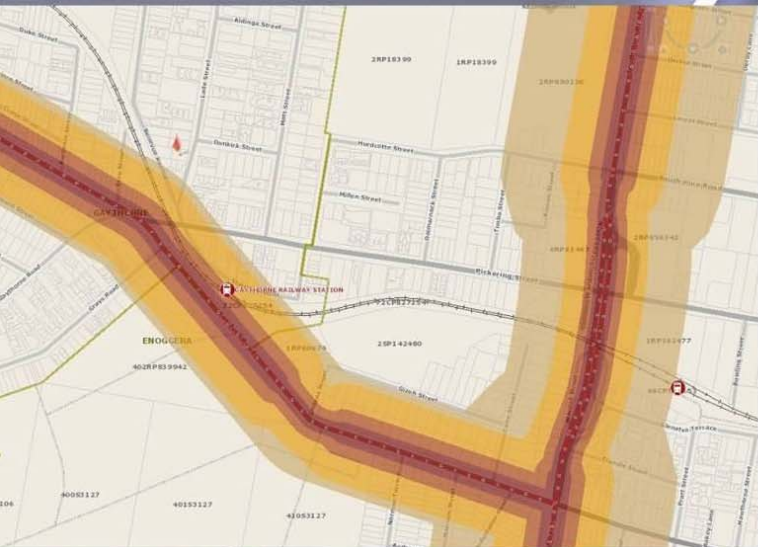




Document Control Page

NOISE MEASUREMENT SERVICES PTY LTD

18 Lade Street, Gaythorne QLD 4051

PO Box 2127

Brookside Centre, QLD 4053

Telephone: (07) 3355 9707

Facsimile: (07) 3355 7210

E-mail: info@noisemeasurement.com.au

Copy No _____

Revision No	Issue Date	Revision Description	Author	Review
0	08/07/2021	Draft Report for Consideration	JD	GR, MT
1	28/07/2021	Incorporate final plans and release	JD	MT

Copy No(s)	Rev No	Destination
1 pdf	1	Mayhill Planning and Architecture
2	1	Noise Measurement Services

REPORT FOR Mayhill Planning and Architecture

CONTACT Michael Lowe

Signed



Max Thorne
(Director)

DISCLAIMER

This Report by Noise Measurement Services Pty Ltd is prepared for a particular Client and is based on the agreed objective, scope, conditions and limitations as may be stated in the Executive summary. The Report presents only the information that Noise Measurement Services Pty Ltd believes, in its professional opinion, is relevant and necessary to describe the issues involved. The Report should not be used for anything other than the intended purpose and should not be reproduced, presented or reviewed except in full. The intellectual property of this Report remains with Noise Measurement Services Pty Ltd. The Client is authorised, upon payment to Noise Measurement Services Pty Ltd of the agreed Report preparation fee, to provide this Report in full to any third party.

Contents

Executive Summary	4
Conclusions.....	4
Recommendations.....	4
1. Introduction	8
2. Measurement of Ambient Noise Levels	13
2.1 Measurement Procedures.....	13
2.2 Measured Noise Levels.....	14
3. Noise Criteria and Limits	16
3.1 BCC – City Plan.....	16
3.1.1 Transport Noise Corridor Overlay Code.....	16
3.1.2 BCC – Residential Design – Multiple Dwelling Code	16
3.1.3 Brisbane City Plan 2014 – Centre or Mixed Use Code.....	18
3.2 QDC MP4.4 – Road and Rail Traffic Noise	20
3.3 Air Conditioning - Noise Emissions	21
3.4 Environmental Protection (Noise) Policy 2019.....	22
3.5 State Development Assessment Provisions	22
4. Noise Impact Assessment	23
4.1 Brisbane City Plan 2014	23
4.1.1 Car Parking and Vehicle Movements	23
4.1.2 Air- Conditioners.....	23
4.1.3 Gymnasium.....	23
4.1.4 Cafe	24
4.2 QDC MP4.4	24
Appendix A: Plans	28
Appendix B: Traffic Noise Calculations.....	33
Appendix C: Railway Noise Calculations	40
Appendix D: Building Construction – QDC MP4.4	47
Appendix E: Statement of Qualifications	55
Appendix F: Glossary.....	56

Executive Summary

This Report is in response to a request from Mayhill Planning and Architecture for a noise impact assessment report on a proposed 24 unit multiple residential development at 1 & 3 Folkestone Street, Bowen Hills (Lots 3 & 4 on RP10094). The development is adjacent to Abbotsford Road, which is a designated *Transport Noise Corridor* under the Brisbane City Council (BCC) Cityplan 2014. It is also within the *Transport Noise Corridor* for the Sunshine Coast/Caboolture and Inner City Rail line. The development is therefore subject to design requirements under the Queensland Development Code Mandatory Part 4.4. The default Noise Categories for the site are Category 3 and 2 for road traffic noise and Category 2 and 1 for rail noise. The default Noise Categories are only valid at ground level.

The site is in a Priority Development Area (PDA), administered by Economic Development Queensland (EDQ) (see **Plate 5**). It is understood that EDQ will employ relevant Council and State for assessment of a development in a PDA. The noise level criteria applicable to this development are contained in:

- Brisbane City Council – City Plan 2014
- Brisbane City Council - Multiple Dwelling Code
- Queensland Development Code Mandatory Part 4.4 – Buildings in a Transport Noise Corridor

In addition the following are considered:

- Department of Environment and Heritage Protection – Environmental Protection Act 1994 (EPA 94)
- State Development Assessment Provisions
- Australian Standard AS2702-1984 Acoustics-Methods for the measurement of road traffic noise

Conclusions

It is concluded that-

- The development is subject to significant levels of road traffic noise from Abbotsford Road. Units with facades overlooking Abbotsford Road are exposed to high levels of noise and are forecast at QDC MP4.4 Categories 3 and 4. Other unit façades will be screened or partially screened from road traffic noise by the unit high rise building itself, and are predicted to fall within Categories 0, 1 and 2 depending on façade location and screening. Predictions by façade are presented in **Section 4**.
- Noise from railway activity was not audible at the property during the site survey. Due to the high levels of traffic noise from Abbotsford Road, direct measurement of railway noise was not viable on site, and road traffic is considered the design driver for transport noise mitigation. Assessment of railway noise has been conducted based upon indicative previous measurements. Based upon this assessment, it is concluded that the required acoustic treatments to mitigate road traffic noise will also mitigate railway noise impacts.
- Noise emissions from vehicle and café activities on site are predicted to meet the requirements of the Brisbane City Plan, and generate minor if not negligible noise impacts due to the high levels of masking road traffic noise on site.

Recommendations

It is recommended that-

- The development be undertaken to achieve not less than the design considerations and acoustic treatments as outlined in **Section 4** in this Report and summarised in **Table ES1** following. 'Deemed to Satisfy' construction methods are outlined in **Appendix D**.

Table ES1: Forecast QDC Categories, year 2031. Levels are in dB(A), façade-adjusted.

Room	Build Noise Category (Road and Rail)	Minimum R _w Required for each component (Schedule 1, QDC MP4.4)					
		Glazing (<1.8m²)	Glazing (>1.8m²)	Walls	Roof/ Ceiling	Floors	Entrance Doors
Unit 101-304							
U101 Living N	Category 2	32	35	41	38	45	33
U101 Bed 1 N	Category 3	35	38	47	41	45	33
U101 Bed 1 E	Category 1	24	27	35	35	N/R	28
U101 Bed 2 W	Category 3	35	38	47	41	45	33
U101 Bed 2 N	Category 3	35	38	47	41	45	33
U101 Bed 3 W	Category 3	35	38	47	41	45	33
U102 Living E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U102 Living S	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U102 Bed 1 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U102 Bed 2 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U201 Living N	Category 2	32	35	41	38	45	33
U201 Bed 1 N	Category 3	35	38	47	41	45	33
U201 Bed 1 W	Category 4	43	43	52	45	51	35
U201 Bed 2 W	Category 4	43	43	52	45	51	35
U202 Living N	Category 2	32	35	41	38	45	33
U202 Living E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U202 Bed 1 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U202 Bed 2 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U203 Living E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U203 Living S	Category 2	32	35	41	38	45	33
U203 Bed 1 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U203 Bed 2 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U203 Bed 2 S	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U204 Living S	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U204 Kitchen E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U204 Kitchen S	Category 3	35	38	47	41	45	33
U204 Kitchen/Living W	Category 4	43	43	52	45	51	35
U204 Bed 1 W	Category 4	43	43	52	45	51	35
U301 Living N	Category 2	32	35	41	38	45	33
U301 Bed 1 N	Category 3	35	38	47	41	45	33
U301 Bed 1 W	Category 4	43	43	52	45	51	35
U301 Bed 2 W	Category 4	43	43	52	45	51	35
U302 Living N	Category 2	32	35	41	38	45	33
U302 Living E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U302 Bed 1 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U302 Bed 2 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U303 Living E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U303 Living S	Category 2	32	35	41	38	45	33
U303 Bed 1 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U303 Bed 2 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U303 Bed 2 S	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U304 Living S	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U304 Kitchen E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U304 Kitchen S	Category 3	35	38	47	41	45	33
U304 Kitchen/Living W	Category 4	43	43	52	45	51	35
U304 Bed 1 W	Category 4	43	43	52	45	51	35

Continued on following page...

Table ES1 continued:

Room	Build Noise Category (Road and Rail)	Minimum R _w Required for each component (Schedule 1, QDC MP4.4)					
		Glazing ($<1.8m^2$)	Glazing ($>1.8m^2$)	Walls	Roof/ Ceiling	Floors	Entrance Doors
Unit 401 -504							
U401 Living N	Category 2	32	35	41	38	45	33
U401 Bed 1 N	Category 3	35	38	47	41	45	33
U401 Bed 1 W	Category 4	43	43	52	45	51	35
U401 Bed 2 W	Category 4	43	43	52	45	51	35
U402 Living N	Category 2	32	35	41	38	45	33
U402 Living E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U402 Bed 1 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U402 Bed 2 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U403 Living E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U403 Living S	Category 3	35	38	47	41	45	33
U403 Bed 1 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U403 Bed 2 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U403 Bed 2 S	Category 1	24	27	35	35	N/R	28
U404 Living S	Category 2	32	35	41	38	45	33
U404 Kitchen E	Category 2	32	35	41	38	45	33
U404 Kitchen S	Category 4	43	43	52	45	51	35
U404 Kitchen/Living W	Category 4	43	43	52	45	51	35
U404 Bed 1 W	Category 4	43	43	52	45	51	35
U501 Living N	Category 2	32	35	41	38	45	33
U501 Bed 1 N	Category 3	35	38	47	41	45	33
U501 Bed 1 W	Category 4	43	43	52	45	51	35
U501 Bed 2 W	Category 4	43	43	52	45	51	35
U502 Living N	Category 2	32	35	41	38	45	33
U502 Living E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U502 Bed 1 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U502 Bed 2 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U503 Living E	Category 1	24	27	35	35	N/R	28
U503 Living S	Category 3	35	38	47	41	45	33
U503 Bed 1 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U503 Bed 2 E	Category 1	24	27	35	35	N/R	28
U503 Bed 2 S	Category 2	32	35	41	38	45	33
U504 Living S	Category 2	32	35	41	38	45	33
U504 Kitchen E	Category 2	32	35	41	38	45	33
U504 Kitchen S	Category 4	43	43	52	45	51	35
U504 Kitchen/Living W	Category 4	43	43	52	45	51	35
U504 Bed 1 W	Category 4	43	43	52	45	51	35

Continued on following page...

Table ES1 continued:

Room	Build Noise Category (Road and Rail)	Minimum R _w Required for each component (Schedule 1, QDC MP4.4)					
		Glazing (<1.8m²)	Glazing (>1.8m²)	Walls	Roof/ Ceiling	Floors	Entrance Doors
Unit 401 -504							
U601 Living N	Category 2	32	35	41	38	45	33
U601 Bed 1 N	Category 3	35	38	47	41	45	33
U601 Bed 1 W	Category 4	43	43	52	45	51	35
U601 Bed 2 W	Category 4	43	43	52	45	51	35
U602 Living N	Category 2	32	35	41	38	45	33
U602 Living E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U602 Bed 1 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U602 Bed 2 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
		32	35	41	38	45	33
U603 Living E	Category 2	35	38	47	41	45	33
U603 Living S	Category 3	N/R	N/R	N/R	N/R	N/R	N/R
U603 Bed 1 E	Category 0	32	35	41	38	45	33
U603 Bed 2 E	Category 2	32	35	41	38	45	33
U603 Bed 2 S	Category 2						
		32	35	41	38	45	33
U604 Living S	Category 2	32	35	41	38	45	33
U604 Kitchen E	Category 2	43	43	52	45	51	35
U604 Kitchen S	Category 4	43	43	52	45	51	35
U604 Kitchen/Living W	Category 4	43	43	52	45	51	35
U604 Bed 1 W	Category 4						
		35	38	47	41	45	33
U701 Living N	Category 3	N/R	N/R	N/R	N/R	N/R	N/R
U701 Living E	Category 0	43	43	52	45	51	35
U701 Bed 1 W	Category 4	35	38	47	41	45	33
U701 Bed 1 N	Category 3	N/R	N/R	N/R	N/R	N/R	N/R
U701 Bed 2 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U701 Bed 3 E	Category 0						
		43	43	52	45	51	35
U702 Living S	Category 4	N/R	N/R	N/R	N/R	N/R	N/R
U702 Bed 1 E	Category 0	35	38	47	41	45	33
U702 Bed 1 S	Category 3	43	43	52	45	51	35
U702 Bed 2 W	Category 4	43	43	52	45	51	35
U702 Bed 3 W	Category 4	43	43	52	45	51	35
U 702 Bed 3 S	Category 4	32	35	41	38	45	33

End of Table ES1

1. Introduction

This Report is in response to a request from Mayhill Planning and Architecture for a noise impact assessment report on a proposed 24 unit multiple residential development at 1 & 3 Folkestone Street, Bowen Hills (Lots 3 & 4 on RP10094). The development is adjacent to Abbotsford Road, which is a designated *Transport Noise Corridor* under the Brisbane City Council (BCC) Cityplan 2014. It is also within the *Transport Noise Corridor* for the Sunshine Coast/Caboolture and Inner City Rail line. The development is therefore subject to design requirements under the Queensland Development Code Mandatory Part 4.4. The default Noise Categories for the site are Category 3 and 2 for road traffic noise and Category 2 and 1 for rail noise. The default Noise Categories are only valid at ground level.

The site is in a Priority Development Area (PDA), administered by Economic Development Queensland (EDQ) (see **plate 5**). It is understood EDQ will employ relevant Council and State for assessment of a development in a PDA. The noise level criteria applicable to this development are contained in:

- Brisbane City Council – City Plan 2014
- Brisbane City Council - Multiple Dwelling Code
- Queensland Development Code Mandatory Part 4.4 – Buildings in a Transport Noise Corridor

In addition the following are considered:

- Department of Environment and Heritage Protection – Environmental Protection Act 1994 (EPA 94)
- State Development Assessment Provisions
- Australian Standard AS2702-1984 *Acoustics-Methods for the measurement of road traffic noise*

The locality and development design is presented in the following **plates** and **photographs**. Plans are set out in **Appendix A**. Terms and definitions used in this Report are found in **Appendix F**.

Plate 1.1: Showing the site and locality (source: Google; Queensland Government, Mayhill).



Plan 1.1: Showing the site plan for the development (Source: Mayhill Planning and Architecture).



