PROPOSED RESIDENTIAL DEVELOPMENT

680-688 East Street & 165 Alexandra Street, East Albury
AS 2021 Aircraft Noise Intrusion Assessment

Prepared for:

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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with NSW Land & Housing Corporation (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
670.30067-R01-v4.0	14 April 2022	Matthew Bryce	Martin Davenport	Matthew Bryce
670.30067-R01-v3.0	29 November 2021	Matthew Bryce	Martin Davenport	Matthew Bryce
670.30067-R01-v2.0	9 November 2021	Matthew Bryce	Martin Davenport	Matthew Bryce
670.30067-R01-v1.0	15 September 2021	Matthew Bryce	Martin Davenport	Matthew Bryce

CONTENTS

DOCUMENT REFERENCES

TABLES

FIGURES

APPENDICES

1 Introduction

It is proposed to construct residential dwellings on land known as 680-688 East Street & 165 Alexandra Street, East Albury, NSW.

The land is subject to the Clause 7.9 of the *Albury Local Environmental Plan* (ALEP 2010) and the Albury City Council (ACC) "*Development Control Plan 2015*" (the DCP), which require consideration of the development with regard to Australian Standard 2021:2015 "*Acoustics – Aircraft Noise Intrusion – Building Siting and Construction*" (AS 2021).

The development will be a two-storey residential apartment complex. Layout plans and elevation drawings are shown in **Appendix A**. The location of the site relative to the Albury Airport can be seen in **Figure 1**.

This report presents the results of the assessment together with recommendations for building construction materials to meet the requirements of AS 2021.

2 AS 2021 ASSESSMENT

2.1 Site Classification and ANEF Contours

AS 2021 ranks sites as "unacceptable", "conditionally acceptable" or "acceptable" for residential development based on the site location relative to the Australian Noise Exposure Forecast (ANEF) contours.

The ANEF contours for the Albury Airport are shown in **Figure 1**. It can be seen that the site is outside the 20 ANEF contour which would indicate that the site is acceptable for residential use as defined in AS 2021 and further assessment using the AS 2021 methodology is generally not required. Nonetheless an assessment has been undertaken to confirm the adequacy of the proposed building constructions in relation to aircraft noise intrusion.

2.2 Procedure

Based on the aircraft types commonly in use at the Albury Airport, aircraft noise levels at the site may be determined.

The aircraft types commonly in service at the Albury Airport would be Boeing 717, Saab 340 and Bombardier Dash 8.

The aircraft noise level can be found using tables of aircraft noise data provided in AS 2021, taking into consideration the distance of the site from the closer end of the nearest runway (DL), the distance from the furthest end of the nearest runway (DT) and the perpendicular side distance to a projection of the extended runway centre-line and passing through the building site (DS).

The relative elevations of the site and the airport are also considered. The approximate elevation levels of the site and the airport are 165 m and 163 m respectively, ie there is little difference between the elevations. As the relative height difference is less than 10 m, no adjustments to the flight path distances are required.

The applicable distances for the site have been determined in accordance with the AS 2021 methodology as summarised in **Table 1**.

Figure 1 Site Location and Surrounds

Figure 2 Albury Airport ANEF Contours

Table 1 Albury Airport to 680-688 East Street & 165 Alexandra Street, East Albury

Component	Distances, m		
	Landing (DL)	Take off (DT)	Side Projection (DS)
Distance, m	800	2,675	540
Elevation adjustment, m	0	0	N/A
Effective distance, m	800	2,675	540

Based on the information shown in **Table 1**, and the common aircraft type using the airport, the maximum noise level expected at the site would be 74 dBA during a take-off.

2.3 Maximum Internal Noise Levels due to Aircraft Noise Intrusion

Recommended indoor design sound levels (effective maximum levels) for various areas of a range of building types and uses are provided in Table 3.3 of AS 2021. The indoor design sound levels for various occupancies within a residence are presented in **Table 2**.

