BEFORE A PANEL OF INDEPENDENT HEARINGS COMMISSIONERS
AT WAIMAKARIRI DISTRICT COUNCIL

UNDER the Resource Management Act 1991

IN THE MATTER of Variation 1 to the Waimakariri District Plan

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STATEMENT OF EVIDENCE OF GRAEME ROBERT MCINDOE ON BEHALF OF WAIMAKARIRI DISTRICT COUNCIL

URBAN DESIGN

19 August 2024

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1. INTRODUCTION

1.1 My full name is Graeme Robert McIndoe. I am a registered architect and qualified urban designer with 42 years professional experience in architecture and urban design, and am founding director of Wellington-based specialist urban design consultancy McIndoe Urban Ltd.

1.2 I am a Fellow of the New Zealand Institute of Architects, and in 1985-86 gained a Diploma (with distinction) and a Master of Arts in Urban Design as a Commonwealth Scholar at the Joint Centre for Urban Design in Oxford, England. I have a Bachelor of Architecture with First Class Honours (1982), and a Bachelor of Building Science (1980), both from Victoria University of Wellington. From 1992-2009 I also held a permanent half-time position at the Victoria University of Wellington School of Architecture. I was a Senior Lecturer in urban design history, theory and methods, and architectural design. I have the following experience that is particularly relevant to this project.

Selected relevant experience

1.3 Multi-unit housing design and site planning:

(a) 40+ years in architectural and urban design practice including design of residential masterplans on a site, neighbourhood and city quarter scale.

(b) Author of residential design guides for Wellington and Porirua City Councils.

(c) Membership/chairmanship of multiple design review panels including the Auckland Council's Eke Panuku Technical Advisory Group (TAG) and the Nelson Tasman urban design panel regularly reviewing and assessing multi-unit residential development.

(d) Professional design review for Wellington, Palmerston North and Nelson City Councils on housing design projects for over 30 years.

1.4 Shading studies and analysis:

(a) Porirua City Council District Plan shading study advice and research on aspects of a well-functioning environment (including sunlight).

(b) Current and recent shading studies I have carried out for major projects include shading in Auckland's Wynyard and Viaduct Harbour Precincts/PC78 for VHHL; proposed development on the Downtown Carpark site for Precinct Properties; and Wynyard Quarter's Central Precinct shading studies for Eke Panuku; New Dunedin Hospital for the Ministry of Health; and for Victoria University of Wellington's Te Huanui development at 320 The Terrace.

Code of Conduct

1.5 I confirm that I have read the Expert Witness Code of Conduct set out in the Environment Court's Practice Note 2023. I have complied with the Code of Conduct in preparing this evidence and agree to comply with it while giving evidence. Except where I state that I am relying on the evidence of another person, this written evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in this evidence.

Background

1.6 I was commissioned by Waimakariri District Council (WDC) to describe realistic theoretical building forms on representative typical urban sites within the Waimakariri region. This work was to provide WDC with three dimensional models for the nine representative sites to utilise in their study of the energy and amenity implications of shading effects. As a secondary control, one of the nine sites has been selected for a more conventional shading study to identify the relative shading effects experienced with the three scenarios. The full study is described in detail in Attachment 1 which should be read as part of this evidence.

Scope of Evidence

2. My evidence will address the following:

(a) Findings

(b) Overview of methodology

(c) Selection of representative lots for testing

(d) Parameters for theoretical development on each chosen lot

(e) Development testing

(f) Development potential

(g) Sample shading study

(h) Observations on scenarios

(i) Conclusions

3. FINDINGS

3.1 These detailed studies of development under three height and HIRB envelope scenarios on each of nine typical lots demonstrate[1]:

(a) Variation in height and HIRB provides significant shading reduction while at the same time retaining generous development potential. It also significantly reduces adverse visual effects including potential visual dominance and the compromise to local neighbourhood character.

Envelope and shading effects

(b) Reducing permitted maximum height from 11m to 8m provides significant benefit in reducing shading effects. There is a reduction in the length of shadow when dropping from three to two storey development of just under one third. This reduction will have a significant beneficial effect on neighbouring sites.

(c) Variation in HIRB provides some relatively minor and localised benefit in terms of reducing shading effects on immediate existing neighbours which are currently mainly low intensity single storey detached dwellings with low site coverage. The benefits of a more restrictive

[1] This text is extracted from Attachment 1, pages 3-4: 'Summary findings'

HIRB are greater as development becomes more intensive and site coverage greater, and when neighbouring private outdoor living spaces are on the site boundary.