ROTHSCHILD KINGSBRIDGE PTY LTD
client

1 & 3 FOLKESTONE ST, BOWEN HILLS
address

SITE ANALYSIS
drawing title

2020-108
job number

LP
drawn

1:900
scale at A3

DA 0.04
drawing number

J
issue

27.07.21
date

DA
description



Plate 1.2: Default road traffic Noise Categories for the Development, Category 3 and 2. (Source: Brisbane City Council).



Plate 1.3: Default rail traffic Noise Categories for the Development, Category 2 and 1. (Source: DILGP SPP interactive mapping)

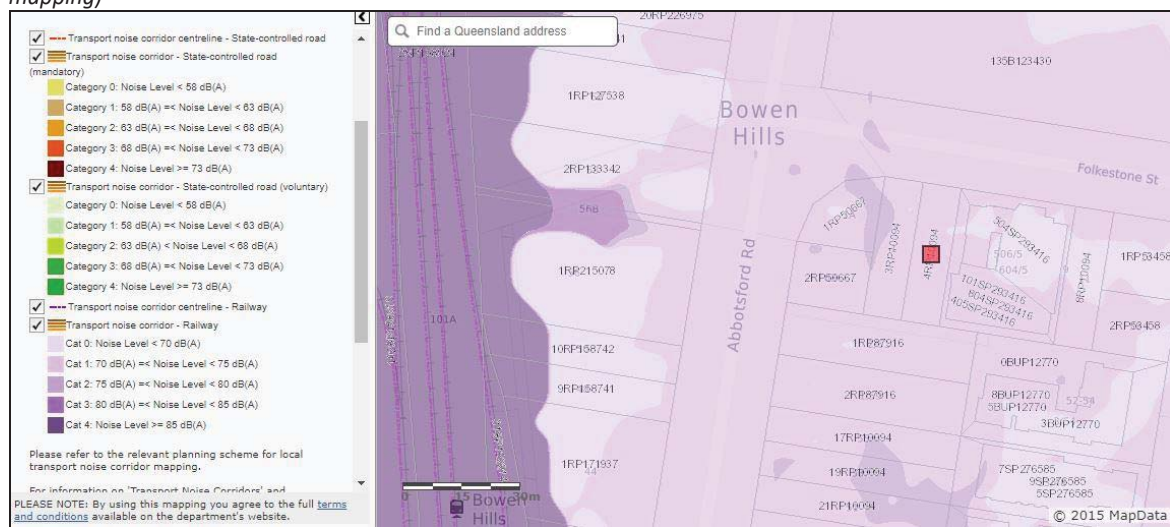


Plate 1.4: State Interest Zoning. The site is within a Priority Development Area (Source: Economic Development Queensland).

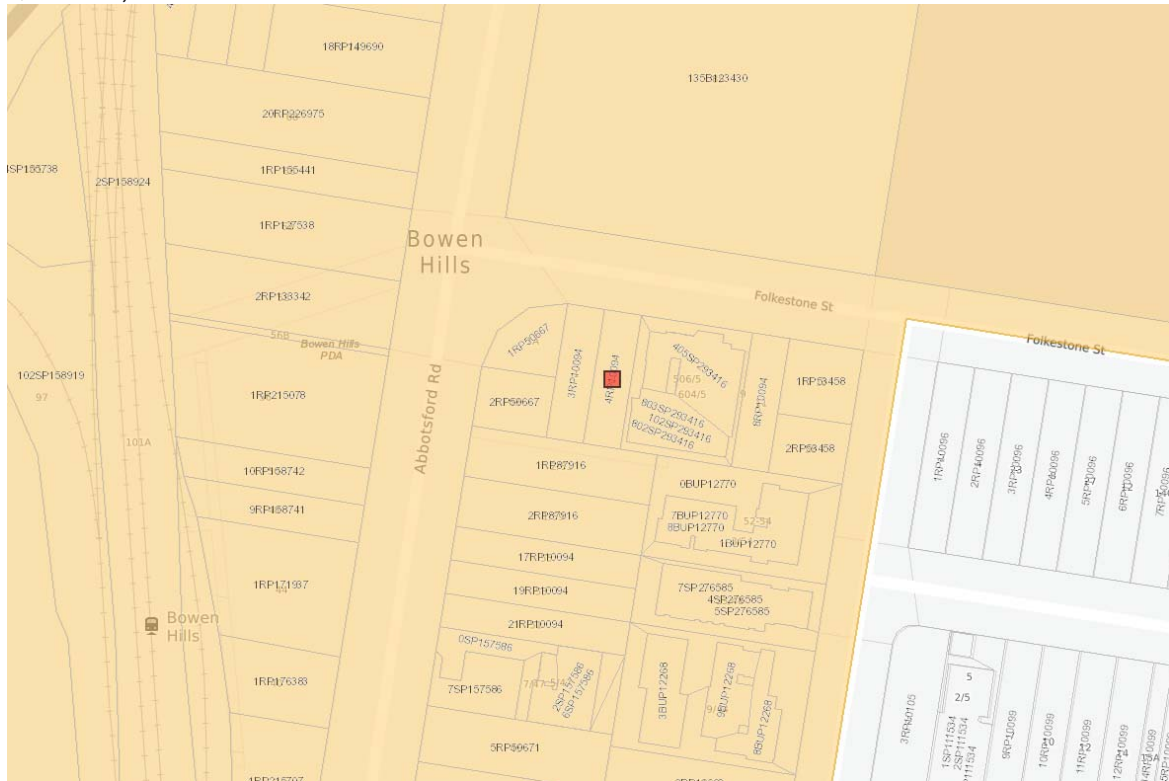


Plate 1.5: PDA Zoning. Note the site is within an emerging community zone for BCC purposes (Source: Mayhill Architecture)



1 BOWEN HILLS PDA ZONE PLAN
1:900 @ A3

ROTHSCHILD KINGSBRIDGE PTY LTD | 1 & 3 FOLKESTONE ST, BOWEN HILLS

ZONE PLAN
drawing title

2020-108 | LP | 1:900 | DA 0.02 | J | 27.07.21 | DA
job number | drawn | scale at A3 | day number | issue | date | description



Photo 1: Showing current view of the site from Folkestone Street



Photo 2: Showing current view of the site from Abbotsford Road



2. Measurement of Ambient Noise Levels

2.1 Measurement Procedures

In order to assess the potential impact of noise from all sources of noise in the locale, an ambient noise survey was conducted on-site. The noise logger was located on 3 Folkstone Street, Bowen Hills, 2.3 metres from the northern boundary, on the west boundary and 1.4 metres above ground level with a clear view of Abbotsford Road

The measurement location is identified as ML1 in this Report, and is presented in the following **plate and photographs**. The location was 1m from the existing building and is considered façade-affected.

Plate 2.1: The measurement location ML1 is marked. (Source: Google).



Photo 3: Showing ML1, view to road



The noise logger was field calibrated before and after the measurement session and was found to be within 0.4 dB(A) of the reference signal. All instrumentation used in this assessment hold a current calibration certificate from a certified NATA calibration laboratory. The following instruments were used to measure the ambient noise levels-

- Rion NL-22 Class 2 environmental noise logger;
- Larson Davis CAL200 Class 1 calibrator.

Ambient sound pressure levels were measured generally in accordance with Australian Standard AS1055.2018 - *Acoustics-Description and measurement of environmental noise* and Australian Standard AS2702-1984 *Acoustics-Methods for the measurement of road traffic noise*.

2.2 Measured Noise Levels

Ambient noise levels were recorded in 15 minute intervals from the 10th to the 16th of June 2021, and data from Thursday 11th June (representing a “typical” day) is presented in tabular form. The data is presented in **Figure 2.1** and **Table 2.1** below.

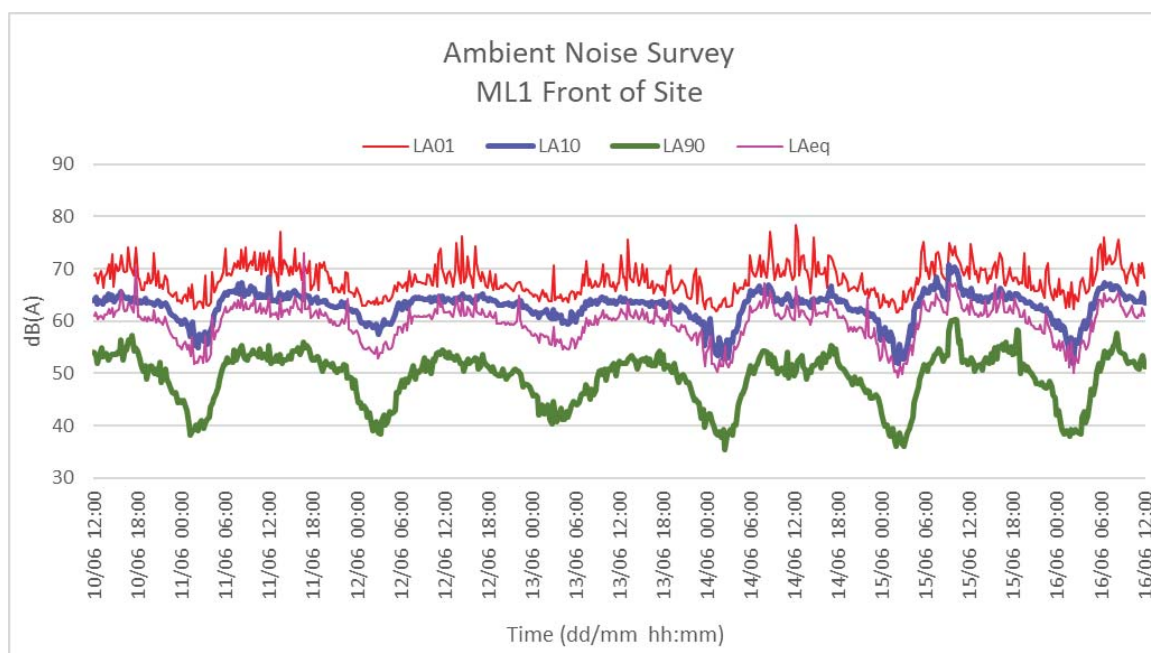


Figure 2.1: Measured ambient noise levels at Location ML1, (levels in dB(A), free field).

Table 2.1: Average ambient noise levels at ML1 on Thursday 11th June (levels in dB(A), free field).

Time	LA(01)	LA(10)	LA(90)	LAeq
Day 6am to 6pm	73.3	65.1	53.6	63.5
Evening 6pm to 10pm	71.0	63.4	51.6	60.7
Night 10pm to 6am	68.9	60.2	44.9	57.8
Day max 1-hr				68.1
Night max 1-hr (night to 6am)				62.3
CoRTN 6am to 12pm		64.4	52.6	
24 hour	72.0			61.6

The table above includes measured levels from all sources of noise including road traffic, residential and other local sources of noise. Road traffic noise from Abbotsford Road was observed to be the dominant noise source, and the data presented in **Table 1** and **Figure 1** is considered to be consistent with an acoustic environment controlled by road traffic noise. As a conservative assumption, the measured $L_{10, 18hr}$ from all sources is considered representative of road traffic noise, and has been used to calibrate the road traffic noise model presented in **Appendix B**.

Noise from railway activity was not audible at the property during the site survey. Due to the high levels of traffic noise from Abbotsford Road, it is concluded that direct measurement of railway noise is not viable on site, and that road traffic is considered the design driver for transport noise mitigation. Assessment of railway noise has been conducted based upon indicative previous measurements.

The measured $L_{10, 18hr}$ at ML1 was 66.9 dB(A), façade-adjusted. This value has been used to validate the road traffic noise model presented in **Appendix B**.

3. Noise Criteria and Limits

3.1 BCC – City Plan

3.1.1 Transport Noise Corridor Overlay Code

Under the BCC City Plan 2014, Abbotsford Road has been designed as a Transport Noise Corridor, and the development site is within Noise Categories 2 and 3 of the Abbotsford Road overlay presented on the Brisbane City Council website (see **Plate 1.2**). As a multiple dwelling within an Emerging Community Zone, it is understood that the development is assessable against the Transport Noise Corridor Overlay Code, as set out in Table 5.10.23 of the City Plan, and reproduced in **Table 3.1** below. Investigations show that the site is not under an *Industrial Amenity* Overlay, despite being in the vicinity of an industrial precinct. No industrial noise was observed during surveys, and it is considered that construction that achieves the design requirements for road traffic noise will also mitigate industrial noise.

Table 3.1: Brisbane City Plan 2014, Table 5.10.23 – Levels of assessment for Transport noise corridor overlay

Development	Level of assessment	Assessment criteria
All aspects of developments		
MCU, ROL, building work or operational work if prescribed exempt development	Exempt	Not applicable
MCU, ROL, building work or operational work if self-assessable development	No change	Not applicable
MCU		
MCU for a dual occupancy, multiple dwelling, residential care facility, retirement facility or rooming accommodation where accommodating 6 or more people, involving a new premises or an existing premises with an increase in gross floor area	No change	Transport noise corridor overlay code

It is concluded that there are mandated design requirements for mitigation of noise emissions from Abbotsford Road. Predictions of road traffic noise are set out in **Section 4**. The QDC MP4.4 is considered in **Section 3.3**.

3.1.2 BCC – Residential Design – Multiple Dwelling Code

The Brisbane City Council (BCC) *City Plan 2014 Multiple Dwelling Code* provides performance requirements and acceptable solutions for noise issues when assessing a material change of use and/or building work for a multiple dwelling not within a centre zone category or mixed use zone. As discussed in **Section 3.1** BCC has designated traffic noise corridors around certain Council roads, and the QDC MP4.4 methodology applies to acoustic assessment that may be required within these corridors. The QDC MP4.4 is considered in **Section 3.3**.

Table 3.2: Performance criteria and acceptable solutions from City Plan 2014 Section 9.3.14.3 Multiple Dwelling Code

Performance Criteria	Acceptable Outcome
PO21 Development..... provides car parking that minimises impacts on the quality of adjoining streetscapes or public spaces and the <i>amenity</i> of adjoining residents in terms of location, bulk, form and amenity impacts including noise, odour or light having regard to: (a) The proximity of <i>dwelling houses</i> or existing multiple dwellings on adjoining sites; (c) <i>setback</i> distances to mitigate impacts;	AO21.1 Development..... provides car parking that is: (a) Located below ground; (b) Located at ground level or above ground only if: (i) Contained within the <i>development footprint</i> and located behind the main building line, except where visitor parking. (c) Set back from front, rear and side boundaries in accordance with a neighbourhood plan or if no neighbourhood plan applies or no requirements are specified in a neighbourhood plan, <i>Table 9.3.14.3.E</i> (d) Screened and landscaped
PO23 Development provides vehicle access and parking that must not impact on the <i>amenity</i> and privacy of residents within or adjoining the site.	AO23.1 Development ... ensures that a hardstand or manoeuvring area situated at <i>ground level</i> is: (a) Located to minimise noise disturbance: (b) Screened to: (i) Minimise the reflection of car headlights onto dwelling windows; (ii) Attenuate noise; (c) Separated from habitable windows to minimize noise and fumes disturbance; AO23.2 Development (a) Ensures any vehicle movement or vehicle parking areas along the side or rear boundary are acoustically screened from adjoining dwellings; or (b) Provides a vegetated buffer next to any movement or parking areas of 1m wide along the side boundary and 2m wide along the rear boundary

Performance Criteria	Acceptable Solutions
PO34 Development provides front fencing and retaining walls that must: (a) Facilitate casual surveillance of the street and public space; (b) Enable use of private open space; (c) Assist in highlighting entrances to the property; (d) Provide a positive interface to the streetscape	AO34.1 Development ensures that, where fencing is provided, the height of any new fence located on any common boundary to a street or public space is a maximum of: (a) 1.2m, where fence construction is solid or less than 50% transparent; (b) 1.5m where fence construction is at least 50% transparent; (c) 1.8m and solid only where the site is on an arterial road.
PO37 Development must provide good neighbour fencing to adjoining properties.	AO37 Development with side and rear boundary fencing that is required to achieve or protect privacy or amenity, is: (a) A minimum of 1.8m in height; (b) A maximum of 1.2m in height where fence construction is solid or less than 50% transparent, or 1.5m where fence construction is at least 50% transparent, forward of the main building line to the front boundary except where it has a noise mitigation function.
PO42 Development that includes mechanical plant (including air-conditioning plant, heat pumps and swimming pool pumps) ensures it is located, designed and attenuated to achieve the following criteria: • $L_{Aeq,adj,T}$ emitted from mechanical plant is not greater than the rating background level plus 3 at a sensitive use not associated with the development. Where T is • Day (7am to 6pm): 11hr, • Evening (6pm to 10pm): 4hr, • Night (10pm to 7am): 9 hr.	AO42 Development ensures mechanical plant is <i>acoustically screened</i> from nearby sensitive uses.