Table 2 Indoor Design Sound Levels – Residential Building

Area of Occupancy Indoor	Design Sound Level, dBA
Sleeping Areas[1]	50
Other Habitable Areas	55
Bathrooms, Toilets, etc	60

1. Applies during the night-time period only, ie 10:00 pm until 7:00 am. This reverts to the "Other Habitable Areas" criterion at other times.

2.4 Aircraft Noise Reduction

The aircraft noise reduction (ANR), ie the level of sound attenuation required by the building envelope, is determined for the future dwelling based on the identified external aircraft noise level at the site and the indoor design sound levels.

The aircraft noise reduction (ANR) to be obtained by the building construction for each of the occupancies has been described in **Table 3**.

Table 3 Required Aircraft Noise Reduction

Area of Occupancy	Maximum External Aircraft Noise Level, dBA	Indoor Design Sound Level, dBA	Aircraft Noise Reduction, dBA
Sleeping Areas	74	50	24
Other Habitable Areas	74	55	19
Bathrooms, Toilets etc.	74	60	14

The internal design sound levels and the ANR assume that windows and external entry doors are closed. However, as the site is out of the ANEF 20 contour, it will not be a requirement to provide mechanical ventilation, which would be the case for "conditionally acceptable" sites, however this may be provided if desired.

3 BUILDING CONSTRUCTION REQUIREMENTS

3.1 Nominated Constructions

The project drawings nominate the constructions of building elements as described in **Table 4**, together with the expected minimum sound reduction performance.

Table 4 Nominated Building Constructions and Sound Insulation Rating

Building Element	Construction	Minimum Sound Insulation Performance, R_w
Roof/ceiling	Colourbond sheet roofing, sarking/insulation blanket over roof trusses, 13 mm plasterboard ceiling, cavity insulation	40
External walls	Brick/blockwork veneer (10 mm or 13 mm plasterboard) with cavity insulation	50

3.2 Sound Insulation Calculations and Requirements

Procedures for determining the necessary acoustic rating, expressed as a Weighted Sound Reduction Index (R_w), of individual building elements are also included in AS 2021. Calculations take into consideration room size, the area of each facade element, the orientation of the facade with respect to noise from the runway and room use.

The calculation procedure in AS 2021 establishes the required sound insulation performance of each building envelope component (ie external wall, roof/ceiling, glazing, entry doors), so that the internal noise level is achieved whilst an equal contribution of aircraft noise energy is distributed across each component. Consequently, building envelope components with a greater surface area must offer greater sound insulation performance.

Based on the sound insulation performance that would be achieved by the nominated external wall and roof/ceiling constructions (refer to **Table 4**), it will be the glazing or external entry doors that will control aircraft noise intrusion into the dwelling.

Based on the AS 2021 methodology and the proposed dwelling design, the maximum R_w rating value for the glazing to any habitable or bedroom occupancy within the development would be R_w 24 dB. Examples of the AS 2021 calculations have been provided in **Appendix B**.

That required performance will not be considered onerous and may be achieved with wide range of proprietary glazing configurations, including 6 mm float glass in an aluminium frame with weather seals.

There are numerous manufacturers/suppliers of glazing systems that produce proprietary systems capable of achieving the nominated R_w rating and it will be the manufacturer/supplier will be responsible for providing test data or similar confirming satisfactory performance of window/glazing systems. The builder will be responsible for ensuring the correct glazing is installed appropriately and effectively to each location.

There will be no acoustic performance specification for glazing to non-habitable areas (ie bathrooms, toilets), or for external entry doors.

4 CONCLUSIONS

SLR has undertaken an assessment of aircraft noise at 680-688 East Street & 165 Alexandra Street, East Albury, in accordance with AS 2021 as required by the Albury *Local Environment Plan 2010* and the Albury *Development Control Plan 2015*.

The maximum level of aircraft noise expected at the proposed residence is 74 dBA.

Glazing or external entry doors will control aircraft noise intrusion into the dwelling.

Based on the AS 2021 methodology and the proposed building design/constructions, the maximum required sound insulation performance for habitable occupancies (ie bedrooms and living/dining/kitchen areas) is R_w 24 dB. Glazing no less than 6 mm thick in standard proprietary systems would achieve that performance. Many other proprietary systems would also achieve the required sound insulation performance.

