AMENDED IN RED
By: Andrew McKnight
Date: 26 October 2023
Queensland Government

PLANS AND DOCUMENTS referred to in the PDA DEVELOPMENT APPROVAL
Approval no: DEV2023/1435
Date: 31 October 2023
Queensland Government

Paradigm 42

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17 October 2023

Your Reference: Lot 862 Banya 862 Social Housing, ~~Central Ave Nirimba~~ QLD
Our Reference: 0866 R01 2

Jess Knott
Coast 2 Bay Housing Group
PO Box 324
Nambour Qld 4560

Dear Jess,

RE: Compliance with QDC MP4.4

1. Introduction

This letter is to address the road traffic noise attenuation requirements for the abovementioned site, for compliance with the requirements of Schedule 3 of *Queensland Development Code* MP 4.4 and EDQ requirements. The assessment has been based on the following information:

1. *Queensland Development Code*, MP 4.4 Buildings in a Transport Noise Corridor (MP 4.4);
2. Australian/New Zealand Standard AS 2107-2016 *Acoustics – Recommended design sound levels and reverberation times for building interiors*;
3. Australian Standard AS 3671-1989 *Acoustics – Road traffic noise intrusion – Building siting and construction*;
4. Australian Standard *AS 1668 The use of mechanical ventilation and airconditioning in buildings*;
5. Australian Standard *AS 1668.2 Part 2: Mechanical ventilation in buildings*;
6. ABCB, Part A2 Compliance with the NCC, Vol 3 Ammendment 1, https://ncc.abcb.gov.au/editions/2019-a1/ncc-2019-volume-three-amendment-1/section-governing-requirements/part-a2 ;
7. Department of Transport and Main Roads, *Road Traffic Noise Management: Code of Practice* 2008;
8. Extract of Information Request from EDQ
9. Report by Trinity Consultants, Report: 197401.0141.R01V04.docx, Dated; 8 July 2021. Note that less than 10% of the report has been reproduced and therefore does not infringe copyright;
10. Drawings by Hollindale Mainwaring Architecture, Job No: 1279, ~~dated 25/1/2023 as appended to the end of this report.~~

Refer approved architectural plans by Hollindale Mainwaring Architecture dated 17 October 2023 Rev H

2. The Site Location

The site location is shown below in Figure 1.

Figure 1: Location of site, Source: Hollindale Mainwaring Architecture

3. Internal Assessment Criteria

MP 4.4 only concerns itself with habitable rooms. Therefore, bathrooms, ensuites, laundries, storage areas, garages are not assessable. As this lot is in a transport noise corridor MP 4.4 is applicable.

We have assessed this property to Australian/New Zealand Standard AS/NZS 2107:2016 *Acoustics – Recommended design sound levels and reverberation times for building interiors* (AS 2107). The relevant section is below in Table 2.

Performance Requirements - Road Traffic Noise -MP4.4 Schedule 3

Schedule 3 of MP4.4 states:

> The objective of the *noise assessment* is to clearly demonstrate that the *noise category* that is applicable to a particular part of or entire building, or site. The criteria for determining the relevant *noise category* are given below in Table 1 [of MP4.4]:

Table 1: Table 1 of MP 4.4 'Noise category levels'

Noise Category	Level of transport noise ($L_{A10, 18hr}$) for State-controlled roads and designated local government roads	Single event maximum noise* (L_{Amax}) for railway land
Category 4	≥ 73 dB(A)	≥ 85 dB(A)
Category 3	68 - 72 dB(A)	80 – 84 dB(A)
Category 2	63 – 67 dB(A)	75 – 79 dB(A)
Category 1	58 - 62 dB(A)	70 - 74 dB(A)
Category 0	≤ 57 dB(A)	≤ 69 dB(A)

Further on it states:

> **Noise assessment requirements – *State-controlled Roads* and Local Government roads:**
>
> A noise assessment for State-controlled roads and Local Government roads must be undertaken in accordance with the Road Traffic Noise Management: Code of Practice (Department of Transport and Main Roads, 2008).