3.1.3 Brisbane City Plan 2014 – Centre or Mixed Use Code

The City Plan 2014 Centre or Mixed Use Code provides guidance to assess the suitability of proposed centre use activities, and is summarized (in part) in **Tables 3** and **4** below. Calculation of and assessment to these criteria has been conducted in accordance with the City Plan 2014 Noise Impact Assessment Planning Scheme Policy.

Table 3.3: Centre or Mixed Use Code (in part)

Performance Outcome	Acceptable Outcome
PO1 Development: a) has hours of operation which are controlled so that the use does not detrimentally impact on the amenity of adjoining residents; b) where not located in a Special entertainment precinct identified in a neighbourhood plan, does not result in noise emissions that exceed the noise (planning) criteria in Table 9.3.3.F low frequency noise criteria in Table 9.3.3.3.G and night-time noise criteria in Table 9.3.3.3.H in a sensitive zone or a nearby sensitive use. Note—A noise impact assessment report prepared in accordance with the Noise impact assessment planning scheme policy can assist in demonstrating achievement of this performance outcome	AO1.1 Development: (c) for any other use: (i) where in the Principal centre zone or Major centre zone has unlimited hours of operation; (ii) where in the District centre zone, Neighbourhood centre zone or Mixed use zone: (A) has hours of operation, including for deliveries, which are limited to 6am to 10pm; or (B) does not generate noise which is clearly audible and disturbing in a dwelling or other sensitive use; (iii) where in any other zone: (A) has hours of operation, including for deliveries, which are limited to 6am to 8pm; or (B) does not generate noise which is clearly audible and disturbing in a dwelling or other sensitive use.
	AO1.2 Development ensures mechanical plant or equipment is acoustically screened from an adjoining sensitive use. Note—Mechanical plant includes generators, motors, compressors and pumps e.g. air-conditioning, refrigeration or cold room motors

3.2 QDC MP4.4 – Road and Rail Traffic Noise

The QDC MP4.4 is intended to ensure that habitable rooms of *relevant residential buildings* located in transport noise corridors are designed and constructed to reduce transport noise from the gazetted or designated road or rail in question. Noise reduction requirements fall into categories, based on $L_{10,18hr}$ or $L_{Amax, 24hr}$ noise levels along the façades of the proposed development (see **Table 3.3**). Construction of the dwelling is then to “deemed to satisfy” solutions, see **Table 3.4**.

The proposed development sits within Noise Categories 2 and 3 of the *Transport Noise Corridor* for Abbotsford Road at ground level, based on the noise contours published by Brisbane City Council (see **Plate 1.2**), and Noise Category 1 and 2 of the *Transport Noise Corridor* for the rail line at ground level, based on the noise contours published by DILGP (see **Plate 1.3**). These are calculated rather than measured and are only applicable to the ground level facades.

The development site is also located approximately 50m from Bowen Hills station, and is potentially exposed to noise from railway passes-by. It is noted that Brisbane City Council no longer has a railway noise policy, and that the Module 1 provisions are not mandated as the site is further than 25m from railway land. The site is in a transport noise corridor for the railway, at least in part, as shown in **Plate 1.3**.

Noise from railway activity was not audible at the property during the site survey. Due to the high levels of traffic noise from Abbotsford Road, it is concluded that direct measurement of railway noise is not viable on site, and that road traffic is considered the design driver for transport noise mitigation. Assessment of railway noise has been conducted based upon indicative previous measurements.

Table 3.3: Noise levels associated with QDC MP4.4 Noise Categories.

Noise Category	Level of Transport Noise $L_{A10,18hr}$ for State Controlled Roads	Level of Transport Noise $L_{A10,18hr}$ for Designated Local Government Roads	Single event maximum noise L_{Amax} for railway
Category 4	≥ 73 dB(A)	≥ 73 dB(A)	≥ 85 dB(A)
Category 3	68 - 72 dB(A)	68 - 72 dB(A)	80 - 84 dB(A)
Category 2	63 - 67 dB(A)	63 - 67 dB(A)	75 - 79 dB(A)
Category 1	58 - 62 dB(A)	58 - 62 dB(A)	70 - 74 dB(A)
Category 0	≤ 57 dB(A)	≤ 57 dB(A)	≤ 69 dB(A)

Note* the sound levels are measured at 1 metre from the façade.

Table 3.4: Performance requirements of QDC MP4.4.

Performance Requirements	Acceptable Solutions
Residential Buildings	
P1 <i>Habitable rooms in a relevant residential building are adequately protected from transport noise to safeguard occupants' health and amenity.</i>	A1 The <i>external envelope</i> of each habitable room in a <i>relevant residential building</i> must comply with the minimum R_w for each building component specified in Schedule 1 to achieve a minimum <i>transport noise reduction</i> level for the relevant <i>noise category</i> by: a) Using materials specified in Schedule 2; OR b) Using materials with <i>manufacturer's specifications</i> that, in combination, achieve the minimum R_w value for the relevant building component and acceptable <i>noise category</i>.

The revised categories are set out in **Section 4**. The default Deemed to Satisfy building solutions for these Categories, for use at Building Approval stage, are set out in **Appendix D**.

3.3 Air Conditioning - Noise Emissions

Alternative ventilation, such as air-conditioning, may be installed. State requirements are set out under the Environmental Protection Act 1994; in that Act noise from air conditioning must not exceed the following noise levels when measured as the LA90 dB(A) level over a period of 15 minutes at an affected building:

- Between 10pm and 7am: 3 dB(A) above the background level
- From 7am to 10pm: 5 dB(A) above the background level

It is considered that achieving the emission criteria set out in PO42 of the BCC Multiple Dwelling Code also achieves the less strict requirements of the EPA 1994. Noise mitigation for potential air conditioning is not within the scope of this report, although due to the high existing background levels the relevant criteria are considered readily achievable.

3.4 Environmental Protection (Noise) Policy 2019

The Environmental Protection (Noise) Policy 2019 establishes Acoustic Quality Objectives to protect or enhance stated environmental values. The environmental values to be enhanced or protected under the policy are the qualities of the acoustic environment that are conducive to protecting the health and biodiversity of ecosystems; and the qualities of the acoustic environment that are conducive to human health and well-being, including ensuring a suitable acoustic environment for individual's to sleep, study and learn, to be involved in recreation including relaxation and conversation; and the qualities of the acoustic environment that are conducive to protecting the amenity of the community. The values are generally protected by meeting the acoustic quality objectives.

The ambient observations for this Report indicate that road traffic noise is the dominant noise source at the development site. Noise from 'ordinary' use of public roads is specifically excluded from the Policy, and it is understood that the Acoustic Quality Objectives are not intended to override local government noise policies, where in force. It is therefore concluded that the policy objectives for the environmental values of an individual are applied as part of this development approval by meeting the requirements of the QDC MP4.4, and of the Brisbane City Plan 2014.

3.5 State Development Assessment Provisions

It is noted that Abbotsford Road is not a state-controlled road, and that the development site is not within 25m of a state-controlled road or railway land. It is therefore concluded that the provisions of Module 1 are not applicable to the proposed development. Acoustic design to mitigate transport noise impacts is nonetheless required through the Queensland Development Code Mandatory Part 4.4 (discussed in **Section 3.2** above).

4. Noise Impact Assessment

4.1 Brisbane City Plan 2014

4.1.1 Car Parking and Vehicle Movements

The development plans show parking areas to be located below ground, with vehicle movement areas screened from neighbouring properties in concurrence with Acceptable Outcomes **AO21.1-(a)**, **AO23.1** and **AO23.2** of the Multiple Dwelling Code. It is therefore concluded that noise from vehicle activity on site will be minimal, and meet the requirements of the Brisbane City Plan. Due to the high levels of road traffic noise in the locale, it is expected that vehicle activity on site will be generally masked by the existing acoustic environment.

4.1.2 Air-Conditioners

It is expected that dwellings within the development will incorporate some form of air-conditioning. However, the layout and plant selection has not been determined at this stage. The layout and selection of air-conditioning plant should be considered so that noise emission from the units does not exceed the noise emission criteria required by the BCC Multiple Dwelling Code, as presented in **Table 4.1** below. RBL calculations were made in accordance to the BCC Noise Impact Assessment Planning Scheme Policy.

Table 4.1: BCC Multiple Dwelling Code noise emission criteria, levels in dB(A).

	PO42 criteria	Measured RBL	Maximum emission to nearby sensitive use
Day	RBL + 3	51	54
Evening	RBL + 3	49	52
Night	RBL + 3	39	42

There is also an ongoing responsibility to comply with the requirements of the State of Queensland under the Environmental Protection Act 1994. The appropriate criteria to be met is set out in **Section 3.4**, although compliance with Council criteria is considered to also demonstrate compliance with the less stringent State criteria. Detailed plant noise assessment can be conducted – if required – at the Building Approval stage once specifications can be determined. Due to the high levels of road traffic noise in the locale, it is nonetheless expected that the criteria will be readily achievable without additional acoustic treatment.

4.1.3 Gymnasium

The development plans show a possible gymnasium near the south western side of Level 1. The design is fully enclosed, and it is expected that noise from exercise activities will be generally contained within the building envelope. Barring designated free-weight areas or amplified music – which are not envisioned and would be inconsistent with the scale of the room – it is predicted that noise breakout will be minimal, and generally masked by the high levels of road traffic noise in the locale. Detailed assessment of gymnasium activities can be conducted – if required – at the Building Approval stage once architectural plans and gymnasium layout become available, although it is expected that noise will be adequately contained within the building envelope without any additional acoustic treatment.

4.1.4 Cafe

The development plans show a Café on the northern façade of the building on Ground Level. While the specific tenancy and use has not been determined at this stage, it is understood that café activities will fall within the Acceptable Outcome hours of operation as set out in the *Centre or Mixed Use Code* – being “hours of operation, including for deliveries, which are limited to 6am to 8pm”. Due to the high levels of road traffic noise in the locale – and the exposed location of the outdoor café areas – it is expected that noise from café activity will be generally masked by road traffic noise, and in any case generate minor if not negligible noise impacts in the locale.

4.2 QDC MP4.4

New dwellings subject to Queensland Development Code Mandatory Part 4.4 – Buildings in a Transport Noise Corridor (“QDC MP4.4”) are built to the Category calculated on the basis of the $L_{10, 18hr}$ or $L_{Amax, 24hr}$ at its façade (this is height dependant, so different levels may have different Categories). This Code relates to the Habitable Rooms of a dwelling, and bedrooms are not differentiated from living rooms.

The Brisbane City Council transport noise corridor overlay defines this property as being in Category 2 and 3 at ground level. This has been reconsidered in this report which is prepared generally in accordance with the Department of Transport and Main Roads’ *Code of Practice*. Road traffic noise is identified as the dominant noise source at the development site, and the applicable QDC categories as calculated for road traffic noise are also considered to appropriately mitigate railway noise.

The nearest major road is Abbotsford Road, which is closely positioned to site. Measured traffic noise has been validated to current traffic flows and future road traffic noise from Abbotsford Road has been calculated into the 10 year design horizon. Details of the road traffic noise model are presented in **Appendix B**. Details of the Rail noise model are presented in **Appendix C**. Results from the traffic noise model are presenting in **Table 4.2** below. “Deemed to satisfy” building solutions for QDC MP4.4 Categories are presented in **Appendix D**.

It is recommended that balconies be largely “enclosed”; that is, the wing-walls and floor of solid construction. A ‘solid’ design has been shown to reduce noise within the centre of the balcony area, with a measured 3.5 dB(A) noise reduction over the façade level if solid balustrades are also included. It is unclear from development plans which – if any – balconies are to include solid balustrades, although a 3 dB(A) reduction to noise forecasts may be appropriate if solid balustrades are to be provided.

Table 4.2: Forecast QDC Categories, year 2031. Levels are in dB(A), façade-adjusted.

Room	Build Noise Category (Road and Rail)	Minimum R _w Required for each component (Schedule 1, QDC MP4.4)					
		Glazing (<1.8m²)	Glazing (>1.8m²)	Walls	Roof/ Ceiling	Floors	Entrance Doors
Unit 101-304							
U101 Living N	Category 2	32	35	41	38	45	33
U101 Bed 1 N	Category 3	35	38	47	41	45	33
U101 Bed 1 E	Category 1	24	27	35	35	N/R	28
U101 Bed 2 W	Category 3	35	38	47	41	45	33
U101 Bed 2 N	Category 3	35	38	47	41	45	33
U101 Bed 3 W	Category 3	35	38	47	41	45	33
U102 Living E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U102 Living S	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U102 Bed 1 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U102 Bed 2 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U201 Living N	Category 2	32	35	41	38	45	33
U201 Bed 1 N	Category 3	35	38	47	41	45	33
U201 Bed 1 W	Category 4	43	43	52	45	51	35
U201 Bed 2 W	Category 4	43	43	52	45	51	35
U202 Living N	Category 2	32	35	41	38	45	33
U202 Living E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U202 Bed 1 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U202 Bed 2 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U203 Living E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U203 Living S	Category 2	32	35	41	38	45	33
U203 Bed 1 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U203 Bed 2 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U203 Bed 2 S	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U204 Living S	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U204 Kitchen E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U204 Kitchen S	Category 3	35	38	47	41	45	33
U204 Kitchen/Living W	Category 4	43	43	52	45	51	35
U204 Bed 1 W	Category 4	43	43	52	45	51	35
U301 Living N	Category 2	32	35	41	38	45	33
U301 Bed 1 N	Category 3	35	38	47	41	45	33
U301 Bed 1 W	Category 4	43	43	52	45	51	35
U301 Bed 2 W	Category 4	43	43	52	45	51	35
U302 Living N	Category 2	32	35	41	38	45	33
U302 Living E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U302 Bed 1 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U302 Bed 2 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U303 Living E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U303 Living S	Category 2	32	35	41	38	45	33
U303 Bed 1 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U303 Bed 2 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U303 Bed 2 S	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U304 Living S	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U304 Kitchen E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U304 Kitchen S	Category 3	35	38	47	41	45	33
U304 Kitchen/Living W	Category 4	43	43	52	45	51	35
U304 Bed 1 W	Category 4	43	43	52	45	51	35

Continued on following page...

