Statement of Evidence of

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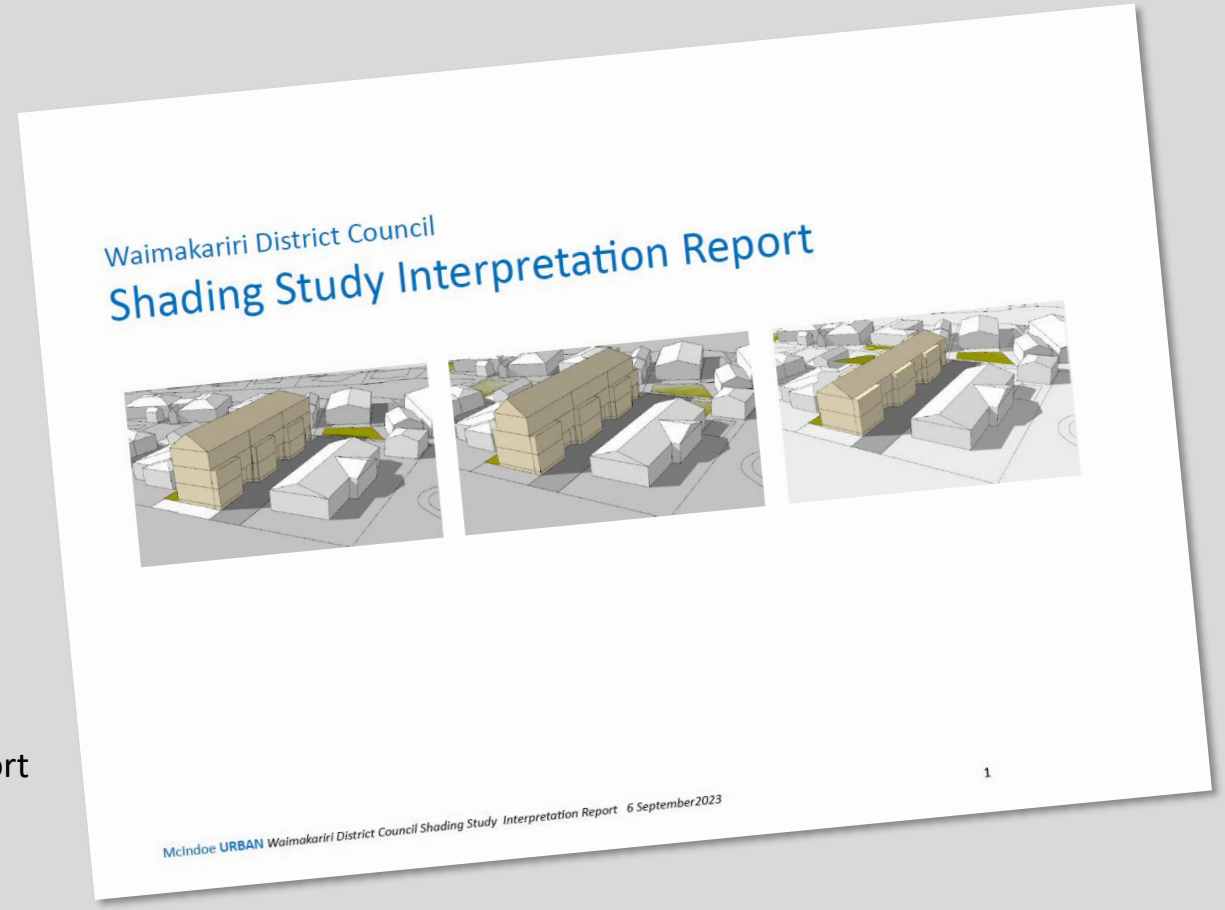
on behalf of
Waimakariri District Council

Urban Design

19 August 2024

Key images and tables extracted from evidence
including Attachment 1, 6 September Shading Study Interpretation Report



Selection of representative lots for testing

Development on street facing lot

5. Lot on NE-SW axis, street to north

5A

54 Koura Drive, Rangiora

Lot attributes

- 600 sqm (approx.)
- Contemporary subdivision.
- Compact proportions (approx. 1:2).
- Most open space SW facing at rear.
- Modest front setback.
- Local street.

5B

19 Monarch Boulevard, Kaiapoi

Lot attributes

- 700 sqm (approx.).
- Contemporary subdivision.
- Compact proportions (approx. 1:2).
- Generous N facing side yard.
- Extensive mid-block open space.
- Broad collector road.