1 *Road Traffic Noise Management: Code of Practice* (Department of Transport and Main Roads, 2008).

The *Road Traffic Noise Management: Code of Practice* states:

> Australian Standard AS 3671: Acoustics – Road traffic noise intrusion – Building siting and construction, **may be used to determine the minimum R_W for each building component on all sides of a building**.

The bold text is ours.

AS 3671-1989 - Acoustics – Road traffic noise intrusion – Building siting and construction

Australian Standard AS 3671-1989 *Acoustics – Road traffic noise intrusion – Building siting and construction* states in the scope:

> 1.1 SCOPE. This Standard concerns the reduction of road traffic noise intrusion in building in areas near new of upgraded freeways, tollways, major roads, and national routes or other roads carrying more than 2000 vehicles per day; it may also be used to assess the acoustical adequacy of existing buildings in similar areas. It provides guidelines for determining the type of building construction necessary to achieve acceptable noise levels indoors, **as recommended in AS 2107, for different types of activity.**

The bold text is ours.

The underlying criteria is AS 2107.

Australian/New Zealand Standard AS 2107-2016 Acoustics – Recommended design sound levels and reverberation times for building interiors;

The purpose of MP 4.4 is to 'ensure *habitable rooms* of Class 1, 2, 3 and 4 buildings located in a *transport noise corridor* are designed and constructed to reduce *transport noise*.' (p. 2). Therefore, non-habitable rooms such as bathrooms, ensuites, laundries, storage areas, garages are not assessable.

We have assessed this property to Australian/New Zealand Standard AS/NZS 2107:2016 *Acoustics – Recommended design sound levels and reverberation times for building interiors* (AS 2107). The relevant section is below in Table 2: .

Table 2: From AS 2107 Table 1

	Type of occupancy/activity	Design sound level, ($L_{Aeq,t}$) range
7	**RESIDENTIAL BUILDINGS**	
	Houses and apartments in inner city areas or entertainment districts near major roads	
	Living areas	35 to 45
	Sleeping areas (night time)	35 to 40

This represents the performance requirement, in that the external fabric of the building should be designed so that the internal noise levels meet the 'Design sound level, (L_{Aeqt}) range' from AS 2107.

Trinity Report

The requirement to achieve the criteria set out in AS 2107 is the same as that in the Trinity report. The Trinity report does not provide the modelled noise levels for this site, but we have assessed it based on the noise to the site directly south of Lot 862 namely Lot 7287 (p. 91-92/164).

4. EDQL

An extract of EDQ's information request for Nirimba is below. Expectation is that Banya will have similar requirements. This report as stated above satisfies this requirement:

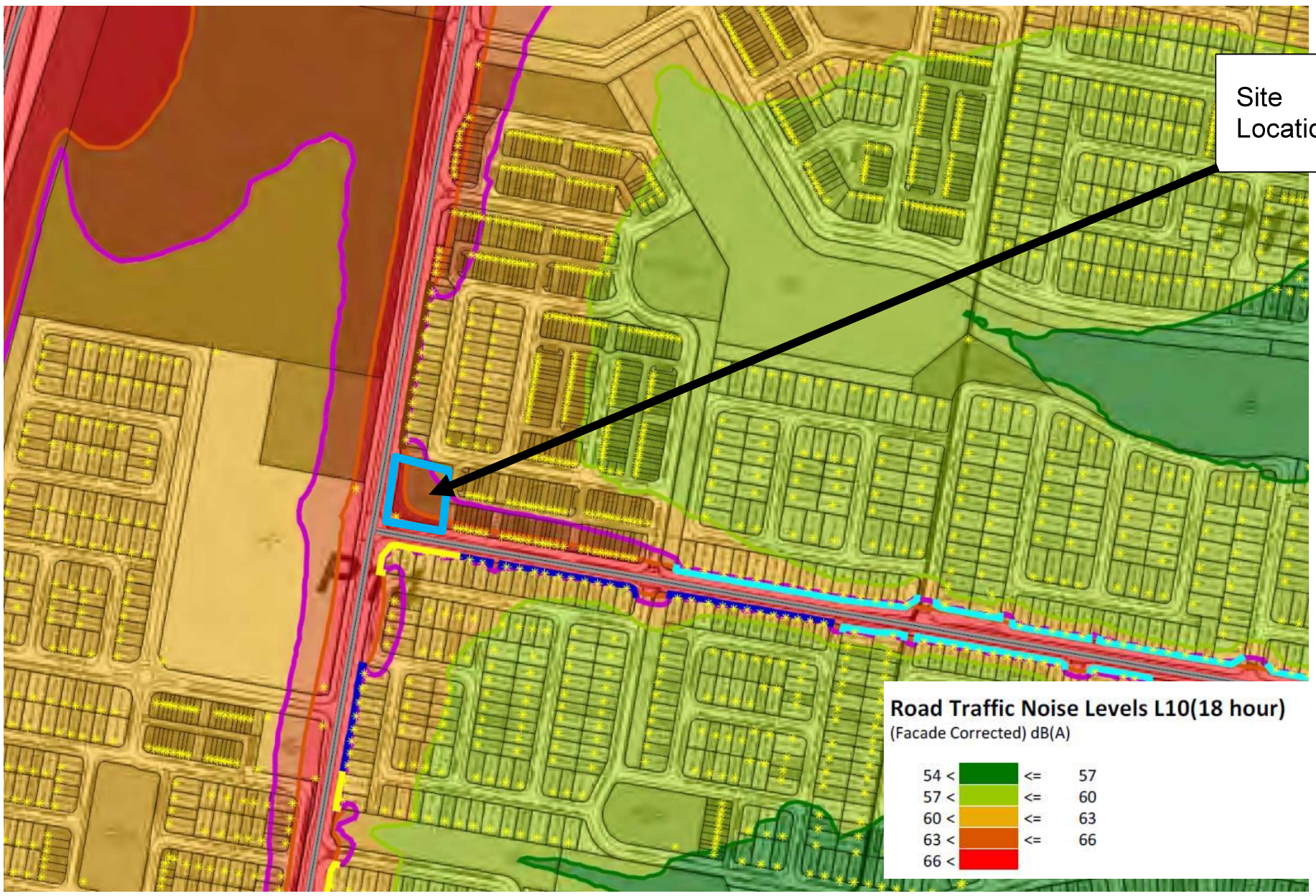
> Acoustic – Road traffic noise
>
> The Plan of development seeks an Acoustic barrier or treatment/s to residential properties along Central Avenue, including a Class 2 building.
>
> 1) Provide a Noise Impact Assessment Report that demonstrates how the development will achieve the required acoustic mitigation (i.e. MP4.4 Building in Transport Noise Corridor requirements) to achieve the applicable noise limits, and requisite internal noise levels stipulated in AS2107.

This report provides the results of calculating internal noise levels from the external levels reported in the Trinity report.

5. Trinity Report

Trinity has performed extensive modelling across the site. The relevant image is reproduced below with the scale associated with it.

Figure 2: From Trinity Report Figure G.1A, p. 136/164,



The Trinity report designates noise levels associated with each block of the original plan. However, the original modelling did not take account of the shielding affect of the proposed building nor of the adjacent buildings. We have considered the affect of these in our calculations. These levels were used in our calculations.

We have used the external noise levels in the Trinity report. Noise levels for level two from experience is usually higher than level 1, because line of sight to the other side of the road is better:

Table 3: Noise levels determined from Trinity Report

South of Lot 862	G	L1	L2	Page of Trinity report
Lot 7827 ($L_{10\ 18\ hour}$) dB(A)	69	70	71	p. 91-92

However these figures include façade reflection at 1 metre from the façade. This is not the noise level that the façade is exposed to, which is normally acknowledged as 2.5 dB lower. This is the noise that reaches the façade. If one measures 1 metre from the façade the sound level meter will measure the noise reaching the façade and the noise reflected.

Based on orientation and location we have determined the noise levels for each room. These are below in Table 4.

