MATTHEW PALAVIDIS
VICTOR FATTORETTO
MATTHEW SHIELDS

Proposed Residential Development, Ivanhoe Stage 2, Macquarie Park

Development Application Environmental Noise Impact Assessment

SYDNEY
9 Sarah St
MASCOT NSW 2020
(02) 8339 8000

ABN 11 068 954 343
www.acousticlogic.com.au

Project ID	20210325.1
Document Title	Development Application Environmental Noise
Attention To	Frasers Property Ivanhoe Pty Ltd

Revision	Date	Document Reference	Prepared By	Checked By	Approved By
0	27/04/2021	20210325.1/2704A/R0/GW	GW		
1	24/05/2021	20210325.1/2405A/R1/GW	GW		
2	24/05/2021	20210325.1/2405A/R2/GW	GW		GW
3	15/06/2021	20210325.1/1506A/R3/GW	GW		GW
4	21/06/2021	20210325.1/2106A/R4/GW	GW		GW
5	24/06/2021	20210325.1/2406A/R5/GW	GW		GW
6	25/06/2021	20210325.1/2506A/R6/GW	GW		GW
7	16/07/2021	20210325.1/1607A/R7/GW	GW		GW

TABLE OF CONTENTS

1 INTRODUCTION

Acoustic Logic have been engaged to conduct an acoustic assessment of potential noise and vibration impacts associated with the proposed mixed-use development of Stage 2, Ivanhoe, Macquarie Park. Masterplan SSDA of the precinct of the project site has been approved.

In this report we will:

- Conduct an external noise intrusion assessment and propose indicative acoustic treatments that will ensure a reasonable level of amenity is achieved for future occupants.
- Identify potential noise sources generated by the site and determine noise emission goals for the development to meet relevant acoustic requirements, ensuring that nearby developments are not adversely impacted by the subject development.
- Conduct a preliminary review of construction noise and vibration impacts to nearby noise sensitive receivers and identify potential treatment and/or controls where feasible and reasonable.

Acoustic Logic have utilised the following documents and regulations in the assessment of noise intruding into and noise emanating from the development:

- NSW Department of Planning *State Environmental Planning Policy SEPP (Infrastructure)* 2007.
- NSW Department of Planning *Development Near Rail Corridors and Busy Roads – Interim Guideline*.
- NSW Environmental Protection Authority (EPA) document *Noise Policy for Industry (NPfI)* 2017.
- EPA Interim Construction Noise Guideline (ICNG).

This assessment has been conducted using the architectural drawings prepared by below:

- C2- Chrofi Rev 07 dated 10/07/2021
- C3- Fox Johnston Rev DA dated 7/7/2021
- C4- COX Architecture (Rev 1 dated 09/07/2021) provided to this office.

2 RESPONSE TO SEARS

The environmental noise and vibration assessment is required by the Secretary's Environmental Assessment Requirements (SEARs) for SSD 15822622 dated 06/04/2021. The table below identifies the SEARS that have been issued to the development Ivanhoe Estate Redevelopment- Stage 2 as part of the State Significant Development Application. The relevant reference within this report has also been provided.

Table 1 -SEARs and Relevant Reference

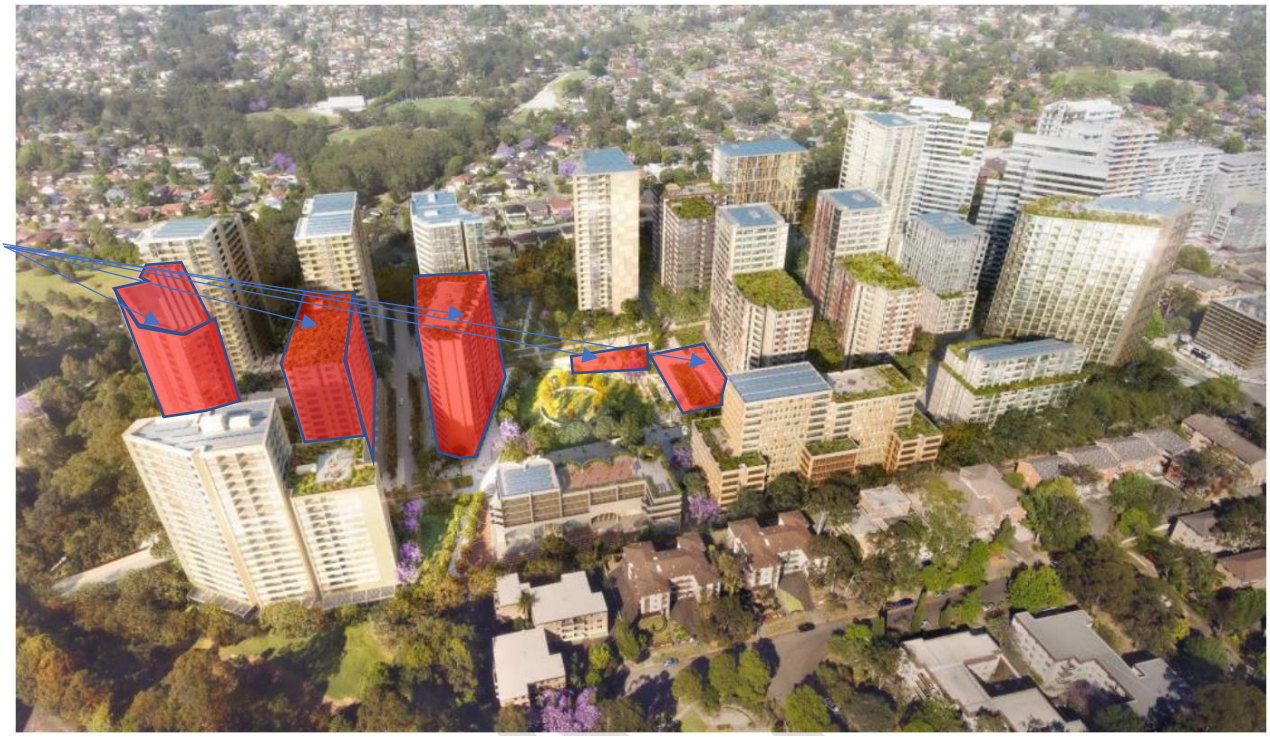
SEARs Item	Report Reference
16. Noise and Vibration The EIS must include a noise and vibration assessment in accordance with the relevant EPA guidelines. This assessment must detail construction and operational noise and vibration impacts on nearby sensitive receivers and outline the proposed management and mitigation measures that would be implemented.	Section 4-8

3 PROPOSAL & SITE DESCRIPTION

The proposed Stage 2 of Midtown in Macquarie Park compromise Buildings C2, C3 and C4. Detailed description is below:

- The C2 site envisions to become the heart of the Midtown Precinct. The central communal area will consist of the 3,300 sqm Village Green, a 1,300 sqm pool and gym on the lower ground and additional 500 sqm allocated to community space to the upper floor which looks to service residents with an active flexible space adjacent to the School and Aged Care facility with space for an enterprise café. The gym and pool are for future commercial lease.
- The C3 site will become the central precinct overlooking the Village Green consisting of one residential building of 167 units covered across 16 storeys and a ground floor retail podium along a through site link which connect the Village Green to Neighbourhood Street 3. 168 car parking spaces and 167 bike racks will be spread across four basement floors within the building.
- The C4 Site has been approved within the master plan super lot of varying height ranging between 17 and 24 stories and a targeted apartment yield of 272 markets dwellings along with 216 social units as park of Frasers property commitment to LAHC.

