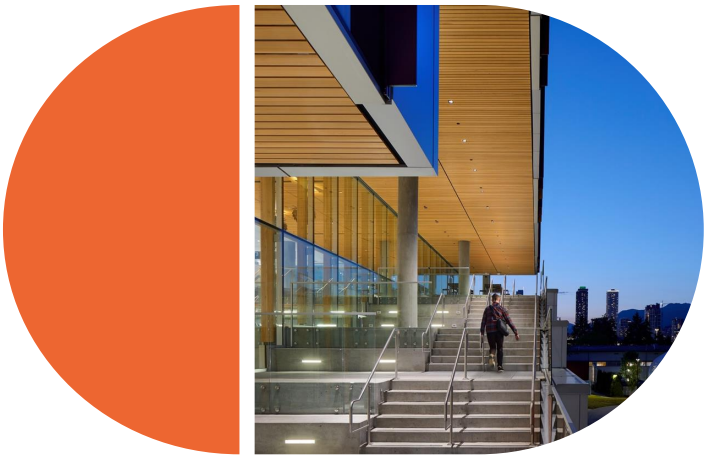
2 - 16 Pockley Avenue, Roseville

Noise & Vibration Impact Assessment for State Significant Development Application



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Ref: 301351698

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Revision Schedule

Revision No.	Date	Description	Prepared by	Quality Reviewer	Project Manager Final Approval
000	28/02/2025	Draft Issue	Jonathan Salim	Mathew McGrory	Mathew McGrory
001	10//04/2025	Issue for SSDA	Jonathan Salim	Mathew McGrory	Rebecca Dracup
002	16/04/2025	Project Description Update	Jonathan Salim	Mathew McGrory	Rebecca Dracup
003	23/09/2025	Drawings Update	Jonathan Salim	Mathew McGrory	Rebecca Dracup

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SEARs Requirements Declaration: 2-16 Pockley Avenue

Declaration		
Name	Jonathan Salim	
Qualifications	BEng, Member of Australian Acoustical Society (MAAS), and Member of Engineer Australia (MIEAust).	
	The undersigned declares that this Acoustic Report for State Significant Development Application (SSDA) has been prepared in response to the following SEARs requirements issued for the Project on 15/11/2024 for SSD-77825469:	
SEARs item no.	**SEARs Requirement**	**Relevant Section of this Report**
12. Noise and Vibration	Provide a noise and vibration assessment prepared in accordance with the relevant NSW Environment Protection Authority (EPA) guidelines. The assessment must detail construction and operational noise and vibration impacts on nearby sensitive receivers and structures and outline the proposed management and mitigation measures that would be implemented.	Section 7 and 9
Signed		
Dated	23/09/2025	

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1. Executive Summary

This Noise & Vibration Impact Assessment has been prepared by Stantec Australia to accompany a Stage 1 State Significant Development Application (SSDA) for the residential development proposal at 2 - 16 Pockley Avenue, Roseville.

The cadastral details for land development can be found on Table 1 below.

Table 1: Cadastral details for land development

Street Name	Cadastral Details
2 Pockley Avenue, Roseville	Lot 11 of DP8261
4 Pockley Avenue, Roseville	Lot 12 of DP8261
6 Pockley Avenue, Roseville	Lot 13 of DP8261
8 Pockley Avenue, Roseville	Lot 14 of DP8261
10 Pockley Avenue, Roseville	Lot 15 of DP8261
12 Pockley Avenue, Roseville	Lot 16 of DP8261
14 Pockley Avenue, Roseville	Lot 17 of DP8261
16 Pockley Avenue, Roseville	Lot 18 of DP8261

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued for the project (SSD-77825469).

This report concludes that the proposed residential development is suitable and warrants approval without requiring any specific acoustic mitigation measures summarised in Section 10 of this report.

2. Introduction

This report has been prepared to support a State Significant Development Application (SSDA) for demolition of existing buildings and construction of a residential apartment development, including affordable housing apartments, above basement car parking located at 2 - 16 Pockley Avenue, Roseville.

This assessment discusses the potential noise and vibration impacts onto the proposed development from the nearby roads and railway corridor. This report also provides criteria and general recommendations for addressing operational and construction noise and vibration impacts to the nearby receivers.

This report provides:

- A summary of measured noise levels on the site and its surroundings
- Noise and vibration criteria for the proposed site
- An acoustic assessment of the current noise environment considering the measured noise levels and applicable types of sources
- Preliminary noise impact assessment for internal noise levels
- Assessment of operational and construction noise impacts
- Indicative recommendations for noise mitigation measures for the proposed development to meet the relevant criteria

The assessment has been prepared considering the following documentation

- Planning Secretary's environmental assessment requirements (SEARs) SSD-77829461
- Ku-ring-gai Development Control Plan (DCP) 2024
- Architectural drawings by Woods Bagot
- Transport Impact Assessment prepared by Varga Traffic Planning
- *Noise Policy for Industry* (NPI), NSW EPA, 2017
- *Development Near Rail Corridors and Busy Roads – Interim Guideline*, NSW Government Department of Planning (DoP), 2008
- *State Environmental Planning Policy* (SEPP) (Transport and Infrastructure) 2021
- *Road Noise Policy* (RNP), NSW EPA, 2011

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessments Requirements (SEARs) issued on 15th November 2024 for application SSD-77825469. Specifically, this report has been prepared to respond to the SEARs requirement issued below.

Item	Description of requirement	Section reference (this report)
12. Noise and Vibration	Provide a noise and vibration assessment prepared in accordance with the relevant NSW Environment Protection Authority (EPA) guidelines. The assessment must detail construction and operational noise and vibration impacts on nearby sensitive receivers and structures and outline the proposed management and mitigation measures that would be implemented.	Section 7 and 9

This document and related work has been prepared following Stantec's Quality and Environmental Management Systems, which are based on AS/NZS ISO 9001:2015 and ISO 14001:2015 respectively

3. Project Overview

The applicant seeks development consent under Division 4.7 State Significant Development of the Environmental Planning & Assessment Act 1979 (EP&A Act) for a new residential development comprising three residential flat buildings which includes the provision of in-fill affordable housing on the site at 2-16 Pockley Avenue, Roseville.

Specifically, this SSDA seeks approval for:

- Site preparation including demolition, excavation and tree removal of the site;
- Construction of a residential flat building containing 3 building elements of up to 9 storeys including:
  - Part-3, part 4 and part 5-level combined basement parking with the provision of 285 car parking spaces,
  - 178 dwellings including 39 affordable housing dwellings above carpark;
- Ground level and on-building landscaping works including communal open spaces in Pavilion A.
- Augmentation of, and connection to, existing utilities as required

3.1 Site Description

The proposed residential development proposal at 2-16 Pockley Avene, Roseville, is located within the Ku-ring-gai Council Local Government Area (LGA) and is zoned R2 (Low Density Residential). The site is bordered by Larkin Street to the east, residential receivers to the north, west, and south. The cadastral details for land development can be found in Table 2 below.

Table 2: Cadastral details for land development

Street Name	Cadastral Details
2 Pockley Avenue, Roseville	Lot 11 of DP8261
4 Pockley Avenue, Roseville	Lot 12 of DP8261
6 Pockley Avenue, Roseville	Lot 13 of DP8261
8 Pockley Avenue, Roseville	Lot 14 of DP8261
10 Pockley Avenue, Roseville	Lot 15 of DP8261
12 Pockley Avenue, Roseville	Lot 16 of DP8261
14 Pockley Avenue, Roseville	Lot 17 of DP8261
16 Pockley Avenue, Roseville	Lot 18 of DP8261

The existing noise environment is currently dominated by road traffic noise on the surrounding local roads and nearby major road (Pacific Highway). Typical to such a traffic environment is for the daytime traffic to start early in the morning and to quiet down late in the evening.

Refer to Figure 1 for the location of the proposed building locations, measurement positions and surrounding receivers. The receivers have been identified within three Noise Catchment Areas (NCAs) as shown in Figure 1.

Figure 1: Overview of the site and measurement locations

4. Noise Survey

4.1 Overview

Attended and unattended noise surveys were conducted in the locations shown in Figure 1 to establish the ambient and background noise levels of the site and surrounds. Noise surveys have been carried out in accordance with the method described in the AS/NZS 1055:2018 'Acoustics – Description and measurement of environmental noise'.

4.2 Instrumentation

The following equipment was used for the noise surveys:

- Hand-held sound spectrum analyzer B&K 2250, S/N 3027679
- Sound Calibrator B&K Type 4231, S/N 3028774
- Bruel and Kjaer Noise Logger B&K 2250 S/N 3011864
- Bruel and Kjaer Noise Logger B&K 2250 S/N 3011814

All equipment was calibrated before and after the measurements and no significant drift was found. All equipment carries current traceable calibration certificates that can be provided upon request.

4.3 Unattended Noise Survey Results

An unattended noise survey was undertaken on the site between the 19th of February to the 26th of February 2025 to quantify the local noise environment and to establish the noise criteria to the nearest noise sensitive receivers surrounding the site. Refer to Figure 1 for the monitoring locations on site. The local ambient noise environment is dominated by noise from the local traffic.

In accordance with NSW noise guidelines, the averaged background noise level for each assessment period (day/evening/night) is called "*the Rating Background Level"* (RBL) and are the levels used for assessment purposes.

The measured background noise levels are used to determine the single-figure RBL for each assessment period and are shown in Table 3. The results of the unattended ambient noise survey and the determined RBLs representing each of the assessment periods over the whole monitoring period are shown in Table 3. Results of the monitoring are presented in the following subsections and graphs of these logged results are provided in Appendix A.

The results of the unattended background and ambient noise survey are shown in Table 3.

As required in the NSW NPI, any data likely to be affected by rain, wind or other extraneous noise has been excluded from the calculations.

Table 3: Unattended noise measurements

Location	Equivalent Continuous Noise Level $L_{Aeq,period}$ – dB(A)			Rating Background Noise Level RBL – dB(A)		
	Day	Evening	Night	Day	Evening	Night
L1	51	52	42	40	35	30
L2	46	46	41	36	34	30

In addition to the conducted noise survey, noise data from the noise survey carried out by Renzo Tonin Associates detailed in the DA Acoustic Assessment report for Roseville Memorial Club dated December 6, 2022, has been utilized to establish the traffic noise levels along the Pacific Highway. This was due to the influence of nearby construction works at nearby developments during the time of monitoring. The results of the noise survey are provided in Table 4.

Table 4: Unattended traffic noise measurements (RTA report, TL332-02F01, rev4)

Location	Equivalent Continuous Noise Level $L_{Aeq,period}$ - dB(A)	
	Day ($L_{Aeq, 15\ Hour}$)	Night ($L_{Aeq, 9\ Hour}$)
Pacific Highway	70	65

4.4 Attended Noise Survey Results

Attended noise measurements of 15-minute period were conducted on site in order to characterise the acoustic environment for the noise intrusion into the development and to determine any noise impact on the surrounding receivers. A summary of the attended noise measurements taken at the site are shown on Table 5. Refer to Figure 1 for the measurement locations.

Table 5: Attended noise measurements

Measurement Location	Measurement Time	$L_{Aeq,duration}$, dB(A)	$L_{Amax,\ duration}$, dB(A)	Comments
P1	19/02/2025 – 2:14 PM	47	69	Construction noise including heavy machinery and vehicles (Vehicle reversing alarm, etc). Includes noise generated by flora and fauna (trees rustling, cicadas)
	26/02/2025 – 2:08 PM	53	73	Construction noise. Includes noise produced from passing cars as well as noise generated by flora and fauna (trees rustling, cicadas)
P2	19/02/2025 – 3:04 PM	47	64	Construction noise. Includes noise generated by flora and fauna (trees rustling, cicadas)
	26/02/2025 – 2:35 PM	45	66	Construction noise. Includes noise produced from passing cars as well as noise generated by flora and fauna (trees rustling, cicadas)
P3	26/02/2025 – 2:57 PM	56	74	Construction noise. Includes noise produced from passing cars as well as noise generated by flora and fauna (trees rustling, cicadas)
P4	26/02/2025 – 3:16PM	65	83	Construction noise and noise from Pacific Highway.

5. Noise Criteria

5.1 External Noise Criteria

5.1.1 Ku-ring-gai Local Environment Plan (LEP) 2015

Relevant Planning Documents from Ku-ring-gai Council have been reviewed for any noise requirements or criteria.

The zoning of the land area of the site is R2 – Low Density Residential under Ku-ring-gai Local Environmental Plan 2015. The surrounding areas are zoned as R2 – Low Density Residential and R4 – High Density Residential.

Figure 2: Land zoning of the site and surroundings.

5.1.2 Ku-ring-gai Development Control Plan

The proposed development is located within the Ku-ring-gai council boundary. Based on Part 23.7 of Ku-ring-gai DCP 2024, noise levels associated with air conditioning, kitchen, bathroom, laundry ventilation, or other mechanical ventilation systems and plant either as an individual piece of equipment or in combination is not to be audible within any habitable room in any residential premises before 7am and after 10pm. Outside of these restricted hours noise levels associated with air conditioning, kitchen, bathroom, laundry ventilation, or other mechanical ventilation systems and plant either as an individual piece of equipment or in combination is not to emit a noise level greater than 5dB(A) above the background noise (LA90, 15 min) when measured at the boundary of the nearest potentially affected neighbouring properties. The background (LA90, 15 min) level is to be determined without the source noise present.

5.1.3 NSW Noise Policy for Industry (NPI)

The NSW Environment Protection Authority (EPA) sets out criteria in its Noise Policy for Industry (NPI) 2017 to control the noise emissions from industrial noise sources or continuous steady state noise.

The calculation is based on the results of the ambient and background noise unattended monitoring, addressing two components:

- Controlling intrusive noise into nearby residences (Intrusiveness Criteria)
- Maintaining noise level amenity for particular land uses (Amenity Criteria)

Once both criteria are established the most stringent for each considered assessment period (day, evening, night) is adopted as the Project Noise Trigger Level (PNTL).

5.1.3.1 Intrusiveness Criteria

The NSW EPA NPI states the following:

> *"The intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (represented by the LAeq descriptor), measured over a 15-minute period, does not exceed the background noise level by more than 5 dB when beyond a minimum threshold. This intrusiveness noise level seeks to limit the degree of change a new noise source introduces to an existing environment."*

The intrusiveness criterion can be summarised as L_{Aeq}, 15 minute ≤ RBL background noise level plus 5 dB(A).

Table 6: NSW NPI intrusiveness criteria

Period	Noise Descriptor dB(A)	Noise Criteria – dB(A)		
		NCA 1	NCA 2	NCA 3
Day (7:00am to 6:00pm)	$L_{Aeq,15min}$ ≤ RBL + 5	45	41	41
Evening (6:00pm to 10:00pm)	$L_{Aeq,15min}$ ≤ RBL + 5	40	39	39
Night (10:00pm to 7:00am)	$L_{Aeq,15min}$ ≤ RBL + 5	35	35	35

5.1.3.2 Amenity Criteria

The NSW NPI states the following:

> *"To limit continuing increases in noise levels from application of the intrusiveness level alone, the ambient noise level within an area from all industrial noise sources combined should remain below the recommended amenity noise levels specified in Table 2.2 where feasible and reasonable. The recommended amenity noise levels will protect against noise impacts such as speech interference, community annoyance and some sleep disturbance"*

The applicable parts of Table 2.2: Recommended LAeq Noise Levels from Industrial Noise Sources which are relevant to the project are reproduced below:

Table 7: NSW NPI amenity criteria for external noise levels

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Project Amenity Noise Level[1], $L_{Aeq,\ 15mins}$, dB(A)
Residential	Suburban[2]	Day	53
		Evening	43
		Night	38
Commercial	All	When in use	63

Notes:

1. Project amenity noise level is Recommended Noise Level minus 5 dB(A) plus 3 dB(A) to convert from period level to a 15-minute level.
2. Suburban area as defined in EPA NSW NPI Table 2.3

5.1.3.3 'Modifying Factor' Adjustments

The NSW NPI also states:

> "Where a noise source contains certain characteristics, such as tonality, impulsiveness, intermittency, irregularity or dominant low-frequency content, there is evidence to suggest that it can cause greater annoyance than other noise at the same noise level."

In order to take into account the potential annoying character of the noise an adjustment of 5 dB(A) for each annoying character aspect and cumulative of up to a total of 10 dB(A), is to be added to the measured value to penalise the noise for its potentially greater annoyance aspect.

Table C of the NSW DECCW NPI (see Table 8 below) provides procedures for determining whether an adjustment should be applied for greater annoyance aspect.

