)
Places of worship	Internal noise level	45 dB(A)
Active recreation areas (characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion)	External noise level	65 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	60 dB(A)
Community centres	Refer to the recommended “maximum” internal levels in AS2107 for specific uses	
Industrial premises	External noise level	75 dB(A)
Offices, retail outlets	External noise level	70 dB(A)

3.1.1 Site specific noise management levels

Presented below in Table 4 is the receiver specific noise criteria. For sensitive receivers such as educational, an external noise criterion is assumed based on a typical indoor to outdoor attenuation from an open window of 10 dB(A).

Table 4 Site specific external construction noise management levels, dB(A)

Area	Type	Daytime 7am to 6pm	Evening 6pm to 10pm	Night-time 10pm to 7am	Highly noise affected
NCA1	Residential	57	52	50	75
All	Education	55 ¹	NA	NA	NA

Note 1 This is external noise management receiver location, assuming a 10 dB reduction for windows open.

3.2 Construction vibration

The works considered as part of the CNVIS does not include vibration generating equipment, and as such has not been assessed. The vibration criteria have not been included here for brevity.



4 PREDICTED IMPACTS

4.1 Proposed out of hours works

The concrete pour would be completed during standard (approved) daytime hours. Consideration of impacts from daytime works is not considered here.

Proposed works - Concrete finishing works

These Out of Hours Work would be limited to the finishing the concrete slab as it dries.

Works are expected to take place over one day, which has been scheduled for 19th December. In the event that this day cannot proceed 23rd December has been provisioned as a backup day.

The works would take place from 6 pm to 9 pm, falling within the evening period, or Out of Hours Period 1.

Due to the project sustainability (Greenstar), and to achieve the required structural finish requirements, the concrete has a longer curing time than typical works. This work cannot be completed within the approved construction standard working hours; hence Hindmarsh are applying to complete the works during Outs of Hours Work (OoHW) Period 1.

Presented below in Table 5 is a summary of the construction equipment noise levels

Table 5 Construction equipment sound power levels

Equipment	Number of	Duty cycle	Soud power level, dB(A)
Power trowel (helicopter)	3	100	102
Daymaker	1	100	91
Generator	1	100	95
Total site noise	5	100	107

4.2 Noise impacts

Construction noise levels have been predicted using Gekko, PWNAs construction noise prediction and management tool. This software calculates the propagation of noise in accordance with ISO9613 undertaking three-dimensional ray tracing to consider the propagation of noise, including all relevant reflections and refractions through the local built environment. Gekko has been benchmarked against other noise propagation software, with results found to be within 0.5 dB of competing models. This accuracy is within the tolerance of the relevant propagation algorithms.

Presented below in Table 6 is a summary of the predicted noise impacts from the assessed scenario.

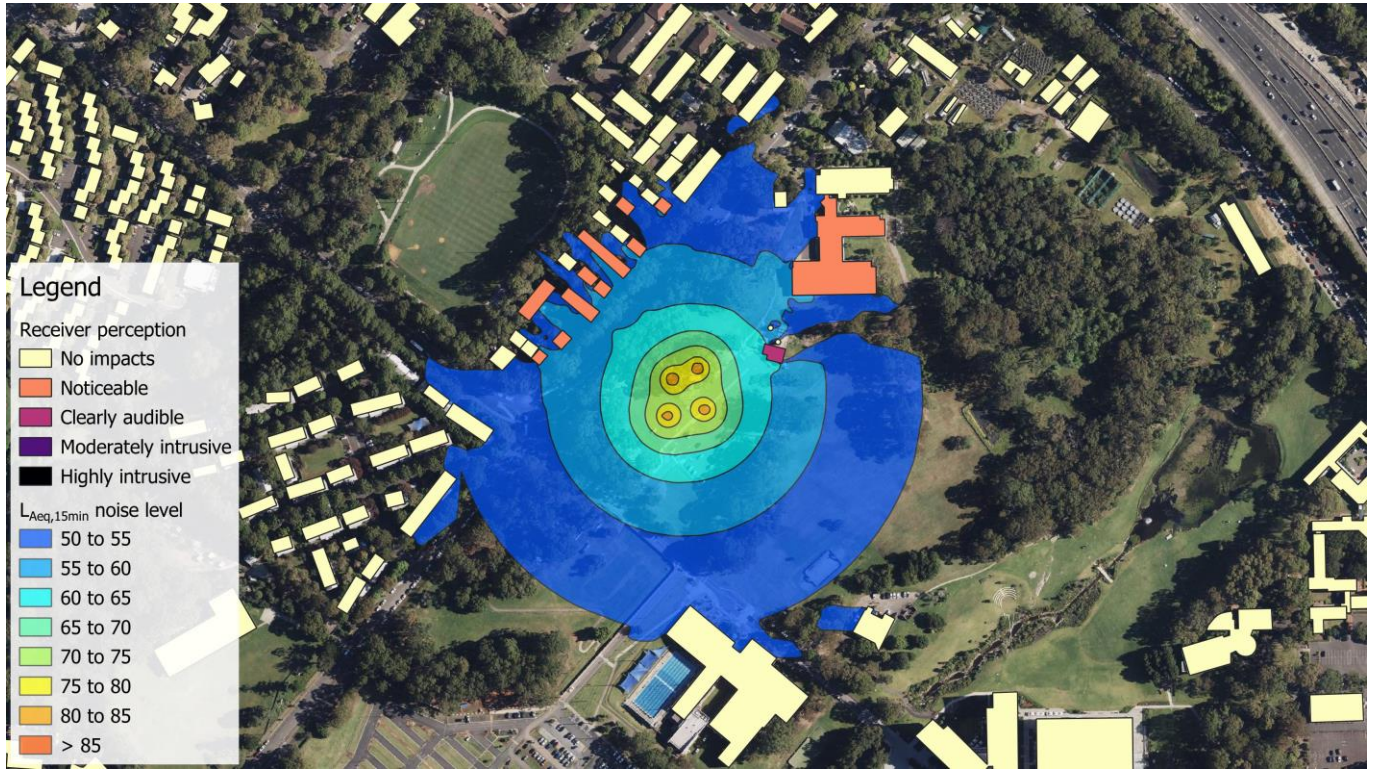
Table 6 OoHW Period 1 – Evening noise impacts – number of receivers in perception range

