APPENDIX G

Noise Impact Assessment prepared by Stantec

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344 – 350 Ross River Road, Cranbrook

Noise Impact Assessment

10/10/2025

Ref: 301051166

PREPARED FOR:

Hurst Constructions QLD
Attention: Kieran Dee

PREPARED BY:

Marcus Kamppi

Stantec

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

Revision Schedule

Revision No.	Date	Description	Prepared by	Quality Reviewer
P01	08/09/2025	Draft – For review and comment	MK	CE
C01	10/10/2025	Final	MK	CE

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Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

Contents

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

List of Appendices

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

1. Introduction

Stantec Australia Pty Ltd (Stantec) have been engaged by Hurst Constructions QLD (Hurst) to undertake a noise impact assessment for the development application stage (DA) of a residential apartment project. The project site is located at 344 – 350 Ross River Road, Cranbrook QLD 4814 (Lot 1 & 2 RP721729 and Lot 3 SP146326) and is within the City of Townsville (CoT) local government area.

This acoustic services report:

- defines understanding of the existing site and proposed uses of the buildings;
- details noise monitoring and attended measurements undertaken for the project;
- defines acoustic quality standards for the project;
- outlines the acoustic design parameters and goals for various acoustic parameters, including:
    - road traffic noise intrusion; and
    - environmental noise emissions.
- Recommend the design values for the abovementioned parameters for the various spaces, based on the applicable design guidelines discussed in this report.

Each of the acoustical aspects identified have been addressed in this report and recommendations are made to provide a consistent acoustical outcome for the project.

A glossary of terms used in this report is provided in **Appendix A**.

The recommendations made in this report are specific to the building design at the date of issue of this report. The building design is subject to change during the following stages. Where this occurs, the assumptions made to inform the recommendations in the report may no longer be valid; therefore, further advice should be sought to ensure that the acoustic outcomes presented in this report are achieved.

The performance of products referred to in this report are made to meet the acoustic requirements only. It does not consider other aspects, including but not limited to thermal, wind, impact, structural, mechanical, national construction code, security and fire requirements. Relevant discipline reports, drawings and specifications should be referred to for conformance.

This report relates to this specific project and must not be applied to any other project without prior consultation with Stantec. Designs and conditions can vary between projects causing significant variations in acoustic performance and relevant subsequent advice to one project may not apply to another.

This report shall not be relied upon as providing any warranties or guarantees of construction quality regarding acoustics.

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Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

2. Background

2.1 Regulations, Policies, Standards and Guidelines

The following documents detailed in **Table 1** are relevant to the project and are referred to throughout this report.

Table 1: Applicable Regulations, Policies, Standards and Guidelines referenced in this report

Title	Abbreviation
STATE LEGISLATION AND LOCAL COUNCIL POLICIES	
Queensland Environmental Protection Act 1994	EPA 1994
Queensland Environmental Protection (Noise) Policy 2019	EPP 2019
Townsville City Plan 2014 (Version 2024/01)	TCC 2014
Queensland Government State Development Assessment Provisions SDAP v3.3 – *State Code 1– Development in a state-controlled road environment*	SDAP SC1
Queensland Development Code Mandatory Part 4.4 – *Buildings in a Transport Noise Corridor* Version 1.1 (published 17 August 2015 from Department of Housing and Public Works)	QDC MP4.4
AUSTRALIAN AND INTERNATIONAL STANDARDS	
Australian Standard AS 1055:2018 *Acoustics – Description and measurement of environmental noise*	AS 1055
International Standards Organization 9613-2:2014 *Attenuation of sound during propagation outdoors – Part 2: General method of calculation*	ISO 9613
GUIDELINES	
Department of Transport and Main Roads (TMR) – Transport Noise Management Code of Practice 2013 Volume 1 – Road Traffic Noise	TMR CoP
UK Department of Transport Welsh Office *Calculation of Road Traffic Noise* 1988	CoRTN

2.2 Study Inputs

Acoustic assessment and the preparation of this report have been conducted based on the received documentation detailed in **Table 2**.

Table 2: Received documentation

Date Received	Detail	Revision / Date Prepared	Prepared By	Format
05/10/2025	Architectural drawings package: • *251003_344-350 ROSS RIVER ROAD_DA WIP SET*	Various / 12/09/2025	Counterpoint Architecture	pdf

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

3. Project Overview

3.1 Site Description

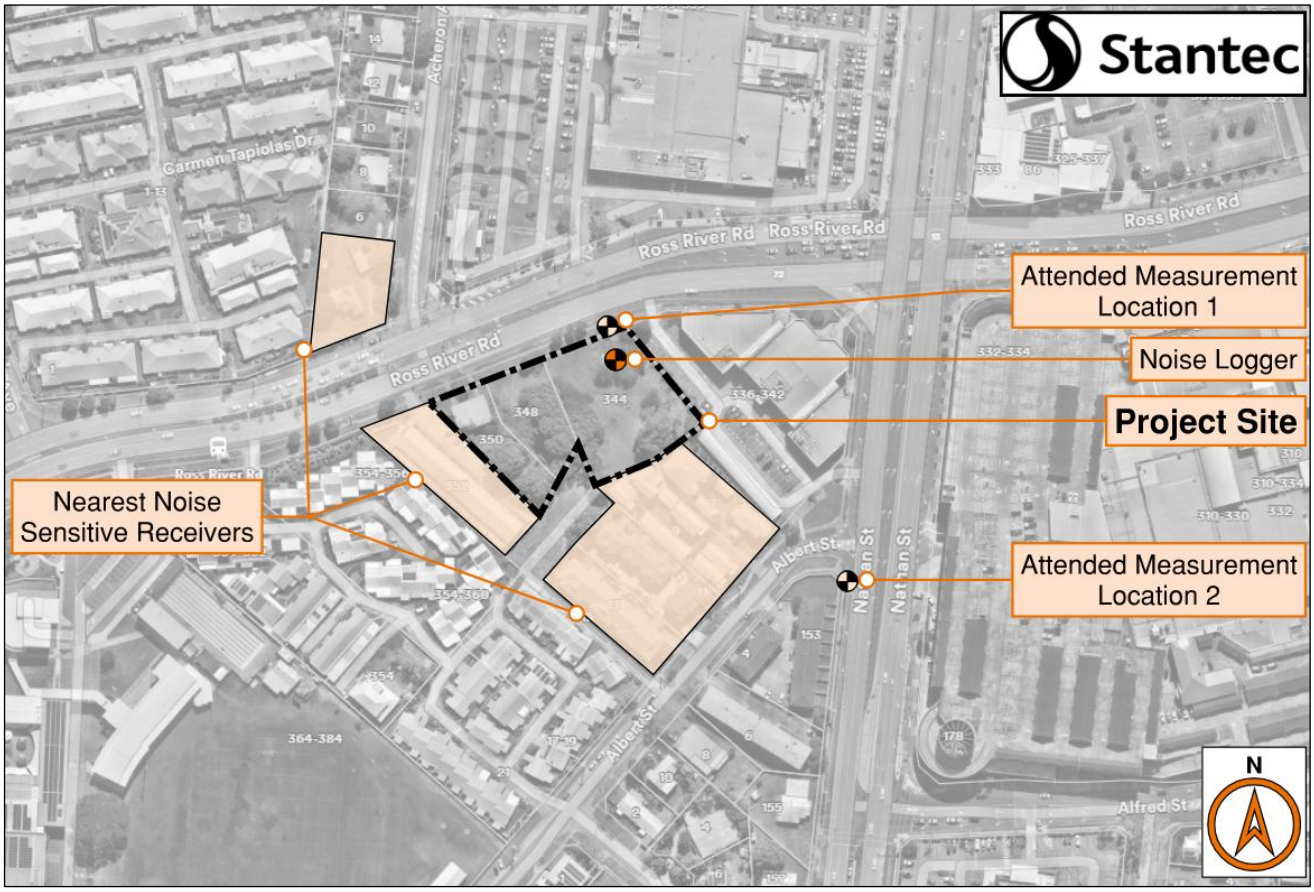
3.1.1 Project Location

The project site is located at 344 – 350 Ross River Road, Cranbrook QLD 4814 (Lot 1 & 2 RP721729 and Lot 3 SP146326) and is within the City of Townsville. The site is bound by:

- **NORTH:** Ross River Road which separates the site from a mix of residential and commercial uses.
- **EAST:** Commercial offices.
- **SOUTH / WEST:** Existing residential uses including townhouses and apartments.

The project site, surrounding areas and noise measurement locations are detailed in **Figure 1**.

Figure 1: Project site, surrounding land uses and noise measurement locations



Source: Nearmap (image dated 12/07/2025 – link) | Annotations by Stantec

3.1.2 Surrounding Land Uses / Zoning

The Townsville City Plan interactive mapping (link) was reviewed to determine zoning of the site and surrounding lots (see **Figure 2**). The following was identified:

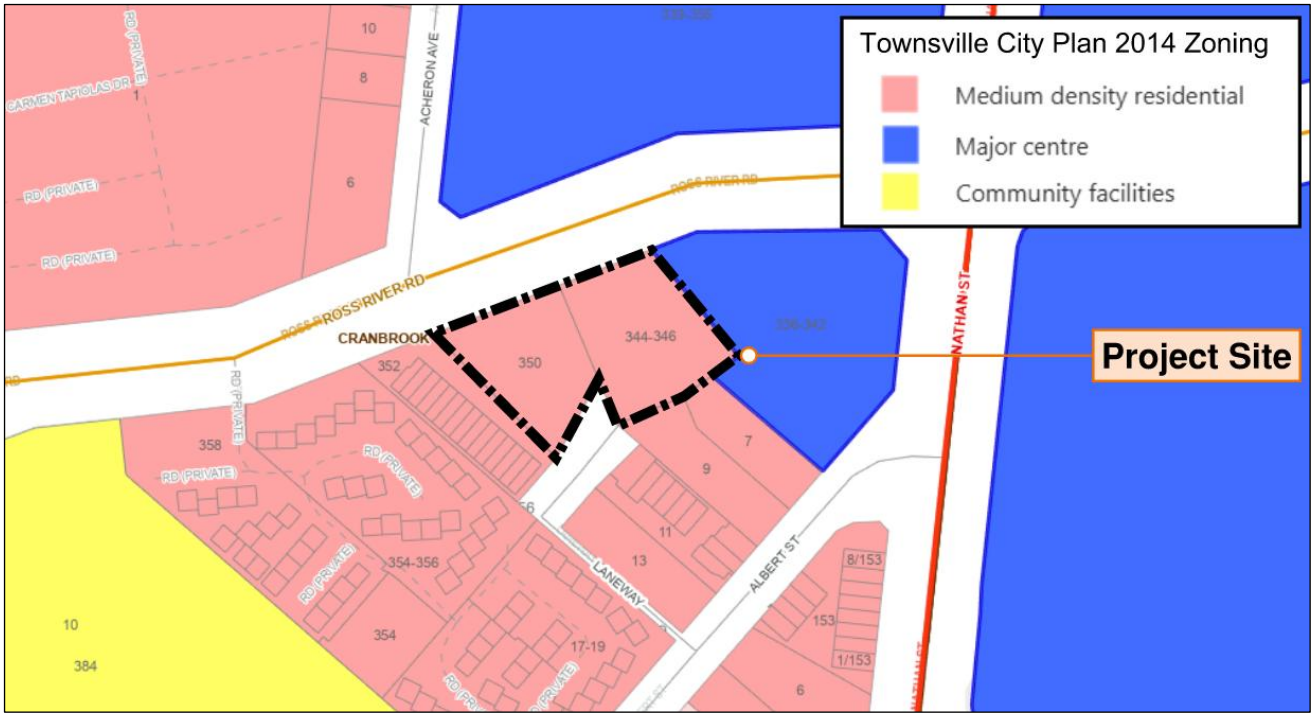
- The project site is zoned Medium density residential;
- Existing land uses surrounding the project site generally consist of the following zoning;

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

- Medium density residential;
- Major centre; and
- Community facilities.

- The nearest noise sensitive receptors to the project site are located at:
  - North: 357 Ross River Road, Cranbrook 4814;
  - South: 7 – 13 Albert Street, Cranbrook 4814; and
  - West: 352 Ross River Road, Cranbrook 4814.
- The proposed development is located within;
  - 25 m of a State Transport Corridor and Transport Noise Corridor – State-controlled Roads (mandatory) contours up to Category 3: 68 dB(A) ≤ 73 dB(A) (see **Figure 3** and **Figure 4**, respectively).
- The proposed development is not located within;
  - Aircraft Noise Exposure Forecast (ANEF) contours;
  - Transport Noise Corridors – Rail contours; or
  - Transport Noise Corridors – State-controlled Roads (voluntary) contours.

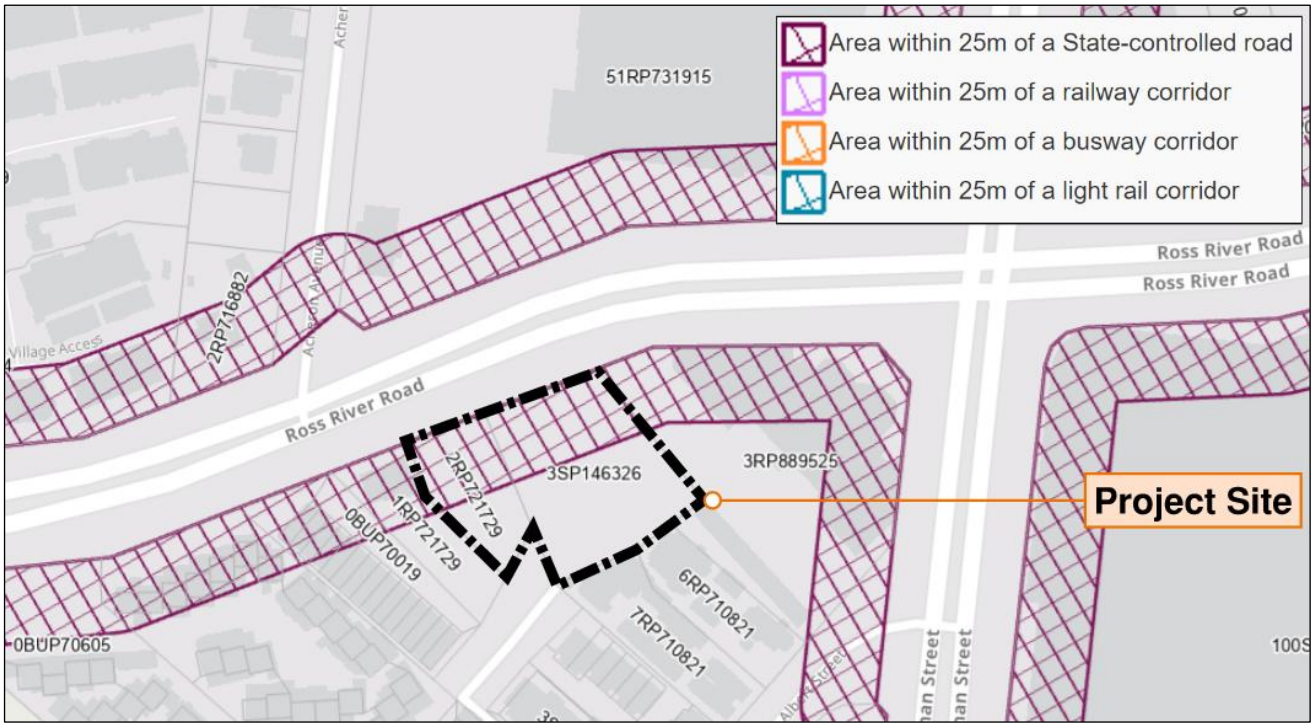
Figure 2: Land use / zoning surrounding the project site



Source: TownsvilleMAPS (link) (accessed 27/08/2025) | Annotations by Stantec

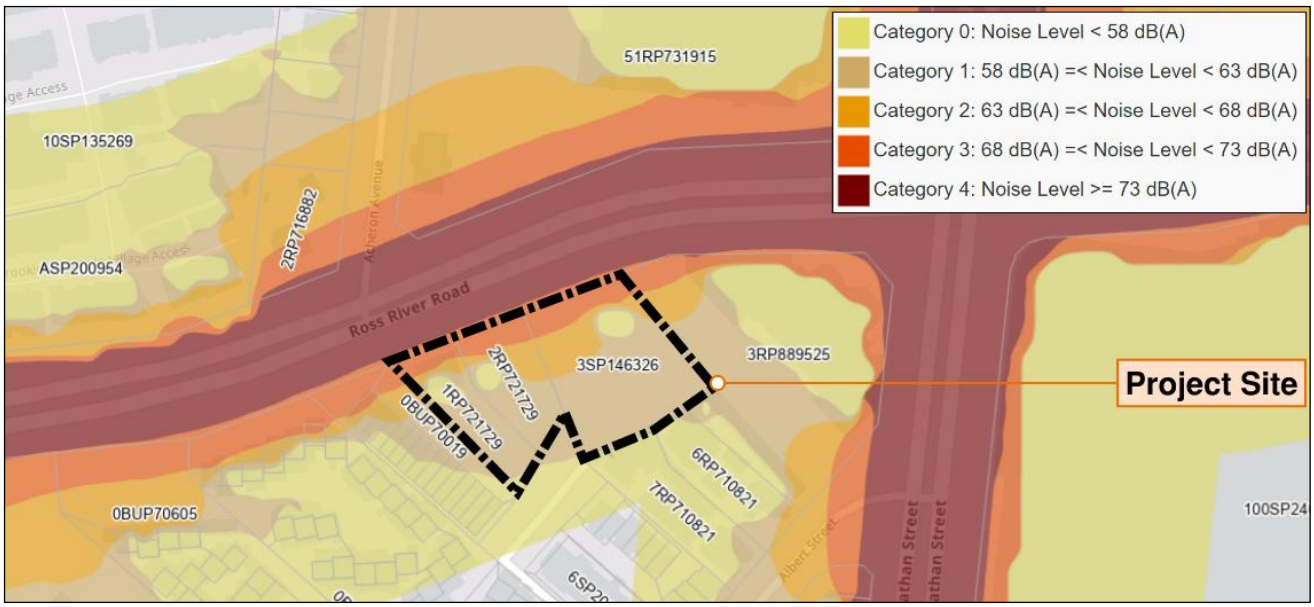
Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

Figure 3: Project location shown within 25 m of a state-controlled road



Source: QLD Government Development Assessment Mapping System (accessed 27/08/2025) | Image compiled by Stantec

Figure 4: Project location shown in context with Transport noise corridors – State-controlled road (mandatory)



Source: QLD Government State Planning Policy Interactive Mapping System (accessed 27/08/2025) | Image compiled by Stantec

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

3.2 Proposed Development

Based on the architectural documentation received (refer to **Table 2**) the project site will include two (2) residential apartment buildings which will yield 81 apartments across levels 1 - 4. The ground level is reserved for an office, carparking, secure bicycle parking, wash bay and a refuse storage / collection area.