Table 4.2 continued:

Room	Build Noise Category (Road and Rail)	Minimum R _w Required for each component (Schedule 1, QDC MP4.4)					
		Glazing (<1.8m²)	Glazing (>1.8m²)	Walls	Roof/ Ceiling	Floors	Entrance Doors
Unit 401 -504							
U401 Living N	Category 2	32	35	41	38	45	33
U401 Bed 1 N	Category 3	35	38	47	41	45	33
U401 Bed 1 W	Category 4	43	43	52	45	51	35
U401 Bed 2 W	Category 4	43	43	52	45	51	35
U402 Living N	Category 2	32	35	41	38	45	33
U402 Living E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U402 Bed 1 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U402 Bed 2 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U403 Living E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U403 Living S	Category 3	35	38	47	41	45	33
U403 Bed 1 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U403 Bed 2 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U403 Bed 2 S	Category 1	24	27	35	35	N/R	28
U404 Living S	Category 2	32	35	41	38	45	33
U404 Kitchen E	Category 2	32	35	41	38	45	33
U404 Kitchen S	Category 4	43	43	52	45	51	35
U404 Kitchen/Living W	Category 4	43	43	52	45	51	35
U404 Bed 1 W	Category 4	43	43	52	45	51	35
U501 Living N	Category 2	32	35	41	38	45	33
U501 Bed 1 N	Category 3	35	38	47	41	45	33
U501 Bed 1 W	Category 4	43	43	52	45	51	35
U501 Bed 2 W	Category 4	43	43	52	45	51	35
U502 Living N	Category 2	32	35	41	38	45	33
U502 Living E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U502 Bed 1 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U502 Bed 2 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U503 Living E	Category 1	24	27	35	35	N/R	28
U503 Living S	Category 3	35	38	47	41	45	33
U503 Bed 1 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U503 Bed 2 E	Category 1	24	27	35	35	N/R	28
U503 Bed 2 S	Category 2	32	35	41	38	45	33
U504 Living S	Category 2	32	35	41	38	45	33
U504 Kitchen E	Category 2	32	35	41	38	45	33
U504 Kitchen S	Category 4	43	43	52	45	51	35
U504 Kitchen/Living W	Category 4	43	43	52	45	51	35
U504 Bed 1 W	Category 4	43	43	52	45	51	35

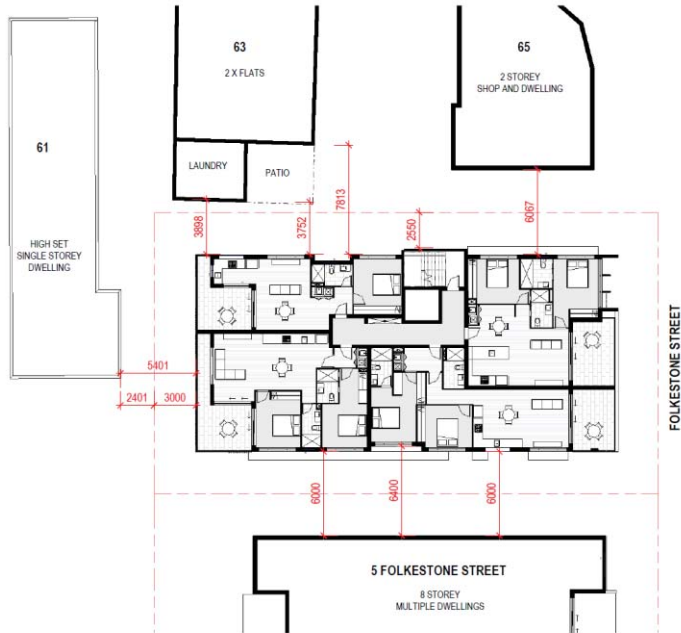
Continued on following page...

Table 4.2 continued:

Room	Build Noise Category (Road and Rail)	Minimum R _w Required for each component (Schedule 1, QDC MP4.4)					
		Glazing ($<1.8m^2$)	Glazing ($>1.8m^2$)	Walls	Roof/ Ceiling	Floors	Entrance Doors
Unit 401 -504							
U601 Living N	Category 2	32	35	41	38	45	33
U601 Bed 1 N	Category 3	35	38	47	41	45	33
U601 Bed 1 W	Category 4	43	43	52	45	51	35
U601 Bed 2 W	Category 4	43	43	52	45	51	35
U602 Living N	Category 2	32	35	41	38	45	33
U602 Living E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U602 Bed 1 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U602 Bed 2 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
		32	35	41	38	45	33
U603 Living E	Category 2	35	38	47	41	45	33
U603 Living S	Category 3	N/R	N/R	N/R	N/R	N/R	N/R
U603 Bed 1 E	Category 0	32	35	41	38	45	33
U603 Bed 2 E	Category 2	32	35	41	38	45	33
U603 Bed 2 S	Category 2						
		32	35	41	38	45	33
U604 Living S	Category 2	32	35	41	38	45	33
U604 Kitchen E	Category 2	43	43	52	45	51	35
U604 Kitchen S	Category 4	43	43	52	45	51	35
U604 Kitchen/Living W	Category 4	43	43	52	45	51	35
U604 Bed 1 W	Category 4						
		35	38	47	41	45	33
U701 Living N	Category 3	N/R	N/R	N/R	N/R	N/R	N/R
U701 Living E	Category 0	43	43	52	45	51	35
U701 Bed 1 W	Category 4	35	38	47	41	45	33
U701 Bed 1 N	Category 3	N/R	N/R	N/R	N/R	N/R	N/R
U701 Bed 2 E	Category 0	N/R	N/R	N/R	N/R	N/R	N/R
U701 Bed 3 E	Category 0						
		43	43	52	45	51	35
U702 Living S	Category 4	N/R	N/R	N/R	N/R	N/R	N/R
U702 Bed 1 E	Category 0	35	38	47	41	45	33
U702 Bed 1 S	Category 3	43	43	52	45	51	35
U702 Bed 2 W	Category 4	43	43	52	45	51	35
U702 Bed 3 W	Category 4	43	43	52	45	51	35
U 702 Bed 3 S	Category 4	32	35	41	38	45	33

End of Table ES1

Appendix A: Plans



1 BUILDING SEPARATION PLAN - TYPICAL TOWER
1:200 @ A3

ROTHSCHILD KINGSBRIDGE PTY LTD
client

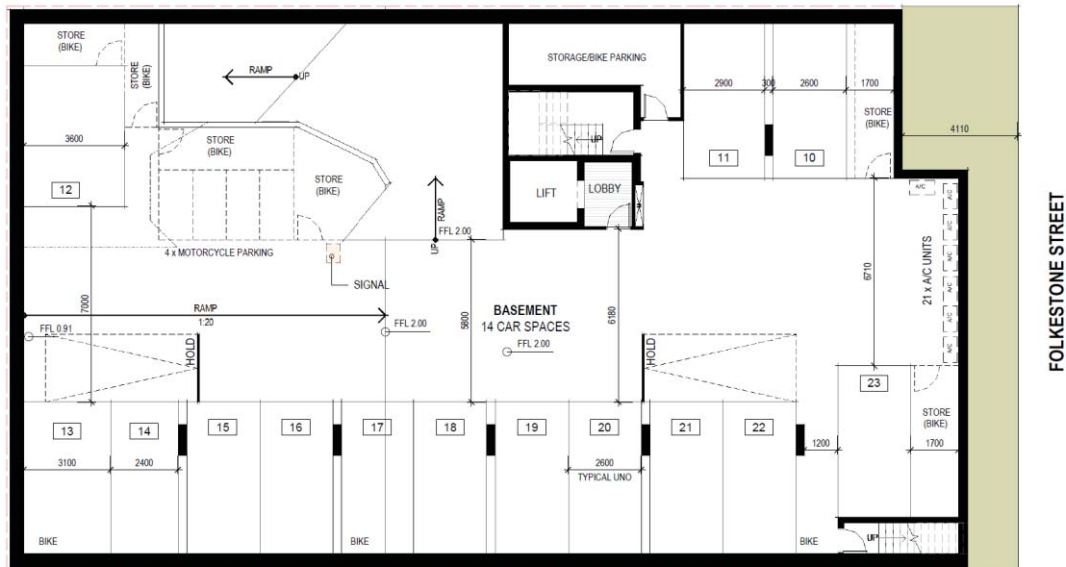
1 & 3 FOLKESTONE ST, BOWEN HILLS
address

BUILDING SEPARATION PLAN
drawing title

2020-108 LP 1:200 DA 1.02 J 27.07.21 DA
job number drawn scale at A3 day number issue date description



BASEMENT FLOOR PLAN



1 BASEMENT FLOOR
1:100 @ A3

ROTHSCHILD KINGSBRIDGE PTY LTD
client

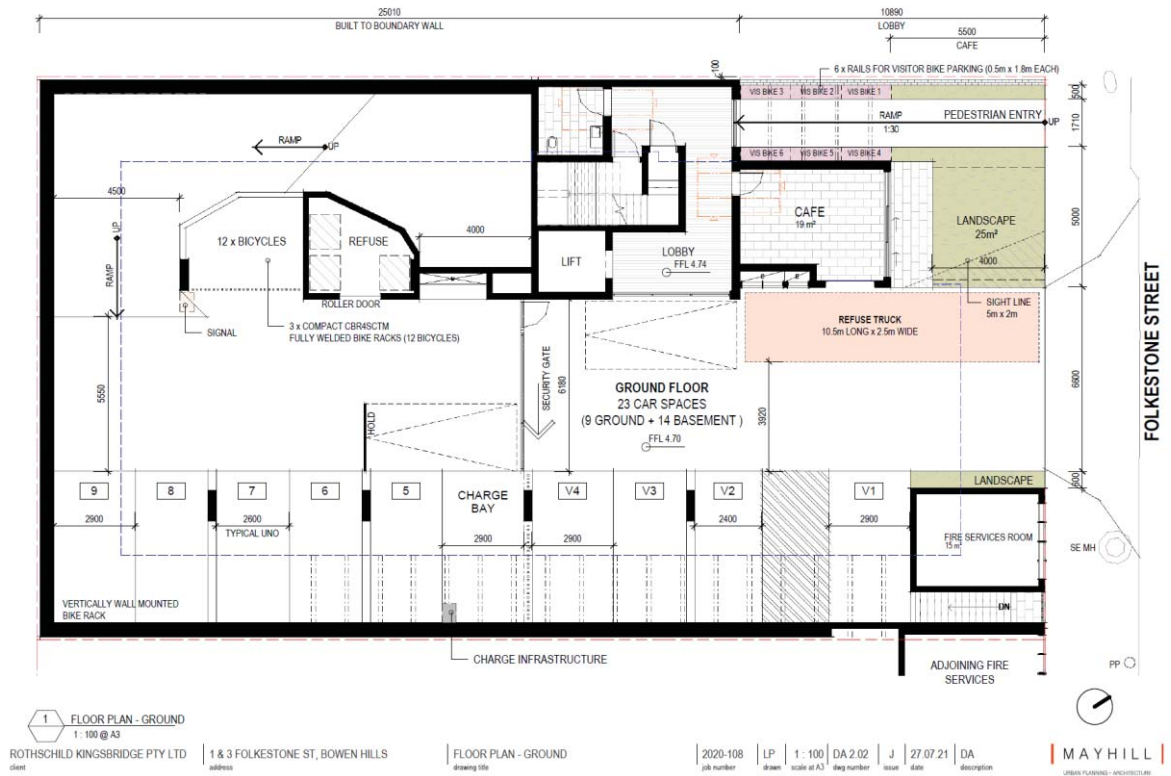
1 & 3 FOLKESTONE ST, BOWEN HILLS
address

FLOOR PLAN - BASEMENT
drawing title

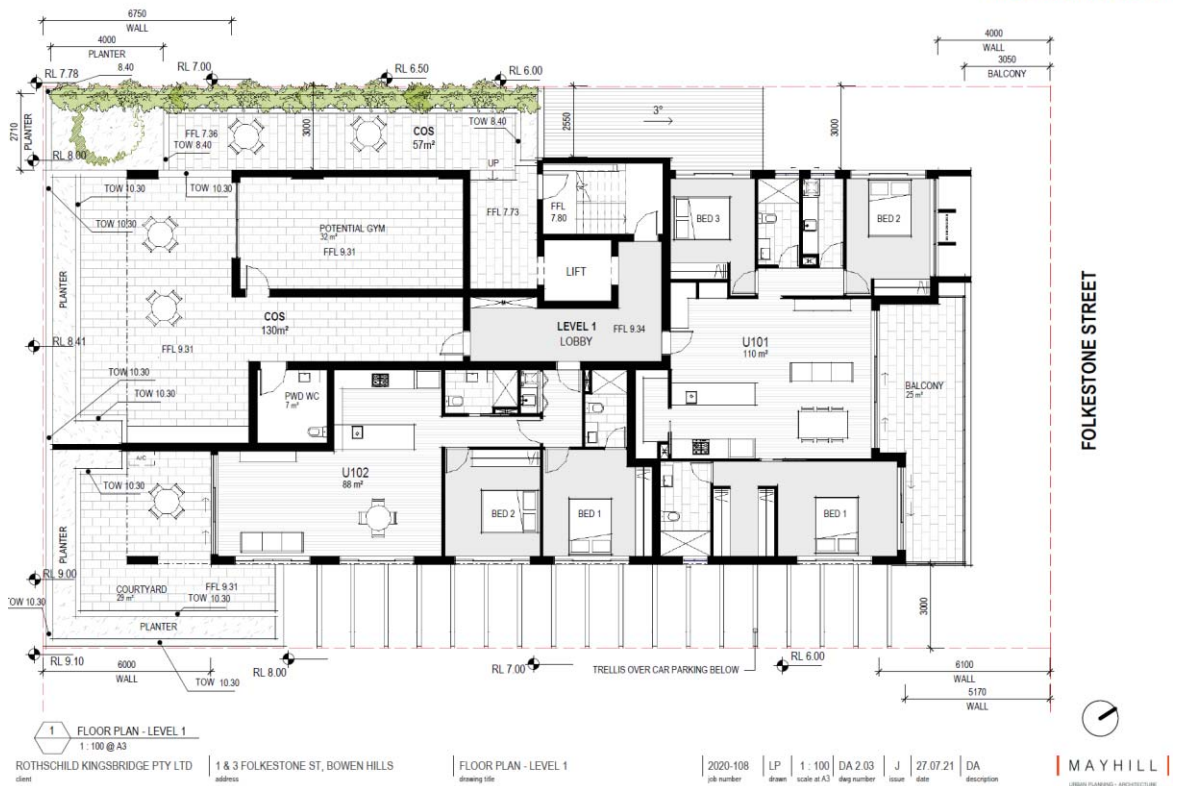
2020-108 LP 1:100 DA 2.01 J 27.07.21 DA
job number drawn scale at A3 day number issue date description