Building locations have been marked in Figures below:



Indicative image of buildings of Stage 2

Location of Stage 2 in Master Plan of Midtown Precinct

Masterplan outlining Stage 2

Figure 1 Site Map and the Nearest Noise Receiver Locations

The nearest noise receivers around Stage 2 are envisaged as below:

- Receiver 1 (R1): Building C1 of Stage 1 which is approved and in the process of being delivered.
- Receiver 2 (R2): Existing multistorey residential building located adjacent to northern boundary of Midtown Precinct. Recent site inspection indicates that majority buildings of R2 directly facing project site is vacant at this stage.
- Receiver 3 (R3): Commercial building located north eastern to the Midtown Precinct.
- Receiver 4 (R4): Commercial building located eastern to the project site.
- Receiver 5 (R5): Residential buildings located across Epping Road.

4 SURVEY OF BACKGROUND NOISE LEVELS

Background noise were recorded using by using six Acoustic Research Laboratories Pty Ltd noise loggers. The loggers were programmed to store 15-minute statistical noise levels throughout the unmanned monitoring period. The equipment was calibrated at the beginning and the end of the measurement using a Rion NC-73 calibrator; no significant drift was detected. All measurements were taken on A-weighted fast response mode.

Detailed noise monitor locations are below:

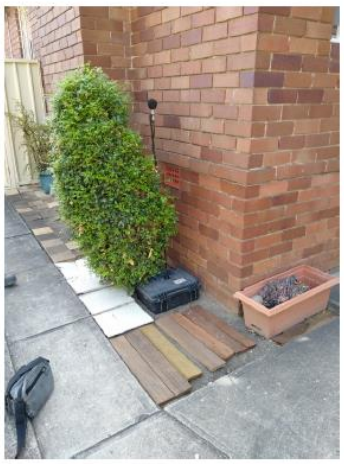
- Location 1- Front yard of residential dwelling at 204 Epping Rd, Macquarie Park. The measured background noise levels were generally not affected by construction activities at project site or neighbouring site.
- Location 2- Middle of western boundary of project site with microphone adjacent to the construction site at 137-143 Herring Rd. the recorded background noise during daytime is affected by construction activities therefore the RBL of evening time should be adopted.
- Location 3- Front yard of residential dwelling at 155 Herring Road, Macquarie Park. The background noise levels were generally not affected by construction activities at the project site during day.
- Location 4- Front yard of residential dwelling at 3 Peach Tree Road, Macquarie Park. The measured background noise levels were generally not affected by construction activities at project site
- Location 5- End of Cobar Way, Macquarie Park. The measured background noise levels were generally not affected by construction activities at project site.
- Location 6- Located within vacant land adjacent to 168 Epping Road, Marsfield. The measured background noise level was not affected by construction noise from the project site.

Site investigation of above noise monitor locations indicates:

- Loggers at location 1 & 6 represent the nearest residential noise Receiver 5
- Logger at location 2 represents the nearest residential noise Receiver 1.
- Logger at location 3, 4 & 5 represent the nearest residential noise Receiver 2

Figure 2 New Background Noise Monitor Locations

Photos of noise monitors are presented below:



1

2

3

4

5

6

5 MEASUREMENT TIME PERIOD

Unmanned measurements at above locations were conducted between 13th and 28th January 2020.

6 MEASURED RATING BACKGROUND NOISE LEVEL

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

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

Weather data of Olympic Park station has been adopted and the weather affected noise data has been excluded in this assessment.

Summarised Rating Background Noise Levels are below:

6.1.1 Logger 1- Front Yard of Residential Dwelling at 204 Epping Rd

Site investigation indicates that the construction noise of project site and neighbouring site was not audible.

Table 2 – Rating Background Noise Levels- Logger 1

Location	Date	ABL		
		Day	Evening	Night
#1	Monday 13 January 2020	-	51	39
	Tuesday 14 January 2020	55	52	39
	Wednesday 15 January 2020	-	-	38
	Thursday 16 January 2020	55	54	-
	Friday 17 January 2020	56	-	41
	Saturday 18 January 2020	54	52	38
	Sunday 19 January 2020	51	53	40
	Monday 20 January 2020	56	-	38
	Tuesday 21 January 2020	55	53	42
	Wednesday 22 January 2020	-	-	-
	Thursday 23 January 2020	-	52	47
	Friday 24 January 2020	56	54	47
	Saturday 25 January 2020	53	52	42
	Sunday 26 January 2020	48	52	45
	Monday 27 January 2020	50	52	42
	Tuesday 28 January 2020	-	-	-
	RBL	**54**	**52**	**41**

6.1.2 Logger 2- Middle of Western Boundary of Project Site

Noise level during day time was affected by construction activities therefore the evening time RBL should be adopted for day time period.

Table 3 – Rating Background Noise Levels- Logger 2

Location	Date	ABL		
		Day	Evening	Night
#2	Monday 13 January 2020	-	43	34
	Tuesday 14 January 2020	50	43	33
	Wednesday 15 January 2020	-	-	34
	Thursday 16 January 2020	48	46	-
	Friday 17 January 2020	51	-	36
	Saturday 18 January 2020	47	43	34
	Sunday 19 January 2020	41	44	33
	Monday 20 January 2020	53	-	34
	Tuesday 21 January 2020	50	43	36
	Wednesday 22 January 2020	-	-	-
	Thursday 23 January 2020	-	42	33
	Friday 24 January 2020	49	46	40
	Saturday 25 January 2020	45	42	34
	Sunday 26 January 2020	40	40	36
	Monday 27 January 2020	42	43	35
	Tuesday 28 January 2020	-	-	-
	RBL	**48**	**43**	**34**

6.1.3 Logger 3 – Front Yard of 155 Herring Road, Macquarie Park

Site investigation indicates that the construction noise of project site and neighbouring site was audible. Evening time RBL should be applied.

Table 4 – Rating Background Noise Levels- Logger 3

Location	Date	ABL		
		Day	Evening	Night
#3	Monday 13 January 2020	-	48	37
	Tuesday 14 January 2020	57	49	37
	Wednesday 15 January 2020	-	-	37
	Thursday 16 January 2020	56	55	-
	Friday 17 January 2020	58	-	38
	Saturday 18 January 2020	52	51	37
	Sunday 19 January 2020	45	50	36
	Monday 20 January 2020	56	-	37
	Tuesday 21 January 2020	56	49	37
	Wednesday 22 January 2020	-	-	-
	Thursday 23 January 2020	-	53	38
	Friday 24 January 2020	56	51	39
	Saturday 25 January 2020	51	48	36
	Sunday 26 January 2020	44	46	37
	Monday 27 January 2020	45	48	36
	Tuesday 28 January 2020	-	-	-
	RBL	**56**	**49**	**37**

6.1.4 Logger 4 – Front Yard of 3 Peach Tree Road, Macquarie Park

Site investigation indicates that the construction noise of project site and neighbouring site was generally not audible.

