Environmental Noise Assessment

Proposed Mixed Use Development

At 11-23 Macarthur Avenue, Hamilton

On behalf of Brookfield Portside East Pty Ltd

22BRA0093 R01_1

About TTM

For 40 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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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 draft	02/05/2023
0	S Yorke	A Ashworth	Client issue	02/05/2023
1	S Yorke		Plans update	11/05/2023

Executive Summary

TTM was engaged by Brookfield Portside East Pty Ltd to undertake an environmental noise assessment of a proposed mixed-use development located at 11-23 Macarthur Avenue, Hamilton. The assessment was based on the Northshore Hamilton Priority Development Area (PDA) Development Scheme (October 2022) and Brisbane City Council City Plan 2014 Planning Scheme.

City Plan 2014 planning scheme codes and overlays were utilised where relevant and acceptable outcomes applied. Waste collection at the loading dock is recommended to operate between 6am – 8pm.

Aircraft noise was assessed and indicative façade attenuation requirements for habitable rooms were recommended. Once building floor plans are finalised, including room and glazing dimensions, detailed design can be conducted to confirm façade attenuation requirements required for each habitable room type.

Façade treatments for aircraft noise are expected to adequately mitigate any other potential external noise sources which are expected to be at a lower noise impact level.

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 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 Brookfield Portside East Pty Ltd to undertake an environmental noise assessment of a proposed mixed-use development located at 11-23 Macarthur Avenue, Hamilton. This report will form part of a development application for consideration by relevant authorities.

1.2 References

This report is based on the following:

- Northshore Hamilton Priority Development Area (PDA) Development Scheme (October 2022)
- 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 aircraft noise onto the development
- Assessment of noise generated by the development onto nearby sensitive receivers
- Assessment of offsite noise intrusion on the residential component of 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:

- Part 7 Wharf Street, Part 11 Wharf Street, 11 Macarthur Avenue, Part 23 Macarthur Avenue, and Part 1A Macarthur Avenue, Hamilton Qld 4007

The site locality is shown in Figure 1.

Figure 1: Site Locality

2.2 Description of Surrounding Environment

The site is bound by MacArthur Avenue to the north, Wharf St to the east, internal road to the south and a residential multistorey development to the west. The current acoustic environment primarily consists of local road traffic noise from MacArthur Avenue and intermittent aircraft pass-by noise.

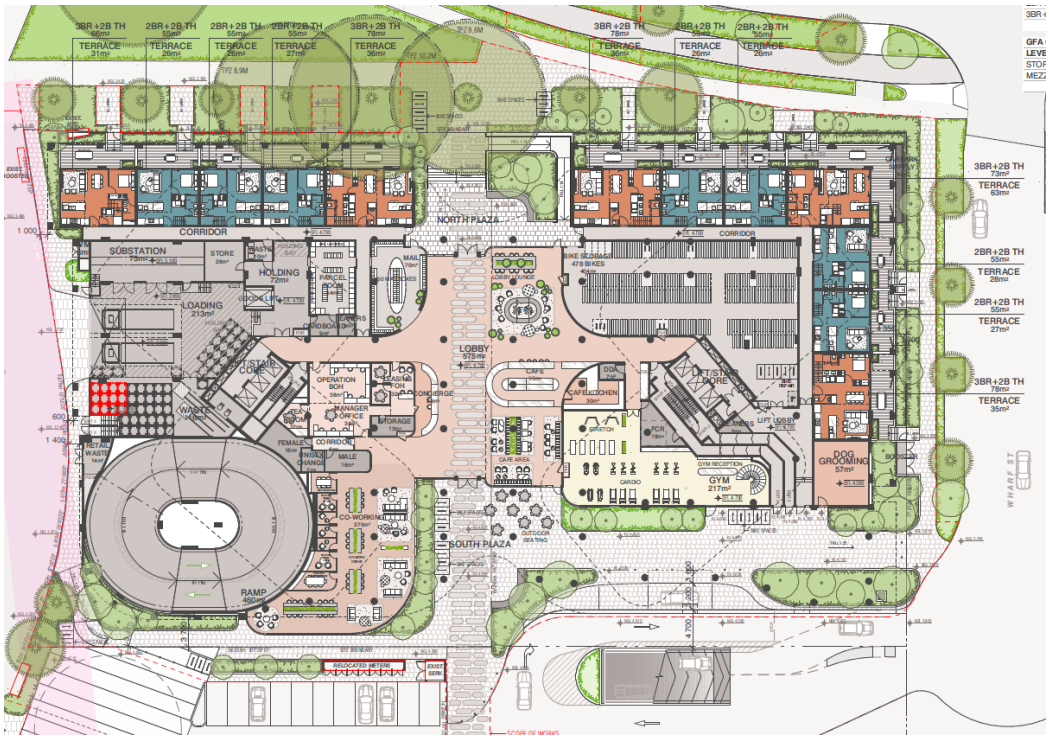
3 Proposed Development

3.1 Development Description

The proposal is a high density, mixed use development modelled on a built to rent framework, comprising a residential tower with non-residential uses (café, gym, dog grooming) and basement and podium car parking. Operating hours for non-residential use is proposed to be 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 Floor