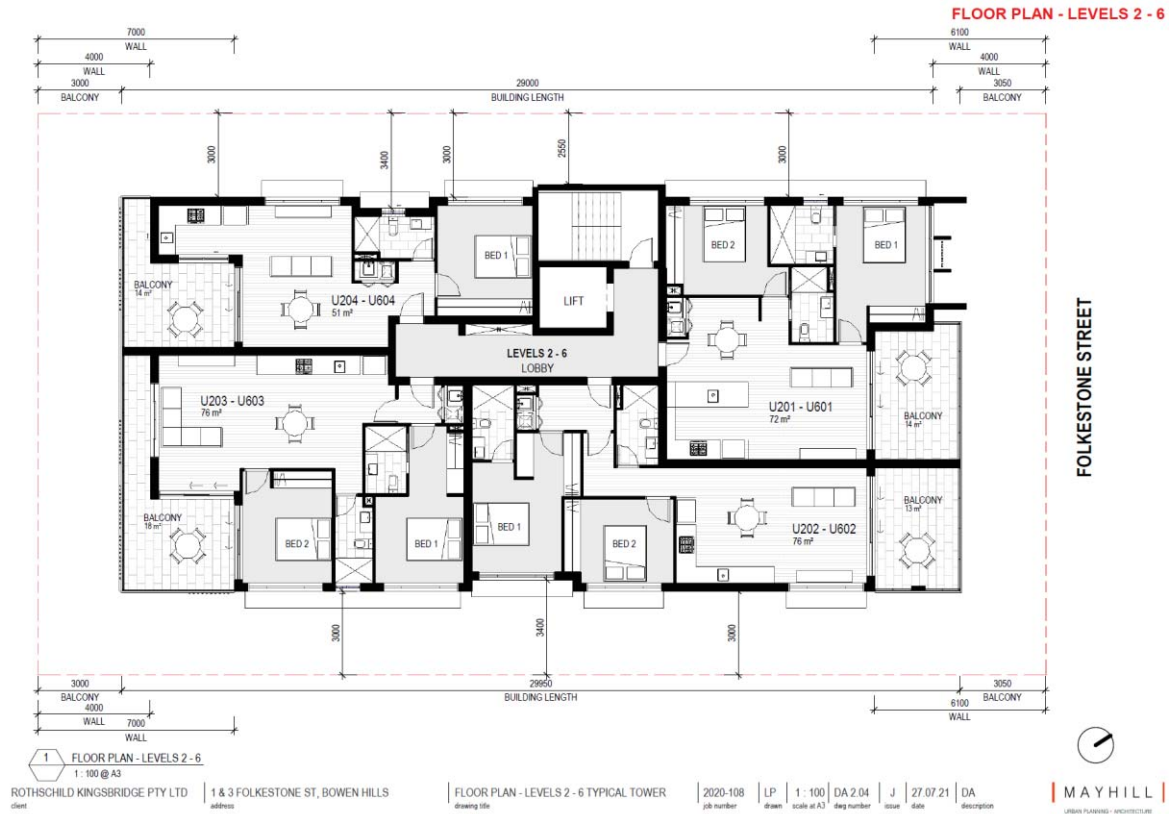


GROUND FLOOR PLAN

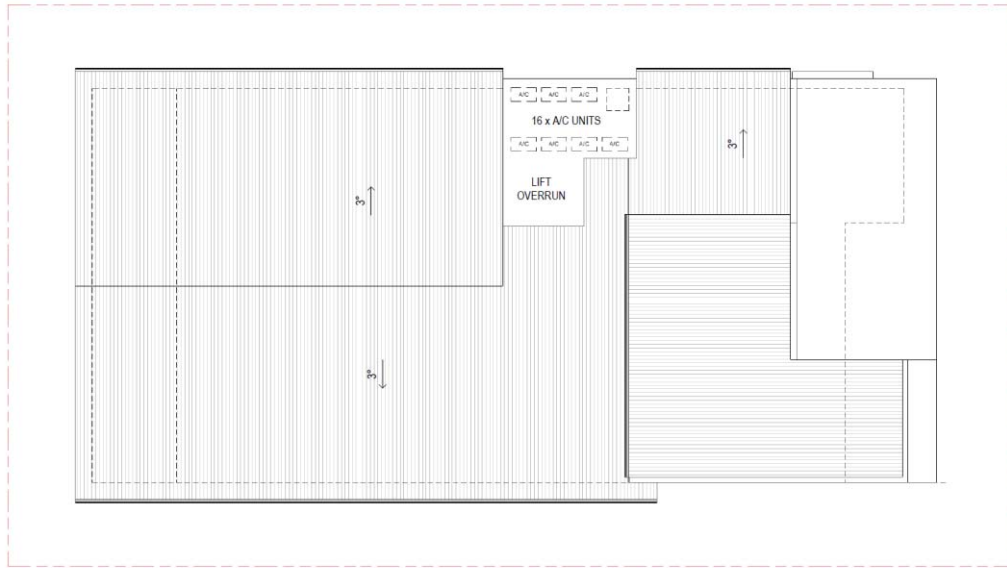


FLOOR PLAN - LEVEL 1





ROOF PLAN



1 ROOF PLAN
1:100 @ A3

ROTHSCHILD KINGSBRIDGE PTY LTD
client

1 & 3 FOLKESTONE ST, BOWEN HILLS
address

ROOF PLAN
drawing title

2020-108 LP 1:100 DA 2.06 J 27.07.21 DA
job number draw scale at A3 diag number issue date description



1 NORTH ELEVATION (FOLKESTONE STREET)
1:200 @ A3

2 SOUTH ELEVATION
1:200 @ A3

FACE BRICK CLADDING
PGH DRY PRESSED BRICK FACINGS
FLINDERS RED WITH MACQUARIE
BLEND MIX.



ABBRV	DESCRIPTION
AL GL	POWDER COATED ALUMINIUM FRAMED GLAZING
BAL 1	ALUMINIUM FRAMED CLEAR GLASS SOLID BALUSTRADE WITH NO GAPS
CL 1	CLADDING TYPE 1. VERTICAL CLADDING. PAINT FINISH.
CL 2	CLADDING TYPE 2. FACE BRICK CLADDING.
CL 3	CLADDING TYPE 3. HORIZONTAL CLADDING. PAINT FINISH.
REN	RENDERED BLOCK WALL. PAINT FINISH.
RS	ROOF SHEETING. REFER TO FINISHES SCHEDULE.
SCRN 1	SCREEN TYPE 1. POWDER COATED ALUMINIUM FIXED FEATURE BATTENS.
SCRN 2	SCREEN TYPE 2. POWDER COATED ALUMINIUM MOVABLE SCREENS.
WIN	DOUBLE HUNG WINDOW. TOP OPEN, BOTTOM FIXED.

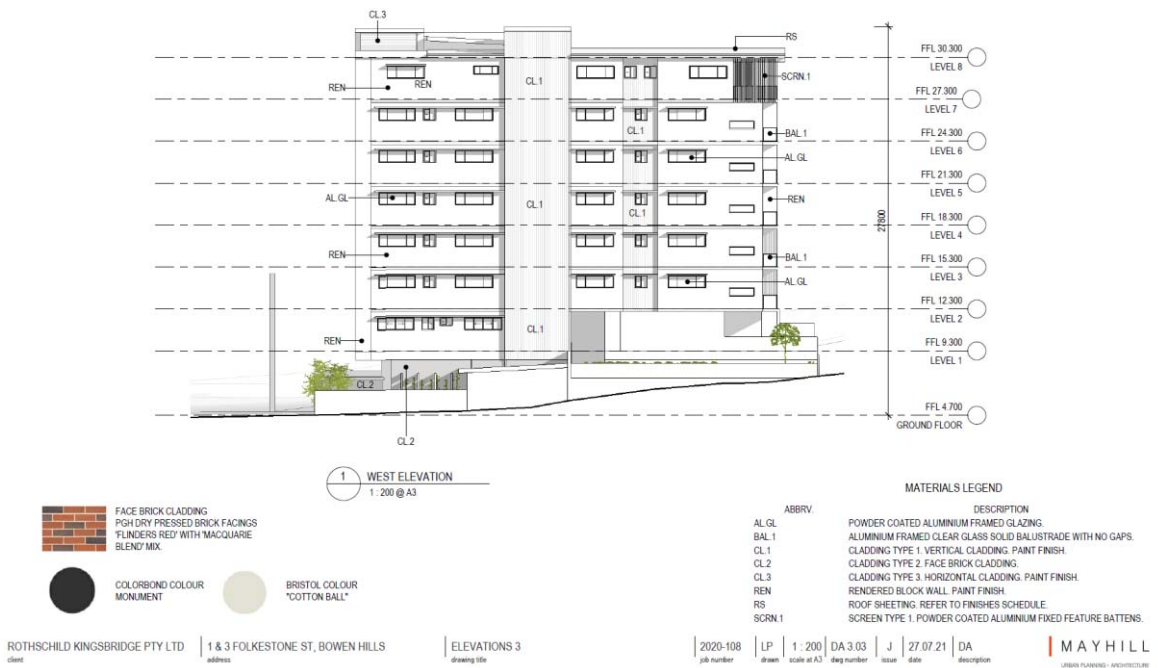
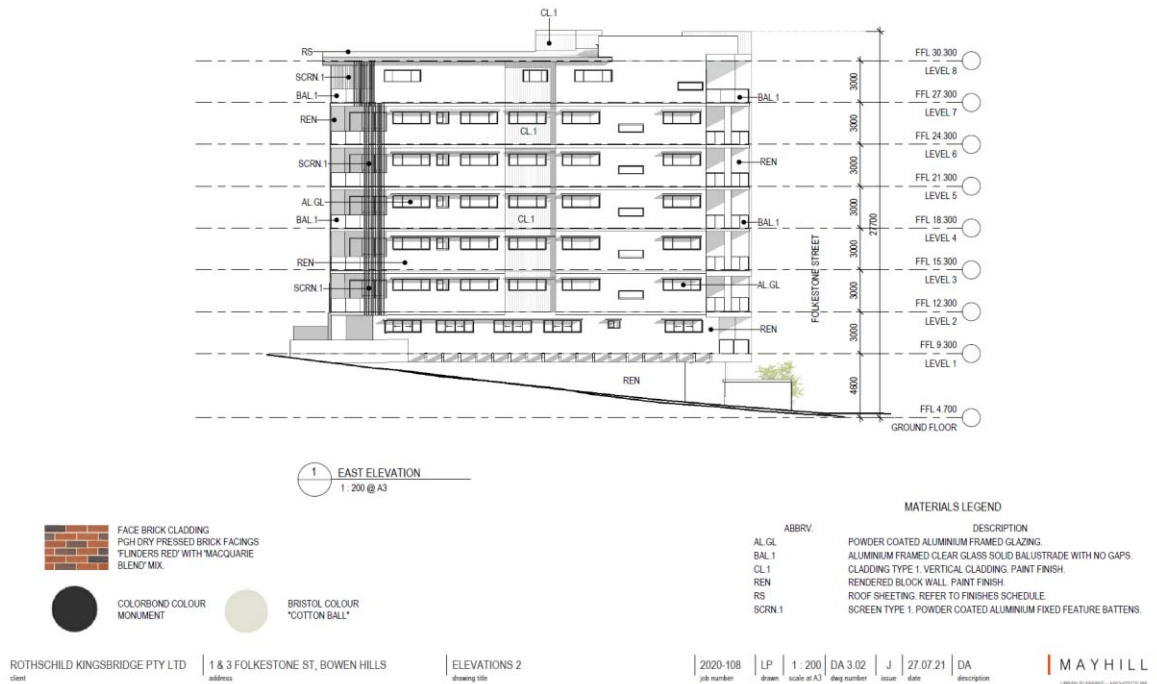
ROTHSCHILD KINGSBRIDGE PTY LTD
client

1 & 3 FOLKESTONE ST, BOWEN HILLS
address

ELEVATIONS 1
drawing title

2020-108 LP 1:200 DA 3.01 J 27.07.21 DA
job number draw scale at A3 diag number issue date description





Appendix B: Traffic Noise Calculations

The 10-year design levels for traffic noise are calculated for the proposed development. Calculations are performed in accordance with Australian Standard AS2702-1984 *Acoustics-Methods for the measurement of road traffic noise* and 'Calculation of Road Traffic Noise', 1975-1988.

Predicted levels for this report have been calculated using CRTN prediction models PEN3D2000 and are façade-adjusted. Existing and future traffic volumes have been calculated from data provided by Veitch Lister Consulting and Brisbane City Council. Topographic data was obtained from Geoscience Australia (1m contours). The assumptions that were made for the calculations included:

Road	Vehicles per 24hr (18hr volume is 94% of 24hr)			Growth (%p.a.)	HV %	Speed (km/hr)	Source Height (m)
	2015	2021	2031				
Abbotsford Road	38,388	40,750	45,013	1.00%	10.00%	40	0.5

- Measured noise level year 2021 for ML1, 66.9 dB(A) L10, 18hr façade adjusted (including all sources of noise including rail, Folkestone Street and other sources);
- Calculated noise level year 2021 for ML1, 65.7 dB(A) L10, 18hr façade adjusted (Abbotsford road noise only);
- Predicted design level year 2031 for ML1, 66.1 dB(A) L10, 18hr façade adjusted;
- Predicted increase in road traffic noise over the ten year design horizon is +0.4 dB(A);
- Source height 0.5m;
- Bench height 4.7m AHD;
- Boundary fences not treated as acoustic fencing.

Results from the road traffic noise model are presented in the following **Plates** and **Table**.

Plate B1: Noise Contours Level 1, year 2031. Levels in dB(A) $L_{10, 18hr}$, façade-adjusted.



Plate B2: Noise Contours Level 2, year 2031. Levels in dB(A) $L_{10, 18hr}$, façade-adjusted.

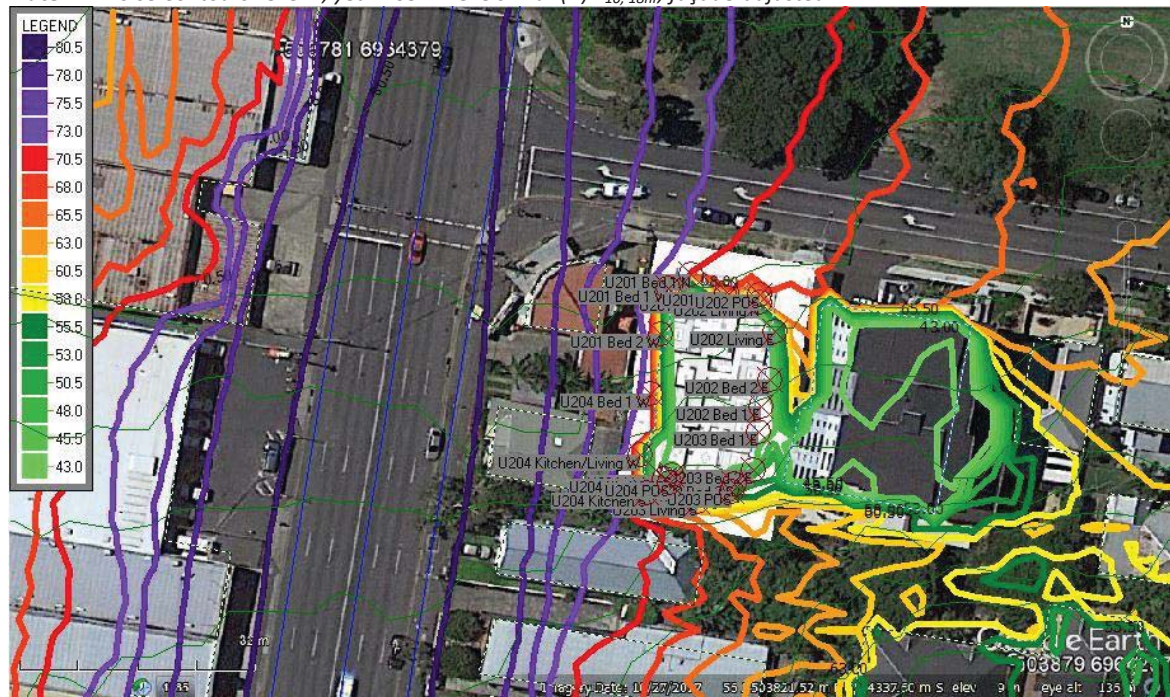


Plate B5: Noise Contours Level 5, year 2031. Levels in dB(A) $L_{10, 18hr}$, façade-adjusted.

