




**147 Marion Road Airport Noise
Assessment
Aircraft Noise Intrusion Assessment**

Document Information

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Revision Table

Report revision	Date	Comments
0	16 December 2016	Initial issue
1	21 December 2016	Minor updates for issue for PDPA
2	20 April 2017	Updates to wall constructions
3	1 August 2017	Prediction update

Glossary

A-weighting	A spectrum adaption that is applied to measured noise levels to represent human hearing. A-weighted levels are used as human hearing does not respond equally at all frequencies.
dB	Decibel—a unit of measurement used to express sound level. It is based on a logarithmic scale which means a sound that is 3 dB higher has twice as much energy. We typically perceive a 10 dB increase in sound as a doubling of that sound level.
dB(A)	Units of the A-weighted sound level.
Frequency (Hz)	The number of times a vibrating object oscillates (moves back and forth) in one second. Fast movements produce high frequency sound (high pitch/tone), but slow movements mean the frequency (pitch/tone) is low. 1 Hz is equal to 1 cycle per second.
L ₉₀	Noise level exceeded for 90 % of the measurement time. The L ₉₀ level is commonly referred to as the background noise level.
L _{eq}	Equivalent Noise Level—Energy averaged noise level over the measurement time.
L _{max}	The maximum instantaneous noise level.
Night	Between 10.00 p.m. on one day and 7.00 a.m. on the following day as defined in the Noise EPP

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1 Introduction

This report outlines an aircraft noise intrusion assessment for the proposed development at 147 Marion Road, Richmond. The development includes expansion of the existing commercial development to add a commercial tenancy intended for general office use, and three residential apartments. The location of the existing and proposed dwellings are presented in Figure 1.

An aircraft noise intrusion assessment report has been requested by the West Torrens Council, in accordance with the requirements of Australian Standard AS2021:2015 – *Acoustics – Aircraft Noise Intrusion – Building Siting and Construction*.

Potential aircraft noise intrusion into the development has been assessed in accordance with AS2021.



Figure 1 Location of proposed development

2 Development Plan

The proposed development is located within the West Torrens Council area, and it must have regard to the West Torrens Council Development Plan.

The site is located in a Neighbourhood Centre Zone, Policy Area 14 (Low Density). There are no Principles of Development Control (PDC) in this zone or policy area relating to noise. There are some Council Wide objectives relating to buildings near airfields that are applicable, and these are outlined below.

For Buildings near Airfields:

PDC 6 Development within areas affected by aircraft noise should be consistent with *Australian Standard AS2021 - Acoustics - Aircraft Noise Intrusion - Building Siting and Construction*.

3 Noise Criteria

3.1 Aircraft noise impact

Assessment of the impact of aircraft noise on building sites is undertaken under Australian Standard (AS) 2021–2015.¹ Under AS 2021, the acceptability of building sites is dependent on the ANEF (Australian Noise Exposure Forecast) zone that it is located in. The relevant zones for different building types are shown in Table 1.

Table 1 Extract from AS 2021 - Building site acceptability based on ANEF zones

Building type	ANEF zone of site		
	Acceptable	Conditionally acceptable	Unacceptable
House, home unit, flat, caravan park	< 20 ANEF	20 – 25 ANEF	>25 ANEF
Hotel, motel, hostel	< 25 ANEF	25 – 30 ANEF	>30 ANEF
School, university	< 20 ANEF	20 – 25 ANEF	>25 ANEF
Hospital, nursing home	< 20 ANEF	20 – 25 ANEF	>25 ANEF
Public building	< 20 ANEF	20 – 30 ANEF	>30 ANEF
Commercial building	< 25 ANEF	25 – 35 ANEF	>35 ANEF
Light industrial	< 30 ANEF	30 – 40 ANEF	>40 ANEF
Other industrial	Acceptable in all ANEF zones		

It is proposed that the site will be used for both residential premises and commercial development, and therefore the most stringent classification would be as a house or home unit building. The building site is crossed by the ANEF 25 contour for Adelaide Airport (ANEF 2034). The location of the site in relation to the ANEF is shown in Figure 2.

Based on the requirements of AS 2021 and Table 1, the site is 'conditionally acceptable' for houses and commercial development.

¹ Australian Standard 2021–2000 *Acoustics—Aircraft noise intrusion—Building siting and construction*.