Development potential

(d) Eight of the nine typical sites provide significant development potential and allows three units under all envelope scenarios. This is with the exception of the smallest lot, Site 1. Site 1, irrespective of permitted height, at 309m² does not allow for three realistically sized and configured units with on-site carparking.

(e) When buildings are three storeys high (scenarios 1 and 2), the Gross Floor Area (GFA) possible is significantly greater than required to meet the MDRS three-unit aspiration. The range of unit sizes and average unit sizes approaches twice what is needed to achieve typical development.

(f) When height is restricted to two storeys (Scenario 3), three units each with a floor area which correlates with what would typically be expected remain possible. The sites allow floor areas suitable for a wide range of typical unit types and sizes.

4. OVERVIEW OF METHODOLOGY

4.1 In summary:

(a) Nine representative lots were selected for testing.[2]

(b) A three-dimensional model of the theoretical development of three units on each site under each of three scenarios for varying height and HIRB envelopes was prepared and supplied to WDC for use in their analysis.

[2] The task was to describe a theoretical development on the nine representative typical lots, not a plan that any redevelopment should or will occur on any of them.

(c) The Gross Floor Area (GFA) of development that is possible on each of the nine sites designed in accordance with the identified parameters was measured and compared with typical unit types and sizes.

(d) A conventional shading study on a sample representative lot was undertaken as a cross-check on the implications of the development envelope scenarios.

(e) The study concluded with urban and architectural design interpretation and observations on the outcomes.

4.2 The methodology and the findings at each stage is described in full in Attachment 1 and to avoid undue repetition is therefore covered in this statement at an overview level. Attachment 1 should be referred to for detailed description and explanation. Extracts from that including tables and illustrations will be presented to the hearing.

5. SELECTION OF REPRESENTATIVE LOTS FOR TESTING

5.1 The following criteria for case study site selection were used:

(a) The site must represent a typical urban condition;

(b) The site size represents a typical urban lot;

(c) Adjoining lots are residential and of the same type and general size as the case study lot; and

(d) There is an existing dwelling on the lot and each adjoining lot.

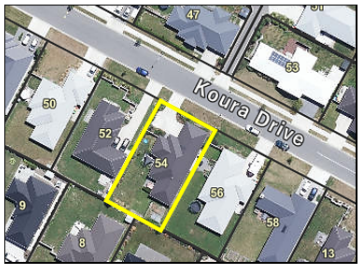
5.2 Aerial photographs and cadastral plans of Rangiora, Pegasus, Kaiapoi and Woodend were examined to find sample lots that best met the criteria. Both street fronting and rear lots were examined and nine representative, typical lot orientations were found. These represent the typical orientations of lots throughout the urban areas in the WDC area with street to the north, south and either east or west.

5.3 The initial selection of three potential representative lots for each of the nine orientations was tabulated and the attributes of each identified. Our initial selection of 27 sites including the record of attributes of each was reviewed by WDC and we selected the nine for study. An example describing the attributes of each sample lot and selection of Site 5 is described below. This is Figure 3

from Attachment 1: *'Example of site options, assessment and selection rationale. Lot 5C was selected.'*[3]

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.

5.4 The height and roof form of dwellings around each selected lot was viewed in order to construct a three-dimensional Sketchup model of the existing houses around the selected site. The driveway and private outdoor living area of the adjoining lots were also identified on plan in order to assist understanding of the amenity implications of shading variation.

6. PARAMETERS FOR THEORETICAL DEVELOPMENT ON EACH LOT

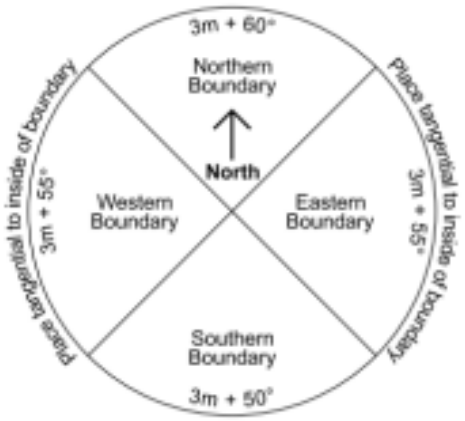
6.1 Three development envelope scenarios have been tested with maximum heights, and height in relation to boundary (HIRB) as below.[4]

	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)

[3] Refer to Attachment 1, page 7

[4] Refer to Attachment 1, page 4.

6.2 Figure 1 in Attachment 1 'Orientation-specific HIRB as per Christchurch City Council' is below:



D Applicable to all buildings:
- in the Medium Density **Residential Zone (MRZ) and High Density Residential Zone (HRZ)**

6.3 Development designed for each scenario provides three units to the theoretical maximum possible under the maximum permitted height and HIRB with application of otherwise sensible and realistic approaches to building form.

