



3 December 2025

Our Ref: 20BRA0161 L01_1

Your Ref:

PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

Approval no: DEV2025/NSH/4175

Date: 06 February 2026



Attention: Bryce Ibrahim

PDS

Dear Bryce,

RE: Minor Change Application – 19 Hercules Street, Hamilton

This letter outlines a review by Colliers (previously TTM) of the revised project documentation in relation to a minor change application and the impact of the revised documentation on the currently approved environmental noise assessment report and development approval conditions.

This review is based on the following:

- Revised architectural plans by FUSE as presented in Appendix A
- EDQ Development Approval Conditions, ref DEV2020/1165, dated 9 December, 2021
- EDQ approved *Environmental Noise Impact Assessment* (ENA) Report by TTM (ref: 20BRA0161 R01_1, dated 23/11/2020) (Appendix B)

A review of the revised architectural plans was conducted and the plans were determined to be consistent with the assessment and recommendations of the approved ENA report with the exception of aircraft noise.

The current City Plan 2014 planning scheme Airport Environs overlay mapping does not located the site within an aircraft noise ANEF zone. Therefore, Sections 7 and 8.1 of the approved ENA report are now not applicable. The other recommendations of Section 8 remain applicable.

Hence the EDQ development approval condition MCU 34 can be adjusted as follows:

Acoustic treatments

a) Construct the approved development to include the acoustic treatments specified in ~~Section 8~~ Section 8.2 and 8.3 of the following approved document:

i. Environmental Noise Impact Assessment prepared by TTM dated 23/11/2020, ref number 20BRA0161 R01_1



One additional, general recommendation is as follows:

- The conference room external facades and pre-function space west façade on the mezzanine level to achieve a minimum acoustic rating of Rw35.

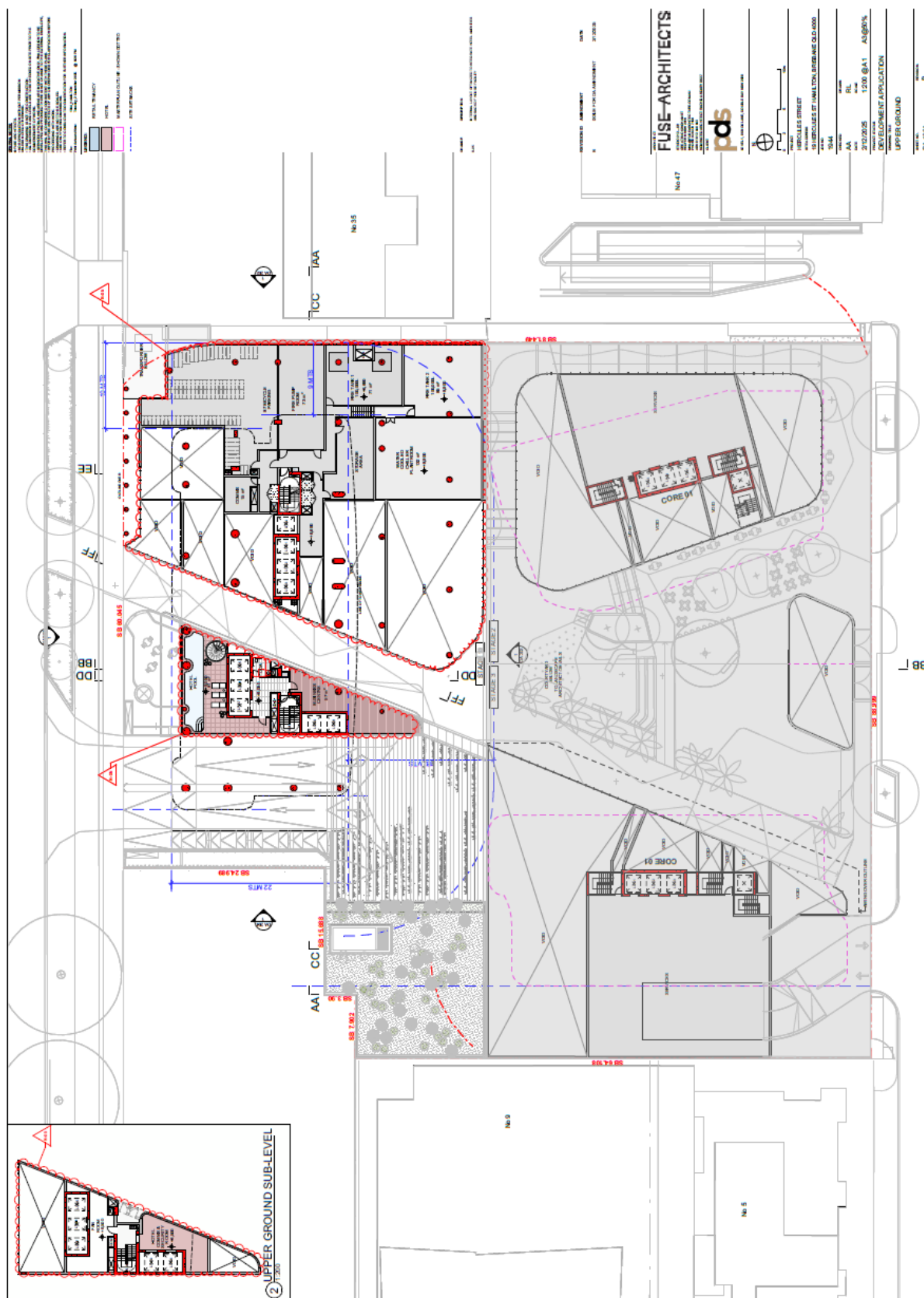
We trust this information meets with your current requirements. Should you have any queries please do not hesitate to contact Colliers.