Table 4: External Noise Levels L_{Aeq}

Type	Apartment	Room	North	East	South	West
D	1.01	Bed	63.5			66.5
		KLD	63.5			66.5
C	1.02	Meeting	63.5	60.5	62.5	
		Office	60.5	60.5	61.5	
D	1.03	Bed	63.5			64.5
		KLD				64.5
D	1.04	Bed	62.5	60.5		
		KLD	60.5	60.5	61.5	
D	1.05	Bed			66.5	66.5
		KLD			66.5	66.5
E	1.06	Bed		65.5	66.5	
		KLD	62.5		65.5	
E	1.07	Bed		65.5	65.5	
		KLD	65.5		65.5	
D	2.01	Bed	64.5			67.5
		KLD	64.5			67.5
A	2.02	Bed 1	64.5	61.5		
		Bed 2		61.5	64.5	
		KLD	61.5			
D	2.03	Bed	63.5			65.5
		KLD	63.5			65.5
D	2.04	Bed	63.5	62.5		
		KLD	62.5	62.5		
A+	2.05	Bed 1		62.5	65.5	
		Bed 2			64.5	
		Bed 3			64.5	63.5
		KLD		63.5		
A+	2.06	Bed 1	61.5	64.5		
		Bed 2	60.5			
		Bed 3	63.5	65.5		65.5
		KLD		61.5		
A	2.07	Bed 1		66.5	64.5	
		Bed 2	60.5	64.5		
		KLD			66.5	
A	2.08	Bed 1			66.5	65.5
		Bed 2	61.5			
		KLD			65.5	
E	2.09	Bed		66.5	65.5	
		KLD	62.5		65.5	
E	2.10	Bed		65.5	66.5	
		KLD	62.5		65.5	

Type	Apartment	Room	North	East	South	West
D	2.11	Bed			67.5	67.5
		KLD			66.5	67.5
A	2.12	Bed 1			64.5	67.5
		Bed 2		61.5	64.5	
		KLD				67.5
B	2.13	Bed	64.5			67.5
		KLD		61.5		67.5
A	2.14	Bed 1	64.5			67.5
		Bed 2	63.5	61.5		
		KLD				67.5
D	3.01	Bed	65.5			68.5
		KLD				68.5
A	3.02	Bed 1	65.5	63.5		
		Bed 2		63.5	65.5	
		KLD	62.5			
D	3.03	Bed	64.5			67.5
		KLD	67.5			65.5
D	3.04	Bed	64.5	61.5		
		KLD	62.5	61.5		
A	3.05	Bed 1		61.5		
		Bed 2			62.5	65.5
		KLD	61.5			
A	3.06	Bed 1	61.5	61.5		
		Bed 2		62.5		65.5
		KLD		61.5		
A	3.07	Bed 1		61.5	64.5	
		Bed 2	64.5	61.5		
		KLD			61.5	
A	3.08	Bed 1			64.5	65.5
		Bed 2	63.5			
		KLD			64.5	
E	3.09	Bed		62.5	64.5	
		KLD	62.5		62.5	
E	3.10	Bed		61.5	64.5	
		KLD	63.5		61.5	
D	3.11	Bed			65.5	68.5
		KLD			65.5	68.5
A	3.12	Bed 1			65.5	68.5
		Bed 2		62.5	64.5	
		KLD				68.5
B	3.13	Bed	65.5			68.5
		KLD		62.5		68.5
A	3.14	Bed 1	65.5			68.5
		Bed 2	65.5	63.5		
		KLD				68.5

Noise Exposure s provided in L_{Aeq}(dB) because this is the parameter used in AS 2107. Usually the L_{Aeq}(dB) is 3 dB less than $L_{A10,}$ for road traffic noise, however we have not modified this to take into account the higher noise levels during peak hour. Further to this, we have used the same levels for bedrooms to account for the early morning peak hour prior to 7 am to reflect the noisiest hour when people might still be in bed. This is a conservative approach.