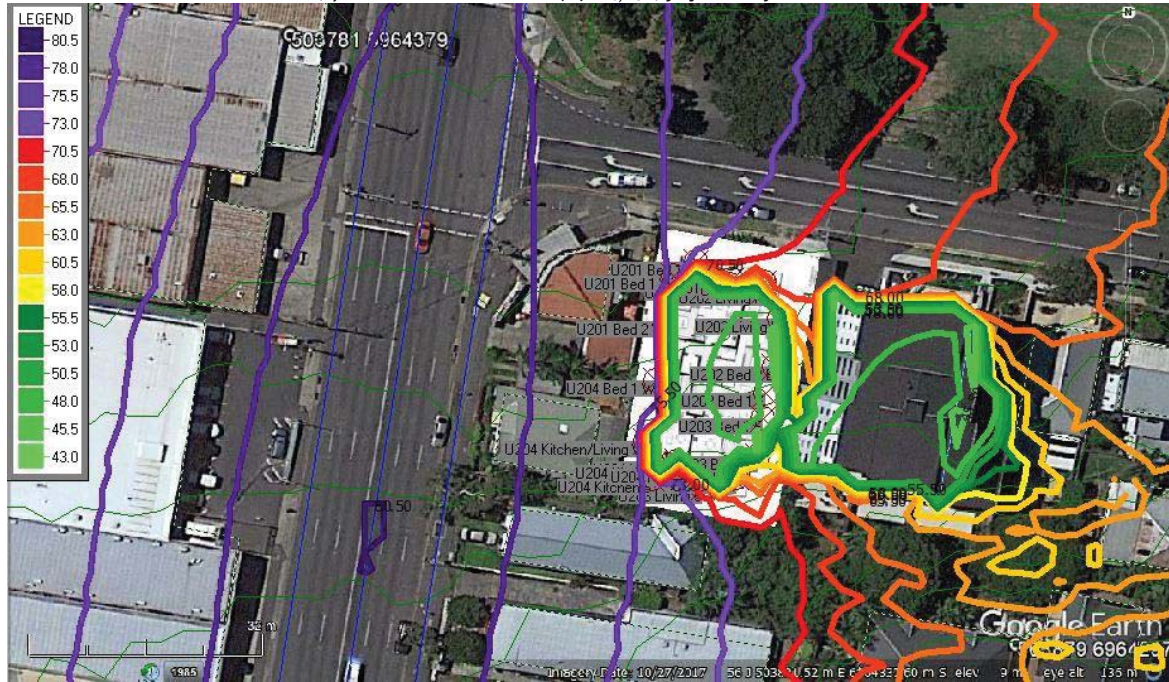


Plate B6: Noise Contours Level 6, year 2031. Levels in dB(A) $L_{10, 18hr}$, façade-adjusted.

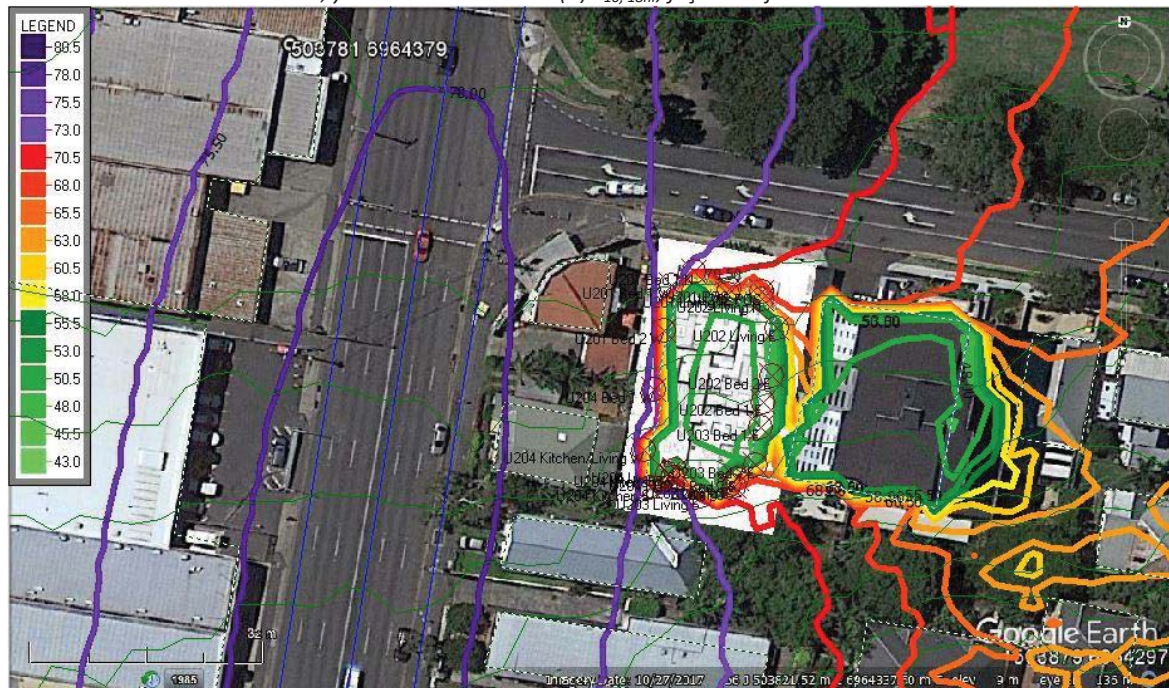
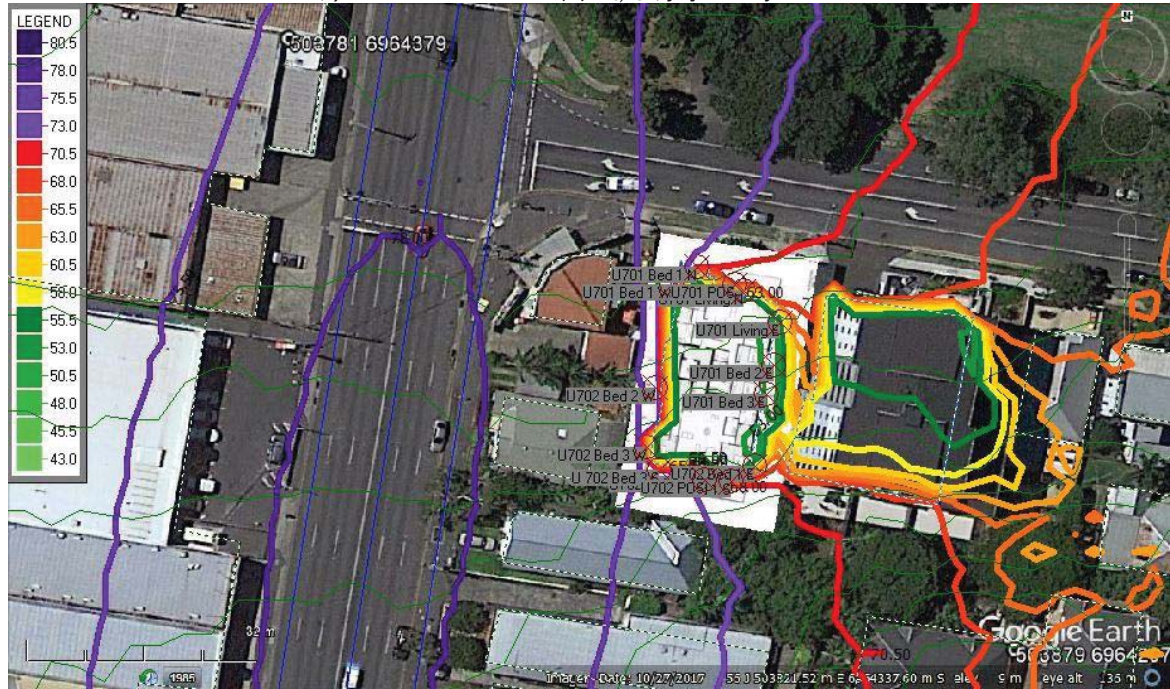


Plate B7: Noise Contours Level 7, year 2031. Levels in dB(A) $L_{10, 18hr}$, façade-adjusted.**Table B1:** Point calculations year 2031. Levels in dB(A) $L_{10, 18hr}$, façade-adjusted.

Façade	Receiver Height (AHD)	$L_{10, 18hr}$	Façade	Receiver Height (AHD)	$L_{10, 18hr}$
U101 Living N	10.8	65.5	U201 Living N	14.1	66.7
U101 Bed 1 N	10.8	67.7	U201 Bed 1 N	14.1	70.1
U101 Bed 1 E	10.8	59.4	U201 Bed 1 W	14.1	73.6
U101 Bed 2 W	10.8	72.1	U201 Bed 2 W	14.1	73.3
U101 Bed 2 N	10.8	69.2	U202 Living N	14.1	64.9
U101 Bed 3 W	10.8	71.0	U202 Living E	14.1	43.8
U102 Living E	10.8	44.2	U202 Bed 1 E	14.1	44
U102 Living S	10.8	44.9	U202 Bed 2 E	14.1	43.9
U102 Bed 1 E	10.8	44.0	U203 Living E	14.1	50.1
U102 Bed 2 E	10.8	44.0	U203 Living S	14.1	63.6
			U203 Bed 1 E	14.1	44.1
			U203 Bed 2 E	14.1	50
			U203 Bed 2 S	14.1	52.7
			U204 Living S	14.1	54.2
			U204 Kitchen E	14.1	51.2
			U204 Kitchen S	14.1	71.1
			U204 Kitchen/Living W	14.1	73.4
			U204 Bed 1 W	14.1	73.3

Table B1 continued....

Façade	Receiver Height (AHD)	L _{10, 18hr}		Façade	Receiver Height (AHD)	L _{10, 18hr}
U301 Living N	16.8	67.1		U501 Living N	22.8	67.3
U301 Bed 1 N	16.8	70.5		U501 Bed 1 N	22.8	70.4
U301 Bed 1 W	16.8	75.4		U501 Bed 1 W	22.8	75.3
U301 Bed 2 W	16.8	74.5		U501 Bed 2 W	22.8	75.4
U302 Living N	16.8	65.4		U502 Living N	22.8	65.7
U302 Living E	16.8	43.8		U502 Living E	22.8	46
U302 Bed 1 E	16.8	44		U502 Bed 1 E	22.8	46.2
U302 Bed 2 E	16.8	43.9		U502 Bed 2 E	22.8	46.2
U303 Living E	16.8	52		U503 Living E	22.8	62.4
U303 Living S	16.8	64.8		U503 Living S	22.8	70.9
U303 Bed 1 E	16.8	44		U503 Bed 1 E	22.8	46.3
U303 Bed 2 E	16.8	51.7		U503 Bed 2 E	22.8	57.7
U303 Bed 2 S	16.8	54.9		U503 Bed 2 S	22.8	65.3
U304 Living S	16.8	57.2		U504 Living S	22.8	66.3
U304 Kitchen E	16.8	54		U504 Kitchen E	22.8	63.2
U304 Kitchen S	16.8	72		U504 Kitchen S	22.8	74.6
U304 Kitchen/Living W	16.8	74.4		U504 Kitchen/Living W	22.8	75.7
U304 Bed 1 W	16.8	74.8		U504 Bed 1 W	22.8	75.4
U401 Living N	19.8	67.4		U601 Living N	25.8	67.2
U401 Bed 1 N	19.8	70.6		U601 Bed 1 N	25.8	70.3
U401 Bed 1 W	19.8	75.4		U601 Bed 1 W	25.8	75.1
U401 Bed 2 W	19.8	75.5		U601 Bed 2 W	25.8	75.2
U402 Living N	19.8	65.7		U602 Living N	25.8	65.7
U402 Living E	19.8	44		U602 Living E	25.8	48.9
U402 Bed 1 E	19.8	44.2		U602 Bed 1 E	25.8	49.1
U402 Bed 2 E	19.8	44.1		U602 Bed 2 E	25.8	49.1
U403 Living E	19.8	54.6		U603 Living E	25.8	62.6
U403 Living S	19.8	67.5		U603 Living S	25.8	70.8
U403 Bed 1 E	19.8	44.3		U603 Bed 1 E	25.8	49.1
U403 Bed 2 E	19.8	53.9		U603 Bed 2 E	25.8	62.6
U403 Bed 2 S	19.8	57.9		U603 Bed 2 S	25.8	65.4
U404 Living S	19.8	64.5		U604 Living S	25.8	66.2
U404 Kitchen E	19.8	63.1		U604 Kitchen E	25.8	63.3
U404 Kitchen S	19.8	74.7		U604 Kitchen S	25.8	74.4
U404 Kitchen/Living W	19.8	75.7		U604 Kitchen/Living W	25.8	75.5
U404 Bed 1 W	19.8	75.5		U604 Bed 1 W	25.8	75.3

Table B1 continued....

Façade	Receiver Height (AHD)	L _{10, 18hr}				
U701 Living N	28.8	68				
U701 Living E	28.8	54.1				
U701 Bed 1 W	28.8	75				
U701 Bed 1 N	28.8	70.3				
U701 Bed 2 E	28.8	53.9				
U701 Bed 3 E	28.8	54				
U702 Living S	28.8	72.6				
U702 Bed 1 E	28.8	55				
U702 Bed 1 S	28.8	71.1				
U702 Bed 2 W	28.8	75.1				
U702 Bed 3 W	28.8	75.3				
U 702 Bed 3 S	28.8	73.9				

Appendix C: Railway Noise Calculations

The potential effects of rail noise from the Ipswich rail line are predicted for the proposed development using PEN3D2000 in accordance with the environmental propagation model in the book “Engineering Noise Control – Theory and Practice” by Bies & Hansen. Meteorological and atmospheric factors are included, but are not considered significant at the distances involved. Predictions include a façade-adjustment to the calculations of QDC Categories presented in **Section 4**. The basic equation adopted is-

$$L_p = L_w - 20 \log_{10}(r) - 10 \log_{10}(4\pi) + AE$$

Where:

- L_p is the sound pressure level at an observer
- L_w is the sound power level of the source
- $20 \log_{10} r - 10 \log_{10}(4\pi)$ is the Distance attenuation (spherical)
- AE is the excess attenuation factors and is determined as the sum of the contributions

Due to high levels of road traffic noise in the locale, direct measurement of railway noise impacts was not viable on-site. The railway noise model has therefore been calibrated to sound power levels calculated from previous representative railway noise measurements.

Assumptions used in the noise model included:

- Bench 4.7m AHD;
- Boundary fences assumed to be acoustically transparent
- Ground contours sourced from Geoscience Australia;
- Trains in both directions;
- Assumed average source height of 0.5m for EMU (electric multiple unit);
- L_{Amax} rail noise event sound power level as an average of all trains in Table C1.

Table C1: L_{Amax} rail noise event sound power levels. Levels are in dB(Z).

Frequency	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
L_{max} SWL	119	120	125	131	118	118	124	123

Plate C1: Noise Contours Level 1. Levels in dB(A) max, façade-adjusted.



Plate C2: Noise Contours Level 2. Levels in dB(A) Lmax, façade-adjusted.