Table 8: Table C1 from the NSW DECCW NPI – Modifying factor corrections

Factor	Assessment / Measurement	When to Apply	Correction[1]	Comments
Tonal Noise	One-third octave or narrow band analysis	Level of one-third octave band exceeds the level of the adjacent bands on both sides by: - **5 dB** or more if the centre frequency of the band containing the tone is above 400 Hz - **8 dB** or more if the centre frequency band containing the tone is 160 to 400 Hz inclusive - **15 dB** or more if the centre frequency of the band containing the tone is below 160 Hz	5 dB[2]	Narrow-band frequency analysis may be required to precisely detect occurrence.
Low Frequency Noise	Measurement of C-weighted and A-weighted level	Measure / assesses C- and A-weighted levels over same time period. Correction to be applied if the difference between the two levels is 15 dB or more	5 dB[2]	C-weighting is designed to be more responsive to low-frequency noise, especially at higher overall levels

Factor	Assessment / Measurement	When to Apply	Correction[1]	Comments
Impulsive Noise	A-weighted fast response and impulsive response	If difference in A-weighted maximum noise levels between fast response and impulse response is greater than 2 dB	Apply difference in measured levels as the correction, up to a maximum of 5 dB.	Characterised by a short rise time of 35 milliseconds (ms) and decay time of 1.5 s.
Intermittent Noise	Subjectively assessed	Level varies by more than 5 dB	5 dB	Adjustment to be applied for **night-time only.**
Duration	Single-event noise duration may range from 1.5 min to 2.5 h	On event in any 24-hour period	0 to – 20 dB(A)	The acceptable noise level may be increased by an adjustment depending on duration of noise.
Maximum Adjustment	Refer to individual modifying factors	Where two or more modifying factors are indicated	Maximum correction of 10dB(A)[2] (excluding duration correction)	

Notes:

1. Corrections to be added to the measured or predicted levels.
2. Where a source emits tonal and low-frequency noise, only one 5 dB correction should be applied if the tone is in the low-frequency range.

5.1.3.4 Project Noise Trigger Levels (PNTL)

The following criteria is applicable for the external noise emissions from the development, as detailed below in Table 9. These project noise trigger levels are in accordance with the requirements of the NSW NPI, and shall be assessed to the most affected point on or within the residential boundary.

Table 9: Project noise trigger levels

Period	Descriptor	PNTL dB(A)		
		NCA 1	NCA 2	NCA 3
Residential receivers				
Day (7:00am to 6:00pm)	$L_{Aeq,15min}$	45	41	41
Evening (6:00pm to 10:00pm)	$L_{Aeq,15min}$	40	39	39
Night (10:00pm to 7:00am)	$L_{Aeq,15min}$	35	35	35
Commercial receivers				
When in use	$L_{Aeq,15min}$	63	63	63

Where necessary, noise mitigation measures will be incorporated in the design to ensure that noise levels comply with the recommended noise emission criteria noted above.

5.1.4 Traffic Generation Noise Criteria

Road traffic noise impact is assessed in accordance with the introduced NSW Road Noise Policy (Office of Environment and Heritage July 2011). The criterion (Table 3 – Road Traffic Noise Assessment Criteria for Residential Land Uses) divides land use developments into different categories and lists the respective criteria for each case. The category that is relevant to the proposed use of the site is shown below in Table 10.

Table 10: NSW Road Noise Policy – Traffic noise assessment criteria

Road Category	Type of project/land use	Assessment Criteria – dB(A)	
		Day (7am – 10pm)	Night (10pm – 7am)
Arterial roads	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{Aeq,1\ hour}$ 60 (external)	$L_{Aeq,1\ hour}$ 55 (external)
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	$L_{Aeq,1\ hour}$ 55 (external)	$L_{Aeq,1\ hour}$ 50 (external)

In the event that the traffic noise at the site is already in excess of the criteria noted above, the NSW RNP states that the primary objective is to reduce the existing level through feasible and reasonable measures to meet the criteria above.

If this is not achievable, Section 3.4.1 Process for applying the criteria – Step 4 states that for existing residences affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise should be limited to 2dB above that of the corresponding 'no build option'.

5.2 Internal Noise Criteria

5.2.1 AS/NZS 2107:2016

Australian Standard AS/NZS 2107:2016 – *'Acoustics- Recommended design sound levels and reverberation times for building interiors'* specifies target noise levels for internal spaces to the development. Refer to Table 11 for the proposed internal noise level criteria.

Table 11: Internal noise level criteria (AS/NZS 2107:2016)

Type of occupancy/activity	Design Sound Level (LAeq,t) range
Houses and apartments near major roads	
Living areas	35 to 45 (See note 2)
Sleeping areas (night-time)	35 to 40 (See note 2)
Work Areas	35 to 45
Enclosed Car Parks	< 65
Washrooms and Toilets	45 to 55

5.2.2 Sleep Disturbance Criteria

The NSW Noise Policy for Industry (NPI) establishes sleep disturbance criteria for residential receivers in proximity to industrial noise sources during the night-time period, such as vehicle movements and the train passing by. The criteria for protecting the amenity of surrounding residential receivers from sleep disturbance are:

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

Table 12 summarises the sleep disturbance criteria for the proposed development.

Table 12: Sleep Disturbance Criteria

Period	Sleep Disturbance Criteria	
	L_{AFmax} – dB(A)	$L_{Aeq,15min}$ – dB(A)
Night (10:00pm to 7:00am)	52	40

5.2.3 State Environmental Planning Policy (Transport and Infrastructure) 2021 & Development Near Rail Corridors and Busy Roads – Interim Guideline

The *DoP's Development near Rail Corridors and Busy Roads – Interim Guideline* governs the required maximum internal noise levels averaged over particular time periods within bedrooms and living areas of apartments in the proposed development. The guideline details the application of Section 2.1.20 of the State Environmental Planning Policy (SEPP) Transport and Infrastructure which states the following for residential developments:

> *"If the development is for the purposes of residential accommodation, 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:*
>
> 1. *In any bedroom in the residential accommodation – 35 dB(A) at any time between 10.00 pm and 7.00 am,*
> 2. *Anywhere else in the residential accommodation (other than a garage, kitchen, bathroom or hallway) – 40 dB(A) at any time."*

The DoP's Development near Rail Corridors and Busy Roads – Interim Guideline also states the following with regard to an open windows (alternative means of ventilation) assessment:

> *"If internal noise levels with windows or doors open exceed the criteria by more than 10dBA, 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."*

Table 13 provides a summary of the internal noise limits for both windows closed and open established in Clause 3.6 "What Noise and Vibration Criteria Should Be Applied" of the DoP Interim Guideline.

Table 13: Summary of DoP's Interim Guideline criteria spaces adjacent to rail corridors and busy roads

Type of habitable space	Applicable Time Period	Assessment Noise Metric	Windows/Doors Closed Criteria dB(A)	Windows/Doors Open Criteria – dB(A)
Bedroom	10:00pm – 7:00am	$L_{Aeq,9h(night)}$	35	45
Living area	At any time	$L_{Aeq,15h(day)}$	40	50

Since the development is located approximately 130m away from the busy road (Pacific Highway) with a line of sight to the road, the SEPP criteria will be applied.

6. Construction Noise and Vibration Criteria

6.1 Construction Noise Criteria

Noise criteria for construction sites are established in accordance with the Interim Construction Noise Guideline (*ICNG July 2009*) by the NSW Office of Environment & Heritage (NSW OE&H) currently under The NSW Environment Protection Authority (EPA). It is important to note that the recommended criteria are for planning purposes only. Numerous other factors need to be considered when assessing potential noise impacts from construction works.

However, in undertaking the assessment of potential noise intrusion associated with the proposed construction activities, Chapter 4 of the NSW EPA ICNG (July 2009) were specifically referenced. The noise limits are presented in Table 14, and are applicable to the development.

Table 14: NSW ICNG Construction noise criteria

Time of Day	Management Level $L_{Aeq,15min}$ *	How to Apply
Recommended Standard Hours: Mon – Fri (7am – 6pm)	Noise Affected RBL + 10dB	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured $L_{Aeq,15min}$ 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 residences of the nature of works to be carried out, the expected noise levels and duration as well as contact details.
Sat (8am – 1pm) No work on Sunday & Public Holidays	Highly Noise Affected 75 dB(A)	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 in, taking into account: • 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) • 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 + 5dB	• 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(A) above the noise affected level, the proponent should negotiate with the community. • For guidance on negotiating agreements see section 7.2.2. of NSW EPA ICNG (July 2009).

NOTE: Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30m of the residence. Noise levels may be higher at upper floors of the noise affected residence.

Source: Chapter 4 (Table 2 Sec 4.1.1) of NSW EPA ICNG

6.2 Construction Vibration Criteria

The NSW Environment Protection Authority (EPA) developed a document, “Assessing vibration: A technical Guideline” in February 2006 to assist in preventing people from exposure to excessive vibration levels within buildings. The guideline does not however address vibration induced damage to structures or structure-borne noise effects. Vibration and its associated effects are usually classified as continuous, impulsive or intermittent.

6.2.1 Human Comfort – Continuous and Impulsive Vibration Criteria

Structural vibration in buildings can be detected by occupants and can affect them in many ways including reducing their quality of life and also their working efficiency. Complaint levels from occupants of buildings subject to vibration depend upon their use of the building and the time of the day.

Maximum allowable magnitudes of building vibration with respect to human response are shown in Table 15. It should be noted that the human comfort for vibration criteria are more stringent than the building damage criteria.

Table 15: Preferred and maximum weighted RMS values for continuous and impulsive vibration

Location	Assessment period[1]	Preferred values		Maximum values	
		z-axis	x- and y-axis	z-axis	x- and y-axis
Continuous vibration					
Residences	Daytime	0.010	0.0071	0.020	0.014
	Night time	0.007	0.005	0.014	0.010
Impulsive vibration					
Residences	Daytime	0.30	0.21	0.60	0.42
	Night time	0.10	0.071	0.20	0.14

6.2.1.1 Human Comfort – Intermittent Vibration Criteria

Disturbance caused by vibration will depend on its duration and its magnitude. This methodology of assessing intermittent vibration levels involves the calculation of a parameter called the Vibration Dose Value (VDV) which is used to evaluate the cumulative effects of intermittent vibration. Various studies support the fact that VDV assessment methods are far more accurate in assessing the level of disturbance than methods which is only based on the vibration magnitude.

Table 16: Acceptable Vibration Dose Values for Intermittent Vibration (m/s1.75)

Location	Daytime (7:00am to 10:00pm)		Night-time (10:00pm to 7:00am)	
	Preferred value	Maximum value	Preferred value	Maximum value
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and place of worship	0.40	0.80	0.40	0.80

6.2.2 Structural Damage – Vibration Criteria

Ground vibration criteria are defined in terms of levels of vibration emission from construction activities which will avoid the risk of damaging surrounding buildings or structures. It should be noted that human comfort criteria are normally expressed in terms of acceleration whereas structural damage criteria are normally expressed in terms of velocity.

Most commonly specified structural vibration levels are defined to minimize the risk of cosmetic surface cracks and are set below the levels that have the potential to cause damage to the main structure. Structural damage criteria are presented in German Standard DIN4150-Part 3 “Structural vibration in buildings – Effects on structures” and British Standard BS7385-Part 2: 1993 “Evaluation and Measurement for Vibration in Buildings”. Table 17 indicates the vibration limits presented in DIN4150-Part 3 to ensure structural damage doesn’t occur.

Table 17: Guideline value of vibration velocity, vi, for evaluating the effects of short-term vibration

Line	Type of Structure	Vibration velocity, vi, in mm/s			
		Foundation			Plane of floor of uppermost full storey
		At a frequency of			
		Less than 10Hz	10 to 50Hz	50 to 100*Hz	All Frequencies
1	Buildings used for 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 and 2 and are of great intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8

*For frequencies above 100Hz, at least the values specified in this column shall be applied

6.2.3 Vibration Objectives

Table 18 indicates the vibration criteria for the nearest residential and commercial properties to the development.

Table 18: Construction vibration criteria summary

Location	Period	Human Comfort Vibration Objectives			Building damage Objectives – Velocity (mm/s)
		Continuous mm/s^2 (RMS)		Intermittent m/s$^{1.75}$ (VDV)	
		z-axis	x- and y-axis		
Residential	Daytime	10 - 20	7 - 14	0.20 - 0.40	5
	Night time	7 - 14	5 - 10	0.13 - 0.26	5
Commercial	Any time	20 - 40	14 - 28	0.40 – 0.80	20

7. Noise Impact Assessment

7.1 Mechanical Noise Emissions

Noise sources from general operation of the development site typically include mechanical services noise from air-conditioning equipment located at the rooftop area of the development. These noise sources have been used to predict the potential noise impact at the nearby noise sensitive receivers. These noise-sensitive receivers include the following (Refer to Figure 1):

- Residential receivers across Larkin Street
- Residential receivers across Pockley Avenue
- Residential receivers across Maclaurin Parade

The following noise sources are considered the most likely to cause an adverse noise impact to noise sensitive receivers if not acoustically treated effectively:

- External condenser units located on the rooftop of the proposed development

The location of the proposed plant area is shown below in Figure 3.

In order to assess the worst-case scenario, it is assumed that the air conditioning units associated with the proposed development are running at any time throughout a 24hr period. With all, night time is the most stringent period for the noise generated by the operation of the mechanical plant, therefore this criterion was used as the noise target at the boundary of the nearest sensitive receivers for the project.

Based on a preliminary assessment of the proposed condenser units, a solid acoustic barrier with a height of 2m has been nominated to minimise any potential acoustic impacts to the nearby receivers.

However, due to the early stage of works, the final mechanical plant for the project haven't been selected. Further assessment will be conducted at the later stage once specific units have been selected prior to Construction Certificate to ensure no adverse noise impacts from external mechanical plant in accordance with the criteria outlined in Section 5.1.3.

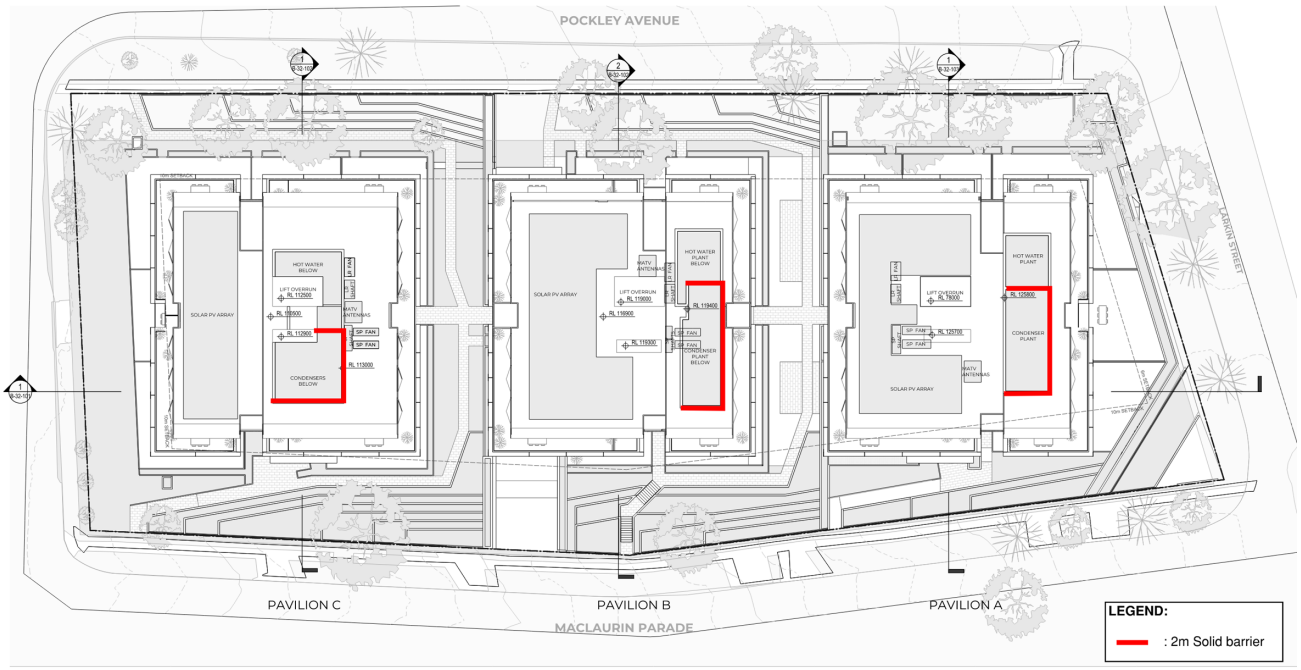


Figure 3: New mechanical plant layout (Rooftop)

7.1.1 General Mechanical Equipment – Noise Mitigation Measures

Noise generation by external mechanical plant associated with the proposed development is to be managed to ensure external noise emissions are not intrusive and do not impact the amenity of the nearest sensitive receivers.