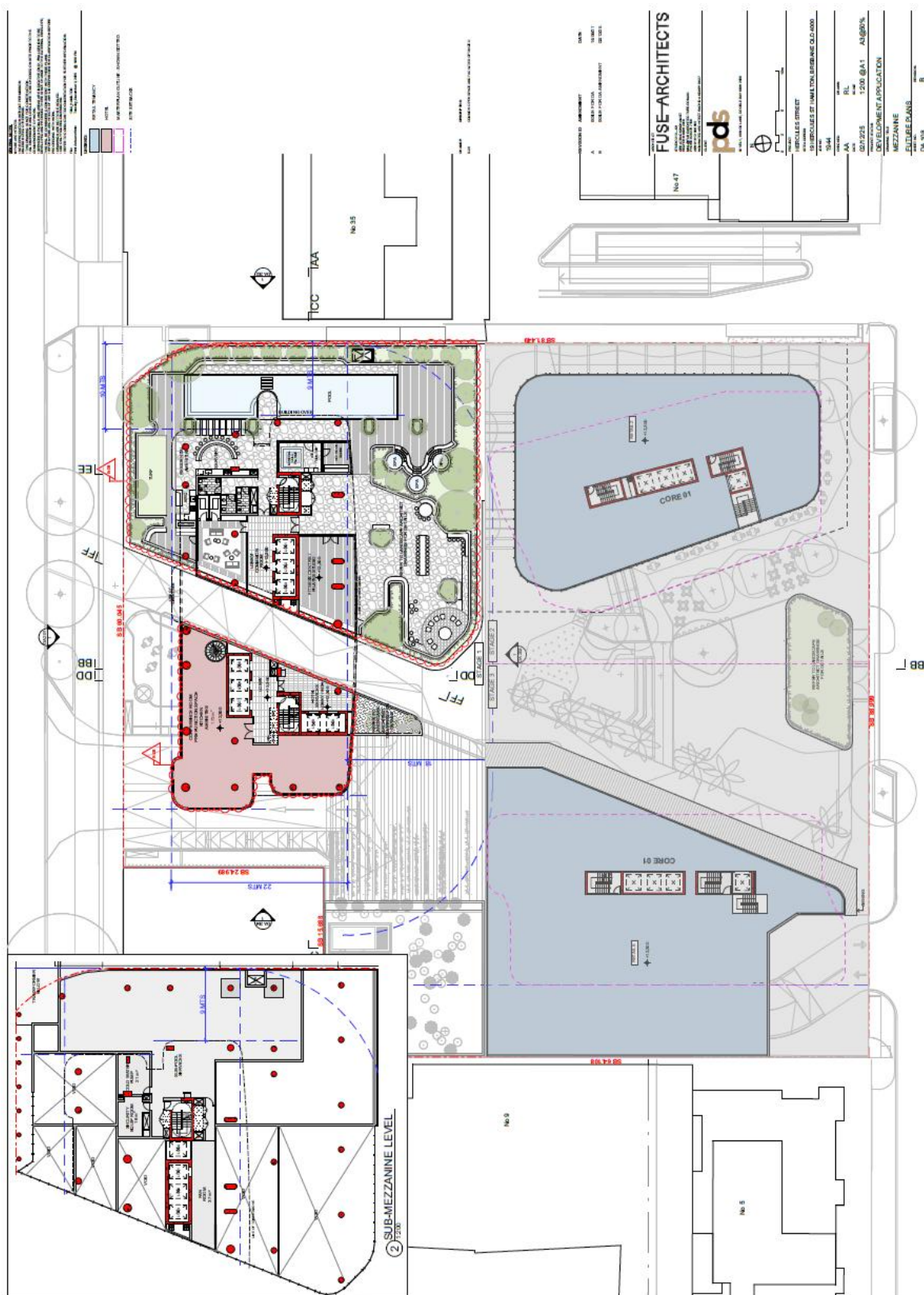
Yours Sincerely,

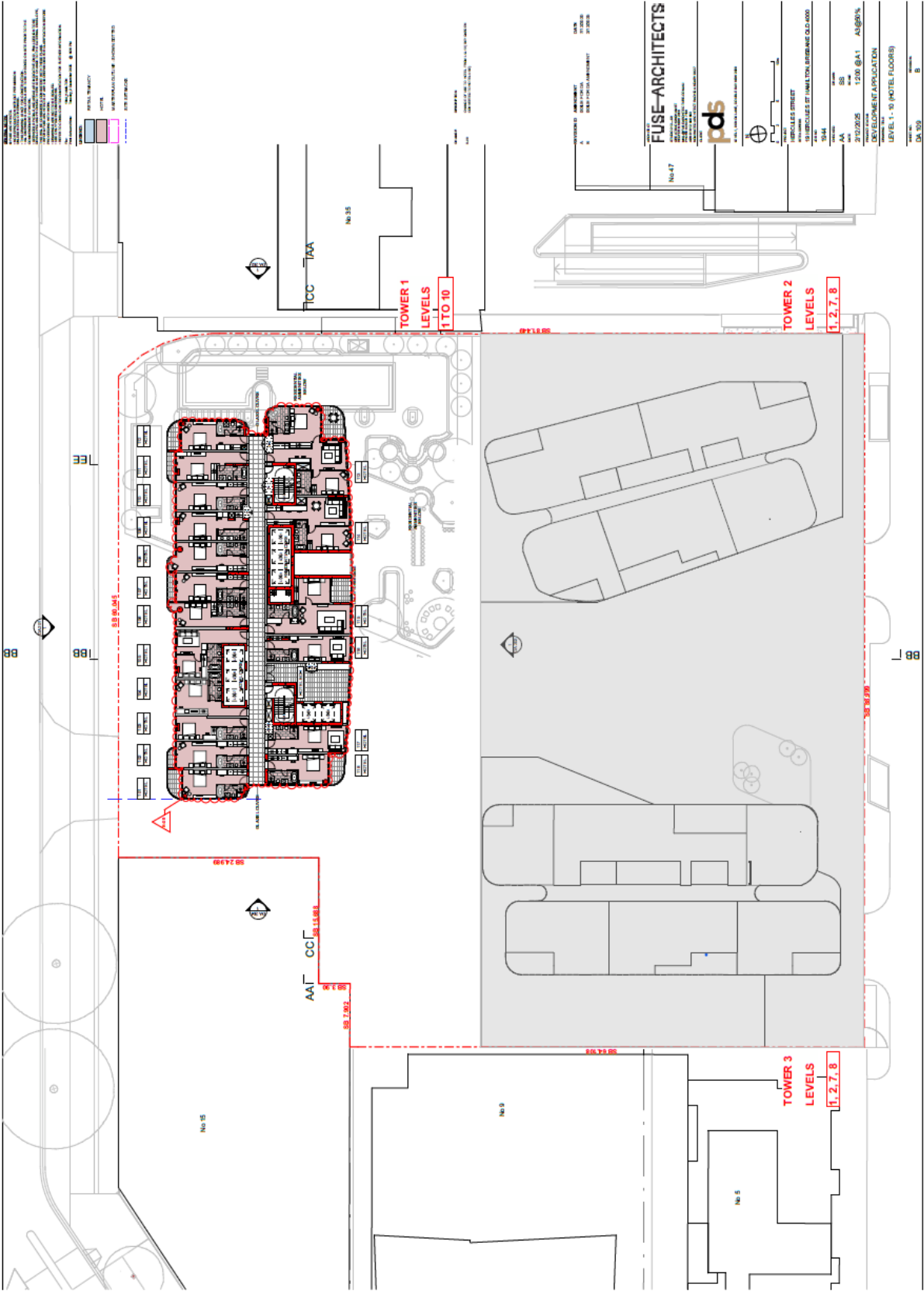
Steve Yorke

Principal Consultant

[Colliers International Engineering & Design Pty Ltd](#)









Appendix B - *Environmental Noise Impact Assessment* (ENA) Report by TTM



Environmental Noise Impact Assessment

Proposed Mixed Use Development – Stage 1

At 19 Hercules Street, Hamilton

On behalf of Wentworth Equities Pty Ltd

20BRA0161 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.

We have over 50 staff, with an unrivalled depth of experience. Our industry knowledge, technical expertise and commercial insight allow us to deliver an exceptional and reliable service.

T: (07) 3327 9500

F: (07) 3327 9501

E: ttmbris@ttmgroup.com.au



Revision Record

No.	Author	Reviewed/Approved	Description	Date
A	S Yorke	A Ashworth	Internal review	20/11/2020
0	S Yorke		Issued to client	20/11/2020
1	S Yorke		Plans update	23/11/2020

Executive Summary

TTM was engaged by Wentworth Equities Pty Ltd to undertake an environmental noise assessment of Stage 1 of a proposed mixed-use development located at 19 Hercules Street, Hamilton. The assessment was based on the Brisbane City Council City Plan 2014 Planning Scheme.

Unattended noise monitoring was undertaken to establish the existing ambient noise levels. Noise generated by the development was assessed onto the nearest noise sensitive receivers in accordance with the Centre and Mixed Use Code and compliance was predicted to be achieved during all time periods.

The Industrial amenity overlay code was assessed and industrial uses are not expected to adversely impact the development.

Aircraft noise was assessed and indicative façade attenuation requirements for habitable rooms may be achieved with standard façade construction. It is recommended that once building floor plans are finalised, detailed design is conducted to confirm façade attenuation requirements and possible acoustic treatments for each habitable room layout type.

It is recommended that mechanical plant with the potential to adversely impact nearby sensitive receivers is acoustically screened in accordance with code acceptable outcomes. 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.

Compliance with City Plan 2014 planning scheme is predicted to be achieved based on the recommendations outlined in Section 8 of this report.