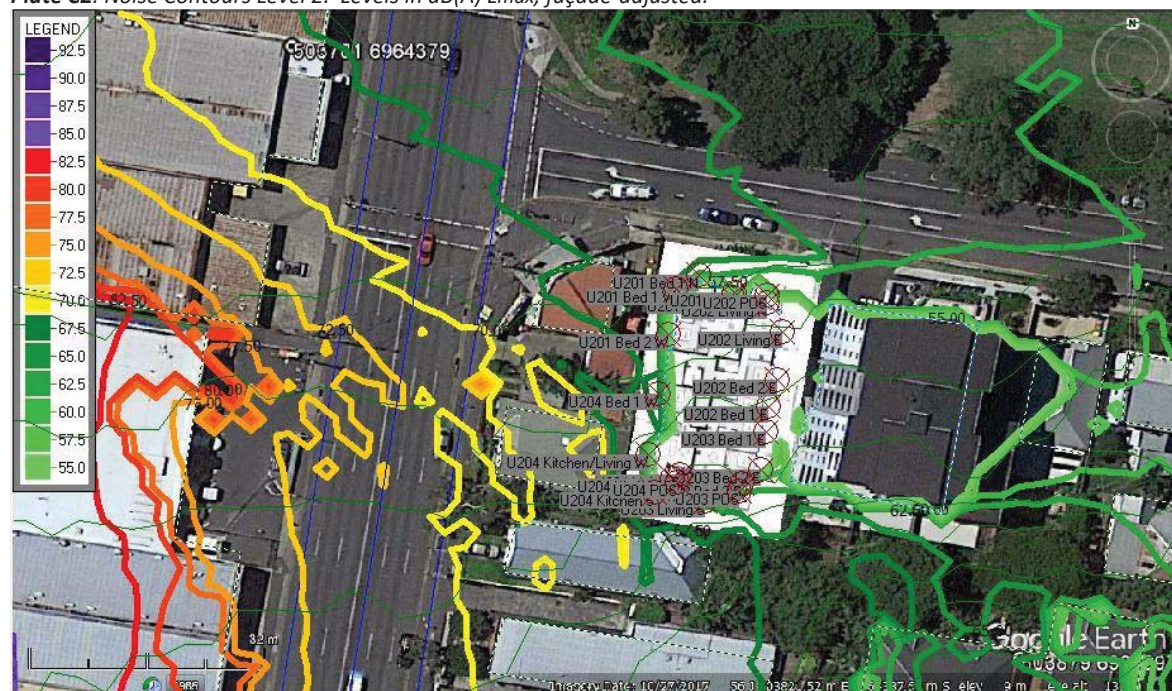


Plate C3: Noise Contours Level 3. Levels in dB(A) L_{max} façade-adjusted.

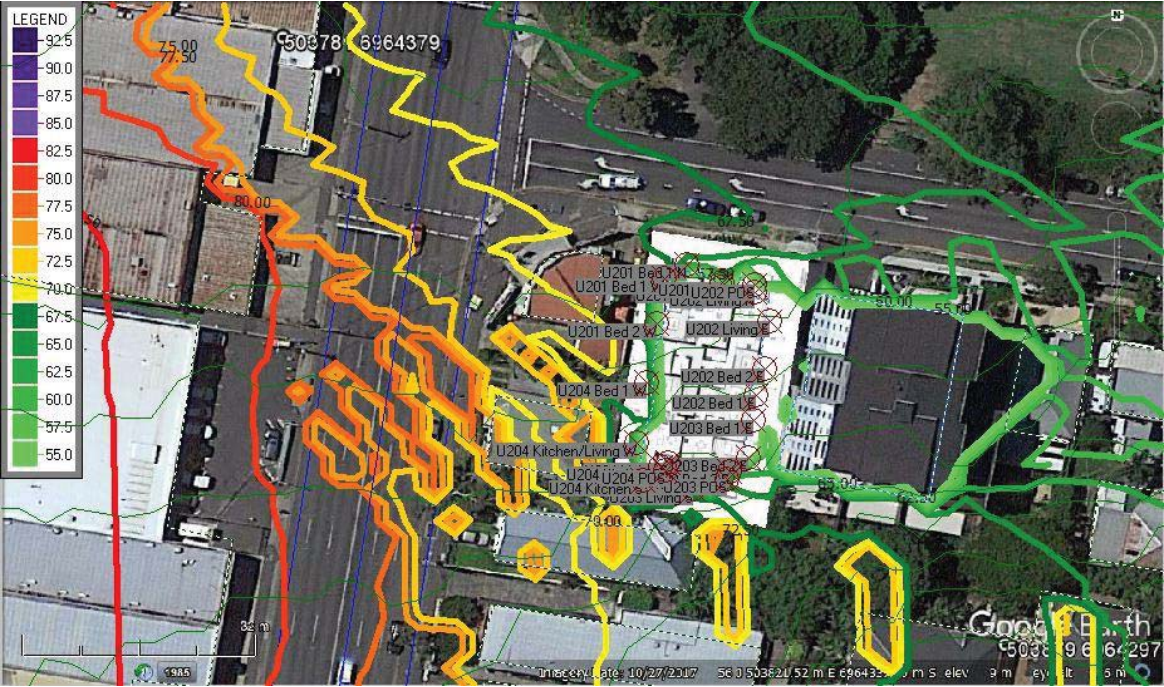


Plate C4: Noise Contours Level 4. Levels in dB(A) L_{max} façade-adjusted.

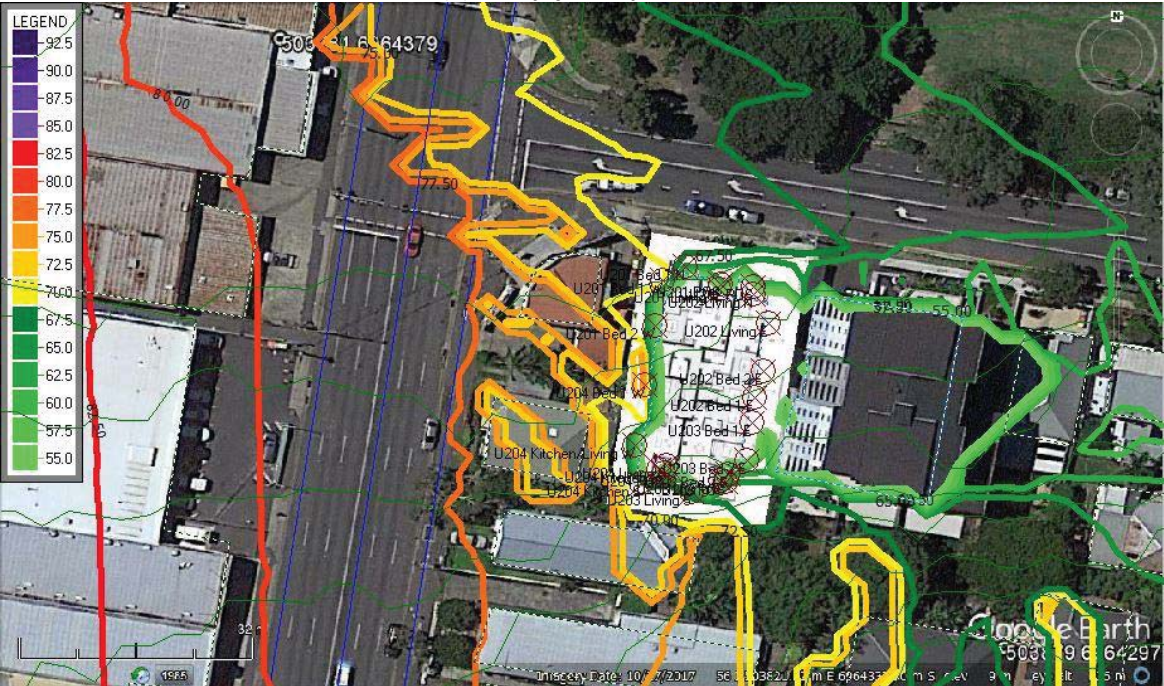


Plate C5: Noise Contours Level 5. Levels in dB(A) L_{max} , façade-adjusted.

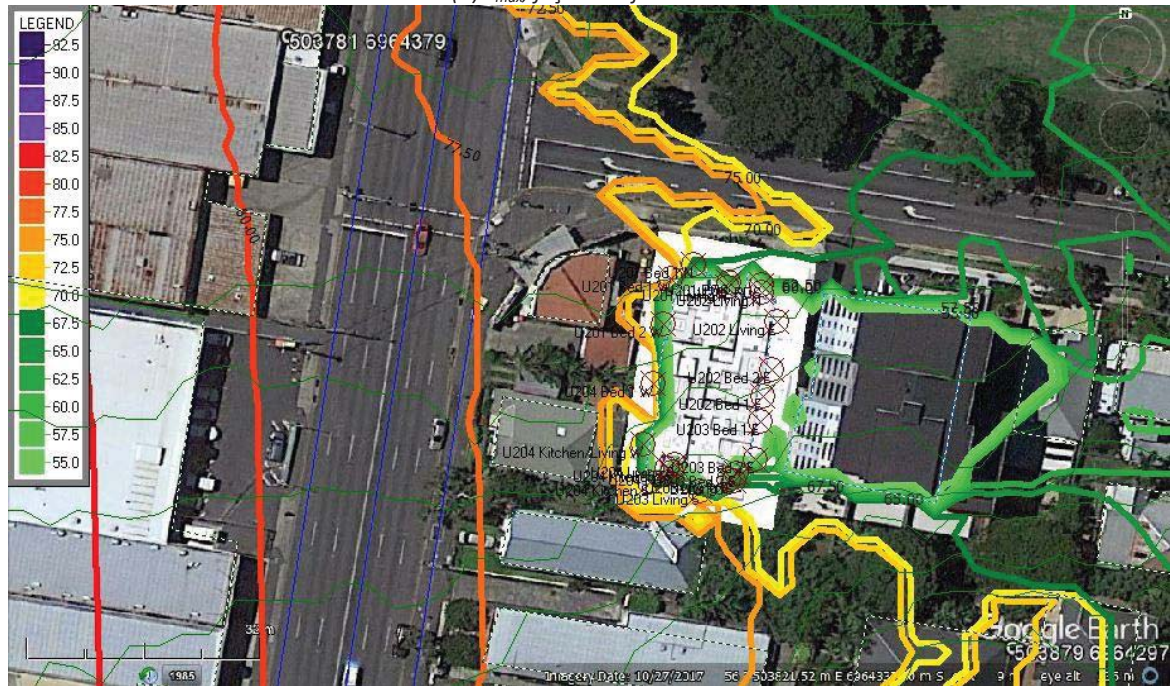


Plate C6: Noise Contours Level 6. Levels in dB(A) L_{max} , façade-adjusted.

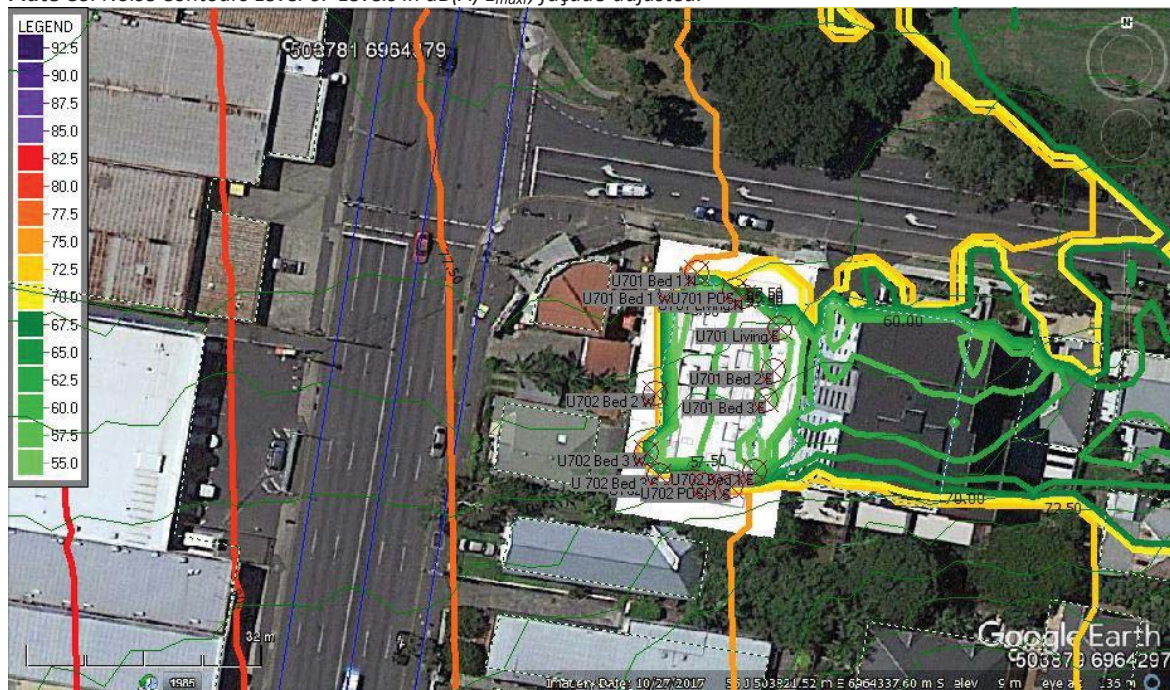


Plate C7: Noise Contours Level 7. Levels in dB(A) L_{max}, façade-adjusted.**Table C1: Point calculations year 2031. Levels in dB(A) L_{10, 18hr}, façade-adjusted.**

Façade	Receiver Height (AHD)	L _{max}	Façade	Receiver Height (AHD)	L _{max}
U101 Living N	10.8	46.9	U201 Living N	14.1	47.4
U101 Bed 1 N	10.8	61.1	U201 Bed 1 N	14.1	62.5
U101 Bed 1 E	10.8	46.1	U201 Bed 1 W	14.1	67.6
U101 Bed 2 W	10.8	65	U201 Bed 2 W	14.1	67
U101 Bed 2 N	10.8	61.7	U202 Living N	14.1	47.1
U101 Bed 3 W	10.8	65.5	U202 Living E	14.1	46.7
U102 Living E	10.8	46.4	U202 Bed 1 E	14.1	46.8
U102 Living S	10.8	46.8	U202 Bed 2 E	14.1	46.8
U102 Bed 1 E	10.8	46.3	U203 Living E	14.1	58.9
U102 Bed 2 E	10.8	46.3	U203 Living S	14.1	64.6
			U203 Bed 1 E	14.1	46.8
			U203 Bed 2 E	14.1	58.7
			U203 Bed 2 S	14.1	58.9
			U204 Living S	14.1	59.1
			U204 Kitchen E	14.1	57.3
			U204 Kitchen S	14.1	66
			U204 Kitchen/Living W	14.1	66.2
			U204 Bed 1 W	14.1	69.1

Table C1 continued....