Table 5 – Rating Background Noise Levels- Logger 4

Location	Date	ABL		
		Day	Evening	Night
#4	Monday 13 January 2020	-	44	36
	Tuesday 14 January 2020	49	44	36
	Wednesday 15 January 2020	-	-	38
	Thursday 16 January 2020	45	42	-
	Friday 17 January 2020	46	-	36
	Saturday 18 January 2020	43	41	36
	Sunday 19 January 2020	39	44	37
	Monday 20 January 2020	47	-	37
	Tuesday 21 January 2020	44	43	38
	Wednesday 22 January 2020	-	-	-
	Thursday 23 January 2020	-	42	38
	Friday 24 January 2020	45	45	42
	Saturday 25 January 2020	46	43	37
	Sunday 26 January 2020	41	42	39
	Monday 27 January 2020	42	45	39
	Tuesday 28 January 2020	-	-	-
	RBL	**45**	**43**	**37**

6.1.5 Logger 5 – End of Cobar Way, Macquarie Park

Site investigation indicates that the construction noise of project site and neighbouring site was not audible.

Table 6 – Rating Background Noise Levels- Logger 5

Location	Date	ABL		
		Day	Evening	Night
#5	Monday 13 January 2020	-	42	39
	Tuesday 14 January 2020	45	42	39
	Wednesday 15 January 2020	-	-	40
	Thursday 16 January 2020	46	44	-
	Friday 17 January 2020	46	-	39
	Saturday 18 January 2020	43	42	39
	Sunday 19 January 2020	40	41	39
	Monday 20 January 2020	47	-	39
	Tuesday 21 January 2020	44	41	39
	Wednesday 22 January 2020	-	-	-
	Thursday 23 January 2020	-	40	37
	Friday 24 January 2020	43	40	36
	Saturday 25 January 2020	40	39	35
	Sunday 26 January 2020	38	38	35
	Monday 27 January 2020	39	39	35
	Tuesday 28 January 2020	-	-	-
	RBL	**43**	**41**	**39**

6.1.6 Logger 6 – Vacant Land Adjacent to 168 Epping Road, Marsfield

Site investigation indicates that the construction noise of project site and neighbouring site was not audible.

Table 7 – Rating Background Noise Levels- Logger 6

Location	Date	ABL		
		Day	Evening	Night
#6	Monday 13 January 2020	-	48	34
	Tuesday 14 January 2020	50	48	34
	Wednesday 15 January 2020	-	-	34
	Thursday 16 January 2020	50	51	-
	Friday 17 January 2020	53	-	37
	Saturday 18 January 2020	50	49	39
	Sunday 19 January 2020	47	49	36
	Monday 20 January 2020	51	-	36
	Tuesday 21 January 2020	49	49	36
	Wednesday 22 January 2020	-	-	-
	Thursday 23 January 2020	-	48	36
	Friday 24 January 2020	50	50	40
	Saturday 25 January 2020	43	48	34
	Sunday 26 January 2020	46	48	36
	Monday 27 January 2020	45	46	34
	Tuesday 28 January 2020	-	-	-
	RBL	**50**	**48**	**36**

6.2 SUMMARISED RBL FOR THE NEAREST NOISE RECEIVERS

RBL for the nearest residential noise receivers are summarised below.

Table 8 – Summarised RBL for the Nearest Residential Receivers

Noise Receiver	Referenced Noise Logger Location	RBL		
		Day	Evening	Night
R1	Logger 2	43*	43	34
R2	Logger 3/4/5, the lowest RBL is adopted	43	41	37
R5	Logger 1 & 6, the lowest RBL is adopted	50	48	36

*Note: evening time RBL is adopted for daytime.

7 TRAFFIC NOISE MEASUREMENTS

The major traffic noise for Stage 2 of Midtown Precinct is along Epping Road which is 6 lane road with high traffic volume. Future buildings D1 to D4 will provide acoustic barrier to the project buildings. The following noise levels were measured along Epping Road during master plan of the Midtown Precinct.

Location	Measured Traffic Noise Level dB(A)L_{eq}	
	Day (7am-10pm)	**Night (10pm-7am)**
13m distance from kerb of Epping Rd	**69**	**66**

8 TRAFFIC NOISE INTRUSION ANALYSIS AND RECOMMENDATIONS

8.1 INTERNAL NOISE CRITERIA

A noise intrusion assessment has been conducted to address the requirements of the following noise criteria/standards:

- NSW Planning State Environmental Planning Policy (SEPP) Infrastructure 2007.
- NSW Department of Planning document – '*Development near Rail Corridors and Busy Roads – Interim Guideline*'.

8.1.1 NSW Department of Planning – State Environmental Planning Policy (SEPP) (Infrastructure) 2007

Map 16 of the traffic volume maps for the Infrastructure SEPP on the RTA website, classifies Regent and Gibbons Streets as roads with > 40,000 AADT. As such, an assessment of the development will be undertaken as per clause 102 of the State Environmental Planning Policy (SEPP Infrastructure) 2007.

Clause 102 of the NSW SEPP for road traffic noise stipulates,

"This clause applies to development for any of the following purposes that is on land in or adjacent to the road corridor for a freeway, a tollway or a transit way or any other road with an annual average daily traffic volume of more than 20,000 vehicles (based on the traffic volume data published on the website of the RTA) and that the consent authority considers is likely to be adversely affected by road noise or vibration:

(a) a building for residential use,

If the development is for the purposes of a building for residential use, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following L_{Aeq} levels are not exceeded:

(a) in any bedroom in the building – 35 dB(A) at any time between 10 pm and 7am,

(b) anywhere else in the building (other than a garage, kitchen, bathroom or hallway) – 40 dB(A) at any time."

8.1.2 NSW Department of Planning – *Development near Rail Corridors or Busy Roads – Interim Guideline*

The NSW Department of Planning's policy, *Development Near Rail Corridors And Busy Roads – Interim Guideline*, sets out internal noise level criteria adapted from the State Environmental Planning Policy (Infrastructure) 2007 (the 'Infrastructure SEPP') for developments with the potential to be impacted by traffic or rail noise and vibration.

Section 3.5 of the NSW Department of Planning's 'Development near Rail Corridors and Busy Roads (Interim Guideline)' states:

"The following provides an overall summary of the assessment procedure to meet the requirements of clauses 87 and 102 of the Infrastructure SEPP. The procedure covers noise at developments for both Road and Rail.

- *If the development is for the purpose of a building for residential use, the consent authority must be satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded:*
  - *in any bedroom in the building: 35dB(A) at any time 10pm-7am*
  - *anywhere else in the building (other than a garage, kitchen, bathroom or hallway): 40dB(A) at any time."*

Section 3.6 of the NSW Department of Planning's 'Development near Rail Corridors and Busy Roads (Interim Guideline) specifies the following noise descriptors for the assessment of traffic noise:

- Day - $L_{eq\ (15\ hour)}$
- Night - $L_{eq\ (9\ hour)}$

The guideline also provides guidance on the assessment of natural ventilation. The allowable internal noise goal is permitted to be 10 dB(A) higher than when the windows are closed (i.e. – allowable level in bedrooms becomes 45 dB(A), and 50 dB(A) in living rooms). Where noise levels would exceed this, the NSW Planning guideline recommends that a ventilation system be provided to achieve the ventilation requirements of the BCA with windows closed. We note that where the 'open window/door' scenario cannot be achieved, this does not necessarily mean than there cannot be operable elements on these façades, only that internal noise level requirements will only be met when they are closed.

8.1.3 Summarised Internal Noise Criteria for Proposed Site

The summarised criteria for all spaces of the development is summarised in Table below.