A road corridor laneway that exits to Albert Street is proposed adjacent to the site boundary. An acoustic assessment of car and waste vehicle movements along this laneway was completed despite not being within the site boundary.

3.3 Existing Acoustic Environment

To quantify the existing noise environment on site and specify noise limits, unattended noise monitoring (noise logging) was conducted from 25th August 2025 to 1st September 2025 (inclusive).

The location of the noise monitoring location has been shown in **Figure 1**.

Noise measurements were conducted following guidance from Australian Standard AS 1055:2018 – *Acoustics – Description and measurement of environmental noise* (AS 1055), and the instruments were configured as follows:

- A-weighting frequency response;
- FAST time response; and
- 15-minute intervals.

The sound level meter was calibrated before and after the measurement period. The instrument showed a drift less than ±1 dB during the course of monitoring; therefore, measurements are considered valid according to AS 1055.

A summary of the average unattended noise levels recorded are presented in **Table 3**. For further details and full measured results, refer to **Appendix B**.

Table 3: Summary of relevant noise descriptors used to determine noise limits and inform acoustic assessment

Monitoring Location	Rating Background Level, dB(A)			Background Noise Level, $L_{90,T}$ dB(A)			Equivalent Continuous Noise Level, L_{eq} dB(A)			Road Traffic Noise Levels		
	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	$L_{10,18h}$ (6am-12am)	$L_{90,18h}$ (6am-12am)	$L_{90,8h}$ (10pm-6am)
See Figure 1	51	49	44	53	50	47	61	60	56	62	52	46

NOTES:

1) Day – 7 AM-6 PM | Evening – 6 PM-10 PM | Night – 10 PM-7 AM

3.3.1 Attended Noise Measurements

Attended noise measurements conducted at the project site on the 25/08/2025 (see location in **Figure 1**). Measurements were conducted between 10:00 AM and 1:30 PM with the primary intent being to provide additional reference points to assist in troubleshooting potential issues with model validation.

Measurements were conducted in accordance with the "*Shortened measurement procedure*" as outlined by the UK Department of Transport Welsh Office *Calculation of Road Traffic Noise* 1988 (CoRTN). CoRTN states;

> *Measurements of L_{10} are made over any three consecutive hours between 1000 and 1700 hours. Using L_{10} (3-hour) as the arithmetic mean of the three consecutive values of hourly L_{10}, the current value of L_{10} (18-hour) can be calculated from the relation:*
>
> $$L_{10}\ (18\text{-hour}) = L_{10}\ (3\ \text{hour}) - 1\ dB(A)$$

The data obtained from the measurements has been provided in **Table 4**. These measurements were used as a reference only with model verification based on long term noise measurements provided by the logger.

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

Table 4: Average traffic count and measured noise level data

ID	Road	Time Period	Vehicle Counts Recorded (both directions)			Measured $L_{10,1hr}$ dB(A)	Calculated	
			Cars	Trucks	% HV		$L_{10,3hr}$ dB(A)	$L_{10,18hr}$ dB(A)
000	Ross River Road	10:15 AM – 10:30 AM	355	14	3.8	67	66.8	65.8
002		11:30 AM – 11:45 AM	380	11	2.8	67		
004		12:45 PM – 1:00 PM	320	12	3.6	67		
001	Nathan Street	11:00 AM – 11:15 AM	533	34	6.0	75	73.8	72.8
003		12:15 PM – 12:30 PM	497	29	5.5	73		
005		1:15 PM – 1:30 PM	498	29	5.5	74		

3.4 Acoustic Design Issues and Considerations

Based on the review of initial design documentation, noise measurement data and site observations, the following acoustic design issues have been identified:

- The project site is exposed to transport generated noise associated with Ross River Road and Nathan Street. Given the level of noise measured, the proposed development will require significant treatments to the building envelope in order to comply with Queensland Development Code Mandatory Part 4.4 (QDC MP4.4). To minimise costs it is recommended that glazing and other openable elements along the northern façade of the development are minimised as far as practicable.
- Noise emissions from onsite activities (carparking, waste collection etc.) and mechanical plant will need to comply with the criteria outlined by the Townsville City Plan (where applicable), EPA 1994 and EPP 2019.
- The Nathan Business Centre is located at 340 Ross Rover Road adjacent to the site. Noise emissions from this site are not expected to require additional acoustic treatment for onsite receivers as:
    - Businesses in this building generally operate during the daytime hours when background noise levels are elevated due to Ross River Road and Nathan Street.
    - The minimum QDC MP4.4 façade treatments required to address road traffic noise intrusion are expected to be sufficient to attenuate carpark noise emissions from the business centre.

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

4. Acoustic Criteria

4.1 Environmental Noise Emissions

4.1.1 Townsville City Plan 2014

The Townsville City Plan 2014 (TCC 2014) requires developments to be designed to maintain the expected level of amenity for the area where they are constructed.

The applicable assessment codes for the proposed multiple dwelling development are stated in Table 5.5.2 – Medium density residential zone and are proved below:

- 6.2.2 Medium density residential zone code
- 9.3.2 Healthy waters code
- 9.3.3 Landscape code
- 9.3.5 Transport impact, access and parking code
- 9.3.6 Works code

A summary of the acoustic-related performance and acceptable outcomes defined under the above codes and applicable to the development are provided in **Table 5**.

Table 5: Acoustic related performance and acceptable outcomes (TCC 2014)

6.2.2 Medium density residential zone code - Table 6.2.2.3(a)	
Performance outcomes	**Acceptable outcomes**
PO4 Development minimises impacts on surrounding land and provides for an appropriate level of amenity within the site, having regard to: a. Noise.	No acceptable outcome is nominated.
P09 Air conditioning units are insulated so that adjoining properties are not affected by the noise source and are not significantly visible from the street.	No acceptable outcome is nominated.
9.3.5 Transport impact, access and parking code - Table 9.5.5.3	
Performance outcomes	**Acceptable outcomes**
PO28 Servicing arrangements minimise any adverse impact on the amenity of premises in the vicinity, having regard to operating hours, noise generation, proximity to sensitive uses, odour generation and dust.	No acceptable outcome is nominated.
9.3.6 Works code – Table 9.3.6.3	
Performance outcomes	**Acceptable outcomes**
PO28 Earthworks do not cause significant impacts through truck movements, dust or noise on the amenity of the locality in which the works are undertaken or along routes taken to transport the material and the transportation of materials minimises adverse impacts on the road network	**AO28** Earthworks are undertaken in accordance with the Development manual planning scheme policy no. SC6.4 - SC6.4.7.4 Earthworks Construction and SC6.4.23.1 Construction Management.
PO34 Construction work is undertaken in a manner which does not cause unacceptable impacts on surrounding areas as a result of dust, odour, noise or lighting.	No acceptable outcome is nominated. **Editor's note**—Applicants should refer to the Development manual planning scheme policy no.SC6.4 for assistance in complying with this outcome.

As no criteria is provided for development acceptable outcomes, it is deemed suitable to apply State policies (EPA 1994 and EPP 2019).

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

4.1.2 Queensland Environmental Protection Act 1994

The objective of the Queensland Environmental Protection Act 1994 (EPA 1994) is *"to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends."*

To uphold this intent, and of relevance to acoustic assessment for the project, the EPA 1994 defines a series of noise-related standards in Chapter 8, Part 3B Offences relating to noise standards. The following sections are considered applicable:

Section 440R Building work

(1) A person must not carry out building work in a way that makes an audible noise—
- *(a) on a business day or Saturday, before 6.30a.m. or after 6.30p.m; or*
- *(b) on any other day, at any time.*

(2) The reference in subsection (1) to a person carrying out building work—
- *(a) includes a person carrying out building work under an owner-builder permit; and*
- *(b) otherwise does not include a person carrying out building work at premises used by the person only for residential purposes.*

Section 440U Air-conditioning equipment

(1) This section applies to premises at or for which there is air-conditioning equipment.

(2) An occupier of the premises must not use, or permit the use of, the equipment on any day:
- *(a) before 7am, if it makes a noise of more than 3dB(A) above the background level [1]; or*
- *(b) from 7am to 10pm, if it makes a noise of more than 5dB(A) above the background level; or*
- *(c) after 10pm, if it makes a noise of more than 3dB(A) above the background level.*

4.1.3 Environmental Protection (Noise) Policy 2019

The Queensland Environmental Protection (Noise) Policy 2019 (EPP 2019) identifies environmental values to be enhanced or protected, states acoustic quality objectives, and provides a framework for making decisions about the acoustic environment.

Schedule 1 Acoustic Quality Objectives

The acoustic quality objectives are stated in Section 7 of Schedule 1 of the EPP 2019. In accordance with EPP 2019, the acoustic quality objectives are stated for a defined type of noise sensitive use and specified period of the day (reproduced in **Table 6**). The environmental values which EPP 2019 aims to enhance or protect are also stated. It is intended that the acoustic quality objectives be progressively achieved as part of achieving the purpose of EPP 2019 over the long term.

Table 6: Acoustic quality objectives as defined in Schedule 1 of the EPP 2019

Sensitive Receptor	Time of Day	Acoustic Quality Objectives [1)] (measured at the receptor) dB(A)			Environmental Value
		$L_{Aeq,adj,1hr}$	$L_{A10,adj,1hr}$	$L_{A1,adj,1hr}$	
residence (for outdoors)	daytime and evening	50	55	65	health and wellbeing
residence (for indoors)	daytime and evening	35	40	45	health and wellbeing
	night-time	30	35	40	health and wellbeing, in relation to the ability to sleep

NOTES:

1) The $L_{Aeq,Adj,T}$ noise limits apply to all noise sources, whilst the $L_{A10,Adj,1hr}$ and $L_{A1,Adj,1hr}$ only apply to intermittent noise sources (i.e. excludes air conditioning).

[1] *NOTE: According to the EPA 1994:*
- *Background level means the background A-weighted sound pressure level under the prescribed standard measured as $L_{A90,\,T}$.*
- *$L_{A90,T}$ means the A-weighted sound pressure level obtained using time weighting 'F' that is exceeded for 90% of the measuring period (T).*

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

Controlling Background Creep

The Acoustic Quality Objectives provided in EPP 2019 do not consider the existing background noise levels when prescribing the criteria. Since the measured background noise levels are considered high enough to exceed the indoor Acoustic Quality Objectives criteria (i.e., 35 dB(A) day/evening, 30 dB(A) night) after applying a 5 dB(A) façade reduction), Stantec refer to the background creep criteria specified in Schedule 10 of EPP 2008. The Environmental Protection (Noise) Policy 2008 states the following;

(1) To the extent that it is reasonable to do so, noise from an activity must not be—

(a) for noise that is continuous noise measured by $L_{A90,T}$— more than nil dB(A) greater than the existing acoustic environment measured by $L_{A90,T}$; or

(b) for noise that varies over time measured by $L_{Aeq,adj,T}$— more than 5dB(A) greater than the existing acoustic environment measured by $L_{A90,T}$.

Table 7: Intrusive noise limits (for controlling background creep)

Receptor	Background Descriptor (time period)	Intrusive Descriptor	Measured L_{90} dB(A)			$L_{Aeq,adj\ 1hr}$ dB(A)		
			Daytime	Evening	Night	Daytime	Evening	Night
Sensitive Receiver Facade	L_{A90}	$L_{Aeq,adj\ 1hr}$	53	50	47	58	55	52

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

4.2 External Noise Intrusion

4.2.1 QLD State Development Assessment Provisions – State Code 1

As indicated in **Figure 3**, the proposed development site is within 25 m of a state-controlled road; therefore, the provisions of the QLD SDAP State Code 1: *Development in a state-controlled road environment* (SDAP SC1) apply. SDAP SC1 also references the following documents which are of relevance to this acoustic assessment:

- Queensland Development Code Mandatory Part 4.4 – *Buildings in a transport noise corridor* (QDC MP4.4); and
- Department of Transport and Main Roads (TMR) – Transport Noise Management Code of Practice 2013 Volume 1 – Road Traffic Noise (TMR CoP);

The applicable performance outcomes and acceptable outcomes are defined in Table 1.5 of SDAP SC1 and are reproduced in **Table 8** below. Noise barriers are suitable to attenuate noise at ground floor communal areas, but given the project consists of a multistorey accommodation building, they are considered impractical for the reduction of façade noise levels. Therefore, acoustic treatment of the building will be based on the requirements of QDC MP4.4.

Table 8: SDAP SC1 applicable Performance and Acceptable Outcomes

Performance Outcomes	Acceptable Outcomes
Material change of use (accommodation activity)	
Above ground floor level requirements (accommodation activity) adjacent to a state-controlled road or type 1 multi-modal corridor	
PO42 Balconies, podiums, and roof decks include: 1. a continuous solid gap-free structure or balustrade (excluding gaps required for drainage purposes to comply with the Building Code of Australia); 2. highly acoustically absorbent material treatment for the total area of the soffit above balconies, podiums, and roof decks.	No acceptable outcome is provided.
PO43 Habitable rooms (excluding a relevant residential building or relocated building) are designed and constructed using materials to achieve the maximum internal acoustic level in reference table 3 (item 3.1 (see **Table 11** below)).	No acceptable outcome is provided.

Table 9: Maximum building facade acoustic levels (Table 1 – SDAP SC1)

Applicable use	Acoustic levels
1.1: Accommodation activity	a. ≤ 60 dB(A) L_{10} (18 hour) façade corrected (measured L_{90} (8 hour) free field between 10pm and 6am ≤40 dB(A)) OR b. **≤ 63 dB(A) L_{10} (18 hour) façade corrected (measured L_{90} (8 hour) free field between 10pm and 6am > 40 dB(A))**

Table 10: Maximum free field acoustic levels (Table 2 – SDAP SC1)

Applicable use	Acoustic levels
2.2: Private open space for an accommodation activity (including lots created for a future accommodation activity)	a. ≤ 57 dB(A) L_{10} (18 hour) free field (measured L_{90} (18 hour) free field between 6am and 12 midnight ≤45 dB(A)) OR b. **≤ 60 dB(A) L_{10} (18 hour) free field (measured L_{90} (18 hour) free field between 6am and 12 midnight >45 dB(A))**

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

Table 11: Maximum internal acoustic levels (Table 3 – SDAP SC1)

Applicable use	Acoustic levels
3.1: Habitable rooms in an accommodation activity (excluding uses addressed in QDC MP4.4)	a. ≤ 35 dB(A) L_{eq} (1 hour) (maximum hour over 24 hours)

4.2.2 Queensland Development Code Mandatory Part 4.4

Queensland Development Code Mandatory Part 4.4 (QDC MP4.4) was introduced 31st August 2010 and updated 17th August 2015 in conjunction with planning policy requirements which define planning overlay areas affected by transportation noise as "Transport Noise Corridors".

The purpose of the Code is to ensure habitable rooms of particular residential buildings located in transport noise corridors are designed and constructed to reduce the extent to which transport noise intrudes into those rooms. The Code applies to any building work on certain residential buildings which are subject to a building development application.

The Code applies to residential buildings if it:

i. is class 1, 2, 3 or 4 building; and

ii. is located in a transport noise corridor; and

iii. is not a relocated building; and

iv. building application is made after release of the Code

The Code requires that each external facade of a habitable room be assigned a noise category:

i. which is dependent upon the future noise exposure at the façade presented in mapping of Transport Noise Corridor; or

ii. as defined by a detailed transportation noise assessment (undertaken in accordance with the requirements of Schedule 3 of the Code). The objective of the noise assessment is to clearly demonstrate the noise category that is applicable to a particular part of a building, or site.