Table 5: From Table 1 of MP 4.4 showing the relationship between noise levels and Noise Category

Noise Category	Level of transport noise ($L_{A10, 18hr}$) for State-controlled roads and designated local government roads	Single event maximum noise* (L_{Amax}) for railway land
Category 4	≥ 73 dB(A)	≥ 85 dB(A)
Category 3	68 - 72 dB(A)	80 – 84 dB(A)
Category 2	63 – 67 dB(A)	75 – 79 dB(A)
Category 1	58 - 62 dB(A)	70 - 74 dB(A)
Category 0	≤ 57 dB(A)	≤ 69 dB(A)

6. Internal Assessment Criteria

Based on floor plans and elevations, glazing and building treatments were determined using an inside to outside calculation method as published in Smith, Peters and Owen, *Acoustics and Noise Control*, Second Edition, Edinburgh, 1996, p. 155, and Bies D.A., and Hanson C.H., *Engineering Noise Control, Theory and Practice*, Third Edition, 2003, Spon Press, NY, p. 342, formula (8.16).

$SPL_{in} = SPL_{out} - R + 10 \log_{10} S - 10 \log_{10} A + K$.

This formula takes into account the Reduction, the area of absorbent material in the room based on RT time, volume of room, area of material under consideration, adjusts for angles of incidence and façade reflection.

The results of our calculations for glazing are below in Table 6.

Table 6: Recommended Glazing to habitable rooms (R_W)

Type	Apartment	Room	North	East	South	West
D	1.01	Bed	28			
		KLD	28			28
C	1.02	Meeting	28	28	28	
		Office	28	28	28	
D	1.03	Bed	28			29
		KLD				28
D	1.04	Bed	28	28		
		KLD	28	28	28	
D	1.05	Bed			31	31
		KLD			28	28
E	1.06	Bed		30	31	
		KLD	28		28	
E	1.07	Bed		30	30	
		KLD	28		28	
D	2.01	Bed	29			32

Type	Apartment	Room	North	East	South	West
		KLD	28			28
A	2.02	Bed 1	31	28		
		Bed 2		28	28	
		KLD	28			
D	2.03	Bed	30			32
		KLD	28			28
D	2.04	Bed	30	29		
		KLD	28	28		
A+	2.05	Bed 1		29	32	
		Bed 2			28	
		Bed 3			28	28
		KLD		28		
A+	2.06	Bed 1	28	31		
		Bed 2	28			
		Bed 3	28	28		28
		KLD		28		
A	2.07	Bed 1		33	31	
		Bed 2	28	28		
		KLD			28	
A	2.08	Bed 1			33	32
		Bed 2	28			
		KLD			28	
E	2.09	Bed		33	32	
		KLD	28		28	
E	2.10	Bed		32	33	
		KLD	28		28	
D	2.11	Bed			36	36
		KLD			28	28
A	2.12	Bed 1			33	36
		Bed 2		28	28	
		KLD				28
B	2.13	Bed	33			36
		KLD		28		28
A	2.14	Bed 1	33			36
		Bed 2	28	28		
		KLD				34
D	3.01	Bed	33			36
		KLD				28
A	3.02	Bed 1	33	31		
		Bed 2		28	28	
		KLD	28			
D	3.03	Bed	32			35
		KLD	28			28
D	3.04	Bed	32	29		
		KLD	28	28		
A	3.05	Bed 1		29		

Type	Apartment	Room	North	East	South	West
		Bed 2			28	29
		KLD	28			
A	3.06	Bed 1	29	29		
		Bed 2		28		29
		KLD		28		
A	3.07	Bed 1		29	32	
		Bed 2	28	28		
		KLD			28	
A	3.08	Bed 1			32	33
		Bed 2	28			
		KLD			28	
E	3.09	Bed		28	28	
		KLD	28		28	
E	3.10	Bed		29	32	
		KLD	28		28	
D	3.11	Bed			33	36
		KLD			28	28
A	3.12	Bed 1			33	36
		Bed 2		28	28	
		KLD				28
B	3.13	Bed	33			36
		KLD		28		28
A	3.14	Bed 1	33			36
		Bed 2	29	28		
		KLD				28

Bathrooms are to have R_W24 glazing.