Table 9 – Summarised Criteria for Internal Noise Levels

Space / Occupancy	Time of Day	Criteria	
		SEPP (Infrastructure) 2007	
Residential (Living Areas)	Day (7am – 10pm)	Doors/ Windows Closed -40 dB(A) $L_{eq(15hr)}$	Doors/ Windows Closed -50 dB(A) $L_{eq(15hr)}$-
Residential (Bedrooms)	Night (10pm – 7am)	Doors/ Windows Closed -35 dB(A) $L_{eq(9\ hr)}$	Doors/ Windows Open-45 dB(A) $L_{eq(9\ hr)}$

8.2 RECOMMENDATION

Traffic noise intrusion analysis has been carried out based on the measured traffic noise levels in Table 2 and the following acoustic treatments are recommended to ensure that the internal noise levels satisfy the requirements in Table 3.

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

8.2.1 Glazed Windows and Doors

The following constructions are recommended to comply with the project noise objectives. Aluminium framed/sliding glass doors and windows will be satisfactory provided they meet the following criteria. All external windows and doors listed are required to be fitted with Q-lon type acoustic seals. (**Mohair Seals are unacceptable**).

Thicker glazing may be required for structural, safety or other purposes. Where it is required to use thicker glazing than scheduled, this will also be acoustically acceptable.

The recommended constructions are listed in the table below.

Table 10 – Recommended Glazing Construction

Stage	Building	Façade	Room	Glazing Thickness	Acoustic Seals
2	C3 & C4	all	all	6.38mm Lam or 6.38mm/12mm gap/6mm	Yes
	C2	All	Gym	10.38 or 10.38mm /12mm air gap/6mm*	Yes
			Office	6.38mm Lam or 6.38mm/12mm gap/6mm	Yes
			Café	6.38mm Lam or 6.38mm/12mm gap/6mm	Yes
			Multipurpose Room/ Community Rooms	12.38mm Lam or 12.38mm Lam/12mm gap/6mm*	Yes
		All	Pool	6mm	Yes

***Note: Acoustic treatment to mitigate noise emission is included**

It is recommended that only window systems having test results indicating compliance with the required ratings obtained in a certified laboratory be used where windows with acoustic seals have been recommended.

In addition to complying with the minimum scheduled glazing thickness, the R_w rating of the glazing fitted into open-able frames and fixed into the building opening will require the use of acoustic seals around the full perimeter of open-able frames and the frame will need to be sealed into the building opening using a flexible sealant.

Table 11- Minimum R_w of Glazing (with Acoustic Seals)

Glazing Assembly	Minimum R_w of Installed Window
6mm	29
6.38m Lam	31
10.38mm Lam	34
12.38mm Lam	36
6.38mm/12mm air gap/6mm	36
10.38mm/12mm air gap/6mm	40
12.38mm/12mm air gap/6mm	41

8.2.2 External Roof/Ceiling

External roof construction will be constructed from concrete or masonry elements, this proposed structure will not require any further acoustic upgrading. In the event that any penetrations are required through the external skin, an acoustic grade sealant should be used to minimise all gaps.

8.2.3 External Walls

- Option 1 External wall construction will be constructed from concrete and masonry elements, this proposed structure will not require any further acoustic upgrading. In the event that any penetrations are required through the external skin, an acoustic grade sealant should be used to minimise all gaps.
- Option 2 Light weight wall: minimum 92mm stud with one layer 9mm FC sheet externally and one layer 13mm thick plasterboard fixed directly to the stud. Infill the cavity by 75mm thick 11Kg/m3 Glasswool. All gaps /junctions should be acoustically sealed.

8.2.4 Entry Doors

External opening entry doors shall have glazing thicknesses equal to those recommended in section 8.2.1 Recommended Glazing Construction, and are to have Raven RP10 to the top and sides, and Raven RP38 to the underside of the door.

8.2.5 Mechanical Ventilation

With respect to natural ventilation of the dwelling, the NSW Department of Planning document "Development near Busy Roads and Rail Corridors - Interim Guideline" dictates that:

- *"If internal noise levels with windows or doors open exceed the criteria by more than 10dB(A), the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia."*

With windows open, the allowable internal noise goal is permitted to be 10dB(A) higher than when the windows are closed (ie – allowable level in bedrooms becomes 45dB(A), and 50dB(A) in living rooms).

The above internal noise levels are achievable with windows /doors open up to 5% of the floor areas therefore no additional ventilation treatment is required.

9 NOISE EMISSION ASSESSMENT

Noise emissions from the site should be assessed to ensure that the amenity of nearby land users is not adversely affected. The primary noise sources from the project site will be mechanical plant and from use of commercial/retail areas.

9.1 NOISE EMISSION CRITERIA

Noise emissions from the development are to be assessed against the NSW Environmental Protection Authority (EPA) *Noise Policy for Industry (NPfI)* 2017 (for mechanical plant).

The NPfI provides guidelines for assessing noise impacts from developments. The recommended assessment objectives vary depending on the potentially affected receivers, the time of day, and the type of noise source. The NPfI has two requirements which must both be complied with, namely an amenity criterion and an intrusiveness criterion.

9.1.1.1 Intrusiveness Criterion

The guideline is intended to limit the audibility of noise emissions at residential receivers and requires that noise emissions measured using the L_{eq} descriptor not exceed the background noise level by more than 5 dB(A).

Table 12 – NPfI Intrusiveness Criteria

Receiver	Time of day	Background Noise Level dB(A)$L_{90(Period)}$	Intrusiveness Criteria (Background + 5dB(A)$L_{eq(15minute)}$
R1	Day (7:00am-6:00pm)	43	48
	Evening (6:00pm-10:00pm)	43	48
	Night (10:00pm-7:00am)	34	39
R2	Day (7:00am-6:00pm)	43	48
	Evening (6:00pm-10:00pm)	41	46
	Night (10:00pm-7:00am)	37	42
R5	Day (7:00am-6:00pm)	50	55
	Evening (6:00pm-10:00pm)	48	53
	Night (10:00pm-7:00am)	36	41

9.1.1.2 Amenity Criterion

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

The Noise Policy for Industry sets out acceptable noise levels for various land uses. Table 2.2 on page 11 of the policy has four categories to distinguish different residential areas. They are rural, suburban, urban and urban/industrial interface. Acoustic Logic will assess noise emissions in accordance with the 'Urban' category.

The NPfI requires project amenity noise levels to be calculated in the following manner:

$$L_{Aeq(15\min)} = Recommended\ Amenity\ Noise\ Level - 5dB(A) + 3dB(A)$$

The amenity levels appropriated for the receivers surrounding the project site are presented in the table below.

Table 13 – NPfI Project Amenity Criteria

Type of Receiver	Time of day	Recommended Project Acceptable Noise Level dB(A)$L_{eq(15\text{-}minutes)}$
Residential (Urban)	Day (7:00am-6:00pm)	58
	Evening (6:00pm-10:00pm)	48
	Night (10:00pm-7:00am)	43
Commercial (R3/R4)	When in Use	63

9.1.1.3 Sleep Arousal Criteria

The NPfI also recommends the following noise limits to mitigate sleeping disturbances:

Where the subject development / premises night -time noise levels at a residential location exceed:

- *$L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or*
- *L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,*

a detailed maximum noise level even assessment should be undertaken.