The applicable criteria for determining the relevant noise category are reproduced from the Code and provided in **Table 12**.

Table 12: MP 4.4 Noise Category levels

Noise Category	Level of transport noise ($L_{10,18hr}$) for State-controlled roads and designated local government roads[1)]
Category 4	≥ 73 dB(A)
Category 3	68 - 72 dB(A)
Category 2	63 - 67 dB(A)
Category 1	58 - 62 dB(A)
Category 0	≤ 57 dB(A)

NOTES:

1) Measured at 1 m from the façade of the proposed building.

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

5. Noise Impact Assessment

5.1 Road Traffic Noise Intrusion

5.1.1 Overview

As the project site is located within 25 m of a State controlled road (see **Figure 3**), a road traffic noise impact assessment is required in order to address the acoustic requirements applicable under SDAP SC1 (see **Section 4.2.1**). The following sections describe the assessment methodology adopted to project future noise impacts across the project area.

5.1.2 Road Traffic Noise Modelling and Calculation Methodology

To predict noise impacts, calculations were made using a three-dimensional computer model of the site created within SoundPLAN 9.0. The computer model included a representation of the existing and future site and incorporated the following inputs:

- Calculation algorithms – SoundPLAN implementation of accepted noise prediction standards;
- Terrain elevation – A 3D representation of the existing terrain and at completion of construction;
- Ground surface corrections – Areas of soft (absorptive) and hard (reflective) ground;
- Roads sources – The placement of each road source as a source line and the input of traffic flow parameter;
- Buildings – Detailed implementation of the proposed building from drawings (i.e., layout, height, floors), and
- Sensitive receptors – Locations where the noise limits are to be assessed.

Noise calculations used the CoRTN algorithm, widely accepted in Australia, and recommended by the TMR CoP. For more details, refer to **Appendix C.1**.

5.1.3 Verification of Road Traffic Noise Model

According to TMR CoP, a road traffic noise model is deemed to be verified if the average difference between the measured and calculated values of the relevant noise descriptors is no more than ± 2 dB. Further, this document states that:

> *"If the average difference between existing measured and calculated noise descriptors values is positive (i.e. average measured values exceed the calculated values), then the calculated values shall be adjusted upwards by this average difference before determining the predicted values."*

> *"If the average difference between existing measured and calculated noise descriptors values is negative (i.e. average calculated values exceed the measured values), then no adjustment shall be made to the calculated values before determining the predicted values."*

Results of the road traffic model verification at unattended monitor, in accordance with TMR CoP, are presented in **Table 13**. The predicted $L_{A10,18hr}$ was 0.3 dB greater than the measured value; therefore, within the acceptable TMR CoP 2013 tolerance. Thus, the road traffic noise model is considered validated and was used to predict noise levels using 2038 (estimated 10-year planning horizon after development is completed – assumed 2028) traffic volumes.

Table 13: Road traffic noise model verification

Measured $L_{10,18hr}$ dB(A)	Predicted $L_{10,18hr}$ dB(A)	Difference
62.3	62.6	+0.3 dB(A)

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

5.1.4 Façade Noise Level Predictions and QDC MP4.4 Category (Residential)

Noise predictions were conducted to estimate road traffic noise impacts onto the proposed development. Details regarding road traffic volume predictions and inputs, as well as other noise modelling parameters, have been provided in **Appendix C**.

A markup of associated QDC noise categories for the proposed development and unit numbers applied are presented in **Appendix D** with a results summary provided in **Appendix E**.

5.1.5 Building Envelope Performance Requirements

Based on the assessment conducted, noise predictions showed that road transportation noise levels will be between QDC MP4.4 Noise Categories 0 – 3. With reference to the applicable categories QDC noise categories determined in **Appendix D**, the minimum laboratory tested airborne sound isolation performance (R_w) of building components presented in **Table 14** are required in accordance with Schedule 1 of QDC MP4.4. Recommendations for the performance and construction of façade elements have been provided in **Table 15**.

NOTES:

- Other forms of construction may be applied, provided these meet the R_w values required.
- Where a R_w rating applies to a window, this applies to the glass, frame and window seal system. An acoustic test certificate will be required from the window supplier for Category 2 glazing and higher. It is noted that in order to achieve the internal design sound levels, windows must remain closed.

Table 14: Minimum R_w required for the building component (reproduced from QDC MP4.4)

Noise Category	Minimum transport noise reduction required for habitable rooms, dB(A)	Component of building's external envelope	Minimum R_w required for each component
3	35	Glazing	38 (total area of glazing for a *habitable* room is greater than 1.8m^2)
			35 (total area of glazing for a *habitable* room is less than or equal to 1.8 m^2)
		External walls	47
		Roof	41
		Floors	45
		Entry doors	33
2	30	Glazing	35 (total area of glazing for a *habitable* room is greater than 1.8m2)
			32 (total area of glazing for a *habitable* room is less than or equal to 1.8 m^2)
		External walls	41
		Roof	38
		Floors	45
		Entry doors	33
1	25	Glazing	27 (total area of glazing for a *habitable* room is greater than 1.8 m^2)
			24 (total area of glazing for a *habitable* room is less than or equal to 1.8 m^2)
		External walls	35
		Roof	35
		Entry doors	28
0	No additional acoustic treatment required – standard building assessment provisions apply.		

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

Table 15: Construction recommendations (reproduced from QDC MP4.4)

Component of building's external envelope	Minimum R_w	Component of building's external envelope
Glazing	38	Minimum 14.38 mm thick laminated glass, with full perimeter *acoustically rated seals*; OR Double glazing consisting of one pane of minimum 5 mm thick glass and one pane of minimum 6 mm thick glass with at least 44 mm air gap, and full perimeter *acoustically rated seals*
	35	Minimum 10.38 mm thick laminated glass, with full perimeter *acoustically rated seals*.
	32	Minimum 6.38 mm thick laminated glass with full perimeter *acoustically rated seals*.
	27	Minimum 4 mm thick glass with full perimeter *acoustically rated seals*
	24	Minimum 4 mm thick glass with standard weather seals
External Walls	47	Two leaves of clay brick masonry at least 110 mm thick with: (i) cavity not less than 50 mm between leaves; and (ii) 50 mm thick mineral insulation or 50 mm thick glass wool insulation with a density of 11kg/m^3 or 50 mm thick polyester insulation with a density of 20kg/m^3 in the cavity. OR Two leaves of clay brick masonry at last 110 mm thick with: (i) cavity not less than 50 mm between leaves; and (ii) at least 13 mm thick cement render on each face OR Single leaf of clay brick masonry at least 110 mm thick with: (i) a row of at least 70 mm x 35 mm timber studs or 64 mm steel studs at 600 mm centres, spaced at least 20 mm from the masonry wall; and (ii) Mineral insulation or glass wool insulation at least 50 mm thick with a density of at least 11 kg/m^3 positioned between studs; and (iii) One layer of plasterboard at least 13 mm thick fixed to outside face of studs. OR Single leaf of minimum 150 mm thick masonry of hollow, dense concrete blocks, with mortar joints laid to prevent moisture bridging.
External Walls (cont.)	41	Two leaves of clay brick masonry at least 110 mm thick with cavity not less than 50 mm between leaves OR Single leaf of clay brick masonry at last 110 mm thick with: (i) a row of at least 70 mm x 35 mm timber studs or 64 mm steel studs at 600 mm centres, spaced at least 20 mm from the masonry wall; and (ii) mineral insulation or glass wool insulation at least 50 mm thick with a density of at least 11 kg/m^3 positioned between studs; and (iii) One layer of plasterboard at least 10 mm thick fixed to outside face of studs OR Single leaf of brick masonry at least 110 mm thick with at least 13 mm thick render on each face OR Concrete brickwork at least 110 mm thick OR In-situ concrete at least 100 mm thick OR

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

Component of building's external envelope	Minimum R_w	Component of building's external envelope
Roof		Precast concrete at least 100 mm thick and without joints.
	35	Single leaf of clay brick masonry at least 110 mm thick with: (i) a row of at least 70 mm x 35 mm timber studs or 64 mm steel studs at 600 mm centres, spaced at least 20 mm from the masonry wall; and (ii) One layer of plasterboard at least 10 mm thick fixed to outside face of studs OR Minimum 6 mm thick fibre cement sheeting or weatherboards or plank cladding externally, minimum 90 mm deep timber stud or 92 mm metal stud, standard plasterboard at least 13 mm thick internally.
	41	Concrete or terracotta tile or metal sheet roof with sarking, plasterboard ceiling at least 10 mm thick fixed to ceiling joists, glass wool insulation at least 50 mm thick with a density of at least 11 kg/m^3 or polyester insulation at least 50 mm thick with a density of at least 20 kg/m^3 in the cavity. OR Concrete suspended slab at least 100 mm thick.
	38	Concrete or terracotta tile or metal sheet roof with sarking, plasterboard ceiling at least 10 mm thick fixed to ceiling cavity, mineral insulation or glass wool insulation at least 50 mm thick with a density of at least 11 kg/m^3.
	35	Concrete or terracotta tile or metal sheet roof with sarking, plasterboard ceiling at least 10 mm thick fixed to ceiling cavity.
Floors	45	Concrete slab at least 100 mm thick OR Tongued and grooved boards at least 19 mm thick with: (i) timber joists not less than 175 mm x 50 mm; and (ii) mineral insulation or glass wool insulation at least 75 mm thick with a density of at least 11 kg/m^3 positioned between joists and laid on plasterboard at least 10 mm thick fixed to underside of joists; and (iii) mineral insulation or glass wool insulation at least 25 mm thick with a density of at least 11 kg/m^3 laid over entire floor, including tops of joists before flooring is laid; and (iv) secured to battens at least 75 mm x 50 mm; and (v) the assembled flooring laid over the joists, but not fixed to them, with battens lying between the joists.
Entry Doors	33	Fixed so as to overlap the frame or rebate of the frame by not less than 10 mm, fitted with full perimeter acoustically rated seals and constructed of - (i) solid core, wood, particleboard or blockboard not less than 45 mm thick; and/or (ii) acoustically laminated glass not less than 10.38 mm thick.
	28	Fixed so as to overlap the frame or rebate of the frame, constructed of - (i) Wood, particleboard or blockboard not less than 33 mm thick; or (ii) Compressed fibre reinforced sheeting not less than 9 mm thick; or (iii) Other suitable material with a mass per unit area not less than 24.4 kg/m^2; or (iv) Solid core timber door not less than 35 mm thick fitted with full perimeter *acoustically rated seals*.

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Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

5.1.6 Outdoor Spaces for Passive Recreation – Private Balconies

Balconies of units that exceed the free field acoustic levels (60 dB(A)) can demonstrate compliance with the code by providing continuous solid gap-free balustrades and absorbent soffit linings as per PO42 (see **Table 8**).

Table 16 provides locations where solid gap-free balustrades and absorbent soffit lining are required to comply with SDAP SC1 PO42. Refer to **Appendix D** for unit numbering applied for the assessment.

Table 16: Unit balconies requiring a continuous solid gap-free balustrades

Level	Building	Units	Orientation	Continuous solid gap-free balustrades required?
Level 1 - 2	1	1 – 6	N, W	Yes
	1	7 – 11	S	No
	2	1 -7	NE, NW	Yes
	2	8 – 11	SE, SW	No
Level 3	1	1 – 6	N	Yes
	1	7 – 11	S	No
	2	1 -7 and 11	NE, NW, SW	Yes
	2	8 – 10	SE	No
Level 4	1	1 – 4	N	Yes
	1	5 – 7	S	No
	2	1 – 5 and 8	NE, NW, SW	Yes
	2	6 and 7	SE	No

To comply with SDAP SC1 PO42; noise affected balconies shall include:

1. a continuous solid gap-free structure or balustrade (excluding gaps required for drainage purposes to comply with the Building Code of Australia); and
2. highly acoustically absorbent material treatment for the total area of the soffit above balconies, podiums, and roof decks.

To address Item 2 above, soffits / ceilings to all balconies may install:

- perforated fibre cement (≥ 16% open area with 50 mm 14 kg/m^3 insulation over recommended); or
- Stramit Corrugated or Stramit Longspan perforated sheet with 50 mm Insulation Solutions Sonobatt type 1 glass wool insulation (min. density 32 kg/m^3) encapsulated in 25 micron Mylar; or
- Any other preferred highly sound absorptive finish.

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

5.2 Environmental Noise Emissions

5.2.1 Assessment Methodology

5.2.1.1 Carparking Areas

Noise emissions from carparking vehicle movements have the potential to influence the general acoustic amenity of surrounding noise sensitive uses. Noise emissions from such sources are required to comply with all relevant environmental noise limits at the nearest noise sensitive receivers outlined in **Section 4.1** of this report.

The complexity of associated noise events can be difficult to accurately simulate as individual noise sources (i.e., vehicle parking bay turnover rates, location of noise event such as motion (acceleration, deceleration), idling, ignition, door slams etc.). Therefore, acoustic assessment has been based on the technical research paper *"Prediction of parking area noise in Australian conditions"* from the Australian Acoustical Society Conference (Nicol and Johnson, 2011) and parking lot study *"Recommendations for the Calculation of Sound Emissions of Parking Areas, Motorcar Centers and Bus Stations as well as of Multi-Storey Car Parks and Underground Car Parks"* (Bavarian Landesamt für Umwelt, 2007, 6th edn, BayLfU).

Correction factors described by Nicol and Johnson (in section *"Application of BAYLFU to Australian Conditions"*) were applied carpark noise emissions in the acoustic simulation model.

Refer to **Appendix C.2.3** for additional assessment input parameters.

5.2.1.2 Road Corridor Laneway (Albert Street Exit)

Noise from vehicles along the road corridor laneway were input as line sources. The model includes car and waste truck movements exiting via the laneway.

Calculations were conducted using the SoundPLAN implementation of ISO 9613. Refer to **Appendix C.2.4** for car movement input parameters and **Appendix C.2.5** for waste collection vehicles.

5.2.1.3 Waste Collection Vehicles

Noise emissions from waste collection vehicles can contribute to the general acoustic environment at surrounding noise sensitive receptors and is required to be assessed against environmental noise limits established in this report.

Noise emissions from heavy vehicle types are typically formed by a combination of successive, often transient, noise events. Events include engine noise (ignition, idle, acceleration, deceleration), reversing alarms (beepers), brake squeals, compression / venting brake release.

Calculations were conducted using the SoundPLAN implementation of ISO 9613. Refer to **Appendix C.2.5** for additional assessment input parameters.

5.2.2 Assessment Inputs and Assumptions

5.2.2.1 Carparking

The proposed development was generated in the acoustic model based on the architectural drawings (refer **Table 2**). The drawings show 111 parking spaces on the ground level.

Site specific carparking movements included in acoustic modelling were determined based on the following assumptions:

- The worst case one-hour peak vehicle movements are expected to occur;
    - Day: Turnover of 50% (56 carparks).
    - Evening: Turnover of 50% (56 carparks).
    - Night: Turnover of 20% (23 carparks).

5.2.2.2 Road Corridor Laneway (Albert Street Exit)

Car volumes along the road corridor laneway were modelled based on 20 vehicles per hour for all time periods. These traffic volumes are conservatively based on the worst-case peak volumes (AM peak) provided by the traffic engineer.

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Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

5.2.2.3 Waste Collection Vehicles

The following assumptions have been made in relation waste collection operations:

- Waste collection will occur during day hours only (i.e., 7 AM – 6 PM).
- Medium rigid vehicles (MRV) ≤ 12.5 m will be used for waste collection.
- Waste collection vehicles will arrive to site and will idle for 10-minutes total whilst picking up waste.
- After waste collection the vehicles will exit via the road corridor laneway to Albert Street.

Typical noise levels associated with waste collection activities are provided in **Appendix C.2.5**.

5.2.3 Predicted Noise Levels

A noise emissions assessment was conducted based on the assessment parameters, inputs and assumptions detailed in the preceding sections of this report.

A summary of predicted noise levels at each receptor has been presented in **Table 17**. Detailed results, including contribution from source groups have been presented in **Appendix F**.

Table 17: Summary of highest predicted noise levels – no acoustic treatments

Noise Sensitive Receptor	Fl.	Outdoor Noise Limit, dB(A)			Predicted Outdoor Noise Level, dB(A)		
		L_{eq}			L_{eq}		
		D [1)]	E [1)]	N [1)]	D	E	N
7 Albert Street	GF	58	55	52	55	47	44
	L1				56	47	44
11 Albert Street	GF				54	43	41
	L1				55	43	42
13 Albert Street	GF				54	44	43
	L1				54	44	43
	L2				54	44	43
17 – 19 Albert Street	GF				56	49	49
352 Ross River Road	L1				57	47	46
357 Ross River Road	GF				40	37	33

NOTES:

1) *Day (D) = 7 AM – 6 PM | Evening (E) = 6 PM – 10 PM | Night (N) = 6 AM – 7 AM*

Based on the predicted noise levels, no additional acoustic treatment is necessary to comply with the noise limits on the basis that waste collection occurs during the day period only (7 AM – 6 PM).