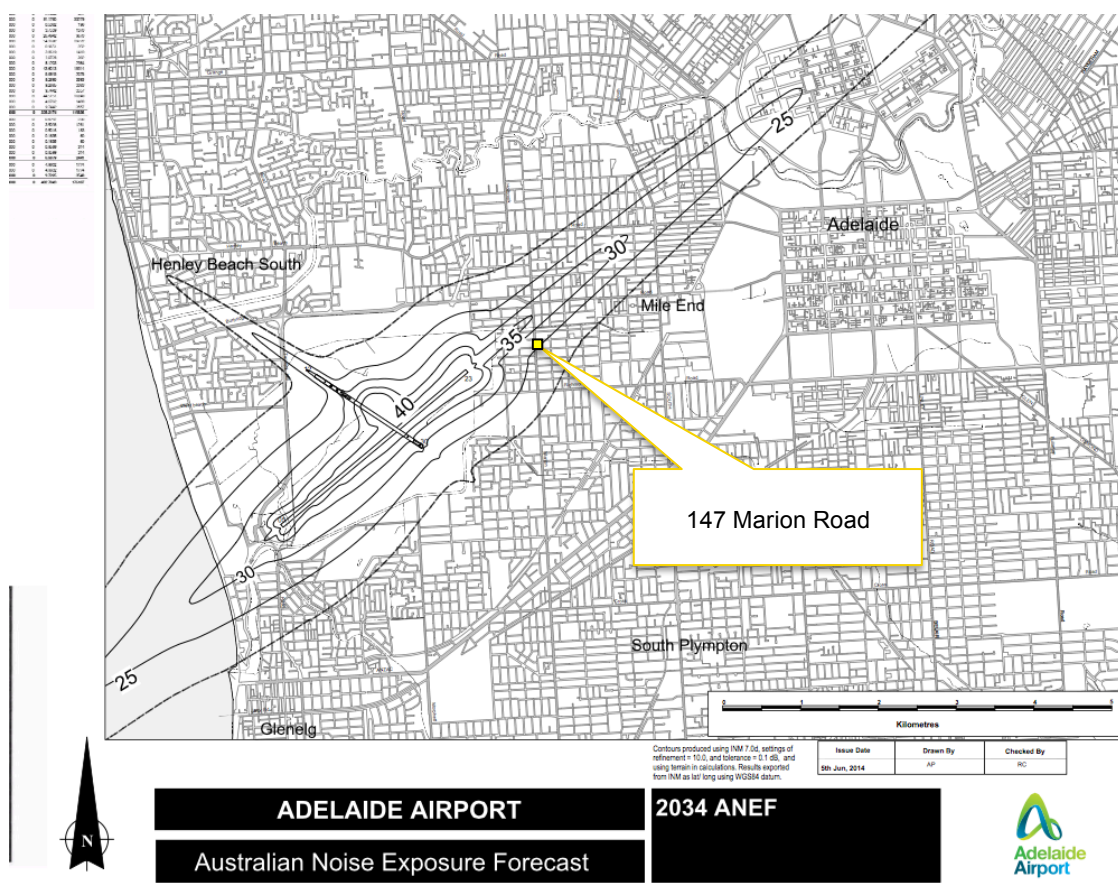


Figure 2 Adelaide Airport 2034 ANEF (excerpt from Adelaide Airport Master Plan 2014)

3.2 AS 2021—Internal noise levels

AS 2021 provides indoor design sound levels for the determination of the required aircraft noise reduction. Appropriate design internal noise criteria are outlined in Table 2

Table 2 AS 2021 indoor design sound levels

Room types	Indoor design sound level, dB(A)
Houses, home units, flats, caravan parks	
Sleeping areas, dedicated lounges	50
Other habitable spaces	55
Bathrooms, toilets, laundries	60

Room types	Indoor design sound level, dB(A)
Commercial buildings, offices and shops	
Private offices, conference rooms	55
Drafting, open offices	65
Typing, data processing	70
Shops, supermarkets, showrooms	75

The commercial tenancy has been assessed as open office.

4 Aircraft types and noise levels

The aircraft types and noise levels at the site have been determined based on proposed fleet mix for 2034 from Adelaide Airport Master Plan 2014 and in accordance with AS 2021. These noise levels are presented in Table 3.