In order to meet the external noise emissions requirements for noise generated by mechanical plant and equipment the following are some typical practices to mitigate noise from the operation of mechanical plant:

- Where possible, locate plant as far away from possible noise sensitive receivers as practical to minimise the aggregate noise level.
- Select low noise mechanical equipment including Condenser Units with night-mode capability.
- Acoustic louvres or solid barriers may be required, surrounding plant items on the rooftop. This mitigation will likely be driven by internal noise criteria within the residential spaces of the proposed development.
- Where possible, locate noisy plant within an enclosed plant space.
- Carpark exhaust is to be included in the mechanical assessment. Carpark exhaust fans are typically located in a plant room in a basement allowing for sufficient ductwork to allow for acoustic internal lining or an attenuator for supply and exhaust to meet environmental noise criteria.

7.2 Façade Analysis

7.2.1 Noise Modelling

A 3D acoustic modelling for external noise intrusion from the surrounding roads and rail corridor was conducted using the software SoundPlanNoise (Version 9.0). This modelling software is recognized by regulatory authorities around Australia and is endorsed by the NSW EPA for the use in projects of this scale. Noise levels from the road were calculated in accordance with the Calculation of Road Traffic Noise (CRTN) method, airborne noise levels from the railway were calculated using the Schall 03 prediction method, and the total calculated noise levels were calibrated to logger data from around the site.

The acoustic modelling was undertaken considering no specific meteorological characteristics such as dominant wind direction and speed or temperature therefore it was considered under neutral conditions.

7.2.2 Glazing Requirements

The general limiting factor of the performance of a building façade in term of noise attenuation is the glazing. The façade noise maps presented in Appendix B of this report have been used to estimate the anticipated noise impact on each of the façades and levels of the development. The noise maps illustrate the L_{Aeq} levels on the façade. The calculations followed the standard EN 12354-3:2000 *Building Acoustics – Estimation of Acoustic Performance of Buildings from the Performance of Elements – Part 3: Airborne Sound Insulation against Outdoor Sound*.

The glazing requirements are expressed in decibels as the weighted sound reduction index R_w. The calculation of the proposed Rw rating has assumed full height and full-size windows, with typical room correction factors. Table 19 presents the recommended acoustic performance of the glazing system throughout the development.

Recommended glazing systems are minimum requirements to satisfy the acoustic criteria, and other glazing systems with equal or better acoustic performance can be used if so required for e.g. structural or thermal reasons.

Refer to Appendix C for the preliminary advise for glazing performance.

Table 19: Indicative acoustic performance of glazing system for the proposed development

Façade Orientation	Level	Room Type	Indicative acoustic performance (Rw)
Pavilion East			
North	GF to L8	Bedroom	32
	L9 to L13	Bedroom	35
	GF to L8	Living Room	32
	L9 to L13	Living Room	35
East/West	GF to L8	Bedroom	32
	L9 to L13	Bedroom	35
	GF to L11	Living Room	32
	L12 to L13	Living Room	35
South	GF to L13	Bedroom	32
	GF to L13	Living Room	32
Pavilion West/Central			
All	GF to L13	Bedroom	32
	GF to L13	Living Room	32

7.2.3 Open Windows Assessment for Natural Ventilation

An open windows assessment has been conducted to assess whether the habitable spaces can meet the internal noise level requirements of the *Development Near Rail Corridors and Busy Roads - Interim Guideline* with windows open for natural ventilation (open in accordance with the natural ventilation requirements of the NCC). If there is an exceedance of the internal noise level criteria with the windows open, alternative means of ventilation is required in accordance with the requirements of the NCC to the noise-affected spaces.

The façade noise modelling results, presented in Appendix B, confirm that internal noise levels for all apartments with windows open comply with the criteria outlined in Section 5.2.3. Accordingly, alternative means of ventilation are not required.

7.3 Traffic Generation Noise

In accordance with traffic impact assessment conducted by Varga Traffic Planning Pty Ltd, the predicted AM/PM generation rates for the proposed development is presented in Table 20 below.

Table 20: Potential traffic generation along Pockley Aveue

AM Peak	PM Peak
33	26

Based on the predicted trip generation rates shown above, the traffic noise impacts on the post-development generated traffic is expected to be insignificant. Hence, the proposed development is expected comply with the requirements of the NSW Road Noise Policy.

8. Rail Corridor Vibration Assessment

The purpose of this vibration assessment is to ensure that the vibration caused by nearby rail corridor does not cause any adverse vibration impact in terms of both human comfort and building damage to the proposed development.

Given the proposed development is approximately 195 away from the nearest operational rail track, the proposed development is outside the threshold requiring any vibration impact assessment in accordance with the *NSW Development Near Rail Corridors and Busy Roads – Interim Guideline* showed in Figure 4 below.

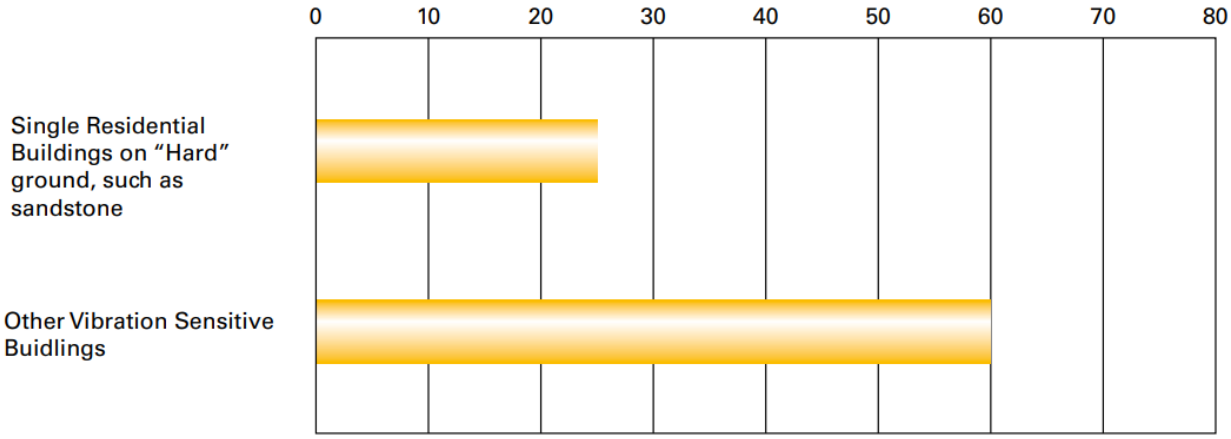


Figure 4: Vibration assessment zone for typical development sites adjacent to rail corridors

9. Construction Noise & Vibration Assessment

9.1 Overview

Currently a detailed construction program is not yet full defined. This section provides general recommendations only and provides applicable criteria together with feasible and reasonable noise and vibration control practices to be observed during the construction of the proposed development.

This preliminary advice provided within this assessment shall form the basis for the Contractor's detailed Construction Noise and Vibration Management Plan (CNVMP) which shall identify any noise criteria exceedances and relevant mitigation measures once construction methods and stages are known.

9.2 Proposed Construction Activities

As part of the noise impact assessment, the following construction stages have been assessed:

1. Early works & Demolition
   - Demolition of the existing structure
   - Earthworks
2. Structural works
   - Basement works
   - Slab pouring
   - Piling works
   - Structural works
   - Façade installation
3. Fit-out
   - Construction of internal structures and finishes

9.3 Proposed Construction Hours

It is expected work associated with the proposal will be carried out during the Standard Construction Hours outlined in *The Interim Construction Noise Guideline (ICNG)* by NSW DECC.:

- Monday to Friday: 7am to 6pm
- Saturday: 8am to 1pm
- Sunday and public holidays: no work

In this report, it is assumed that all works are performed during these standard hours.

9.4 Construction Noise Assessment

A preliminary construction noise assessment has been carried out based on typical plant and machinery expected throughout the construction stages. The preliminary noise assessment has been considered at the nearest existing residential receivers.

9.4.1 Expected Construction Equipment

The noise sources likely to be associated with the works listed in the previous section of this report are presented in Table 21. The equipment noise levels have been extracted from *AS 2436:2010* Guide to *Noise and Vibration Control on Construction, Demolition and Maintenance Sites.*

Table 21: Cumulative impact - Construction equipment noise levels

Stages	Equipment	Quantity	Sound Power Level – dB(A)	Usage in 15-minute period (minutes)	Time Corrected Sound Power Level ($L_{Aeq,15min}$)
Early Works & Demolition	Excavator with breaker attachment	1	116	5	111
	Electric hand tools	5	99	10	97
	Bobcat	1	110	7.5	107
	Mobile Crane	1	108	3	101
	Truck	2	108	5	103
Structural Works	Powered hand tool	5	99	10	97
	Concrete pump	1	110	10	108
	Mobile crane	1	108	3	101
	Bored Piling	1	113	5	108
	Generator	1	110	15	110
	Drum roller	1	109	10	107
	Truck	2	108	5	103
Fit-outs	Powered hand tool	5	99	10	97
	Grinder	2	100	10	98
	Mobile crane	1	108	3	101
	Truck	2	108	5	103

9.4.2 Predicted Noise Levels

The predicted noise levels have been presented in Table 22, Table 23, and Table 24. The calculated noise level have been assessed against the construction noise criteria established in Section 0. For this assessment, a 2m solid barrier or a Type – A hoarding have been assumed to be erected around the site.

Table 22: Predicted noise levels – Scenario 1: Early Works & Demolition

Receiver	Predicted Noise Level Range $L_{Aeq,15min}$	Noise Management Level $L_{Aeq,15min\ dB}$[3]	Noise Management Level Exceedance (dB)	Exceeds Highly Noise Affected Level? (> 75dBA)
NCA01[1]	55 – 68	50	5 – 18	No
NCA02[2]	55 – 68	46	9 – 22	No
NCA03[2]	55 – 68	46	9 – 22	No

Note:

1. Based on unattended noise measurement at L1.
2. Based on unattended noise measurement at L2.
3. Noise Management Level = RBL(day) + 10dB

Table 23: Predicted noise levels – Scenario 2: Structural Works

Receiver	Predicted Noise Level Range $L_{Aeq,15min}$	Noise Management Level $L_{Aeq,15min}$[3]	Noise Management Level Exceedance (dB)	Exceeds Highly Noise Affected Level? (> 75dBA)
NCA01[1]	57 – 70	50	7 – 20	No
NCA02[2]	57 – 70	46	11 – 24	No
NCA03[2]	57 – 70	46	11 – 24	No

Note:

1. Based on unattended noise measurement at L1.
2. Based on unattended noise measurement at L2.
3. Noise Management Level = RBL(day) + 10dB

Table 24: Predicted noise levels – Scenario 3: Fit-out[4]

Receiver	Predicted Noise Level Range $L_{Aeq,15min}$	Noise Management Level $L_{Aeq,15min}$[3]	Noise Management Level Exceedance (dB)	Exceeds Highly Noise Affected Level? (> 75dBA)
NCA01[1]	45 – 56	50	≤6	No
NCA02[2]	45 – 56	46	≤10	No
NCA03[2]	45 – 56	46	≤10	No

Note:

1. Based on unattended noise measurement at L1.
2. Based on unattended noise measurement at L2.
3. Noise Management Level = RBL(day) + 10dB
4. As a conservative approach, 10dB reduction have been applied to account for the façade performance.

9.5 General Acoustic Recommendations for Construction

According to AS 2436 – 2010 *"Guide to noise and vibration control on construction, demolition and maintenance sites"* the following techniques could be applied to minimize the spread of noise and vibrations to the potential receivers.

9.5.1 Noise

If a process that generates significant noise levels cannot be avoided, the amount of noise reaching the receiver should be minimized. Two ways of achieving this are to either increase the distance between the noise source and the receiver or to introduce noise reduction measures such as screens.

Physical methods to reduce the transmission of noise between the site works and residences, or other sensitive land uses, are generally suited to works where there is longer-term exposure to the noise. Practices that will reduce noise from the site include:

- Increasing the distance between noise sources and sensitive receivers.
- Reducing the line-of-sight noise transmission to residences or other sensitive land uses using temporary barriers (stockpiles, shipping containers and site office transportable can be effective barriers).
- Constructing barriers that are part of the project design early in the project to introduce the mitigation of site noise.
- Installing purpose-built noise barriers, acoustic sheds and enclosures.

9.5.2 Screening

On sites where distance is limited, the screening of noise may be beneficial, and this should be taken into account during the planning stages.

If structures such as stores, site offices and other temporary buildings are situated between the noisiest part of the site and the nearest dwellings, some of the noise emission from the site can be reduced. If these buildings are occupied, sound insulation measures may be necessary to protect workers inside the buildings.

A hoarding that includes a site office on an elevated structure offers superior noise reduction when compared with a standard (simple) hoarding. The acoustic performance is further enhanced when the hoarding is a continuous barrier.

Storage of building materials or the placement of shipping containers between the noise source and any noise-sensitive area may also provide useful screening and the same is true of partially completed or demolished buildings. A noisy, stationary plant can be placed in a basement, the shell of which has been completed, provided reverberant noise can be controlled. Where compressors or generators are used in closed areas, it is necessary to ensure that the exhaust gases are discharged directly to the outside air and that there is good cross-ventilation to prevent the build-up of poisonous carbon monoxide fumes and to allow an adequate air supply to maintain efficiency when operating the equipment.

Where such noise barriers are not practical, a worthwhile reduction in noise can be obtained by siting the plant behind and as close as possible to mounds of earth, which may effectively screen any noise-sensitive areas from the plant. These can often be designed into the construction schedule or site arrangement for future landscaping.

Water pumps, fans and other plant equipment that operate on a 24-hour basis may not be an irritating source of noise during the day but may be problematic at night. They should therefore be effectively screened by either situating them behind a noise barrier or by being positioned in a trench or a hollow in the ground provided this does not generate reverberant noise. In such cases, however, adequate ventilation should also be ensured. Long, temporary earth embankments can provide quite an effective noise screen for mobile equipment moving, for example, on a haulage road. When the earthworks are complete, the earth mounds should be removed if possible, with smaller, quieter excavators. A noise barrier may be a more reliable method of noise control than the imposition of restrictions on throttle settings.

In many cases it may not be practical to screen earthmoving operations effectively, but it may be possible to partially shield a construction plant or to build-in at the early stages protective features required to screen traffic noise. Where earth noise barriers are not practical due to lack of space, consideration should be given to the possibility of constructing temporary screens from wood or any equivalent material in surface density.

The usefulness of a noise barrier will depend upon its length, its height, its position relative to the source and to the receiver, and the material from which it is made. A barrier designed to reduce noise from a moving source should extend beyond the last property to be protected to a distance of not less than ten times the shortest measurement from the property to the

barrier. A barrier designed to reduce noise from a stationary source should, where possible, extend to a distance beyond the direct line between the noise source and the receiver to a distance equal to ten times the effective barrier height, which is the height above the direct line between source and receiver.

If the works are predominately within nominally closed structures, careful consideration should be given to reducing noise breakout at any openings.

9.5.3 Crane (diesel operated)

An appropriate silencer on the muffler and acoustic screen around the engine bay are recommended to attenuate the noise emission.

9.5.4 Reversing and warning alarms

Community complaints often involve the intrusive noise of alarms commonly used to provide a safe system of work for vehicles operating on a site. Beeper reversing alarm noise is generally tonal and may cause annoyance at significant distances from the work site.

There are alternative warning alarms capable of providing a safe system of work that are equal to or better than the traditional 'beeper', while also reducing environmental noise impacts. The following alternatives should be considered for use on construction sites as appropriate:

(a) Broadband audible alarms incorporating a wide range of sound frequencies (as opposed to the tonal frequency 'beep') are less intrusive when heard in the neighbourhood.

(b) Variable-level alarms reduce the emitted noise levels by detecting the background noise level and adjusting the alarm level accordingly.

(c) Non-audible warning systems (e.g. flashing lights, reversing cameras) may also be employed, providing safety considerations, are not compromised.

(d) Proximity alarms that use sensors to determine the distance from objects, such as people or structures, and generate an audible alarm in cabin for the driver.

(e) Spotters or observers.

The above methods should be combined, where appropriate.