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

5.3 Mechanical Plant Noise Emissions

Given the current stage of the project, location and type of building services plant have not been proposed; therefore, detailed calculations of proposed equipment selections could not be conducted. In general, the noise emission of mechanical plant associated with the development should be controlled so that the operation of such plant does not adversely impact nearby sensitive receivers. Compliance with the environmental noise limits stated in **Section 4.1** is mandatory.

It is envisaged that the building services plant noise sources will be controllable by common engineering methods that may consist of:

- Judicious location of plant
- Barriers
- Silencers

The selected mechanical equipment should be reviewed and assessed for conformance with the established criteria at the subsequent design stage of the project when specific plant selection is known and appropriate noise control measures can be determined, noting that the cumulative noise emissions from all site noise sources should be considered when determining appropriate mitigation options.

6. Summary of Recommendations

Road Noise Intrusion - Façade

- Units within the development require acoustic façade upgrades up to QDC MP4.4 noise category 3. A summary of these locations is provided in **Appendix E** with markups and unit numbering presented in **Appendix D**.

Road Noise Intrusion – Private Open Spaces

- To comply with SDAP SC1 PO42 it is recommended that units that exceed the free field acoustic limit are provided with solid gap-free balustrades and have soffits over treated with absorptive material. **Table 16** provides unit balconies that require treatment with markups and unit numbering presented in **Appendix D**.

Environmental Noise Emissions

- It is recommended that waste collection from the site is limited to the day period (7 AM – 6 PM).

Mechanical Services Emissions

- Emissions from mechanical plant services are required to be designed to comply with EPA 1994. When equipment selection noise levels are known, these shall be assessed against the relevant environmental noise limit.

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Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

7. Conclusion

Stantec have been engaged by Hurst Constructions QLD to undertake acoustic assessment and provide design advice for the proposed residential apartments at 344 - 350 Ross River Road, Cranbrook QLD 4814.

This acoustic services report has:

- outlined the acoustic services scope of works for the project;
- established relevant acoustic criteria in accordance with current Legislation, Regulations, Council Policies, Australian Standards and Design Guidelines;
- identified key acoustic issues that are to be addressed by the project; and
- provided design advice and construction recommendations pertinent to this project and conducive to the current design stage.

We trust that this report to be sufficient for your current requirements; however, should you have any queries, please do not hesitate to contact the undersigned on (07) 3811 4500.

Regards,

Marcus Kamppi (Author)
Senior Acoustic Engineer for **Stantec**

Carl Edser (Reviewer)
Acoustics Project Technical Lead (QLD) for **Stantec**

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

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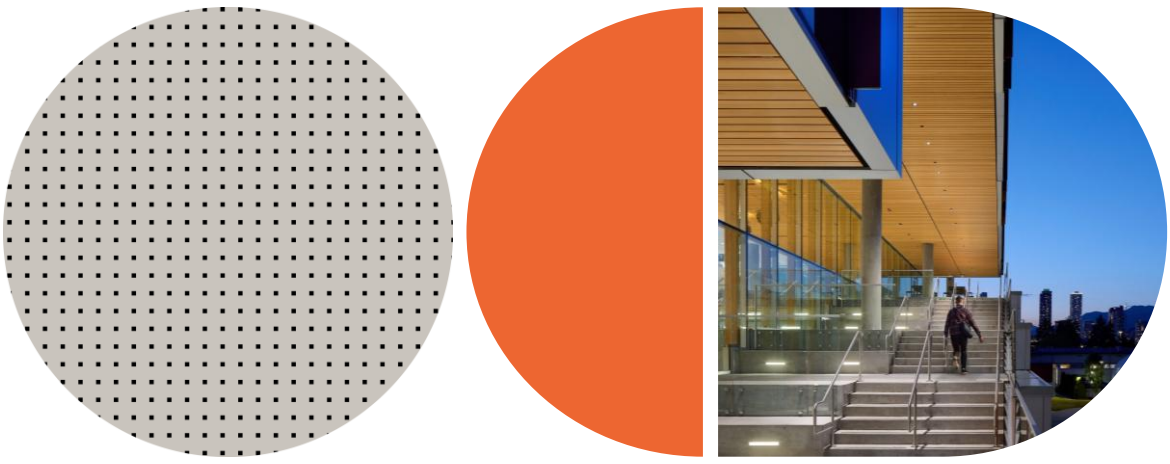
Appendices



Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

Appendix A Glossary of Acoustic Terms

TERM	DEFINITION
Adverse Weather	Weather conditions that affect noise (wind and temperature inversions) that occur at a particular site for a significant period of time. The previous conditions are for wind occurring more than 30% of the time in any assessment period in any season and/or for temperature inversions occurring more than 30% of the nights in winter).
Assessment Location	The position at which noise measurements are undertaken or estimated.
Assessment Period	The period in a day over which assessments are made.
Attenuation	A reduction in the magnitude of sound.
A-weighting	A frequency dependent filter applied to an instrument-measured noise. In its simplest form, the filter is designed to replicate the relative sensitivity to loudness perceived by the human ear.
Background Noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the LA90 noise level.
Barrier	Solid walls or partitions, solid fences, earth mounds, earth berms, buildings, etc. used to reduce noise.
dB	The abbreviation for decibel.
dB(A)	A-weighted sound level in decibels.
Dw	A single number value that represents a field measurement of the weighted level difference between two adjacent spaces separated by a partition. Dw = L1 – L2 where, L1 is the average sound pressure level in the source room; and L2 is the average sound pressure level in the receiver room.
Free Field	An environment in which there are no acoustic reflective surfaces. Free field noise measurements are carried out outdoors at least 3.5 m from any acoustic reflecting structures other than the ground.
Frequency	Frequency is synonymous to pitch. Frequency or pitch can be measured on a scale in units of Hertz (Hz). Most noise sources typically comprise of a vast, and often complex, range of frequencies.
Frequency Response	This is a characteristic of a system which has a measured response resulting from a known applied input. In a mechanical structure, the frequency response function (FRF) is the spectrum of the vibration of a structure divided by the spectrum of the input force to the system. To measure the frequency response of a mechanical system, one must measure the spectra of both the input force to the system and the vibration response.
Intermittent Noise	Level that drops to the background noise level several times during the period of observation.
LA1	The A-weighted sound pressure level exceeded for 1 % of the measurement time period.
LA10	The A-weighted sound pressure level exceeded for 10 % of the measurement time period.
LA90	The A-weighted sound pressure level exceeded for 90 % of the measurement time period. Typically represents the background noise level of an environment.
LAeq	The equivalent continuous sound pressure level in dB(A). It is often accompanied by an additional suffix “T”, which is indicative of the measurement time period. (e.g. LAeq,15min, symbolising the measurement is evaluated over 15-minutes).
LAmax	The maximum A-weighted sound pressure level recorded over the measurement period.
Reflection	Sound wave changed in direction of propagation due to a solid object met on its path.
Reverberation	The persistence of a sound within a space, which will naturally decay over time. Most apparent once the source signal has ceased emitting. Reverberation may have effects on speech intelligibility if not adequately controlled. Reverberation time, represented in seconds, can vary depending on the volume and surface finishes of the space.
Rw	Weighted sound reduction index. A single number value which represents the airborne sound insulation performance of a partition or building element that has been determined under laboratory testing conditions.
Sound Level Meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound Power Level	The total sound energy radiated by a source, expressed in Watts. The sound power level is ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Sound Pressure Level	The measured acoustic wave strength in a given environment and at a particular point of interest where the total sound level expressed is relative to a reference pressure, i.e. the threshold of human hearing. Sound pressure level is typically measured using a standard sound level meter with a microphone, expressed in decibels (dB).

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

Appendix B Noise Monitoring Details

Unattended noise logging was conducted from 25th August 2025 to 1st September 2025 (inclusive) at the location shown in **Figure 1** (coordinates in **Table 18**). This location was considered representative of the noise environment at and around the project site.

Table 18: Noise monitoring coordinates

Latitude	Longitude
-19° 17' 55"	146° 45' 37"

The following instrumentation was used:

- NTi XL2 Class 1 sound level meter (A2A-11555-E0), and Pulsar 105 Class 1 acoustic calibrator (S/N 72913). The instrument had a current calibration certificate by a certified National Association of Testing Authorities (NATA) acoustics laboratory at the time of measurements.

Noise measurements were conducted in accordance with Australian Standard AS 1055:2018 – *Acoustics – Description and measurement of environmental noise*, and the instruments were configured as follows:

- A-weighting frequency response;
- FAST time response;
- 15-minute intervals;

The sound level meter was calibrated before and checked at the end of the measurement period. The instrument showed a drift less than ±1 dB during the course of monitoring; therefore, measurements are considered valid according to AS1055:2018.

Noise Monitoring Results

The raw sound level meter files were post-processed to determine relevant long-term noise descriptors, some of which were used to determine the applicable noise limits.

Results and time trace plots of relevant noise descriptors are provided below (see **Table 19** and **Figure 5**). Where data was not measured for a full period (i.e., at the start and end of measurement), the cells are shown dashed in the table. In addition, the noise descriptor averages are presented.

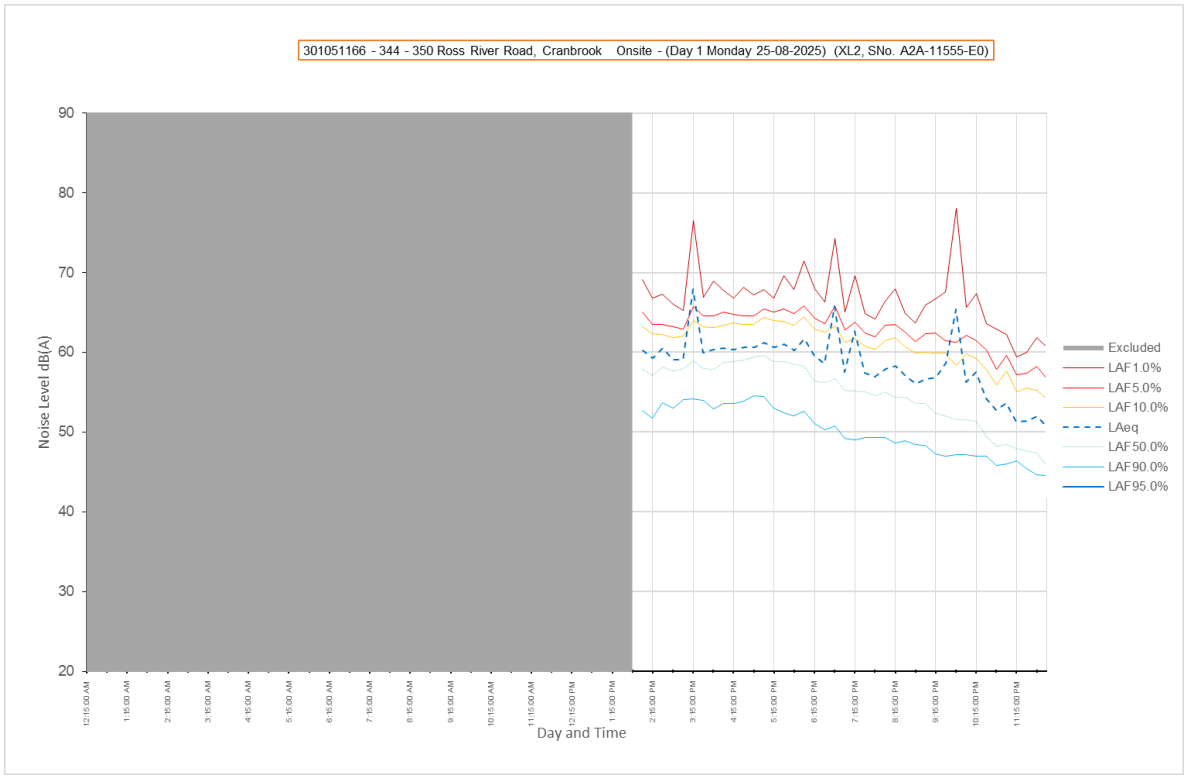
A summary of weather observations by the Bureau of Meteorology (BoM) during the monitoring period is presented in **Table 20** and **Table 21**.

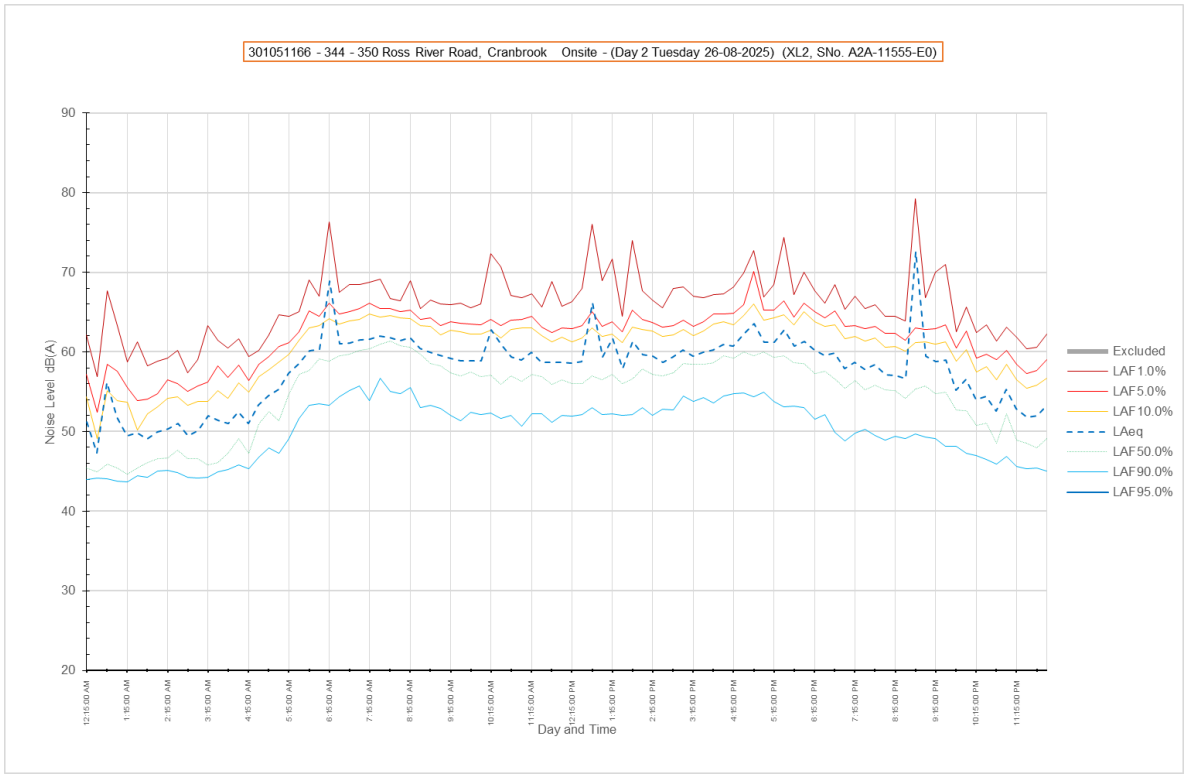
Table 19: Summary of measured noise levels (rounded) – Noise Monitor

Noise descriptor	Average	25/08/25	26/08/25	27/08/25	28/08/25	29/08/25	30/08/25	31/08/25	1/09/25
$L_{A10,18h\ (6am-12am)}$	62	61	62	62	62	63	62	62	63
$L_{A90,18h\ (6am-12am)}$	52	50	52	52	52	52	51	50	53
$L_{A90,8h\ (10pm-6am)}$	46	46	46	46	46	47	46	46	46
$L_{Aeq,7am-6pm}$	61	61	61	61	62	61	62	61	60
$L_{Aeq,6pm-10pm}$	60	60	63	60	60	59	59	59	—
$L_{Aeq,10pm-7am}$	56	54	57	56	56	57	56	55	57
$L_{A90,7am-6pm}$	53	53	53	53	54	54	52	51	53
$L_{A90,6pm-10pm}$	50	49	50	50	50	51	50	49	—
$L_{A90,10pm-7am}$	47	46	47	47	47	47	47	46	47
$RBL_{,7am-6pm}$	51	53	52	52	52	52	51	49	52
$RBL_{,6pm-10pm}$	49	48	49	49	49	50	49	47	—
$RBL_{,10pm-7am}$	44	46	44	45	45	45	45	45	44