4 Measurements

4.1 Equipment

The following equipment was used to measure existing noise levels:

- ARL Ngara environmental noise monitor (SN# 8782A5)
- 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 2nd December and Monday 12th December 2022. The noise monitor was located as shown in Figure 3. The monitor position was considered representative of the ambient noise levels experienced at the site and surrounds 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 recorded on the 2nd and 8th December (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)	51	60
Evening (6pm – 10pm)	49	59
Night time (10pm – 7am)	42	54

5 Noise Criteria

The applicable noise criteria codes for the site location are the Northshore Hamilton PDA Development Scheme October 2022 and Brisbane City Plan 2014.

5.1 Northshore Hamilton PDA Scheme

Northshore Hamilton PDA Development Scheme (October 2022) 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.

As per City Plan 2014, the site is not located within a transport noise corridor or an industrial amenity overlay. The site is not located adjacent to the port marine facilities and is shielded from the port by surrounding buildings to the south and west. Furthermore, passenger cruise ships do not use the port anymore.

Hence the applicable, potential noise assessment aspects are aircraft noise, onsite activities, and offsite loading dock (adjacent to the west).

Onsite noise activities may be addressed by using acceptable outcomes within City Plan 2014.

Façade treatments required for aircraft noise are expected to adequately attenuate any potential external noise, such as the adjacent loading dock (west).

5.2 City Plan 2014

To the extent that the Northshore Hamilton Development Scheme calls up the requirements of the Brisbane City Plan, the relevant sections of this plan are addressed in this section.

Table 2 summarises the planning scheme requirements for the site which are relevant to the acoustic assessment.

Table 2: Site Specific Acoustic Details

Location	Zone	Development Code	Overlay Code
Site	Mixed-Use High Density Zone (Northshore Hamilton PDA)	Multiple Dwelling Code Centre or Mixed-Use Code	Airport Environs

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	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*.

Car parking is located within an enclosed basement and podium which satisfies the noise requirements of P035.

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

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: 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.

Performance Outcomes	Acceptable Outcomes
	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.
	AO63.2 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 a Mixed-use zone (Northshore Hamilton PDA) and therefore *Acceptable Outcome A01.1 (c)(ii)* is relevant and allows hours of operation, including deliveries, from 6am to 10pm. Non-residential proposed hours of operation are between 6am – 10pm. Non-residential uses are enclosed within the building envelope.

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

Outdoor dining is appropriately located with separation by roads and enclosed by the podium level above. Additionally, habitable rooms have upgraded facades in accordance with aircraft noise requirements.

Car parking is located within the building envelope. Additionally, carpark surfaces are recommended to be appropriately surfaced to reduce tyre noise impacts.

5.2.3 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 5.

Table 5: 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 6.

Table 6: 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 Dual occupancy Dwelling house Dwelling unit Multiple dwelling Relocatable home park Residential care facility Retirement facility Rooming accommodation	Other habitable rooms	55dB(A)
Short-term accommodation Tourist park	Sleeping areas	55dB(A)
Educational establishment	Libraries, study areas and sleeping areas	50dB(A)
	Teaching areas and other habitable rooms	55dB(A)
Community care centre Health care services Hospital	Sleeping areas, wards, theatres, treatment and consulting rooms	50dB(A)

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 – 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.

6.1 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.

6.2 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 4.

Figure 4: 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
A333	76.3	1008	9	0	2.8
A332	74.9	628	7	0	1.7
B77W	74.5	528	7	0	1.4
B772	73.8	163	3	0	0.4
B789	72.5	480	5	0	1.3
B733	72.5	411	5	0	1.1
B763	72.4	192	2	0	0.5
B738	72.1	6752	49	0	18.5
A21N	71.3	340	5	0	0.9
A320	71	2383	19	0	6.5
F100	70.9	1375	11	0	3.8
B788	70	436	3	0	1.2
B712	69	1983	14	0	5.4
A359	69	917	9	0	2.5
F70	68.9	1070	10	0	2.9

The aircraft types in Figure 4 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 A333.

In accordance with AS2021, the distance coordinates for the site location relative to the aerodrome runway are presented in Table 7.