Table 7:Indicative Glazing

R_W Rating	Indicative Glazing
35-36	10.38 mm laminated glass with acoustic seals
33-34	8.38 mm laminated glass with acoustic seals
32	6.38 mm laminated glass with acoustic seals
31	6 mm Float with acoustic seals
29-30	5 mm Float with acoustic seals
28	4 mm Float with acoustic seals
24	4 mm Float without acoustic seals

Note this rating is for the whole window system including the window frames and generally requires acoustic seals.

This is indicative only and the glazier will have to determine how best to meet the R_W rating. This may depend on the style or type of window as well as the frames and fittings.

Table 8: Recommended Wall Ratings (R_W)

This applies to the perimeter walls, not the courtyard or carpark walls.

	North	East	South	West
All levels	42	38	45	45

All other walls should be R_W 38 minimum.

7. Recommendations

1 Glazing

All glazing to habitable rooms are to be as per Table 7.

2 Walls

The following or other system must be used that rates to the specified R_W.

External Walls R_W 45

1. FC sheet minimum 9 mm;
2. Sarking to be specified by others;
3. 90mm Studs at 600mm centres;;
4. R1.5 batts;
5. 16mm fire rated plasterboard.

Or

1. FC sheet minimum 16 mm;
2. Sarking to be specified by others;
3. 90mm Studs at 600mm centres;
4. R1.5 batts;
5. 13mm standard plasterboard.

External Walls R_W 42

1. FC sheet minimum 9 mm;
2. Sarking to be specified by others;
3. 90mm Studs at 600mm centres;

4. R1.5 batts;
5. 10mm plasterboard.

3 External Walls R_W 38

1. FC sheet minimum 6 mm, or sheet metal;
2. Sarking to be specified by others;
3. 90mm Studs at 600mm centres;
4. R1.5 batts;
5. 10mm plasterboard.

Roofs/Ceilings

The roofs to apartments 3.09 to 3.14 and 3.01 and 3.02 are to be rated to minimum R_W 41. All others are to be rated at R_W 38.

4 Roof / Ceilings R_W 41

Roof / ceiling to be constructed to CSR system 6402, or other system rated to R_W 41:

1. Steel roof
2. Bradford Anticon over battens;
3. R3.0 batts over ceiling;
4. 10mm standard plasterboard;
5. Sarking to be specified by others.

5 Roof / Ceilings R_W 38

Roof / ceiling to be constructed to CSR system 6402, or other system rated to R_W 41:

1. Steel roof
2. R2.0 batts over ceiling;
3. 10mm standard plasterboard;
4. Sarking to be specified by others.

6 Front Entry Door

All entry door systems including frames should be R_W 30. This may be met with a 35 mm solid core door with acoustic seals, but the manufacturer should confirm this.

7 Further Advice

We have calculated that criteria will be met with the glazing as per Table 7. above.

We have included the kitchen because the floor plan is open plan.

A glazing certificate (Form 16) should be obtained from the glazier demonstrating that the installed glazing meets the minimum weighted sound reduction index (R_W) requirements. The certificate should be retained for certification of the completed dwelling.

Certificates from the door manufacturer should also be supplied.

The external walls and the roof/ceiling should be confirmed by the certifier during construction or the builder can certify them ‘as built’.

Ventilation requirements to Australian Standards or BCA requirements may need to be fulfilled.

Note that this assessment has been performed to meet the minimum requirement by the appropriate guideline. If it is deemed that this is not appropriate and lower ambient noise is preferred, 3 dB should be added to the R_W ratings of the windows. Conversely if windows are difficult to operate for residents, a reduction may be appropriate to reduce weight of windows and doors and make them easier to operate.

We hope that this information proves satisfactory.