Figure 5: Noise mitigation management flow chart

9.6 Noise & Vibration Monitoring Strategy

9.6.1 General Methodology

Noise and vibration levels should be monitored from time to time to ensure that noise generated as a result of remediation and construction activities does not disturb local businesses.

Monitoring may be in the form of regular checks by the builder or indirectly by an acoustic consultant engaged by the builder and in response to any noise or vibration complaints. Where noise and vibration criteria are being exceeded or in response to valid complaints, noise and / or vibration monitoring should be undertaken. This would be performed inside the premises of the affected property and on site adjacent to the affected receivers.

Monitoring is to be undertaken by an experienced noise and vibration monitoring professional or an acoustic consultant. The results of any noise or vibration monitoring are to be provided to the relevant party or person in a timely manner allowing the builder to address the issue and respond to the complaints.

Noise and vibration monitoring can take two forms:

- Short term monitoring
- Long-term monitoring

9.6.1.1 Short-term monitoring

Short-term monitoring consists of attended monitoring when critical stages of the construction are occurring. This normally provides real-time assistance and guidance to the subcontractor on site letting them know when the noise and vibration criteria are exceeded allowing the selection of alternative method on construction or equipment selection to minimise noise and vibration impacts.

9.6.1.2 Long-term monitoring

Similarly, long-term monitoring uses noise and vibration loggers providing real-time alerts to the builder / site manager when the noise and vibration criteria are exceeded.

Typically, the noise and vibration loggers stay on site for a period of several months for the critical construction stages of the project. Sometimes the period of construction noise and vibration monitoring is dictated by the local authorities through the DA conditions.

Both methods are complementary and normally used simultaneously providing a significant of amount of data via the long-term monitoring but also providing information on the sources of noise and vibration generating exceedances via the short-term or attended monitoring.

9.6.2 Noise & Vibration Monitoring Program

The following monitoring program is proposed for this project. Refer to Figure 6 for the approximate monitoring locations:

1. Unattended noise monitor installed at L1 and L2 during the demolition and construction stages, at least for a time period representing the average works. To be determined upon consultation with the appointed contractor.
2. Attended noise and vibration monitoring at the start of new work phases likely to result in an adverse change in the noise emissions, and in the case of complaints.

The monitoring programme as shown above is to be carried out during the likely noisiest stages as agreed with the Acoustic engineer and Contractor. The final monitoring locations are subject to agreement with the relevant stakeholders associated with the surrounding receivers.

Figure 6: Proposed Noise Monitoring Locations.

10. Mitigation Measures

The below table captures all measures required to be implemented as a result of this consultant report. The mitigation measures below only includes required measures. Suggestions or preferences have not been included.

Table 25: Environmental Impact Statement Mitigation Measures

Type	Mitigation Number/Name	Mitigation Measure	Reason for Mitigation Measure
Construction	Construction Noise and Vibration	Construction noise and vibration monitoring regime	To mitigate excessive construction noise and vibration towards the adjacent receivers.
		Site barrier	
Operational	Glazing Thickness	Refer to Appendix C	To protect the amenity within the future residential apartments
	Plantroom Noise Barrier	Refer to Figure 3	To protect the amenity within the future residential apartments and to ensure the noise compliance at the nearest receivers

11. Conclusion

This Noise and Vibration Impact Assessment has been prepared by Stantec Australia to accompany the State Significant Development Application (SSDA) SSD-77825469 for the proposed residential apartment development, including affordable housing apartments, above basement car parking located at 2-16 Pockley Avenue, Roseville.

This report has provided criteria, in-principle treatment and design requirements which aim to achieve the statutory criteria discussed in Section 5.

Acoustic performance requirements for the façade elements have been provided to achieve internal noise levels in accordance with the requirements of the State Environmental Planning Policy (Transport and Infrastructure) 2021. These requirements are based on the noise monitoring conducted on the site between 19th of February and 26th of February 2025.

As outlined in Section 0, a preliminary noise assessment conducted for the proposed mechanical plant (i.e. condenser units). Based on the preliminary acoustic assessment for the mechanical plant, a solid acoustic barrier with a height of 2m has been nominated to minimise any potential acoustic impacts to the nearby receivers. Further assessment will be conducted at the later stage once specific units have been selected prior to Construction Certificate to ensure no adverse noise impacts from external mechanical plant in accordance with the criteria outlined in Section 5.1.3.

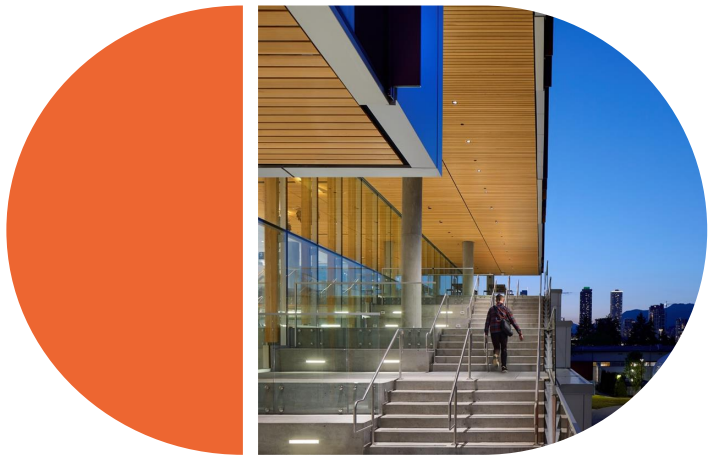
Traffic noise impacts on the post-development generated traffic have also been assessed in Section 0 of this report. Based on the predicted trip generation rates provided by Varga Traffic Planning Pty Ltd, the traffic noise impacts on the post-development generated traffic is expected to be insignificant and comply with the requirements of the NSW Road Noise Policy.

The construction noise and vibration assessments undertaken to predict the impacts on sensitive receivers have been presented in Sections 9 of this report. Reasonable and feasible mitigation methods have been provided to limit the noise and vibration impacts on the nearest sensitive receivers during the construction. The predicted construction noise at the nearest receivers can be found on Section 9.4.2 of this report. A Detailed Construction Noise and Vibration Management Plan (CNVMP) is recommended to be carried out once a construction program and methodology are known.

In summary, based on analyses of the proposed massing plans, all aforementioned criteria relating to the development is able to be satisfied, including the internal noise levels within each spaces and external noise emissions at the most affected receivers. Further assessments will be conducted to provide acoustic mitigation measures such as to comply with the relevant requirements as part of the Detailed Design Phase when all plant selections and locations have been detailed.

The information presented in this report shall be reviewed if any modifications to the features of the development specified in this report occur, including and not restricted to selection of air-conditioning units, layout of equipment, modifications to the building and introduction of any additional noise sources.

Appendices



Appendix A Unattended Noise Measurements

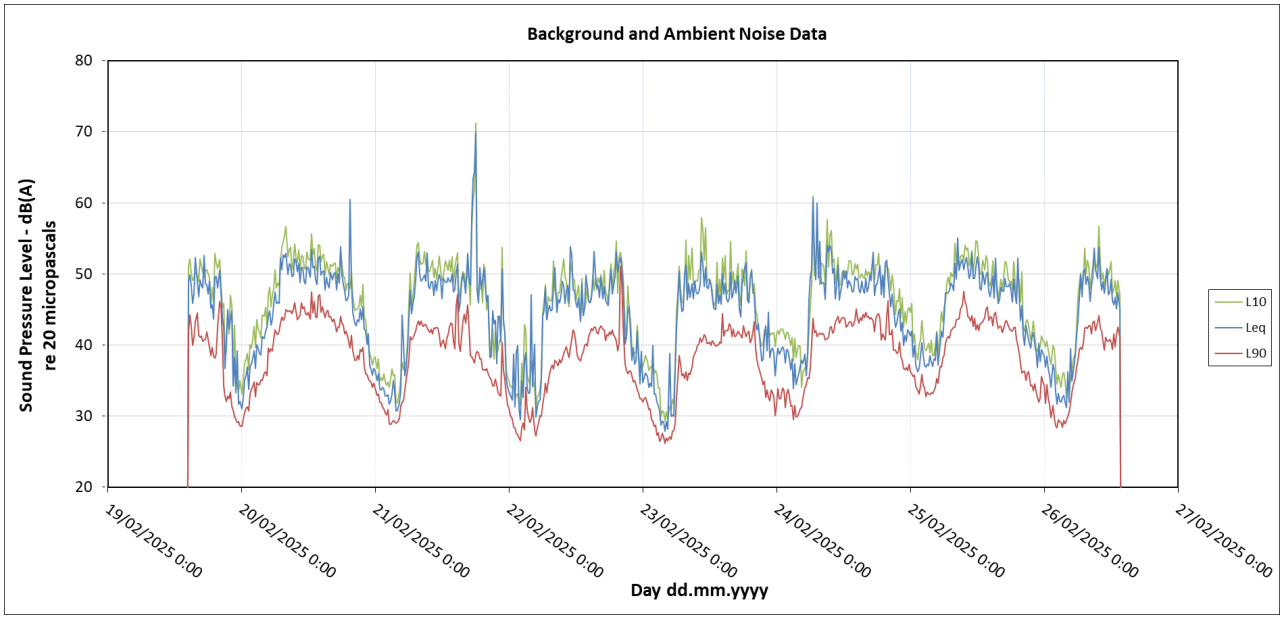


Figure 7: Unattended noise measurement (L1)

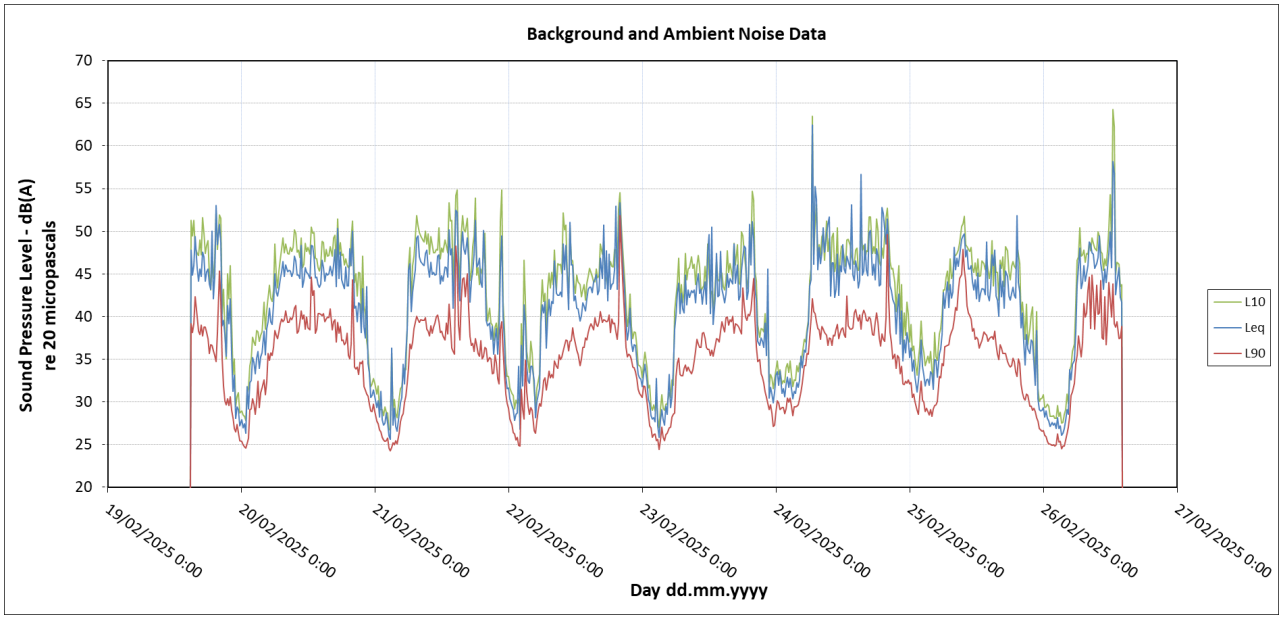
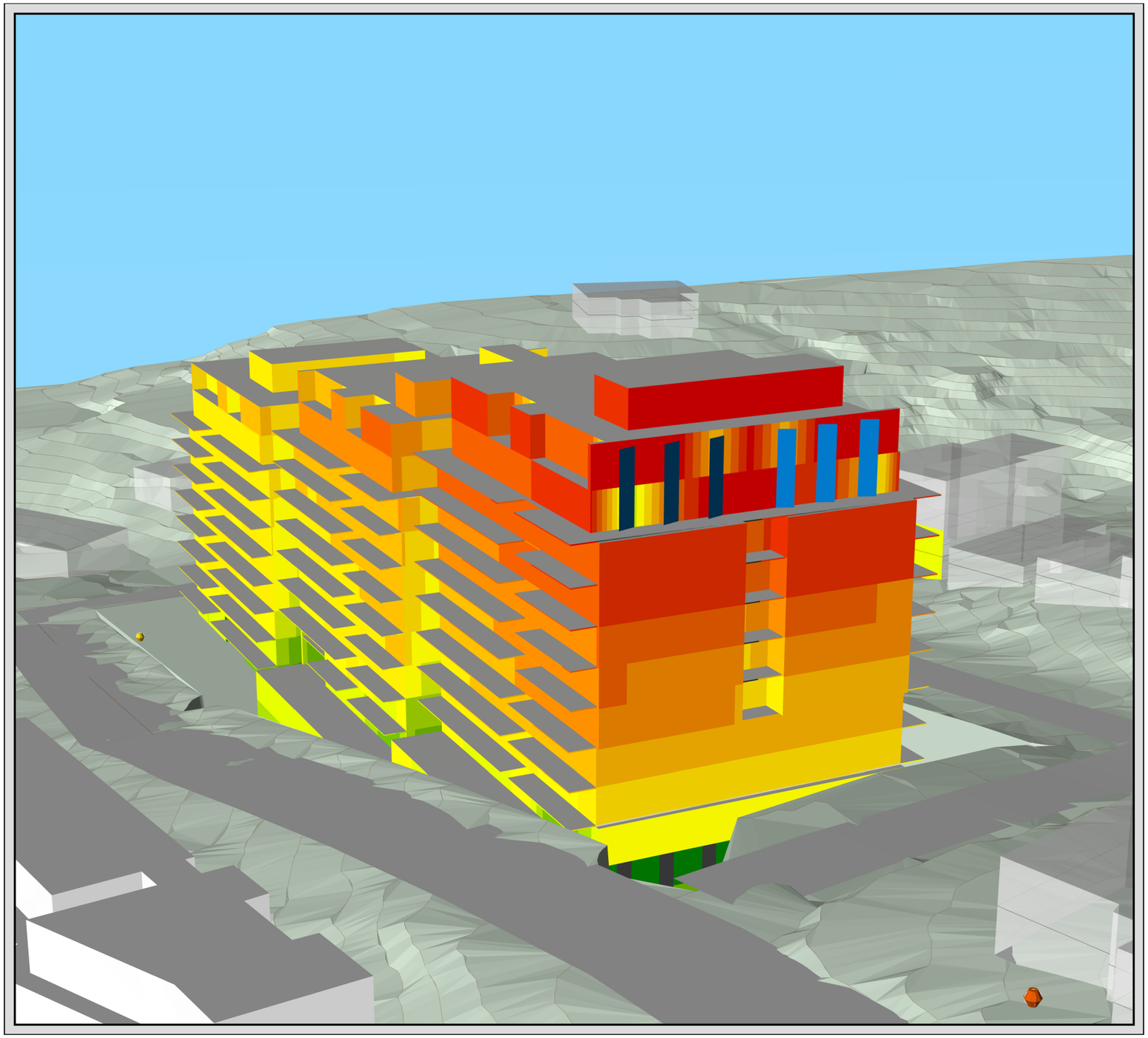


Figure 8: Unattended noise measurement (L2)

Appendix B Façade Noise Maps

Façade Noise Maps (Traffic Day – Side 1)



2 - 16 Pockley Avenue

Facade Noise Map

Day (7am-10pm)

REV	DESCRIPTIONS	AUTHOR	DATE
A	First Issue	JS	16/09/2025

LEGEND:

Noise Level Legend - Laeq (15hrs) in dB(A)

< 40	45 - 46	51 - 52	57 - 58	63 - 64
40 - 42	47 - 48	53 - 54	59 - 60	65 - 66
43 - 44	49 - 50	55 - 56	61 - 62	67 >