Table 7: Distance Coordinates for Site Location as per AS2021

Distance Coordinate	Distance (m)
DL	7500
DT	10,000
DS	350
Elevation difference	Less than 10m

Based on the distance coordinates in Table 7 and Tables 3.7(A) and 3.7(B) of AS2021, the predicted highest aircraft noise level at the development location is presented in Table 8.

Table 8: 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 A333	72	76	**76**

6.3 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 indicative habitable room floor layouts.

In accordance with AS2021, based on the highest predicted aircraft noise level (Table 8), and the internal noise criteria of the Airport Environs Overlay Code (Table 6), indicative levels of acoustic façade treatment for habitable rooms are presented in Table 9. Calculations are included in Appendix C.

Table 9: Aircraft Noise Indicative Façade Treatments – Habitable Rooms

Habitable Room	Required Aircraft Noise Reduction (ANR)	Component	Habitable Rooms Indicative Weighted Sound Reduction R_W
Sleeping areas	26	Glazing / external walls	32
		Roof (top floor)	40

Habitable Room	Required Aircraft Noise Reduction (ANR)	Component	Habitable Rooms Indicative Weighted Sound Reduction R_w
Other habitable rooms (living room)	21	Glazing / external walls	27
		Roof (top floor)	40

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

7 Recommendations

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

7.1 Façade Treatment

An aircraft noise assessment was conducted in accordance with AS2021 as presented in Section 6. 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 10.

Table 10: Aircraft Noise Indicative Façade Treatments – Habitable Rooms

Habitable Room	Required Aircraft Noise Reduction (ANR)	Component	Habitable Rooms Indicative Weighted Sound Reduction R_w
Sleeping areas	26	Glazing / external walls	32
		Roof (top floor)	40
Other habitable rooms (living room)	21	Glazing / external walls	27
		Roof (top floor)	40

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

Façade treatments for aircraft noise are expected to adequately mitigate any other potential external noise sources which are expected to be at a lower noise impact level.

7.2 Management Strategies

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

a. Waste collection at the loading dock to operate between 6am – 8pm.

b. Carpark surfaces to be appropriately surfaced to reduce tyre noise impacts from the development.

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, 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*

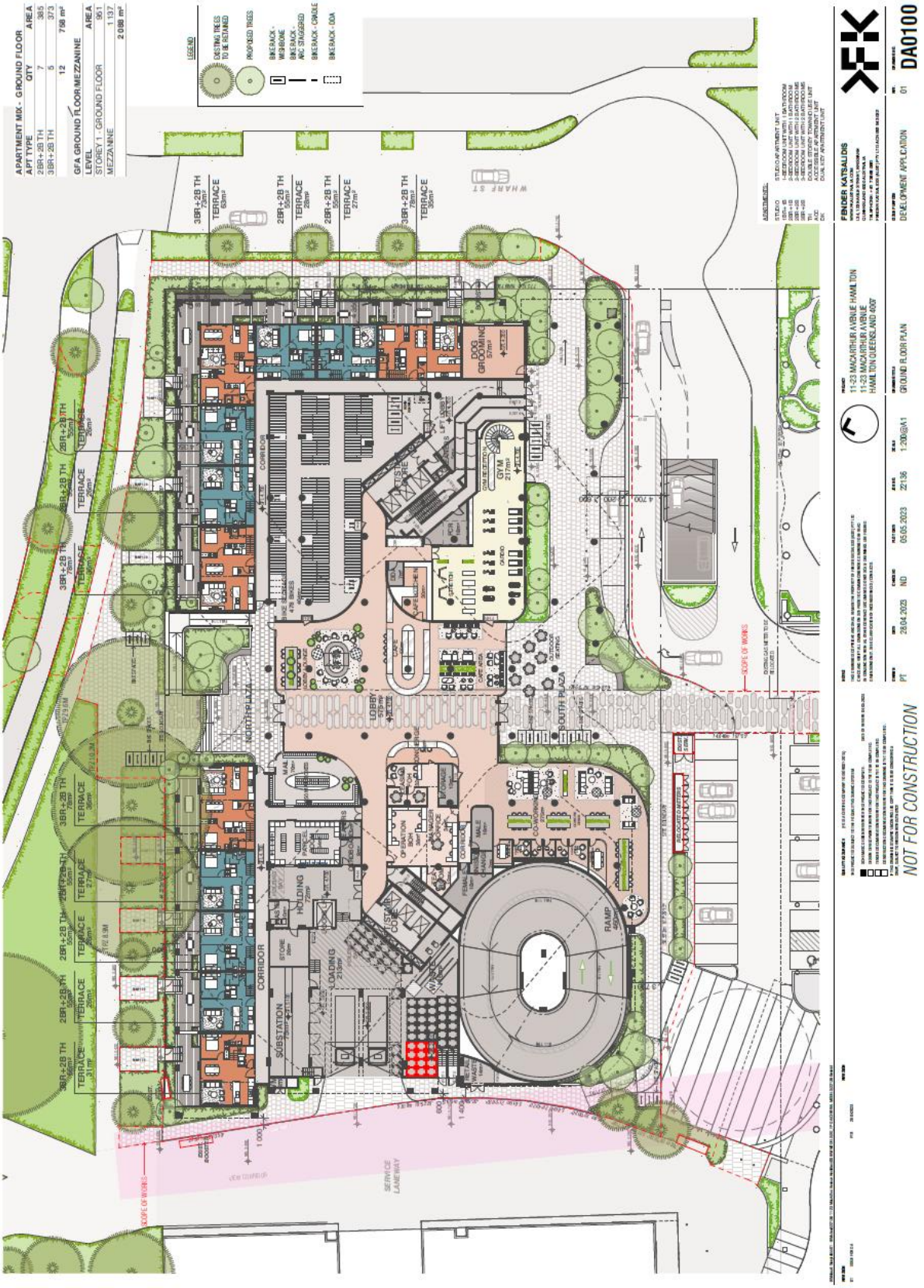
Furthermore, it is also recommended that a mechanical plant noise assessment is conducted once plant selections are finalised to ensure noise emissions comply with criteria.