Scenario	Noise impact range	Noticeable	Clearly audible	Moderately Intrusive	Highly intrusive	> 75 dB(A)
Concrete finishing	31 – 60 dBA	11	0 ¹	0	0	0

Note 1 The maps identify one receiver in the clearly audible category, but it is not residential.

Presented below in Figure 2 is an illustration of the noise impacts, and the perception of the sensitive receivers. These perception categories directly correlated with the appropriate noise management measures.

Figure 2 Noise management maps



4.3 Vibration

The proposed works identified in Section 4.1 do not generate vibration. A vibration impact assessment is not required and has not been assessed.



5 MANAGEMENT AND MITIGATION MEASURES

Project specific general noise management measures can be found in the projects Construction Noise and Vibration Management Subplan.

Presented below is a summary of the required noise management measures for OoHW.

Table 7 Noise management measures

Construction hours	Receiver perception	dB(A) above RBL	dB(A) above ANML	Additional management measures
OOHW Period 1	Noticeable	5 to 10	<= 5	-
Monday – Friday 6pm – 10pm	Clearly audible	> 10 to 20	>5 to 15	PN, RP, DR
Saturday 7am – 8am	Moderately intrusive	> 20 to 30	>15 to 25	PN, V, SN, RO, RP, DR
Sunday / PH 8am-6pm	Highly intrusive	>30	>25	PN, V, SN, RO, RP, DR

Note 1 PN = Periodic notification; SN = Specific notification, individual briefings, or phone call; V = Verification of monitoring; AA = Alternative accommodation; DR = Duration reduction; RO = Project-specific respite offer; RP = Respite period.

The results in Figure 2 identify that 11 residential receivers are identified as Noticeable, with an exceedance of the RBLs of 5 to 10 dB(A). The management measures in Table 7 identify that these receivers are not eligible for any additional noise management measures.

5.1 Recommended noise management measures

While additional noise management measures are not specifically required, given that the noise impacts would be noticeable outside standard construction hours, notification to residential receivers should be undertaken within 250 m to advise the community of the upcoming works, including the expected date and duration. Further information and requirements are presented in Section 6.

Additional mitigation measures also include:

- Regular reinforcement (such as at toolbox talks) of the need to minimise noise and vibration.
- Orienting equipment away from noise sensitive areas.
- Investigate the potential for noise blankets to reduce impacts, particularly around fixed equipment
- Choosing quieter plant and equipment based on the optimal power and size to most efficiently perform the required tasks.
- Selecting plant and equipment with low vibration generation characteristics.
- Operating plant and equipment in the quietest and most efficient manner.
- Use of broadband audible alarms on vehicles and elevating work platforms used on site.



6 COMMUNITY ENGAGEMENT AND CONSULTATION

Active community consultation and the maintenance of positive relations with local residents and businesses would assist in alleviating concerns and thereby minimising complaint. It is common for construction projects to provide community consultation if an exceedance of noise goals has been predicted. This communication is commonly conducted in the form of a letter box drop or more active engagement with more highly impacted receivers.

This form of notification should provide specific notification of the duration and timing of the construction activities so that residents are informed about the proposed works ahead of time. The letter should also provide the community with a hotline number for a community liaison officer available to adequately respond to all project related enquiries.