Table 14 - Sleep Arousal Criteria for Residential Receivers

Receiver	Rating Background Noise Level (Night) dB(A)L_{90}	Emergence Level
R1 Night (10pm – 7am)	34	40dB(A)$L_{eq,\ 15min}$; 52 dB(A)L_{AFmax}
R2 Night (10pm – 7am)	37	42dB(A)$L_{eq,\ 15min}$; 52 dB(A)L_{AFmax}
R5 Night (10pm – 7am)	36	41dB(A)$L_{eq,\ 15min}$; 52 dB(A)L_{AFmax}

In addition to the above, we note that the NSW EPA Road Noise Policy states:

- *maximum internal noise levels below 50–55 dB(A) are unlikely to awaken people from sleep*
- *One to two noise events per night with maximum internal noise levels of 65-70dB(A) are not likely to affect health and wellbeing significantly.*

9.2 NOISE EMISSION FROM LOADING DOCK

Review of the current design indicates:

- Building C2 loading dock is already approved as part of C1 for completeness.
- Building C3 loading dock is fully enclosed with a shared access with the parking. The noise emission is acceptable.
- Building C4 loading dock is with open drive way and the loading dock driveway is partially covered by a landscape roof.

This office has been advised that the bulky loading dock will be primarily used for garbage truck and truck movements will be used during daytime only.

9.2.1 Noise Sources

The potential noise sources associated with the loading dock are listed in table below along with the noise emission levels. The emission levels have been obtained from noise monitoring carried out at similar retail loading dock facilities. Noise measurements were obtained using a Norsonics SA 110 with (serial number 24692) or CEL-593 Type 1 sound level analysers (serial number C1. T 116962), set to fast response. The sound level analysers were calibrated before and after the measurements using a Rion NC-73 calibrator. No significant drift was recorded.

Assessment has been based on rigid trucks up to 8.8m in length and the loading dock operation during day and evening only.

Table 15 -Loading Dock Noise Data

Noise Source	Sound Power Level dB(A)	Type of Noise Source
Truck Idle	99	Quasi-Steady
Trucks Manoeuvring	105	Intermittent

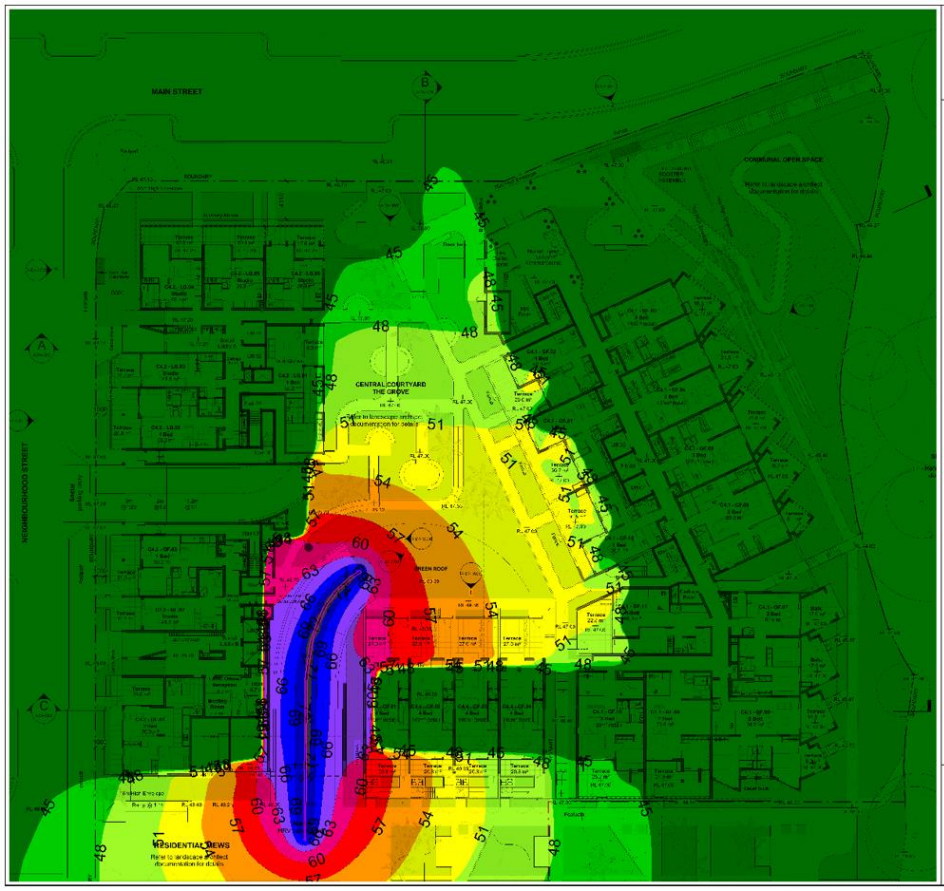
9.2.2 Predicted Noise Levels- Day Time Only

Noise emissions from the operation of the loading dock during the day time have been predicted to the building of project site using SoundPlan™ modelling software implementing the ISO 9613-2:1996 *"Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation"* noise propagation Standard. Sound Power Level data used in the SoundPlan™ modelling is based on measurement results by this office for the truck. The following weather conditions are included in the modelling based on the requirements of ISO9613:

- Wind speed of between 1m/s and 5m/s.
- 10 degrees with 70% relative humidity.

As the loading dock is used infrequently during the daytime, it is recommended to adopt the internal noise criteria detailed in Section 8.1 of this report.

The modelling results for C4 loading dock are below:



Ivanhoe Stage 2

Ground Level Noise Contours
(1800mm above ground)

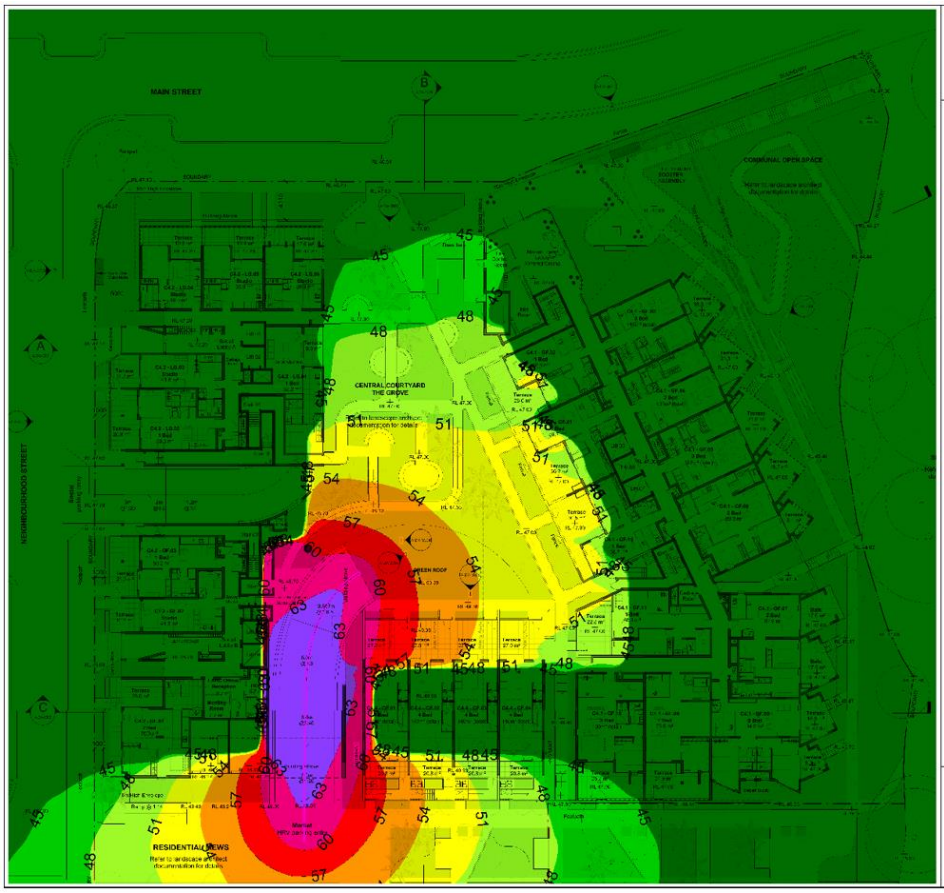
Truck SWL Leq 105dB(A)
Speed: 10 km/h
1 Truck per 15 minutes

