

Randwick Hospital Redevelopment

Construction Noise and Vibration Monitoring Plan: Out of Hours - Hospital Gantry Works

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1 INTRODUCTION

Acoustic Logic has been engaged by Lendlease Building to undertake an acoustic review and provide a summary that will support the SSD 10339 for the proposed Hospital Clinical link bridge gantry installation works.

Gantries will then be installed under the Clinical link bridge and UNSW building annex to allow finishing works (bridge glazing, Annex structural works) to proceed during daytime hours and permit traffic to use Hospital Road and the loading dock.

The gantries will be installed outside of hours as not to disrupt the use of the Hospital's loading dock. Once the gantries are installed finishing works on the bridge and annex will be carried out inside approved hours.

This report presents our noise and vibration assessment for the proposed out of hours gantry installation works east of the Randwick Campus redevelopment.

In this report we will address:

- Potential construction noise and vibration impacts on the nearby sensitive receivers due to the proposed works.
- Detail relevant noise and vibration criteria which have been adopted as well as the outcomes of the acoustic assessment
- Identify noise emission management levels that are appropriate for any works conducted outside of the standard construction hour periods.
- Review of the proposed construction activities and detail management controls being implemented.

2 PROJECT DESCRIPTION

The proposed works will consist of the installation of two gantries under the clinical link bridge and the annex of the building as shown in Figure 2.

The proposed out of hours weekday works involved to install the gantries are as follows:

- Setup of traffic controls and lighting.
- Deliveries of structural steel components
- Craning of steel members, metal sheeting
- Torquing of structural fasteners

The nearest and potentially most affected noise receivers to the proposed works are shown in Figure 1 and are as follows:

- Residential dwellings located along the southern side of Magill Street, 90m away
- Hospital Buildings located along the eastern side of Hospital Road
- Residential dwellings located along the northern side of High Street (not shown as over 200m away to North).

The nearest vibration sensitive receivers to the proposed works will be in the existing Hospital Buildings.

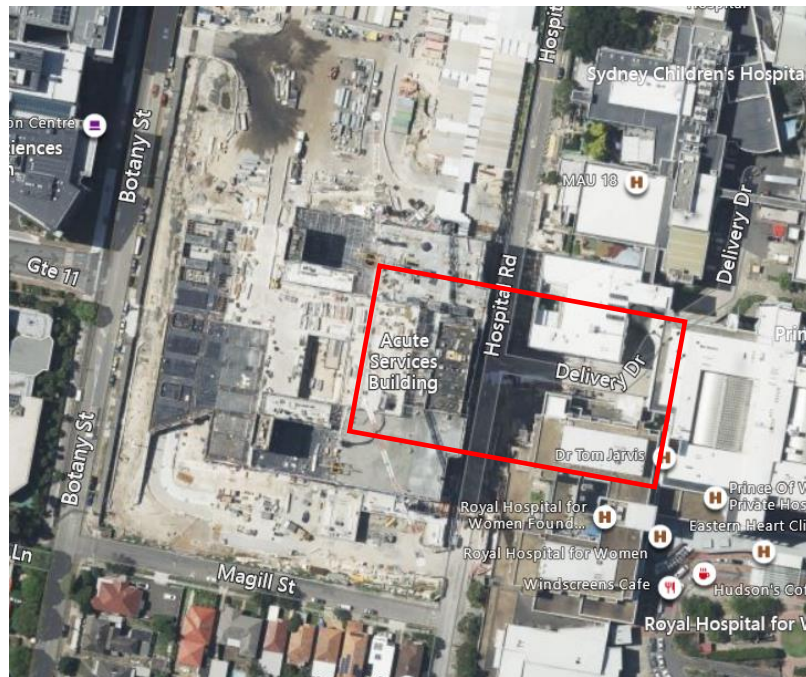


Figure 1 - Site Work Zone Map

2.1 CONSTRUCTION ACTIVITIES

The proposed works will be carried out by a small team of 8 to 10 workers consisting of the crane crew, riggers and traffic controllers to minimise noise.

The gantry work site locations are shown in plan in Figure 2 and in section in Figure 3. The out of hours works will consist of lifting steel beams and metal sheets to construct the gantry work platforms. The gantries will permit further Bridge cladding and finishing works to be carried out during standard work hours.

The following plant has been proposed to be used for the gantry installation works:

- Mobile Crane (Franna or City Crane)
- Rigging hand tools (hammers, podgers, come-alongs, rattleguns)
- Hammer Drills
- Daymakers
- EWPs