8 Conclusion

TTM was engaged by Brookfield Portside East Pty Ltd to undertake an environmental noise assessment of a proposed mixed-use development located at 11-23 Macarthur Avenue, 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 Development Plans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APT TYPE QTY AREA
2BR+2B TH 7 385
3BR+2B TH 5 373
12 758 m²
GFA GROUND FLOOR/MEZZANINE
LEVEL AREA
STOREY 1 - GROUND FLOOR 961
MEZZANINE 1137
2 098 m²
LEGEND
EXISTING TREES TO BE RETAINED
PROPOSED TREES
BIKERACK - WISHBONE
BIKERACK - ARC STAGGERED
BIKERACK - CRADLE
BIKERACK - OOA
NORTH PLAZA
SOUTH PLAZA
LOBBY
GYM
DOG GROOMING
CAFE
LOADING
SUBSTATION
HOLDING
CORRIDOR
RAMP
SERVICE LANEWAY
SCOPE OF WORKS
WHARF ST
FENDER KATSALIDIS
11-23 MACARTHUR AVENUE HAMILTON
11-23 MACARTHUR AVENUE
HAMILTON QUEENSLAND 4007
GROUND FLOOR PLAN
DEVELOPMENT APPLICATION
DA0100
NOT FOR CONSTRUCTION

NOT FOR CONSTRUCTION

DRAWN	DATE	CHECKED	PLOT DATE	JOB NO.	SCALE	DRAWING TITLE
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11-23 MACARTHUR AVENUE HAMILTON
11-23 MACARTHUR AVENUE
HAMILTON QUEENSLAND 4007

FENDER KATSALIDIS

DEVELOPMENT APPLICATION

REV. 01

DA2002

Appendix B Unattended Noise Monitoring Graphs

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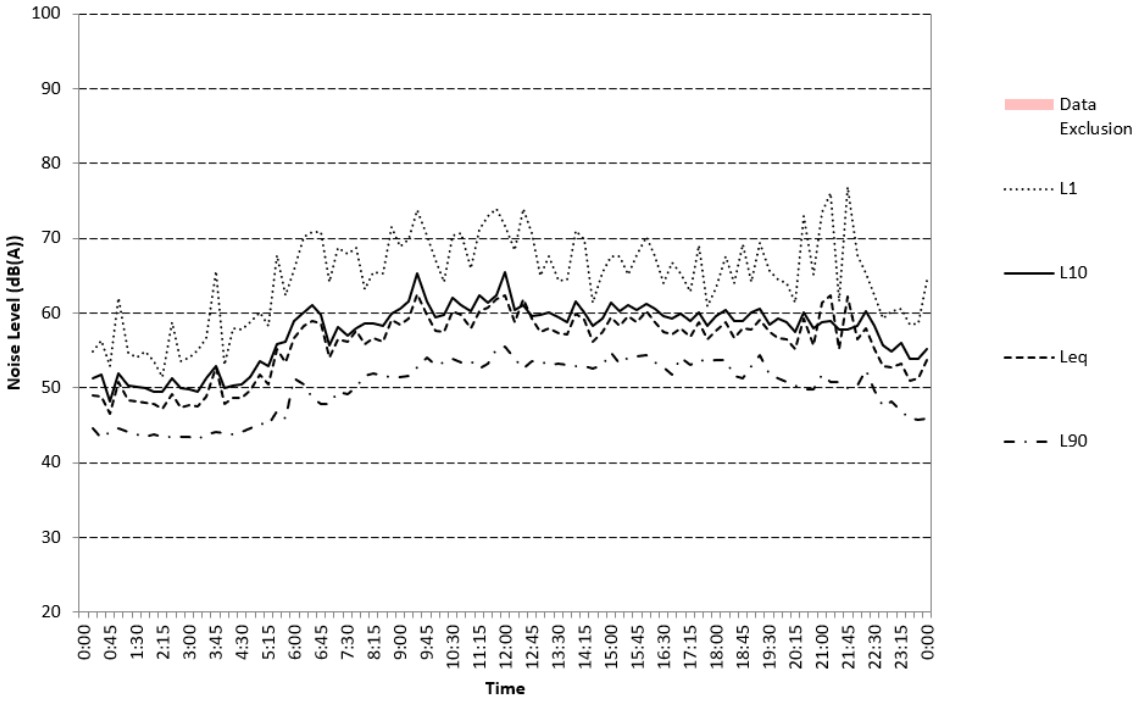

