Environmental Noise Assessment

Proposed Mixed Use Development

At 5 Hercules Street, Hamilton

On behalf of Limitless Residential No.9 Pty Ltd

20BRA0062 R01_1

About TTM

For 30 years, we've been at the centre of the Australian development and infrastructure industry. Our unique combination of acoustics, data, traffic and waste services is fundamental to the success of any architectural or development project.

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Revision Record

No.	Author	Reviewed/Approved	Description	Date
A	S Yorke	A Ashworth	Internal draft	28/06/2022
0	S Yorke	A Ashworth	Client issue	28/06/2022
1	S Yorke		Minor edits	06/07/2022

Executive Summary

TTM was engaged by Limitless Residential No.9 Pty Ltd to undertake an environmental noise assessment of a proposed mixed-use development located at 5 Hercules Street, Hamilton. The assessment was based on the Northshore Hamilton Priority Development Area (PDA) planning scheme (July 2009) and Brisbane City Council City Plan 2014 Planning Scheme.

Unattended noise monitoring was undertaken to establish the existing ambient noise levels. City Plan 2014 planning scheme codes and overlays were utilised where relevant and acceptable outcomes applied. Remaining noise (outdoor dining) was assessed onto the nearest noise sensitive receivers for commercial/retail operating hours between 6am – 10pm. Deliveries and waste collection to occur between 6am - 8pm.

Compliance with the Northshore Hamilton PDA scheme and City Plan 2014 planning scheme is predicted to be achieved based on the recommendations outlined in Section 7 of this report.

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1 Introduction

1.1 Background

TTM was engaged by Limitless Residential No.9 Pty Ltd to undertake an environmental noise assessment of a proposed mixed-use development located at 5 Hercules Street, Hamilton. This report will form part of a development application for consideration by Economic Development Queensland (EDQ).

1.2 References

This report is based on the following:

- Northshore Hamilton Urban Development Area Development Scheme July 2009
- Brisbane City Council *City Plan 2014*
- *Noise impact assessment planning scheme policy* - Schedule 6, City Plan 2014
- Development plans shown in Appendix A
- Site inspection, noise measurements, analysis and calculations conducted by TTM

1.3 Scope

The assessment includes the following:

- Description of the development site and proposal
- Measurement of existing ambient noise levels and statement of assessment criteria relating to environmental noise emissions
- Assessment of the external noise environment.
- Assessment of noise generated by the development onto nearby noise sensitive receivers.
- Details of noise control recommendations to be incorporated to achieve predicted compliance.

2 Site Description

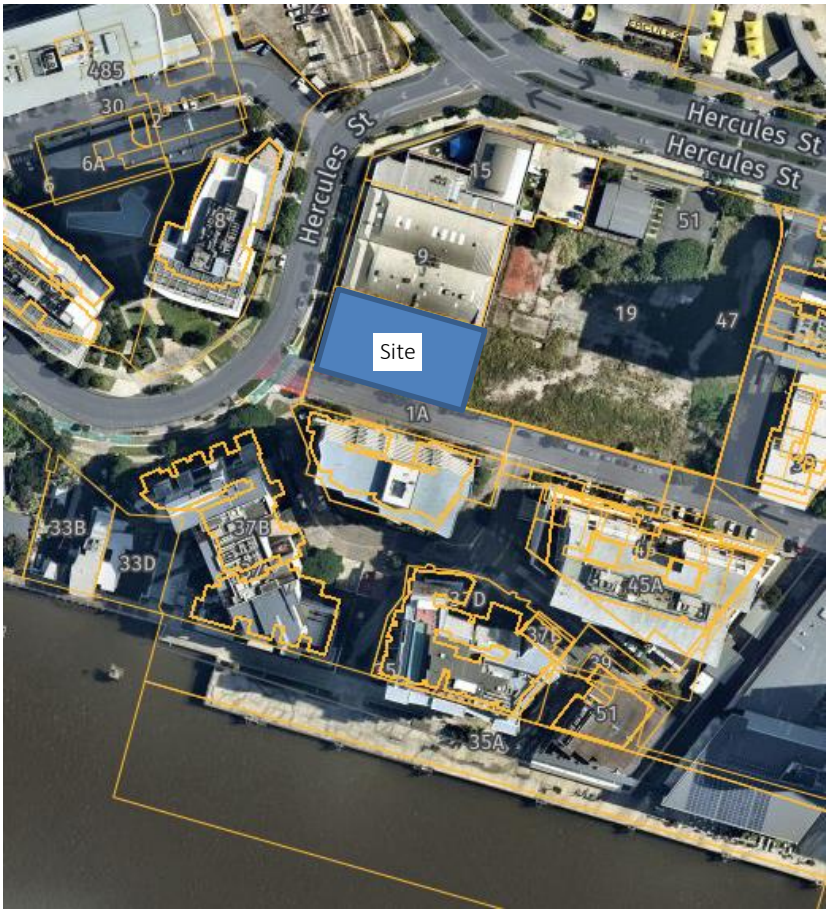
2.1 Site Location

The site is described by the following:

- 5 Hercules Street, Hamilton

The site locality is shown in Figure 1.

Figure 1: Site Locality



2.2 Description of Surrounding Environment

The site is bound by Hercules Street to the west, commercial properties to the north, a lane way to the south and approved, future residential properties to the east. The current acoustic environment primarily consists of local road traffic noise.

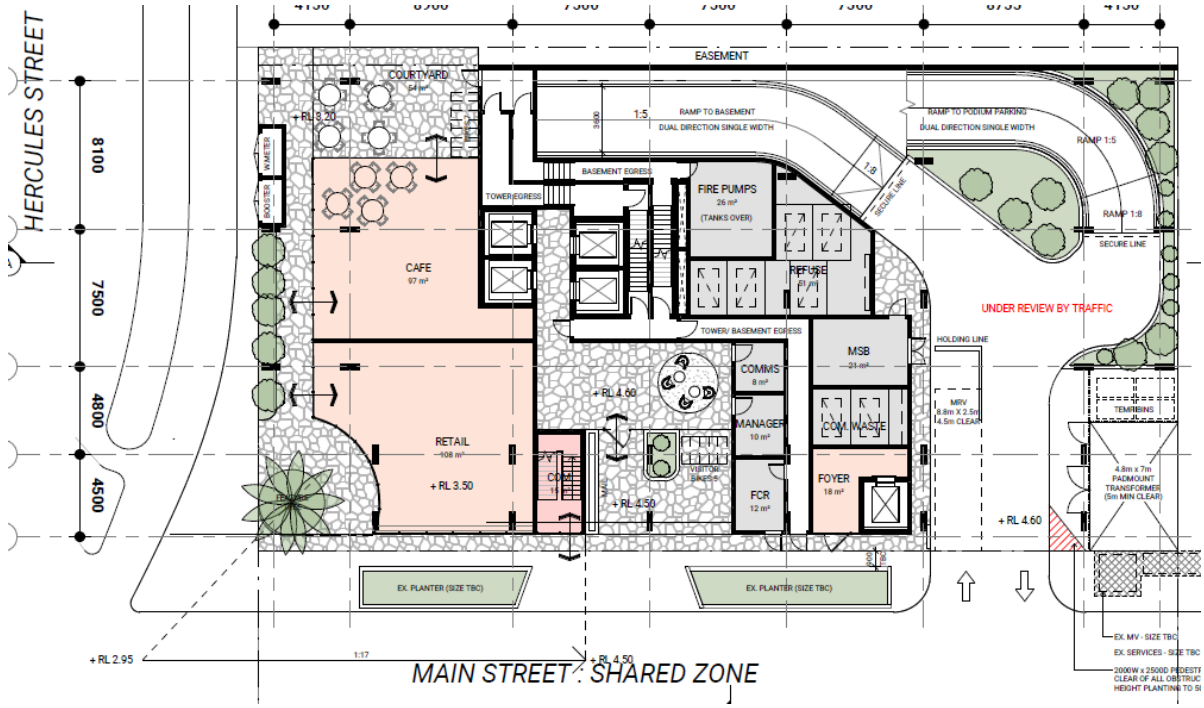
3 Proposed Development

3.1 Development Description

The proposal is a mixed-use development comprising a residential tower, ground floor retail space, commercial tenancies within podium levels, and basement and podium level car parking. Retail hours of operation were assessed for operating hours between 6am – 10pm.

A plan of the development is shown in Figure 2. Further development plans are provided in Appendix A.

Figure 2: Proposed Development Plan – Ground Level



4 Measurements

4.1 Equipment

The following equipment was used to measure existing noise levels:

- Norsonic Nor140 sound level meter as a logger (SN# 1406505)
- Norsonic Nor131 sound level meter (SN# 1313158)
- RION NC-73 acoustical calibrator (SN# 10697023)

All equipment was calibrated by a National Association of Testing Authorities (NATA) accredited laboratory. The equipment was field calibrated before and after the measurement session. No significant drift from the reference signal was recorded.

4.2 Unattended Noise Monitoring

Unattended noise monitoring was conducted to establish the existing ambient noise levels between Friday 13th November and Wednesday 18th November 2020. The noise monitor was located on the site, as shown in Figure 3. The monitor position was considered representative of the ambient noise levels experienced by the nearby noise sensitive receivers with consideration to access and security requirements.