Yours Faithfully

Alan Subkey

Director

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1 - BUILDING PLAN : GROUND FLOOR
1:250

~~Monday, 16 July 2023~~

PLANS | 1279 : SK-2-03 (C) BUILDING PLAN : GROUND FLOOR
CONCEPT DESIGN

MULTIPLE HOUSING, LOT 862 BANYA QLD 4551

COAST2BAY HOUSING GROUP

Hollindale Mainwaring ARCHITECTURE

Paradigm 42

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1 - BUILDING PLAN : SECOND FLOOR
1:250

~~Monday, 16 July 2023~~

PLANS
MULTIPLE HOUSING, LOT 862 BANYA QLD 4551

1279 : SK-2-05 (C) BUILDING PLAN : SECOND FLOOR
CONCEPT DESIGN

COAST2BAY HOUSING GROUP

HMA Hollindale Mainwaring ARCHITECTURE

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By: Andrew McKnight
Date: 26 October 2023

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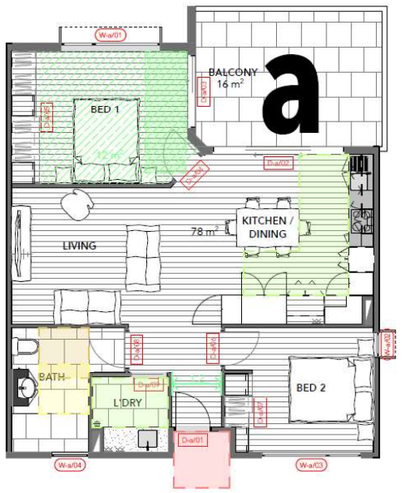
Paradigm 42

1 - BUILDING PLAN : FIRST FLOOR
1:250

Monday, 10 July 2023

PLANS | 1279 : SK-2-04 (C) BUILDING PLAN : FIRST FLOOR
MULTIPLE HOUSING, LOT 862 BANYA QLD 4551 | CONCEPT DESIGN

Hollindale Mainwaring ARCHITECTURE



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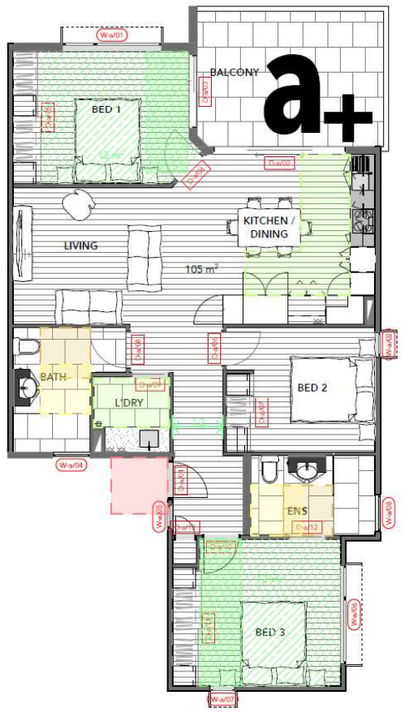
1 / - UNIT a : 2 BED (GOLD) 1:100



1 / - UNIT a+ : 3 BED (GOLD) 1:100

	TOTAL
Type a - 2 BED (LHA GOLD)	12
Type a+ - 3 BED (LHA GOLD)	2
Type b - 1 BED +MPR (LHA GOLD)	2
Type cos - COMMUNAL	1
Type d - 1 BED (LHA PLATINUM)	12
Type e - 1 BED (LHA GOLD)	6
	35

LHA Requirements

- MIN. ENTRY LANDING — Gold: 1350 x 1350; Platinum: 1500 x 1500
- MIN. TOILET CIRCULATION — Gold: 1200 x 1200; Platinum: 1200 x 1200
- MIN. SHOWER CLEARNACE — Gold: 1200 x 1200; Platinum: 1400 x 1600
- MIN. BENCH CIRCULATION CLEARANC — Gold: 1200 clearance to front of fixed benches; Platinum: 1550 clearance to front of fixed bench
- MIN. BEDROOM PATH OF TRAVEL — Gold: 1000 to min. one side of the bed; Platinum: 1000 to min. one side of the bed
- MIN. BEDROOM CIRCULATION — Platinum: 1540 X 2070 between bed and door
- MIN. BEDROOM FLOOR AREA — Gold: 10m2 min.
- MIN. LIVING ROOM CIRCULATION — Platinum: 2250 diameter clear

