BEFORE INDEPENDENT HEARING COMMISSIONERS
IN CHRISTCHURCH

TE MAHERE Ā-ROHE I TŪTOHUA MŌ TE TĀONE O ŌTAUTAHI

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of the hearing of submissions on Plan Change 14 (Housing and Business Choice) to the Christchurch District Plan

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STATEMENT OF PRIMARY EVIDENCE OF DAVID ANTHONY HATTAM ON BEHALF OF CHRISTCHURCH CITY COUNCIL

URBAN DESIGN: RESIDENTIAL ZONES

Dated: 11 August 2023

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EXECUTIVE SUMMARY

1. My full name is **David Anthony Hattam**. I am employed as a Senior Urban Designer at Christchurch City Council, a position I have held since March 2017.

2. I have prepared this statement of evidence on behalf of the Christchurch City Council (the **Council**) in respect of matters arising from the submissions and further submissions on Plan Change 14 to the Christchurch District Plan (the **District Plan**; **PC14**).

3. The purpose of my evidence is to evaluate the urban design issues related to residential zones in PC14 and to consider them in the light of submissions received. In doing so, I consider that good urban design is a fundamental component of a well-functioning environment and is expected by the District Plan.

4. My evidence relates to the form, function and appearance of medium and high density development. It considers appropriate residential development forms for scenarios including medium and high density, focussing in particular on developments of more than 3 units. My evidence also relates to technical matters supporting the Sunlight Access Qualifying Matter.

5. Along with the proposed density as generally outlined in the Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021 (**Enabling Housing Act**) and National Policy Statement on Urban Development 2020 (**NPS-UD**), the form, function and appearance of development contributes to the planned urban character.

6. The Enabling Housing Act and NPS-UD have changed the framework for consideration of design outcomes, but maintaining a level of quality is not inconsistent with this. The Council has undertaken a study of the quality of urban outcomes achieved under the current zoning. The study has shown that the high levels of quality expected by the District Plan are currently not always being met, but that a basic satisfactory standard is achieved more consistently, particularly in the operative Residential Medium Density (**RMD**) zone. My conclusions are informed by this study (in which I was involved) which shows the efficacy of existing planning provisions in Christchurch.

7. PC14 proposes an enabling response to the Enabling Housing Act and NPS-UD in residential zones. This includes through prescribing development envelopes made up from rules such as height limits and recession planes.

As the zone names suggest, the rules allow for more development in the High Density Residential Zone (**HRZ**) than the Medium Density Residential Zone (**MRZ**).

8. The difference between the zones is not the level of quality expected, but that there is a higher level of development in some areas than others. From a design perspective there is no inherent conflict between expecting a good level of quality in development and achieving a high density of building.

9. PC14 includes a Sunlight Access Qualifying Matter to apply to all sites in the MRZ and HRZ. This would implement more restrictive recession planes than those from the Enabling Housing Act. The qualifying matter reflects that recession planes in the Medium Density Residential Standards (**MDRS**) would have a more significant impact on solar access in Christchurch than in other, more northern, tier 1 cities, because the climate is colder and because shallower winter sun angles mean buildings are more likely to be shaded.

10. In the Council's approach, consideration has been given to the overall form of development and an appropriate balance has been struck, in my view, between managing urban design-related effects and enabling a range of developments to occur.

11. In the MRZ, modelling carried out by the Council estimates that there will be a reduction in the theoretical capacity of a typical development site of around 5% due to this qualifying matter, but that there would be significant reductions in winter shading of buildings.

12. In the HRZ, the reduction in recession planes is accompanied by greater leniency elsewhere in the envelope. In the HRZ, in most circumstances, the PC14 envelope would allow a similar level of density to that required under the Enabling Housing Act.

13. The envelope would also allow for less complex buildings that may be easier to build than those that would arise under the Enabling Housing Act recession planes. For example, it would not require buildings to be stepped back with height to stay under the plane.

14. PC14 also allows for some minor exemptions compared to the MDRS where there are wider benefits.

15. I have referred to my previous technical reports in writing this evidence. These were notified with the Section 32 report and consist of a technical

report for the residential zone[1] (referred to as **Residential Technical Report***)* and a technical report for the Sunlight Access Qualifying Matter[2] (referred to as **Sunlight Access QM Report**).

16. Except where noted, my opinions are as expressed in the original reports. I have generally not repeated details from the original reports but have summarised key points as relevant and focussed on responding to submissions.

17. In preparing this evidence I have carried out additional analysis in response to submissions, in addition to my original reports listed above. This analysis consists of:

    (a) A study of the impact of the notified recession planes on the development capacity of narrow sites (which is annexed as **Appendix A**);

    (b) Additional modelling of capacity in the HRZ under PC14 in comparison to a development envelope based on the MDRS (**Appendix B**); and

    (c) Modelling of sunlight access for buildings in the HRZ (**Appendix C**).

18. In addition, I analysed various case studies in conjunction with preparing the Residential Technical Report. Those case studies were not appended to the Section 32 report but are annexed to my evidence as **Appendix D**.

19. I have recommended some changes to PC14 in response to submissions. These are mostly focussed on the more detailed implementation of PC14.

20. I have considered submissions in relation to the appropriateness of the Sunlight Access Qualifying Matter, including modelling various scenarios to test the impact of potential variations in the rule on capacity and form. My opinion remains that the proposed recession planes are the most appropriate given the impacts on capacity and adjacent sites.

21. I have made some recommendations for changes to height limits in response to submissions, based on a revised formula for calculating height. I have also agreed with some submitters that an extra two storeys in the highest density areas in the central city would be appropriate.

[1] Technical report – Urban Design: Medium and High Density Residential Zones; Appendix C to Part 3 of the Section 32 report.
[2] Technical report – Sunlight Access; Appendix C5 to Part 2 of the Section 32 report.

22. More detailed consideration of these matters is set out below.

QUALIFICATIONS AND EXPERIENCE

23. I have worked in the field of urban design for fifteen years. This includes six years as a Senior Urban Designer at the Council and five years working for the Moreton Bay Regional Council (in Queensland) as a strategic planner and urban designer. Prior to this I was a policy and strategy planner at Selwyn District Council, where I managed and undertook the urban design work program, including writing plan changes and managing and contributing to a series of urban design guides.

24. Since joining the Council, I have provided urban design assessment for over 300 multi-unit residential resource consent applications in Christchurch. I have also overseen and participated in a program to review the quality of recent residential development in Christchurch, reviewing around 60 developments in depth.

25. I have been involved in the analysis and drafting of PC14 since the start of the process, including the drafting of technical reports as part of the Section 32 analysis.

26. I hold the qualification of Master of Urban and Regional Planning from Heriot Watt University in Scotland. I also hold the qualification of Bachelor of Arts in Geography, studying at the Centre for Urban and Regional Development Studies at the University of Newcastle upon Tyne.

27. I am a full member of the Royal Town Planning Institute.

28. I am authorised to provide this evidence on behalf of the Council.

CODE OF CONDUCT

29. While this is a Council hearing, I have read the Code of Conduct for Expert Witnesses (contained in the 2023 Practice Note) and agree to comply with it. Except where I state I rely on the evidence of another person, I confirm that the issues addressed in this statement of evidence are within my area of expertise, and I have not omitted to consider material facts known to me that might alter or detract from my expressed opinions.

30. I am an employee of the Council but have discussed with my employer the obligation on an expert witness, in accordance with the Code of Conduct, to give evidence impartially to assist the Panel.

SCOPE OF EVIDENCE

31. My statement of evidence addresses the following matters. These arise from submissions and I have attempted to structure my evidence in a logical way, grouping topics by theme and responding to points raised in more detail, as follows:

    (a) An introduction to my evidence and approach;

    (b) Consideration of submissions on anticipated outcomes;

    (c) Consideration of submissions on the Sunlight Access Qualifying Matter;

    (d) Consideration of submissions related to Heights and Building Envelopes;

    (e) Comments on submissions relating to other Rules and Assessment Matters; and

    (f) Consideration of Definitions.

32. I address each of these points in my evidence below.

INTRODUCTION

33. My evidence is about the form, function and appearance of medium and high-density development. In it I express views about what I consider to be appropriate residential development forms for scenarios including medium and high density, focussing in particular on developments of more than 3 units.

34. Along with the proposed density as generally outlined in the Enabling Housing Act and NPS-UD, the form, function and appearance of development contributes to the planned urban character.

35. The MDRS legislation and NPS-UD would change the framework for consideration of design outcomes – and the new framework is clearly enabling, especially in terms of heights and densities – but from an urban design perspective, maintaining a level of quality is not inconsistent with achieving increased building heights and densities.

36. PC14 proposes an enabling response to the Enabling Housing Act in residential zones. This includes through prescribing development envelopes

via rules such as height limits and recession planes. These envelopes are discussed in detail below.

37. In the Council's approach, consideration has been given to the overall form of development and an appropriate balance has been struck, in my view, between managing effects and enabling a range of developments to occur.

38. The purpose of this report is to evaluate the urban design issues related to PC14 and to consider them in the light of submissions received.