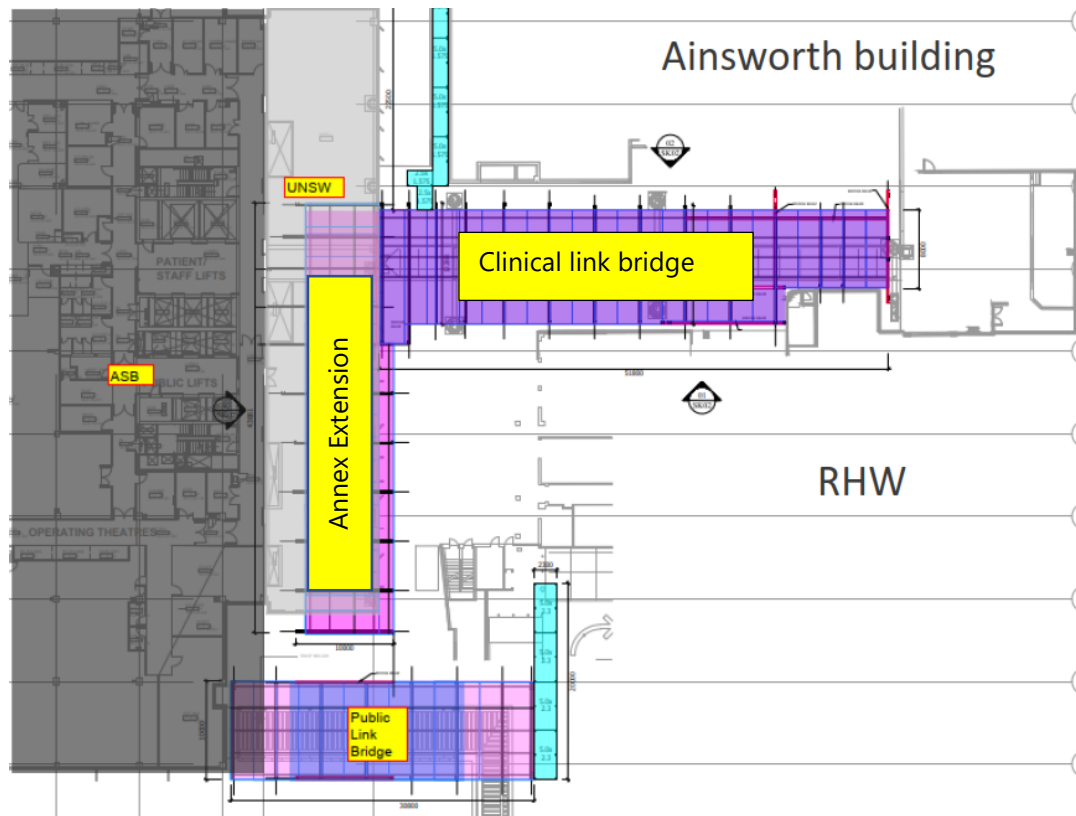
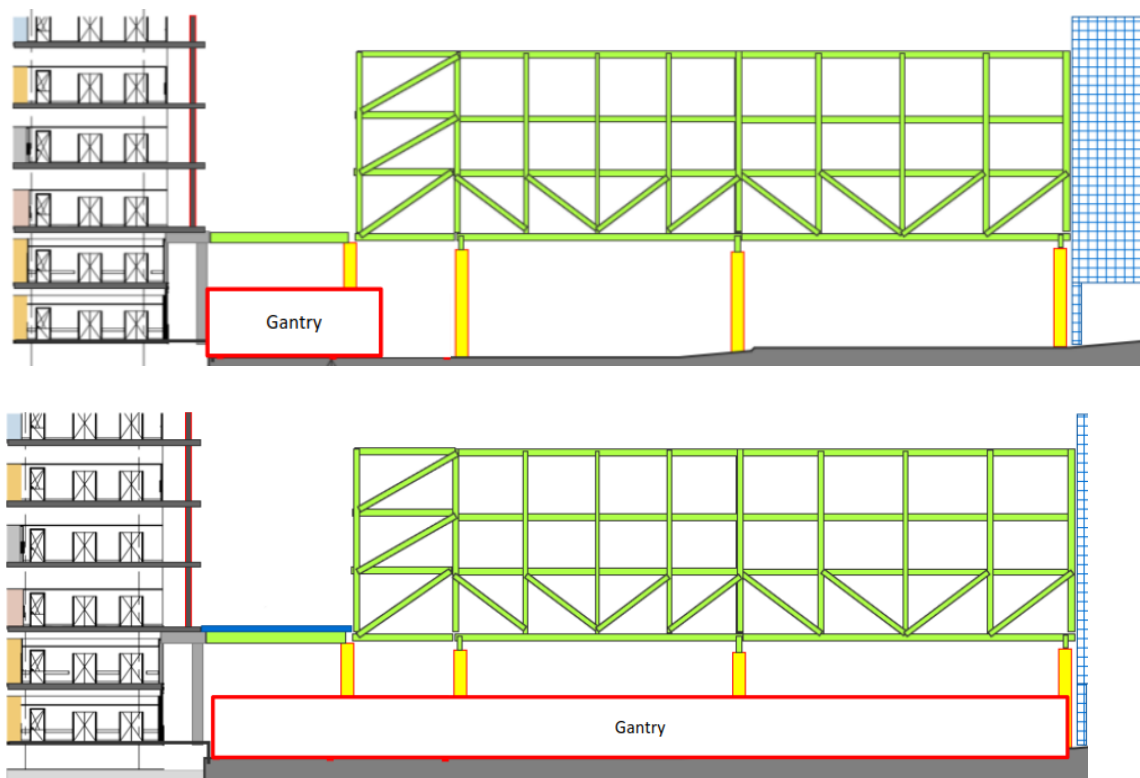


Figure 2 – Proposed Gantry Installations - Plan View



**Figure 3 – Proposed Gantry Installations - Elevation View
(Hospital Road and Delivery Drive)**

2.2 CONSTRUCTION HOURS

The following activities will be required to be undertaken outside the standard construction hours:

1. Gantry Installations
 - The proposed out of hours work hours will be Monday to Friday from 6pm to 4am.

The gantry installation works program requires 5 nights a week for 4 weeks. Respite periods will be provided on weekends with no weekend closures to the Hospital's loading dock during these periods.

As such, a wide range of acoustic mitigation measures have been developed with consideration to the residential receivers but also the existing Randwick Hospital.

3 CONSTRUCTION NOISE MANAGEMENT LEVEL

3.1 RELEVANT CODES AND STANDARDS

In preparing this plan we have considering the following:

- [1] The Development Consent ref: SSD9113.
- [2] Randwick Campus Redevelopment, Noise and Vibration Impact Assessment for State Significant Development (SSD) – Acute Services Building, ref:20180808 AUR.0003.Rep, prepared by Acoustic Studio
- [4] NSW Department of Environment and Climate Change (DECC) "Interim Construction Noise Guideline", 2009
- [5] NSW Department of Environment and Conservation (DEC) "Assessing Vibration: A Technical Guideline", 2006
- [6] Australian Standard "AS 2436: Guide to Noise Control on Construction, Maintenance & Demolition Sites", 1981
- [7] Australian Standard "AS 2670.2: Evaluation of human exposure to whole-body vibration – Part 2: Continuous and shock-induced vibration in buildings (1 to 80 Hz)", 1990
- [8] British Standards Institution "BS 6472 – Evaluation of human exposure to vibration in buildings (1 Hz to 80 Hz)", 1992
- [9] German Institution for Standardisation "DIN 4150.3 : Structural vibration – Effects of vibration on structures", 1999
- [10] NSW Transport (RMS) Construction Noise and Vibration Guideline

3.2 CONSTRUCTION HOURS APPROVED IN STATE SIGNIFICANT DEVELOPMENT (SSD) 9113

The work hours for the project (as per Consent Condition C4) are:

- 7:00am to 6:00pm Monday to Friday
- 8:00am to 5:00pm Saturday

4 NOISE MANAGEMENT TRIGGER LEVEL

Noise emissions from the exempt work should satisfy the following:

- Requirements of the SSD 10339 from the minister of planning and public spaces.
- NSW EPA Interim Construction Noise Guideline (ICNG) 2009; and
- Australian Standard AS2436:2010.