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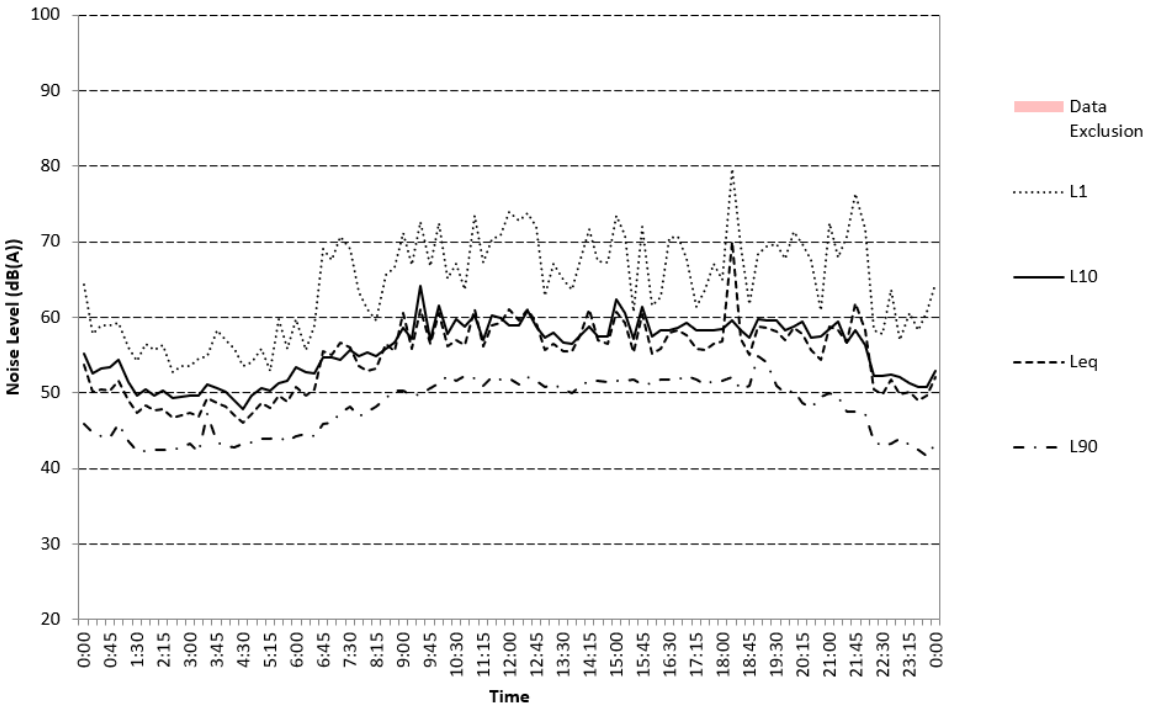