39. I have not been asked to provide comments on the location of boundaries for the various zones and precincts. Instead my evidence is focussed on the management of heights within the zones.

40. I have considered the points made by submitters in and have recommended some changes in response to them. These are mostly focussed on the more detailed implementation of PC14, aiming to fine tune the proposals. Whilst some submitters have disagreed with the thrust of the plan change and sought wholesale changes, I do not agree that this is appropriate or needed.

41. I have referred to my previous technical reports in writing this evidence, namely the Residential Technical Report and the Sunlight Access QM Report which were part of the section 32 materials.

42. In this report I also discuss work carried out by the Council has carried out monitoring medium density developments in various zones in Christchurch in 2019, which I was involved in. This work assessed the quality of urban outcomes achieved in the zones, and includes developments with a range of densities, built under differing regulatory frameworks. The work is also consistent with an earlier study carried out in 2011. It provides a picture of the quality of outcomes in the city over time and space.

43. This work is described in sections 1.2 and 1.3 of the Residential Technical Report and was undertaken in four zones where medium density housing has been constructed, zoned Central City Mixed Use (**CCMU**), Residential Suburban Density Transition (**RSDT**) and Residential Central City (**RCC**).

44. The methodology provides a way to quantify the outcomes from development by grading the developments on a scale from 1-5. In my view, the midpoint of 3 ("basic-satisfactory") does represent that a satisfactory (or mediocre) standard of development is met. However, the "well-considered" threshold is demanding, requiring a very consistent level of outcomes across a wide

variety of categories. I have observed that developments scoring a 3.5 would be considered "good" and consider this a useful way to consider the results.

45. The study,[3] referred to as the Design Outcomes Research, was based on a Ministry for the Environment methodology, which was in turn based on an earlier Council survey undertaken in 2011. This allowed for a comparison across time as well as space.

46. The previous Council survey noted that in 2011 the quality of design was quite poor in medium density areas but was better (equivalent to the "satisfactory" standard) in the central city. This was thought to be due to the higher value of the central city developments as well as to different typologies being viable there.

47. In the later study, an increase in design quality was noted in the RMD zone; and a smaller decrease in quality in the RCC zone, meaning that the quality of RMD developments overtook that of developments in the central city. This was thought to be due to a change in the market in the central city (towards town houses) and an increase in quality in the RMD zone, likely due to the introduction of regulations which required matters such as active street interfaces and discouraged parking at the street edge.

48. This research indicates that the RMD zone provisions have ensured that development is consistently completed to at least a satisfactory overall quality, whilst allowing for high levels of redevelopment overall in the zone. In my opinion, this indicates that they are a suitable framework for the management of medium density housing in Christchurch, with some amendments being appropriate to achieve the desired good quality standard.

49. Conversely, other more permissive zones have not ensured the same level of design quality and consistency. A lower level of regulation would not meet the District Pan and Council's and submitters' aims for good quality design.

50. The report identified some changes in practice that could improve outcomes using the operative rules and assessment matters, in particular related to better Crime Prevention Through Environmental Design (**CPTED**) implementation and better management of communal areas.

[3] Christchurch City Council (2020) *Medium and High Density Housing in Christchurch Urban Design Review and* Christchurch City Council (2021) *Medium Density Housing Research: Additional Case Studies. The second of these is Appendix D to this report.*

51. Subsequent monitoring[4] has indicated improvements in these areas and I consider that more recent development is generally of a higher quality than that seen in the monitoring. This may reflect a change in typologies (towards two-storey, two-bedroom houses with on-site parking and lower site coverage) or a greater number of more experienced developers.

52. Considering more recent RMD developments, it is my view that a high proportion of them would be considered to be "good".

ANTICIPATED OUTCOMES

53. The key Objective in the operative District Plan relating to residential urban design is 14.2.5 High Quality Residential Environments. As the title suggests, this promotes developments of high quality. Submitters have suggested that this aspiration is not well defined and may not be achievable.

54. One suggestion is instead to require “good quality”. I do not consider that this change is necessary, but nor would it be problematic, in my view. That is, I consider that good urban design is a fundamental component of a well-functioning environment. I note that this view reflects the current Plan policy and has been widely supported by submitters. In my view it is important that the Plan state an aspiration for at least good quality design outcomes. However, I consider that the distinction between “good” and “high” quality is semantic. Both terms express a desire for outcomes that are more than basic or mediocre, whilst neither is precise in its meaning.

55. The Urban Design monitoring has demonstrated that good management of higher density development can create consistent improvements in outcomes. An aspiration for good quality is appropriate and whilst it may not be achieved in every case, the existence of an objective sets an expectation for good outcomes overall and an environment where the majority of sites meet this threshold is likely to be one which people consider to be “good” overall.

56. In my view the expectation for good quality outcomes is part of the “planned urban character”. This phrase is used in policy but is not defined. It seems to relate solely to the built form expected (which includes 3 storey buildings, for instance). There is a difference between “planned urban form” and “planned urban character”. The former can be defined by a scale of

[4] Medium Density Housing Research: Additional Case Studies.

buildings, whilst for the latter a wider range of characteristics is implied (such as those in the policies listed under 14.2.5).

57. Clarifying these terms would give consent planners clarity when considering applications and the ability to consider all the relevant policies when making decisions.

58. One submitter considered that multi-unit development *"invariably"* involves the balancing of competing design outcomes and that *"it all comes down to how these are balanced and prioritised"*.[5] I disagree with this statement, with respect, and refer to the research undertaken by Council which shows that it has been possible to achieve at least satisfactory outcomes in most cases, and that it is not necessary to trade off outcomes one against the other to do so.

59. A reasonable expectation for development outcomes is that they may be able to 'do the basics well' (which would be indicated by the broadly satisfactory outcomes in Christchurch, in particular in the RMD zone). Achieving a basic satisfactory outcome against most of the categories would indicate this has been achieved.

60. Regarding the high-density zone, the difference between the zones is not the level of quality expected, but that there is a higher level (ie intensity) of development in some areas than others. It is possible to have very high-quality, high-density development, but doing so may require trade-offs to be anticipated and may require different management, including regulation. However, from an urban design perspective there is no inherent conflict between expecting a good level of quality and a high density of building.

61. This principle is demonstrated by European cities such as Edinburgh, Berlin or Amsterdam which are widely admired for their high-density mid-rise apartments. It is also demonstrated by some Australian cities such as the Gold Coast, which employs a high-rise form with relatively low site coverage.

62. A framework to manage quality could reasonably include more regulation for higher density areas, which are expected to have greater impacts on surrounding sites and public space; notwithstanding that a higher level of development is expected. Whilst some submitters consider more lax regulation is necessary to encourage density in the HRZ, the link is not

[5] Submission number 834.

inherent. The above-mentioned cities employ a stricter consenting regime than what is proposed (or exists) in Christchurch.

63. For example, in Edinburgh there is no 'permitted' status for new dwellings, with all development being discretionary and assessed against strongly worded design policy[6] and a policy protecting amenity for neighbours and occupiers[7]. A further policy[8] requires co-ordination of development, including compliance with masterplanning and allows for compulsory purchase of land by the Council to achieve design outcomes. Between them these policies aim to achieve high quality design in a co-ordinated fashion. Similar outcomes would not be achieved by simply removing side setbacks and recession planes.

64. The Gold Coast also has a discretionary assessment framework seeking, amongst other assessment criteria, *"high quality urban design through highly functional, accessible, attractive, memorable and sustainable buildings and public spaces"*.[9] Site coverage is limited to 50% in the high-density zone and reduces with height (for instance to 40% above 32m). Similarly, setbacks increase with height.

65. I do accept that there are compromises to be made for higher densities, but I do not think these need to be at the expense of achieving a satisfactory level of outcomes. Rather, I consider that developments should be satisfactory in all respects (as indicated by the policies) but that the threshold of *"good quality"* may not be reached across the board. Some aspects of the development may be better than others but all will have a basic level of quality. The making of trade-offs should then mean that some aspects are good or high quality, whilst others are merely average.

66. In my view an issue would likely arise, if the submitters' perspective is accepted – ie that there is invariably a dichotomy between quality and density – with a developer being more likely to resolve the competing outcomes in favour of additional units or better internal outcomes and that community focussed or neighbourly outcomes would be neglected. This has been the experience in Christchurch and other cities in the past, before more District Plan assessment criteria were put in place.

[6] Edinburgh Local Development Plan policy Des 1.
[7] Ibid, Des 5.
[8] Ibid, Des 2.
[9] Gold Coast City Plan High Density Residential Zone Code 6.2.3.2 (2) b.

67. Some submitters have queried the breadth of design issues which are considered under the Plan, with some inferring that these should be restricted to impacts on amenity and the street scene.

68. I consider that PC14 covers the appropriate range of design matters. In particular, issues of safety and the transition from public to private space are important as these affect both amenity and the public realm. Although this could be inferred from the amendments suggested by submitters, it is not clear. Servicing is also a matter that is important because poor provision can affect these other matters.

69. In describing the above, I am not necessarily disagreeing with the submissions. Rather I think it is important to be clear about the matters that comprise good design from the outset. These are the matters that are described in the existing Plan policy and carried through the Residential Design Principles and should be retained in the revised Plan.