- NSW Transport Roads & Maritime Services – Construction Noise and Vibration Guideline

4.1 REQUIREMENTS BY SSD 10339

B12. The Construction Noise and Vibration Management Sub-Plan must address, but not be limited to, the following:

- a) be prepared by a suitably qualified and experienced noise expert;
- b) describe procedures for achieving the noise management levels in EPA's Interim Construction Noise Guideline (DECC, 2009);
- c) describe the measures to be implemented to manage high noise generating works such as piling, in close proximity to sensitive receivers;
- d) include strategies that have been developed with the community for managing high noise generating works;
- e) describe the community consultation undertaken to develop the strategies in condition B12(d);
- f) include a complaints management system that would be implemented for the duration of the construction;
- g) mitigation measures to minimise impacts of works undertaken outside standard hours adherence to the recommendations of the report titled Noise and Vibration Impact Assessment Issue 5 dated 5 August 2019 and prepared by Acoustic Studio, as modified by the conditions of this consent.

4.2 REQUIRMENTS BY NSW INTERIM CONSTRUCTION NOISE GUIDELINE

The NSW EPA Interim Construction Noise Guideline (ICNG) 2009 details specific construction noise and vibration management levels applicable to construction sites within NSW.

Where feasible and practical measures may be applied to the construction site is to endeavour to comply with the noise management levels outlined in the guideline. A summary of the code is detailed below.

4.3 NSW EPA INTERIM CONSTRUCTION NOISE GUIDELINE (ICNG) 2009

NSW EPA INCG adopts different management levels depending on the applicable receiver type, each is discussed below.

4.3.1 Residential Receivers

EPA guidelines adopt differing strategies for noise control depending on the predicted noise level at the nearest residences:

- "Noise affected" level. Where construction noise is predicted to exceed the "noise effected" level at a nearby residence, the proponent should take reasonable/feasible work practices to ensure compliance with the "noise effected level". For residential properties, the "noise effected" level occurs when construction noise exceeds ambient levels by more than:
 - 5dB(A)Leq(15min) for work outside standard construction hours.

Table 1 – Construction Noise Management Level

Receiver Type	"Noise Affected" Level dB(A) _{Leq(15 minutes)}
Residential Receivers	Background + 5dB(A) (Outside Standard Construction Hours)

4.3.2 Other Sensitive

Other sensitive land uses, such as schools and hospitals typically consider noise from construction to be disruptive when the properties are being used. The table below presents management levels for noise at other sensitive land uses based on the principle that the characteristic activities for each of these land uses should not be unduly disturbed.

External noise levels are to be assessed at the most affected point within 50m of the area boundary. Where internal noise levels cannot be measured, external noise levels may be used. A conservative estimate of the difference between internal and external noise levels is 10 dB for buildings other than residences. Some buildings may achieve greater performance, such as where windows are fixed (that is, cannot be opened).

Table 2 – Noise at Sensitive Land Uses

Land Uses	Management Trigger Level _{L_{Aeq}(15min)}
Hospital Wards and Operating Theatres	Internal noise level 45dB(A)

4.4 AUSTRALIAN STANDARD AS 2436:2010 “GUIDE TO NOISE CONTROL ON CONSTRUCTION, MAINTENANCE AND DEMOLITION SITES”

Australian Standard AS 2436 provides guidance on noise and vibration control in respect to construction and demolition sites, the preparation of noise and vibration management plans, work method statements and impact studies.

The Standard states that:

- “Some construction and demolition activities are by their very nature noisy. The authorities responsible for setting noise level criteria for essential works will take note of the constraints imposed by such activities, especially when they are of short duration.”
- Construction, demolition and maintenance works pose different problems of noise and vibration control when compared with most other types of industrial activity, since (a) they are mainly carried on in the open; (b) they are often temporary in nature although they may cause considerable disturbance whilst they last; (c) the noise and vibration arise from many different activities and kinds of plant, and their intensity and character may vary greatly during different phases of the work; and (d) the sites cannot be separated by planning controls, from areas that are sensitive to noise and vibration.

The standard provides advice and guidelines for the prediction of impacts and the methods available to manage impacts. The guideline promulgates feasible and reasonable mitigation strategies and controls, and stakeholder liaison, in the effort to reach a realistic compromise between site activities and impacts on neighbouring properties.

4.5 NSW TRANSPORT CONSTRUCTION NOISE & VIBRATION GUIDELINE

This guideline will be used as it is specific to road works or in this case road closure works. It considers noise and vibration criteria for "out of hours" works (OOHW) that are frequently used as roads need to be open during the day time. In this case continuity of the Hospital's loading operation is desired during the daytime.

The RMS guideline follows the traditional construction hours as presented in Table 3.

Table 3 -Roadworks Construction Hours

Construction Hours	Monday to Friday	Saturday	Sunday/Public Holidays
Standard Construction Hours	7am to 6pm	8am to 1pm	No work

The RMS construction guideline proposes the mitigation measures in Table 4 that may apply when noise and vibration "trigger" levels are exceeded. It is noted that Measures R1 & R2 (shaded) are proposed to be modified by a duration respite being the weekends when the gantry works are carried out during the week nights.

Table 4 - Mitigation Measures

Measure	Description
AA	Alternative Accommodation, specifics determined on project-by-project basis
DR	Duration Reduction, negotiable, reduce respite period to reduce overall project duration
IB	Individual briefing with stakeholders
N	Letterbox Notification of works in advance or equivalent
PC	Phone calls to stakeholders
RO	Respite offer, introduces flexibility to move and resize work blocks or respite periods from the normal 3 hrs on, 1 hr off cycle. eg stop for extended lunch hours near cafes
R1	OOHW Period 1, Limited to no more than 3 consecutive evenings per week unless there is a Duration Respite. For night works these periods of work should be separated by not less than 1 week and no more than 6 evenings per month*
R2	OOHW Period 2, Limited to no more than 2 consecutive nights per week unless there is a Duration Respite. For night works these periods of work should be separated by not less than 1 week and no more than 6 nights per month. Where possible high noise generating works shall be completed before 11pm.*
N	Letterbox Notification of works or equivalent to Specific stakeholders
V	Verification of noise and vibration levels (sample measurements). Not required for projects less than 3 weeks unless to assist in managing complaints

*Past experience indicates the duration reduction can be determined by consultation between the builder and the nearest and most affected receivers

The guideline presents trigger levels in Tables 5, 6 and 7 for noise and vibration levels relevant to standard and out of hours works (OOHW). The noise management level (NML) is equivalent to the NSW EPA's Interim Construction Guideline's "Noise Affected" Level.