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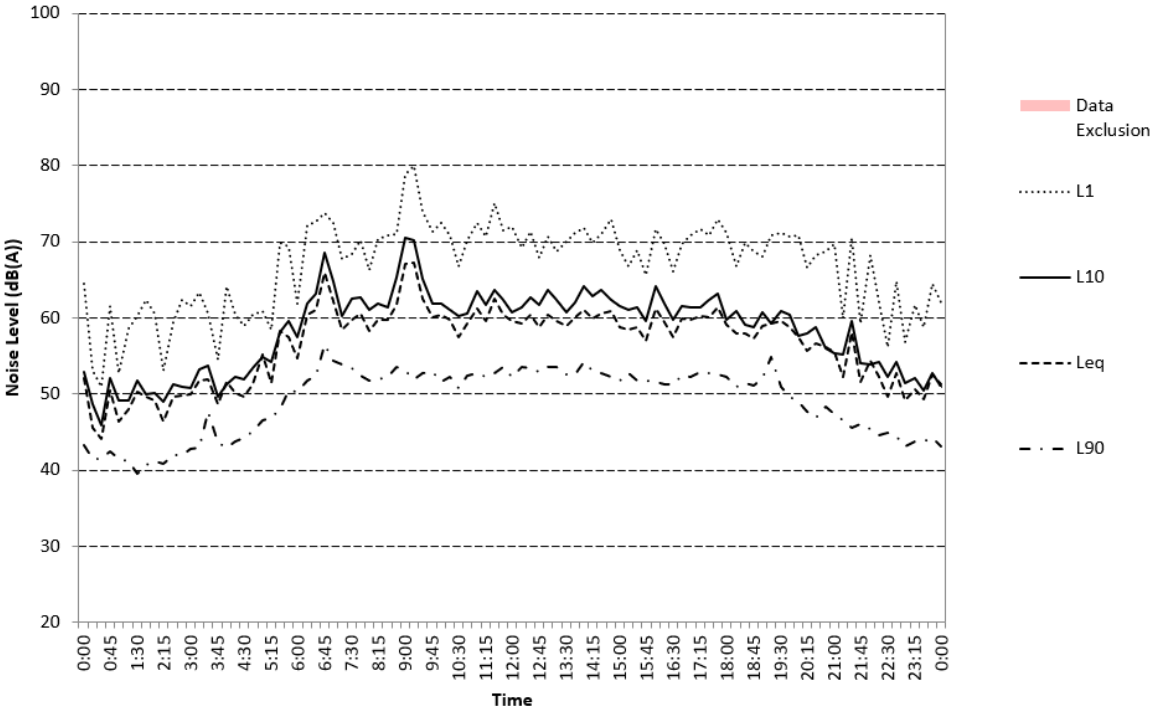

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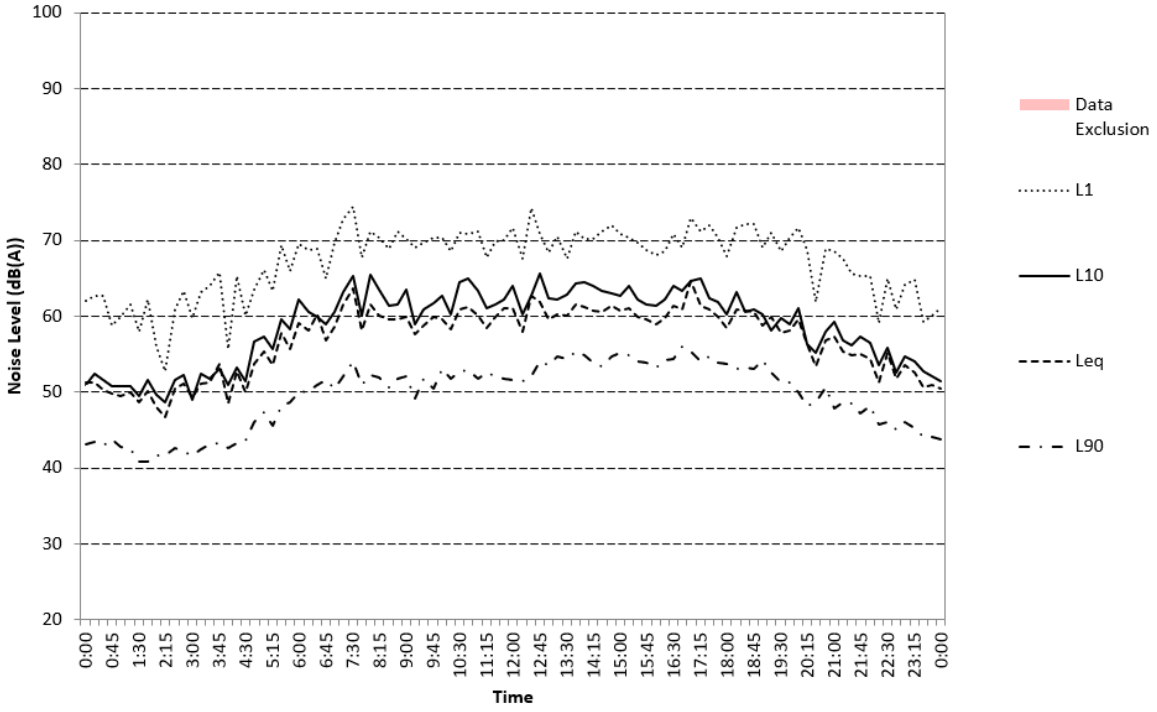