70. The full range of matters, their importance and an evaluation of how these may be managed is described in detail in my original Residential Technical Report. In relation to submissions, I have discussed the more detailed aspects of this below.

SUNLIGHT ACCESS QUALIFYING MATTER

71. The Sunlight Access Qualifying Matter introduces somewhat shallower recession planes for Christchurch compared to the MDRS, which would affect the available development envelope.

72. I carried out detailed analysis of the impact of these recession planes in the Sunlight Access QM Report.

73. Due to the difference in latitude between the Upper North Island and Christchurch, recession planes in the MDRS would have a more significant impact on solar access in Christchurch than in other more northern tier 1 cities, because shallower winter sun angles are more likely to be shaded by buildings.

74. Furthermore, the impact of the MDRS recession planes on sunlight access in Christchurch is greater than in a number of other cities for various reasons, including:

(a) The colder climate means there are more days per year when houses benefit from passive heating if it is available (ie the sun contributes towards raising the interior temperature to a comfortable level for more days per year).

(b) The lower sun angles mean that sun can be more effective at heating building interiors because the sun's rays strike vertical surfaces more directly in the winter.

(c) Mostly flat terrain means that almost all sites will benefit from sun access.

(d) Lower ambient radiation (energy received through clouds) means that Christchurch is more dependent than other cities on direct sunlight for passive heating.

75. The above means that the benefits of sunlight are greater in Christchurch than in other areas, and the costs of shading are higher. Existing units are almost always built to maximise access to sunlight, which demonstrates that these benefits are widely recognised and desired by the market.

76. The Sunlight Access QM report found that in winter:

(a) For sites oriented roughly north-south, the majority of units in Christchurch receive between 20% and 30% less winter solar hours than Auckland. Depending on orientation, the difference is around 20 minutes of sun per day, at a time of year when the duration of sunshine is usually less than two hours.

(b) For sites oriented east-west, Auckland sites would have no ground floor solar access for a third of the year, whereas in Christchurch the equivalent is almost half the year.

77. In the Sunlight Access QM report I carried out further work to assess the impact of reductions in capacity that may result from reductions in recession planes. I modelled typical high-density townhouse developments of the kind seen in the Residential Central City zones, which are expected to be built in the new MRZ zone.

78. Modelling was based on typical inner-suburb sites which have a fairly standard width of 15m and depth of 50m. Such sites are prevalent in inner

areas which are popular for development such as St Albans, Spreydon and Linwood.

79. These found that there was generally a drop of around 5% in theoretical capacity for sites and recommended a variable recession plane be implemented. This plane would have a starting height of 3m and an angle of 60 degrees (north); 50 degrees (south) and 55 degrees east or west.

80. This variable recession plane was preferred to a straight 3m and 50 degree plane because it allowed slightly more development capacity.

81. Between them, the two studies in the Sunlight Access QM Report indicate that there would be significant benefits in amending the MDRS recession planes in Christchurch. The significantly lower levels of winter solar access in Christchurch could be addressed through adopting revised recession planes, which would have a low impact on site capacity. For these reasons, the recommended recession planes were adopted into PC14 as a qualifying matter.

82. Some submitters queried the size of section used in the report, noting that there are narrower parcels in use in the central city and inner suburbs and the parcel size is smaller for these areas than the average for the rest of the city. These submitters were concerned about the impact on development capacity.

83. I note that one reason there are so many small parcels in the inner areas is because they are already quite intensively developed with townhouses on small sections, usually between 100 and 200m^2. These sections are not easily re-used unless they are amalgamated with neighbouring sites. They also skew the average sizes quoted. It is more relevant to consider the attributes of parcels that could be redeveloped.

84. There are narrower parcels that could be redeveloped in the inner suburbs. Many of these sites are in the HRZ zone. These sites are subject to different rules (considered later in this section) and the comparison between MDRS and MRZ is not relevant for these sites (because the MRZ rules do not apply to them).

85. To see the impact of narrower sites on capacity, I carried out some additional analysis to demonstrate the impact of the proposed recession planes on these sites (included as **Appendix A**).

86. The testing shows that:

(a) for 14m wide sites, there continues to be a 5% difference in theoretical capacity for the site. For these sites, the main constraints in capacity are either other rules (such as outdoor living and outlook spaces) or other development requirements such as access and servicing.

(b) For sites between 12 and 14m in width, the difference in capacity is around 10%.

(c) For sites between 10 and 12m wide, the difference is more significant because at this point the recession planes restrict the third storey under the PC14 recession planes, but not under the MDRS. Capacity in these sites is reduced by between 20 and 30%.

(d) For sites below 10m in width, capacity is the same, because both envelopes allow for 2 storeys only.

87. The testing shows that there is a small additional loss of capacity for sites between 12 and 14m wide, and a larger one for sites between 10 and 12m.

88. Within the inner suburbs, there are some parcels with narrow widths, in particular within the 12-15m range. These sites would have a similar theoretical development capacity to previous assumptions, although for the narrower parcels there may be a slightly larger reduction.

89. There are some 10-11m developable parcels, but these are much less common and usually result from a re-subdivision of land. In cases where this has been undertaken to the usual 'battleaxe' configuration (with a front and rear lot), the recession planes do not apply over the right of way and the site may not be constrained. There are otherwise only a very small number of parcels that are 10-12m wide.

90. From the work described above, I conclude that the Sunlight Access Qualifying Matter has some additional impact (over and above that reported in the Sunlight Access QM Report) on capacity for narrow sites, but it is quite small overall.

91. In considering these submissions, I also considered the impact on capacity of the HRZ rules, which also use the stricter recession planes. This is described in more detail under Heights and Building Envelope, below (which

considers the built form standards in their entirety). In summary I consider the notified standards would provide both increased capacity and better solar access than if a more literal MDRS envelope was to be introduced.

92. Some submitters did not consider the proposed recession plane was enough to preserve amenity. They requested more stringent planes be applied, including preserving the current planes.

93. The proposed recession plane was chosen to strike a balance between ensuring a level of amenity in the planned urban environment and ensuring an increase in capacity as expected under the Enabling Housing Act. This is explored in detail in the Residential Technical Report.

94. Some submitters disagree with the Sunlight Access Qualifying Matter altogether, comparing it to various northern hemisphere cities with high-density and high-quality urban form. This matter was discussed in the original report, where it was noted that European development patterns generally result from masterplanning and a more prescriptive planning regime than exists or is proposed in New Zealand. This is an effective way to manage the effects of development for high density, but is not compatible with the more piecemeal approach to development facilitated by the MDRS, which is aimed at making individual sites easy to develop.

95. The high quality and the character of urbanism in Europe results from integrated development which allows for the completion of forms such as perimeter blocks. For example, in the Netherlands it is typical for a development envelope to be set allowing development from boundary to boundary at the front of the site. This is not a reduction in the level of management, rather it is one designed to achieve a particular outcome. It is not realistic, in my view, to expect a similar quality to eventuate in the absence of any overarching management of effects.

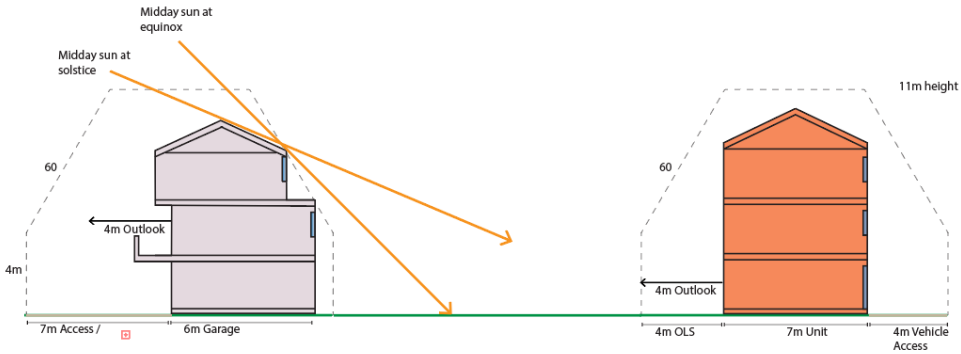
96. Regarding the detailed shading analysis I carried out in the Sunlight Analysis QM Technical Report, some submitters commented on the suitability of examples used to illustrate the impact of shade (refer to Section 2 of the report). Specifically they were commenting on the use of a 3-storey MDRS development casting shadow on a smaller 2-storey existing development.