4.5.1 Sleep disturbance

For night works there is the potential for sleep disturbance. This subsection will derive from some inconsistent sleep disturbance guidelines a reasonable noise level target. The following sleep disturbance criteria are presented in the guidelines and Council conditions:

- Council Condition A30 requires sleep disturbance to be assessed against the EPA Noise Policy for Industry. The Noise Policy for Industry's trigger criteria is the greater of $RBL+15$ or 52dB(A) noise level measured externally. In our case $42+15=57\text{dB(A)}$. If this is exceeded then the NPfI recommends the use of the EPA Road Noise Policy for further analyses.
- The EPA Road Noise Policy summarises the results of a World Health Organisation report (2009) which states:
 - maximum internal noise levels below $50\text{--}55\text{ dB(A)}$ are unlikely to awaken people from sleep
 - one or two noise events per night, with maximum internal noise levels of $65\text{--}70\text{ dB(A)}$, are not likely to affect health and wellbeing significantly.

The EPA Road Noise Policy changes the noise goal to an internal level. In this case a maximum level of 55dB(A) . Now it is typically accepted that the sound transmission loss via a window open for ventilation will be 10dB . From this we can convert the indoor criteria level to an equivalent external noise level target ($55+10=65$)

- The RMS guideline presents an external noise level goal of 65dB(A) L_{max} in its appendix E. This is consistent with the above analyses of using the EPA road noise policy and the expected transmission loss via a window open for ventilation.

Table 5 -Airborne Noise Trigger Levels, L_{Aeq} , 15minute, dB

Period	Perception	Noise Level above NML, dB	Mitigation Measures
Standard Hours	Noticeable	0	None
	Clearly Audible	<10	None
	Moderately Intrusive	10 to 20	N, V
	Highly Intrusive	>20	N, V
	Highly Affected	>75dB(A)	N, V, PC, RO
OOHW 1 Mon-Fri (6pm-10pm) Sat (7am-8am) (1pm-10pm) Sun (8am-6pm)	Noticeable	<5	None
	Clearly Audible	5 to 15	N, R1, DR
	Moderately Intrusive	15 to 25	N, R1, DR,V
	Highly Intrusive	>25	N, R1, DR, V, PC, SN, IB
	Highly Affected	>75dB(A)	N, V, PC, RO
OOHW 2 Mon-Fri (10pm-7am) Sat (10pm-8am) Sun (6pm-7am)	Noticeable	<5	N
	Clearly Audible	5 to 15	N, R2, DR, V
	Moderately Intrusive	15 to 25	N, R2, DR, V, PC, SN, IB
	Highly Intrusive	>25	N, R2, DR, V, PC, SN, IB, AA
	Highly Affected	>75dB(A)	N, V, PC, RO

The RMS guideline considers the regenerated noise from ground borne vibrations. The noise management levels (NML) for ground borne noise are the objectives for each respective time period as shown in Table 6.

Table 6 -Ground Borne Noise Level, L_{Aeq} , 15 minute,dB

Time of Day	Monday to Friday
Daytime 7am to 6pm	Nil
Evening 6pm to 10pm	40dB(A) Internal
Night 10pm to 7am	35dB(A) Internal

Table 7 – Ground Borne Noise Trigger Levels, $L_{Aeq, 15\text{minute}}$, dB

Period	Perception	Noise Level above GB NML, dB	Actions
Standard Hours	Not Applicable	Not Applicable	None
OOHW 1 Mon-Fri (6pm-10pm) Sat (7am-8am) & (1pm-10pm) Sun (8am-6pm)	Clearly Audible	<10	N
	Moderately Intrusive	10 to 20	N, R1, DR, V, SN
	Highly Intrusive	>20	N, R1, DR, V, PC, SN, IB
OOHW 2 Mon-Fri (10pm-7am) Sat (10pm-8am) Sun (6pm-7am)	Clearly Audible	<10	N, V, SN
	Moderately Intrusive	10 to 20	N, R2, DR, V, PC, SN, IB, RO, AA
	Highly Intrusive	>20	N, R2, DR, V, PC, SN, IB, RO, AA

4.6 SUMMARISED CONSTRUCTION NOISE MANAGEMENT TRIGGER LEVELS

Construction noise management levels applicable to the redevelopment during normal working hours have been determined based on the minimum background noise level recorded and the construction noise guidelines detailed in above. Construction noise management levels of the site are detailed in Table 8.

Table 8 –Construction Noise Management Levels

Receiver	Category	Time of Day	Background Noise Level dB(A) $L_{90}(\text{Period})$	Construction Noise Management Trigger Levels dB(A) $L_{eq}(15 \text{ Minute})$
Residential along Hospital Rd	Monday to Friday	7am to 6pm (BG + 10)	45	55
	Saturday	8am to 1pm (BG + 10)	44	54
		1pm to 5pm (BG + 5)	44	49
	Sunday	No works on Sunday	-	-
Hospital Buildings along Hospital Rd (Other Sensitive Land Uses)	Monday – Sunday	Applies when properties are being used (Internal)	-	45 (internal)

For the road closure works the NSW Transport noise and vibration criteria will apply as the programmed works will encroach into:

- Out of Hours Works Period 1 for evening works, Monday to Friday
- Out of Hours Works Period 2 for night works, Monday to Friday

The respective criteria and corresponding mitigation measures listed in Tables 5 and 7 will apply and the noise management level for the out of hours evening and night works is given in Table 9

Table 9 –Construction Noise Management Levels

Receiver	Time of Day	Background Noise Level dB(A) L₉₀(Period)	Noise Management Trigger Levels dB(A) L_{eq}(15 Minute)
Residential (Magill)	Evening	44	49
Residential (Magill)	Night	42	47

The proposed works are unlikely to generate ground borne noise at the residents due to the 90m separation distance. Given most domestic rooms have windows it would be expected that the airborne noise from these operations will mask any ground borne noise.

5 CONSTRUCTION NOISE ASSESSMENT

5.1 NOISE MANAGEMENT LEVELS

Typical equipment selections and the corresponding sound power levels of these items are shown in Table 10. The Table also shows the assumed number of items and the duration of use relative to the 15 minute assessment period and the height of the noise source when in use. These parameters were used in a SoundPlan computer noise model to predict the noise levels at the respective receivers.

Table 10 - Construction Equipment Items and Sound Power Levels

Equipment Item	Item Sound Power Level, dB(A)	No. of items in use simultaneously	% Duration	Source Height above Ground (m) for Bridge Works	Height above Ground (m) for Gantry Works
Drill	102	2	10	9	4.5
Mobile Crane	102	1	10	2	2
EWP	100	1	20	2	2
Rattle Gun	106	2	50	9	4.5
Day-makers	Negligible/Battery	-	-	-	-

In addition, short-term noise measurements were taken to measure a Drill and Rattle Gun in operation on the 17th and 18th May 2022. The measured dB(A)_{Leq} spectra graphed in Figures 4 and 5 confirm that the noise spectra are NOT tonal in characteristics therefore no + 5 dB penalty is applicable.