(a) While not required by the MDRS, on-site parking and in this case a single built-in garage is provided for each unit. This recognises that under current conditions in Waimakariri on-site parking is likely to be provided,

(b) A floor-to-floor height of 2.7 m is used, based on precedent projects built in Waimakariri. For the sake of determining realistic building envelopes, the ground floor is assumed to be 500mm above ground.

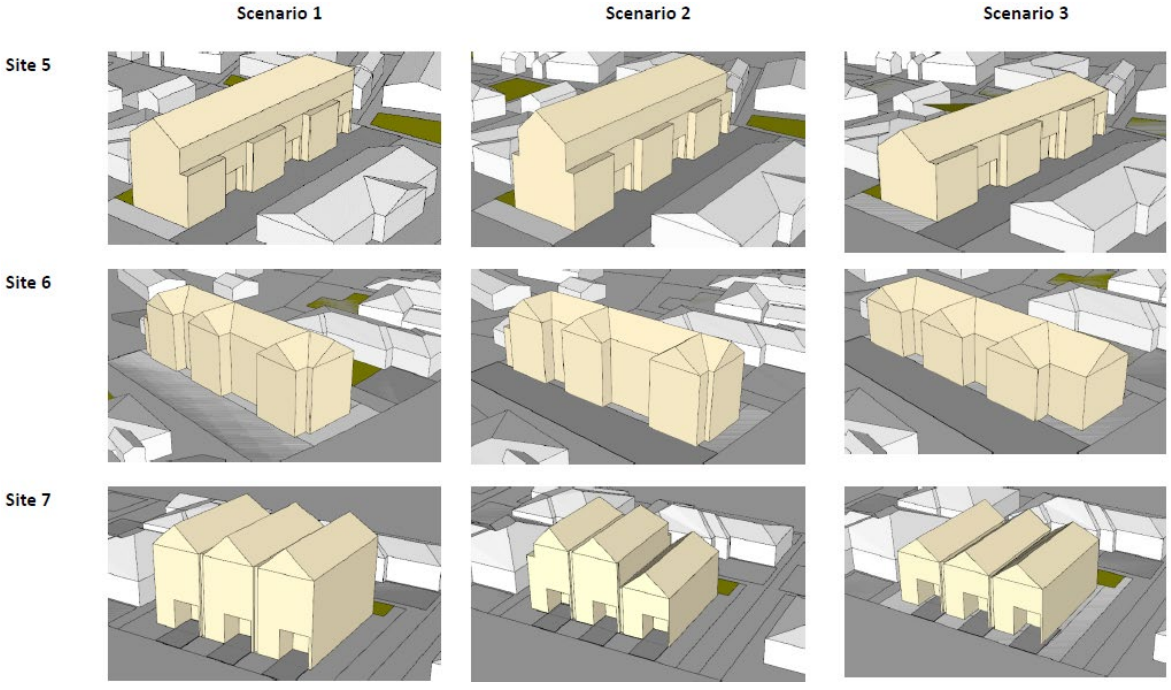
(c) The MDRS 4m by 4m outlook space, and minimum 3m deep and 20m² private outdoor space were also integrated.

(d) The MDRS maximum site coverage of 50% is applied. However, due to providing for vehicle access, boundary setbacks in relation to the HIRB and private open space, typical maximum coverages of approximately only 40% were achievable. 50% coverage was achieved only on Site 7 with that being possible only because access to the garages was directly from the street.

6.4 The site planning and modelling of building form of the three scenarios on each of the nine lots also takes into account drivers such as provision of public fronts and private backs, orientation to the sun, provision for garaging on site and optimal placement of private outdoor living areas. This is sufficient to ensure the forms and planning are realistic illustrations of what might be attempted. The interiors of the units were not planned although the location of likely interior spaces was considered.

7. DEVELOPMENT TESTING

7.1 A three-dimensional model of three units on each site for each of three scenarios for development envelopes was designed and described using SketchUp software. This uses the realistic parameters for theoretical development on the lot as identified above. The 27 representative views of building forms are recorded in Table 1 within Attachment 1.[5] These show one view of the model for each of the scenarios on each site. The image below is an extract from part of Table 1.



Building form, articulation and level of design resolution

7.2 Development is maximised in relation to the envelope, except that complex angles are avoided, and the forms are regularised. These forms are indicative

[5] Table 1 is on pages 12-14 of Attachment 1

and theoretical explorations, not resolved architecture. However, given the bulkiness of the primary forms, some additive elements such as two storey bays on the three storey units and some subtractive elements have been included. This articulation allows expression of individual units and breaks down the scale of large building forms. In addition, some solid balcony balustrades are drawn to test that they are possible within the height/HIRB envelope.