Contents

Executive Summary	2
1 Introduction	6
1.1 Background	6
1.2 References.....	6
1.3 Scope.....	6
2 Site Description	7
2.1 Site Location.....	7
2.2 Description of Surrounding Environment.....	7
3 Proposed Development	8
3.1 Development Description.....	8
4 Measurements	9
4.1 Equipment.....	9
4.2 Unattended Noise Monitoring	9
4.3 Noise Source Measurements	10
4.4 Results of Noise Measurements.....	10
4.4.1 Ambient Noise Levels	10
5 Noise Criteria	11
5.1 City Plan 2014.....	11
5.1.1 Multiple Dwelling Code	11
5.1.2 Centre or Mixed Use Code	15
5.1.3 Industrial Amenity Overlay Code.....	18
5.1.4 Aircraft Noise.....	18
6 Assessment – Onsite Noise	20
6.1 Noise Sensitive Receivers	20
6.2 Noise Source Levels.....	21
6.3 Noise Assessment Methodology	21
6.4 Predicted Noise Levels at Receivers	22
6.4.1 Noise Planning Criteria – L_{eq}	22
6.4.2 Night Time Criteria – L_{max}	22
7 Assessment – Aircraft Noise	23

7.1	ANEF Zone	23
7.2	Predicted Aircraft Noise Levels.....	23
7.3	Façade Attenuation	24
8	Recommendations.....	26
8.1	Façade Treatment	26
8.2	Management Strategies	26
8.3	Mechanical Plant	27
9	Conclusion.....	28
Appendix A	Sample Development Plans	29
Appendix B	Unattended Noise Monitoring Graphs	36
Appendix C	Calculations – Onsite Noise.....	40
Appendix D	Calculations – Aircraft Noise	42

Table Index

Table 1: Measured Ambient Noise Levels	10
Table 2: City Plan 2014 - Site Specific Acoustic Requirements.....	11
Table 3: Multiple Dwelling Code Performance Outcomes PO21, PO23, PO42, PO43	12
Table 4: Mechanical Plant Criteria	15
Table 5: Centre or Mixed-Use Code Requirements.....	15
Table 6: Noise (Planning) Criteria (Table 9.3.3.3.F)	17
Table 7: Night-time Noise Criteria (Table 9.3.3.3.H)	17
Table 8: Airport Environs Overlay Code Performance Outcome PO8	18
Table 9: Performance Outcome PO8 - <i>Table 8.2.2.3.B—Internal noise criteria</i>	19
Table 10: Typical Transient Noise Source Levels.....	21
Table 11: Predicted Noise Planning Impacts	22
Table 12: Distance Coordinates for Site Location as per AS2021.....	24
Table 13: AS2021 Aircraft Noise Level Predictions at the Site	24
Table 14: Aircraft Noise Indicative Façade Treatments – Habitable Rooms	24
Table 15: Aircraft Noise Indicative Façade Treatments – Habitable Rooms	26

Figure Index

Figure 1: Site Locality 7

Figure 2: Proposed Development Plan – Ground Floor..... 8

Figure 3: Noise Monitoring Location..... 9

Figure 4: Noise Sensitive Receivers 20

Figure 5: Noise Activity Locations 21

Figure 6: Aircraft Event Levels - Bulimba Noise Monitoring Terminal (WebTrak)..... 23

1 Introduction

1.1 Background

TTM was engaged by Wentworth Equities Pty Ltd to undertake an environmental noise assessment of Stage 1 of a proposed mixed-use development located at 19 Hercules Street, Hamilton. This report will form part of a development application for consideration by Brisbane City Council.

1.2 References

This report is based on the following:

- 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 noise generated by the development onto nearby sensitive receivers
- Assessment of industrial and aircraft noise onto the development
- 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:

- 19 Hercules Street, Hamilton
- Lot 3 on SP172658

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 north, commercial properties to the west, a lane way to the south and residential properties to the east. The current acoustic environment primarily consists of local road traffic noise, commercial activities and aircraft flyover noise. The site is not located within a transport noise corridor and therefore road traffic noise is not required to be assessed.

3 Proposed Development

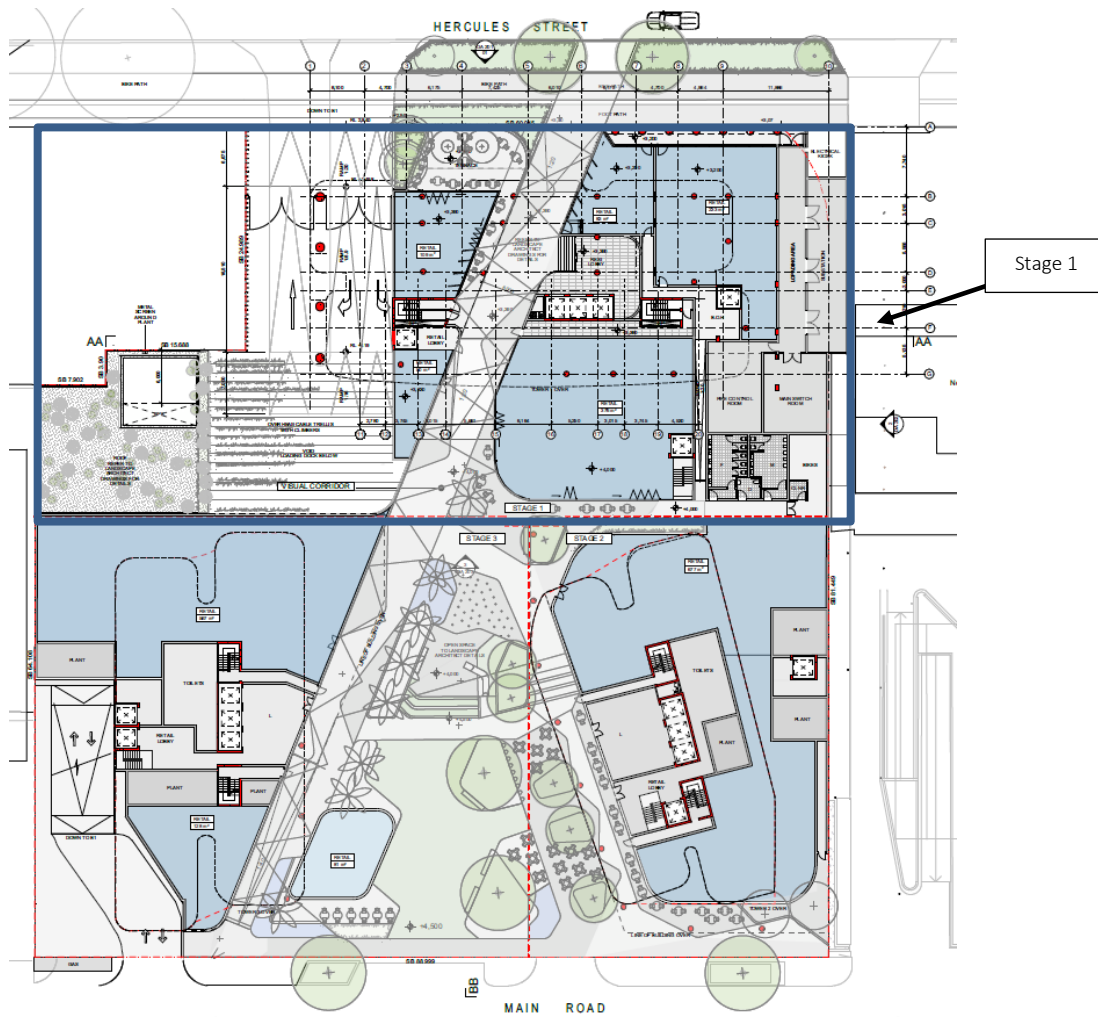
3.1 Development Description

The proposal for Stage 1 is a mixed-use development comprising a residential tower with retail spaces and communal recreation area on lower floors and basement car parking.

Retail hours of operation were assessed over all time periods with restrictions recommended where required.

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

Figure 2: Proposed Development Plan – Ground Floor



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

5.1 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 Airport Environs
Noise Sensitive Receivers	Emerging Community	n/a	n/a

5.1.1 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 PO21, PO23, PO42, PO43

Performance Outcomes	Acceptable Outcomes
PO21 Development where not in a zone in the centre zones category or the Mixed use zone, provides car parking that minimises impacts on the quality of adjoining streetscapes or public spaces and the amenity of adjoining residents in terms of location, bulk, form and amenity impacts including noise, odour or light having regard to: (a) the proximity of dwelling houses or existing multiple dwellings on adjoining sites; (b) the scale and detail of any parking structure walls when viewed from the street and adjoining properties; (c) setback distances to mitigate impacts; (d) the location of actual frontages and public spaces. 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.	AO21.1 Development where not in a zone in the centre zones category or the Mixed use zone, provides car parking that is: (a) located below ground; (b) located at ground level or above ground only if: (i) screened from view from the street, other public spaces or adjoining properties; (ii) contained within the development footprint 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, Table 9.3.14.3.E; (d) screened and landscaped. Note—Car parking which extends 1m above ground level will be counted as a storey in the maximum height and will be subject to the relevant boundary setback requirements. Note—Visitor car parking may be located within the front setback only on one side of an entrance driveway and for the depth of one standard car and where a 1m wide landscaping strip separates the parking space from the street frontage boundary.
	AO21.2 Development, where not in a zone in the centre zones category or the Mixed use zone, of a basement car parking structure located between the street frontage and the main building line is no more than 1m above ground level at any point.
	AO21.3 Development, where not in a zone in the centre zones category or the Mixed use zone, for a basement car parking structure located on the side or rear boundary where up to 1m above ground or where retaining walls and fencing are proposed: (a) the maximum combined height is 2m; (b) structures and fences are finished with low maintenance and prefinished materials. Note—Structures include car parking walls, retaining walls, fences, planters and roofing to terraces, balconies or patios.