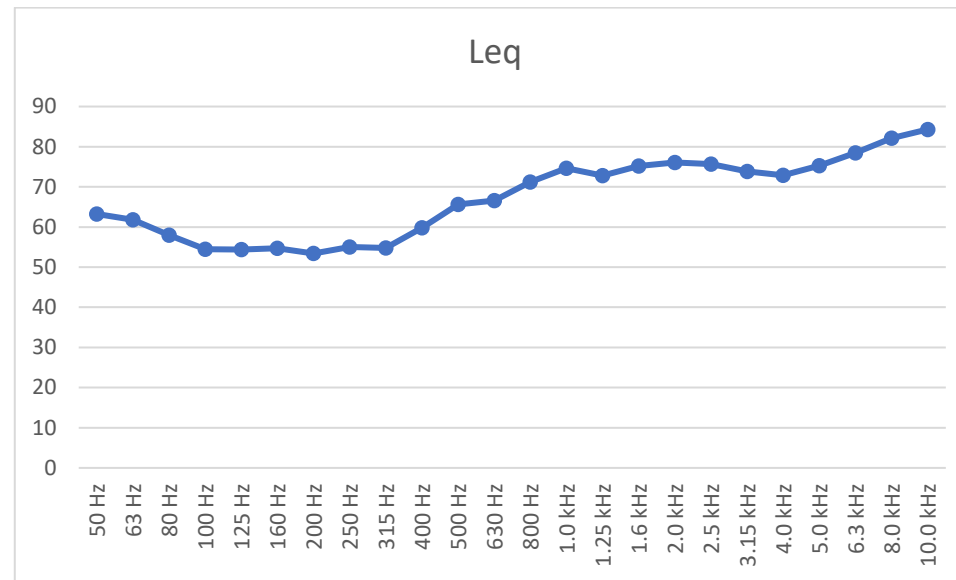


Figure 4 - Measured Noise Level from Concrete Drill at 3m distance

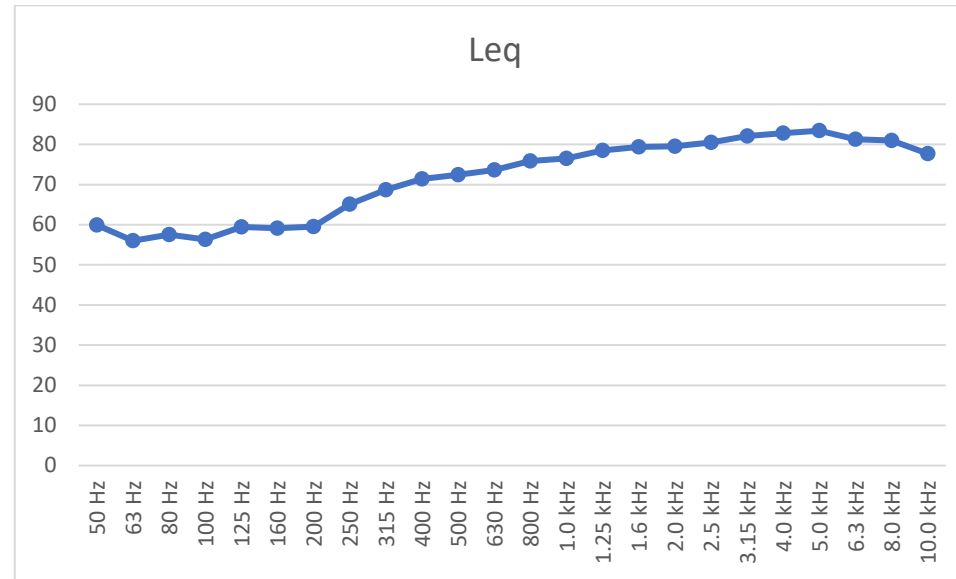


Figure 5 - Measured Noise Level from Rattle Gun at 3m distance

It is assumed that the sound power levels of the proposed machinery to be used on site will be with the ranges presented in Table 10 for each respective plant item. As most machinery is labelled with a sound power level so this can be checked when delivered to site. Equipment should also be unmodified and maintained so the sound power levels are maintained.

A SoundPLAN computer noise model was created to predict the noise levels at the nearest and most affected receivers at the Hospital and Magill Street. The computer model considers the topography and ground absorption of the terrain and the screening and reflection effects of the buildings.

The worst scenario is Rattle Gun, Drill, Mobile Crane and EWP are running simultaneously. The two computer modelled scenarios that were modelled are:

- UNSW/ASB Annex gantry installation
- Clinical link bridge gantry installation

It is assumed that the trucks will be on site before the extended hours and off loaded by mobile cranes during the evening/ night.

Based on the above equipment selections, the predicted combined noise levels from the computer models at nearby receivers are as follows:

Table 11 – Predicted Gantry Construction Noise Levels dB(A) $L_{eq, 15min}$ at Residents

Process	Predicted Noise Level dB(A)L_{eq}	Period	Noise Management Level dB(A)L_{eq}	Noise Management Triggered	Perception
UNSW/ASB Gantry	58	Evening	49	Yes	Clearly Audible
Clinical Bridge Gantry	53	Evening	49	Yes	Noticeable
UNSW/ASB Gantry	58	Night	47	Yes	Clearly Audible
Clinical Bridge Gantry	53	Night	47	Yes	Clearly Audible

The expected noise levels are rated at Clearly Audible in the OOHW period at the residents hence there will need to be respite periods inserted between sets of consecutive worknights, however this can be negotiated to reduce the overall project duration (Duration Reduction).

The project noise management strategy is presented in Table 12.

Table 12 – Noise Management at the Residents

Day	Extended Hours	Typical Plant Equipment used during extended hours	Sound Power Level, dB(A)	Noise Management Trigger Levels dB(A) Leq(15 Minute)	Mitigation
OOHW1					
Monday – Friday	6.00pm – 10.00pm	Drill Mobile Crane EWP Rattle Gun Day-makers	102 102 100 106 Negligible/Battery	49	Nil for Clinical Bridge Gantry Notification, Respite period, Duration Reduction for Annex Gantry
OOHW2					
Monday – Friday	10.00pm – 4.00am	Drill Mobile Crane EWP Rattle Gun Day-makers	102 102 100 106 Negligible/Battery	47	Noise measurement. Notification, Respite period, Duration Reduction
Saturday	6.00pm – 10.00pm	N/A	N/A	N/A	N/A
Sunday	8.00am – 6.00pm	N/A	N/A	N/A	N/A

Table 13 shows the predicted façade noise levels. A review of the façade glazing on the nearest buildings using Google Street View found fixed and openable glazing. It is assumed the facade can achieve a 20dB noise reduction.