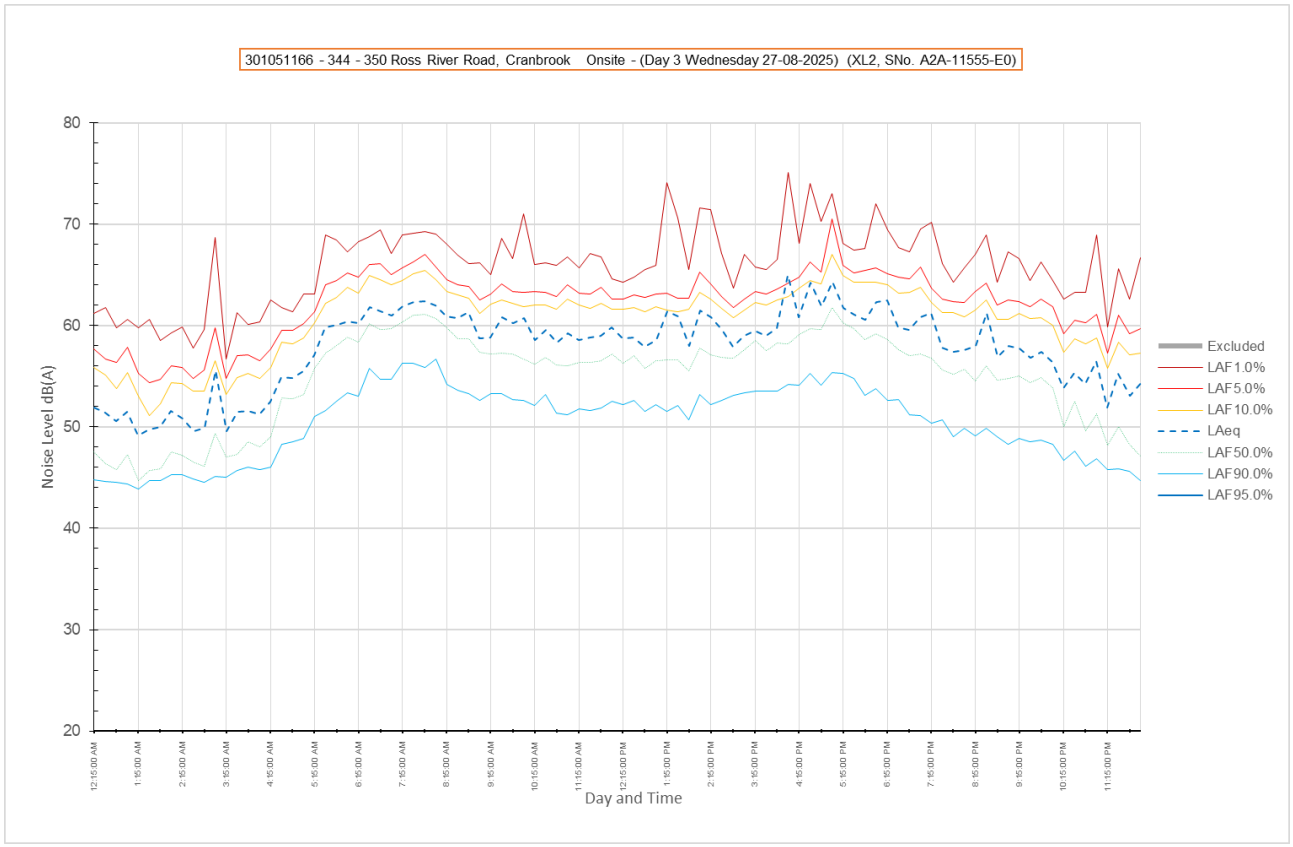
Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

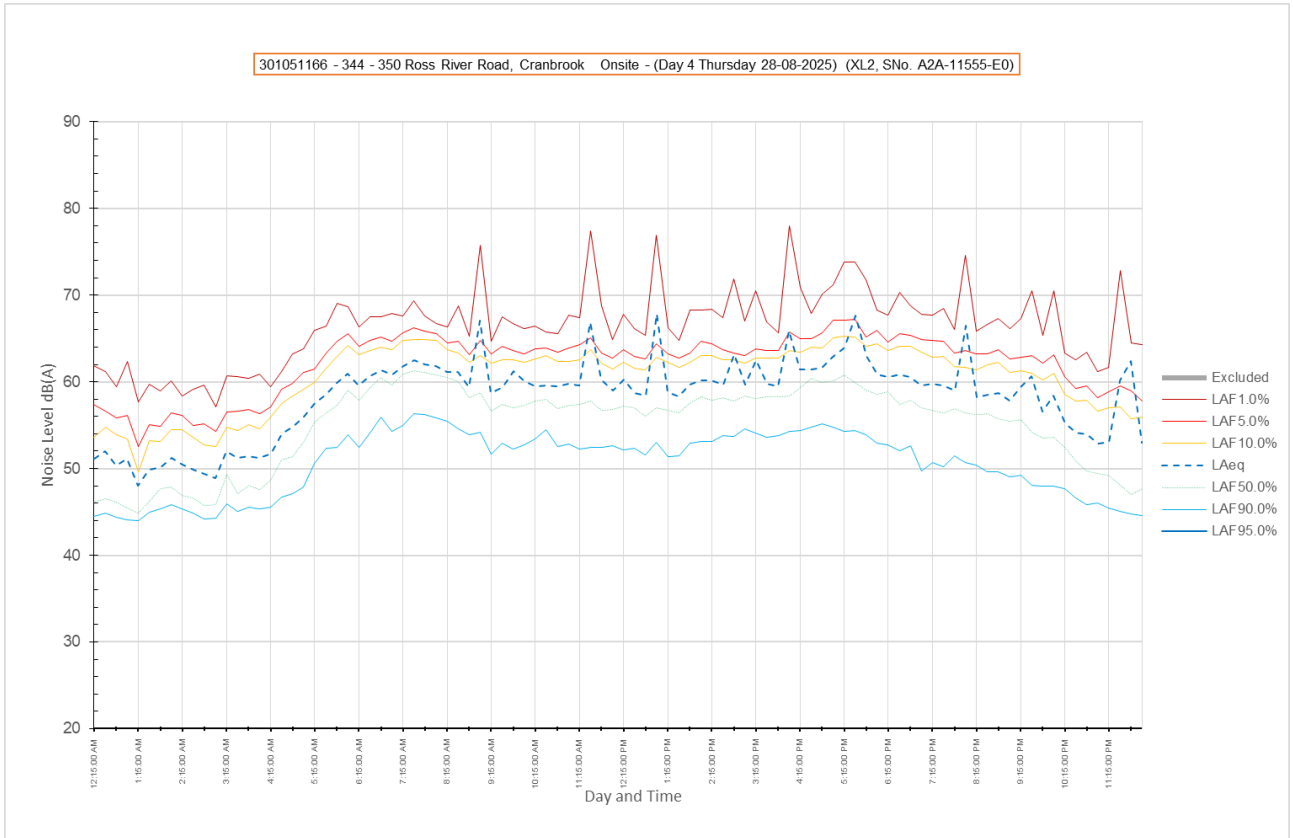
Figure 5: Time trace of relevant noise descriptors



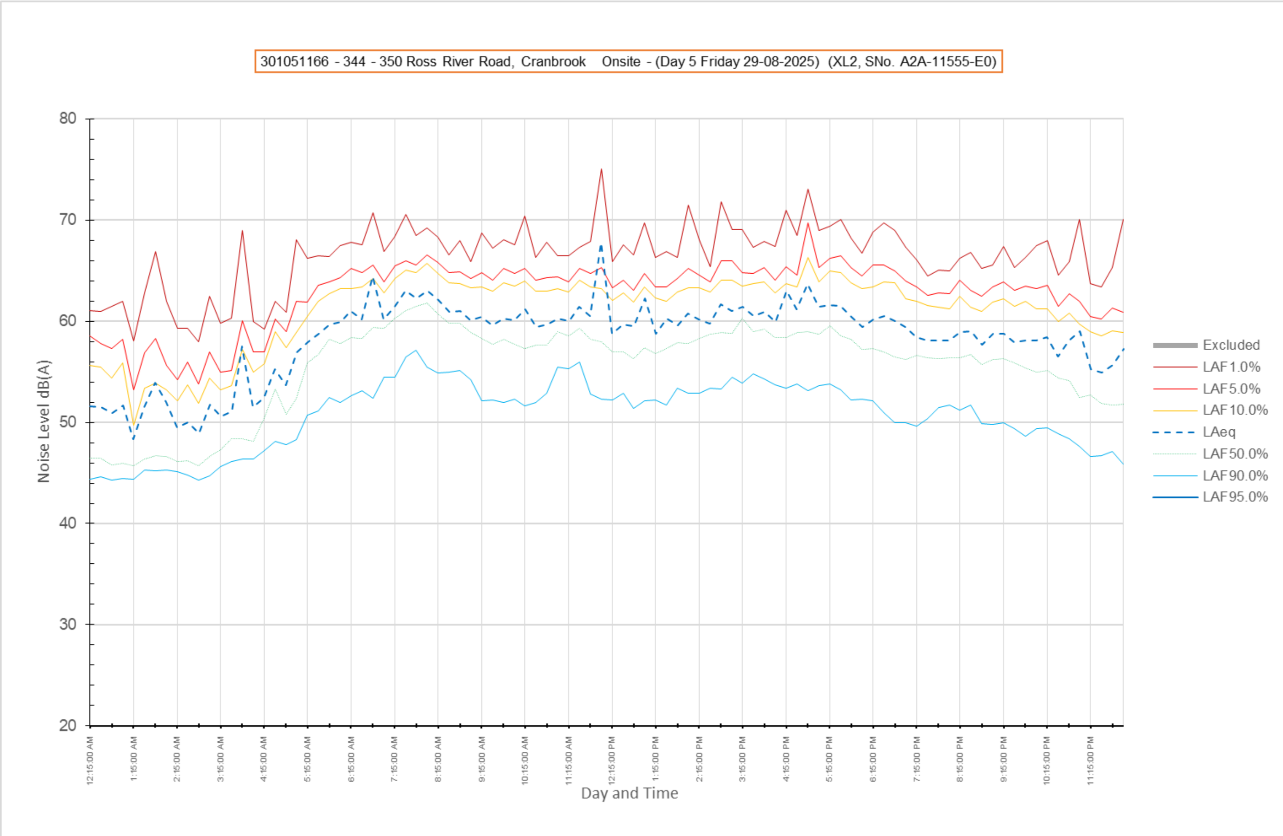


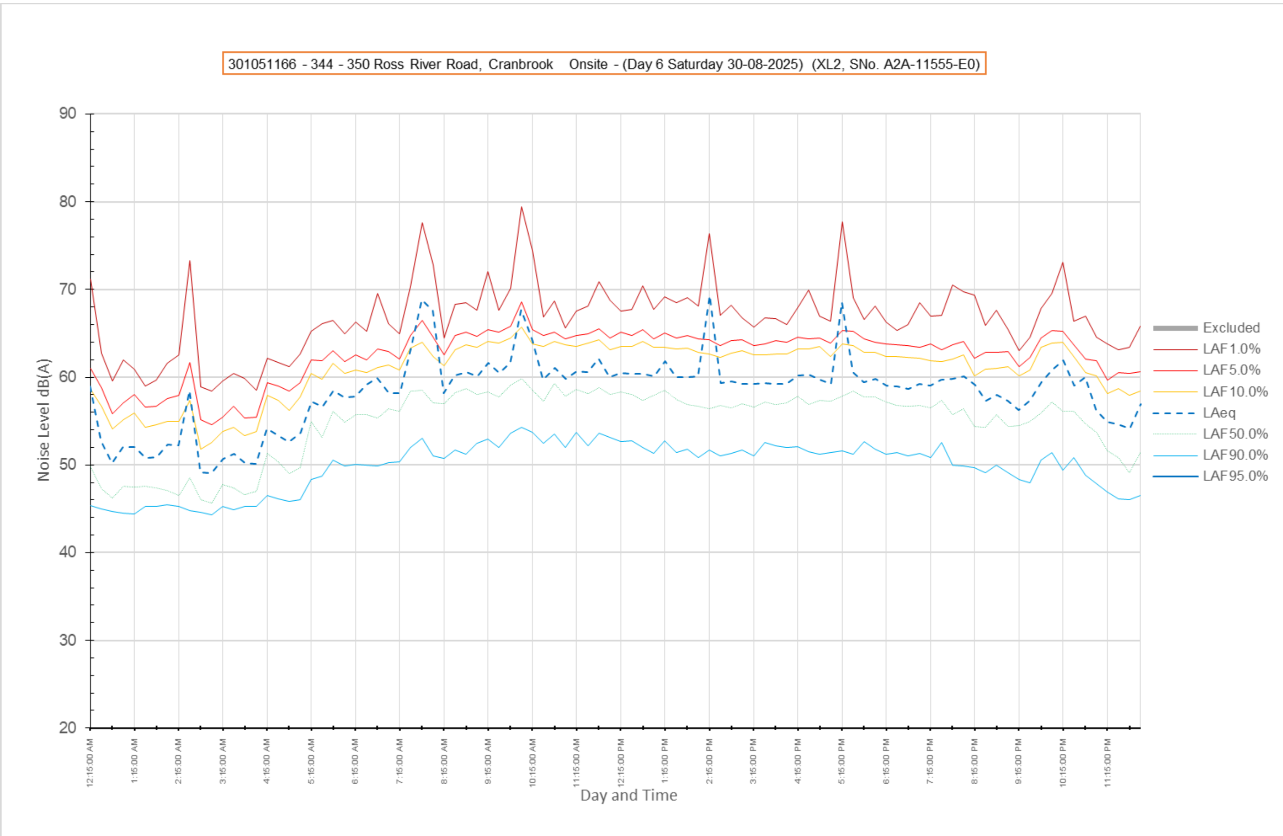
Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025





Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025





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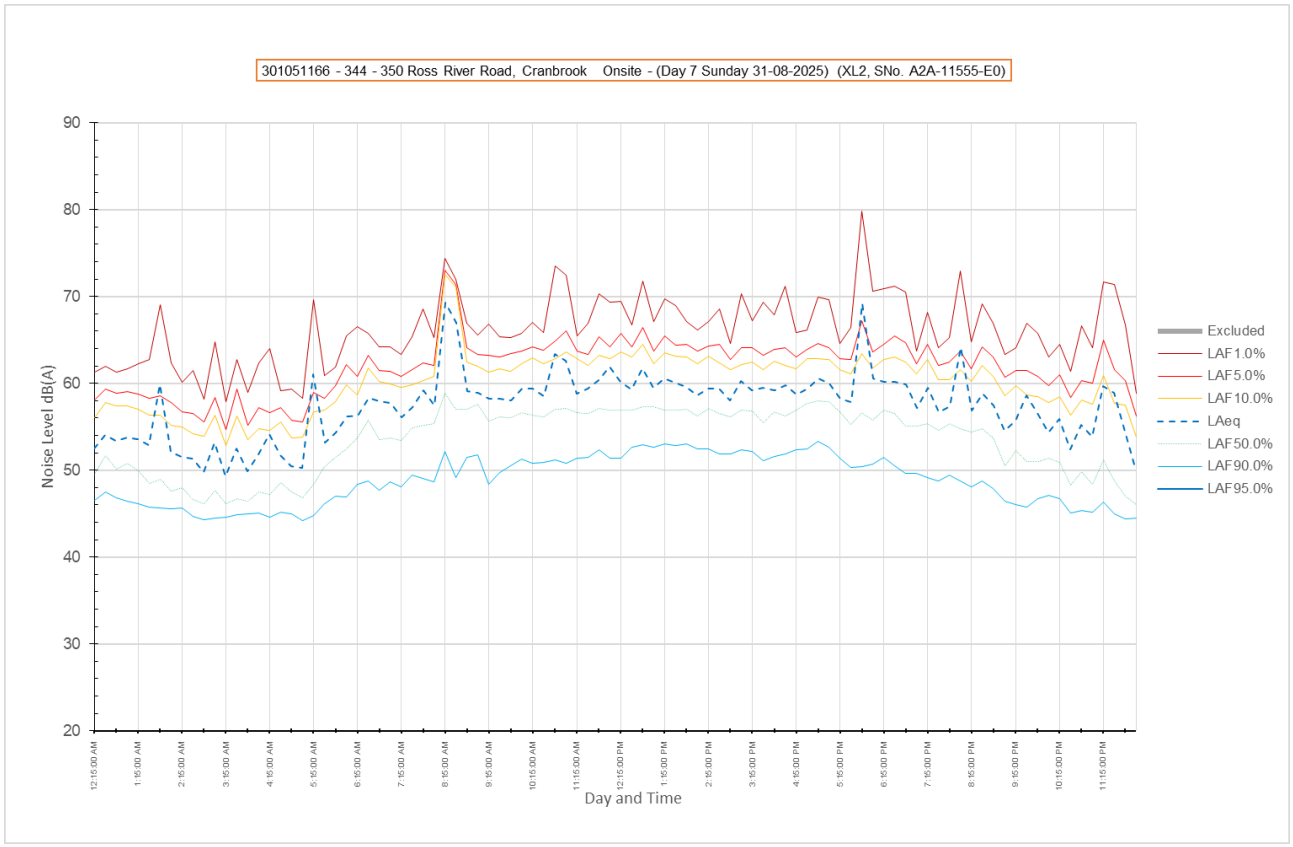
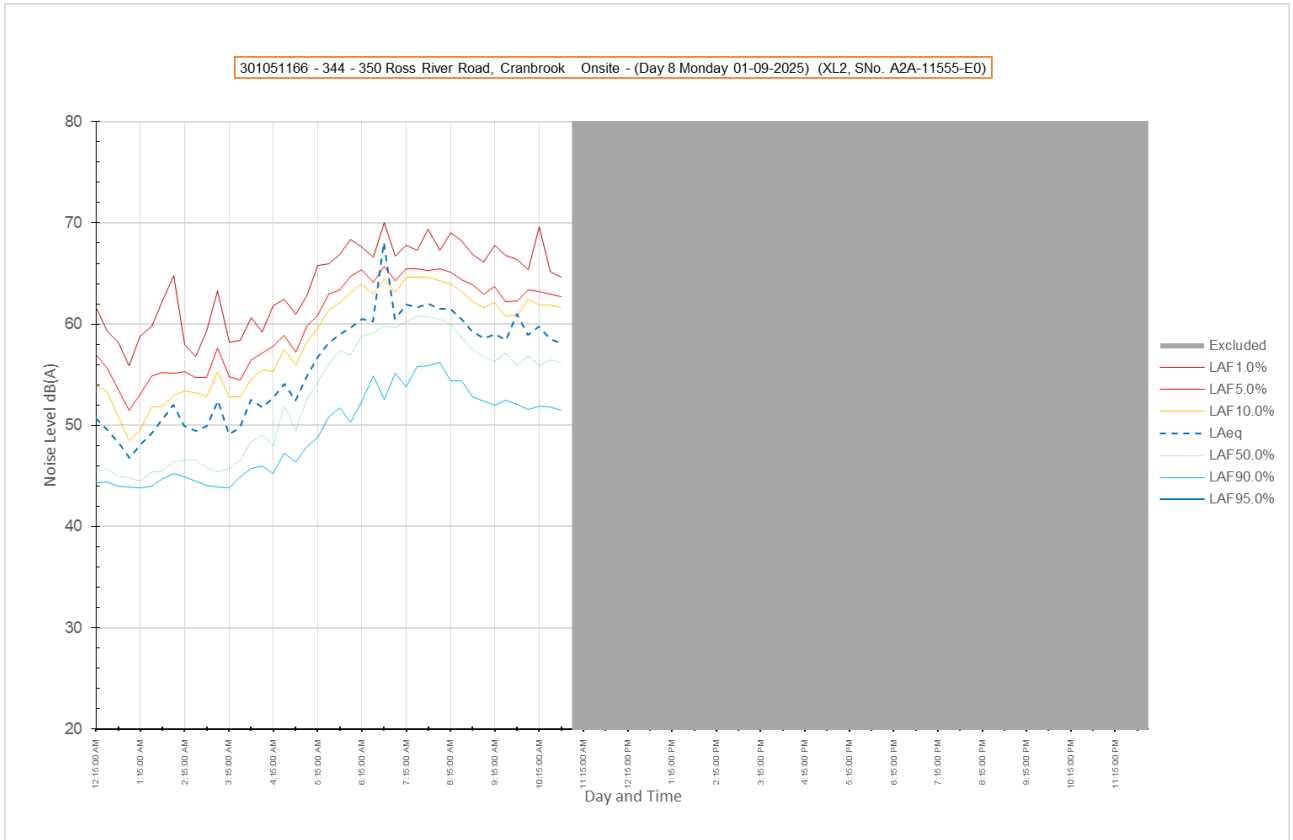
Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025





Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

Table 20: Summary of BoM weather observations during unattended monitoring (August)

Townsville, Queensland
August 2025 Daily Weather Observations

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Fr	15.5	20.7	0			SSW	33	01:06	17.2	71	7	E	7	1019.3	19.9	66	8	NE	13	1015.8
2	Sa	15.4	24.6	0			SSW	52	08:38	17.7	37		SSW	31	1020.7	23.5	19		SW	22	1015.6
3	Su	12.8	24.9	0			SSW	52	10:02	17.3	42		SSW	30	1020.7	24.0	20		SW	19	1015.9
4	Mo	8.7	25.9	0			ENE	30	11:30	19.8	47		NNE	2	1018.3	23.9	45		NE	22	1015.3
5	Tu	11.5	26.3	0			ENE	28	10:10	20.1	74			Calm	1018.8	25.0	51		NE	19	1015.0
6	We	13.5	27.0	0			NE	35	14:29	21.3	76		S	7	1018.5	25.0	50		ENE	26	1015.1
7	Th	13.6	28.4	0			ENE	43	13:25	22.5	67	1	ESE	9	1018.6	25.2	51		ENE	31	1016.4
8	Fr	14.8	26.7	0			ESE	50	10:48	22.5	60		SSE	15	1020.0	25.1	57		ENE	30	1016.4
9	Sa	16.4	28.8	0			SSW	33	11:10	22.7	65	1	SSW	19	1018.4	26.0	52	4	ENE	15	1013.8
10	Su	17.9	26.2	0			NE	35	15:12	21.9	62	4	SSE	11	1018.2	24.2	61		ENE	30	1014.7
11	Mo	15.3	26.6	0			ENE	43	13:30	22.4	65		SE	17	1018.2	24.6	62		ENE	30	1015.4
12	Tu	18.9	25.9	0			ESE	43	15:28	22.8	62	8	SSE	20	1018.9	24.0	61	8	ESE	24	1016.6
13	We	19.2	27.0	0			ENE	39	11:26	22.6	59	8	SE	15	1021.2	24.7	60	8	ENE	26	1018.0
14	Th	13.9	26.7	0			ENE	43	15:20	21.7	57		SSE	9	1020.9	24.7	52		ENE	33	1016.0
15	Fr	11.0	25.7	0			ENE	33	14:07	20.5	69			Calm	1018.7	24.1	47		NE	28	1015.4
16	Sa	11.8	25.7	0			NE	33	13:38	21.1	61		SSE	9	1018.8	24.9	43		ENE	22	1015.2
17	Su	11.0	27.3	0			NNE	31	12:09	21.4	58		WSW	6	1019.0	26.1	42		NE	17	1015.9
18	Mo	12.3	28.4	0			ENE	33	15:32	21.5	33		SW	19	1020.4	25.7	37		NE	24	1016.8
19	Tu	12.9	27.2	0			ENE	35	13:38	21.2	70	8	SW	7	1020.8	25.5	49		ENE	28	1017.1
20	We	14.1	28.5	0			ESE	35	10:55	22.6	74	8	SSE	13	1019.9	26.0	58	8	ENE	22	1016.5
21	Th	16.3	27.7	0			ENE	35	15:50	23.7	72	3	ESE	11	1020.1	25.6	68		ENE	28	1016.5
22	Fr	16.6	28.2	0			ENE	39	10:40	24.4	68		SE	15	1019.4	25.3	68		NE	30	1015.3
23	Sa	15.7	28.7	0			NE	31	14:10	23.0	72		SE	7	1018.2	27.5	30		ENE	22	1013.7
24	Su	14.6	29.5	0			E	39	12:43	23.7	69		SE	11	1017.9	26.7	51		ENE	30	1013.6
25	Mo	15.4	27.7	0			ENE	28	12:06	24.7	69	2	SE	13	1017.5	26.2	47		ENE	20	1013.6
26	Tu	14.7	28.2	0			NE	31	14:25	23.7	69		SE	9	1016.1	27.1	28		NE	22	1012.8
27	We	13.9	27.6	0			NNE	31	13:14	24.3	65	1	SE	6	1015.4	26.2	51		NNE	15	1010.6
28	Th	17.8	29.2	0			NNW	28	09:47	25.0	67		NNW	13	1014.6	27.0	61		NNW	17	1010.1
29	Fr	16.2	32.0	0			ENE	33	15:02	26.5	30		SSW	9	1016.8	30.8	29		ENE	26	1012.2
30	Sa	14.5	30.7	0			SSW	41	10:55	25.8	22		SSW	15	1020.8	30.1	16		S	13	1016.7
31	Su	15.3	26.3	0			ESE	43	10:17	21.6	25		SSE	13	1021.9	24.4	50		ENE	31	1018.1

Table 21: Summary of BoM weather observations during unattended monitoring (September)

Townsville, Queensland
September 2025 Daily Weather Observations

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Mo	15.3	26.5	0			NE	35	14:05	22.1	60		SE	17	1019.3	24.7	60		ENE	26	1015.1
2	Tu	16.5	27.2	0			ENE	35	14:27	24.3	62		SE	19	1019.6	24.0	67	3	ENE	28	1016.5
3	We	16.3		0						23.6	68	1	SE	19	1020.3						

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

Appendix C Noise Modelling Details

C.1 Road Traffic Assessment Inputs

A three-dimensional computer model of the study area was created within SoundPLAN 9.0. The following inputs were utilised:

- **Building receptors** – These were digitised at the location of the most exposed facades to the relevant noise sources. Single point receptors were modelled at 1.5 m above each finished floor level of each building digitised in the model and 1 m from the façade.
- **Road traffic noise** - Calculated using the SoundPLAN implementation of the UK Department of Transport Welsh Office *Calculation of Road Traffic Noise* 1988 (CoRTN), which is accepted by TMR CoP.
- **Ground surface corrections** – 50% ground absorption in accordance with the TMR CoP
- **Sound reflections –** A reflection order of 3 was used.
- **Terrain:** A 1 metre Digital Elevation Model (DEM) derived from LiDAR obtained from an Australian Government website and was used to calculate 3D contours at 0.5 m elevation intervals. The data was used 'as is', and it is considered of sufficient resolution for assessment purposes.
- **Calibration factors:** CoRTN calibration factors of -0.7 dB(A) free field and -1.7 dB(A) façade corrected applied to all calculated noise levels in accordance with Table 4.3.2.1 of the TMR CoP.
- **Road alignments:** Roads were digitised following the alignment shown on georeferenced photography imported into SoundPLAN.
- **Road surface type:** road surface correction of:
    - - 2.0 dB for Open Graded Asphalt (OGA) was applied to Ross River Road;
    - - 0.0 dB for Dense Graded Asphalt (DGA) was applied to Nathan Street.
- **Road traffic parameters:** Road traffic volumes were obtained from the TMR 2014 - 2024 traffic survey data. Traffic growth rates were calculated based on increases in observed vehicle volumes over a 5 – 10 year period. A minimum annual increase of 1.5% was applied where a lower growth was determined. Projected traffic volumes for 2025 and 2038 were calculated based on these growth rates.

The road traffic volumes digitised in the model are presented in **Table 22.**

Table 22: Road traffic volumes for noise modelling

Road	Direction	Source: TMR				Traffic Estimates (2038)		
		2024 AADT	HV %	Growth %	Speed, km/h	94% AADT	HV % [1)]	Speed, km/h
Ross River Road Site ID: 90025	Both	22,467	6.3	1.5	60	26,013	6.3	60
	Against Gazettal (E)	11,534	7.7	1.5	60	13,355	7.7	60
	With Gazettal (W)	11,097	4.9	1.5	60	12,659	4.9	60
Ross River Road Site ID: 90083	Both	18,421	4.7	1.5	60	21,329	4.7	60
	Against Gazettal (E)	9,312	4.4	1.5	60	10,782	4.4	60
	With Gazettal (W)	9,109	4.9	1.5	60	10,547	4.9	60
	Both	26,793	11.9	1.7	70	31,889	11.9	70

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

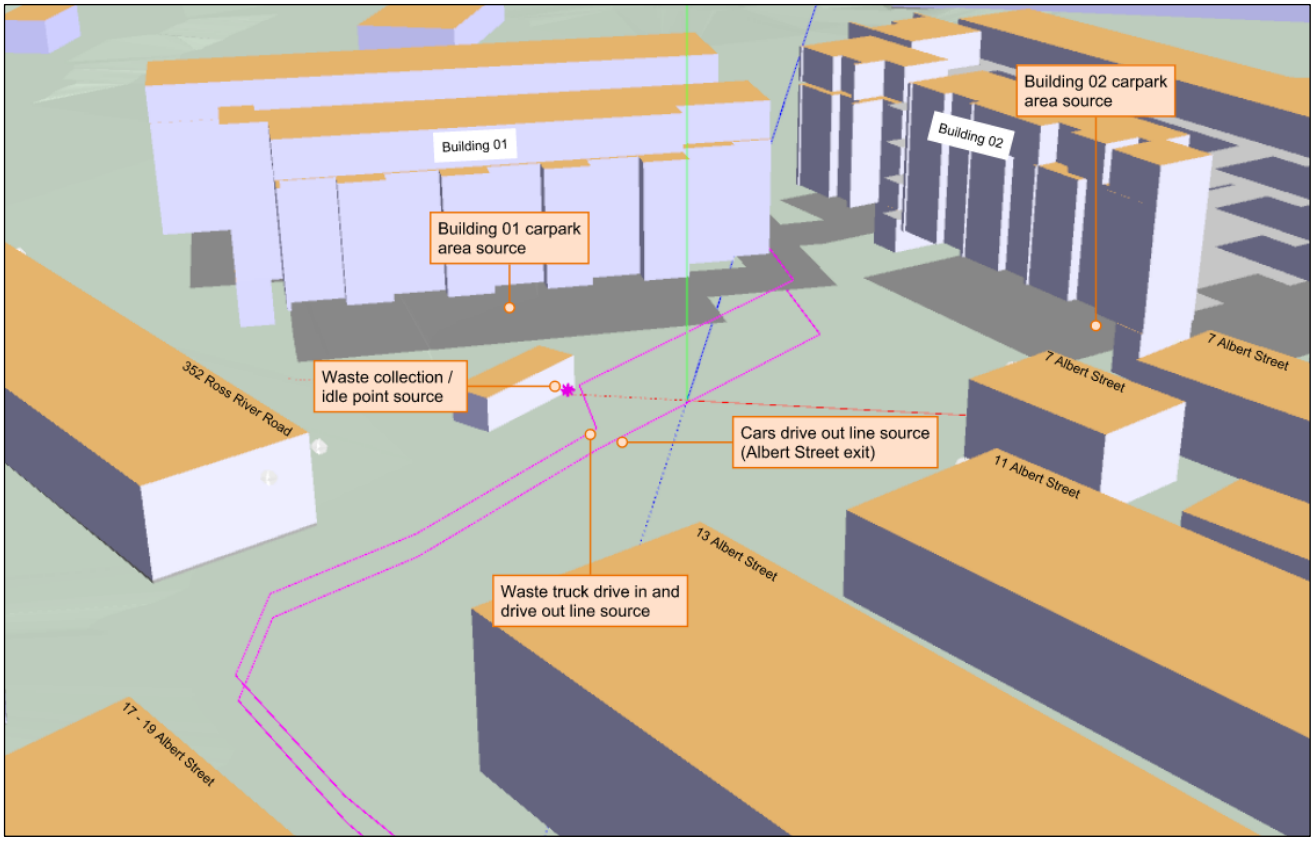
Road	Direction	Source: TMR				Traffic Estimates (2038)		
		2024 AADT	HV %	Growth %	Speed, km/h	94% AADT	HV % [1)]	Speed, km/h
Nathan Street Site ID: 92202	Against Gazettal (S)	12,019	11.5	1.7	70	14,305	11.5	70
	With Gazettal (N)	14,774	12.4	1.7	70	17,584	12.4	70
Nathan Street Site ID: 92188	Both	32,617	9.4	1.5	60	37,766	9.4	60
	Against Gazettal (S)	16,016	9.3	1.5	60	18,544	9.3	60
	With Gazettal (N)	16,601	9.5	1.5	60	19,221	9.5	60

C.2 Environmental Noise Assessment Inputs

C.2.1 Noise Model Layout

The general layout of the noise model generated in SoundPlan has been presented in **Figure 6**.

Figure 6: Noise model layout



Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

C.2.2 Base Model Parameters

A summary of the modelling conditions is presented in **Table 23**.

Table 23: Noise modelling parameters

Item	Inputs and Assumptions
General Assessment Input Parameters	
Calculation Algorithms	Calculations were conducting using the SoundPLAN implementation of ISO 9613-2:1996 - Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation. The following atmospheric parameters were used: • Temperature: 10°C • Relative humidity: 70 % • Atmospheric pressure: 1013.3 mbar For carpark assessments, noise emissions were calculated using the SoundPLAN implementation of the *"Recommendations for the Calculation of Sound Emissions of Parking Areas, Motorcar Centers and Bus Stations as well as of Multi-Storey Car Parks and Underground Car Parks"* (Bavarian Landesamt für Umwelt, 2007, 6th edn).
Ground Topography	A 1 metre Digital Elevation Model (DEM) derived from LiDAR obtained from an Australian Government website and was used to calculate 3D contours at 0.5 m elevation intervals which is considered of sufficient resolution for assessment purposes.
Ground Absorption	50% ground absorption was used for predominately concrete / asphalt type ground surfaces.
Receptor Locations	These were digitised at the location of the most exposed facades to the relevant noise sources. Single point receptors were modelled at 1.5 m above each finished floor level of each building digitised in the model and 1 m from the façade.

C.2.3 Carpark Noise Modelling Inputs

Carpark modelling parameters implemented are provided in **Table 24**.