Figure 3: Noise Monitoring Location

The ambient noise monitor was in a free-field location and 1.5m above ground level. The monitor was set to measure statistical noise levels in 'A'-weighting, 'Fast' response, over 15 minute intervals. Ambient noise levels were measured in accordance with Australian *Standard AS1055:2018 Acoustics – Description and Measurement of Environmental Noise* (AS1055).

Weather during the monitoring period was generally fine with rain occurring on the 18th November (source: Bureau of Meteorology). Weather affected data was excluded from the analysis.

4.3 Noise Source Measurements

Noise levels associated with typical activities which may impact noise sensitive receivers were taken from similar investigations conducted by TTM. Measurements were conducted generally in accordance with Australian Standard AS1055.

4.4 Results of Noise Measurements

4.4.1 Ambient Noise Levels

Table 1 presents the measured ambient noise levels. The Rating Background Level (RBL) was determined in accordance with the BCC *Noise Impact Assessment Planning Scheme Policy* (NIAPSP). Graphical presentation of the measured levels is shown in Appendix B. The measurement results were used to determine the assessment criteria for the development.

Table 1: Measured Ambient Noise Levels

Time Period	Measured Noise Levels, dB(A)	
	RBL L_{90}	L_{eq}
Daytime (7am – 6pm)	52	57
Evening (6pm – 10pm)	51	56
Night time (10pm – 7am)	48	52

5 Noise Criteria

The applicable noise criteria codes for the site location are the Northshore Hamilton PDA Scheme (July 2009 and draft amendment October 2021) and Brisbane City Plan 2014.

In accordance with City Plan 2014, the site is not located within a transport noise corridor or aircraft noise overlay location. The site is also screened to the port area by existing buildings in the south direction and is therefore not expected to be adversely impacted by port noise.

5.1 Northshore Hamilton PDA Scheme

Northshore Hamilton Urban Development Area Development Scheme (July 2009) states in relation noise criteria:

General noise requirements

Development achieves acceptable noise levels for noise sensitive uses in affected areas

The Northshore Hamilton Priority Development Area Proposed Development Scheme Amendment no.1 October 2021 states in relation to noise criteria:

2.5.9.1 Noise

Development manages the noise amenity expectations of different land uses, especially sensitive land uses, with consideration for the variety of noise sources that may contribute to background noise levels in the PDA, such as aircraft operations, transport noise, marine activities, industrial activities and mixed-used urban environments.

Development is designed, sited and constructed to:

i. mitigate exposure of occupants to noise impacts from:

a. industrial noise sources,

b. airport and aviation facilities,

c. marine facilities,

d. designated transport noise corridors, and

ii. meet building standards for recommended sound levels for building interiors, and

iii. achieve minimum acoustic environmental values for indoor and outdoor areas.

The applicable noise assessment aspects are potential onsite noise emissions from external retail activities such as outdoor dining and car movements. These are best addressed by using the performance and acceptable outcomes within City Plan 2014.

5.2 City Plan 2014

The Brisbane City Council City Plan 2014 details site specific planning scheme zones, overlays and codes relevant to a site in the BCC local government area. Table 2 summarises the planning scheme requirements for the site which are relevant to the acoustic assessment.

Table 2: City Plan 2014 - Site Specific Acoustic Requirements

Location	Zone	Development Code	Overlay Code
Site	Emerging Community	Multiple Dwelling Code Centre or Mixed-Use Code	Industrial Amenity
Noise Sensitive Receivers	Emerging Community	n/a	n/a

5.2.1 Multiple Dwelling Code

The development includes residential accommodation units which are applicable for assessment under the *Multiple Dwelling Code*. Table 3 summarises the acoustic requirements that apply to the site.

Table 3: Multiple Dwelling Code Performance Outcomes

Performance Outcomes	Acceptable Outcomes
PO22 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. Note — Where T is • Day (7am to 6pm): 11hr, • Evening (6pm to 10pm): 4hr, • Night (10pm to 7am): 9hr. Where • $L_{Aeq,adj,T}$ is the A-weighted equivalent continuous sound pressure level during measurement time T, adjusted for tonal and impulsive noise characteristics, determined in accordance with the methodology described in the Noise impact assessment planning scheme policy. • The rating background level is determined in accordance with the methodology described in the Noise impact assessment planning scheme policy. 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.	**AO22** Development ensures mechanical plant is acoustically screened from nearby sensitive uses.

Performance Outcomes	Acceptable Outcomes
PO35 Development where not in a zone in the centre zones category or the Mixed use zone, ensures that car parking, hardstand or manoeuvring areas are: a. located to minimise noise and fumes disturbance on residents within and adjoining the site; b. acoustically and visually screened to: i) minimise the reflection of headlights into dwelling windows; ii) attenuate noise impacts; c. landscaped to: i) soften the visual appearance of at grade hardstand areas; ii) enhance pedestrian safety; iii) improve visual amenity for the streetscape and urban area; iv) provide shade for pedestrians and reduce the impact of glare and radiant heat from car parking areas. Note—where in a zone in the centre zones category or the Mixed use zone, the car parking provisions of the Centre or mixed use code apply.	**AO35.1** Development where not in a zone in the centre zones category or the Mixed-use zone, ensures that a **hardstand or manoeuvring area situated at or above ground level is**: a. **located a minimum of 3 metres vertically and horizontally from any habitable window on site to minimise noise disturbance on residents**; b. screened to prevent the reflection of car headlights onto dwelling windows adjoining or opposite the site. **AO35.2** Development where not in a zone in the centre zones category or the Mixed use zone ensures **any vehicle movement or vehicle parking areas along the side or rear boundary are**: b. **acoustically screened from adjoining dwellings to a minimum height of 1.8m**; c. provided with a vegetated buffer next to any movement or parking areas: i) a minimum of 1m wide along the side boundary; ii) a minimum of 2m wide along the rear boundary; iii) planted at a pot size and density sufficient to screen up to 1.5m above ground level at establishment. **AO35.3** Development, where not in a zone in the centre zones category or the Mixed use zone, and where car parking is above ground and uncovered, provides: a. a minimum of 1 shade tree for every 6 car spaces; b. trees which are planted to achieve a minimum 50% shade cover along internal pedestrian paths and driveways within 5 years of certification in accordance with the Landscape work code and the Planting species planning scheme policy. **AO35.4** Development where not in a zone in the centre zones category or the Mixed use zone, provides: a. landscaping that is used to delineate safe pedestrian movement through car parks; b. exterior vehicle movement areas that are broken up by alternative materials, patterns or threshold treatments.

	AO35.5 Development of ground level or other above ground car parking, where not in a zone in the centre zones category or the Mixed use zone, provides densely planted setbacks. Note–Front boundary setbacks must be treated to address streetscape interface issues and be in accordance with the streetscape interface performance outcomes and acceptable outcomes.

It is recommended acoustic screening is utilised for exposed mechanical plant with the potential to impact adjacent sensitive receivers to comply with *Acceptable Outcome AO22*.

Podium level car parking complies with AO35.1 as it is located at least 3m vertically and horizontally from any habitable window.

The ground level car movement area complies with AO35.2 in relation to noise, with acoustic screening to min. 1.8m high to adjoining dwellings (future residential to east) by the use of a minimum 1.8m high acoustic fence on the east boundary.

5.2.2 Centre or Mixed Use Code

The proposed development includes retail use that is applicable for assessment by the *Centre or Mixed Use Code*. Table 4 summarises the primary acoustic requirements that apply.

Table 4: Centre or Mixed-Use Code Requirements

Performance Outcomes	Acceptable Outcomes
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 9.3.3.3.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: (a) for accommodation activities, dwelling unit or emergency services has unlimited hours of operation; (b) for a club, if licensed, function facility, hotel or nightclub entertainment facility does not generate noise which is clearly audible and detectable, or impacts on the amenity of a resident, in a dwelling or other sensitive use; Note-Development for a club, if licensed, function facility, hotel or nightclub entertainment facility is not expected to achieve this outcome. (c) for any other use: i. Where in the Principal centre zone or Major centre zone has unlimited hours of operation; ii. Where in District centre zone, Neighbourhood centre zone or Mixed use zone:

Performance Outcomes	Acceptable Outcomes
	a. Has hours of operation, including 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.
	A01.2 **Development ensures mechanical plant or equipment is acoustically screened from an adjoining sensitive use**.
PO7 Development mitigates impacts on residential amenity in or adjoining the building through: (a) providing an outdoor dining area that is appropriately located (b) ensuring external dining and entertainment areas are visually and acoustically screened from an adjoining dwelling.	**AO7** Development provides for external dining or entertainment areas to be: (a) located in or directly adjacent to the public realm (b) visually and **acoustically screened from an adjoining dwelling.**
PO62 Development of garages, driveways and parking structures minimise impacts on the amenity of neighbouring dwellings.	**AO62.1** Development for a car park: (a) **provides a 2m-high acoustic fence** and a landscaped area 1.5m wide where located **adjacent to a neighbouring dwelling**; (b) is **acoustically screened where the car park is used at night and where located adjacent to a neighbouring dwelling**.
	AO62.2 (a) Development for a **driveway or vehicle movement area is screened by a 2m-high acoustic fence along the side or rear boundary if located adjacent to a residential dwelling**.