Prepared by: OB
Date: 16/07/2021

Noise Level
LAeq
in dB(A)

< 45
45 - 48
48 - 51
51 - 54
54 - 57
57 - 60
60 - 63
63 - 66
66 - 69
69 - 72
72 - 75
>=75

ACOUSTIC LOGIC



Ivanhoe Stage 2

Level 1 Noise Contours
(4800mm above ground)

Truck SWL Leq 105dB(A)
Speed: 10 km/h
1 Truck per 15 minutes

Prepared by: OB
Date: 16/07/2021

Noise Level
LAeq
in dB(A)

< 45
45 - 48
48 - 51
51 - 54
54 - 57
57 - 60
60 - 63
63 - 66
66 - 69
69 - 72
72 - 75
>=75

ACOUSTIC LOGIC

Table 16 -Predicted Noise Levels from Loading Dock (dB(A)$L_{eq,\ 15min}$)

Internal Space	Predicted Noise Level dB(A)$L_{eq,\ 15min}$	Criteria dB(A)L_{eq}	Comply?
Ground Floor Living Room of GF.01	40*	Living room-40 dB(A) Bedroom- 35 dB(A)	Yes
L1 up – Living/Bedroom facing driveway	< 35	Living room-40 dB(A) Bedroom- 35 dB(A)	Yes

*Note: minimum 6.38mm glazing has been recommended in Table 10 to provide R_w 31 rating.

9.3 COMMUNITY CENTRE

Typical noise from operation of the community building will be from patron noise utilising the multipurpose rooms and mechanical plant servicing the building.

9.3.1 Patron Noise

The main noise source in the multipurpose rooms would be patron speech, with a sound power level of 77 dB(A) L_{10} per patron based on AL measurements and music activities' noise.

Patrons' Talking Noise

Noise from patrons talking is expected to be below the sound power level used. The noise level predicted at each receiver is based on a theoretical maximum number of people that may be accommodated in the indoor area with up to 1 in 2 people talking at any one time.

Table 17 – L_{10} Sound Power Level Spectrum of Single Patron, dB

	Octave Band Centre Frequency (Hz)									
	31.5	63	125	250	500	1000	2000	4000	8000	**A-wt dB(A)L_{10}**
Patron Noise (dB(A))	62	62	67	70	74	75	70	51	48	**77**

Background Music

- Sound pressure levels of ambient background music is 70dB(A), background music only permitted inside.

Predicted Noise Level

The nearest noise receiver is the future residential apartment within Building C3 with northern façade overlooking the community building. It is assumed that the community building is operated between 7am to 10 pm Monday to Saturday and 8am to 10pm Sunday/ Public Holidays. All the external façades of the community rooms remain closed during operation. The predicted noise levels are below:

Table 18 – Predicted Noise Level from Community Building

Location	Predicted Noise Level dB(A)L_{eq}	Criteria dB(A)L_{eq}	Comply ?
Northern Façade of C3	< 40 dB(A)	Day – 48 Evening -46	Yes

9.4 MECHANICAL PLANT NOISE

Detailed plant selection has not been undertaken at this stage, as plant selections have not been determined. Detailed acoustic review should be undertaken at CC stage to determine acoustic treatments to control noise emissions to satisfactory levels. Satisfactory levels will be achievable through appropriate plant selection and location and, if necessary, standard acoustic treatments such as duct lining, acoustic silencers and enclosures.

Noise emissions from all mechanical services plant to the closest residential receiver should comply with the noise emission criteria in Section 9.1.

9.5 NOISE FROM GYM AND CAFE

Gym and café are for future commercial lease, no detailed operational information is available for assessment. Similar as many existing mixed use development the tenant is supposed to provide a separate application for their proposed operation before occupation.

10 CONSTRUCTION NOISE AND VIBRATION

An assessment of likely construction noise impacts has been undertaken. The assessment includes:

- Identification of the noise and vibration guidelines which will be applicable to this project.
- Identification of potentially impacted nearby sensitive receivers.
- Identify likely sources of noise and vibration generation and predicted noise levels at nearby development.
- Formulation of a strategy to address the guidelines identified and mitigation treatments.

10.1 NOISE MANAGEMENT LEVELS

10.1.1 Requirements by SEARs SSD-15822622

Noise and vibration
The EIS must include a noise and vibration assessment in accordance with the relevant EPA guidelines. This assessment must detail construction and operational noise and vibration impacts on nearby sensitive receivers and outline the proposed management and mitigation measures that would be implemented.

Noise and vibration emissions from construction activities at the project site will be assessed against the following guidelines:

- Noise
    - EPA Interim Construction Noise Guideline (ICNG)
- Vibration
    - German Standard DIN 4150-3 *Structural Vibration: Effects of Vibration on Structures*
    - British Standard BS 6472:1992 *Guide to Evaluate Human Exposure to Vibration in Buildings (1Hz to 80Hz)*

10.1.2 EPA Interim Construction Noise Guideline

The ICNG assessment procedure requires the following:

- Determination of noise management levels (based on ambient noise monitoring).
- Review of generated noise levels at nearby development.
- Recommendation of noise controls strategies when noise management levels are exceeded.

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 affected" level at a nearby residence, the proponent should take reasonable/feasible work practices to ensure compliance with the "noise affected level". For residential properties, the "noise effected" level occurs when construction noise exceeds ambient levels by more than 10dB(A)$L_{eq(15min)}$.

- "*Highly noise affected level"*. Where noise emissions are such that nearby properties are "highly noise affected", noise controls such as respite periods should be considered. For residential properties, the "highly noise affected" level occurs when construction noise exceeds 75dB(A)$L_{eq(15min)}$ at nearby residences.

Section 4.1.3 of the guideline also specifies management levels for land used for commercial purposes. The guidelines recommend that external noise levels be assessed at the most affected occupied point of the premises.

A summary of the above noise management levels from the ICNG is presented below in Table 19.

Table 19 – Noise Management Levels

Receiver Type	Daytime Background Noise Level $dB(A)L_{90(period)}$	"Noise Affected" Level - $dB(A)L_{eq(15min)}$	"Highly Noise Affected" Level - $dB(A)L_{eq(15min)}$
R1/R2	43	53	75
R5	50	60	75
R4/R3	Commercial	70	

If noise levels exceed the exceed the management levels identified above, reasonable and feasible noise management techniques will be reviewed.