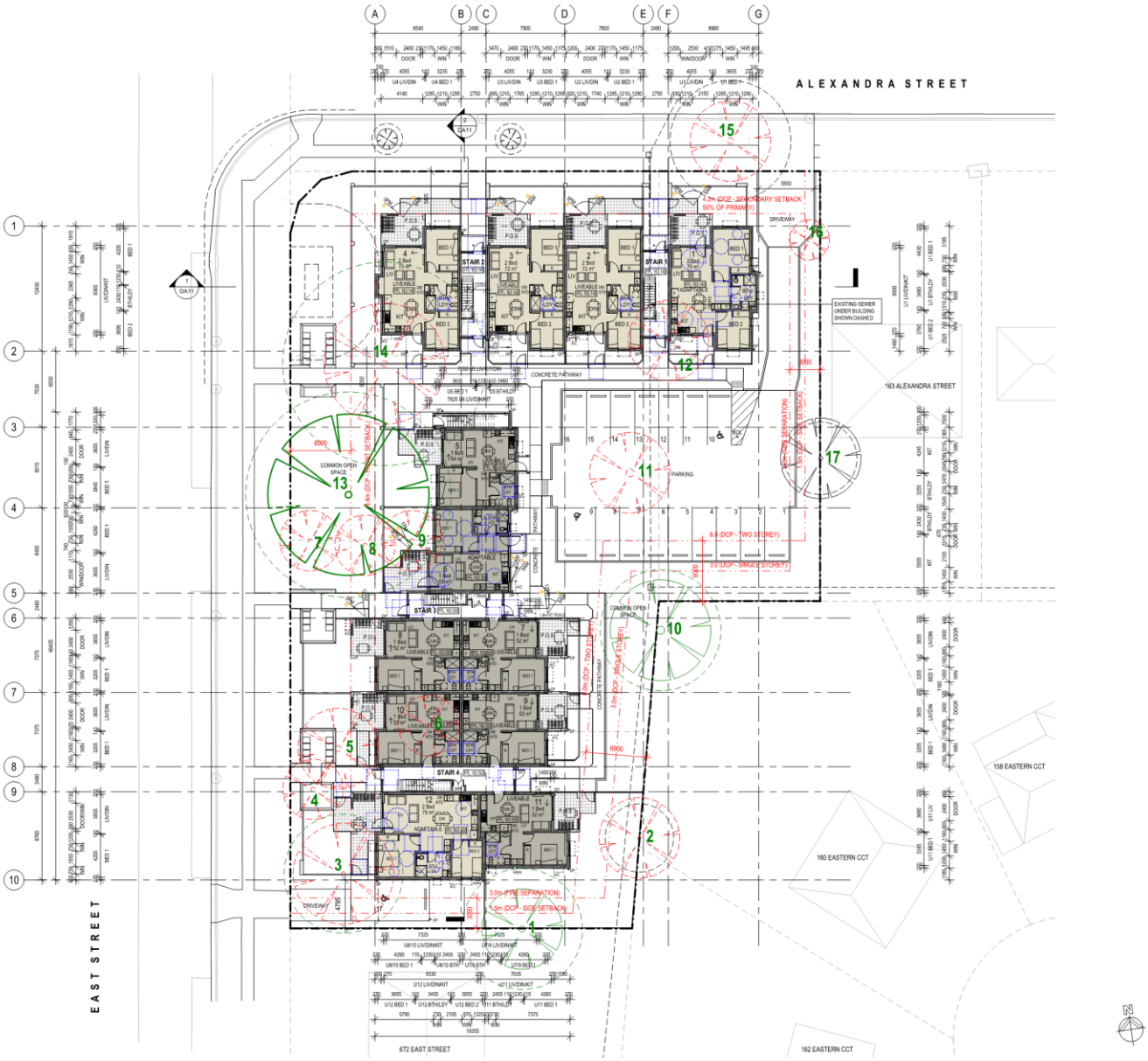
Therefore, specific acoustic measures are not required to be included into the dwelling design other than glazing to habitable areas. The required sound insulation performance is not onerous and likely to be achieved by standard proprietary glazing systems.