Scale 1:2083

0 10 20 40 60 80 m

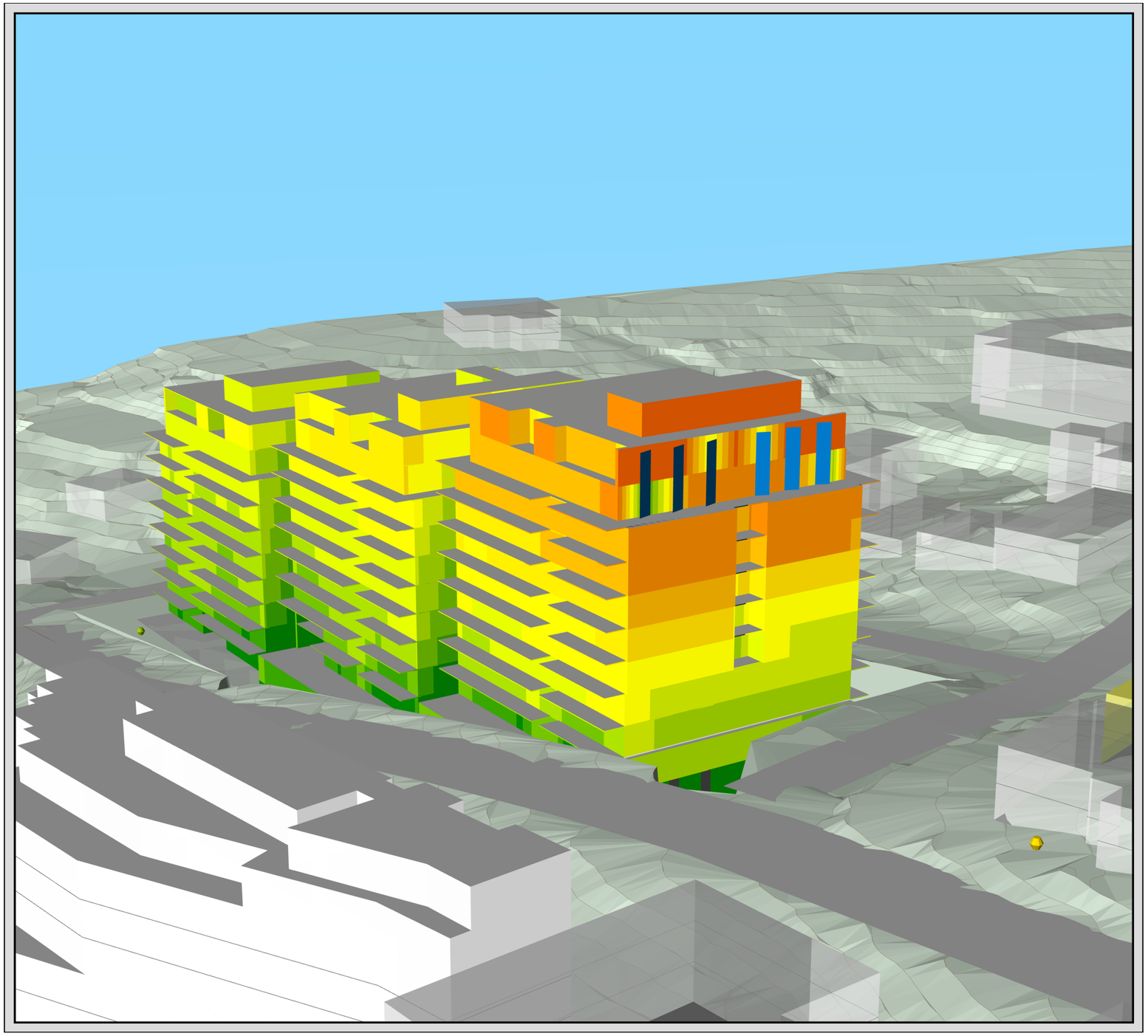
N

PROJECT NUMBER: 301351697

CONSULTANT: Stantec

CLIENT: AQUALAND

Façade Noise Maps (Traffic Night – Side 1)



2 - 16 Pockley Avenue

Facade Noise Map

Night (10pm-7am)

REV	DESCRIPTIONS	AUTHOR	DATE
A	First Issue	JS	16/09/2025

LEGEND:

Noise Level Legend - Laeq (9hrs) in dB(A)

< 40	45 - 46	51 - 52	57 - 58	63 - 64	
40 - 42	47 - 48	53 - 54	59 - 60	65 - 66	
43 - 44	49 - 50	55 - 56	61 - 62	67 >	

Scale 1:2083

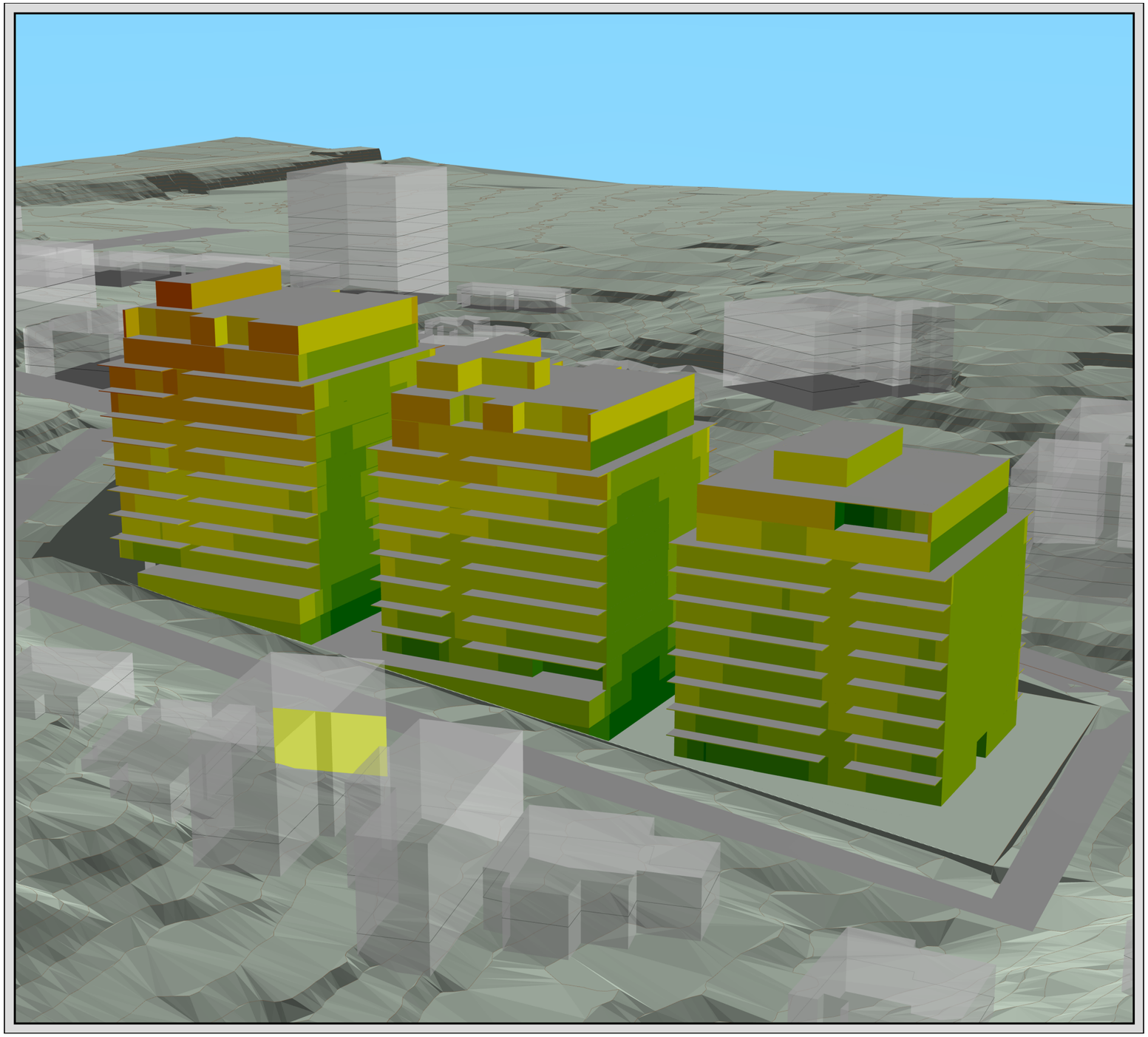
0 10 20 40 60 80 m

PROJECT NUMBER: 301351697

CONSULTANT: Stantec

CLIENT: AQUALAND

Façade Noise Maps (Traffic Day – Side 2)



2 - 16 Pockley Avenue

Facade Noise Map

Day (7am-10pm)

REV	DESCRIPTIONS	AUTHOR	DATE
A	First Issue	JS	16/09/2025

LEGEND:

Noise Level Legend - Laeq (15hrs) in dB(A)

< 40	45 - 46	51 - 52	57 - 58	63 - 64
40 - 42	47 - 48	53 - 54	59 - 60	65 - 66
43 - 44	49 - 50	55 - 56	61 - 62	67 >

Scale 1:2083

0 10 20 40 60 80 m

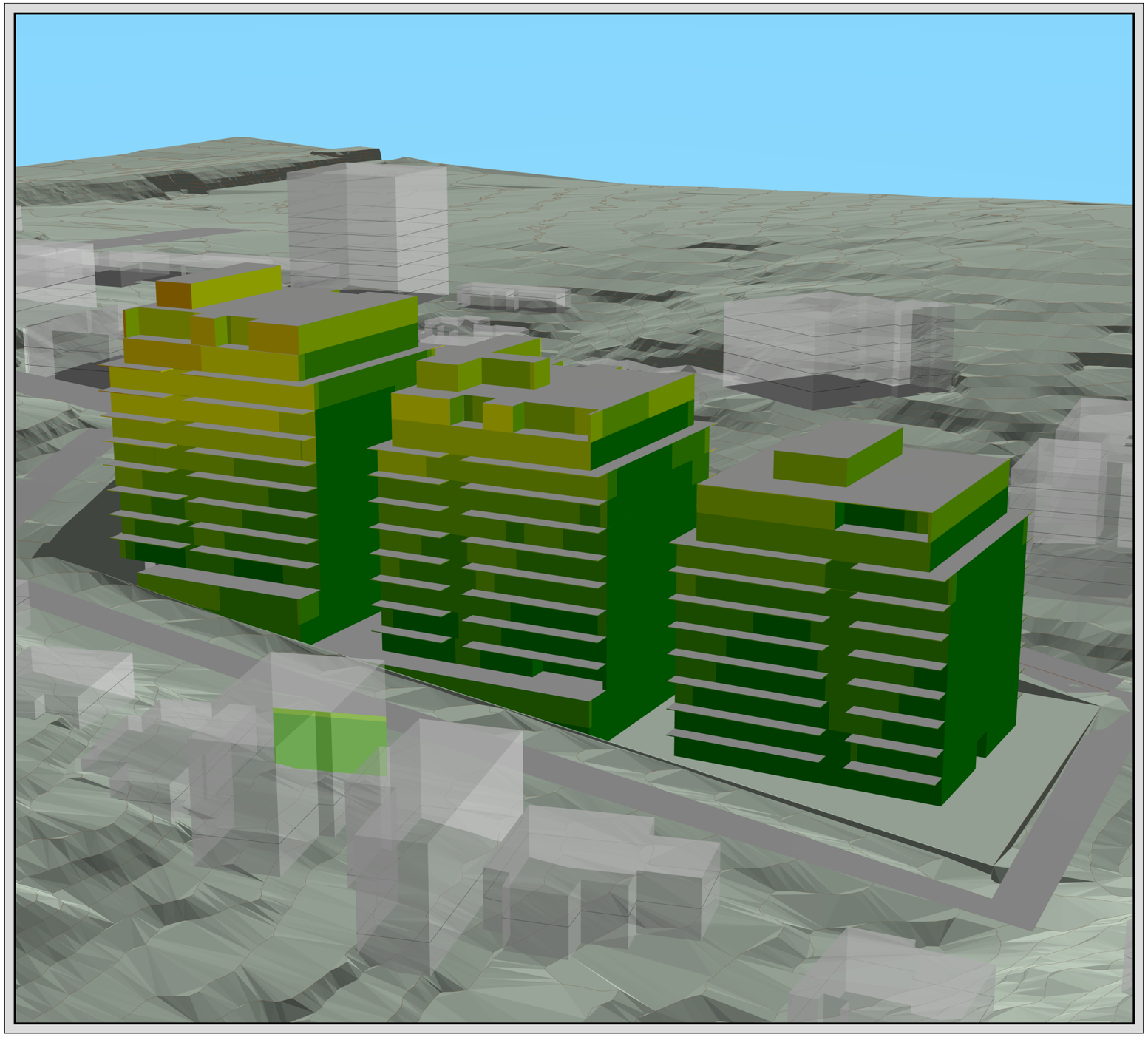
N

PROJECT NUMBER: 301351697

CONSULTANT: Stantec

CLIENT: AQUALAND

Façade Noise Maps (Traffic Night – Side 2)



2 - 16 Pockley Avenue

Facade Noise Map

Night (10pm-7am)

REV	DESCRIPTIONS	AUTHOR	DATE
A	First Issue	JS	16/09/2025

LEGEND:

Noise Level Legend - Laeq (9hrs) in dB(A)

< 40	45 - 46	51 - 52	57 - 58	63 - 64	40 - 42	47 - 48	53 - 54	59 - 60	65 - 66	43 - 44	49 - 50	55 - 56	61 - 62	67 >

Scale 1:2083

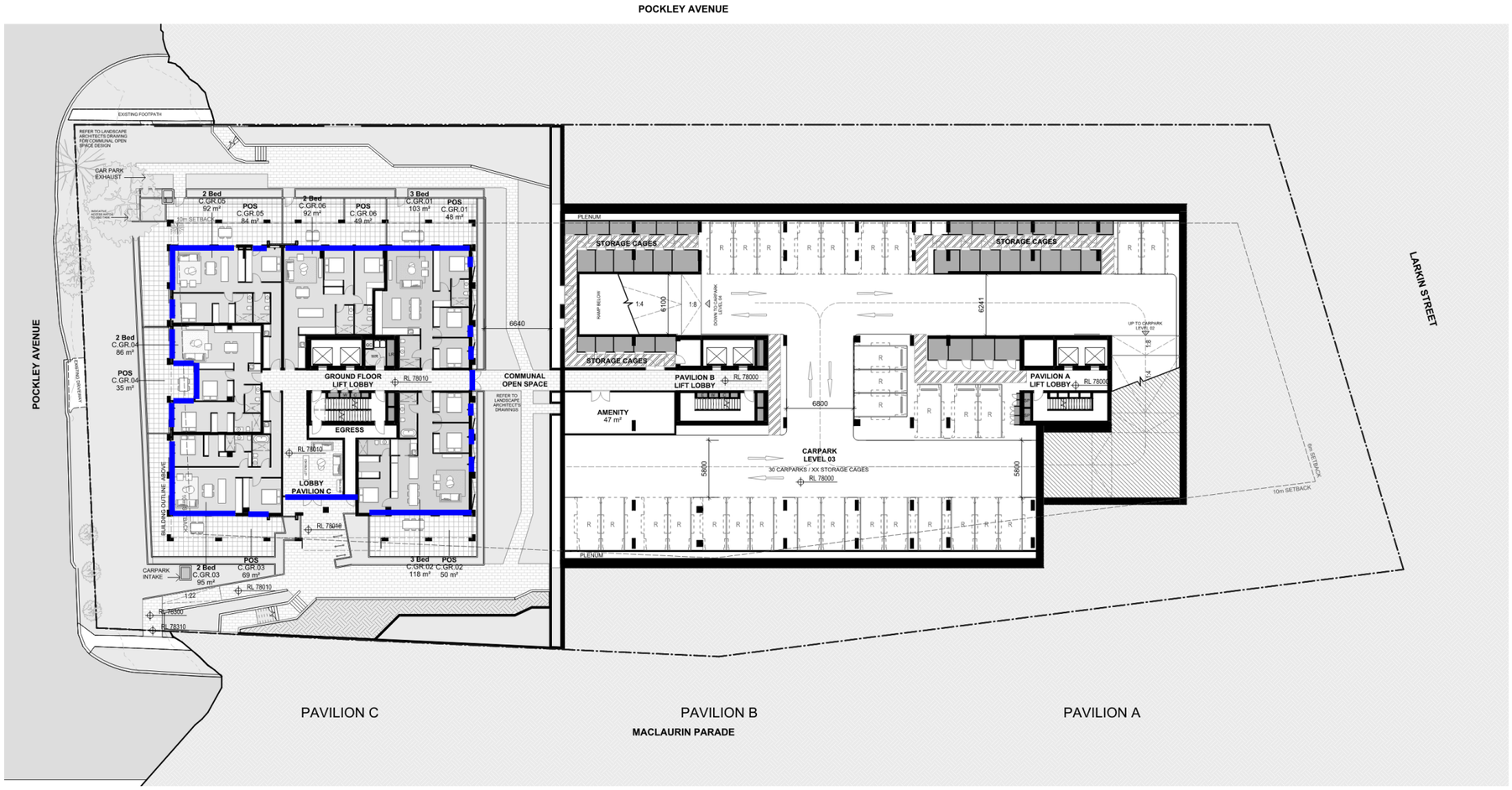
0 10 20 40 60 80 m

PROJECT NUMBER: 301351697

CONSULTANT: Stantec

CLIENT: AQUALAND

Appendix C Preliminary Glazing Mark-ups



LEGEND:

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: min. Rw 35 windows

Stantec

Recent revision history

#	Status	Description	Date

FOR INFORMATION ONLY - SSDA CHANGES

Date generated 27/08/2025 10:50:31 AM

LEGEND

LR - LOBBY RELIEF
SP - STAIR PRESSURIZATION
GE - GARBAGE EXHAUST
C - COMM CUPBOARD
E - ELECTRICAL CUPBOARD
KE - KITCHEN EXHAUST
CE - CARPARK EXHAUST
HR - HYDRAULIC RISER
F - FIRE EXTINGUISHER
FCR - FIRE CONTROL ROOM
FHR - FIRE HOSE REEL
W - WATER METER
GM - GAS METER
GC - GARBAGE CHUTE
WR - WASTE ROOM

Project: Pockley Avenue

Client: Aqualand Prestige

Issuer: W–B WOODS BAGOT

Project number: 122021

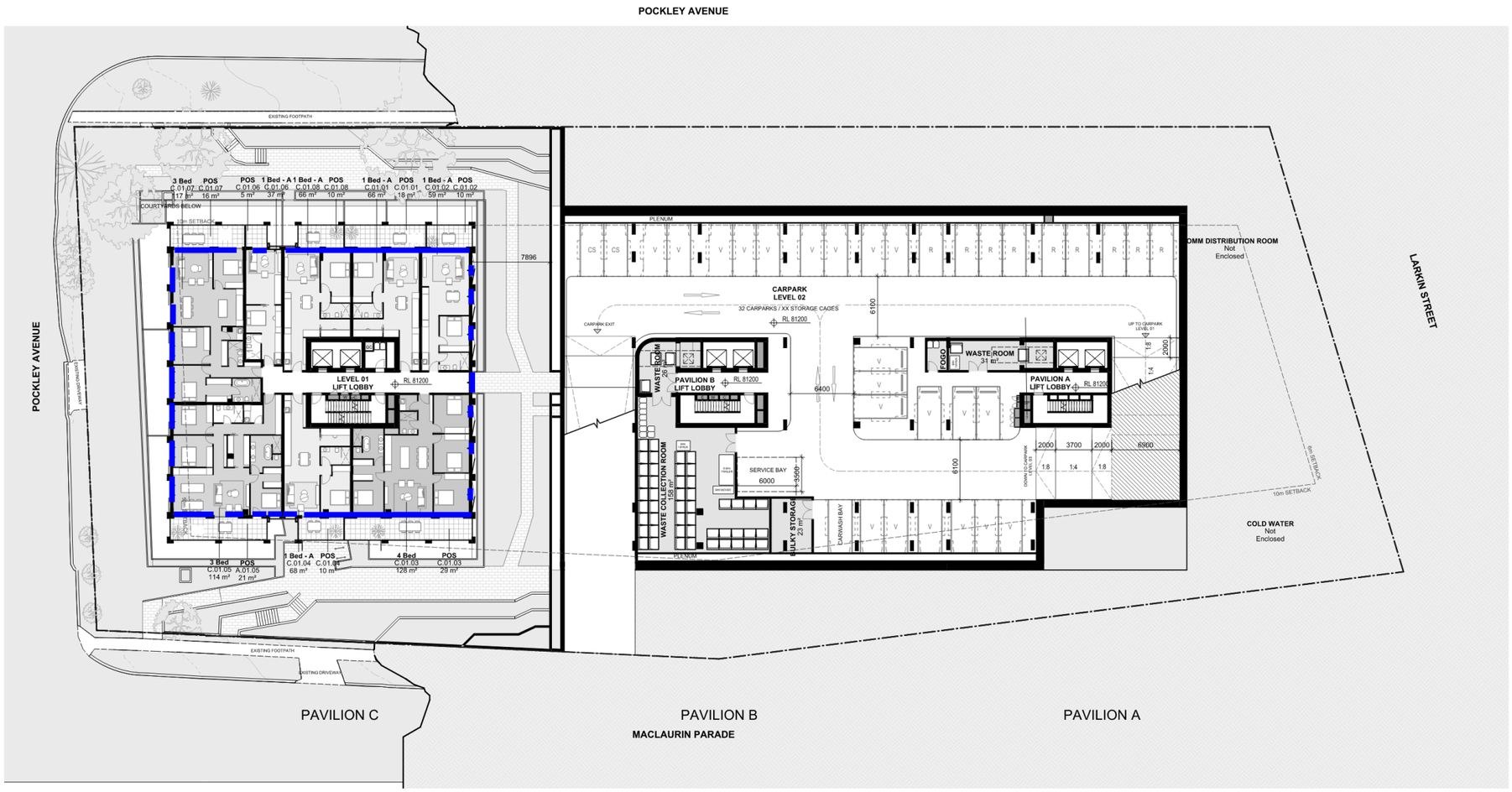
Size check: 25mm

Checked | Approved | Sheet size: A1 | Scale: 1 : 200

Sheet title: Basement 04 Plan

Sheet number: DA-AR-B-22-096 | Revision: B

Status: For Information



LEGEND:

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: min. Rw 35 windows

Stantec

Recent revision history

#	Status	Description	Date
		FOR INFORMATION ONLY - SSDA CHANGES	

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SP - STAIR PRESSURIZATION
GE - GARBAGE EXHAUST
C - COMM CUPBOARD
E - ELECTRICAL CUPBOARD
KE - KITCHEN EXHAUST
CE - CARPARK EXHAUST
HR - HYDRAULIC RISER
F - FIRE EXTINGUISHER
FCR - FIRE CONTROL ROOM
FHR - FIRE HOSE REEL
W - WATER METER
GM - GAS METER
GC - GARBAGE CHUTE
WR - WASTE ROOM

Project: Pockley Avenue

Client: Aqualand Prestige

Issuer: W–B WOODS BAGOT

Project number: 122021

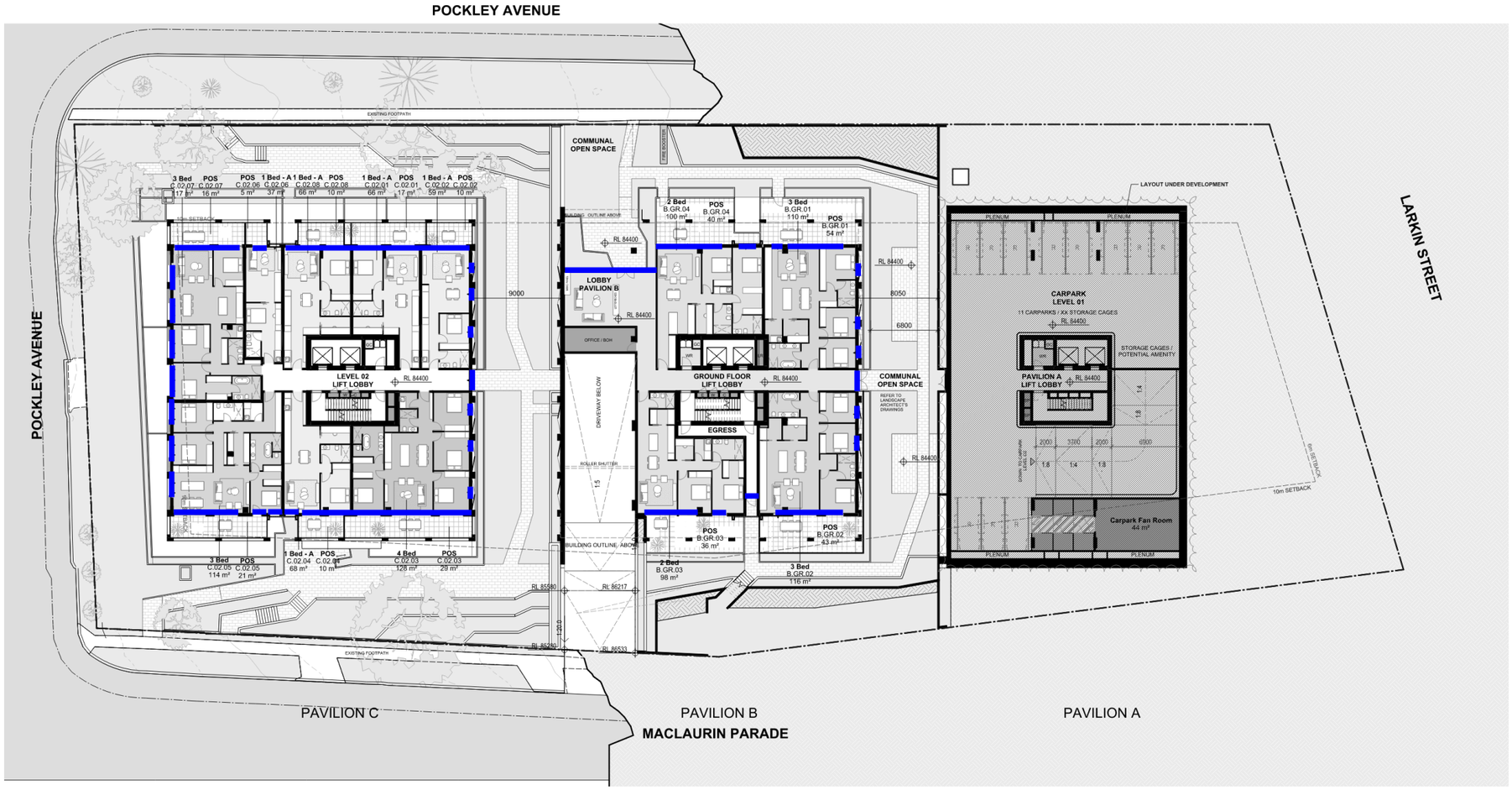
Size check: 25mm

Checked | Approved | Sheet size: A1 | Scale: 1 : 200

Sheet title: Basement 03 Plan

Sheet number: DA-AR-B-22-097 Revision: B

Status: For Information



LEGEND:

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: min. Rw 35 windows

Stantec

Recent revision history

#	Status	Description	Date

FOR INFORMATION ONLY - SSDA CHANGES

Date generated 27/08/2025 10:50:53 AM

LEGEND

LR - LOBBY RELIEF
SP - STAIR PRESSURIZATION
GE - GARBAGE EXHAUST
C - COMM CUPBOARD
E - ELECTRICAL CUPBOARD
KE - KITCHEN EXHAUST
CE - CARPARK EXHAUST
HR - HYDRAULIC RISER

F - FIRE EXTINGUISHER
FCR - FIRE CONTROL ROOM
FHR - FIRE HOSE REEL
W - WATER METER
GM - GAS METER
GC - GARBAGE CHUTE
WR - WASTE ROOM

Project: Pockley Avenue

Client: Aqualand Prestige

Issuer: W–B WOODS BAGOT

Project number: 122021

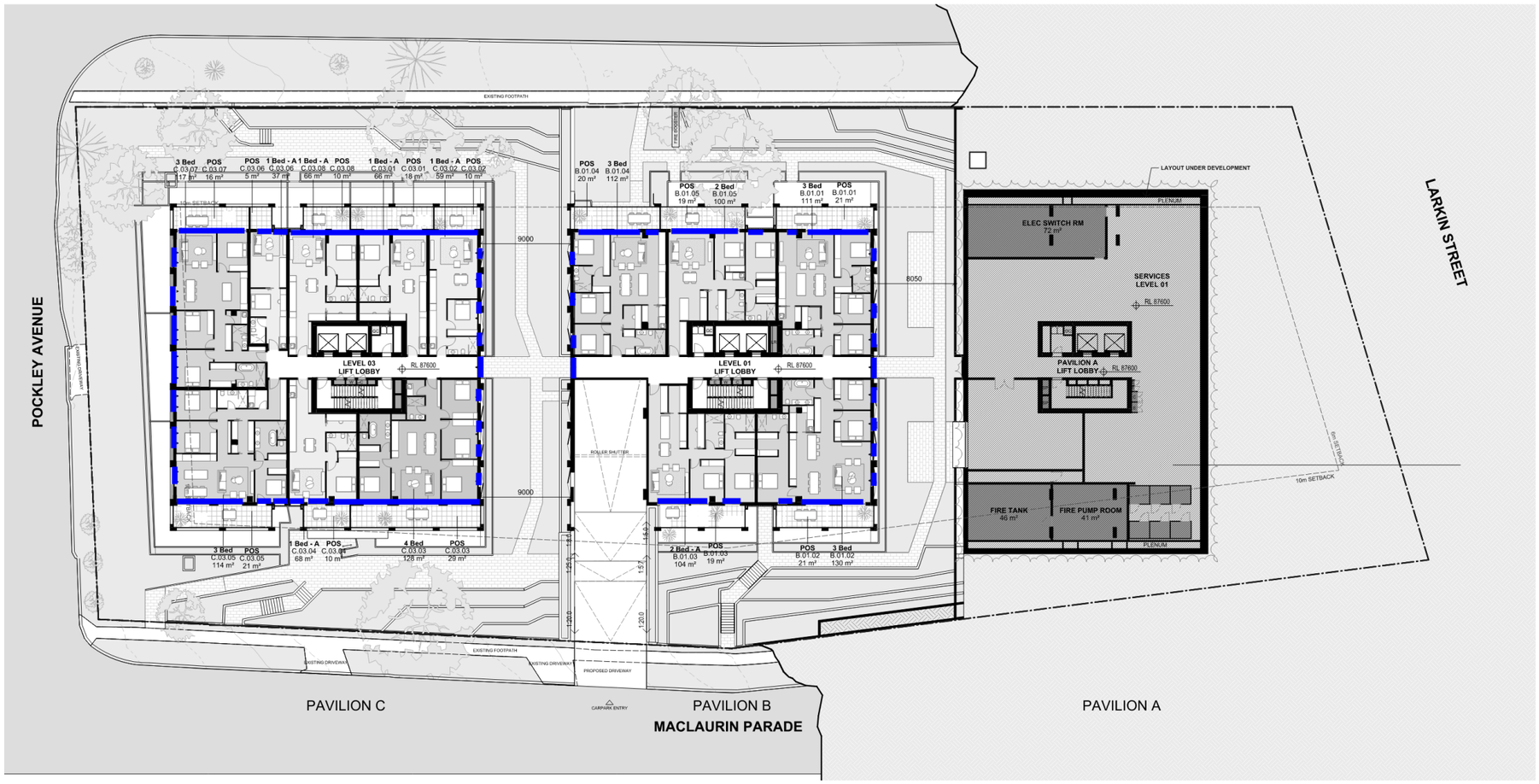
Size check: 25mm

Checked | Approved | Sheet size: A1 | Scale: 1 : 200

Sheet title: Basement 02 Plan

Sheet number: DA-AR-B-22-098 Revision: B

Status: For Information



LEGEND:

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Stantec

Recent revision history

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		FOR INFORMATION ONLY - SSDA CHANGES	