Accommodation activities comply with *Acceptable Outcome A01.1 (a)* as these activities are allowed unlimited hours of operation.

The site is located in an Emerging community zone and therefore *Acceptable Outcome A01.1 (c)(iii)* is applicable and allows hours of operation, including deliveries from 6am to 8pm.

Commercial hours of operation, including outdoor dining, was assessed for operation between 6am –10pm. The proposed ground level outdoor dining area is located on the north west corner of the building which is screened from adjoining dwellings in west and south directions.

Deliveries to operate during the allowed hours of 6am – 8pm.

It is recommended the development comply with *Acceptable Outcome AO1.2* by applying acoustic screening to exposed mechanical plant with the potential to impact adjacent sensitive receivers.

Ground level car movement area complies with AO62.1/62.2 in relation to noise, with acoustic screening to 2m high to adjoining dwellings (future residential to east) by the use of a 2m high acoustic fence on the east boundary.

5.2.2.1 Noise (Planning) Criteria

The noise emission criteria of Performance Outcome PO1 of the Centre or Mixed Use Code (Table 9.3.3.F) is presented in Table 5.

Table 5: Noise (Planning) Criteria (Table 9.3.3.3.F)

Criteria Location	Intrusive noise criteria, dB(A) Day, evening and night $L_{Aeq,adj,T}$ are not greater than the RBL plus the value shown in Column 1				Acoustic amenity criteria, dB(A) Day, evening and night $L_{Aeq,adj,T}$ are not greater than the values in this column for the relevant criteria location		
	Column 1	Day	Evening	Night	Day	Evening	Night
Emerging community zone boundary	+5	57	56	53	55	50	45
Project Specific Criteria*					55	50	45

Day: 7am – 6pm. Evening: 6pm – 10pm. Night 10pm – 7am.

*The project specific noise criterion is taken as the most stringent value for each time period from the Intrusive and Amenity noise criteria.

5.2.3 Industrial Amenity Overlay Code

The site is located within an *Industrial Amenity Overlay* area of City Plan 2014. During site visits no adverse noise activities were observed from any industrial uses. A survey of the surrounding area did not identify any industrial uses with the potential to adversely impact the proposed development. Hence no further analysis of industrial uses was conducted.

6 Assessment – Onsite Noise

The following section presents an assessment of noise associated with the development to determine the potential impacts at the nearest sensitive receivers.

The relevant transient noise activities, not addressed by acceptable outcomes (Section 5.2), with the potential to adversely impact the nearest noise sensitive receivers are:

- Retail - outdoor dining (ground floor)

Deliveries and waste collection will be recommended to occur during allowed operating hours (6am - 8pm). See Section 7 for recommendations.

6.1 Noise Sensitive Receivers

This assessment will focus on the nearest noise sensitive receivers as outlined below and shown in Figure 4. If compliance can be achieved at these nearest receivers, then all remaining noise sensitive locations are expected to comply.

- Receiver 1: Residential use in an Emerging community zone to the south of the site
- Receiver 2: Residential use in an Emerging community zone to the west of the site
- Receiver 3: Residential use (future) in an Emerging community zone to the east of the site

Figure 4: Noise Sensitive Receivers

6.2 Noise Source Levels

Table 6 presents the typical noise sources with the potential to impact noise sensitive receivers and the respective measured noise levels. The noise source levels were calculated to one metre and include corrections for tonality and impulsiveness as per *AS1055* where applicable.

Table 6: Typical Transient Noise Source Levels

Noise Source Description	Prediction Location	Measured Duration (sec)	Noise Level at 1m, dB(A)		'Peak' events per hour or % of period
			$L_{Aeq,T}$	L_{Amax}	
Outdoor dining	Outdoor dining area (Ground Floor)	60	75	N/A^	100%

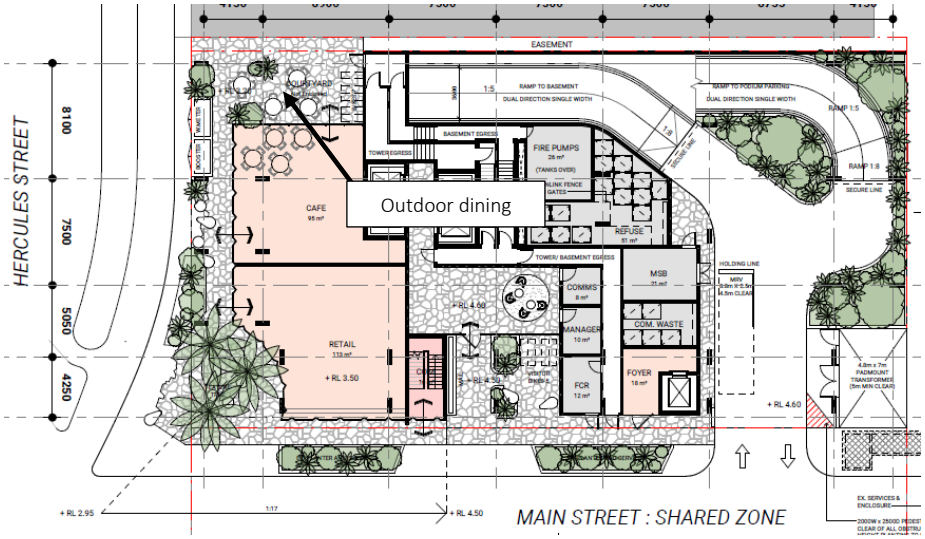
^People and vehicle pass-by noise is excluded from L_{max} assessment in accordance with NIAPSP.

6.3 Noise Assessment Methodology

The following assumptions have been made for noise calculations:

- Outdoor dining was predicted from the nearest outdoor dining area. The noise duration was assumed to be continuous during the assessment time period.
- Attenuation from building screening was included where applicable.
- Figure 5 presents the relevant noise activity locations.

Figure 5: Noise Activity Locations



6.4 Predicted Noise Levels at Receivers

The predicted noise levels from typical onsite activities are based on the noise sources presented in Table 6 and the assumptions outlined in Section 6.3. Calculations are included in Appendix C.

6.4.1 Noise Planning Criteria – L_{eq}

Table 7 presents the predicted noise emission levels.

Table 7: Predicted Noise Planning Impacts

Receiver	Noise Source	Predicted External Noise Level L_{Aeq} dB(A)	Complies with Criteria?	
			Day 7am - 6pm 55 dB(A)	Evening 6pm - 10pm 50 dB(A)
1	Outdoor dining	25	✓	✓
2	Outdoor dining	45	✓	✓
3	Outdoor dining	22	✓	✓

Noise activities are predicted to comply with the relevant noise criteria at all receivers.

7 Recommendations

Recommended noise mitigation measures are presented in this section to achieve predicted compliance with the relevant assessment criteria.

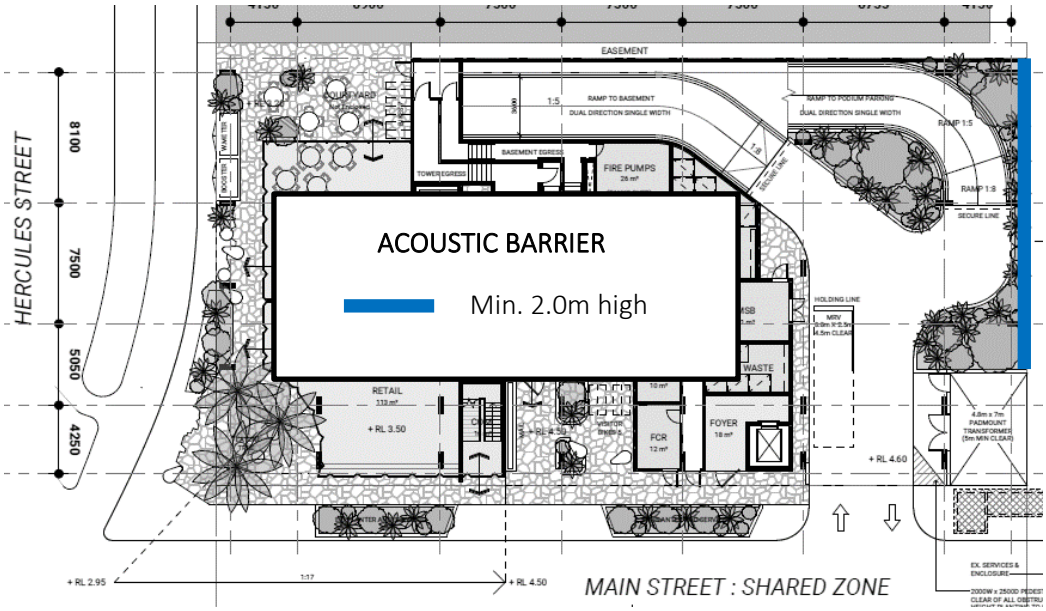
7.1 Acoustic Barrier

In accordance with Multiple dwelling code (AO35.2) and Centre or mixed use code (AO62.1/62.2), acoustic screening is recommended for the ground level car manoeuvring area at the location, height and extent as shown in Figure 6.