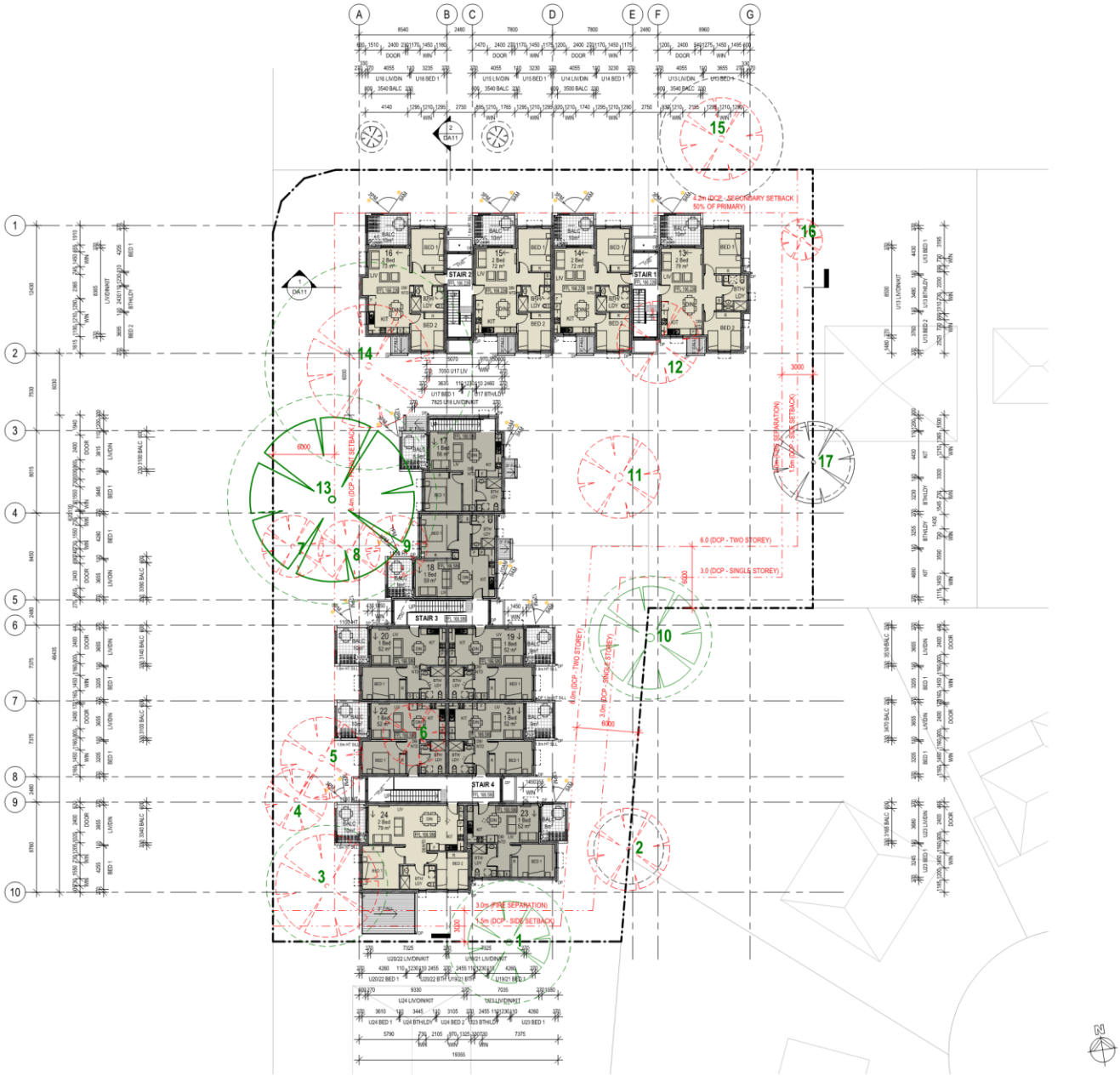
Adequate sound insulation performance of the selected glazing system as specified in this report must be confirmed during the detailed design, with the correct installation (ie type and location as recommended in this report) certified by the builder during construction.