Table 3 Aircraft noise levels

Aircraft category	Aircraft type	Aircraft noise level, dB(A)		Percentage of movements ⁽¹⁾
		Take off	Arrivals	
A380	A380 – 800	86	74	0.3
Large Wide Bodied (LWB)	B777 – 300 ER A350 – 900	89	76	2
Medium Wide Bodied (MWB)	A330 – 300 A330 – 200	88	74	1.4
Medium Wide Bodied (MWB)	Boeing B787 – 900, Boeing B787 – 800	83	72	6.3
Large Narrow Bodied (LNB) and Other Categories	B737-800 A320 and other aircraft types	87	74	90

Note: (1) The percentage of movements is based on information provided in the Adelaide Airport Master Plan 2014, proposed fleet mix for 2034.

5 Facade requirements

5.1 Residential apartments

Table 4 outlines the required constructions for the apartments within the proposed development to achieve compliance with the internal noise criteria outlined in AS 2021 for 100% flight activity.

Table 4 Indicative facade constructions and acoustic rating to achieve compliance with 100% flight activity

Floor	Facade element	R _w	Appropriate form of construction	Nominal element area as a percentage of floor area
Lower	External Windows, Ensuite and Bathroom	36	<ul style="list-style-type: none"> Single 10mm annealed glass awning window with acoustic rated seals around the perimeter OR Proprietary openable window with minimum R_w 36 	<ul style="list-style-type: none"> 15%
	External Windows, Bedroom 1	42	<ul style="list-style-type: none"> Fixed Double glazing—6.38 mm laminated glass / minimum 50 mm air gap / 10.38 mm laminated glass OR Proprietary openable double glazed window with minimum R_w 42 	<ul style="list-style-type: none"> 10%
	External Hinged Door, Bedroom 1	42	<ul style="list-style-type: none"> Two sets of 40 mm thick solid core or 10.38 mm laminated glass doors separated by at least 100 mm with: <ul style="list-style-type: none"> Acoustic rated seals for the head and the jambs such as Kilargo S7080si or Raven RP10 Acoustic rated drop down seal at the bottom such as Kilargo IS8010si or Raven RP8Si OR Proprietary openable door with minimum R_w 42 	<ul style="list-style-type: none"> 16%
	External Windows, Living Room	37	<ul style="list-style-type: none"> Fixed double glazing—6.38 mm laminated glass / minimum 12 mm air gap / 10.38 mm laminated glass OR Proprietary openable double glazed window system tested to meet minimum R_w 37 	<ul style="list-style-type: none"> 65%

Floor	Facade element	R _w	Appropriate form of construction	Nominal element area as a percentage of floor area
	External Door, Living Room	37	<ul style="list-style-type: none"> Proprietary sliding door system tested to achieve R_w 37. A suitable product would be Capral 900 series sliding door with 10.5 mm VLam Hush (300214 Glazing channel). 	<ul style="list-style-type: none"> 12%
	Glazed sliding door Bedroom 2	43	<ul style="list-style-type: none"> Two sets of 10.5 mm VLam Hush glazed sliding doors separated with minimum 100 mm. Airtight seal created using pile weather stripping with a flexible fin such as Raven 'Glidefin' or Schlegel 'Finseal T-slot, installed on: <ul style="list-style-type: none"> both sides of the head both sides of the leading edge door jamb trailing edge of the sliding door Two sets of Alspec Aluminium 'ProGlide/Altitude' sliding door, with 10.5mm VLam glass and seals, set minimum 100 mm apart is suitable. <p>Note: An airlock (e.g. a small entry room) with two separate sets of acoustically rated doors is another method of achieving required noise attenuation.</p>	<ul style="list-style-type: none"> Typical 2.1m x 2.8 m
	Roof & Ceiling	50	<ul style="list-style-type: none"> Metal deck roofing Pitched roof 2x13 mm plasterboard ceiling on resilient mounts to underside of roof trusses Minimum 50 mm of 32kg/m³ insulation over the ceiling. 	Not relevant

Minimum wall constructions to achieve internal noise criteria are as below:

- 6 mm fibre cement sheet or Fielders TL5 Colorbond metal cladding
- 25 mm top hat
- 2 x 13 mm fire rated plasterboard

- 90 mm timber stud
- Minimum 50 mm of 32 kg/m³ insulation
- 2 x 13 mm fire rated plasterboard
- Junctions all sealed and no wall ventilation.

It may be seen by reference to Table 4 that high R_w rated glazing configurations are required for the Bedrooms and Living Rooms due to the large glazing areas to these rooms. The high R_w rated glazing will likely result in higher costs and, with regard to the secondary door systems, may cause operational issues. Accordingly, the following Table 6 outlines indicative reasonable and practical constructions to achieve a 3 to 5 dB(A) relaxation of the noise criteria in these rooms as outlined in AS2021 during 100% flight activity.