5C

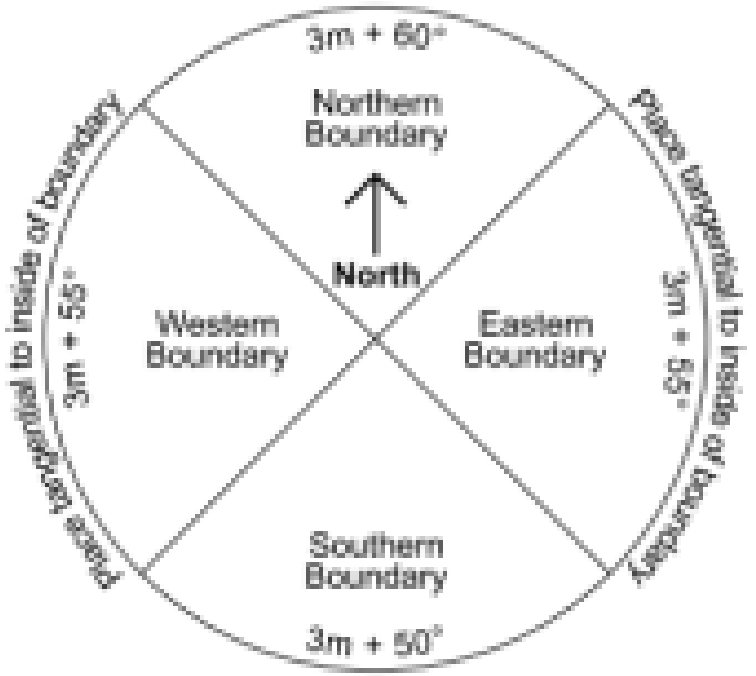
15 Johns Road, Rangiora

Lot attributes

- 600 sqm (approx.)
- Traditional subdivision.
- Elongated proportions (approx. 1:3).
- Most open space SE facing at rear.
- Broad collector Road.

Parameters for theoretical development on each site

	Maximum permitted height	HIRB
Scenario 1	11m + 1m for roof features	MDRS 4m+60°
Scenario 2	11m + 1m for roof features	Orientation specific, as per CHCH City Council (refer Figure 1)
Scenario 3	8m + 1m for roof features	Orientation specific, as per CHCH City Council (refer Figure 1)



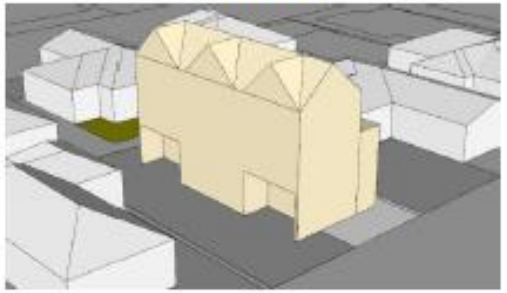
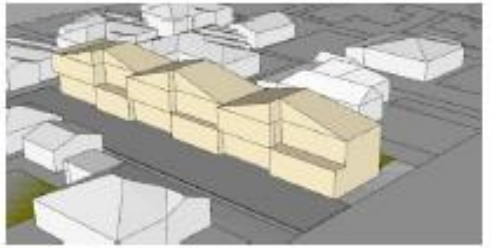
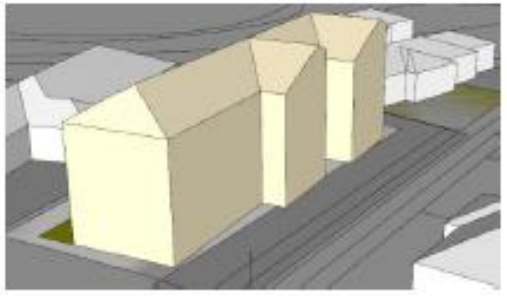
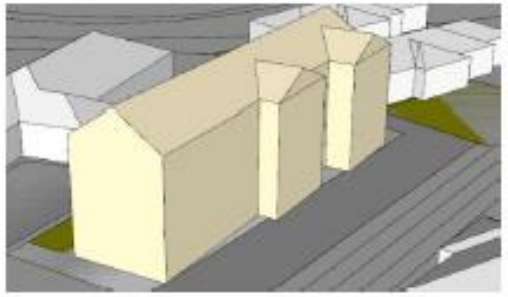
D Applicable to all buildings:

- in the Medium Density **Residential Zone (MRZ) and High Density Residential Zone (HRZ)**

Development testing

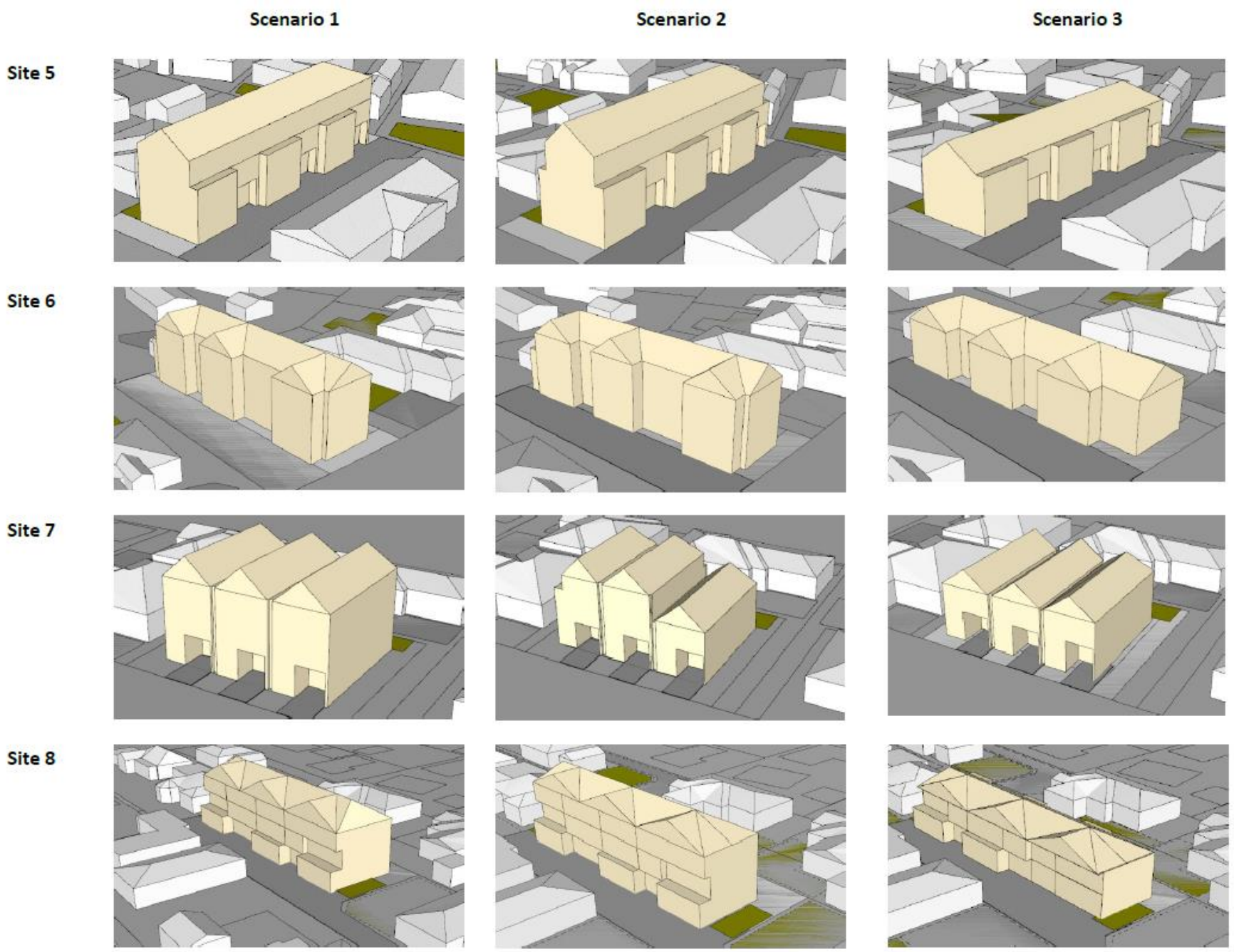
(Attachment 1, p12)

Table 1 Representative comparative views of the models for each scenario

	Scenario 1	Scenario 2	Scenario 3
Site 1			
Site 2			
Site 3			
Site 4			

Development testing

(Attachment 1, p13)