APPENDIX A

Proposed Development – Layout Plan and Elevation Drawings


ALEXANDRA STREET
EAST STREET
PROPOSED NEW FOOTPATH - FINAL LAYOUT AND LEVELS SUBJECT TO COUNCIL REQUIREMENTS
CONNECT TO PROPOSED KERB INLET PIT - REFER TO ENG. DRAWINGS
EXISTING STREET TREE REMOVED AND NEW STREET TREE PROVIDED
ADDRESS SIGNAGE
DRIVEWAY
EXISTING SEWER UNDER BUILDING - UNITS 1-4 REQUIRE PILES TO SUSPEND FOOTINGS OVER SEWER PIPE. SEWER PIPE WILL REQUIRE CONCRETE ENCASEMENT WHERE IT PASSES THROUGH UNITS 1-4.
PROVISION FOR SUBSTATION (ESSENTIAL ENERGY)
PLANTING TO BE PROVIDED TO GARBAGE / SUBSTATION SCREENING
BOUNDARY GAS + WATER METERS
CONCRETE PATHWAY (1:100 X-FALL)
163 ALEXANDRA STREET
COMMON OPEN SPACE
12.5% ENCROACHMENT (40.8m² / 326.6m²) INTO TPZ OF TREE 13 BY BUILDINGS AND PATHWAYS
10.8% ENCROACHMENT (4.4m² / 40.7m²)
BELOW GROUND RWT - SIZE AND USAGE IN ACCORDANCE WITH BASIX REQUIREMENTS
6.5 (DCP - TWO STOREY)
6.0 (DCP - SINGLE STOREY)
NEW COLORBOND FENCE 1.8m HT
1.9% ENCROACHMENT (2.2m² / 113.1m²)
158 EASTERN CCT
160 EASTERN CCT
162 EASTERN CCT
672 EAST STREET
CONNECT TO PROPOSED KERB INLET PIT - REFER TO ENG. DRAWINGS
UNIT GAS + WATER METERS
ROOF TO CARPORT
3.0m (FIRE SEPARATION)
1.5m (DCP - SIDE SETBACK)
NEW COLORBOND FENCE 1.2m HT
STAIR 1
STAIR 2
STAIR 3
STAIR 4
4 / 16
3 / 15
2 / 14
1 / 13
5 / 17
6 / 18
8 / 20
7 / 19
10 / 22
9 / 21
12 / 24
11 / 23
PARKING
N


ALEXANDRA STREET
EAST STREET
672 EAST STREET
163 ALEXANDRA STREET
158 EASTERN CCT
160 EASTERN CCT
162 EASTERN CCT
EXISTING SEWER UNDER BUILDING SHOWN DASHED
CONCRETE PATHWAY
COMMON OPEN SPACE
PARKING
DRIVEWAY
STAIR 1
STAIR 2
STAIR 3
STAIR 4
4.7m (DCP - SECONDARY SETBACK 50% OF PRIMARY)
6.0 (DCP - TWO STOREY)
3.0 (DCP - SINGLE STOREY)
3.0m (FIRE SEPARATION)
1.5m (DCP - SIDE SETBACK)
6000
N


A
B
C
D
E
F
G
1
2
3
4
5
6
7
8
9
10
STAIR 1
STAIR 2
STAIR 3
STAIR 4
6.0 (DCP - TWO STOREY)
3.0 (DCP - SINGLE STOREY)
3.0m (FIRE SEPARATION)
1.5m (DCP - SIDE SETBACK)
N