Performance Outcomes	Acceptable Outcomes
PO23 Development where not in a zone in the centre zones category or the Mixed use zone, provides vehicle access and parking that must not impact on the amenity and privacy of residents within or adjoining the site. Note—Where in a zone in the centre zones category or the Mixed use zone, the car parking	AO23.1 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 ground level 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 minimise noise and fumes disturbance; (d) landscaped to soften the visual appearance of the hardstand areas.
	AO23.2 Development where not in a zone in the centre zones category or the Mixed use zone: (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 Outcomes	Acceptable Outcomes
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. 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.	AO42 Development ensures mechanical plant is acoustically screened from nearby sensitive uses.
PO43 Development provides refuse and recycling collection and storage facilities that: (a) are centralised in an unobtrusive dedicated storage room or separate screened structure; (b) are located and managed so that adverse impacts on building occupants, neighbouring properties and the public realm are minimised; (c) provide for refuse and recycling including source separation; (d) are of a design that allows low frequency service collection; (e) minimise ongoing building management cost for occupants.	AO43.1 Development provides refuse and recycling collection and storage facilities in accordance with the Refuse planning scheme policy.
	AO43.2 Development ensures that refuse and recycling collection and storage location and design, does not have any adverse impact including odour, noise or visual impacts on the amenity of residents within or adjoining the development. Note—Refer to the Refuse planning scheme policy for further guidance.

Car parking is located within an enclosed basement which satisfies the noise requirements of PO21 and PO23.

To comply with *Performance Outcome PO42* it is recommended the development comply with *Acceptable Outcome AO42* by applying acoustic screening to exposed mechanical plant with the potential to impact adjacent sensitive receivers.

PO42 criteria based on the measured background noise levels (as detailed in Section 4.4.1) are summarised in Table 4.

Table 4: Mechanical Plant Criteria

Time Period	Measured RBL L ₉₀ dB(A)	Criteria L _{Aeq,adj,T}
Day (7am – 6pm)	52	55
Evening (6pm – 10pm)	51	54
Night (10pm – 7am)	48	51

Waste collection is located within the basement level which satisfies the noise requirements of PO43.

5.1.2 Centre or Mixed Use Code

The proposed development includes retail use that is applicable for assessment by the *Centre or Mixed Use Code*. Table 5 summarises the primary acoustic requirements that apply.

Table 5: 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: - Where in the Principal centre zone or Major centre zone has unlimited hours of operation; - 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.	A07 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.	A062.1 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.
	A062.2 (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.
PO63 Development provides refuse and recycling collection and storage facilities that: (a) are located conveniently in an unobtrusive dedicated storage room or separate screened structure; (b) are located and managed so that adverse impacts on building occupants, neighbouring properties and the public realm are minimised; (c) provide for refuse and recycling including source separation; (d) are of a design which allows low-frequency service collection; (e) minimise ongoing building management cost for occupants.	A063.1 Development is designed and constructed to ensure refuse and recycling collection and storage facilities comply with the Refuse planning scheme policy.
	A063.2 Development is designed and constructed to ensure refuse and recycling collection and storage facilities do not have any odour, noise or visual impacts which are detectable and disturbing at the site or adjoining sites. Note—Refer to the Refuse planning scheme policy for further guidance.

All 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.

An assessment of retail activities was conducted to determine if the hours of operation can be extended beyond 8pm.

Car parking and waste collection is located within an enclosed basement which satisfies the noise requirements of P062 and P063 respectively.

5.1.2.1 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 6. The project specific criteria are identified in 'bold'.

Table 6: 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.

5.1.2.2 Night-time Noise Criteria

The night-time noise criteria for 'impact / short duration' type noise sources are outlined in *Table 9.3.3.3.H* of the code. This criteria is reproduced in Table 7. The project specific criteria is identified in 'bold'.

Table 7: Night-time Noise Criteria (Table 9.3.3.3.H)

Criteria Location	Where the existing $L_{Aeq,9hr}$ night at the criteria location is:	Average of the highest 15 single L_{Amax} events over a given night period is not greater than the following values at the relevant criteria location	The Absolute highest single L_{Amax} event over a given night period is not greater than the following values at the relevant criteria location
At the zone boundary of a Emerging community zone	45 to 60 dB(A) 48 dB(A) measured	$L_{Aeq,9hr}$ night + 5 dB(A) 57 dB(A)	$L_{Aeq,9hr}$ night + 10dB(A) 62 dB(A)

5.1.3 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.

5.1.4 Aircraft Noise

The site is located within the ANEF (Aircraft Noise Exposure Forecast) 20-25 zone of the Brisbane Airport. The Airport Environs Overlay Code performance outcome related to acoustics for this development is detailed in Table 8.

Table 8: Airport Environs Overlay Code Performance Outcome PO8

Performance Outcomes	Acceptable Outcomes
PO8 Development for a sensitive use adequately attenuates for aircraft noise in buildings to protect the health and wellbeing of occupants by complying with the internal noise criteria in Table 8.2.2.3.B. 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.	AO8.1 Development for a childcare centre, community care centre, community residence, dual occupancy, dwelling house, dwelling unit, educational establishment, health care services, hospital, multiple dwelling, relocatable home park, residential care facility, retirement facility or rooming accommodation located in the ANEF 20-25 sub-category: (b) provides external windows and doors which are acoustically rated to a minimum of Rw 30. (c) ensures that the roof, ceiling and insulation combination is acoustically rated to a minimum of Rw 45. (d) ensures that external walls are acoustically rated to a minimum of Rw 50.
	AO8.2 Development for short-term accommodation or tourist park located in the ANEF 25-30 sub-category: (e) provides external windows and doors which are acoustically rated to a minimum of Rw 30; (f) ensures that the roof, ceiling and insulation combination is acoustically rated to a minimum of Rw 45; (g) ensures that external walls are acoustically rated to a minimum of Rw 50.

Table 8.2.2.3.B of Performance Outcome PO8 is detailed in Table 9.

Table 9: Performance Outcome PO8 - Table 8.2.2.3.B—Internal noise criteria

Sensitive use	Activity of internal space	L _{AMax} 'S' time weighting
Child care centre	Sleeping areas	50dB(A)
Community residence	Other habitable rooms	55dB(A)
Dual occupancy		
Dwelling house		
Dwelling unit		
Multiple dwelling		
Relocatable home park		
Residential care facility		
Retirement facility		
Rooming accommodation		
Short-term accommodation	Sleeping areas	55dB(A)
Tourist park		
Educational establishment	Libraries, study areas and sleeping areas	50dB(A)
	Teaching areas and other habitable rooms	55dB(A)
Community care centre	Sleeping areas, wards, theatres, treatment and consulting rooms	50dB(A)
Health care services		
Hospital		

Note:

- L_{AMax} 'S' time weighting is the A-weighted maximum sound pressure level of aircraft noise measured using the slow responsive time
- Rw: weighted sound reduction index
- dB(A): A-weighted decibels

6 Assessment – Onsite Noise

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

The relevant transient noise activities with the potential to adversely impact the nearest noise sensitive receivers are:

- Conversation
- Outdoor dining

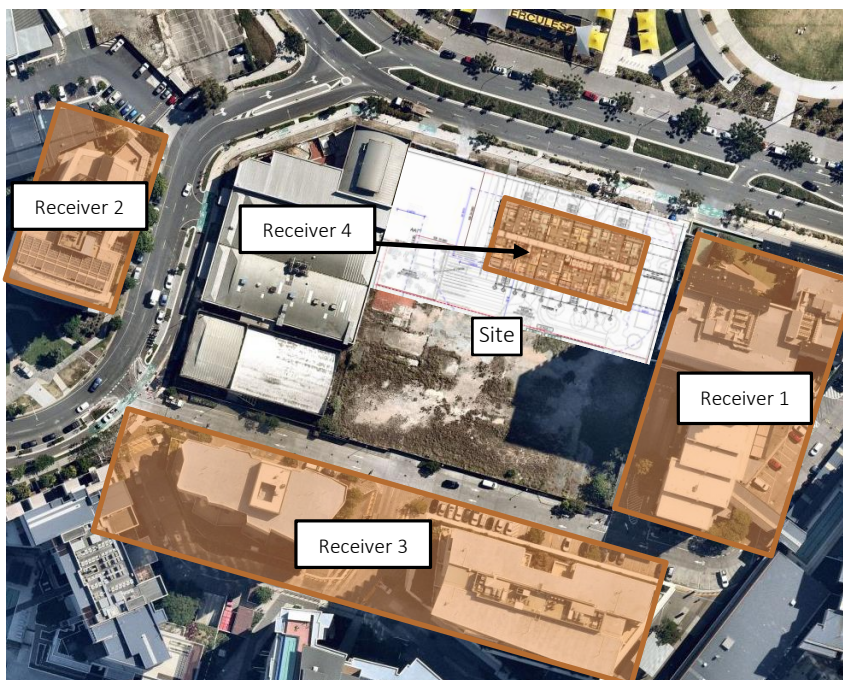
Vehicle movements (car, delivery, waste collection) are enclosed within the basement level in relation to offsite receivers. Deliveries and waste collection will be recommended to occur during allowed operating hours (6am - 8pm) in consideration to onsite receivers.

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 east of the site
- Receiver 2: Residential use in an Emerging community zone to the west of the site
- Receiver 3: Residential use in an Emerging community zone to the south of the site
- Receiver 4: Onsite residential receivers

Figure 4: Noise Sensitive Receivers



6.2 Noise Source Levels

Table 10 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 10: 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}	
Conversation	Nearest congregation area	60	65	N/A [^]	100%
Outdoor dining	Nearest outdoor dining area	60	75	N/A [^]	100%

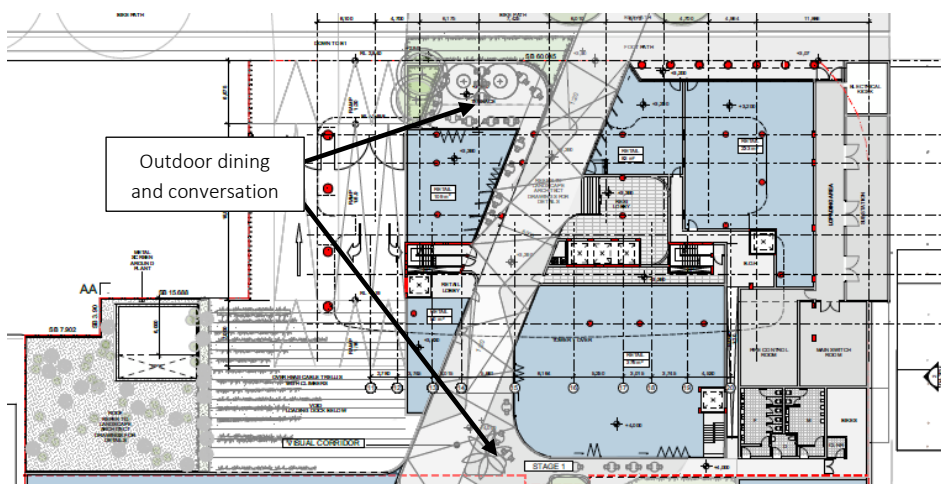
[^]People and vehicle pass-by noise is excluded from L_{max} assessment in accordance with NIAPSP.

6.3 Noise Assessment Methodology

The following assumptions have been made for noise calculations:

- Conversation noise was based on 'raised, male voice' speech levels as per published data contained in Harris CM, Handbook of Acoustical Measurements and Noise Control – 3rd ed. Ch 16.3, Mc Graw-Hill Inc. The noise duration was assumed to be continuous during the assessment time period.
- 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 10 and the assumptions outlined in Section 6.3. Sample calculations are shown in Appendix C.

6.4.1 Noise Planning Criteria – L_{eq}

Table 11 presents the predicted noise emission levels.

Table 11: Predicted Noise Planning Impacts

Receiver	Noise Source	Predicted External Noise Level L_{Aeq} dB(A)	Complies with Criteria?		
			Day 55 dB(A)	Evening 50 dB(A)	Night 45 dB(A)
1	Conversation	33	✓	✓	✓
	Alfresco dining	43	✓	✓	✓
2	Conversation	23	✓	✓	✓
	Alfresco dining	33	✓	✓	✓
3	Conversation	28	✓	✓	✓
	Alfresco dining	38	✓	✓	✓
4	Conversation	34	✓	✓	✓
	Alfresco dining	44	✓	✓	✓

Relevant noise activities are predicted to comply with the criteria at all receivers during all time periods.

6.4.2 Night Time Criteria – L_{max}

As per Table 10, people and vehicle pass-by noise is excluded from L_{max} assessment in accordance with NIAPSP.

7 Assessment – Aircraft Noise

Aircraft noise was assessed as a noise source with the potential to impact the proposed development and the assumptions and results of the assessment are presented in the following sections.

7.1 ANEF Zone

The site is located within the ANEF (Aircraft Noise Exposure Forecast) 20-25 zone of Brisbane Airport. In accordance with AS2021, the proposed development is 'Conditionally Acceptable' which means the development may require noise attenuation treatments to provide an acceptable level of amenity for future residents.

7.2 Predicted Aircraft Noise Levels

AS2021 provides an assessment method to determine the predicted aircraft noise level at the site location based on aircraft type and proximity to the airport runway.

Aircraft types operating from Brisbane Airport were determined from the online service 'WebTrak' of Air Services Australia. The Aircraft Event Levels from Webtrak historical data (Feb 2019 – Jan 2020) for the nearest noise monitoring terminal (Bulimba) are presented in Figure 6.

Figure 6: Aircraft Event Levels - Bulimba Noise Monitoring Terminal (WebTrak)

Aircraft Event Levels

This table shows the top 15 aircraft types by event count and level.

Aircraft Type	Average Event Level	Event Counts			
		Total	Max/day	Min/day	Avg/day
F70	69.6	14	1	0	0
A139	69.6	13	1	0	0
B712	68.4	12	2	0	0
A320	67.4	30	2	0	0.1
F100	67.4	26	2	0	0.1
B763	67.1	116	2	0	0.3
A333	66.6	508	7	0	1.4
A332	66.4	360	6	0	1
A388	66.4	101	2	1	0.3
B77W	66.3	194	4	0	0.5
B789	66.1	13	1	0	0
B772	66	38	2	0	0.1
B734	65.6	27	2	0	0.1
B738	65.5	1427	19	0	3.9
B733	65.4	98	3	0	0.3

The aircraft types in Figure 6 are sorted in descending order of 'average event level'. Based on consideration of aircraft noise level and frequency of aircraft events, the selected aircraft type for this assessment was the Airbus A320.

In accordance with AS2021, the distance coordinates for the site location relative to the aerodrome runway are presented in Table 12.

Table 12: Distance Coordinates for Site Location as per AS2021

Distance Coordinate	Distance (m)
DL	7280
DT	10570
DS	420
Elevation difference	Less than 10m

Based on the distance coordinates in Table 12 and Tables 3.5(A) and 3.5(B) of AS2021, the predicted highest aircraft noise level at the development location is presented in Table 13.

Table 13: AS2021 Aircraft Noise Level Predictions at the Site

Aircraft Type	Arrival Aircraft Noise Level dB(A) L_{max}	Departure Aircraft Noise Level dB(A) L_{max}	Highest Aircraft Noise Level dB(A) L_{max}
Airbus A320	68	66	68

7.3 Façade Attenuation

Detailed building plans are not available at the development application stage. In order to provide indicative acoustic treatments and demonstrate compliance with internal criteria is achievable, preliminary acoustic design calculations were conducted based on an indicative habitable room floor plan.

In accordance with AS2021, based on the highest predicted aircraft noise level (Table 13), and the internal noise criteria of the Airport Environs Overlay Code (Table 9), indicative levels of acoustic façade treatment for habitable rooms are presented in Table 14. Calculations are included in Appendix D.