Table 13 – Predicted Works Noise Levels dB(A) $L_{eq, 15min}$ at Hospital Facade

Process	Predicted Noise Level dB(A)L_{eq}	Noise Management Level dB(A)L_{eq}	Noise Management Triggered
UNSW/ASB Gantry	81-85	65	Yes
Clinical Link Bridge Gantry	75	65	Yes

With respect to noise impacts on internal areas of the hospital:

- The construction noise levels are unavoidable and the works are internal to the hospital.
- For rooms within the Hospital facing the temporary construction site noise levels up to 20dB above target levels can be expected depending on the glazing type. It is noted that these high noise levels are very localised as can be seen in the computer noise models attached in the Appendix.

During the construction works the following best practices should be employed to minimise noise impact the nearest and most sensitive receivers:

- Plant and Equipment should be strategically positioned and orientated as to minimise noise emissions from the site
- Any plant not used for extended periods should be turned off
- Extensive periods of continuous machinery operations should be avoided
- The most appropriately sized machine or tool should be used for the job
- Dead blow hammers should be used to minimise noise
- Core or diamond drilling can be used instead of hammer drills to minimise noise and vibrations
- Come-alongs should be used to shift modules rather than hammer blows
- Electric lighting should be used rather than diesel "Daymakers"

5.2 SLEEP DISTURBANCE

It was noticed that the letter provided by Department Planning and Environment dated 13/05/2022 with reference number: SSD-10339-PA-32 states:

The Department recommends using 52 dB or RBL + 5. Whichever is greater as external noise goals.

It is noted that the sleep disturbance trigger level in terms of $\text{dB(A)}_{L_{\max, F}}$ has been specified in the EPA's Noise Policy for Industry and it recommends using the greater of 52 dB(A) or RBL + 15dB. Hence the sleep disturbance noise trigger level should be $42 + 15 = 57 \text{ dB(A)}_{L_{\max}}$.

However as explained in section 4.5.1 the Noise Policy for Industry directs you to the EPA Road Noise Policy if the sleep disturbance trigger level is exceeded. We derived an external noise level goal based on the Road Noise Policy's recommendation with an open window condition and this target noise level is consistent with the RMS guide for out-of-hours-works.

We have withdrawn our proposed 75dB(A) L_{\max} noise level that assumed normal people would close their windows at night if prewarned by the notification letter. The correct external L_{\max} noise level goal for this project should be 65dB(A) for an open window condition. It is unreasonable for the Dept. of Planning to impose the Noise Policy for Industry's trigger level for this temporary noise source as the Policy's intent is for a permanent installation.

5.2.1 Source Noise Data

The operational noise from rattle gun and concrete drill has been measured by this office. The Sound Power Level of $\text{dB(A)}_{L_{\max}}$ has been detailed below:

- Rattle Gun 117 $\text{dB(A)}_{L_{\max, F}}$
- Concrete Drill 116 $\text{dB(A)}_{L_{\max, F}}$

5.2.2 Predicted Noise Level

Noise emission calculations have been carried out on distance attenuation alone and the predicted noise levels at the residential receivers on Magill Street are presented in Table 14.

Table 14 – Predicted Sleeping Disturbance Noise Level $\text{dB(A)}_{L_{\max}}$

Work	Predicted Noise Level	Time	Noise Management Level	Noise Management Required
UNSW/ASB Gantry	72	Night	65	Yes
Clinical Bridge Gantry	67	Night	65	Marginal*

*Note: a difference of 1-2dB is not perceptible (NSW Road Noise Policy)

6 VIBRATION

Acoustic Logic have been informed that the gantry structures are self-supporting steel frames and will not be drilled into the ground (pavement) or surrounding structures. Provided items land softly on the pavement during construction significant vibrations should not be generated.

7 RECOMMENDATIONS

Exceedance of the noise management trigger levels at the residential receivers are anticipated. We recommend that a reasonable and feasible noise mitigation/management is implemented.

We recommend the following:

- Notification should be provided to residences advising of the dates of the proposed works.
- Aim to carry out the noisiest work components early in the evening.
- Vehicles to use non-tonal (squawking) reversing beacons if feasible.
- Using silenced equipment where possible
- All plant not in use is to be switched off
- Care to be taken to reduce impact noise from activities such as:
 - banging of tailgates
 - door slams
- Scheduling of works hours to minimise noise impact and providing respite periods
- Maintaining a complaint register and dealing with complaints accordingly

As the noise management level targets are predicted to be exceeded the mitigation management plan should follow the recommendations from the NSW Transport (RMS) Construction Noise and Vibration Guideline (Tables 4 & 5). In brief, notification will need to be given prior to the works, respite periods will need to be introduced but may be withdrawn by negotiation.

8 CONCLUSION

Noise emissions from the proposed Hospital Clinical link bridge gantry installation works during evening and night-time have been assessed based on requirements below:

- Condition B12 of SSDA
- NSW Interim Construction Noise Guideline
- Australian Standard AS 2436:2010
- NSW Transport Construction Noise and Vibration Guideline

Soundplan modelling predicts the noise levels clearly audible to residential receivers and the recommended noise controls are detailed in Section 7 to mitigate the noise impact.

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

Yours faithfully,



Acoustic Logic Consultancy Pty Ltd
Tomas Bohdan

APPENDIX 1 – PREDICTED GANTRY INSTALLATION NOISE LEVELS FROM SOUNDPLAN

Predicted Facade Noise Levels

Phase 1

Prepared by: OB
Date: 24/02/2022

Noise Level

L_{eq}
in dB(A)

	< 40
	40 - 45
	45 - 50
	50 - 55
	55 - 60
	60 - 65
	65 - 70
	70 - 75
	75 - 80
	80 - 85
	85 - 90
	>= 90