The acoustic barrier should:

- Be the minimum height relative to the finished car manoeuvring ground level.
- Be of solid construction and have no gaps or holes for the extent shown.
- Be constructed of a material with a surface mass not less than 12.5kg/m^2.

Figure 6: Recommended Acoustic Barrier – Ground Level



7.2 Management Strategies

The following management strategies are recommended to achieve predicted compliance and minimise noise annoyance:

a. Commercial/retail tenancy operating hours between 6am – 10pm.

b. Deliveries and waste collection to occur during allowed operating hours 6am - 8pm.

c. Any speed humps should be bitumen, concrete (as part of the slab), or rubber, and not metal.

d. Any grates or other protective covers in the car park and access driveways must be rigidly fixed in position to eliminate movement and be maintained.

7.3 Mechanical Plant

As detailed mechanical plant selections are not available at this stage, it is not possible to carry out a detailed examination of any attenuation measures that may be required to achieve the noise criteria.

To comply with planning scheme acceptable outcomes for mechanical plant (City Plan 2014), we recommend the following for plant with the potential to adversely impact nearby sensitive receivers:

> *Development ensures mechanical plant is acoustically screened from nearby sensitive uses.*

The definition of 'acoustically screened' is provided in Table SC1.2.3.B of Brisbane City Plan 2014, Schedule 1 Definitions:

> *The source of noise is completely screened from view of habitable rooms (including balconies, patios, decks and verandas) of an adjoining sensitive use by solid, gap free material and construction e.g. acoustic fence, building, or enclosure.*
>
> *Acoustic barrier: Solid, gap free barrier with minimum surface density of 12.5kg/m^2*

Furthermore, it is also recommended that a mechanical plant noise assessment is conducted once plant selections are finalised to ensure noise emissions comply with criteria.

8 Conclusion

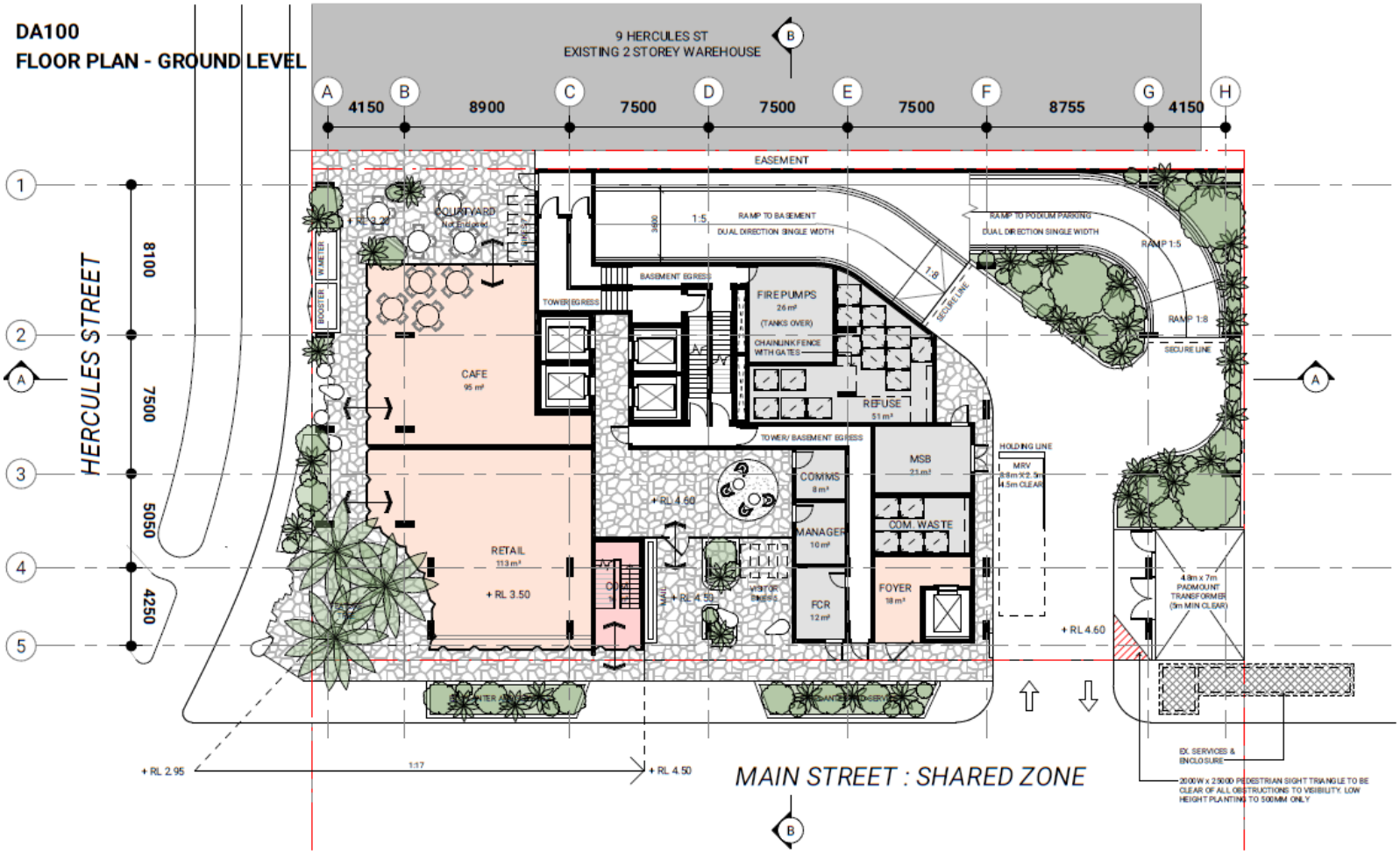
An environmental noise assessment was conducted of a proposed mixed-use development located at 5 Hercules Street, Hamilton.

Compliance with the Northshore Hamilton Priority Development Area (PDA) planning scheme and Brisbane City Council *City Plan 2014* planning scheme is predicted to be achieved based on the recommendations outlined in Section 7 of this report.

Appendix A Sample Development Plans

plus

DA100
FLOOR PLAN - GROUND LEVEL



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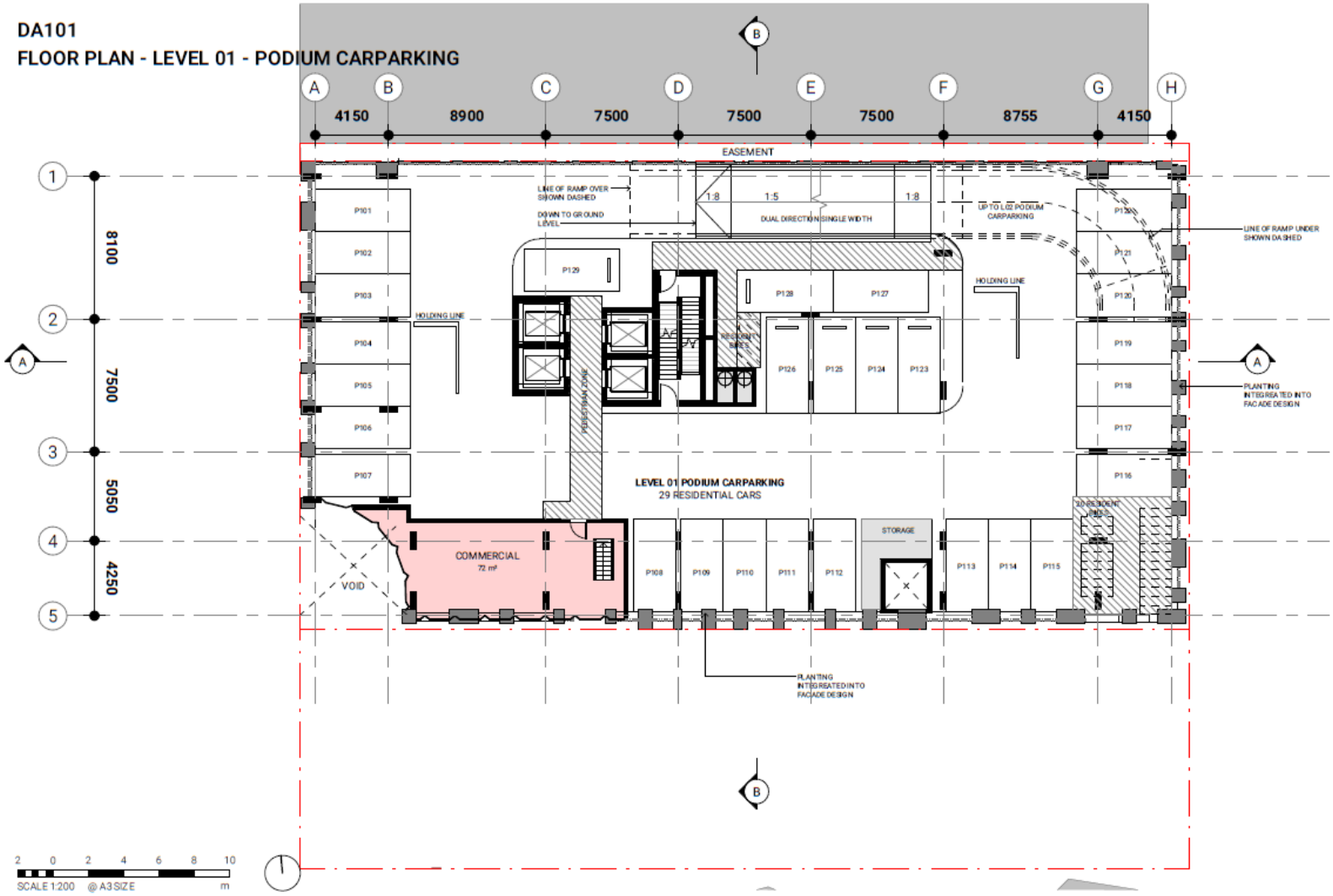
ISSUE 1
Date of Issue | 23.06.22