97. This is an appropriate scenario, in my view. The 3-storey development is permitted under the rules and is used to show the effects of a developer maximising the use of the envelope, as they are entitled to do. The 2-storey

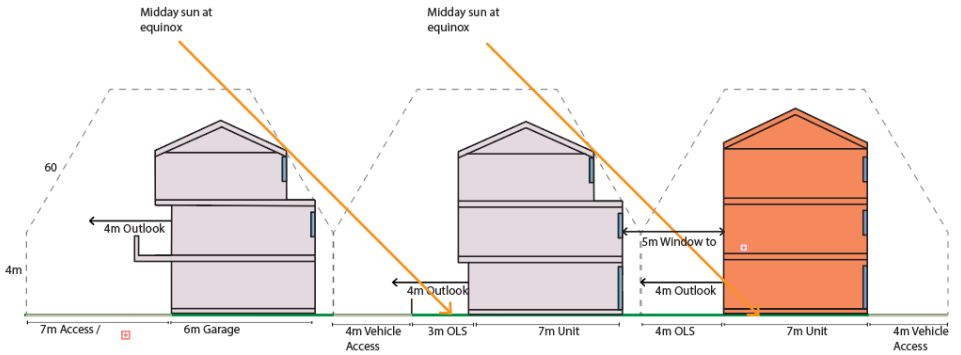
development may have just been built (either under existing rules, or potentially under the new rules). Such a development would be constructed with a legitimate expectation of sunlight access during its 50-year lifespan; or be built in future given the level of demand for such dwellings and the industries' ability to deliver them at scale. Such dwellings have little ability to innovate over their lifespan, so any new technology or practice that evolves over time will not benefit the many recently erected houses. These dwellings form a legitimate and widespread part of the existing and anticipated environment.

98. The submitter also notes the loss of ability for a designer of a site to capture sun for use on their site (by locating buildings at the boundary and having a larger open area on one side). In my view this illustrates the benefits of the recession plane – designers do not need to make defensive decisions to capture sunlight on their site, because more sunlight access is ensured by recession planes. In locating buildings at the boundaries, as suggested by the submitter, effects on neighbours are increased. The issue of sunlight access is more equitably resolved by ensuring a level of access between sites, rather than expecting designers to build defensively in case neighbours put up intrusive buildings next door.

99. The diagram below shows a rational response to such a building being constructed on a neighbouring site, and the effects this may have on existing housing.



This typology creates more shading and overlooking on the vacant site next door



A rational response is to set this building back

Which creates shading and overlooking on this site

HEIGHTS AND BUILDING ENVELOPE

Heights

100. PC14 sets up a hierarchical approach to heights through the MRZ and HRZ, in accordance with the approach outlined in the NPS-UD. In the HRZ it sets heights of 20m for six-storey development and 32m for ten-storeys. In the MRZ, it implements the MDRS height of 12m and allows for four storey 14m development in defined areas around some centres.

101. In setting heights, a consistent methodology is useful. In defining heights for PC14 zones, the practice was to assume 3m per floor, with 2m for a roof. This allows a generous floor to ceiling height of 2.7m, with 0.3m between floors. Work undertaken as part of the Sunlight Access QM Technical Report has demonstrated that a 2.7m stud height is seldomly developed (more exclusive developments may go to 2.55m or 2.6m). Whilst developers rarely provide these higher-than-required ceilings, there can be additional inter-floor space needed for taller buildings for structural reasons, so the 3m floor height allows for some flexibility. Taller floor to ceiling heights can add up to an extra floor over a tall building.

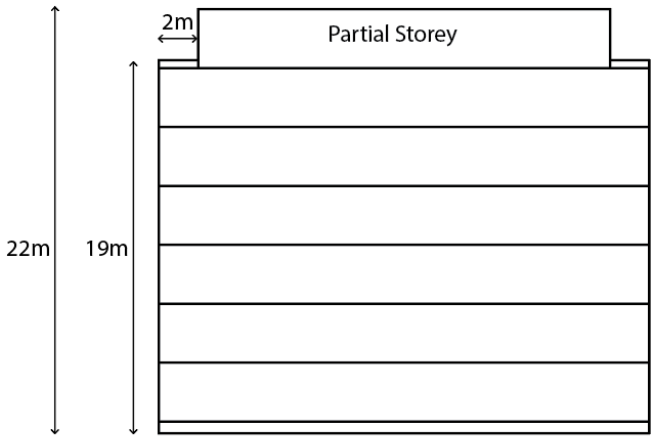
102. Some submitters asked for increases to heights including the 14m height around smaller centres, the 20m six-storey height limit and the 32m ten-storey limit.

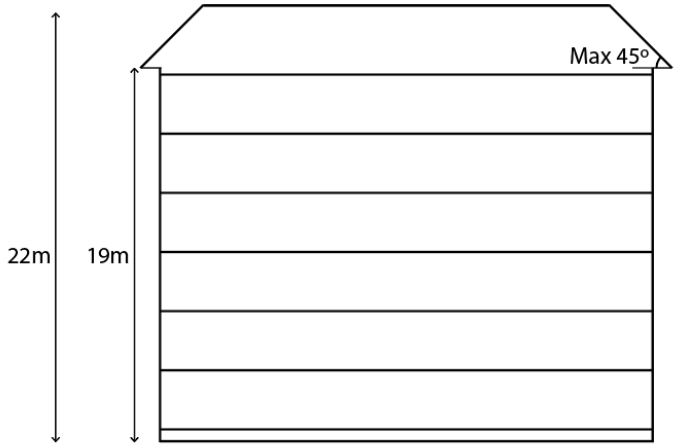
103. In considering these requests, it is important to bear in mind that there is an increased impact for wall height as opposed to roof height, because roofs tend to slope and therefore be at least partially set back from boundaries, compared to the rest of the building.

104. At a roof slope of 45 degrees, there is at most a marginal impact in terms of additional shading to neighbours, including buildings across the street. With this in mind, there is scope to raise the roof height without significantly increasing the scale of impacts on neighbours and the public realm, if the wall heights are maintained.

105. A suggested approach for taller buildings (ie in the HRZ) is to allow for a wall height at 3m per storey, with an extra metre for matters such as flood floor levels. Above this, a more generous 3m roof height can be accommodated. The roof may include additional accommodation (an extra floor) and / or be used for roof mounted equipment such as lifts. However, in view of the impact of additional height, the roofspace should be set back. A roof plane of 45 degrees is proposed, which would allow for a pitched roof or for a top storey set back from the walls.

106. The diagrams below show how this could be applied:





107. This proposal would allow for an additional storey in some instances, which would provide additional capacity, but in a manner that would have minimal impacts on surroundings.

108. Submitters also asked for additional height in the HRZ higher height precinct. This is an area which is centrally located and much of which is already zoned for higher densities. It is the optimal location for higher densities to occur. Much of it benefits from high quality outlook such as over Hagley Park and the Ōtākaro / Avon River precinct.

109. I understand that higher heights in this location would enable additional types of accommodation to the provided and enhance viability. This is the driver for increasing heights rather than an urban design reason. However, I do consider that increased viability and vitality within the Central City is a desirable urban design outcome.

110. One of the considerations for the notified 10 storey height limit related to the potential for visual dominance of very tall buildings, in relation to surroundings where there is expected to be a mix of typologies in the foreseeable future. Acknowledging the importance of viability, I consider there is a balance to be considered between amenity and economic outcomes.

111. Another consideration is the impact on neighbours from additional shading above 6 storeys. Most of the testing I have carried out has been on six storey typologies. When the height is increased beyond this level it is hard to manage and contain the impacts of shading. This is simply due to the length of the shadows cast, which would reach across streets and affect sites beyond the immediate neighbour. Simply put, it is harder to ensure that there

would be a fixed number of hours of sunlight access for any new or existing building. The possibility of shading at least of lower floors is therefore a characteristic of the zone which cannot be eliminated.

112. This shading impact would occur above six storeys and as such would occur at ten storeys and also with taller buildings (although it reasonable to assume that there would be an increased area of impact from each extra level of a taller building).

113. With the above factors in mind, I consider that an increase in height from 10 to 12 storeys could be appropriate. This is in consideration of the limited extent of the higher height precinct and its central location with very high amenity and very good access to facilities. I consider that these areas would still offer a desirable living environment even though many dwellings would be subject to shading for at least some of the year.

114. For completeness, I do not consider that the high height precinct (above six storeys) is appropriate in areas that have less good access to amenity and facilities. This would especially include Hornby, which although it has some facilities, does not have the same very high level of amenity and accessibility as the central city.

115. This would allow for heights of:

    (a) 19m / 22m (6 storeys in the HRZ zone);

    (b) 31m / 34m (10 storeys in the HRZ higher height precinct); and

    (c) 37m / 40m (possible 12 storeys in the HRZ higher height precinct).

Appropriateness of MRZ development envelope

116. The MRZ development envelope encompasses the MDRS height of 12m and the recession planes as modified by the Sunlight Access Qualifying Matter. It also includes the higher height precinct which was notified at 14m.