Façade	Receiver Height (AHD)	Lmax		Façade	Receiver Height (AHD)	Lmax
U301 Living N	16.8	48.1		U501 Living N	22.8	50.6
U301 Bed 1 N	16.8	63.8		U501 Bed 1 N	22.8	67.5
U301 Bed 1 W	16.8	69.6		U501 Bed 1 W	22.8	75.7
U301 Bed 2 W	16.8	68.4		U501 Bed 2 W	22.8	75.7
U302 Living N	16.8	47.8		U502 Living N	22.8	50.3
U302 Living E	16.8	47.2		U502 Living E	22.8	49.5
U302 Bed 1 E	16.8	47.4		U502 Bed 1 E	22.8	49.7
U302 Bed 2 E	16.8	47.3		U502 Bed 2 E	22.8	49.7
U303 Living E	16.8	59.1		U503 Living E	22.8	60.1
U303 Living S	16.8	65.9		U503 Living S	22.8	69.1
U303 Bed 1 E	16.8	47.4		U503 Bed 1 E	22.8	49.7
U303 Bed 2 E	16.8	58.9		U503 Bed 2 E	22.8	59.8
U303 Bed 2 S	16.8	59.1		U503 Bed 2 S	22.8	60
U304 Living S	16.8	59.3		U504 Living S	22.8	60.4
U304 Kitchen E	16.8	57.7		U504 Kitchen E	22.8	58.4
U304 Kitchen S	16.8	67.4		U504 Kitchen S	22.8	70.2
U304 Kitchen/Living W	16.8	67.6		U504 Kitchen/Living W	22.8	70.4
U304 Bed 1 W	16.8	70.4		U504 Bed 1 W	22.8	75.7
U401 Living N	19.8	49.2		U601 Living N	25.8	53
U401 Bed 1 N	19.8	65.6		U601 Bed 1 N	25.8	69
U401 Bed 1 W	19.8	75.8		U601 Bed 1 W	25.8	75.5
U401 Bed 2 W	19.8	69.9		U601 Bed 2 W	25.8	75.6
U402 Living N	19.8	48.9		U602 Living N	25.8	52.7
U402 Living E	19.8	48.2		U602 Living E	25.8	51.5
U402 Bed 1 E	19.8	48.4		U602 Bed 1 E	25.8	51.7
U402 Bed 2 E	19.8	48.4		U602 Bed 2 E	25.8	51.7
U403 Living E	19.8	59.5		U603 Living E	25.8	60.8
U403 Living S	19.8	67.6		U603 Living S	25.8	70.2
U403 Bed 1 E	19.8	48.4		U603 Bed 1 E	25.8	51.7
U403 Bed 2 E	19.8	59.3		U603 Bed 2 E	25.8	60.5
U403 Bed 2 S	19.8	59.4		U603 Bed 2 S	25.8	60.7
U404 Living S	19.8	59.7		U604 Living S	25.8	61.4
U404 Kitchen E	19.8	58		U604 Kitchen E	25.8	58.8
U404 Kitchen S	19.8	68.9		U604 Kitchen S	25.8	75.9
U404 Kitchen/Living W	19.8	69.1		U604 Kitchen/Living W	25.8	75.8
U404 Bed 1 W	19.8	75.9		U604 Bed 1 W	25.8	75.8

Table C1 continued....

Façade	Receiver Height (AHD)	Lmax				
U701 Living N	28.8	60.3				
U701 Living E	28.8	57.1				
U701 Bed 1 W	28.8	75.4				
U701 Bed 1 N	28.8	73.8				
U701 Bed 2 E	28.8	57.3				
U701 Bed 3 E	28.8	57.5				
U702 Living S	28.8	75.4				
U702 Bed 1 E	28.8	57.9				
U702 Bed 1 S	28.8	75.1				
U702 Bed 2 W	28.8	75.6				
U702 Bed 3 W	28.8	75.8				
U 702 Bed 3 S	28.8	75.7				

End of Table C1

Appendix D: Building Construction – QDC MP4.4

This Annex is based on the building construction guidelines of 'Queensland Development Code Mandatory Part 4.4 – Buildings in Transport Noise Corridors'. The Code provides information for new houses, townhouses, units, hotel and motels (Class 1-4 buildings) as well as renovations to relevant Class 1-4 buildings to achieve certain levels of noise mitigation through the use of appropriate materials for floors, walls, roofs, windows and doors for the relevant noise category presented in **Section 4** of this Report.

Under the Department of Local Government and Planning criteria the site is considered to be in the following Categories based on the measured or calculated $L_{10, 18hr}$ or $L_{Amax, 24hr}$ value or distance from the road, depending on the property definition given by QDC. The relationships are set out in **Table D1**:

Table D1: Noise Categories, related to façade noise levels.

Noise Category	Level of Transport Noise $L_{A10,18hr}$ for State Controlled Roads	Level of Transport Noise $L_{A10,18hr}$ for Designated Local Government Roads	Single event maximum noise L_{Amax} for railway
Category 4	≥ 73 dB(A)	≥ 73 dB(A)	≥ 85 dB(A)
Category 3	68 - 72 dB(A)	68 - 72 dB(A)	80 - 84 dB(A)
Category 2	63 - 67 dB(A)	63 - 67 dB(A)	75 - 79 dB(A)
Category 1	58 - 62 dB(A)	58 - 62 dB(A)	70 - 74 dB(A)
Category 0	≤ 57 dB(A)	≤ 57 dB(A)	≤ 69 dB(A)

Note* the sound levels are measured at 1 metre from the façade.

Performance Requirements	Acceptable Solutions
Residential Buildings	
P1 Habitable rooms in a relevant residential building are adequately protected from transport noise to safeguard occupants' health and amenity.	A1 The external envelope of each habitable room in a relevant residential building must comply with the minimum R_w for each building component specified in Schedule 1 to achieve a minimum transport noise reduction level for the relevant noise category by: a) Using materials specified in Schedule 2; OR b) Using materials with manufacturer's specifications that, in combination, achieve the minimum R_w value for the relevant building component and acceptable noise category.

SCHEDULE 1

Noise category	Minimum transport noise reduction (dB(A)) required for habitable rooms	Component of building's external envelope	Minimum R_w required for each component
Category 4	40	Glazing	43
		External walls	52
		Roof	45
		Floors	51
		Entry doors	35
Category 3	35	Glazing	38 (where total area of glazing for a habitable room is greater than 1.8m ²)
			35 (where total area of glazing for a habitable room is less than or equal to 1.8m ²)
		External walls	47
		Roof	41
		Floors	45
		Entry doors	33

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

SCHEDULE 2

Component of building's external envelope	Minimum R_w	Acceptable forms of constructions
Glazing	43	Double glazing consisting of two panes of minimum 5mm thick glass with at least 100mm air gap and full perimeter <i>acoustically rated seals</i> .
	38	Minimum 14.38mm thick laminated glass, with full perimeter <i>acoustically rated seals</i> ; OR Double glazing consisting of one pane of minimum 5mm thick glass and one pane of minimum 6mm thick glass with at least 44mm air gap, and full perimeter <i>acoustically rated seals</i> .
	35	Minimum 10.38mm thick laminated glass, with full perimeter <i>acoustically rated seals</i> .
	32	Minimum 6.38mm thick laminated glass with full perimeter <i>acoustically rated seals</i> .
	27	Minimum 4mm thick glass with full perimeter <i>acoustically rated seals</i> .
	24	Minimum 4mm thick glass with standard weather seals

Component of building's external envelope	Minimum R_w	Acceptable forms of constructions
External walls	52	Two leaves of clay brick masonry, at least 270mm in total, with subfloor vents fitted with noise attenuators
	47	Two leaves of clay brick masonry at least 110mm thick with: (i) Cavity not less than 50mm between leaves; and (ii) 50mm thick mineral insulation or 50mm thick glass wool insulation with a density of 11kg/m^3 or 50mm thick polyester insulation with a density of 20kg/m^3 in the cavity. OR Two leaves of clay brick masonry at least 110mm thick with: (i) Cavity not less than 50mm between leaves; and (ii) At least 13mm thick cement render on each face. OR Single leaf of clay brick masonry at least 110mm thick with: (i) A row of at least 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced at least 20mm from the masonry wall; and (ii) Mineral insulation or glass wool insulation at least 50mm thick with a density of at least 11kg/m^3 positioned between studs; and (iii) One layer of plasterboard at least 13mm thick fixed to outside face of studs. OR Single leaf of minimum 150mm thick masonry of hollow, dense concrete blocks, with mortar joints laid to prevent moisture bridging.

Component of building's external envelope	Minimum R_w	Acceptable forms of constructions
External walls	41	Two leaves of clay brick masonry at least 110mm thick with cavity not less than 50mm between leaves OR Single leaf of clay brick masonry at least 110mm thick with: (i) A row of at least 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced at least 20mm from the masonry wall; and (ii) Mineral insulation or glass wool insulation at least 50mm thick with a density of at least 11kg/m³ positioned between studs; and (ii) One layer of plasterboard at least 10mm thick fixed to outside face of studs. OR Single leaf of brick masonry at least 110mm thick with at least 13mm thick render on each face OR Concrete brickwork at least 110mm thick OR In-situ concrete at least 100mm thick OR Precast concrete at least 100mm thick and without joints.
	35	Single leaf of clay brick masonry at least 110mm thick with: (i) A row of at least 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced at least 20mm from the masonry wall; and (ii) One layer of plasterboard at least 10mm thick fixed to the outside face of studs OR Minimum 6mm thick fibre cement sheeting or weatherboards or plank cladding externally, minimum 90mm deep timber stud or 92mm metal stud, standard plasterboard at least 13mm thick internally.

Component of building's external envelope	Minimum R_w	Acceptable forms of constructions
Roof	45	Concrete or terracotta tile or sheet metal roof with sarking, <i>acoustically rated plasterboard</i> ceiling at least 13mm thick fixed to ceiling joists, cellulose fibre insulation at least 100mm thick with a density of at least 45kg/m ³ in the cavity OR Concrete or terracotta tile or sheet metal roof with sarking, 2 layers of <i>acoustically rated plasterboard</i> at least 16mm thick fixed to ceiling joists, glass wool insulation at least 50mm thick with a density of at least 11kg/m ³ or polyester insulation at least 50mm thick with a density of at least 20kg/m ³ in the cavity.
	41	Concrete or terracotta tile or sheet metal roof with sarking, plasterboard ceiling at least 10mm thick fixed to ceiling joists, glass wool insulation at least 50mm thick with a density of at least 11kg/m ³ or polyester insulation at least 50mm thick with a density of at least 20kg/m ³ in the cavity OR Concrete suspended slab at least 100mm thick.
	38	Concrete or terracotta tile or sheet metal roof with sarking, plasterboard ceiling at least 10mm thick fixed to ceiling cavity, mineral insulation or glass wool insulation at least 50mm thick with a density of at least 11kg/m ³
	35	Concrete or terracotta tile or metal sheet roof with sarking, plasterboard ceiling at least 10mm thick fixed to ceiling cavity
Floors	51	Concrete slab at least 150mm thick
	45	Concrete slab at least 100mm thick OR Tongued and grooved boards at least 19mm thick with: (i) Timber joists not less than 175mm x 50mm; and (ii) Mineral insulation or glass wool insulation at least 75mm thick with a density of at least 11kg/m ³ positioned between joists and laid on plasterboard at least 10mm thick fixed to underside of joists; and (iii) Mineral insulation or glass wool insulation at least 25mm thick with a density of at least 11kg/m ³ laid over entire floor, including tops of joists before flooring is laid; and (iv) Secured to battens at least 75mm x 50mm; and (v) The assembled flooring laid over the joists, but not fixed to them, with battens lying between the joists.

Component of building's external envelope	Minimum R_w	Acceptable forms of constructions
Entry Doors	35	Solid core timber not less than 45mm thick, fixed so as to overlap the frame or rebate of the frame by not less than 10mm, with full perimeter <i>acoustically rated seals</i> .
	33	Fixed so as to overlap the frame or rebate of the frame by not less than 10mm, fitted with full perimeter <i>acoustically rated seals</i> and constructed of: (i) Solid core wood, particleboard or blockboard not less than 45mm thick; and/or (ii) Acoustically laminated glass not less than 10.38mm thick
	28	Fixed so as to overlap the frame or rebate of the frame, constructed of: (i) Wood, particleboard or blockboard not less than 33mm thick; or (ii) Compressed fibre reinforced sheeting not less than 9mm thick; or (iii) Other suitable material with a mass per unit area not less than 24.4kg/m², or (iv) Solid core timber door not less than 35mm thick fitted with full perimeter <i>acoustically rated seals</i>.

Appendix E: Statement of Qualifications

The Signatory to this Report is Qualified under the Australian Qualifications Framework at Level 8 (Post-Graduate) in Monitoring and Evaluating Noise and Noise Management:

Mr Max Thorne, LLB (Otago), Principal NMS

Mr Josh Dyer, B.Env.Tech (Griffith), Senior Acoustician NMS

Mr Matt Dever, B.Audio (SAE), Senior Acoustician NMS

Mr Matt Fishburn, B.E., RPEQ, Reviewer

Mr Geoff Renison, Acoustician NMS

NMS Specific Project Reviewer

Dr Bob Thorne PhD, FRSPH, MIOA, MAAS

Projects and Studies by NMS

- Assessment of transportation noise to QDC MP4.4 and Queensland State Development guidelines
- Assessment of noise from light industry onto noise sensitive places
- Assessment of quarry noise on residential neighbours
- Mine site, blasting and drilling assessments
- Environmental noise impact assessment and prediction modeling for residential estates and residential developments
- Traffic noise impact assessments for residential developments
- Remote telemetry systems for noise monitoring
- Industrial noise impact assessments and associated noise management plans
- Occupational noise assessment
- Industrial surveys for noise exposure and noise management
- The effects of noise from patrons and music on residential neighbours
- Building acoustics (in association with Alpha Acoustics)
- Vehicle noise compliance (ADR)
- Research investigations into the effects of various noise sources on sensitive and non-sensitive communities

Appendix F: Glossary

Event maximum sound pressure level ($LA_{\%,adj,T}$), L01

The L01 level is calculated as the noise level equalled and exceeded for 1% of the measurement time, for example 9 seconds in any 15 minute interval. L01 is an appropriate level to characterise single events, such as from train bypass.

In this Report, the measured L01 levels for day/evening/night are not averaged but are arranged from low to high in the relevant day/evening/night interval and the value that is found at the 90th percentile (L10 of L01 sample) in the interval is recorded as its "L01" level.

Average maximum sound pressure level ($LA_{\%,adj,T}$), L10

The "L10" level is an indicator of "steady-state" noise or intrusive noise conditions from traffic, music and other relatively non-impulsive noise sources. The L10 level is calculated as the noise level equalled and exceeded for 10% the measurement time, for example 90 seconds in any 15 minute interval. The measured L10 time-intervals for day/evening/night are arithmetically averaged to present the "average maximum" levels of the environment for day/evening/night. The level can be adjusted for tonality or impulsiveness.

Background sound pressure level ($LA_{90,T}$), L90

Commonly called the "L90" or "background" level and is an indicator of the quietest times of day, evening or night. The L90 level is calculated as the noise level equalled and exceeded for 90% the measurement time. The measured L90 time-intervals are arithmetically averaged to present the "average background" levels of the environment for day/evening/night. The level is recorded in the absence of any noise under investigation. The level is not adjusted for tonality or impulsiveness.

Equivalent Continuous or time average sound pressure level ($LA_{eq,T}$), Leq

Commonly called the "Leq" level it is the logarithmic average noise level from all sources far and near. The maximum 1-hour levels within the day/evening/night time intervals are referenced for building design. The level can be adjusted for tonality.

Façade-adjusted level

A sound level that is measured at a distance of 1.0 metre from a wall or façade. The level is nominally 2.5 dB higher than the free-field level.

Free-field level

A sound level that is measured at a distance of more than 3.5 metres from a wall or façade.

Weighted Sound Reduction Index, R_w

A single number value used to compare the sound reduction index of building elements. Similar to the Sound Transmission Class (STC) rating that is still in common use. R_w and STC are not identical though may be considered, for most applications, as being interchangeable. A high R_w indicates high sound reduction.