70526 | UNTITLED | 5 HERCULES STREET, HAMILTON | BRISBANE

plus

Site: 5 Hercules St, Hamilton
Reference: 20BRA0062 R01_1

DA101
FLOOR PLAN - LEVEL 01 - PODIUM CARPARKING



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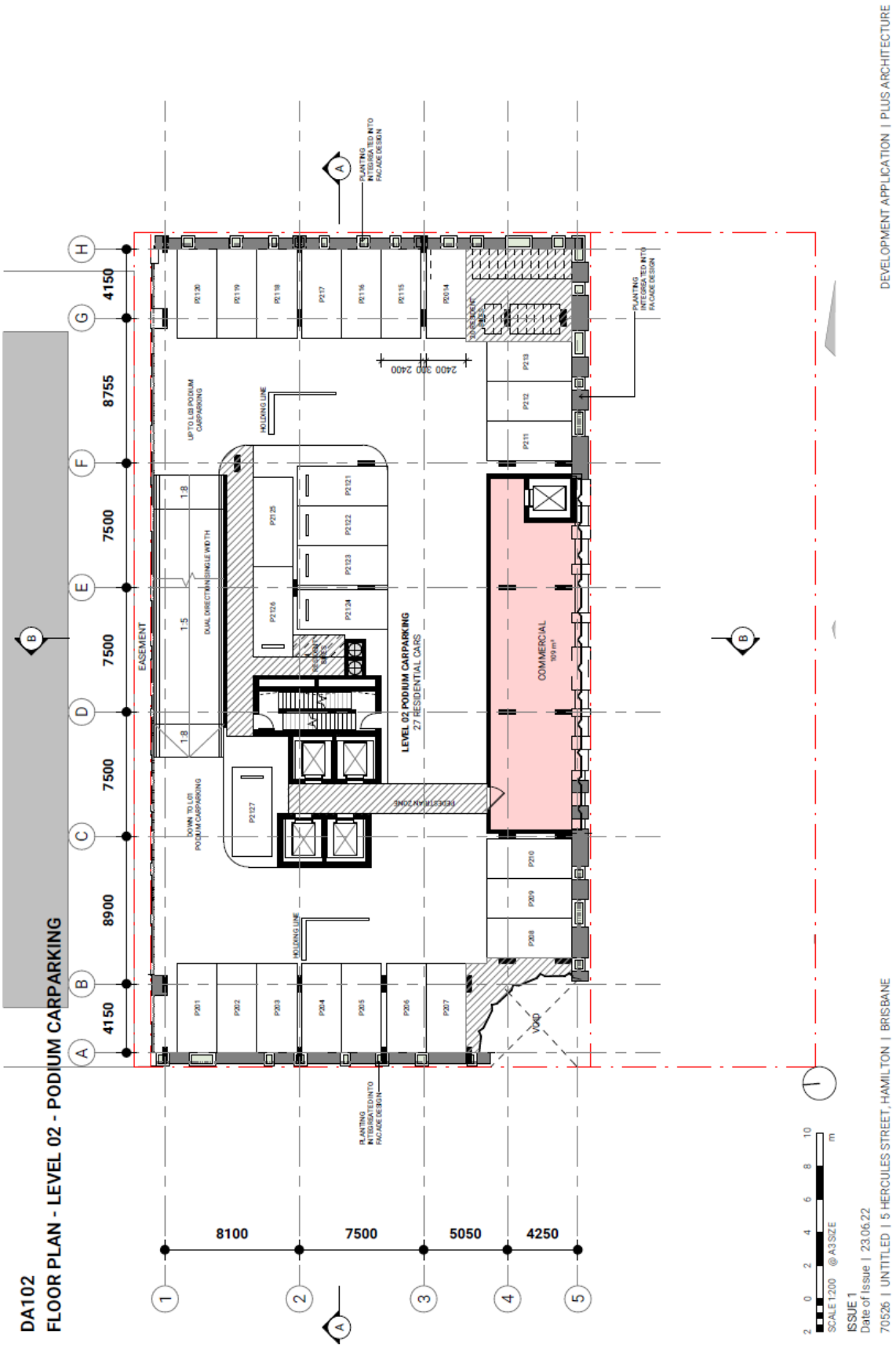
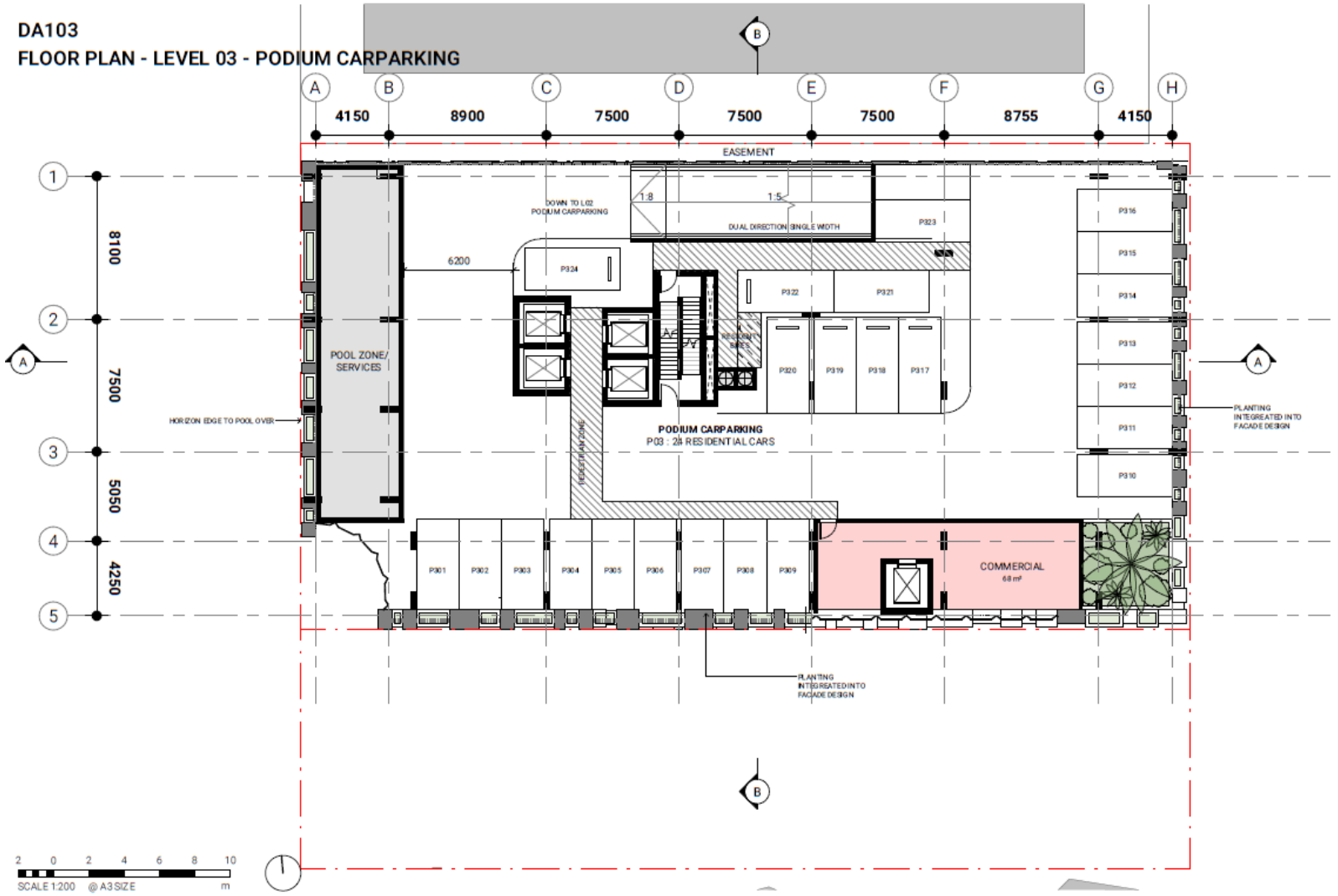
ISSUE 1
Date of Issue | 23.06.22