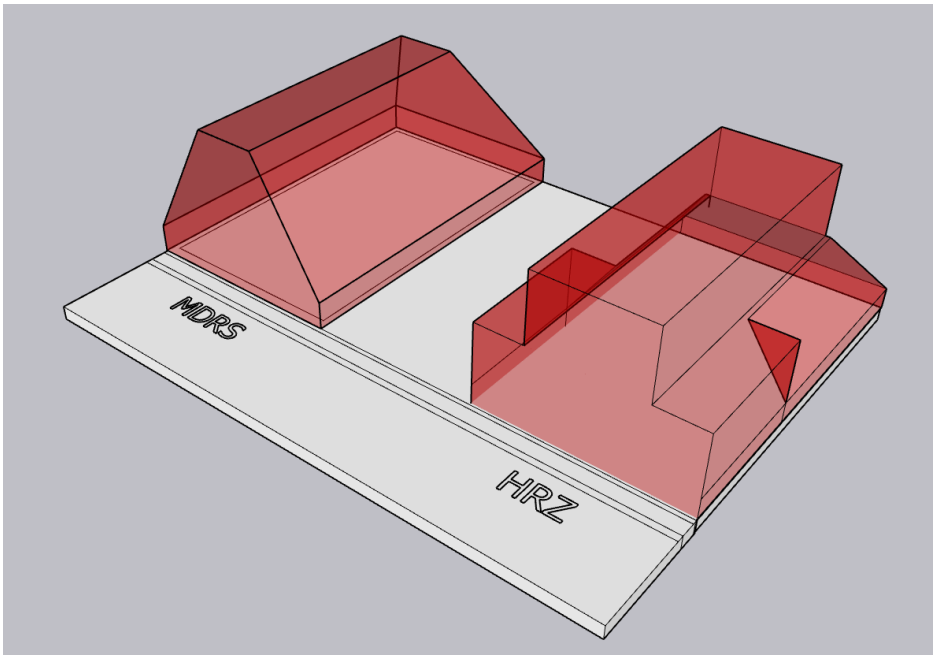
117. The envelope created by the Sunlight Access Qualifying Matter is discussed above, and in my view is appropriate to apply in the MRZ.

118. For the higher height precinct, some submitters have queried why the height is not 22m to allow for six storeys, noting that the notified 14m height would only allow for 4. The precinct is located around smaller centres with more limited facilities. It is generally expected that it will be developed with 2 and 3

storey buildings, as provided by the MDRS framework. Such development is prevalent at the moment; this is likely to be the case for the foreseeable future and widespread taller (6-7 storey) development would be visually dominant in the context of the expected 2 and 3 storey units. The higher height limit is provided to allow some flexibility for additional height if desired, but this is not expected to be widespread.

Appropriateness of HRZ development envelope

119. The MDRS development envelope is made up of recession planes and a height limit. Following the legislation literally would lead to a shape defined by a height of around 21m and recession planes on internal boundaries at 4m and 60 degrees. The actual buildable volume is further determined by site coverage which can restrict what is built in this area.



Above: Development envelopes shaped by setbacks, recession planes and height limits in the High Density Zone and an alternative zone using MDRS standards.

120. The PC14 envelope adopts the stricter recession planes through the Sunlight Access Qualifying Matter, but also allows for two exemptions. The recession plane does not apply within 20m of a road boundary and does not apply above a height of 12m; instead there is a setback at this level. This change ensures there is good solar access at the rear of sites but allows for developments to take advantage of the street edge which is better able to absorb its effects.

121. The merits of different development envelopes are discussed in section 10.3.1 of the Residential Technical Report. The notified building envelope was preferred to one based on the MDRS because of the poor performance of that envelope in providing for sunlight access, combined with other disadvantages identified. These include:

    (a) More complex buildings;

    (b) Lower capacity on narrow sites;

    (c) Effects on neighbours (such as high levels of overlooking) because buildings are encouraged to be oriented to side boundaries;

    (d) Little ability to provide consolidated open space; and

    (e) Generally poor street scene impacts (because buildings are oriented to side boundaries.

122. By contrast, the proposed envelope promotes simpler buildings with fewer steps; provides more capacity on narrow sites by allowing for 4 storeys boundary to boundary (albeit with 1m setbacks); encourages buildings to address the street and reduce building bulk and the extent of overlooking.

123. Overall I consider that the HRZ zone provides for higher capacity and better urban outcomes than the MDRS. In order to demonstrate this I have carried out two further studies, included as **Appendices 2 and 3** of this report.

124. **Appendix B** looks at the potential capacity of six storey buildings on two different sites in the HRZ and what could be built under different potential built form standards. These are: HRZ; the existing RCC standards; and a ruleset derived from applying MDRS recession planes. In this study, I concluded that HRZ has the highest capacity under both scenarios.

125. The analysis in **Appendix B** shows that for the HRZ, there would generally be similar or higher capacity than an envelope constructed using MDRS recession planes. This is due to the use of vertical recession planes above 12m; and exemptions to recession planes at side boundaries. Construction would also be simpler because fewer steps in the building would be required; and narrow sites are more usable with the HRZ provisions.

126. The table below shows the modelled floorspace constructed under various scenarios. The HRZ zone allows for 1,300m^2 of floorspace on a narrow site,

compared with 1,270m^2 for an MDRS derived envelope. On a wider site, HRZ allows 4225m^2 compared with 3,825m^2 for MDRS.

Site	Rule Scenario	Floor Space (m^2)	Site Coverage (%)
Narrow - 750m^2 15m wide, 50m deep	RCC	1050	60
	MDRS	1270	50
	HRZ	1300	50
Wide - 1500m^2 30m wide, 50m deep	RCC	3925	52.5
	MDRS	3825	50
	HRZ	4225	50

127. Furthermore, the disparity (ie the potential increase in buildable area under PC14 compared to MDRS scenarios) increases with height because taller buildings are so much less restricted without a recession plane to comply with.

128. Some submitters were concerned about the impact of the notified HRZ provisions and whether these preserved sufficient sunlight access for neighbours. The provisions are aimed at preserving sun access during a larger proportion of the day. They do this by encouraging built form to be located at the street front (where its impact can be more readily absorbed by the public realm) and by managing the bulk of the buildings on the site through assessment matters, as well as by employing stricter recession planes at low levels. The intention is to limit the depth of buildings, so that sun will filter through the gaps, while providing capacity in a predictable manner.

129. **Appendix C** looks at the impact of various six-storey development scenarios on neighbouring sites. As for the capacity study, the scenarios were derived from different potential rulesets and were considered at different site orientations, which can be very significant in how much sunlight is received.

130. In this study I used a benchmark of 2 hours of sunlight per day enabled to at least half of the façade of a neighbouring building. This is a moderate level of sunlight access that takes into account the high-density nature of the environment. The models also provided a similar amount of floorspace in each scenario.

131. The study demonstrates that sunlight access is compromised to some extent in all tested scenarios, because shallow sun angles mean that steep recession planes cannot guarantee winter sun access. However, the

performance varied according to site orientation and the development envelope adopted.

132. The analysis demonstrates that a 6-storey envelope based on MDRS creates poor sunlight access during the winter through to the equinox, in particular for east-west orientations where sunlight access was poor.

133. The best overall building envelope (Scenario 4 in the study) was a Shallow Perimeter Block model derived from the HRZ rules. It performs quite well for most orientations, including allowing good sunlight for the southern quadrant even in mid-winter (sites facing south-east, south and south-west). However, winter sun access was poor for the northern quadrant (sites facing north-east, north and north-west).

134. Although there is no building envelope that provide year-round access to all orientations, I concluded that a shallow building based on HRZ provides the best all-round performance. The HRZ based envelope also has a wider range of advantages described above.

135. I also found that the depth of buildings was a very significant factor in creating shading on neighbouring sites.

136. In relation to the policy, submitter 834 considers that it can be appropriate to locate height and mass away from the road edge, although the submission does not provide any reasons for this. I note that the HRZ framework is quite enabling and would allow for this, mostly to a greater extent that the MDRS. The policy is aimed at encouraging development to the street front because of the greater capacity of public space to absorb impacts such as overlooking, bulk and shading. It recognises these benefits which are carried through into rules in the HRZ. The policy will also be useful for consent processing, for instance that long runs of terraces can have a positive impact on the street scene.

Building coverage – 14.5.2.4 & 14.6.2.2

137. Some submitters asked for site coverage to be 60% for all development in the HRZ (or for the limit to be removed), on the basis that there was no existing limit within RCC (and that it was therefore thought to be a reduction in capacity in some cases), or that it is incompatible with higher density. I disagree with both these statements.

138. The capacity modelling in **Appendix B** shows that the proposed HRZ envelope allows a similar or higher capacity to both the MDRS envelope and the existing RCC zone.

139. The reasons for maintaining the 50% MDRS limit for the HRZ were discussed in the Residential Technical Report (section 10.3.4) and are as follows:

    (a) The potential development envelope is shaped by a variety of factors, not just site coverage. PC14 proposes an envelope with limited recession planes which allows for more development at height than the MDRS, including near zero setbacks at ground level. It is not really the case that there is a reduction in the amount of development permitted per site.

    (b) Existing development forms are predominantly town houses. A sample of site density shows that these rarely exceed 50% site coverage even in the CCMU zone where there is no site coverage limit. Site coverage is not a factor in site capacity or layout for these developments.

    (c) A higher site coverage allows for more building bulk which can have a significant impact on neighbouring sites, particularly at height. Keeping the site coverage at 50% is an important part of managing the bulk and shading impacts of the buildings, particularly in the more enabling HRZ envelope.

    (d) For taller buildings, there can be significant competition for space at the ground level as designers need to allocate space for servicing, parking, landscaping and outdoor space, as well as buildings. In the Design Outcomes research, higher site coverage for apartments was associated with lower quality outcomes due to this pressure on the use of the ground plane.