Table 24: Acoustic simulation model carpark assumptions and inputs

Parameter	Model Input
Parking lot type (K_{PA})	Housing Estate (+0 dB)
Base unit (B0)	1 parking bay
Base B (total parking bays)	Total: 111
Road surface (K_{Stro})	Asphaltic driving lanes (+0 dB)
Passaging traffic	Combined
Impulsive surcharge (K_I)	2 dB
$L_{max,adj}$ – Door slam / Closing tail gate / boot lid	L_w 91 dB(A)
Single vehicle noise level	Ref. L_w 64 dB(A)
Vehicle spectrum	Car, no-load / ground run (to simulate flat carpark)
Source height	RL 0.5 m above terrain

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

C.2.4 Road Corridor Laneway (Albert Street Exit)

Car movement inputs along the road corridor laneway are provided in **Table 25**.

Table 25: Input parameters for road corridor laneway car movements

Parameter	Model Input
Single vehicle noise level	Cars exiting via laneway driveway – L_w 47 dB/m, m^2 (L_w 87 dB(A) @ 10 km/h)
Vehicle spectrum	Car, driving on asphalt < 30km/h
Source height	0.5 m above terrain

C.2.5 Waste Truck Modelling Inputs

Truck movement parameters implemented for waste collection are provided in **Table 26**.

Table 26: Input parameters for waste collection vehicle

Parameter	Model Input
Single vehicle noise level	Waste collection vehicle travelling (line source) – L_w 63 dB/m, m^2 (L_w 100 dB(A) @ 5 km/h) Waste pickup / idle (point source) - L_w 100 dB(A) for 10 minutes
Vehicle spectrum	SoundPLAN spectrum - C8.18 Refuse wagon
Source height	2.0 m above terrain

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

Appendix D Building Envelope Performance Requirements (QDC MP4.4)

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

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SKETCH TITLE *Prepared By: MK*

344 - 350 Ross River Road Cranbrook
QDC MP4.4 Building Envelope Requirements

301051166	AC-SK-001	03/09/2025	001
PROJECT No.	SKETCH No.	DATE	REV

Treatment of exposed floor to Level 1 units

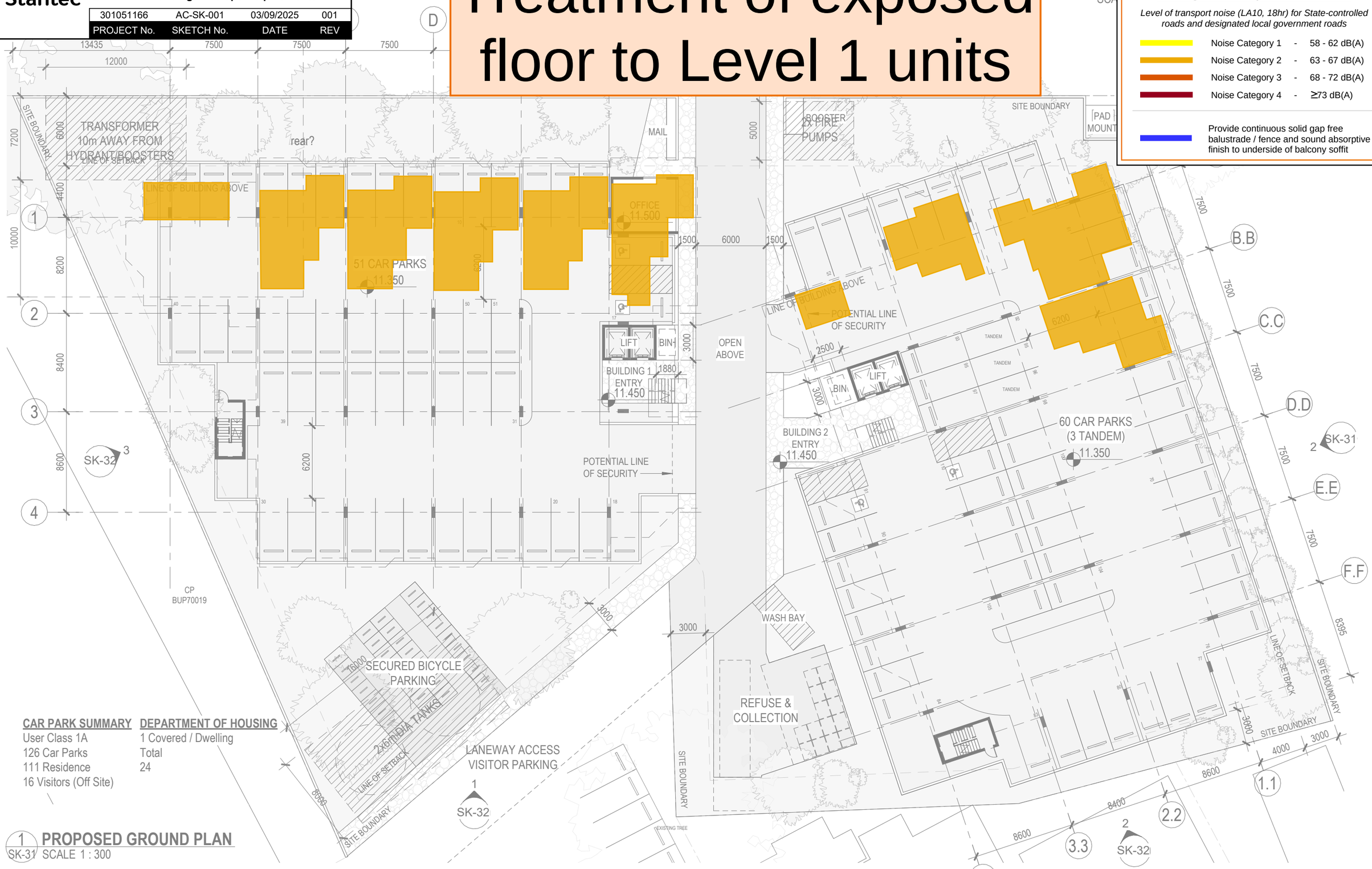
Queensland Development Code MP 4.4

Buildings in a Transport Noise Corridor

Level of transport noise (LA10, 18hr) for State-controlled roads and designated local government roads

- Noise Category 1 - 58 - 62 dB(A)
- Noise Category 2 - 63 - 67 dB(A)
- Noise Category 3 - 68 - 72 dB(A)
- Noise Category 4 - ≥73 dB(A)

Provide continuous solid gap free balustrade / fence and sound absorptive finish to underside of balcony soffit



CAR PARK SUMMARY
User Class 1A
126 Car Parks
111 Residence
16 Visitors (Off Site)

DEPARTMENT OF HOUSING
1 Covered / Dwelling
Total
24

1 PROPOSED GROUND PLAN
SK-31 SCALE 1 : 300

PROJECT	CLIENT DETAILS	TITLE	PROJECT NO.	DATE	DRAWING No.	ISSUE
ROSS RIVER ROAD RESIDENTIAL **344/346 & 350 ROSS RIVER RD** **CRANBROOK, QLD, 4814**		**PROPOSED FLOOR PLAN - GROUND**	**25869**	**27.08.25**	**SK-21**	**P3**

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SKETCH TITLE *Prepared By: MK*

344 - 350 Ross River Road Cranbrook
QDC MP4.4 Building Envelope Requirements

301051166	AC-SK-001	03/09/2025	001
PROJECT No.	SKETCH No.	DATE	REV

Level 1

Queensland Development Code MP 4.4

Buildings in a Transport Noise Corridor

Level of transport noise (LA10, 18hr) for State-controlled roads and designated local government roads

- Noise Category 1 - 58 - 62 dB(A)
- Noise Category 2 - 63 - 67 dB(A)
- Noise Category 3 - 68 - 72 dB(A)
- Noise Category 4 - ≥73 dB(A)

Provide continuous solid gap free balustrade / fence and sound absorptive finish to underside of balcony soffit

Building 1

Building 2

GARDEN

LINE OF SETBACK

SITE BOUNDARY

LINE OF VEHICULAR ACCESS BELOW

POTENTIAL BRIDGE

FIRE

LIFT

BIN CHUTE

3B 2B 93SQM

2B 1B 76SQM

2B 1B PLATINUM 84SQM

1B 1B SILVER 52SQM

1B 1B GOLD 51SQM

1B 1B SILVER 51SQM

1B 1B GOLD 51SQM

SK-31

SK-32

APARTMENT TYPOLOGY

- 1 Bed
- 2 Bed
- 3 Bed

APARTMENT YIELD

Levels 1-3
6 x 1 Bed
14 x 2 Bed
2 x 3 Bed

Top Level
3 x 1 Bed
0 x 2 Bed
12 x 3 Bed

DEPARTMENT OF HOUSING

Levels 1-3
3 x 1 Bed Gold
3 x 1 Bed Silver
1 x 2 Bed Platinum

Top Level
3 x 1 Bed Silver

Total
24 Units

1 PROPOSED LEVEL 1

SK-31 SCALE 1 : 300

PROJECT	CLIENT DETAILS	TITLE	PROJECT NO.	DATE	DRAWING No.	ISSUE
ROSS RIVER ROAD RESIDENTIAL 344/346 & 350 ROSS RIVER RD CRANBROOK, QLD, 4814		PROPOSED FLOOR PLAN -LEVEL 1	25869	28.08.25	SK-22	P4

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SKETCH TITLE *Prepared By: MK*

344 - 350 Ross River Road Cranbrook
QDC MP4.4 Building Envelope Requirements

PROJECT No.	SKETCH No.	DATE	REV
301051166	AC-SK-001	03/09/2025	001

Level 2

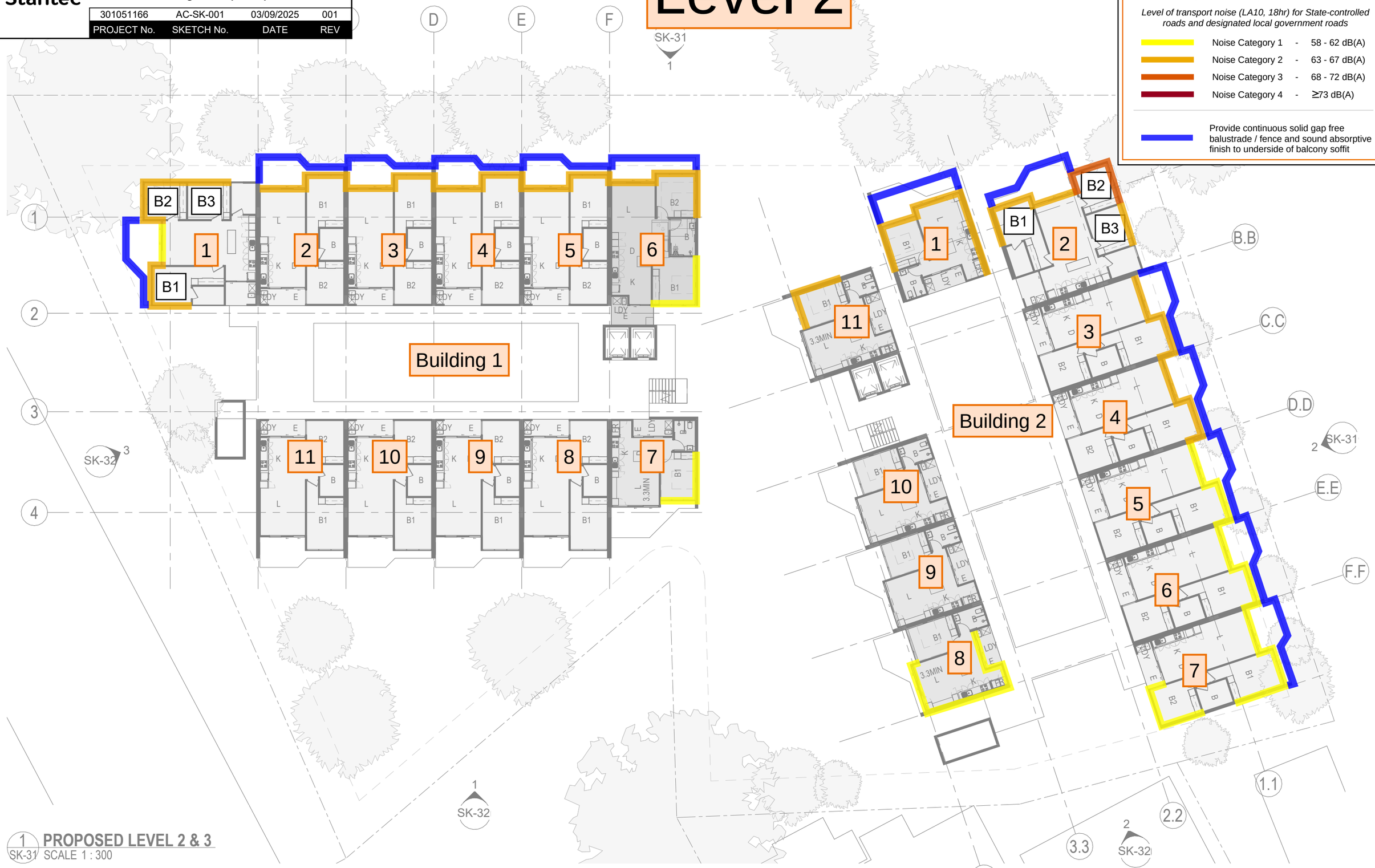
Queensland Development Code MP 4.4

Buildings in a Transport Noise Corridor

Level of transport noise (LA10, 18hr) for State-controlled roads and designated local government roads

- Noise Category 1 - 58 - 62 dB(A)
- Noise Category 2 - 63 - 67 dB(A)
- Noise Category 3 - 68 - 72 dB(A)
- Noise Category 4 - ≥73 dB(A)

Provide continuous solid gap free balustrade / fence and sound absorptive finish to underside of balcony soffit



1 SK-31 **PROPOSED LEVEL 2 & 3** SCALE 1 : 300

PROJECT	CLIENT DETAILS	TITLE	PROJECT NO.	DATE	DRAWING No.	ISSUE
ROSS RIVER ROAD RESIDENTIAL 344/346 & 350 ROSS RIVER RD CRANBROOK, QLD, 4814		PROPOSED FLOOR PLAN - LEVEL 2 & 3	25869	28.08.25	SK-23	P4

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SKETCH TITLE *Prepared By: MK*

344 - 350 Ross River Road Cranbrook
QDC MP4.4 Building Envelope Requirements

PROJECT No.	SKETCH No.	DATE	REV
301051166	AC-SK-001	03/09/2025	001

Level 3

Queensland Development Code MP 4.4

Buildings in a Transport Noise Corridor

Level of transport noise (LA10, 18hr) for State-controlled roads and designated local government roads

- Noise Category 1 - 58 - 62 dB(A)
- Noise Category 2 - 63 - 67 dB(A)
- Noise Category 3 - 68 - 72 dB(A)
- Noise Category 4 - ≥73 dB(A)

Provide continuous solid gap free balustrade / fence and sound absorptive finish to underside of balcony soffit

Building 1

Building 2

SK-31

SK-32

1 PROPOSED LEVEL 2 & 3

SK-31 SCALE 1 : 300

PROJECT	CLIENT DETAILS	TITLE	PROJECT NO.	DATE	DRAWING No.	ISSUE
ROSS RIVER ROAD RESIDENTIAL 344/346 & 350 ROSS RIVER RD CRANBROOK, QLD, 4814		PROPOSED FLOOR PLAN - LEVEL 2 & 3	25869	28.08.25	SK-23	P4

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SKETCH TITLE *Prepared By: MK*

344 - 350 Ross River Road Cranbrook
QDC MP4.4 Building Envelope Requirements

301051166	AC-SK-001	03/09/2025	001
PROJECT No.	SKETCH No.	DATE	REV

Level 4

Exposed roof areas of Level 3 units below

Exposed roof areas of Level 3 units below

Queensland Development Code MP 4.4

Buildings in a Transport Noise Corridor

Level of transport noise (LA10, 18hr) for State-controlled roads and designated local government roads

- Noise Category 1 - 58 - 62 dB(A)
- Noise Category 2 - 63 - 67 dB(A)
- Noise Category 3 - 68 - 72 dB(A)
- Noise Category 4 - ≥73 dB(A)

Provide continuous solid gap free balustrade / fence and sound absorptive finish to underside of balcony soffit

Building 1

Building 2

APARTMENT TYPOLOGY

- 1 Bed
- 2 Bed
- 3 Bed

APARTMENT YIELD

Levels 1-3
6 x 1 Bed
14 x 2 Bed
2 x 3 Bed

Top Level
3 x 1 Bed
0 x 2 Bed
12 x 3 Bed

DEPARTMENT OF HOUSING

Levels 1-3
3 x 1 Bed Gold
3 x 1 Bed Silver
1 x 2 Bed Platinum

Top Level
3 x 1 Bed Silver

Total
24 Units

PROJECT	CLIENT DETAILS	TITLE	PROJECT NO.	DATE	DRAWING No.	ISSUE
ROSS RIVER ROAD RESIDENTIAL 344/346 & 350 ROSS RIVER RD CRANBROOK, QLD, 4814		PROPOSED FLOOR PLAN - LEVEL 4	25869	28.08.25	SK-30	P4

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SKETCH TITLE *Prepared By: MK*