DA102
FLOOR PLAN - LEVEL 02 - PODIUM CARPARKING
LEVEL 02 PODIUM CARPARKING
27 RESIDENTIAL CARS
COMMERCIAL
EASEMENT
VOID
8100
7500
5050
4250
4150
8755
7500
7500
7500
8900
4150
SCALE 1:200 @ A3 SIZE
ISSUE 1
Date of Issue | 23.06.22
70526 | UNTITLED | 5 HERCULES STREET, HAMILTON | BRISBANE
DEVELOPMENT APPLICATION | PLUS ARCHITECTURE

plus

DA103
FLOOR PLAN - LEVEL 03 - PODIUM CARPARKING



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ISSUE 1
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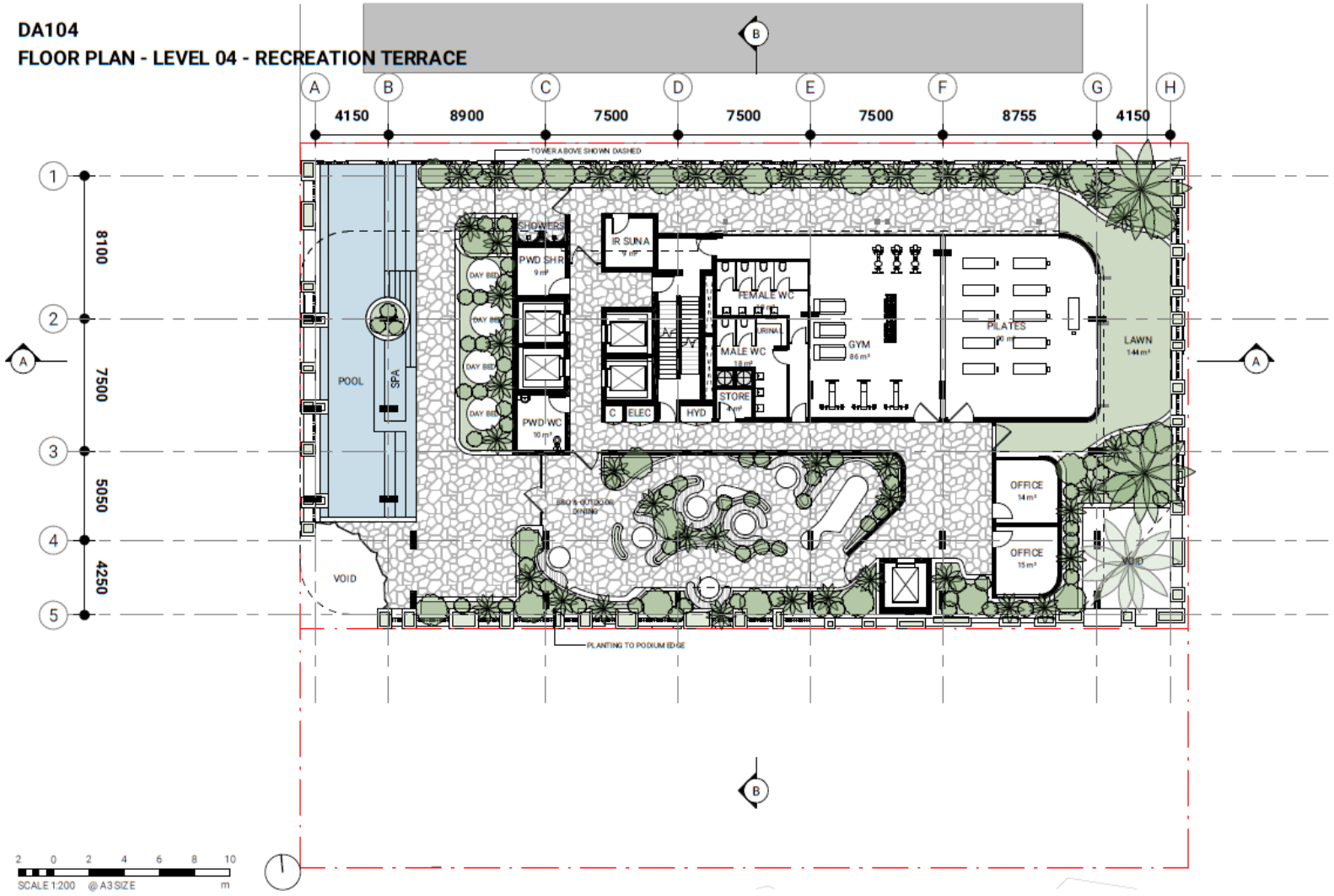
plus

DA104
FLOOR PLAN - LEVEL 04 - RECREATION TERRACE



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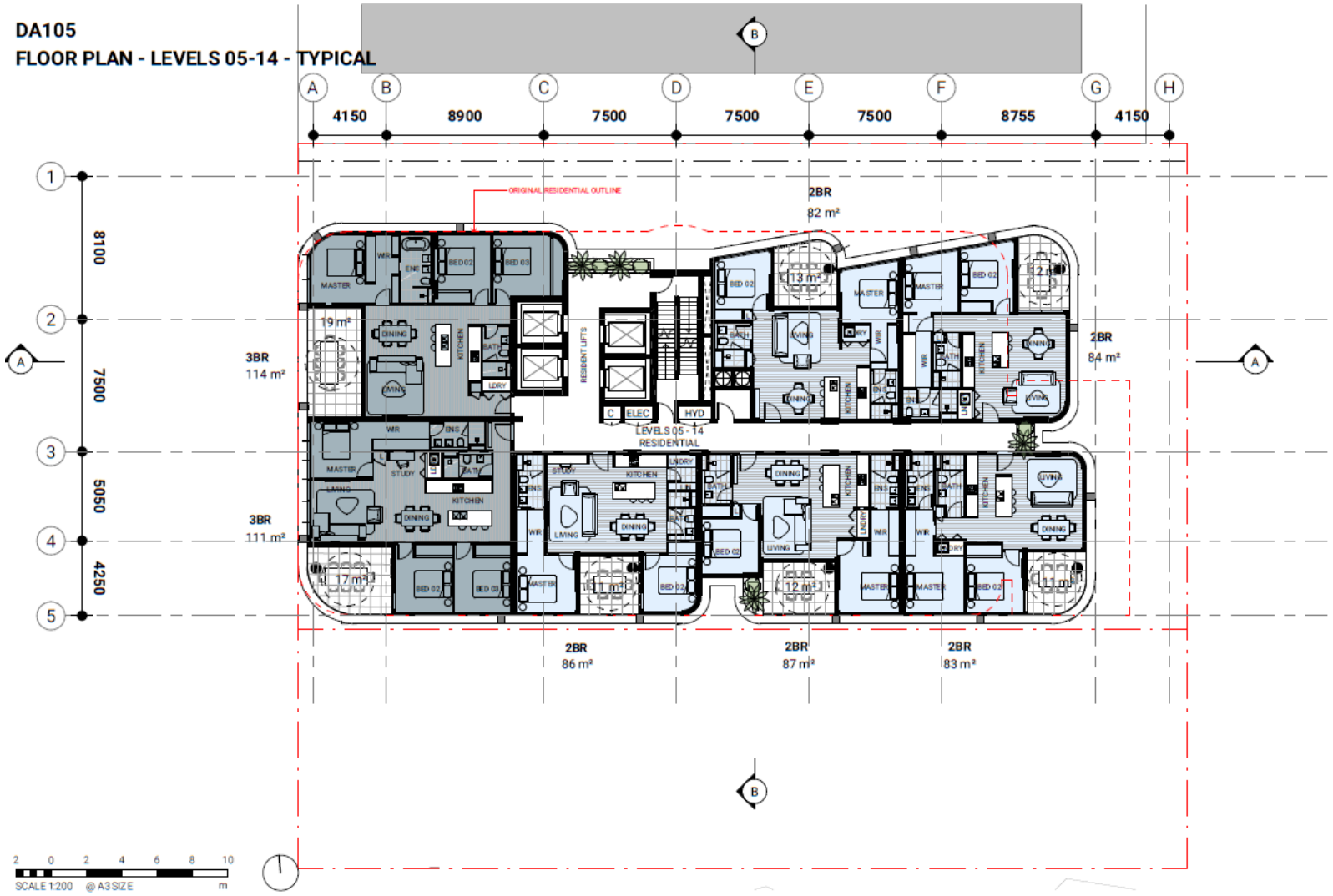
Date of Issue | 23.06.22