    (e) Rule 14.6.2.12.a.i allows for an increase in site coverage in some situations. These are for development that is car free, on wide sites and includes a communal space. Such sites are considered to have a lower risk of adverse effects because there is less pressure on space at ground level from servicing and parking.

140. Some submitters requested a reduced minimum width for 60% site coverage so that two combined narrow (10m wide) sites would qualify, as opposed to the 25% specified in rule. Although site amalgamation is beneficial, it is not

the main reason why the threshold has been set at 25m, a level which is based on an analysis of risk in relation to the potential for poorer quality outcomes.

141. I understand that the Council intends to recommend changes to PC14, relating to disabled car parking for all sites, which would (as written) include sites where 60% building coverage was proposed. This would be in addition to the notified requirement for a loading bay. Whilst I understand the reasons why this has been proposed, it can have a significant impact on the amenity of the site, given the factors described above.

142. For instance, on a development of 20 units, the need for access, turning and parking for 3 parking spaces (2 disabled and a loading space) would typically create a requirement for around 90m^2 of hard surface (compared to around 15m^2 required for a loading bay accessed from the street). This would likely equate to between 5 and 10% of the area of the site.

143. Noting the key issue of the competition for space on the ground plane, this would have a significant impact on site planning, and the ability to achieve the expected level of amenity and safety on the site. For this reason, I consider the additional building coverage in rule 14.6.2.12.1.i should be reduced to 55%.

144. Furthermore, given the potential impact of building bulk on shading for neighbours, I recommend that the increase in site coverage should not apply above 12m.

145. At the heights and densities required under the Enabling Housing Act, using piecemeal development of existing sites, there is no perfect solution that provides a combination of high density with minimal impacts on neighbouring sites. However, testing of building shapes built using the front recession plane exemptions showed that these buildings created less shading on neighbours than buildings designed around MDRS recession planes. This is because the built form was concentrated at the front of the site, creating gaps in the buildings at the rear. A moderate (50%) site coverage was a key component of this finding.

146. Having considered submissions, I recommend that the building coverage is maintained at 50%. I also recommend that the 60% HRZ exception for car free development on wider sites is limited to 12m in height and 55% building coverage.

Exclusion of eaves from site coverage

147. PC14 makes an exception from the site coverage limit for eaves, as these have a substantial benefit for weathertightness and do not have the same visual impact as the building as a whole. Some submitters asked for an extension to this to 600mm for eaves and 200mm for gutters.

148. From an urban design perspective, the concern I have here is that this amounts to quite a high proportion of a typical site. For instance, it can amount to an extra 70m^2 on a typical 750m^2 site, bringing the site coverage to almost 60%.

149. The NZ Building Code (Acceptable Solution E2/AS1) includes a key threshold of 600mm of eaves and guttering (which reduces the risk category for a building with regard to leaking[10]). I suggest the most practical threshold for PC14 is one that allows this but does not go much beyond it. I therefore recommend a total of 650mm of eaves and guttering combined. If developers require wider eaves, they would have the option of reducing the size of building or applying for a consent.

RULES AND ASSESSMENT MATTERS

150. Submissions have been received requesting a wide variety of changes to the notified rules and assessment matters. I have attempted to address these by theme in this section.

Height in relation to boundary (rule 14.5.2.6 and 14.6.2.2)

151. In this section I am considering aspects of the rule not directly related to the Sunlight Access Qualifying Matter.

152. One submitter[11] asked for an increase in the permitted length of 'height in relation to boundary' exceptions in the HRZ zone. That is to say that the submitter asked for the distance where recession planes do not apply at the front of the site to be increased (from the front 20m of the site depth or 60%). They considered it should relate to the size of urban block (and presumably increase with site depth).

153. I disagree with this suggestion. The depth of 20m is intended to be a compromise between allowing for a reasonable depth of building, and one that would manage the degree of adverse impact on neighbours. It is also

[10] Acceptable Solution E2/AS1 External Moisture, Table 1.
[11] 834.

related to the ability to potentially build a dual aspect apartment block with windows facing front and rear, as is the case from successful European perimeter block implementation. It is not aimed at facilitating sideways facing apartment blocks close to the boundary, with very high privacy and shading impacts on neighbours.

154. The current operative District Plan (Appendix A4.16.2) allows for a *"single gable"* to intrude into recession planes. This exemption is proposed to be removed. However, I agree with submitters[12] that it should be retained if the Sunlight Access Qualifying Matter is included. It provides a bit more flexibility of roof form, with only a limited impact on solar access. Of the other exemptions in the appendix, I do not agree that the staircase should apply, because this one has the greater potential to create additional shading and could be in addition to the shading that would be generated by development at the front of the site.

Setbacks and related issues (14.5.2.7 and 14.6.2.3)

Front setback

155. One submitter[13] questioned the need for a setback in the HRZ, whilst another[14] suggested a requirement for a variation in the front building line (such as a 200mm step) to provide more visual interest to buildings.

156. The 1.5m setback is a simple way to provide a threshold between the building and the street and to ensure there is space for some landscaping to soften the building form. It also contributes to privacy as it can be quite intrusive if people are passing directly next to windows. The presence of a landscaping strip is usually positive for both the street and for on-site amenity and defines the public and private realm.

157. Some European cities have a tradition of zero setbacks in central areas. An example is parts of Edinburgh or Amsterdam which have high-density mid-rise apartments. These cities often manage the transition by a step in the floor level so that the interior is elevated. One benefit of the zero setback is the consistent hard edge that the buildings create to frame the street, including through consistent horizontal lines and window placement. This creates a particular character which can be appealing.

[12] 89.
[13] 762.
[14] 685.

158. However, as noted above, these are perimeter block cities which were created by masterplanning, rather than the piecemeal redevelopment that is to be enabled in Christchurch. The same consistency of form would not be achieved here and tall buildings with zero setbacks will appear quite dominant and isolated in existing residential zones which are not likely to be redeveloped in this way more generally in the foreseeable future.

Above: Typical Georgian Tenements in Edinburgh (Google Street View)

159. These cities have also not overcome the privacy issues. My experience in the UK is that there would usually be net curtains used as a privacy device and that greater street engagement will not necessarily result from zero setbacks.

160. Whilst reduced setbacks may sometimes be appropriate if well designed, I do not consider that a zero setback will necessarily create good outcomes for amenity or street engagement As such, I consider that the risk of poor outcomes from zero setbacks in residential areas (primarily relating to poor privacy) outweigh the benefits unless the building is very carefully designed.

161. A step in the building line can create visual interest. This is generally managed through the existing Residential Design Principle (Built form and Appearance) proposed to be extended to the HRZ, which contemplates visual interest being achieved in a number of ways, for instance through glazing and materiality. The implementation of this matter is considered broadly successful. As a result I do not consider it is necessary to require steps in the building line in addition to this.

162. A partial relaxation in the setback, for instance to allow for features such as porches, may be one way to increase flexibility. In my experience of consenting, these are always allowed at present if desired and a limited exception for porches to project into the setback would be a straightforward change to the rules.

163. I therefore agree that a permitted standard for porches is appropriate. I suggest that this should be an allowance for a 1.5m wide and 0.8m deep porch roof (ie it may occupy half depth of the setback and should be able to project a small distance each side of a typical door). This exception should apply to canopy roof porches only, rather than enclosed porches or those that require support pillars.

164. Otherwise, the setback is already quite narrow, and in particular is too narrow for most trees to grow. I consider that the benefit of a reduced setback may be as a trade-off if it allowed space for tree planting elsewhere on the frontage, visible to the street (ie not in an outdoor living space). This is probably best managed through an assessment matter.

165. One submitter[15] pointed out that some streets, including those in HRZ areas, are narrow (around 10m) and that tall buildings on these streets may create enclosure and reduce sunlight access. I agree with this comment and note that in Christchurch, a building height to street width ratio of more than 1:1 is likely to create shade on the site on the opposite side of the street.

166. The impact of this can be reduced with a road wall height (which is the approach used in the central city). This would require a setback for upper floors so that the building as a whole is not visually dominant and would have a reduced shading impact. I suggest this could apply above the MDRS 12m height limit, and suggest a 4m setback from the boundary. This would mean that the upper levels of tall buildings were separated by 18m across a 10m wide street.

Fencing (14.5.2.9 and 14.6.2.6)

167. Some submitters[16] requested changes to the notified fencing requirements, which allow for 1.5m fencing for half the length of the site (and 1m fencing for the remainder).

[15] 685.
[16] 89.

168. Many existing units are built with partly fenced frontages (usually 1.8m fencing in front of the outdoor living space and open frontages in front of the house). This usually results in an engaging frontage and I agree with submitters that it is appropriate to allow for 1.8m fencing for half the site width (excluding access) to create a balance between openness and privacy.