7.3 While these theoretical examples were modelled to allow for realistic site planning and the characteristics of real development on each site, they do not show architecture. Precedent images from Hobsonville Point in Auckland are included in Attachment 1 to show how the appearance of the basic envelopes above might be developed with materials, colour and secondary detail to become architecture.[6]

8. DEVELOPMENT POTENTIAL

8.1 The outcome of measuring development potential is that when the development is to three storeys (Scenarios 1 and 2), terraced units much larger than would ever be built in this situation are possible on eight of the nine sites. This also shows that when the height is limited to two storeys (Scenario 3) that realistically sized units are achieved.

8.2 The floor area of development achieved for each scenario on each of the nine sites was measured and tabulated[7]. This found the average gross floor area possible for each of the three units possible on these nine sites was 284m² for Scenario 1, 247m² for Scenario 2 and 182m² for Scenario 3.

8.3 To determine whether this was sufficient I examined other projects and referred to MHUD guidance and for comparison tabulated the areas of typical unit sizes. These areas are recorded in Table 3 within Attachment 1. This indicates the floor areas needed for different types of townhouse. For example, a two-storey 3 bedroom terraced unit with a built in garage is likely to be approximately 135-150m². The same unit type at three storeys high would be likely to be 150-160m².

[6] Refer to Attachment 1, pages 14 and 15.

[7] Refer Attachment 1, Table 2 'Floor area of development achieved'

8.4 Except for the smallest lot (the 309m² Site 1) three units can readily be achieved on each lot, irrespective of building height.

8.5 When the maximum permitted height is 11m the GFA for each unit was excessively and unrealistically large on all but the smallest of the lots tested.[8]

(a) Excluding smallest and largest (i.e. sites 1 and 2) and assuming the remaining seven sites represent typical availability, then for Scenario 1 the range of sizes is 209m²-393m² and the average unit size is 284m².

(b) For Scenario 2 the range of sizes 172m²-312m² and the average unit size is 247m².

8.6 This demonstrates that there is more development capacity on these lots than required to meet the MDRS three-unit aspiration, with average unit sizes when 3-storey development is enabled approaching twice what is needed to achieve typical development.

8.7 For Scenario 3 which has a maximum permitted height of 8m, the GFA for each unit is realistic on eight of the nine lots. Excluding the smallest and largest (i.e. sites 1 and 2) and assuming the remaining seven sites represent typical availability, the range of unit sizes is 130m²-231m² and the average unit size is 182m². With reference to Table 3 in Attachment 1, this allows floor areas suitable for a wide range of typical unit types and sizes.

9. SAMPLE SHADING STUDY

9.1 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 having 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, was considered to be suitably representative of the group of nine.

9.2 The shading effect check was undertaken at early/mid-morning, midday and late afternoon/early evening at the winter and summer solstices and the