70526 | UNTITLED | 5 HERCULES STREET, HAMILTON | BRISBANE

DEVELOPMENT APPLICATION | PLUS ARCHITECTURE

plus

DA105
FLOOR PLAN - LEVELS 05-14 - TYPICAL



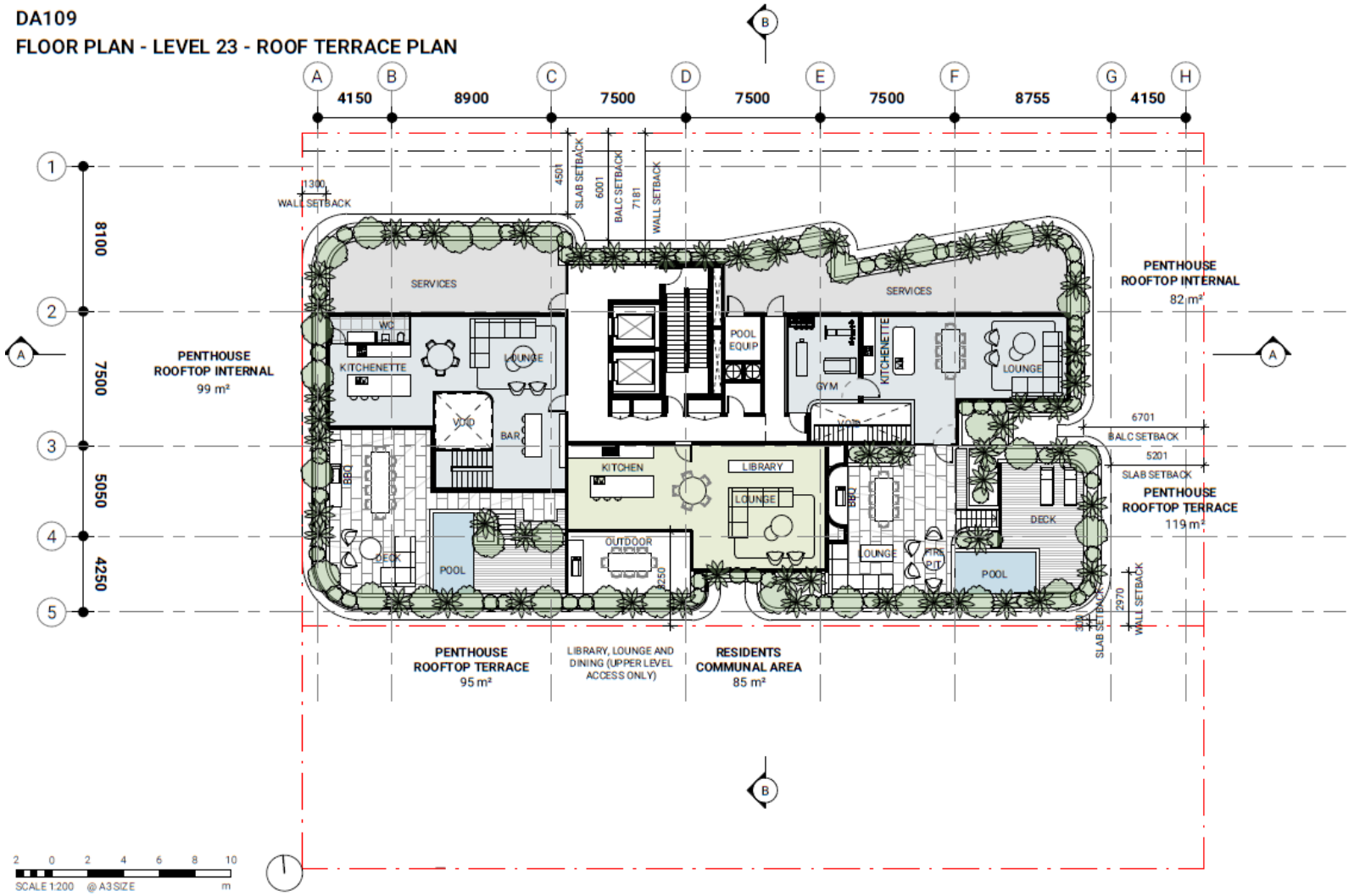
ISSUE 1
Date of Issue | 23.06.22

70526 | UNTITLED | 5 HERCULES STREET, HAMILTON | BRISBANE

DEVELOPMENT APPLICATION | PLUS ARCHITECTURE

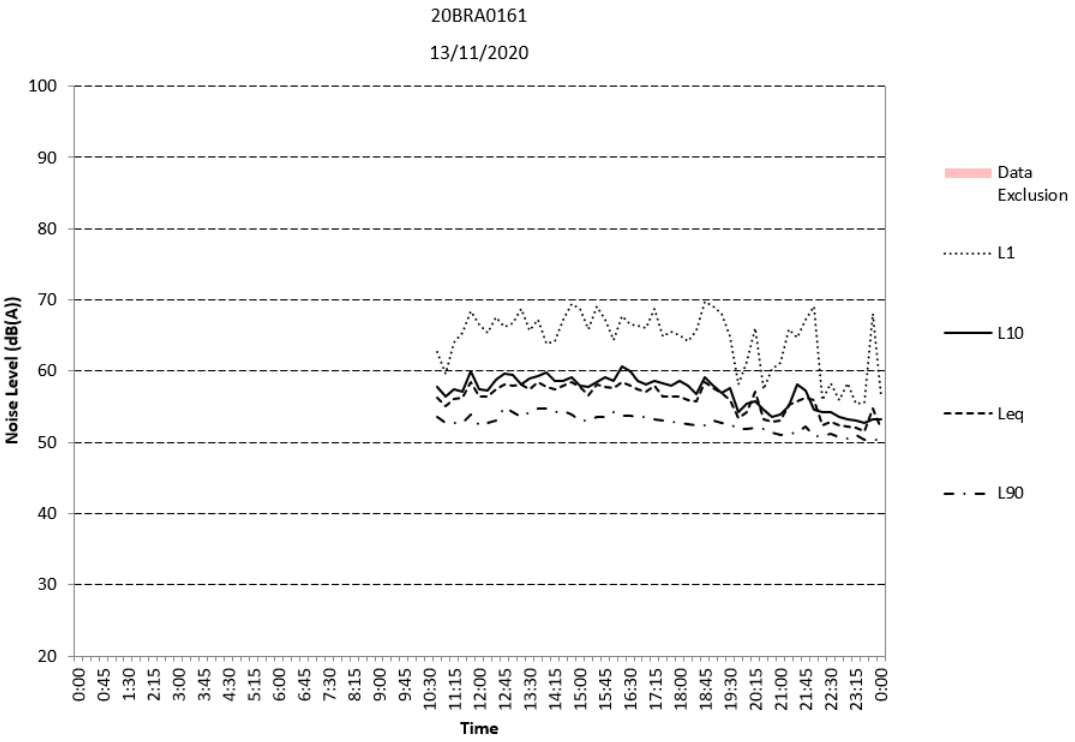
plus architecture

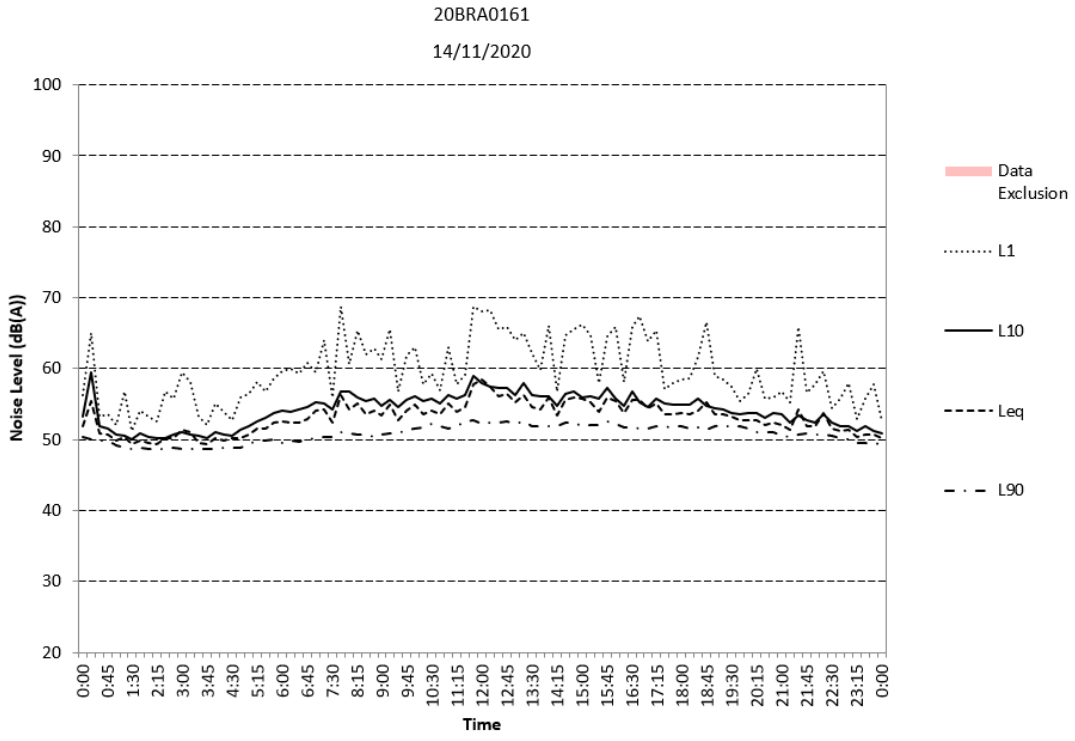
DA109
FLOOR PLAN - LEVEL 23 - ROOF TERRACE PLAN