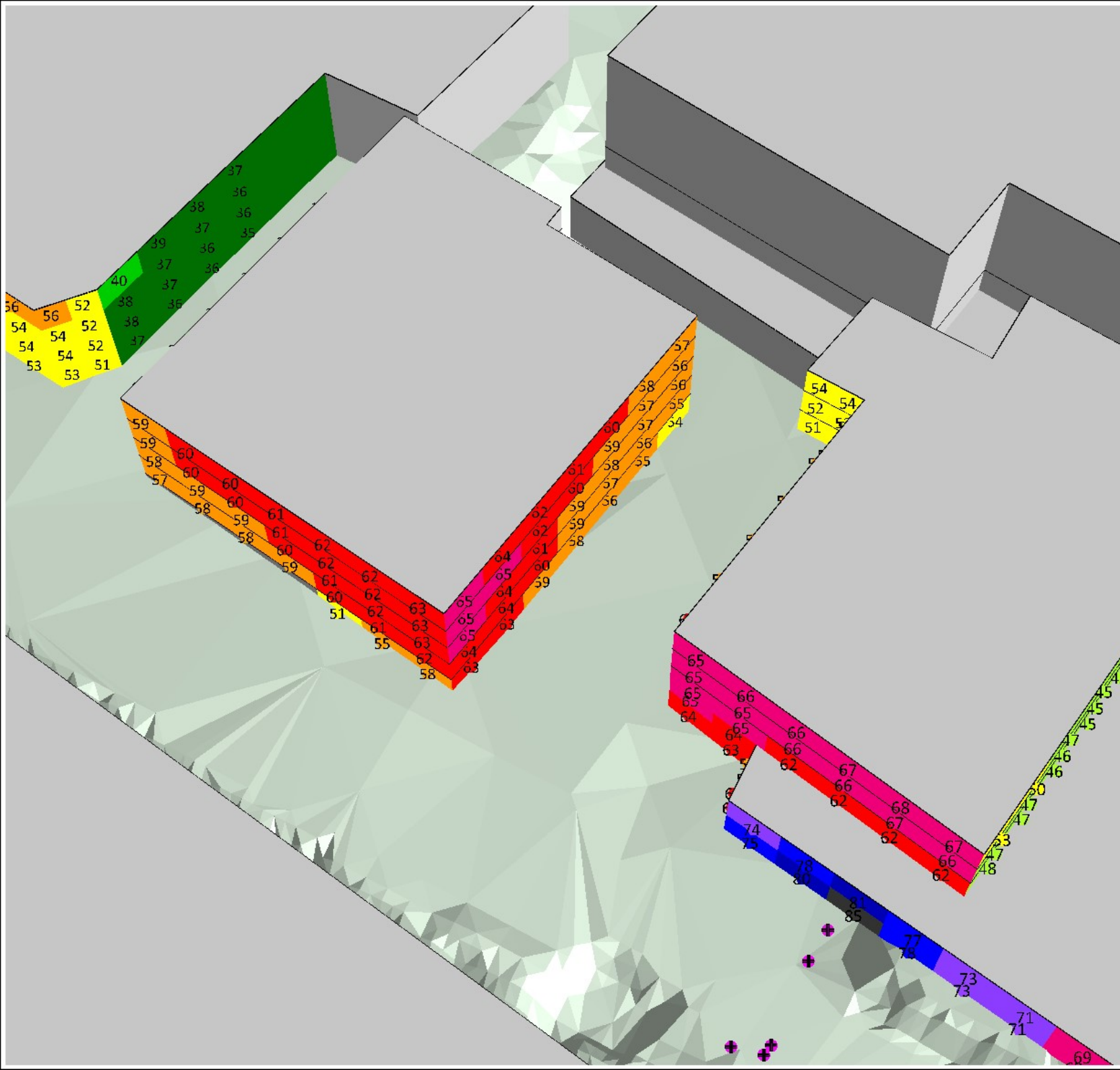
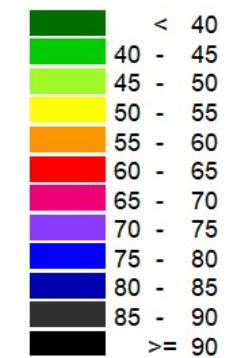
Predicted Facade Noise Levels

Phase 1

Prepared by: OB
Date: 24/02/2022

Noise Level

L_{eq}
in dB(A)



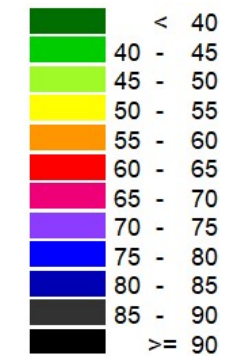
Predicted Facade Noise Levels

Phase 1

Prepared by: OB
Date: 24/02/2022

Noise Level

L_{eq}
in dB(A)