Ideally the hotline number should provide concerned locals an opportunity to raise any concerns with the project proponent and provide an opportunity to determine the best method to satisfy all requirements.

Prior to the works onsite being undertaken, it is recommended that community consultation with the neighbouring affected parties be undertaken as detailed in the projects Community Consultation and Engagement Plan which will be undertaken by the building contractor.

However, should not be limited to the beginning of the onsite works but throughout, providing the community with constant updates on the progress and upcoming works. In our experience these could include:

- Site noticeboard,
- Email notifications; and
- Letterbox drops.

During the proposed work the building contractor should engage with the community. The community interaction and notification is required to include the following:

1. Notification of the proposed works to be undertaken on the site and the periods when works will be conducted, including information regarding the programme of works such as demolition and ground works. This should include the expected period when activities such as hydraulic hammering, rock breaking, concrete or rock sawing is required to be undertaken.
2. Details of the relevant site representative where complaints can be registered.
3. Details of the methodology to respond to complaints raised from the surrounding receivers.
4. A register of complaints, to be kept on site including record of time and nature of the complaint as well as the outcomes and comments regarding investigations resulting from the complaint.



7 CONCLUSION

Hindmarsh are currently pouring the mezzanine concrete slab. Due to the project sustainability (Greenstar), and to achieve the required structural finish requirements, the concrete has a longer curing time than typical works. This work cannot be completed within the approved construction standard working hours; hence Hindmarsh are applying to complete the works during Outs of Hours Work (OoHW).

This report presents a Construction Noise and Vibration Impact Statement of the proposed works.

The applicable noise criteria has been based on the Interim Construction Noise Guideline, and background noise levels measured at the time of the SSD submission. The proposed works would take place from 6pm to 9pm, falling into the evening period, or Out of Hours Period 1. The proposed works would not extend into the night-time period.

Noise impacts have been calculated, based on the proposed works and representative noise source levels. The predictions identify that the noise levels would be up to 60 dB(A) at the most affected receivers, which is an exceedance of 8 dB(A) and is considered to be Clearly Audible.

This report has included recommendations for appropriate noise mitigation and management measures to minimise the potential impacts to the local community. Given the impacts would not extend into the night-time period, and the impacts are not considered intrusive, noise monitoring is not required.

Community consultation has also been recommended to communicate the potential impacts to the local community and to provide the community with a complaints hotline.

In the event you require any additional information or clarification regarding this report please contact the author below.

Regards,

A handwritten signature in black ink, appearing to read 'Michael Allan'.

MICHAEL ALLAN
TECHNICAL DIRECTOR
E MichaelA@pwna.com.au
PULSE WHITE NOISE ACOUSTICS



APPENDIX A. ACOUSTIC TERMINOLOGY

The following is a brief description of the acoustic terminology used in this report:

Ambient Sound	The totally encompassing sound in a given situation at a given time, usually composed of sound from all sources near and far.
Audible Range	The limits of frequency which are audible or heard as sound. The normal ear in young adults detects sound having frequencies in the region 20 Hz to 20 kHz, although it is possible for some people to detect frequencies outside these limits.
Character, acoustic	The total of the qualities making up the individuality of the noise. The pitch or shape of a sound's frequency content (spectrum) dictate a sound's character.
Decibel [dB]	The level of noise is measured objectively using a Sound Level Meter. The following are examples of the decibel readings of every day sounds; 0dB the faintest sound we can hear 30dB a quiet library or in a quiet location in the country 45dB typical office space. Ambience in the city at night 60dB Martin Place at lunch time 70dB the sound of a car passing on the street 80dB loud music played at home 90dB the sound of a truck passing on the street 100dB the sound of a rock band 115dB limit of sound permitted in industry 120dB deafening
dBA	<i>A-weighted decibels</i> The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dBA. Practically all noise is measured using the A filter. The sound pressure level in dBA gives a close indication of the subjective loudness of the noise.
Frequency	Frequency is synonymous to <i>pitch</i> . Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Loudness	A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on
L _{max}	The maximum sound pressure level measured over a given period.
L _{min}	The minimum sound pressure level measured over a given period.
L ₁	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L ₁₀	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L ₉₀	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L ₉₀ noise level expressed in units of dBA.
L _{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Sound Pressure Level, LP dB	A measurement obtained directly using a microphone and sound level meter. Sound pressure level varies with distance from a source and with changes to the measuring environment. Sound pressure level equals 20 times the logarithm to the base 10 of the ratio of the rms sound pressure to the reference sound pressure of 20 micro Pascals.
Sound Power Level, Lw dB	Sound power level is a measure of the sound energy emitted by a source, does not change with distance, and cannot be directly measured. Sound power level of a machine may vary depending on the actual operating load and is calculated from sound pressure level measurements with appropriate corrections for distance and/or environmental conditions. Sound power levels is equal to 10 times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power of 1 picoWatt.