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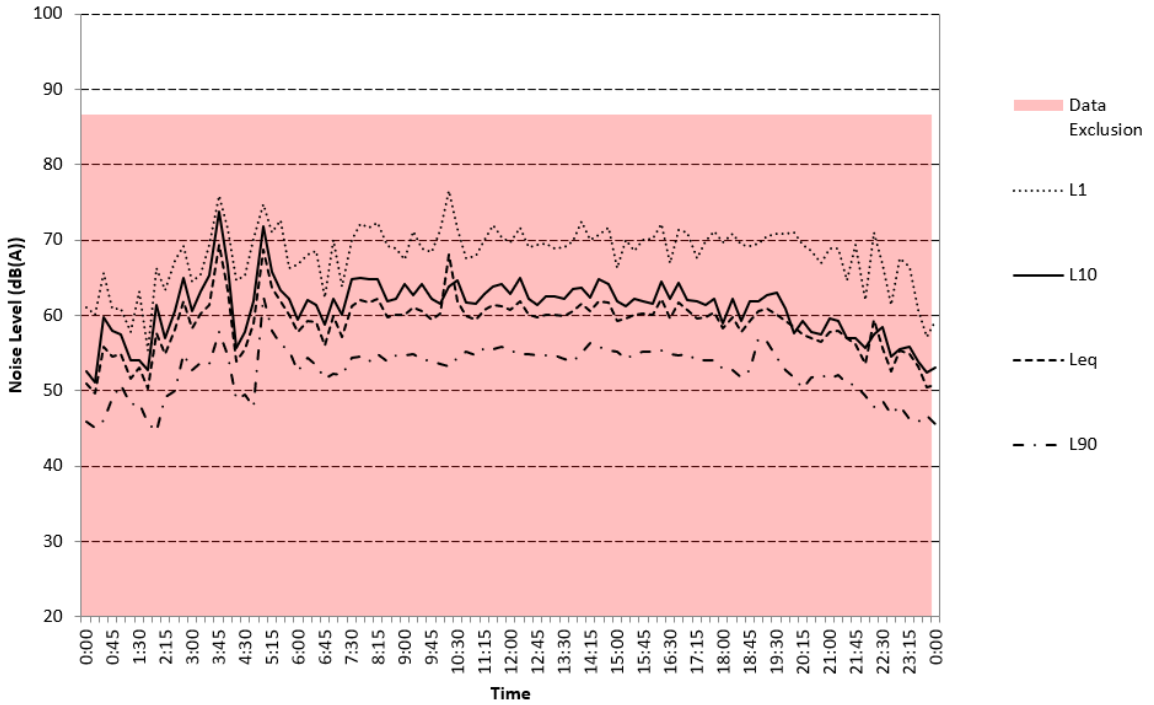

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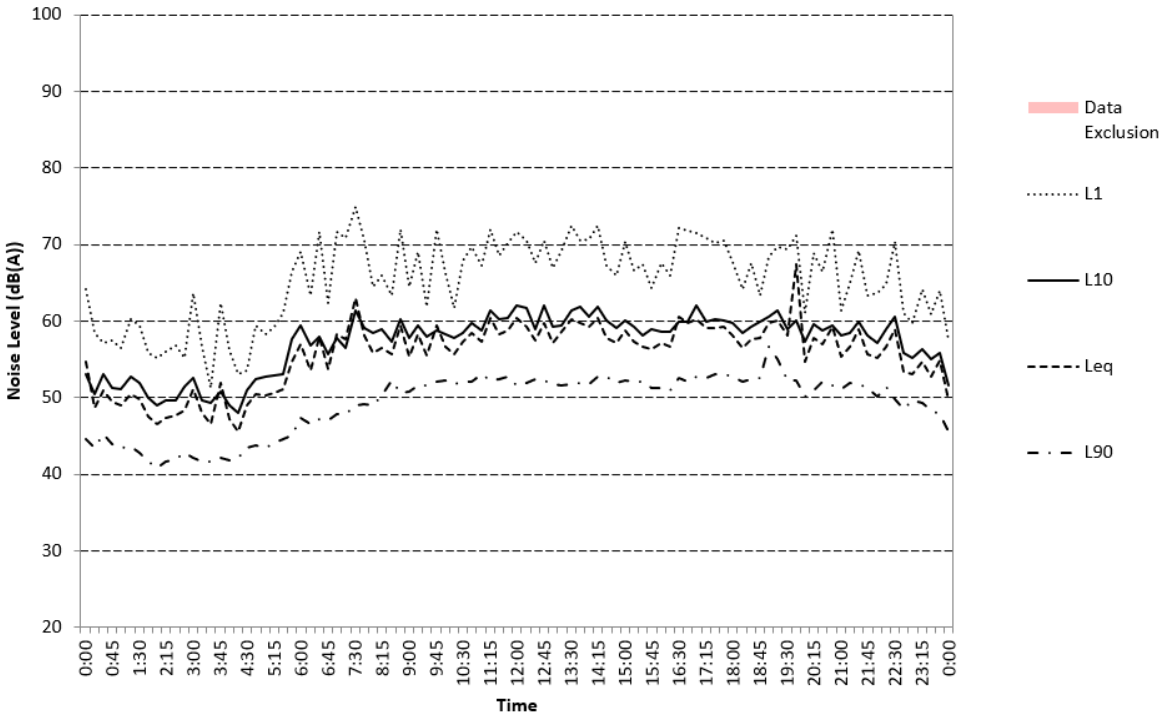