Table 14: Aircraft Noise Indicative Façade Treatments – Habitable Rooms

Habitable Room	Required Aircraft Noise Reduction (ANR)	Component	Habitable Rooms Indicative Weighted Sound Reduction R_w
Bedroom	18	Glazing / external walls	24
		Roof (top floor)	40

Habitable Room	Required Aircraft Noise Reduction (ANR)	Component	Habitable Rooms Indicative Weighted Sound Reduction R_w
Living room	13	Glazing / external walls	24
		Roof (top floor)	40

It is recommended that once building floor plans are finalised, detailed design is conducted to confirm façade attenuation requirements and possible acoustic treatments required for each habitable room. The design should be conducted in accordance with AS2021:2015.

8 Recommendations

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

8.1 Façade Treatment

An aircraft noise assessment was conducted in accordance with AS2021 as presented in Section 7. As detailed building plans are not available at the development application stage, indicative acoustic treatments for aircraft noise mitigation based on typical apartment rooms, were outlined. These are presented in Table 15.

Table 15: Aircraft Noise Indicative Façade Treatments – Habitable Rooms

Habitable Room	Required Aircraft Noise Reduction (ANR)	Component	Habitable Rooms Indicative Weighted Sound Reduction R_w
Bedroom	18	Glazing / external walls	24
		Roof (top floor)	40
Living room	13	Glazing / external walls	24
		Roof (top floor)	40

These indicative treatments indicate that internal noise criteria may be achieved with standard façade construction.

It is recommended that once building floor plans are finalised, detailed design is conducted to confirm façade attenuation requirements and possible acoustic treatments required for each habitable room layout type. The design should be conducted in accordance with AS2021:2015.

8.2 Management Strategies

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

- No noise related restrictions to retail hours of operation including outdoor dining.
- Deliveries and waste collection to occur during allowed operating hours 6am - 8pm.
- 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.

8.3 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, 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/m²

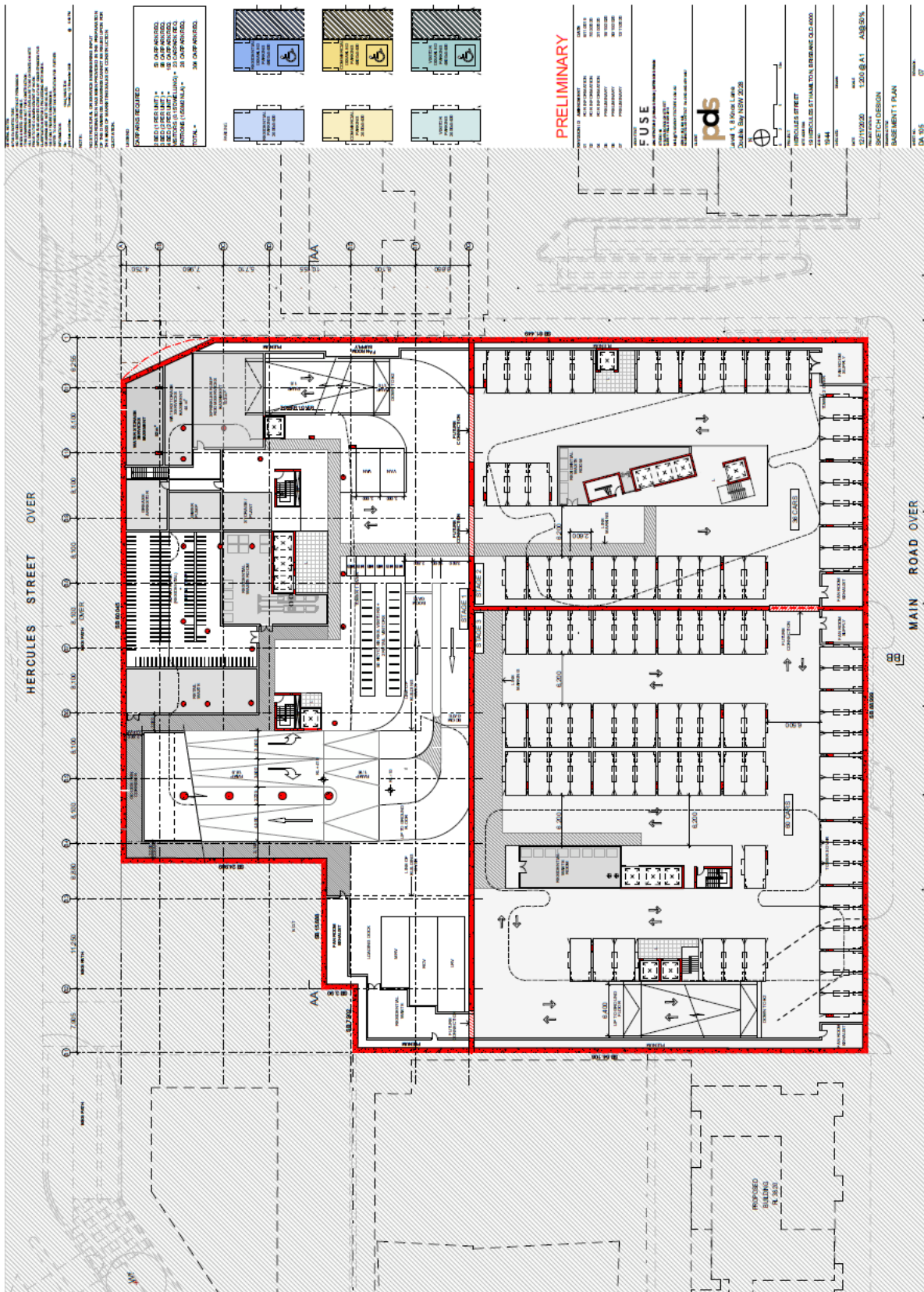
Furthermore, it is also recommended that a mechanical plant noise assessment is conducted once plant selections are finalised to ensure noise emissions comply with criteria.