A unit with open frontage and fencing outdoor living

169. Some submitters asked for more fencing to be allowed, for example for wide sites south of the street where there can be a preference to locate outdoor living space to the street for sun access. This is discussed in my Residential Technical Report[17]. A traditional approach has been to require open fencing to such areas. However, the disadvantage with this is that it creates a conflict between the desire of residents for privacy in gardens and the aim of an active and engaging street frontage. The issue is the creation of privacy sensitive space at the street frontage, as much as the screening used to create the privacy.

170. Experience in Christchurch has been that such fencing is often screened post-occupancy (for instance with cloth) and that this is not a successful way to achieve street engagement. Occupiers have a legitimate reason for the screening and it is a predictable response. The issue is the location of the outdoor living space, rather than its treatment.

[17] Technical Report – Urban Design – Medium and High Density Residential Zones Section 4.1.3.

Open fencing has been screened for privacy at the front of these units

171. Based on our research, my opinion is that the best way to resolve this dilemma is for developments to provide a public frontage separately to any outdoor living space. This would consist of a front door and a separate window, as well as some threshold space (eg landscaping) to create an engaging entrance.

172. Consistent with the earlier discussion on site layout, there is a need to identify locations for public entrances at the site planning stage, whilst outdoor space can be located elsewhere on the frontage where required. The 50% requirement for tall fencing provides guidance and a trigger for assessment for the extent of frontage which can be compromised by privacy sensitive areas.

Service space (14.5.2.13 and 14.6.2.1)

173. Some submissions request that fold-up washing lines be permitted as an alternative to a service space. The disadvantage with this is that washing lines may be in use for a lot of the time and in particular large households may do washing every day. As a result it may not be possible to fold the line away out of use as much as the submitters suppose. For this reason I do not agree with the submission.

174. Some submitters[18] have asked for bin storage to be reduced if it can be provided cumulatively. I agree that this is practical and is something that does often occur at present (Council officers take a pragmatic approach and try and ensure a practical solution for bins, irrespective of how much space they occupy).

Outdoor living space (14.5.2.5 and 14.6.2.10)

175. One submitter[19] asked for internal balconies to be permitted. I assume this would be to allow enclosed balconies such as those at 422 Hagley Avenue (below). These are spaces that can be fully enclosed by bifold windows which open fully to convert the space into a balcony. My understanding is that such spaces are counted as internal by banks and can allow units to meet a threshold for lending that apartments should be 50m^2.

422 Hagley Avenue has enclosed balconies.

176. The disadvantage of these spaces is that they can be fully internalised and mean that apartments no longer have any outdoor living space. This may create a pathway for such apartments (with no such space) to become commonplace. However, they may be appropriate sometimes. Because of this, I consider that they should remain a discretionary activity.

[18] 798.
[19] 798.

Mechanical ventilation (14.5.2.17 and 14.6.2.15)

177. Some submitters[20] have asked for this rule to be deleted; or amended to require screening of HVAC (heating, ventilation and air conditioning) units. They raise issues with the rule including its wording and the practicality of the rule.

178. There are examples where HVAC units have been installed in front of units in a prominent and obtrusive manner and the rule is aimed at managing this situation.

179. I agree that screening would be sufficient to manage the effects of mechanical ventilation, noting that urban design assessment will generally ensure a good standard of street interface. I also agree that it should not apply to internal boundaries because the impact will be more limited. Generally, the Council requires landscape plans as part of consent applications, which should help to manage the impact of HVAC units that may be installed in these semi-public areas.

Above: Prominent HVAC units installed next to the street

Windows to street (rule 14.5.2.10 and 14.6.2.8)

180. Some submitters[21] asked for a reduction in the required percentage, particularly in relation to south-facing facades for reasons of thermal performance.

181. PC14 as notified has already reduced these requirements from those set out in the MDRS, subject to certain criteria which are aimed at encouraging engagement and oversight from living areas of the house, allowing a

[20] 89.
[21] Ibid.

reduction in the amount of glazing if it provides effective engagement. Reference should be made to my reporting on this in 4.1.1 of my Residential Technical Report. Some submitters noted that these reductions seem somewhat complicated.

182. The aim of the reductions is that there should ideally be a front door (ie a public entrance to the street) and at least a moderate sized ground floor window facing the street from the living space of each dwelling from a living space. This will ensure that there is a reasonable amount of glazing from each house and that it is connected to active parts of the house which are less privacy-sensitive and more highly used (than bedrooms, for example).

183. As part of his Section 42A Report, Ike Kleynbos has suggested a simpler rule allowing for 15% glazing if certain conditions are met (relating to the above requirements for a door and a window). I agree with this recommended change.

184. Some submitters have requested a reduced amount of glazing for south facing facades for thermal performance reasons (because glazing is much less thermally efficient than walls). I consider that the reductions available (to 15%) will manage this issue adequately as any further reduction risks negating the positive street interface benefits the provision provides.

185. Some submitters[22] requested that the reference in the rule to a "single gable" be amended to roofspace. This would mean that any gable (or other roof-form) would not be included in the calculation of area to glaze. I agree with this request, which would encourage more variation in roof-form (rather than encouraging hip roofs to reduce the required area of glazing).

Garage location (14.5.2.15 and 14.6.2.14)

186. In the HRZ, the rule requires that garages are located behind the front unit, whereas in the MRZ the requirement is that they are 1.2m behind the front façade. Some submitters[23] queried this inconsistency. Consistency is desirable and the latter rule has been sufficient in the RMD zone so I consider it should be applied to both zones.

187. The rule applies to garages at the street front, including those facing sideways. The location of sideways-facing garages in front of units does not create an engaging street scene because it obstructs the relationship

[22] Ibid.
[23] 798.

between the living areas of the house and the street. This has a greater impact in medium density areas (compared to standard residential zones) as they intensify because there is an increased development of sites in general, and because of the nature of site layout (requiring new accessways which can reduce the effective frontage of the site). There are also increased adverse impacts from sites (such as the increase in hard surface and reduction in landscape space on the road verge). All of these things affect the level of amenity in medium density areas. One way to mitigate this is through ensuring buildings have engaging frontages.

188. Kāinga Ora states in its submission that the rule must not apply internally within the site. I disagree because I do consider that this issue is one that the Plan should continue to manage in some way. However, I think that issues of parking dominance are appropriately managed by the assessment matters proposed under rule 14.15.1.

Ground floor habitable room (14.5.2.12)

189. Kāinga Ora (834.124) requests a change in this rule to remove the requirement that 50% of units have a ground floor habitable space, which is based on the current RMD zone, and instead rely on 50% of the ground floor being habitable space. The difference is that the former rule discourages horizontally stacked apartments (arranged one above the other). As the submitter states, the aim of the rule is to avoid complexes which are dominated by garaging. I agree that this change is appropriate, and reflects a change from the current zone (which is aimed at facilitating townhouses) to one that allows more flexibility of form.

Building length and separation (rule 14.15.1 e ii)

190. The residential design principles include a 3m separation (rule 14.15.1 e ii E) between buildings on the same site, in conjunction with a maximum length of 30m. The purpose is to avoid (or manage the impacts of) unusually long buildings, other than lining the street boundary.

191. The HRZ zone includes a separation standard of 10m for tall buildings (rule 14.6.2.5). The reasons for this are described in the Residential Technical Report (section 10.3.6) and are to manage the visual bulk of such buildings whilst allowing sunlight to penetrate between them in the absence of recession planes. I regard this as the most effective way to manage the impact of shading from tall buildings. The standard is a separation of the full

height of the building, recognising that sunlight access and outlook is provided at all levels of the building and that the HRZ building envelope is very permissive compared to the MDRS. The separation standard is a fundamental component of the management of tall buildings in allowing for reduced recession planes. As for other standards, it should not be seen in isolation but is part of a holistic approach to enabling and managing density.

192. Some submitters[24] have asked for it to removed. I do not support this, particularly if the recession plane relaxations are to be retained, because it is part of a systematic approach to the management of tall buildings. This is discussed in more depth under Sunlight Access (above), which shows the benefits of ensuring separation between buildings as an alternative to recession planes.

193. Some submitters have queried whether the standard applies to separation from buildings on neighbouring sites. I agree that it should not because this is managed by other rules (setbacks and recession planes). This should be clarified if necessary.

Residential Design Principles (14.15.1)

194. The 'Residential Design Principles' are the key assessment matters for multi-unit development in the RMD and RSDT zones in the current District Plan. PC14 proposes to retain the existing principles, which are well proven in terms of achieving good outcomes as well as well understood by the development industry.

195. Some amendments are proposed to these, as summarised below.

196. Principle c *City Context and Character* is changed to *Context and Site Layout*. This is in recognition of the emphasis placed by the NPS-UD on changing character. It is also a recognition of the importance of site layout in determining outcomes, as discussed earlier in this evidence. This is implicit in the existing principles which describe the expected outcomes. Sometimes issues can only be fully resolved by changes to the layout, rather than late-stage mitigations like changing cladding or window placement, as is discussed fully in the Residential Technical Report (Section 2):

> *Site layout is a key determinant of the quality, functionality and contribution of the development to the neighbourhood, and becomes*

[24] 798.

more significant as the scale of development increases. To a large extent, how well a development scheme meets a wide range of design outcomes is driven by the layout of elements on the site, including buildings, landscape, internal space, access, car parking, private outdoor space, and servicing. If these elements are not well laid out on the site this has knock on effect to the whole of the development, with limited opportunity to create good overall development outcomes.