10.1.3 German Standard DIN 4150-3 *Structural Vibration: Effects of Vibration on Structures*

German Standard DIN 4150-3 (1999-02) provides vibration velocity guideline levels for use in evaluating the effects of vibration on structures. The vibration levels presented in DIN 4150-3 (1999-02) are detailed in Table 4.

It is noted that the peak velocity is the value of the maximum of any of the three orthogonal component particle velocities as measured at the foundation, and the maximum levels measured in the x- and y-horizontal directions in the plane of the floor of the uppermost storey.

Table 20 – DIN 4150-3 (1999-02) Safe Limits for Building Vibration

	TYPE OF STRUCTURE	PEAK PARTICLE VELOCITY (mms^{-1})			
		At Foundation at a Frequency of			Plane of Floor of Uppermost Storey
		< 10Hz	10Hz to 50Hz	50Hz to 100Hz	All Frequencies
1	Buildings used in commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8

The surrounding commercial buildings would be considered a Type 1 structures, whilst nearby residences would be classified as Type 2 structures. The heritage building at 118 Regent Street (Receiver 5) would be classified as a Type 3 structure. We also note that heritage structures are not necessarily structurally compromised, and as such a higher vibration level may be acceptable to the structure. In the event that

vibration levels to the church building are proposed to be raised, we recommend that this be undertaken in consultation from both heritage and structural experts.

10.1.4 British Standard BS 6472:1992 Guide to Evaluate Human Exposure to Vibration in Buildings (1Hz to 80Hz)

The NSW EPA document "*Assessing Vibration: A Technical Guideline*" provides procedures for assessing tactile vibration and regenerated noise within potentially affected buildings and is used in the assessment of vibration impact on amenity. Relevant vibration levels are presented below.

Table 21 – EPA Recommended Vibration Levels

		RMS acceleration (m/s^2)		RMS velocity (mm/s)		Peak velocity (mm/s)	
Place	**Time**	**Preferred**	**Maximum**	**Preferred**	**Maximum**	**Preferred**	**Maximum**
Continuous Vibration							
Residences	**Daytime**	0.01	0.02	0.2	0.4	0.28	0.56
Offices		0.02	0.04	0.4	0.8	0.56	1.1
Workshops		0.04	0.08	0.8	1.6	1.1	2.2
Impulsive Vibration							
Residences	**Daytime**	0.3	0.6	6.0	12.0	8.6	17.0
Offices		0.64	1.28	13.0	26.0	18.0	36.0
Workshops		0.64	1.28	13.0	26.0	18.0	36.0

10.2 ACTIVITIES TO BE CONDUCTED AND THE ASSOCIATED NOISE SOURCES

Typically, the most significant sources of noise or vibration generated during a construction project will be demolition, excavation/ground works and building structure works. The following table presents assessment noise levels for typical construction equipment expected to be used:

Table 22 – Sound Power Levels of Typical Equipment

Equipment/Process	Sound Power Level dB(A)
Dozer/Excavator with Bucket	112
Excavator with Hydraulic Hammering	120
Rock Saw/Concrete Saw	120
Concrete Pump	110
Concrete Vibrators	100
Trucks, Work Vehicles, Forklifts	105
Powered Hand Tools	95-100

The noise levels presented in the above table are derived from the following sources:

- Table A1 of Australian Standard 2436:2010; and
- Data held by this office from other similar studies.

10.3 PREDICTED NOISE LEVELS AND COMMENTS

Noise generated by plant and equipment will be managed to generally comply with the nominated acoustic criteria, and where this noise goal may be exceeded, noise will be managed based on principles consistent with Australian Standard 2436 and the recommendations of the ICNG. Noise levels will vary depending on where in the construction site the work is undertaken. To address this, a range of predicted noise levels is provided. Predicted noise levels are presented below. Predictions take into account the noise reduction as a result of distance only.

To R1

It is assumed that the R1 is not occupied during excavation stage and it will be occupied during construction stage.

Table 23 – Predicted Noise Generation to Receiver R1 (External)

Activity	Predicted Level – dB(A) $L_{eq(15min)}$ (External Areas)	Comment
Concrete Pump	66-78	Exceedance of highly noise affected level expected, primarily when working close to western boundary the site.
Concrete Vibrators	56-68	Exceedance of noise affected level expected when working close to the western boundary of the site.
Trucks, Work Vehicles, Forklifts	61-73	Exceedance of noise affected level expected when working close to the western boundary of the site.
Powered Hand Tools	51-63	Exceedance of noise affected level expected when working close to the western boundary of the site

To R2

Table 24 – Predicted Noise Generation to Receiver R2 (External)

Activity	Predicted Level – dB(A) $L_{eq(15min)}$ (External Areas)	Comment
Dozer/Excavator with Bucket	68-74	Exceedance of noise affected level expected when working close to the northern boundary of the site.
Excavator with Hydraulic Hammering	76-82	Generally exceeds highly noise affected level expected, primarily when working close to northern boundary
Rock Saw/Concrete Saw	76-82	Generally exceeds highly noise affected level expected, primarily when working close to northern boundary
Concrete Pump	66-72	Exceedance of noise affected level expected when working close to the northern boundary of the site.
Concrete Vibrators	56-62	Exceedance of noise affected level expected when working close to the northern boundary of the site.
Trucks, Work Vehicles, Forklifts	61-67	Exceedance of noise affected level expected when working close to the northern boundary of the site.
Powered Hand Tools	51-57	Intermittent exceedance of noise affected level expected when working close to close to northern boundary.

To R3

Table 25 – Predicted Noise Generation to Receiver R3 (External)

Activity	Predicted Level – dB(A) $L_{eq(15min)}$ (External Areas)	Comment
Dozer/Excavator with Bucket	< 63	Comply with requirements of EPA Interim Construction Noise Guideline
Excavator with Hydraulic Hammering	< 70	
Rock Saw/Concrete Saw	< 70	
Concrete Pump	< 61	
Concrete Vibrators	< 51	
Trucks, Work Vehicles, Forklifts	< 56	
Powered Hand Tools	< 46	

To R4

Table 26 – Predicted Noise Generation to Receiver R4 (External)

Activity	Predicted Level – dB(A) $L_{eq(15min)}$ (External Areas)	Comment
Dozer/Excavator with Bucket	< 63	Marginally comply with requirements of EPA Interim Construction Noise Guideline
Excavator with Hydraulic Hammering	< 71	
Rock Saw/Concrete Saw	< 71	
Concrete Pump	< 61	
Concrete Vibrators	< 51	
Trucks, Work Vehicles, Forklifts	< 56	
Powered Hand Tools	< 46	

To R5

Table 27 – Predicted Noise Generation to Receiver R5 (External)

Activity	Predicted Level – dB(A) $L_{eq(15min)}$ (External Areas)	Comment
Dozer/Excavator with Bucket	< 63	Exceedance of noise affected level expected when working close to the southern boundary of the site
Excavator with Hydraulic Hammering	< 70	
Rock Saw/Concrete Saw	< 70	
Concrete Pump	< 61	
Concrete Vibrators	< 51	
Trucks, Work Vehicles, Forklifts	< 56	
Powered Hand Tools	< 46	

10.4 DISCUSSION

With respect to noise generating sources and activities during construction works for the proposed development, the preliminary analysis above indicates the following:

- The construction activities with the greatest potential for noise and vibration impacts on surrounding receivers typically include use of the following:
    - Hammering (Excavator with Hydraulic Hammer, Jack Hammering)
    - Rock Saws and Concrete Saws
    - Piling activities (not known what type of piling is intended to be used)
- Typical measures to minimise and mitigate potential noise impacts on surrounding occupants may include the following:
    - Construction of hoarding around the site perimeter to provide noise screening to northern receivers.
    - As much as practicable, use of alternative equipment (i.e., saws/munchers as opposed to hydraulic hammering).
    - Work vehicles, trailers and concrete trucks should turn off their engines when on site (unless needed to remain on during concrete pumping).
    - Use of silencing devices in the form of engine shrouding or industrial silencers fitted to exhausts may be considered.
    - In the event continuous exceedances of the "highly noise affected level" are predicted, respite periods should be considered in accordance with the ICNG recommendations.
- Noise impacts from powered hand tools and general fit-out works internally will decrease once the building façade is erected and façade elements enclose the building (i.e., windows and doors are installed).
- In the event of complaints, attended measurements of noise, or vibration monitoring may be considered where access is permitted.
- A detailed assessment of noise and vibration in a construction noise and vibration management plan is to be conducted once construction plans, construction equipment, and construction methodology are finalised. Reasonable and feasible control measures are to be adopted as per the ICNG.

We note, with regards to the receivers surrounding the project site:

- Buildings at R2 location are not currently occupied, and it is not known whether these buildings will be occupied with residents once the proposed works begin at the project site.
- The detailed assessment of noise and vibration to be conducted as part of a construction noise and vibration management plan prior to CC stage for the project site should take the above into consideration in determining reasonable and feasible acoustic controls to minimise the impacts of construction noise activities where necessary.

11 INTERNALNOISE ISOLATION

The following acoustic isolation is required by current NCC Building Code Australia:

11.1 FLOORS

BCA Clause F5.4a: Floors separating sole-occupancy units or a sole occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby or the like will be required to have a Weighted Sound Reduction Index + Traffic Noise Spectrum Adaptation Term (abbreviated as R_w+C_{tr}) of not less than 50.

11.1.1 Tiled/Timber Floors

BCA Clause F5.4a: Hard floors including floors with a timber or tiled finish) separating sole-occupancy units or a sole occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby or the like will be required to have an L_{ntw} of no more than 62.

11.2 INTERTENANCY WALL

BCA Clause F5.5a(i): Walls separating sole occupancy units will be required to have a Weighted Sound Reduction Index + Traffic Noise Spectrum Adaptation Term (abbreviated as R_w+C_{tr}) of not less than 50.

11.2.1 Intertenancy Wall between Wet and Habitable Areas

BCA Clause F5.5a(i & iii): Walls separating a bathroom, sanitary compartment, laundry or kitchen in one sole occupancy unis from habitable room (other than a kitchen) in an adjoining unit will be required to have a Weighted Sound Reduction Index + Traffic Noise Spectrum Adaptation Term (abbreviated as R_w+C_{tr}) of not less than 50 and be of discontinuous construction.

11.2.2 For Stairway, Public Corridor, Public Lobby, etc – BCA Clause F5.5a (ii)

BCA Clause F5.5a (ii & iii): Walls separating sole occupancy units from a plant room, lift shaft, stairway, public corridor, public lobby or the like will be required to have a Weighted Sound Reduction Index (abbreviated as R_w) of not less than 50. In addition, walls separating sole occupancy units from a plant room or lift shaft are required to be of discontinuous construction.

11.2.3 Intertenancy Wall/Roof Junction

BCA Clause F5.5e & f: Walls systems required to achieve a BCA criterion with a roof or floor located above are to:

i) Continue to the underside of the floor/roof above or

ii) Provide a ceiling to maintain the wall system required BCA criteria.

11.3 TREATMENT OF ENTRY DOORS

BCA Clause F5.5b: For a door assembly located in a wall that separates a sole-occupancy unit from a stairway, public corridor or the like, will be required to have an R_w of not less than 30. For a door assembly located in a wall that separates 2 dwellings, it will be required to have an R_w+C_{tr} of not less than 50.

11.4 WASTE, STORMWATER AND DOMESTIC SUPPLY PIPING

BCA Clause F5.6: Ducts, Hot and Cold Domestic Water, Stormwater, Soil and Waste pipes which serves or passes through more than one sole occupancy unit must be separated from habitable rooms (other than a kitchen) in any other sole occupancy units by a Weighted Sound Reduction Index + Traffic Noise Spectrum Adaptation Term (abbreviated as R_w+C_{tr}) of not less than 40 if it is adjacent to a habitable room, and R_w+C_{tr} 25 if it is adjacent to a wet area (bathroom, laundry, etc.) or kitchen.

11.5 MECHANICAL SERVICE DUCTING

BCA Clause F5.6:Ducts, Hot and Cold Domestic Water, Stormwater, Soil and Waste pipes which serves or passes through more than one sole occupancy unit must be separated from habitable rooms (other than a kitchen) in any other sole occupancy units by a Weighted Sound Reduction Index + Traffic Noise Spectrum Adaptation Term (abbreviated as R_w+C_{tr}) of not less than 40 if it is adjacent to a habitable room, and R_w+C_{tr} 25 if it is adjacent to a wet area (bathroom, laundry, etc.) or kitchen.

11.6 SOUND ISOLATION OF PUMPS

BCA Clause F5.7: For all pumps a flexible coupling must be used at the point of connection between the service pipes in a building and any circulating pumps or other pump.

11.7 ACOUSTIC RECOMMENDATIONS

Detailed acoustic design for the walls, floors, risers and mechanical systems will be carried out at CC stage to ensure that the interna noise isolation satisfy the requirements above.

12 CONCLUSION

Noise emissions associated with the proposed mixed-use development of Stage 2, Ivanhoe, Macquarie Park has been carried out. The following documents/guidelines have generally been utilised in the assessment of noise intruding into and noise emanating from the development:

- Requirements of Item 16 detailed in SEARs for SSD 15822622 dated 06/04/2021
- NSW Department of Planning *State Environmental Planning Policy SEPP (Infrastructure)* 2007.
- NSW Department of Planning *Development Near Rail Corridors and Busy Roads – Interim Guideline*.
- NSW Environmental Protection Authority (EPA) document *Noise Policy for Industry (NPfI)* 2017.
- EPA Interim Construction Noise Guideline (ICNG).

In light of the information above, this report concludes the following:

- Internal noise level criteria have been established based on the requirements of NSW SEPP (Infrastructure) and *Development near rail corridors and busy roads – Interim guideline*. Indicative recommendations for glazing construction have been nominated in Section 8.1.3 of this report.
- External noise emission goals have been established based on the requirements of the NSW EPA *Noise Policy for Industry* in Section 9. A detailed assessment of noise emissions from mechanical plant and equipment is to be conducted once equipment selections and layouts have been finalised during the CC stage of the project.
- A preliminary assessment of construction noise impacts has been undertaken based on the procedure outlined in the NSW EPA *Interim Construction Noise Guideline*. Noise management levels have been established for nearby noise sensitive receivers, and noise levels have been predicted based on typical construction activities. Noting an exceedance in the "highly affected noise management level" typical mitigation measures have been presented. A detailed construction noise and vibration management plan is to be undertaken, taking into consideration the proposed construction methodologies, approved hours of work and the occupation status of nearby residential buildings.

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

Yours faithfully,

Acoustic Logic Pty Ltd
George Wei
Associate Director, MAAS