Date generated 27/08/2025 10:51:05 AM

Project: Pockley Avenue

Client: Aqualand Prestige

Issuer: W–B WOODS BAGOT

Project number: 122021

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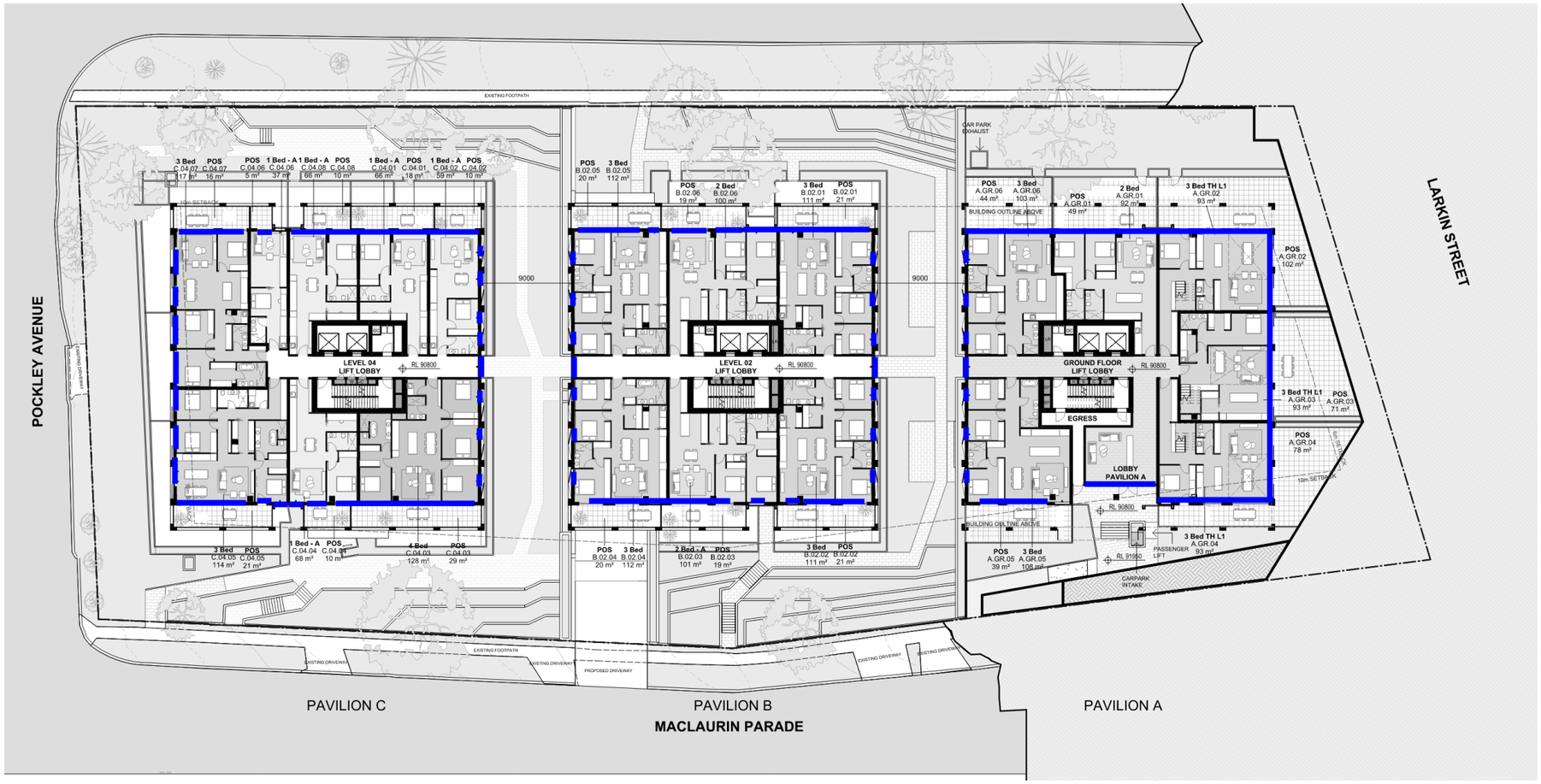
Checked | Approved | Sheet size: A1 | Scale: 1 : 200

Sheet title: Basement 01 Plan

Sheet number: DA-AR-B-22-099 Revision: B

Status: For Information



LEGEND:

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Stantec

Recent revision history

#	Status	Description	Date

FOR INFORMATION ONLY - SSDA CHANGES

Date generated 27/08/2025 10:51:21 AM

Project: Pockley Avenue

Client: Aqualand Prestige

Issuer: W–B WOODS BAGOT

Project number: 122021

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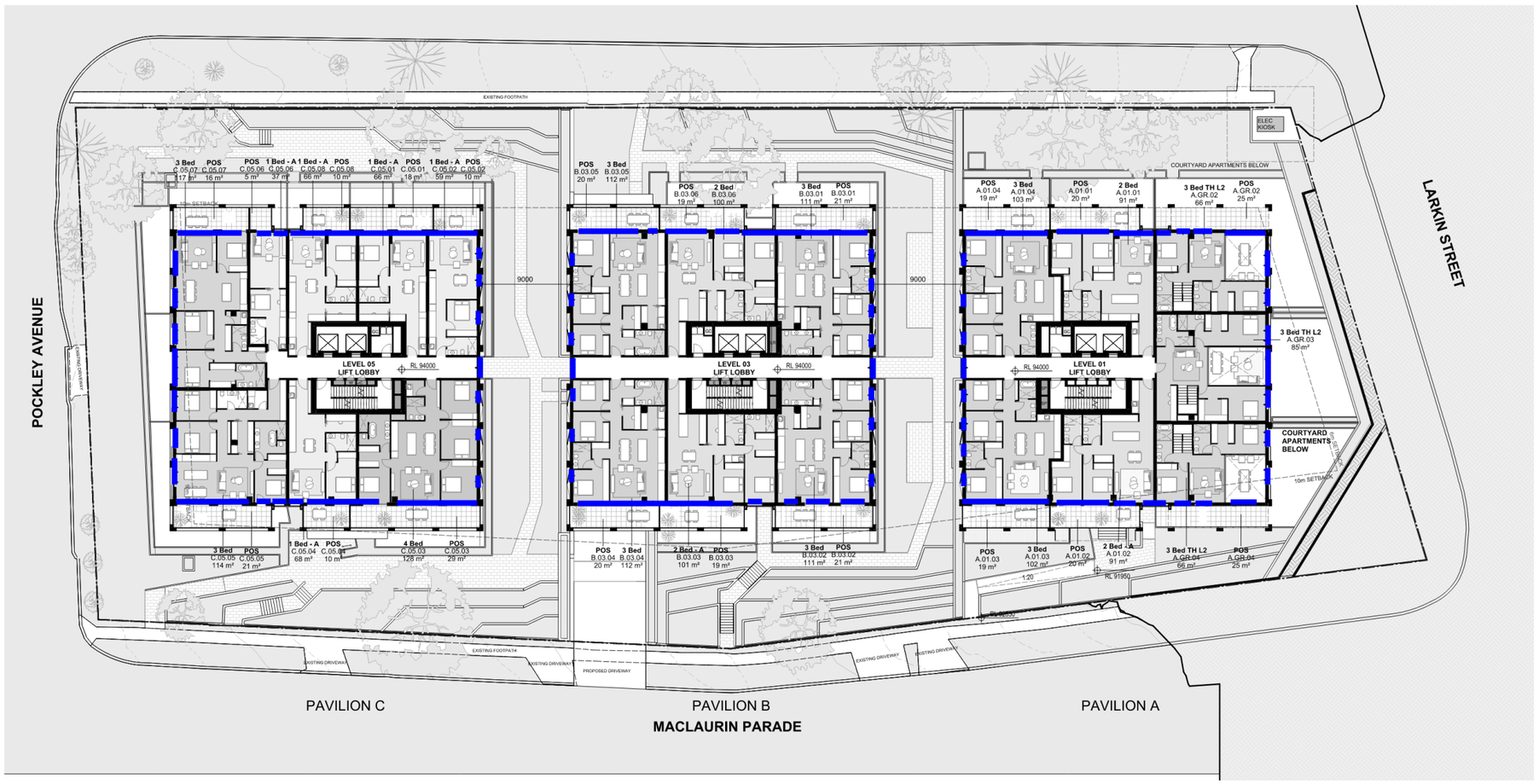
Sheet title: Ground Floor Plan

Sheet number: DA-AR-B-22-100 | Revision: B

Status: For Information



LEGEND:

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Stantec

Recent revision history

#	Status	Description	Date

FOR INFORMATION ONLY - SSDA CHANGES

Date generated 27/08/2025 10:51:37 AM

Project: Pockley Avenue

Client: Aqualand Prestige

Issuer: W–B WOODS BAGOT

Project number: 122021

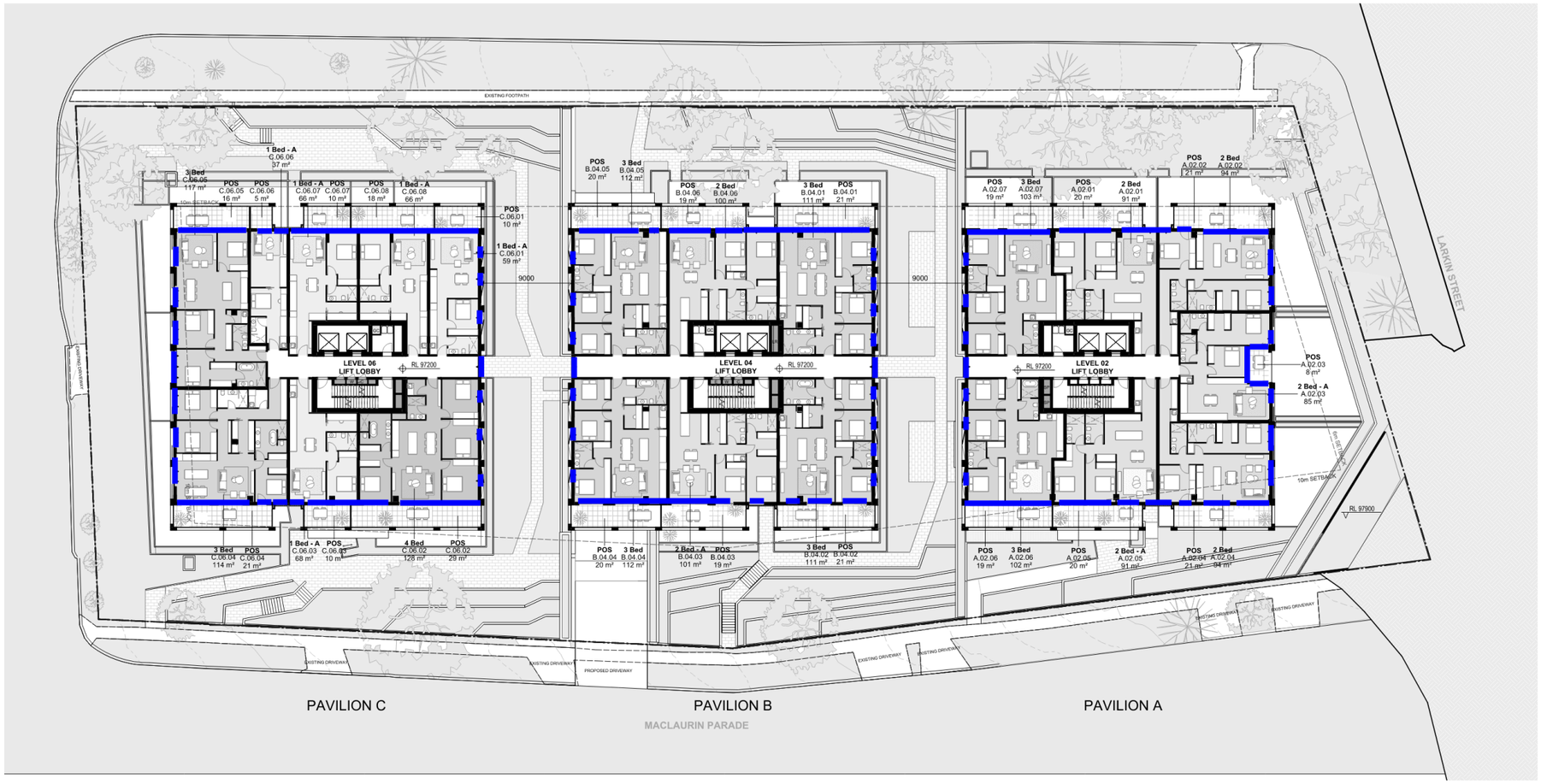
Size check: 25mm

Checked | Approved | Sheet size: A1 | Scale: 1 : 200

Sheet title: Level 01 Plan

Sheet number: DA-AR-B-22-101 | Revision: B

Status: For Information



LEGEND:

: min. Rw 32 windows

: min. Rw 35 windows

Stantec

Recent revision history

#	Status	Description	Date

FOR INFORMATION ONLY - SSDA CHANGES

Date generated 27/08/2025 10:51:57 AM

Notes

Contractor must verify all dimensions on site before commencing work or preparing shop drawings.

Do not scale drawings.

Project: Pockley Avenue

Client: Aqualand Prestige

Issuer: W–B WOODS BAGOT

Project number: 122021

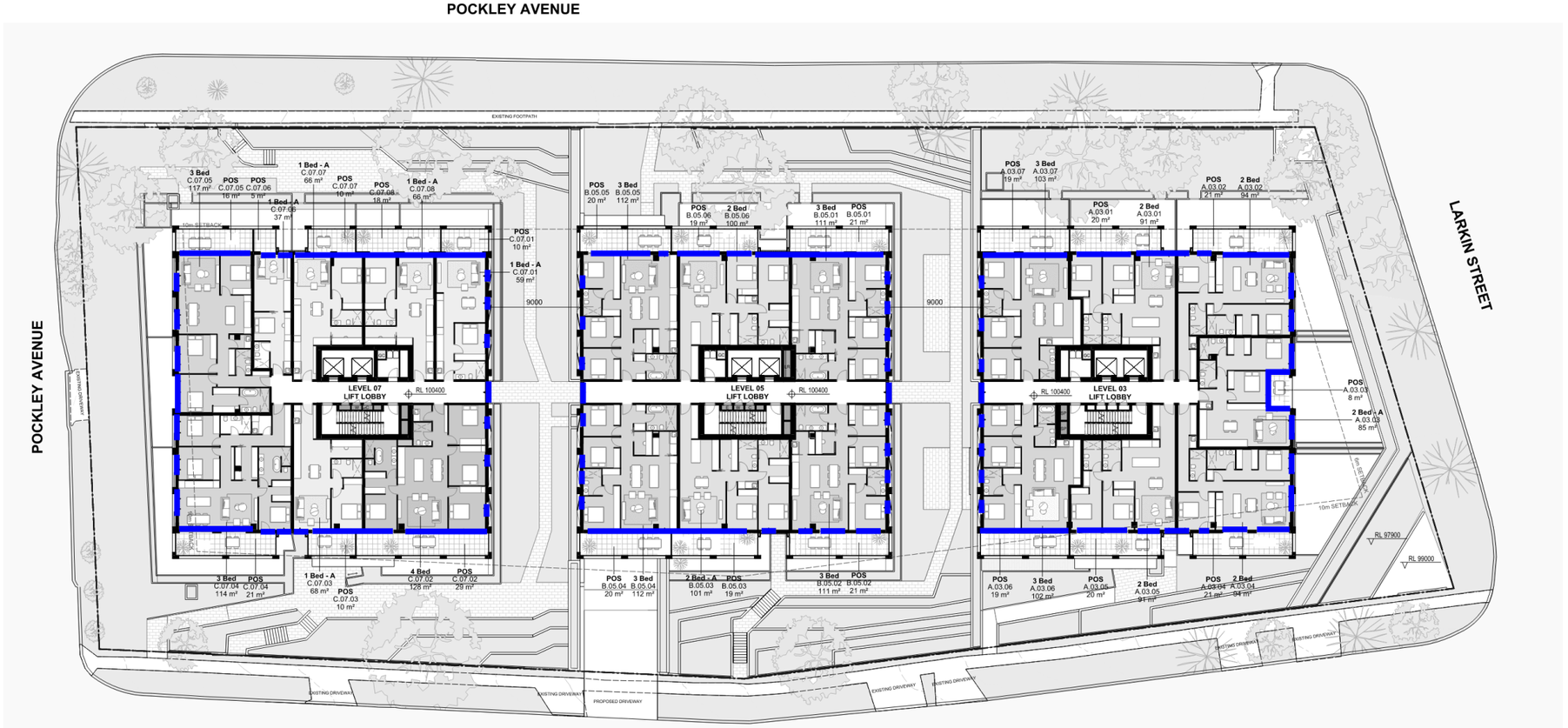
Size check: 25mm

Checked | Approved | Sheet size: A1 | Scale: 1 : 200

Sheet title: Level 02 Plan

Sheet number: DA-AR-B-22-102 | Revision: B

Status: For Information



LEGEND:

: min. Rw 32 windows

: min. Rw 35 windows

Stantec

Recent revision history

#	Status	Description	Date
		FOR INFORMATION ONLY - SSDA CHANGES	

Date generated 27/08/2025 10:52:18 AM

Project: Pockley Avenue

Client: Aqualand Prestige

Issuer: W–B WOODS BAGOT

Project number: 122021

Size check: 25mm

Checked | Approved | Sheet size: A1 | Scale: 1 : 200

Sheet title: Level 03 Plan

Sheet number: DA-AR-B-22-103 | Revision: B

Status: For Information

LEGEND:

: min. Rw 32 windows

: min. Rw 35 windows

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Recent revision history

#	Status	Description	Date
		FOR INFORMATION ONLY - SSDA CHANGES	

Date generated 27/08/2025 10:52:29 AM

Project: Pockley Avenue

Client: Aqualand Prestige

Issuer: W–B WOODS BAGOT

Project number: 122021

Size check: 25mm

Checked | Approved | Sheet size: A1 | Scale: 1 : 200

Sheet title: Level 04 Plan

Sheet number: DA-AR-B-22-104 | Revision: B

Status: For Information

PAVILION C

PAVILION B

PAVILION A

LEGEND:

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: min. Rw 35 windows

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Recent revision history

#	Status	Description	Date
		FOR INFORMATION ONLY - SSDA CHANGES	

Date generated 27/08/2025 10:52:40 AM

Project: Pockley Avenue

Client: Aqualand Prestige

Issuer: W–B WOODS BAGOT

Project number: 122021

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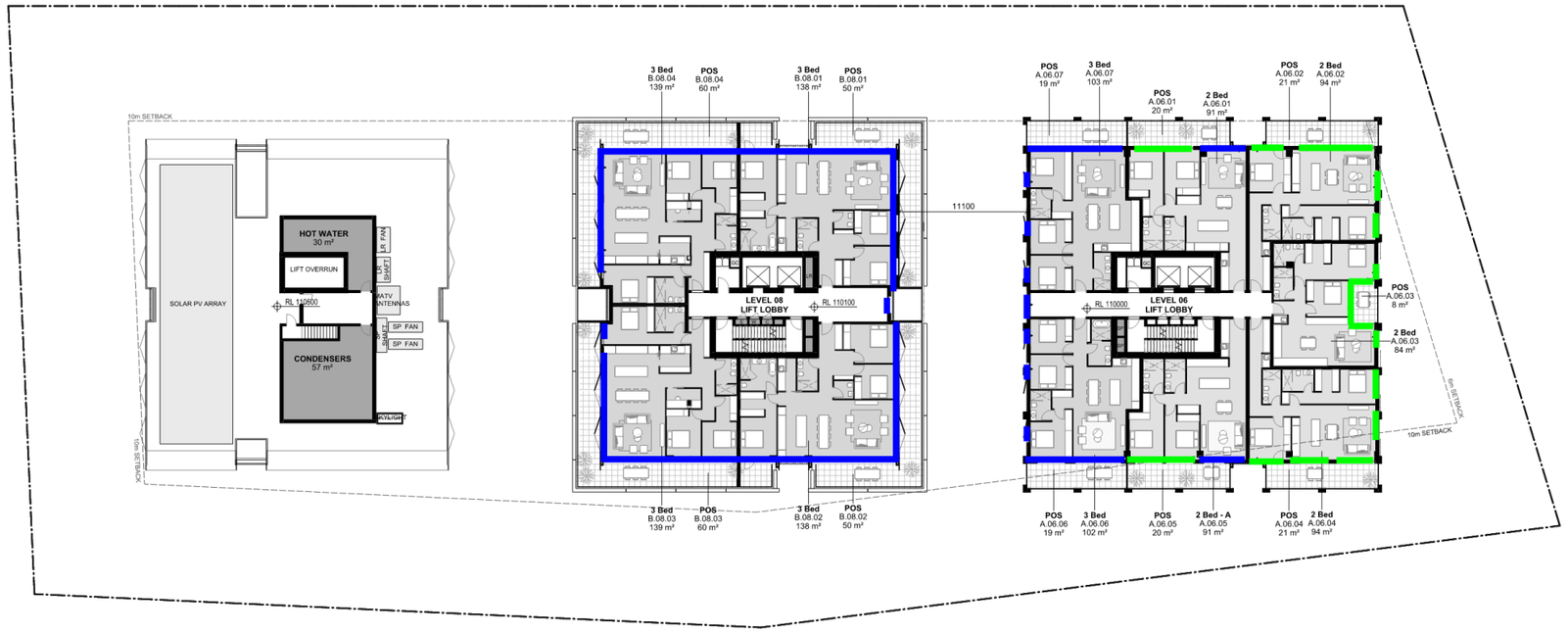
Checked | Approved | Sheet size: A1 | Scale: 1 : 200

Sheet title: Level 05 Plan

Sheet number: DA-AR-B-22-105 | Revision: B

Status: For Information



LEGEND:

: min. Rw 32 windows

: min. Rw 35 windows

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Recent revision history

#	Status	Description	Date
		FOR INFORMATION ONLY - SSDA CHANGES	

Date generated 27/08/2025 10:52:49 AM

Project: Pockley Avenue

Client: Aqualand Prestige

Issuer: W–B WOODS BAGOT

Project number: 122021

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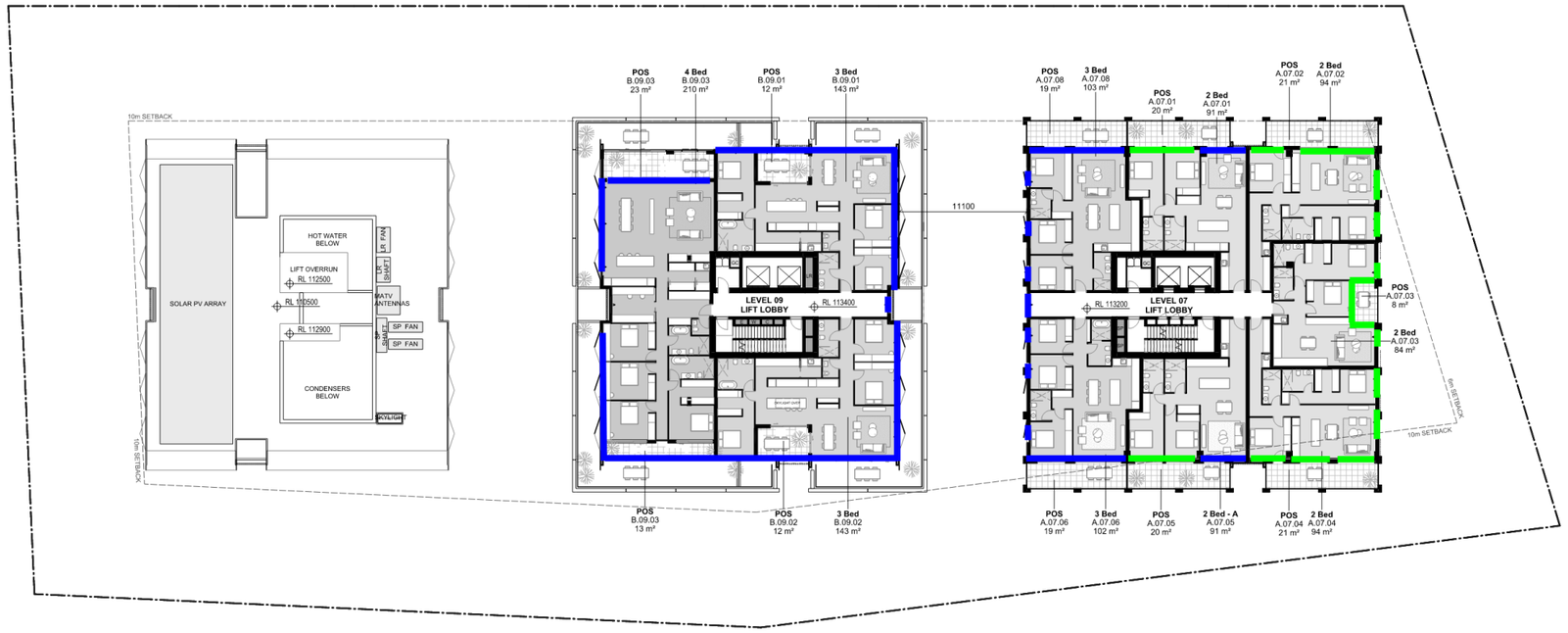
Checked | Approved | Sheet size: A1 | Scale: 1 : 200

Sheet title: Level 06 Plan

Sheet number: DA-AR-B-22-106 Revision: B

Status: For Information



PAVILION C PAVILION B PAVILION A

LEGEND:

: min. Rw 32 windows

: min. Rw 35 windows

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Recent revision history

#	Status	Description	Date
		FOR INFORMATION ONLY - SSDA CHANGES	

Date generated 27/08/2025 10:53:00 AM

Project: Pockley Avenue

Client: Aqualand Prestige

Issuer: W–B WOODS BAGOT

Project number: 122021

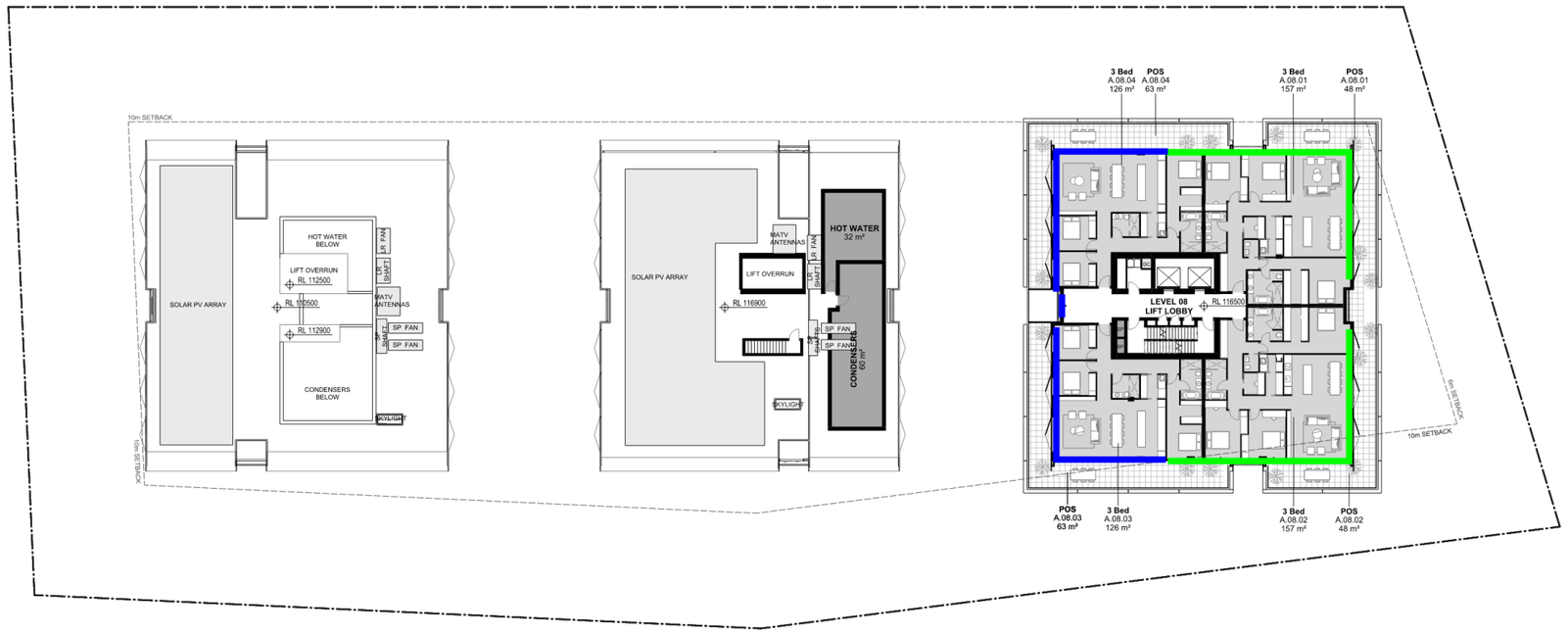
Size check: 25mm

Checked | Approved | Sheet size: A1 | Scale: 1 : 200

Sheet title: Level 07 Plan

Sheet number: DA-AR-B-22-107 Revision: B

Status: For Information



PAVILION C PAVILION B PAVILION A

LEGEND:

: min. Rw 32 windows

: min. Rw 35 windows

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Recent revision history

#	Status	Description	Date

FOR INFORMATION ONLY - SSDA CHANGES

Date generated 27/08/2025 10:53:08 AM

Notes

Contractor must verify all dimensions on site before commencing work or preparing shop drawings.

Do not scale drawings.

Project: Pockley Avenue

Client: Aqualand Prestige

Issuer: W–B WOODS BAGOT

Project number: 122021

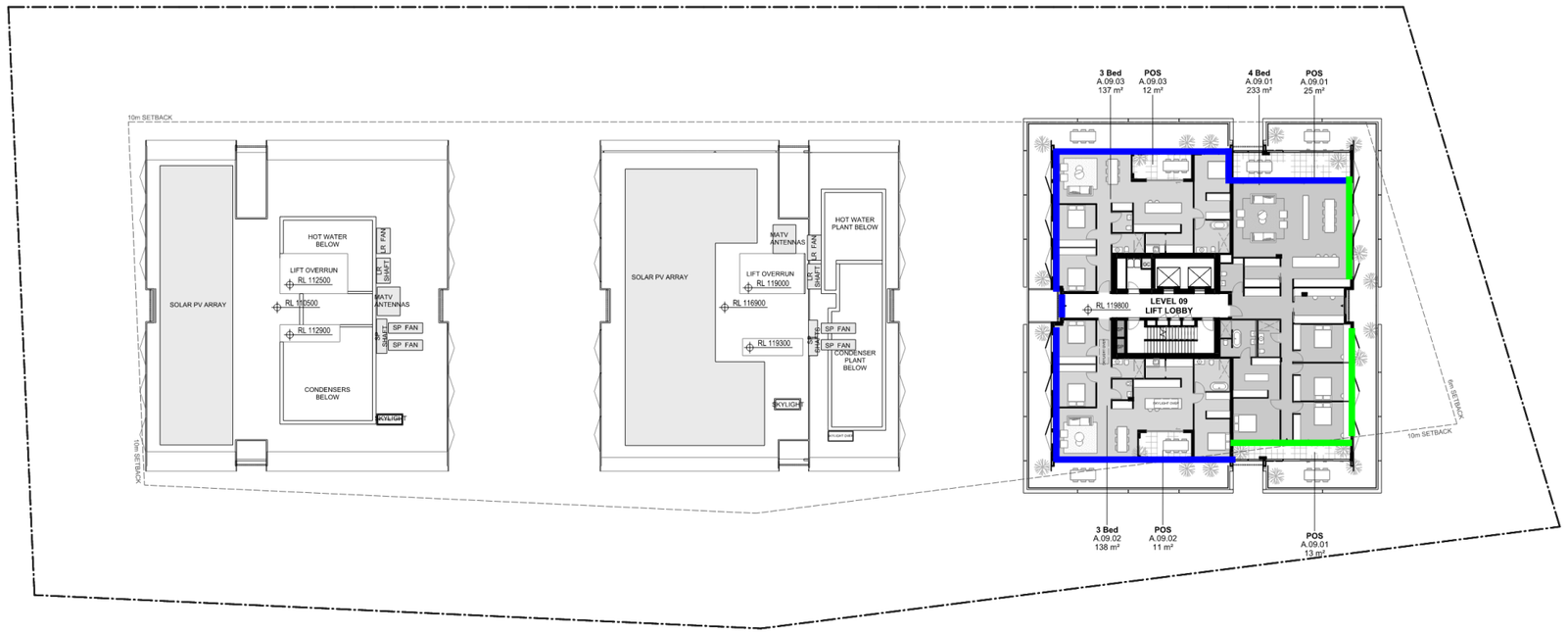
Size check: 25mm

Checked | Approved | Sheet size: A1 | Scale: 1 : 200

Sheet title: Level 08 Plan

Sheet number: DA-AR-B-22-108 Revision: B

Status: For Information



LEGEND:

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: min. Rw 35 windows

Stantec

Recent revision history

#	Status	Description	Date

FOR INFORMATION ONLY - SSDA CHANGES

Date generated 27/08/2025 10:53:15 AM

Project
Pockley Avenue

Client
Aqualand Prestige

Issuer
W–B WOODS BAGOT

Project number
122021

Size check
25mm

Checked

Approved

Sheet size
A1

Scale
1 : 200

Sheet title
Level 09 Plan

Sheet number
DA-AR-B-22-109

Revision
B

Status
For Information

Stantec

Stantec is a global leader in sustainable architecture, engineering, and environmental consulting. The diverse perspectives of our partners and interested parties drive us to think beyond what's previously been done on critical issues like climate change, digital transformation, and future-proofing our cities and infrastructure. We innovate at the intersection of community, creativity, and client relationships to advance communities everywhere, so that together we can redefine what's possible.

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