~~Monday, 16 July 2023~~

UNITS | 1279 : SK-4-02 (C) UNIT PLANS
MULTIPLE HOUSING, LOT 862 BANYA QLD 4551 | CONCEPT DESIGN

Hollindale Mainwaring ARCHITECTURE

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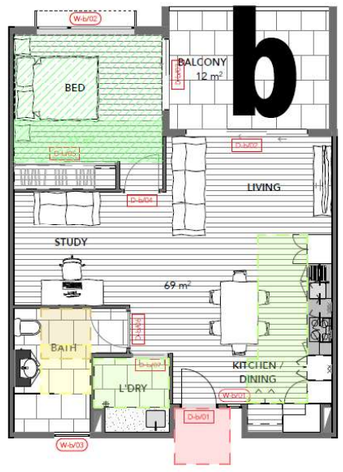
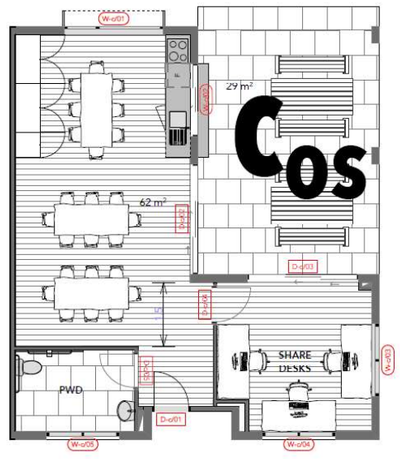


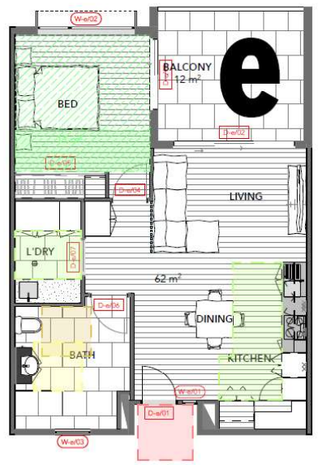
1 - UNIT b : 1 BED + MPR (GOLD) 1:100



1 - TYPE c : COMMUNAL 1:100

	TOTAL
Type a - 2 BED (LHA GOLD)	12
Type a+ - 3 BED (LHA GOLD)	2
Type b - 1 BED +MPR (LHA GOLD)	2
Type cos - COMMUNAL	1
Type d - 1 BED (LHA PLATINUM)	12
Type e - 1 BED (LHA GOLD)	6
	35

1 - UNIT d : 1 BED (PLATINUM) 1:100



1 - UNIT e : 1 BED (GOLD) 1:100

	TOTAL
Type a - 2 BED (LHA GOLD)	12
Type a+ - 3 BED (LHA GOLD)	2
Type b - 1 BED +MPR (LHA GOLD)	2
Type cos - COMMUNAL	1
Type d - 1 BED (LHA PLATINUM)	12
Type e - 1 BED (LHA GOLD)	6
	35

LHA Requirements

- MIN. ENTRY LANDING — Gold: 1350 x 1350; Platinum: 1500 x 1500
- MIN. TOILET CIRCULATION — Gold: 1200 x 1200; Platinum: 1200 x 1200
- MIN. SHOWER CLEARNACE — Gold: 1200 x 1200; Platinum: 1400 x 1600
- MIN. BENCH CIRCULATION CLEARANCE — Gold: 1200 clearance to front of fixed benches; Platinum: 1550 clearance to front of fixed benches
- MIN. BEDROOM PATH OF TRAVEL — Gold: 1000 to min. one side of the bed; Platinum: 1000 to min. one side of the bed
- MIN. BEDROOM CIRCULATION — Platinum: 1540 X 2070 between bed and door
- MIN. BEDROOM FLOOR AREA — Gold: 10m2 min.
- MIN. LIVING ROOM CIRCULATION — Platinum: 2250 diameter clear

~~Monday, 16 July 2023~~

UNITS | 1279 : SK-4-04 (C) UNIT PLANS
MULTIPLE HOUSING, LOT 862 BANYA QLD 4551 | CONCEPT DESIGN COAST2BAY HOUSING GROUP

HMA Hollindale Mainwaring ARCHITECTURE