Predicted Facade Noise Levels

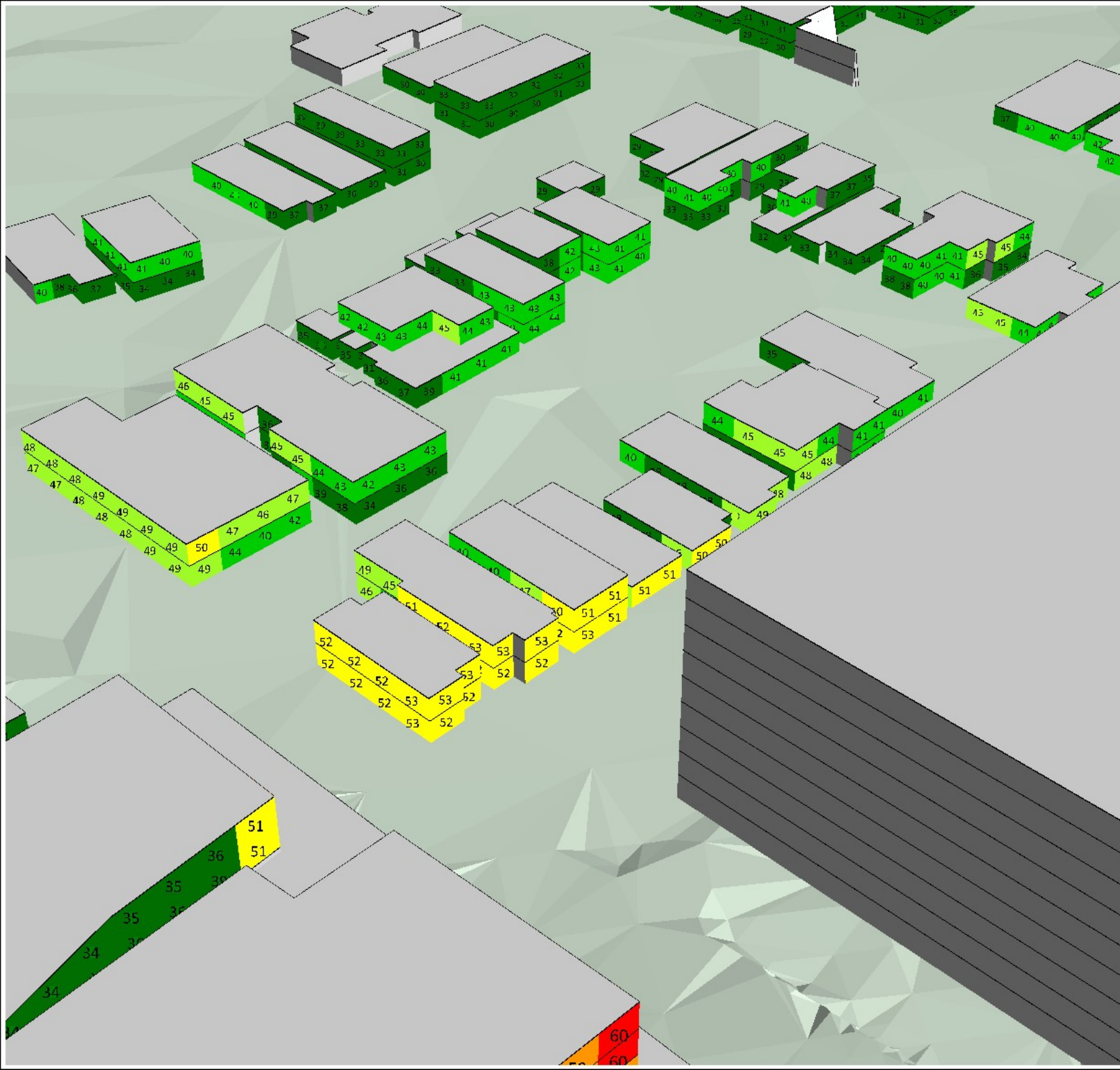
Phase 2

Prepared by: OB
Date: 24/02/2022

Noise Level

L_{eq}
in dB(A)

	< 40
	40 - 45
	45 - 50
	50 - 55
	55 - 60
	60 - 65
	65 - 70
	70 - 75
	75 - 80
	80 - 85
	85 - 90
	>= 90



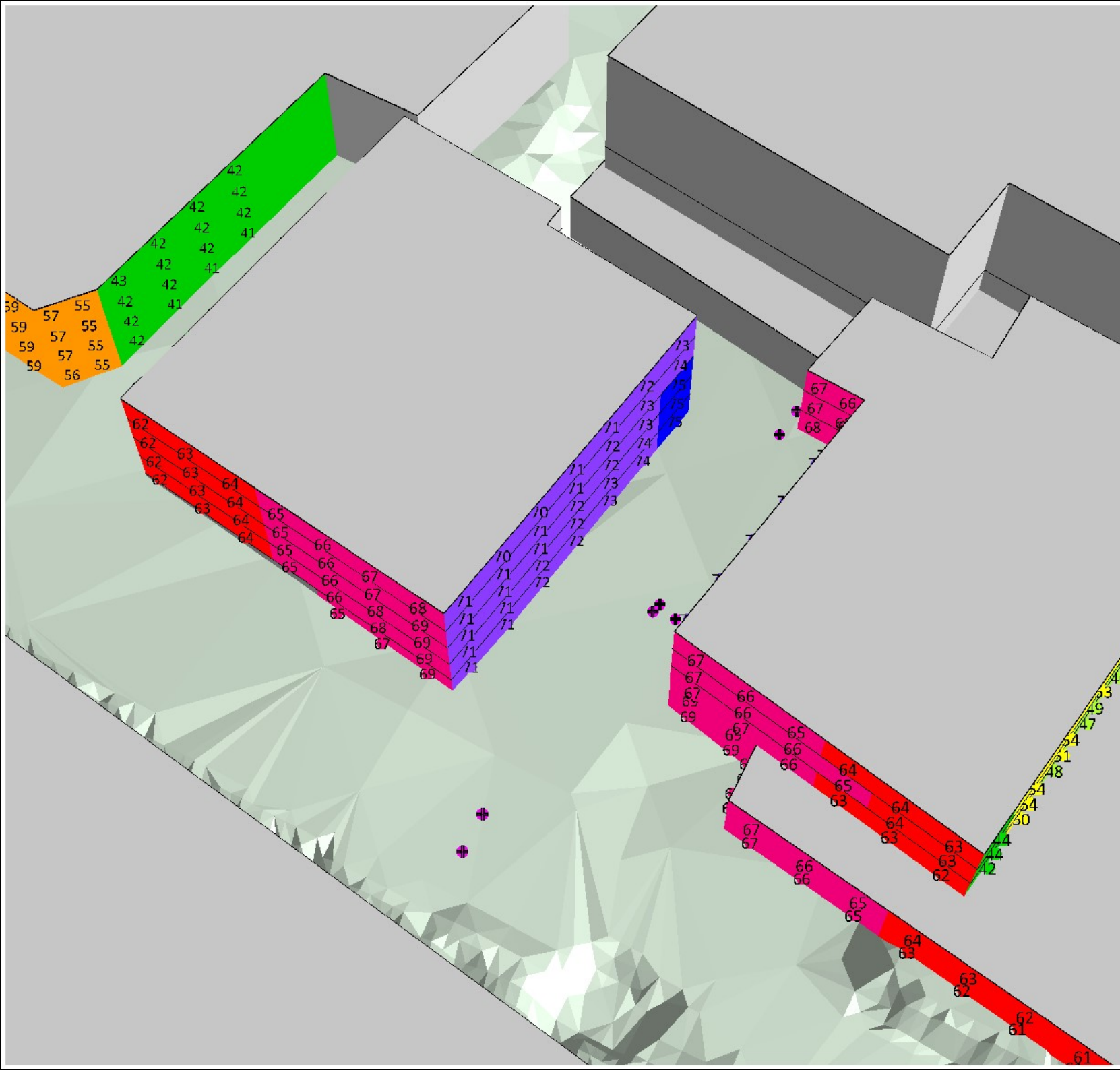
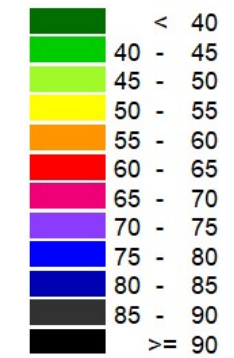
Predicted Facade Noise Levels

Phase 2

Prepared by: OB
Date: 24/02/2022

Noise Level

L_{eq}
in dB(A)



Predicted Facade Noise Levels

Phase 2

Prepared by: OB
Date: 24/02/2022

Noise Level

L_{eq}
in dB(A)