[8] Refer to Attachment 1, Table 3

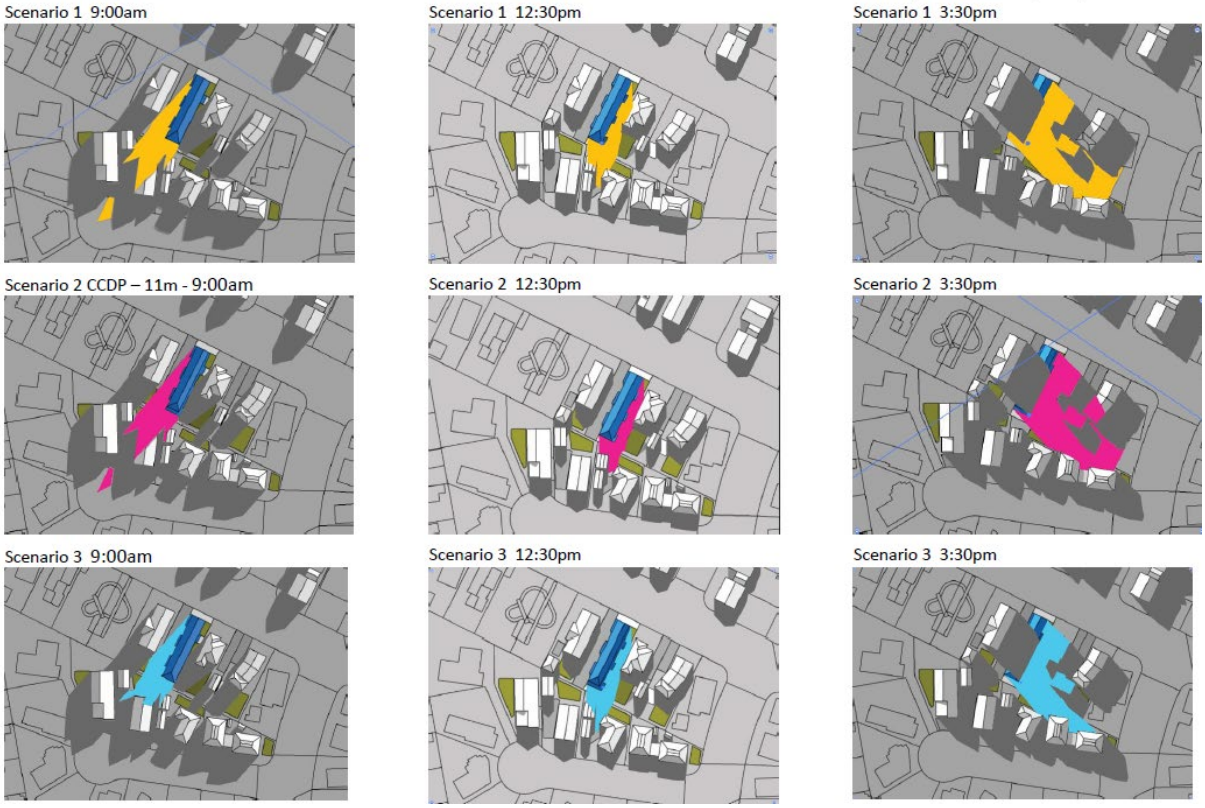
spring equinox. The time and logic for their selection are described in Table 4 in Attachment 1.[9]

9.3 The shading studies were undertaken using Sketchup software for the three scenarios of development on Site 5. 27 separate shading diagrams for the chosen site were prepared and these overlaid to show a comparative assessment of shading effects. The shading study outcomes are shown in Tables 5 and 6.1-6.3 in Attachment 1[10]. An extract from Table 6.1 is shown below.

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)

Placeholder images: backgrounds to be adjusted for consistency



[9] Refer Attachment 1, page 20 Table 4: 'Selection of times for shading effect check on a representative lot'

[10] Refer to Attachment 1, pages 21-24.

10. OBSERVATIONS ON SCENARIOS

10.1 Observations on shading effects relating to different development scenarios are as follows[11]:

Variation of height

10.2 Variation in height from three down to two storeys provides significant benefit in reducing shading effects. Relative to the three-storey scenarios, two-storey development casts significantly less shade in mid-winter, and when the sun is low in the morning and afternoon at all times of year.

Variation in HIRB

10.3 Comparison between scenarios 1 and 2 both of which are three-storey/11m show that variation in HIRB provides some, but relatively minor and localised benefit in terms of reducing shading effects.

10.4 The reduction of shading effect from the two-storey Scenario 3 relative to the three storey Scenario 1 that is due solely to variation in HIRB is imperceptible. The significant reduction in shading is driven primarily by reduction of maximum height from three to two storeys.

Development capacity

10.5 Site 1 (with an area of 309m²) is too small to allow for realistically allow for three units at either two or three storeys.

10.6 Irrespective of height being two or three storeys, Sites 2-9 allow for realistic development to three and four bedrooms, variously with and without a garage.

10.7 The unit sizes possible with the three-storey scenarios 1 and 2 are significantly in excess of what is required for typical and realistic units of three or four bedrooms.

[11] Refer to Attachment 1, pages 25-27. Table 7: 'Comparison of shading and development capacity effects on a typical lot.'

10.8 The two-storey Scenario 3 allows for realistic potential unit sizes on each site.

Architectural and urban design factors

10.9 While recognising that three storey form is permitted by the MDRS, three-storey multi-unit development is unduly visually dominant and contrasts radically with the single storey existing residential environment. In comparison, two-storey form is not visually dominant and can sit comfortably in that environment.

11. CONCLUSION

11.1 In summary, this study finds that:

(a) On the typical representative lots, these three-storey envelopes provide much greater GFA on site than is necessary to develop three terraced residential units. Building to these envelopes will also appear visually dominant in townships characterised by existing one or two storey development.

(b) The Scenario 3 envelope with a height of 8+1m and HIRB responsive to orientation of the boundary has significantly reduced shading effects. It also maintains potential for three generously sized dwellings on each site and eliminates undue visual dominance effects.

Graeme Robert McIndoe
19 August 2024

Attachments

1. Waimakariri District Council Shading Study Interpretation Report (6 September 2023)