ISSUE 1
Date of Issue | 23.06.22

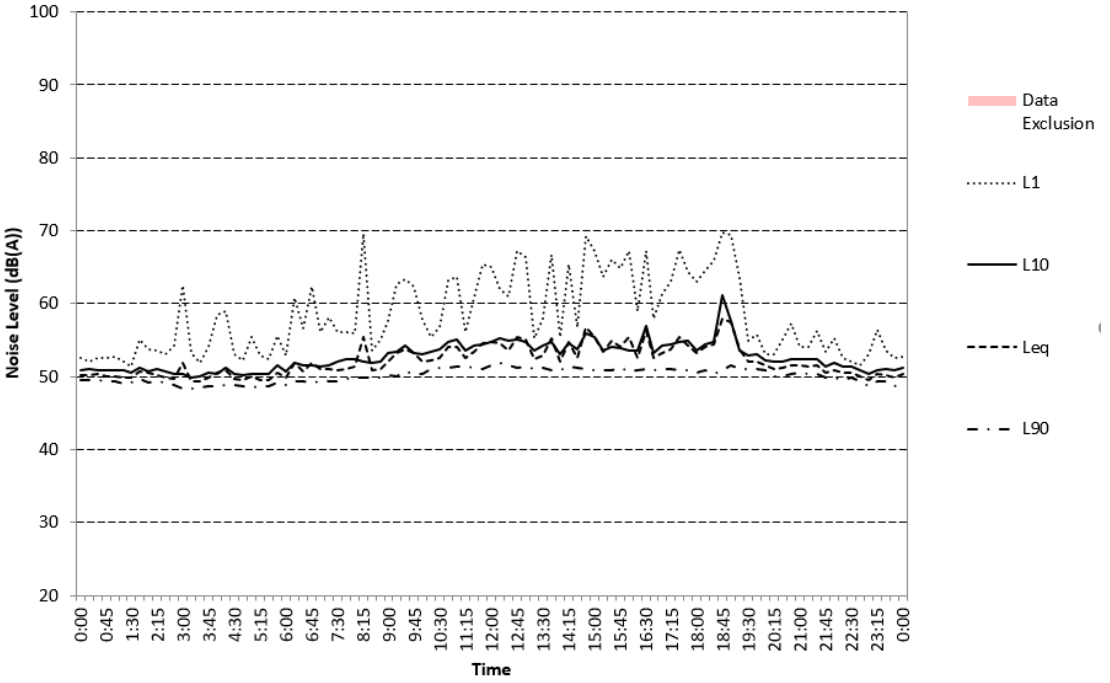
Appendix B Unattended Noise Monitoring Graphs


20BRA0161
13/11/2020
Noise Level (dB(A))
Time
Data Exclusion
L1
L10
Leq
L90


20BRA0161
14/11/2020
Noise Level (dB(A))
Time
Data Exclusion
L1
L10
Leq
L90

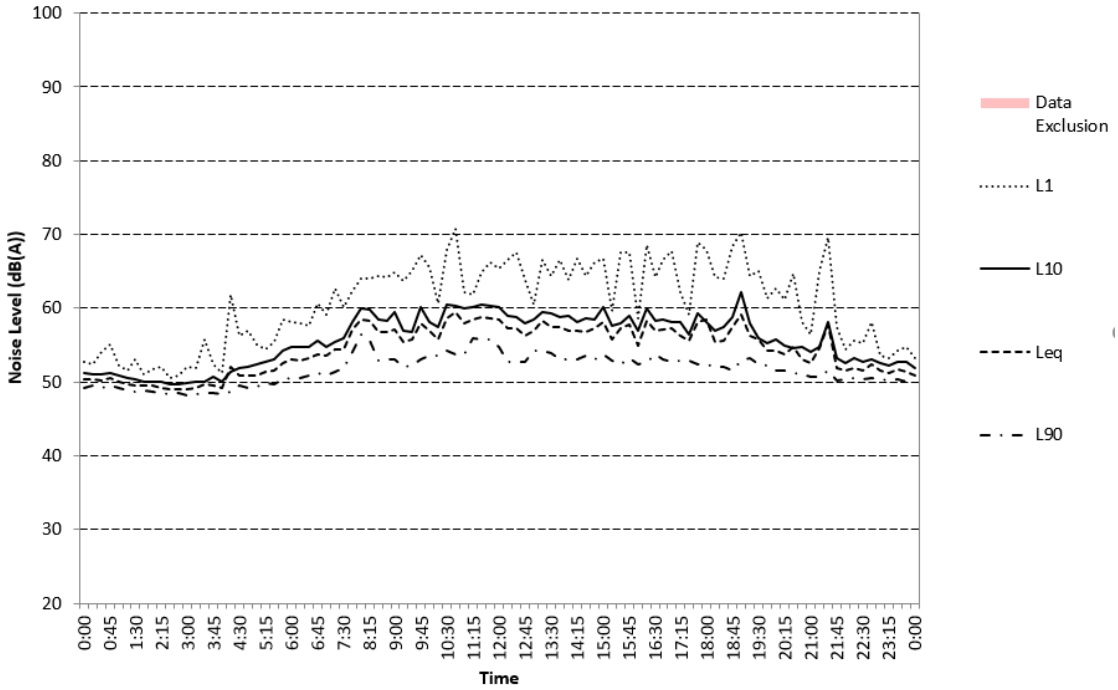
20BRA0161

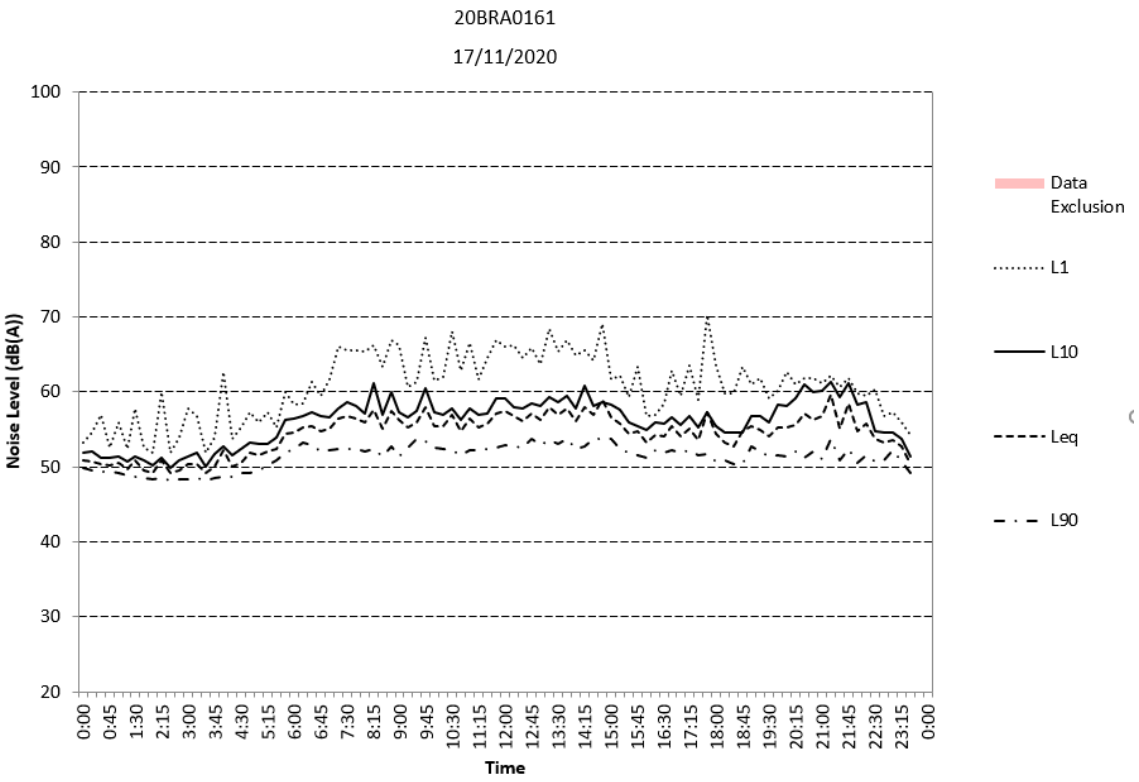
15/11/2020



20BRA0161

16/11/2020




20BRA0161
17/11/2020
Noise Level (dB(A))
100
90
80
70
60
50
40
30
20
0:00
0:45
1:30
2:15
3:00
3:45
4:30
5:15
6:00
6:45
7:30
8:15
9:00
9:45
10:30
11:15
12:00
12:45
13:30
14:15
15:00
15:45
16:30
17:15
18:00
18:45
19:30
20:15
21:00
21:45
22:30
23:15
0:00
Time
Data Exclusion
L1
L10
Leq
L90

Appendix C Calculations

PROJECT #: **Activity Noise**

Noise Source	Duration (sec)	Leq	1 Hour Period (sec)	Events	Leq Level	Distance to Receivers R1	R2	R3
Outdoor dining	60	75	3600	60	75	30	30	45

Noise level due to Distance loss								
Outdoor dining						45	45	42

Shielding (building, barrier etc)						R1	R2	R3
Outdoor dining						20	0	20

Noise Level at Receiver						R1	R2	R3
Outdoor dining						25	45	22