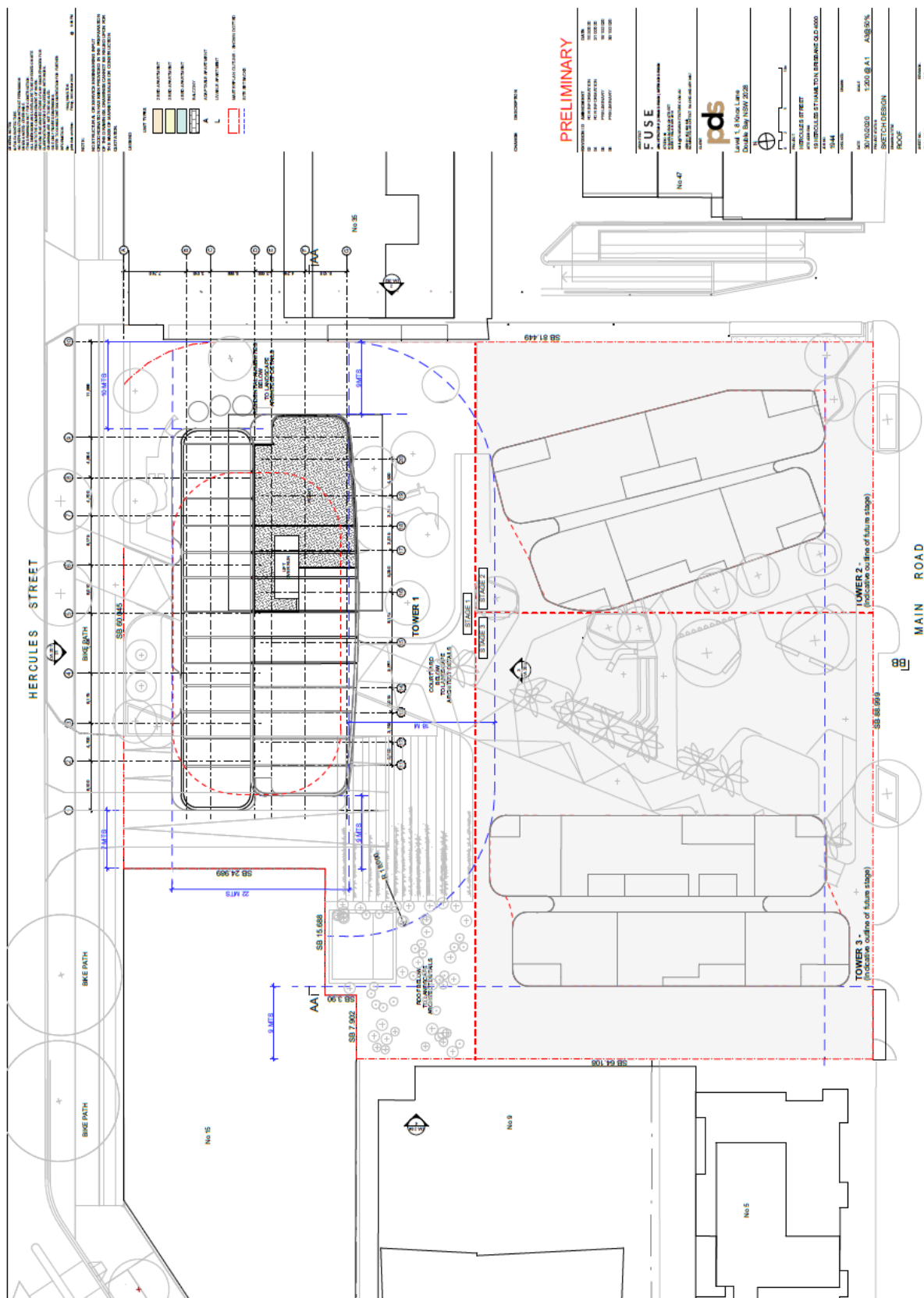
9 Conclusion

An environmental noise impact assessment was undertaken of a proposed mixed-use development located at 19 Hercules Street, Hamilton.

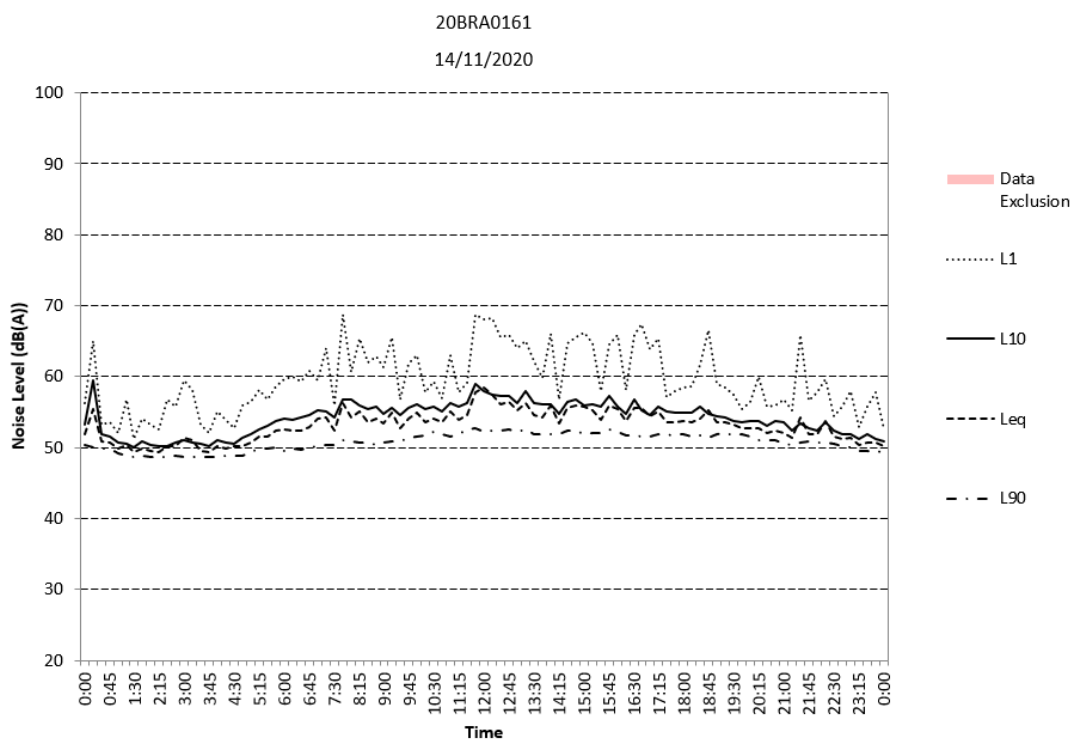
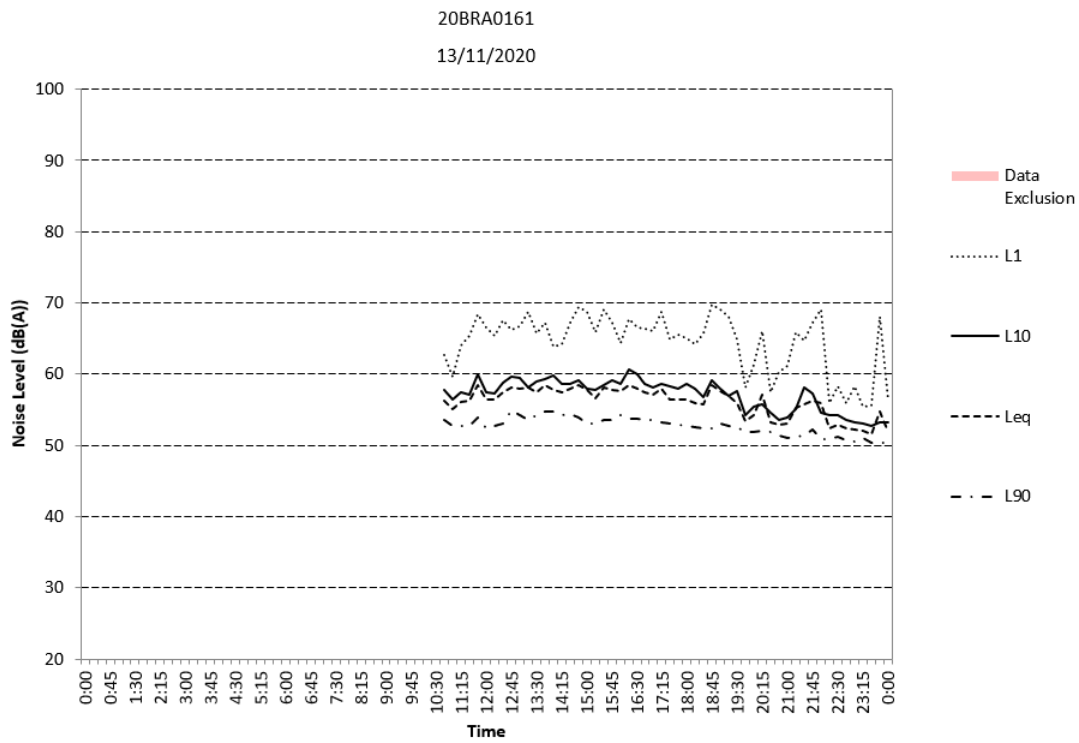
Compliance with the Brisbane City Council *City Plan 2014* planning scheme is predicted to be achieved based on the recommendations outlined in Section 8 of this report.