Table 5 Alternative practical facade constructions and acoustic rating with 100% flight activity

Floor	Facade element	R_w	Appropriate form of construction
Lower	External Door, Living Room	37	<ul style="list-style-type: none"> • Proprietary sliding door system tested to achieve R_w 37. A suitable product would be Shanghai YY Construction YY100 Aluminium Sliding Door with 9.76 mm laminated glass / 12 mm cavity / 9.76 mm laminated glass.
	External Door / Window, Bedroom 1	35	<ul style="list-style-type: none"> • Proprietary hinged door system tested to achieve a minimum R_w of 35. A suitable product would be Sontron L35 with: <ul style="list-style-type: none"> – Acoustic rubber contact seals for the head and the jambs such as Kilargo S7080si or Raven RP10 – Acoustic drop down seal at the bottom such as Kilargo IS8010si or Raven RP10 OR • Proprietary glazed window system tested to achieve a minimum R_w of 35. A suitable product would be Shanghai YY Construction Awning Window with 8.52 mm laminated glass / 12 mm gap / 10.52 mm laminate glass, and fitted with Schlegel Q-Lon seals.
	External Window, living room	37	<ul style="list-style-type: none"> • Fixed double glazing—6.38 mm laminated glass / minimum 12 mm air gap / 10.38 mm laminated glass OR • Proprietary openable double glazed window system tested to meet minimum R_w 37
Upper	External Door, Bedroom 2	37	<ul style="list-style-type: none"> • Proprietary sliding door system tested to achieve minimum R_w 37. A suitable product would be Shanghai YY Construction YY100 Aluminium Sliding Door with 9.76 mm laminated glass / 12 mm cavity / 9.76 mm laminated glass.

With the above constructions, the following increases over the AS2021 internal noise criteria are predicted:

- Bedrooms: 4 – 5 dB(A),
- Living room, 5 dB(A).

5.2 Commercial tenancy

Table 6 outlines the required constructions for the commercial tenancy within the proposed development to achieve compliance with the internal noise criteria outlined in AS 2021 for 100% flight activity.

Table 6 Indicative facade constructions and acoustic rating to achieve compliance with 100% flight activity

Facade element	R _w	Appropriate form of construction
External Door	30	<ul style="list-style-type: none"> • 40 mm thick solid core or 6.38 mm laminated glass door with: <ul style="list-style-type: none"> – Acoustic rated rubber contact seals for the head and the jambs such as Kilargo S7080si or Raven RP10 – Acoustic rated drop down seal at the bottom such as Kilargo IS8010si or Raven RP8Si OR • Proprietary openable door tested to achieve minimum R_w 30
Southern Window	32	<ul style="list-style-type: none"> • Fixed 6.38 mm laminated glass window OR • Proprietary openable window tested to achieve minimum R_w 32
Western Window	32	<ul style="list-style-type: none"> • Single 6.38 mm laminated glass awning window with acoustic rated rubber seals around the perimeter OR • Proprietary openable window tested to achieve minimum R_w 32
Roof	42	<ul style="list-style-type: none"> • Metal deck roofing with minimum Bradford Anticon 55 insulation over battens • Pitched roof • 10 mm suspended plasterboard ceiling, or minimum CAC 35 mineral fibre tiles • Minimum 165 mm of 8kg/m³ insulation over the ceiling.

Minimum wall constructions as per the residential tenancies will provide sufficient noise reduction to achieve internal noise criteria (repeated below):

- 6 mm fibre cement sheet or Fielders TL5 Colorbond metal cladding
- 25 mm top hat
- 2 x 13 mm fire rated plasterboard
- 90 mm timber stud
- Minimum 50 mm of 32 kg/m³ insulation
- 2 x 13 mm fire rated plasterboard
- Junctions all sealed and no wall ventilation.

6 Conclusion

This report outlines indicative constructions to control aircraft noise intrusion for the proposed two storey residential premises at 147 Marion Road, Richmond.

In summary, the facade constructions (or acoustically equivalent) for both strict compliance and reasonable and practical compliance with Australian Standard AS2021 – *Acoustics – Aircraft Noise Intrusion – Building Siting and Construction* are outlined in this report. The reasonable and practical constructions are predicted to meet the intent of AS 2021 in terms of perceived noise amenity with the benefit of reduced construction complexity and cost.