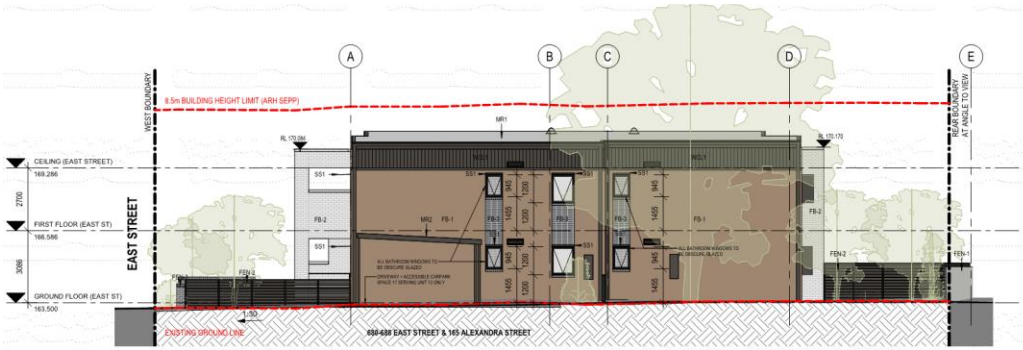
1 NORTH ELEVATION (ALEXANDRA STREET)
SCALE 1 : 100 MM

2 WEST ELEVATION (EAST STREET)
SCALE 1 : 100 MM

1 EAST ELEVATION (REAR OF EAST STREET UNITS)
SCALE 1 : 100 MM

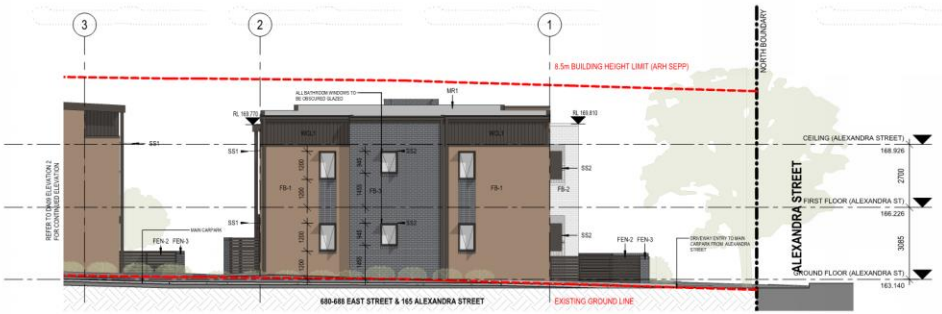
EXTERIOR FINISHES			
CODE	MATERIAL	DESCRIPTION	FINISH
FB-1		FACE BRICK	BROWN WITH NATURAL VARIATION
FB-2		BALCONY WALLS	WHITE
FB-3		FEATURE BRICK	DARK GREY
MR1		MAIN METAL ROOFS	COLORBOND SHALE GREY (OR SIMILAR)
MR2		SECONDARY METAL ROOFS	COLORBOND WOODLAND GREY (OR SIMILAR)
WCL1		PREFINISHED METAL WEATHERBOARD-LOOK CLADDING	COLORBOND WOODLAND GREY (OR SIMILAR)
G, DP, LVR-1		GUTTERS, DOWNPIPES, METAL FLASHINGS, ALUMINIUM PRIVACY LOUVRES	COLORBOND WOODLAND GREY (OR SIMILAR)
WF, DF, SS1, SS2		ALUMINIUM WINDOW FRAMES, DOOR FRAMES, SUN SHADES	TO MATCH COLORBOND WOODLAND GREY (OR SIMILAR)
P1		PAINT FINISH TO STAIR LOBBY CONCRETE AWNINGS	TO MATCH COLORBOND WOODLAND GREY (OR SIMILAR)
BAL-1		GLASS BALUSTRADES	GREY SEMI-OPAQUE
CC-1		CONCRETE DRIVEWAYS	COLOURED CONCRETE DARK GREY
CONC		CONCRETE COURTYARDS, PATHWAYS	NATURAL GREY CONCRETE
FT1		EXTERIOR NON-SLIP FLOOR TILES	SANDY GREY
FEN-1		COLORBOND METAL FENCING TO BOUNDARIES SOLID PANELS 1.8m HT	COLORBOND SHALE GREY (OR SIMILAR)
FEN-2		SLATTED PRIVACY FENCING	COLORBOND WOODLAND GREY (OR SIMILAR)
FEN-3		BRICK PIERS, GARBAGE AREA WALLS	DARK GREY