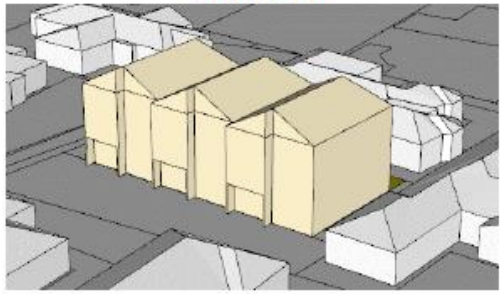


Development testing

(Attachment 1, p14)

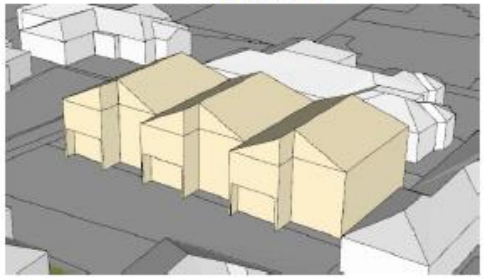
Site 9

Scenario 1



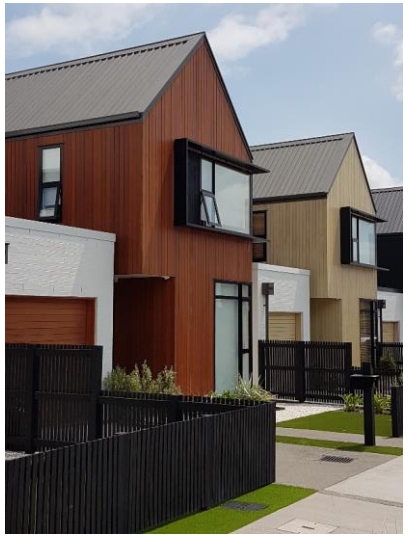
Scenario 2

Scenario 3



The architecture of typical multi-unit development

(Attachment 1, pp14,15)



Development potential

(Attachment 1, pp16,17)

Table 2 Floor area of development achieved

		Scenario 1: MDRS height 11m, HIRB 4m+60°		Scenario 2 height 11m, HIRB orientation-specific		Scenario 3 height 8m, HIRB orientation-specific	
Site	Site area m²	Total GFA m²	Average unit m²	Total GFA m²	Average unit m²	Total GFA m²	Average unit m²
1	309	282	94	270	90	187	62
2	1013	1283	428	1076	359	718	239
3	528	628	209	516	172	389	130
4	750	980	327	847	282	606	202
5	606	713	238	699	233	479	160
6	671	835	278	758	253	544	181
7	449	656	219	556	185	435	145
8	998	1178	393	936	312	694	231
9	870	979	326	873	291	689	230
	Average unit size[1]		284		247		182

[1] This calculation of average unit size excludes the smallest and largest sites (sites 1 and 2 respectively).

McIndoe URBAN *Waimakariri District Council Shading Study Interpretation Report 6 September2023*

TABLE 3 Typical unit sizes for comparison

	2 bed	3 bed	4 bed	*Notes*
2 storey without garage	82 m²	107 m²	130 m²	*MHUD minimum GFA*[2]
2 storey with built-in garage	120-130 m²	135-150 m²	150-175m²	*Estimate*
3 storey without garage	n/a	n/a	145-170m²	*Estimate*
3 storey with built-in garage	n/a	150-160 m²	165-190 m²	*Estimate*

Sample shading study

(Attachment 1, p19)

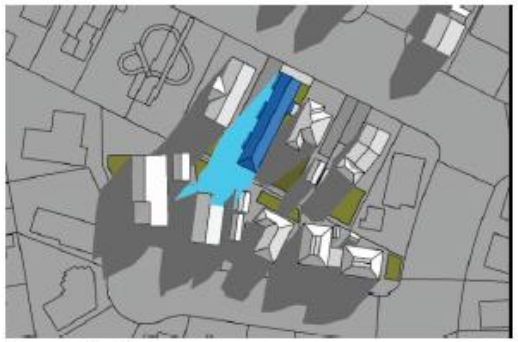
In order to inform an assessment of the implication on shading of the three scenarios for height and HIRB, one of the typical sites has been selected as a test. This is site 5, which is considered to be representative of the group of nine. It is close to the typical orientation of the urban grid that is most common in Waimakariri's townships, and with the street to the north of the site.