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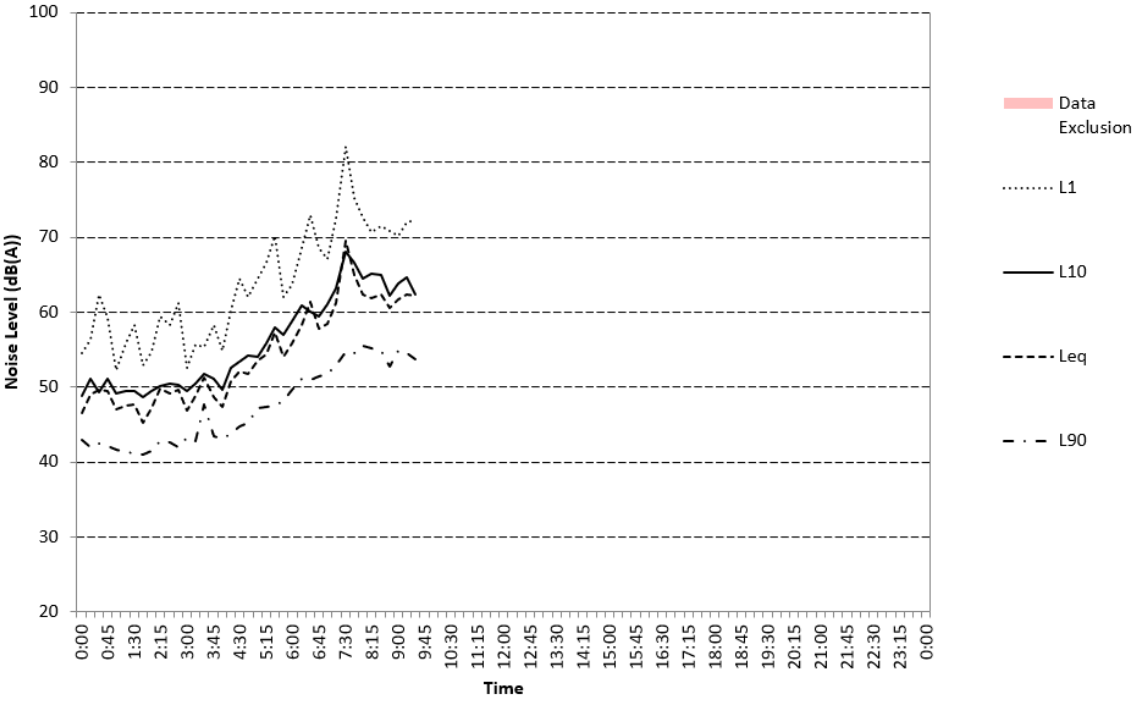

Appendix C Calculations

Aircraft Noise

AS2021:2000 Calculations

Building Component	Aircraft noise dB(A)	Indoor Design dB(A)	ANR dB(A)	Element Area (S_x) (m^2)	Floor Area (S_f) (m^2)	Ceiling Height (m)	RT60 (s)	Components (unit)	Orientation Kc dB(A)	ANARc dB(A)	Estimated R_w	Adjusted R_w
Sleeping area												
Glazing	76	50	26.0	8	9	2.8	0.5	1	6	26.02059991	31	31
										Overall Rw	31.02059991	31
Other habitable room (living room)												
Glazing	76	55	21.0	13	36	2.8	1.3	1	6	20.74031268	26	26
										Overall Rw	25.74031268	26
Sleeping area (top floor)												
Glazing	76	50	26.0	8	9	2.8	0.5	2	6	29.03089987	34	32
Roof/ceiling	76	50	26.0	9	9	2.8	0.5	2	6	29.3305321	34	40
										Overall Rw	34.18329954	34.48154638
Other habitable room (living room) (top floor)												
Glazing	76	55	21.0	13	36	2.8	1.3	2	6	23.75061263	29	27
Roof/ceiling	76	55	21.0	36	36	2.8	1.3	2	6	28.30993219	33	40
										Overall Rw	31.60296992	32.28144894