Appendix A Sample Development Plans



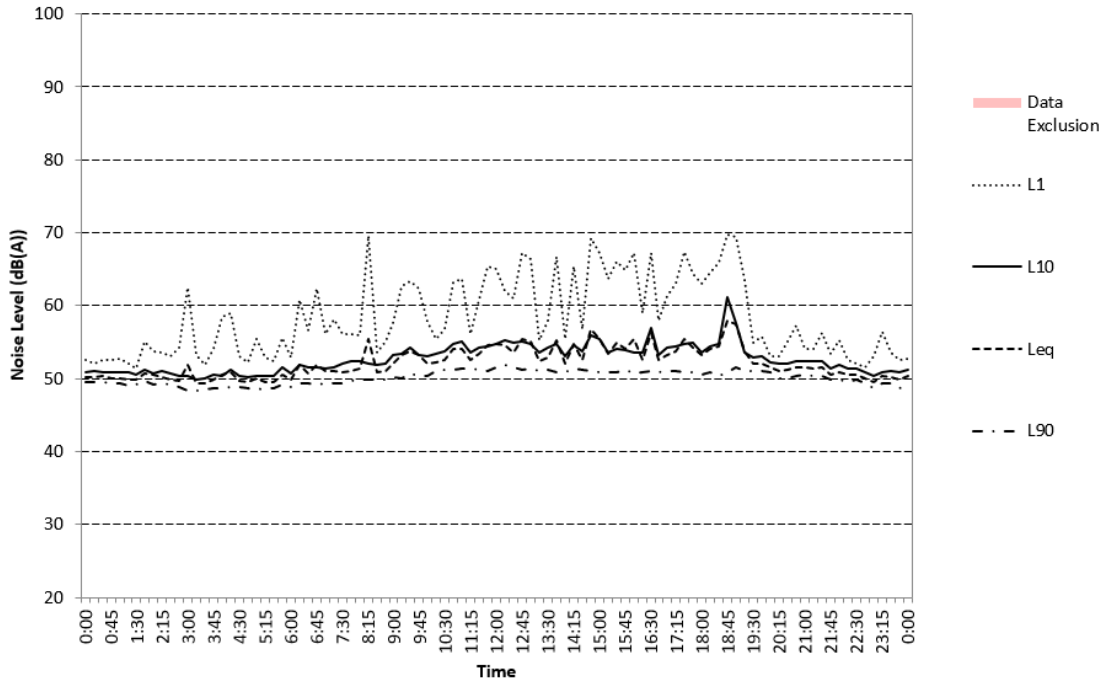


Appendix B Unattended Noise Monitoring Graphs



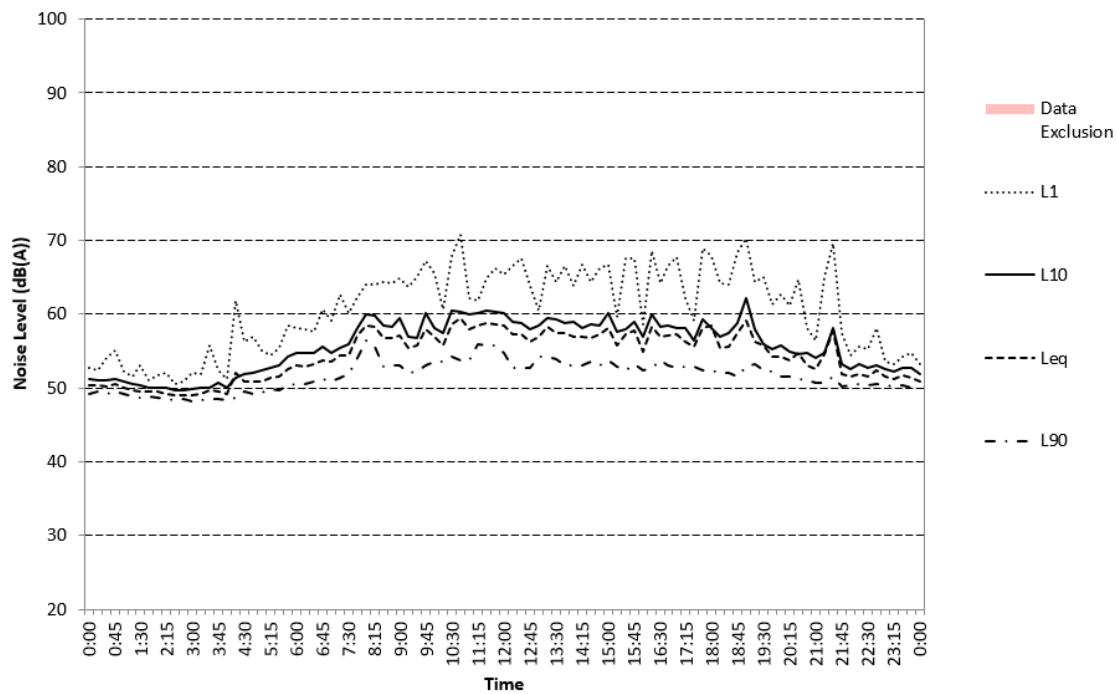
20BRA0161

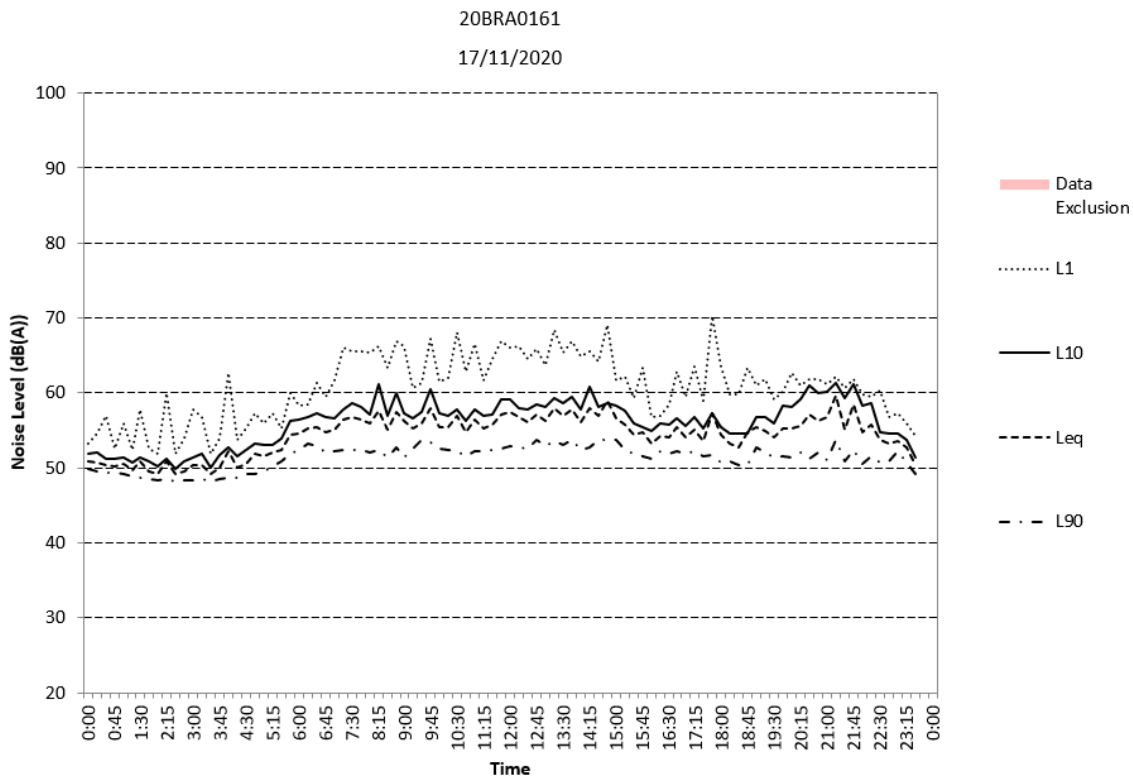
15/11/2020



20BRA0161

16/11/2020





Appendix C Calculations – Onsite Noise

Onsite Noise Planning Leq Calculations

PROJECT #:

Noise Source	Activity Noise		1 Hour Period (sec)	Events	Leq Level	Distance to Receivers			
	Duration (sec)	Leq				R1	R2	R3	R4
Conversation	60	65	3600	60	65	40	125	68	16.5
Outdoor dining	60	75	3600	60	75	40	125	68	16.5

Noise level due to Distance loss									
Conversation						33	23	28	41
Outdoor dining						43	33	38	51
	0					#NUM!	#NUM!	#NUM!	#NUM!
	0					#NUM!	#NUM!	#NUM!	#NUM!
	0					#NUM!	#NUM!	#NUM!	#NUM!
	0					#NUM!	#NUM!	#NUM!	#NUM!
	0					#NUM!	#NUM!	#NUM!	#NUM!
	0					#NUM!	#NUM!	#NUM!	#NUM!
	0					#NUM!	#NUM!	#NUM!	#NUM!
Shielding (building, barrier etc)						R1	R2	R3	R4
Conversation						0	0	0	7
Outdoor dining						0	0	0	7
	0					0	0	0	0
	0					0	0	0	0
	0					0	0	0	0
	0					0	0	0	0
	0					0	0	0	0
	0					0	0	0	0
	0					0	0	0	0
	0					0	0	0	0
Noise Level at Receiver						R1	R2	R3	R4
Conversation						33	23	28	34
Outdoor dining						43	33	38	44

Appendix D Calculations – Aircraft Noise

Site: 19 Hercules St, Hamilton
Reference: 20BRA0161 R01 1