Conventional shading studies have been produced for the summer and winter solstices, and the spring equinox. The rationale for selection of the sample times is recorded in Table 4. In undertaking these studies, the individual shading studies for each scenario were produced and then these were overlaid and a dashed line shows the maximum extent of shading. The example below is for 9.30am on June 21.

Site 5: lot on NE-SW axis, street to north

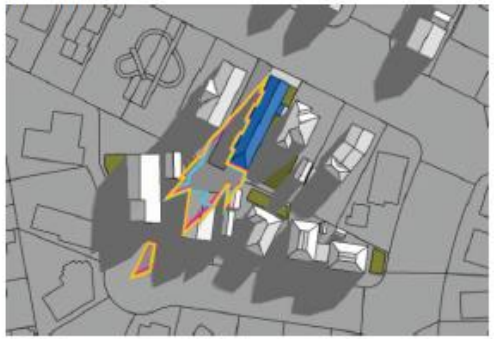
Scenario 1

Scenario 2



Scenario 3

Base shading



Scenarios overlaid

Logic for selecting shading times

(Attachment 1, p20)

Table 4 Selection of times for shading effect check on a representative lot

	Sunrise		Meridian		Sunset
21 June (NZST)	**7.52am**		**12.25pm**		**4.59pm**
shading study at	9.30am	Δ = 3hr	12.30pm	Δ = 3hr	3.30pm
	1.5hr after sunrise				1.5hr before sunset
21 Sept. (NZST)	**6.16am**		**12.17pm**		**6.18pm**
shading study at	8.30am	Δ = 4hr	12.30pm	Δ = 4hr	4.30pm
	2.25hr after sunrise				1.75hr before sunset
21 Dec.(Daylight saving)	**5.44am**		**1.21pm**		**8.59pm**
shading study at	8.30am	Δ = 5hr	1.30pm	Δ = 5hr	6.30pm
	2.75hr after sunrise				2.5hr before sunset
Logic of time selection for shading	Early/mid morning - Sun is moderately low		Midday - Sun is at or close to its highest in the sky and shadows will be shortest		Late afternoon / early evening - Sun is moderately low

The output of shading studies as undertaken using SketchUp software for the three scenarios of development on Site 5 is tabulated below:

- Comparative shading study outcomes are shown in Table 5.
- Tables 6.1-6.3 show the base shading diagrams used to prepare Table 5.
- Observations on shading effects relating to different development scenarios on the selected representative lot are recorded in Table 7.

Sample shading study

(Attachment 1, p22)

Table 6.1 Winter solstice shading outcomes for Site 5 – June 21

Key
Scenario 1 Orange: MDRS (11+1m, 4m+60°)
Scenario 2 Pink: (11+1m, ChCh City HIRB)
Scenario 3 Blue: (8+1m, ChCh City HIRB)

Scenario 1 9:00am

Scenario 1 12:30pm

Scenario 1 3:30pm

Scenario 2 CCDP – 11m - 9:00am

Scenario 2 12:30pm

Scenario 2 3:30pm

Scenario 3 9:00am

Scenario 3 12:30pm

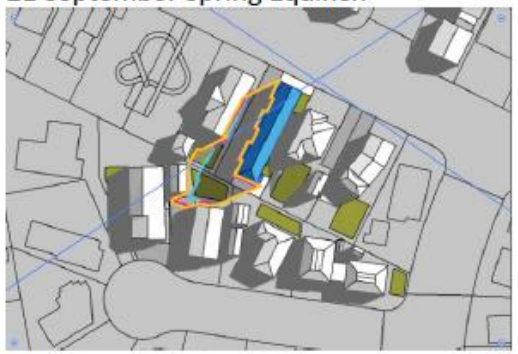
Scenario 3 3:30pm

Sample shading study

(Attachment 1, p21)

Table 5 Comparative shading study outcomes for Site 5

Key
Scenario 1 Orange line: MDRS (11+1m, 4m+60°)
Scenario 2 Pink line: (11+1m, ChCh City HIRB)
Scenario 3 Blue dashed line: (8+1m, ChCh City HIRB)

June 21 Winter Solstice	21 September Spring Equinox	21 December Summer Solstice
 9.00am	 8.30am	 8.30am
 12.30pm	 12.30pm	 12.30pm
 3.30pm	 4.30pm	 6.30pm