INTERIOR FINISHES		
MATERIAL	DESCRIPTION	FINISH
FLOOR TILE	LIVING, DINING, KITCHEN	LARGE FORMAT NON-SLIP SELECTED FLOOR TILE
FLOOR TILE	BATHROOMS, LAUNDRY	NON-SLIP SELECTED CERAMIC FLOOR TILE
CARPET	BEDROOMS	SELECTED CARPET
FLOOR TILE	LOBBIES/ STAIRS	NON-SLIP SELECTED TILE
WALLS	RENDER OVER MASONRY (STAIRS), 10mm IMPACT PLASTERBOARD OVER MASONRY / 13mm IMPACT PLASTERBOARD OVER STUD WALL	PAINTED
CEILING	GROUND FLOOR SUSPENDED 13mm PLASTERBOARD / FIRST FLOOR 13mm PLASTERBOARD	PAINTED



1 SOUTH ELEVATION (DRIVEWAY FROM EAST STREET)
SCALE 1 : 100 MM

2 NORTH ELEVATION (UNIT 17 STAIR)
SCALE 1 : 100 MM



3 EAST ELEVATION (DRIVEWAY FROM ALEXANDRA STREET)
SCALE 1 : 100 MM

4 SOUTH ELEVATION (REAR OF ALEXANDRA STREET UNITS
SCALE 1 : 100 MM

APPENDIX B

Example AS 2021 Calculations

AS2021 Method for Calculating Sound Insulation Performance (Rw)				
Occupancy	**IF Bed**			
AS2021 External aircraft noise level, dBA L_{Amax}	74			
AS2021 Indoor design objective, dBA	50			
Aircraft Noise Reduction, dB	24			
No. of builidng elements	3			
Floor area, m^2	11.52			
reverberation Time (RT), s	0.8			
Orientation, Kc	6			
Ceiling height, m	2.7			
Building elements		**ANAc**	**est Rw**	**comp factor**
Windows area, m^2	1.68	23	28	0.000132472
External wall area, m^2	7.23	29	34	8.70117E-05
Ceiling area, m^2	11.52	31	36	0.000132472
Door area, m^2	0.00001	-29	-24	0.000132472
Composite Rw			**33**	
Total area	20.4			
room vol	31.104			
		Rw	**comp factor**	
Windows area, m^2	1.68	24	0.000327371	
External wall area, m^2	7.23	50	3.53891E-06	
Ceiling area, m^2	11.52	40	5.63876E-05	
Door area, m^2	0.00001	100	4.89476E-17	
Composite Rw		**34**		
Total area	20.4			

AS2021 Method for Calculating Sound Insulation Performance (Rw)				
Occupancy	**1F LDK**			
AS2021 External aircraft noise level, dBA L_{Amax}	74			
AS2021 Indoor design objective, dBA	55			
Aircraft Noise Reduction, dB	19			
No. of builidng elements	3			
Floor area, m^2	52			
reverberation Time (RT), s	1.2			
Orientation, Kc	6			
Ceiling height, m	2.7			
Building elements		**ANAc**	**est Rw**	**comp factor**
Windows area, m^2	7.2	19	24	0.000393199
External wall area, m^2	6.3	19	24	0.000183437
Ceiling area, m^2	52	28	33	0.000393199
Door area, m^2	0.00001	-39	-34	0.000393199
Composite Rw			**29**	
Total area	65.5			
room vol	140.4			
		Rw	**comp factor**	
Windows area, m^2	7.2	21	0.000873155	
External wall area, m^2	6.3	50	9.61832E-07	
Ceiling area, m^2	52	40	7.93893E-05	
Door area, m^2	0.00001	100	1.52672E-17	
Composite Rw		**30**		
Total area	65.5			

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