Stantec

344 - 350 Ross River Road Cranbrook
QDC MP4.4 Building Envelope Requirements

PROJECT No.	SKETCH No.	DATE	REV
301051166	AC-SK-001	03/09/2025	001

Treatment of Level 4 unit roof

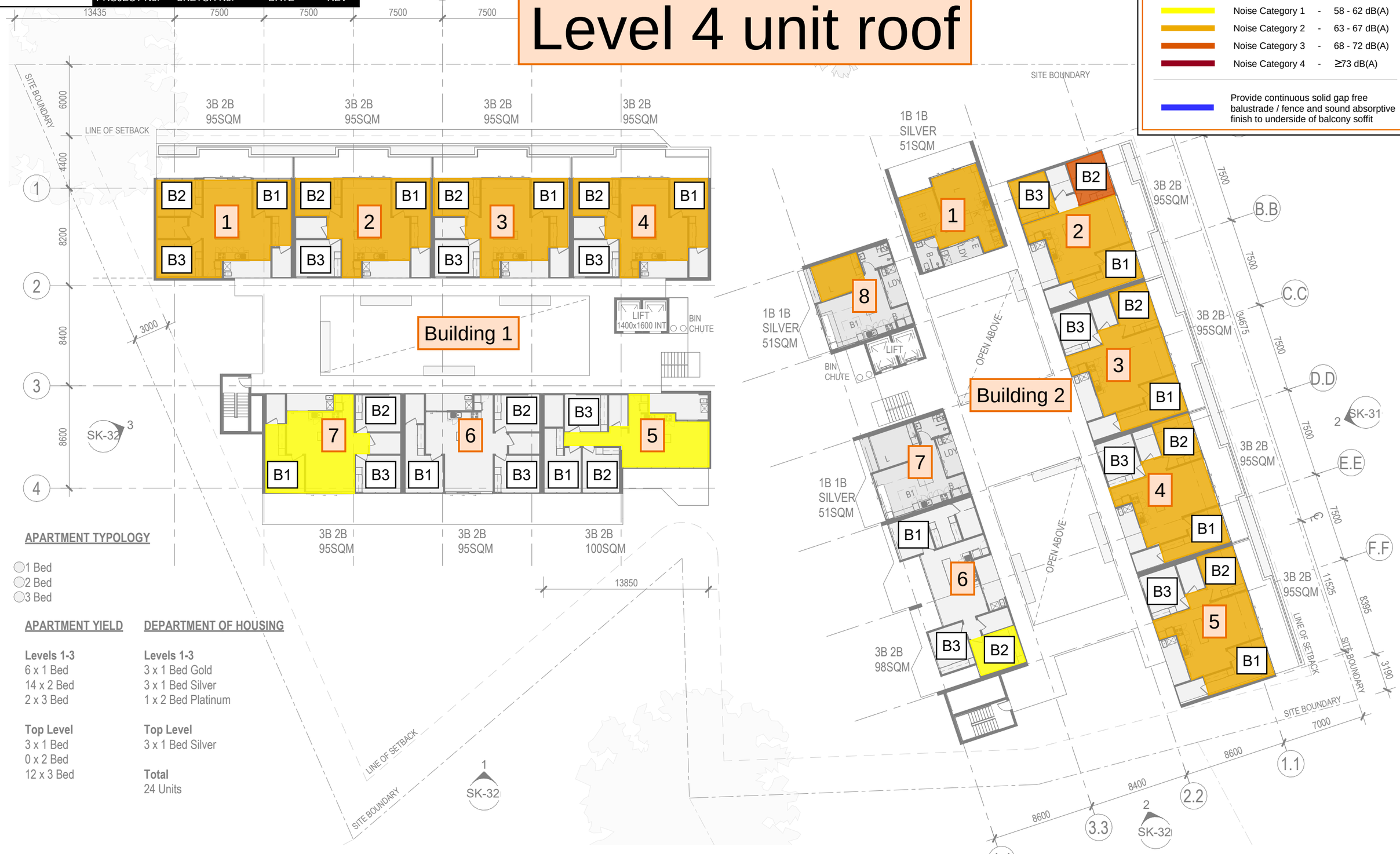
Queensland Development Code MP 4.4

Buildings in a Transport Noise Corridor

Level of transport noise (LA10, 18hr) for State-controlled roads and designated local government roads

- Noise Category 1 - 58 - 62 dB(A)
- Noise Category 2 - 63 - 67 dB(A)
- Noise Category 3 - 68 - 72 dB(A)
- Noise Category 4 - ≥73 dB(A)

Provide continuous solid gap free balustrade / fence and sound absorptive finish to underside of balcony soffit



APARTMENT TYPOLOGY

- 1 Bed
- 2 Bed
- 3 Bed

APARTMENT YIELD

Levels 1-3
6 x 1 Bed
14 x 2 Bed
2 x 3 Bed

Top Level
3 x 1 Bed
0 x 2 Bed
12 x 3 Bed

DEPARTMENT OF HOUSING

Levels 1-3
3 x 1 Bed Gold
3 x 1 Bed Silver
1 x 2 Bed Platinum

Top Level
3 x 1 Bed Silver

Total
24 Units

PROJECT	CLIENT DETAILS	TITLE	PROJECT NO.	DATE	DRAWING No.	ISSUE
ROSS RIVER ROAD RESIDENTIAL 344/346 & 350 ROSS RIVER RD CRANBROOK, QLD, 4814		PROPOSED FLOOR PLAN - LEVEL 4	25869	28.08.25	SK-30	P4

COUNTERPOINT

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Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

Appendix E Road Noise Modelling Results

Building	Unit	Room	Fl	L10(18h) dB(A)	Category
1	Unit 1	Bed 1	F 1	62	Category 1
1	Unit 1	Bed 2	F 1	67	Category 2
1	Unit 1	Bed 3	F 1	67	Category 2
1	Unit 1	Living	F 1	62	Category 1
1	Unit 1	Bed 1	F 2	63	Category 2
1	Unit 1	Bed 2	F 2	67	Category 2
1	Unit 1	Bed 3	F 2	67	Category 2
1	Unit 1	Living	F 2	62	Category 1
1	Unit 1	Bed 1	F 3	63	Category 2
1	Unit 1	Bed 2	F 3	67	Category 2
1	Unit 1	Bed 3	F 3	67	Category 2
1	Unit 1	Living	F 3	62	Category 1
1	Unit 1	Bed 1	F 4	66	Category 2
1	Unit 1	Bed 2	F 4	66	Category 2
1	Unit 1	Bed 3	F 4	63	Category 2
1	Unit 1	Living	F 4	66	Category 2
1	Unit 2	Bed 1	F 1	67	Category 2
1	Unit 2	Living	F 1	67	Category 2
1	Unit 2	Bed 1	F 2	67	Category 2
1	Unit 2	Living	F 2	67	Category 2
1	Unit 2	Bed 1	F 3	67	Category 2
1	Unit 2	Living	F 3	67	Category 2
1	Unit 2	Bed 1	F 4	66	Category 2
1	Unit 2	Bed 2	F 4	66	Category 2
1	Unit 2	Living	F 4	66	Category 2
1	Unit 3	Bed 1	F 1	67	Category 2
1	Unit 3	Living	F 1	67	Category 2
1	Unit 3	Bed 1	F 2	67	Category 2
1	Unit 3	Living	F 2	67	Category 2
1	Unit 3	Bed 1	F 3	67	Category 2
1	Unit 3	Living	F 3	67	Category 2
1	Unit 3	Bed 1	F 4	66	Category 2
1	Unit 3	Bed 2	F 4	66	Category 2
1	Unit 3	Living	F 4	66	Category 2
1	Unit 4	Bed 1	F 1	67	Category 2
1	Unit 4	Living	F 1	67	Category 2
1	Unit 4	Bed 1	F 2	67	Category 2
1	Unit 4	Living	F 2	67	Category 2
1	Unit 4	Bed 1	F 3	67	Category 2
1	Unit 4	Living	F 3	67	Category 2
1	Unit 4	Bed 1	F 4	66	Category 2
1	Unit 4	Bed 2	F 4	66	Category 2

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

Building	Unit	Room	Fl	L10(18h) dB(A)	Category
1	Unit 4	Living	F 4	66	Category 2
1	Unit 5	Bed 1	F 1	67	Category 2
1	Unit 5	Living	F 1	67	Category 2
1	Unit 5	Bed 1	F 2	67	Category 2
1	Unit 5	Living	F 2	67	Category 2
1	Unit 5	Bed 1	F 3	67	Category 2
1	Unit 5	Living	F 3	67	Category 2
1	Unit 5	Living	F 4	59	Category 1
1	Unit 6	Bed 1	F 1	62	Category 1
1	Unit 6	Bed 2	F 1	67	Category 2
1	Unit 6	Living	F 1	67	Category 2
1	Unit 6	Bed 1	F 2	62	Category 1
1	Unit 6	Bed 2	F 2	67	Category 2
1	Unit 6	Living	F 2	67	Category 2
1	Unit 6	Bed 1	F 3	62	Category 1
1	Unit 6	Bed 2	F 3	67	Category 2
1	Unit 6	Living	F 3	67	Category 2
1	Unit 7	Bed 1	F 1	58	Category 1
1	Unit 7	Bed 1	F 2	58	Category 1
1	Unit 7	Bed 1	F 3	58	Category 1
1	Unit 7	Bed 1	F 4	60	Category 1
1	Unit 7	Entry	F 4	58	Category 1
1	Unit 11	Living	F 3	58	Category 1
1	Unit 11	Living	F 3	59	Category 1
2	Unit 1	Bed 1	F 1	64	Category 2
2	Unit 1	Living	F 1	65	Category 2
2	Unit 1	Bed 1	F 2	64	Category 2
2	Unit 1	Living	F 2	65	Category 2
2	Unit 1	Bed 1	F 3	64	Category 2
2	Unit 1	Living	F 3	65	Category 2
2	Unit 1	Bed 1	F 4	64	Category 2
2	Unit 1	Living	F 4	65	Category 2
2	Unit 2	Bed 1	F 1	66	Category 2
2	Unit 2	Bed 2	F 1	67	Category 2
2	Unit 2	Bed 3	F 1	64	Category 2
2	Unit 2	Living	F 1	66	Category 2
2	Unit 2	Bed 1	F 2	66	Category 2
2	Unit 2	Bed 2	F 2	68	Category 3
2	Unit 2	Bed 3	F 2	65	Category 2
2	Unit 2	Living	F 2	66	Category 2
2	Unit 2	Bed 1	F 3	66	Category 2
2	Unit 2	Bed 2	F 3	68	Category 3
2	Unit 2	Bed 3	F 3	66	Category 2
2	Unit 2	Living	F 3	66	Category 2
2	Unit 2	Bed 1	F 4	65	Category 2

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

Building	Unit	Room	Fl	L10(18h) dB(A)	Category
2	Unit 2	Bed 2	F 4	68	Category 3
2	Unit 2	Bed 3	F 4	66	Category 2
2	Unit 2	Living	F 4	65	Category 2
2	Unit 3	Bed 1	F 1	63	Category 2
2	Unit 3	Living	F 1	63	Category 2
2	Unit 3	Bed 1	F 2	64	Category 2
2	Unit 3	Living	F 2	64	Category 2
2	Unit 3	Bed 1	F 3	65	Category 2
2	Unit 3	Living	F 3	65	Category 2
2	Unit 3	Bed 1	F 4	64	Category 2
2	Unit 3	Bed 2	F 4	65	Category 2
2	Unit 3	Living	F 4	65	Category 2
2	Unit 4	Bed 1	F 1	62	Category 1
2	Unit 4	Living	F 1	61	Category 1
2	Unit 4	Bed 1	F 2	63	Category 2
2	Unit 4	Living	F 2	63	Category 2
2	Unit 4	Bed 1	F 3	64	Category 2
2	Unit 4	Living	F 3	64	Category 2
2	Unit 4	Bed 1	F 4	64	Category 2
2	Unit 4	Bed 2	F 4	64	Category 2
2	Unit 4	Living	F 4	64	Category 2
2	Unit 5	Bed 1	F 1	61	Category 1
2	Unit 5	Living	F 1	61	Category 1
2	Unit 5	Bed 1	F 2	62	Category 1
2	Unit 5	Living	F 2	62	Category 1
2	Unit 5	Bed 1	F 3	64	Category 2
2	Unit 5	Living	F 3	64	Category 2
2	Unit 5	Bed 1	F 4	65	Category 2
2	Unit 5	Bed 2	F 4	64	Category 2
2	Unit 5	Entry	F 4	58	Category 1
2	Unit 5	Living	F 4	64	Category 2
2	Unit 6	Bed 1	F 1	61	Category 1
2	Unit 6	Living	F 1	60	Category 1
2	Unit 6	Bed 1	F 2	62	Category 1
2	Unit 6	Living	F 2	61	Category 1
2	Unit 6	Bed 1	F 3	64	Category 2
2	Unit 6	Living	F 3	63	Category 2
2	Unit 6	Bed 2	F 4	61	Category 1
2	Unit 7	Bed 1	F 1	61	Category 1
2	Unit 7	Living	F 1	60	Category 1
2	Unit 7	Bed 1	F 2	62	Category 1
2	Unit 7	Bed 2	F 2	60	Category 1
2	Unit 7	Living	F 2	61	Category 1
2	Unit 7	Bed 1	F 3	64	Category 2
2	Unit 7	Bed 2	F 3	62	Category 1

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

Building	Unit	Room	Fl	L10(18h) dB(A)	Category
2	Unit 7	Living	F 3	63	Category 2
2	Unit 8	Entry	F 2	58	Category 1
2	Unit 8	Entry	F 3	60	Category 1
2	Unit 8	Living	F 4	63	Category 2
2	Unit 9	Entry	F 3	58	Category 1
2	Unit 11	Bed 1	F 1	63	Category 2
2	Unit 11	Bed 1	F 2	63	Category 2
2	Unit 11	Bed 1	F 3	63	Category 2

Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

Appendix F Environment Emissions – Source Group Contributions

Noise Sensitive Receptor	Fl.	Outdoor Noise Limit, dB(A) L_{eq}			Predicted Outdoor Noise Level, dB(A) L_{eq}			Source	Group Source Contribution dB(A) L_{eq}		
		D [1)]	E [1)]	N [1)]	D	E	N		D	E	N
7 Albert Street	GF	58	55	52	55	47	44	GF Carparks	46	46	42
								Cars – Albert St Exit	39	39	39
								Waste Truck Drive In / Out	43	—	—
								Waste Idle / Pickup	54	—	—
	L1	58	55	52	56	47	44	GF Carparks	46	46	42
								Cars – Albert St Exit	40	40	40
								Waste Truck Drive In / Out	43	—	—
								Waste Idle / Pickup	55	—	—
11 Albert Street	GF	58	55	52	54	43	41	GF Carparks	41	41	37
								Cars – Albert St Exit	39	39	39
								Waste Truck Drive In / Out	43	—	—
								Waste Idle / Pickup	54	—	—
	L1	58	55	52	55	43	42	GF Carparks	41	41	37
								Cars – Albert St Exit	40	40	40
								Waste Truck Drive In / Out	44	—	—
								Waste Idle / Pickup	54	—	—
13 Albert Street	GF	58	55	52	54	44	43	GF Carparks	40	40	40
								Cars – Albert St Exit	42	42	42
								Waste Truck Drive In / Out	45	—	—
								Waste Idle / Pickup	53	—	—
	L1	58	55	52	54	44	43	GF Carparks	40	40	40
								Cars – Albert St Exit	42	42	42
								Waste Truck Drive In / Out	46	—	—
								Waste Idle / Pickup	53	—	—
	L2	58	55	52	54	44	43	GF Carparks	41	41	41

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Document Set ID: 27701987
Version: 1, Version Date: 28/10/2025

Noise Sensitive Receptor	Fl.	Outdoor Noise Limit, dB(A)			Predicted Outdoor Noise Level, dB(A)			Source	Group Source Contribution dB(A)		
		L_{eq}			L_{eq}				L_{eq}		
		D [1]	E [1]	N [1]	D	E	N		D	E	N
13 Albert Street								Cars – Albert St Exit	40	40	40
								Waste Truck Drive In / Out	45	—	—
								Waste Idle / Pickup	53	—	—
17 – 19 Albert Steet	GF	58	55	52	56	49	49	GF Carparks	35	35	31
								Cars – Albert St Exit	49	49	49
								Waste Truck Drive In / Out	53	—	—
								Waste Idle / Pickup	49	—	—
352 Ross River Road	L1	58	55	52	57	47	46	GF Carparks	43	43	43
								Cars – Albert St Exit	45	45	45
								Waste Truck Drive In / Out	49	—	—
								Waste Idle / Pickup	56	—	—
357 Ross River Road	GF	58	55	52	40	37	33	GF Carparks	37	37	37
								Cars – Albert St Exit	25	25	25
								Waste Truck Drive In / Out	31	—	—
								Waste Idle / Pickup	36	—	—

NOTES:

1) Day (D) = 7 AM – 6 PM | Evening (E) = 6 PM – 10 PM | Night (N) = 6 AM – 7 AM

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Level 3,
52 Merivale Street
South Brisbane QLD 4101
Tel +61 7 3811 4500

stantec.com/au

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