197. Principle d *Relationship to the street and Public Open Spaces* is aimed at ensuring an engaging street frontage is provided. Changes are aimed at improving the functionality of interfaces, so that windows to habitable rooms are provided and are visible from streets and accessways and that front doors (*"public entrances"*) are also visible from the street. This change is in part differentiating between front doors (for public access) and ranch-sliders which are used to access private space. The latter do not usually form a functional public entrance because they are connecting two private spaces; and where they face the street they are often screened.

198. Principle e *Built form and Appearance* has been partly simplified to reduce the focus on appearance, with a focus instead on managing bulk and providing coherent detailing and articulation. One reason for this is a concern that developers sometimes consider it necessary to provide for relatively complex buildings (eg with complicated changes in cladding and push and pull on facades) when simpler solutions would be just as appropriate. One example of such is the regular use of vertically stacked windows to visually express each unit in a flat façade.

This building has a flat façade but vertical stacking of features clearly articulates the frontage.

199. The principle also manages the bulk of taller buildings by moderating the bulk of roof forms (anticipating for instance through setbacks, pitched roofs, mansards or other means). Importantly, point E includes guidance on dimensions for the length of buildings, to manage access to sunlight and provide some visual variation. This dimension (30m) is related to a generous dimension for 3 townhouse units and also for tall buildings, for both appearance and shading.

200. Principle f *Residential Amenity* has been amended to provide guidance on the functional and safe location of communal space based on experience consenting what was until recently a relatively unusual feature in multi-unit complexes. Communal space is more likely and significant for larger developments and is expected to become more common in HRZ. In particular, such space is most successful where it is central and has incidental use (ie people pass through it on their way through the site) rather than being in a corner of the site.

201. Another clause has been added for taller buildings to reflect the advantages of an orientation to the street, which reinforces the existing privacy clause.

202. Principle g *Access, Parking and Servicing* has principally been amended in recognition of the ability to carry out car-free development.

203. Principle h *Safety* has been amended to provide more clarity on some of the clauses. The Design Outcomes research indicated relatively poor outcomes relating to CPTED which seemed to be principally related to interpretation and insufficient understanding of CPTED from planners and developers. This is the difference between a 'tick box' approach (for instance that there should be windows next to an accessway) and a more fully rounded assessment that would look at whether a safe environment was being created in general.

204. Overall these principles are a well-rounded approach to considering the quality of outcome from a development. As previously discussed, a satisfactory outcome in each of these would be expected to result in a development that would have a good quality overall.

205. It is worth noting that the principles are split into a 'headline' which has primacy, with the detailed matters following being principally for guidance. However, in my experience considerable weight is given to consideration of these detailed matters in applications and they provide useful guidance for

interpretation. I consider they also assist in consistent interpretation because it is clear what the Council will consider in applications.

206. Some submitters[25] (Kāinga Ora and Otautahi Community Housing Trust) queried the application of these principles and suggested an alternative set:

    (i) Whether the design of the development is in keeping with, or complements, the scale and character of development anticipated for the surrounding area and relevant significant natural, heritage and cultural features.

    (ii) The relationship of the development with adjoining streets or public open spaces including the provision of landscaping, and the orientation of glazing and pedestrian entrances;

    (iii) Privacy and overlooking within the development and on adjoining sites, including the orientation of habitable room windows and balconies;

    (iv) The provision of adequate outdoor living spaces, outdoor service spaces, waste and recycling bin storage including the management of amenity effects of these on occupants and adjacent streets or public open spaces;

    (v) Where on-site car parking is provided, the design and location of car parking (including garaging) as viewed from streets or public open spaces

207. I comment on these as follows.

208. The Residential Design Principles are well proven in Christchurch. They are well understood by developers and have resulted in consistent satisfactory outcomes. Amendments proposed are based on experience and research, or are designed to manage changes brought about by NPS-UD implementation.

209. The principles also relate to the points listed policy in 14.2.5.3, which was supported by Kāinga Ora in its submission. They are one of the principal means to implement this policy and without them I consider that it is unlikely that the policy would be achieved.

[25] 834 and 877.

210. The design principles seem quite broad, but they are related to the outcomes described earlier in this evidence and in practice list 6 principles, compared with 5 that Kāinga Ora has proposed. The main difference in complexity is the level of detail (and guidance) provided in the principles rather than the scope of matters to consider.

211. At this higher level, the Kāinga Ora principles are broadly similar, but notably do not include safety (CPTED) and do not include explicit consideration of site layout.

212. The Kāinga Ora assessment matters are also quite vague, in my view. The weakness with these is that whilst they identify things that will be considered, they do not point to an expected outcome.

213. One example in the above is clause ii. Whilst it requires *"the provision of landscaping"* it does not require that this is visible. An existing issue with the (pre-amendment) design principles is with the provision of landscaping next to streets. Applicants sometimes provide this, but behind fences where it is not visible. In this example applicants obey the rule and the direction of this principle, but there is no public benefit from it. Similarly, there is limited benefit from orienting windows to the street if these are behind solid fencing or screening. The Residential Design Principles have evolved over time to manage outcomes as they are experienced in Christchurch, based on monitoring of outcomes on the ground.

214. Another example is Clause ii, which contemplates outdoor living spaces, with matters for consideration being that they are adequate and that effects of these on occupants are managed. This is clearly not, in my view, an apt way to consider the appropriateness of outdoor living spaces, which are required for the benefits they are expected provide which can include amenity, usable space for outdoor activities and access to planting and nature. The matter needs to consider what these benefits are, not the potential issues these spaces may cause.

215. Clause iii considers privacy and identifies the importance of the location and orientation of windows. This is appropriate but the solution to this may be more complicated than moving the windows, which may not be possible on its own – it may involve amending the layout of units. The suggested assessment matters will not allow the fundamental issue to be adequately addressed and will instead lead to low value changes that trade-off one issue

for another (such as outlook for privacy) without a good overall outcome being achieved. This would not amount to good urban design overall.

216. Finally, matter e. proposed by Kāinga Ora is aimed at managing parking but only its effect on the public realm. Other aspects of Kāinga Ora's submission express concern to ensure an appropriate level of amenity for residents. Although parking is not mandated, it is likely to be included in many or most developments and in my view the appearance, management and maintenance of communal spaces is an important part of the amenity of the site. Parking areas can also affect safety (for instance by creating dark unobserved spaces under buildings), which in my view is a key consideration in the functioning of multi-unit complexes.

217. In my opinion the Kāinga Ora assessment matters are not sufficiently clear and omit key matters, including relating to safety and amenity. Overall, they would facilitate a lower standard of built outcome than anticipated, as has been the experience in the Central City zone. As a result, they would not implement the proposed policy 14.2.5.3.

Retirement villages

218. One submitter[26] asked that the MDRS be used as a baseline for consenting for retirement villages, but also requested certain exceptions such as outlook space because these premises manage their own amenities. I note that built form standards (including the MDRS) are not proposed to apply to retirement villages in PC14, which instead continues the Plan's existing restricted discretionary framework.

219. The submitter has proposed some alternative assessment matters for retirement villages to replace the existing ones. I have considered the proposed assessment matters, but I consider that they are less clear than the existing matters (14.15.9). This means that they provide less certainty for developer and the community around the type of effects to be assessed. The proposed matters are as follows:

    (i) The extent and effects arising from exceeding any of the relevant density standards (both individually and cumulatively)

    (ii) The effects of the retirement village on the safety of adjacent streets or public open spaces;

[26] 811.

(iii) *The effects arising from the quality of the interface between the retirement village and adjacent streets or public open spaces;*

(iv) *The extent to which articulation, modulation and materiality addresses adverse visual dominance effects associated with building length;*

(v) *The matters in 14.2.1.6, 14.2.3.1, 14.2.3.2, 14.2.3.3, 14.2.3.4, 14.2.3.5, 14.2.3.6, 14.2.3.7, 14.2.5.1, 14.2.5.2, 14.2.5.3, 14.2.5.4, 14.2.6.1, 14.2.7.1, 14.2.7.6, 14.2.8.3 and the proposed new policies as inserted.*

(vi) *The positive effects of the construction, development and use of the retirement village.*

220. In the above, the submitter also requests that the density standards are used as a guide for retirement village development.

221. They also request they are modified such that retirement villages are excluded from some of these standards. This includes outlook spaces, which they suggest should be only 1m x 1m because residents have access to other spaces in the complex. I consider that residents are still likely to spend a considerable amount of time at home and would appreciate outlook in the same way that other people (who may also spend a lot of their time away from home) would. I consider that the density standards are a minimum and that there is no special case to amend them if they are to be used as a guideline to a restricted discretionary application where breaches could be considered in any case.

222. Related to the above, the submission asks that outdoor living spaces should be modified so that half the space may be provided indoors. I consider this is inappropriate for apartments, because the required space is so low at $8m^2$. Even for houses, the amount of space required is low at $20m^2$ and is likely to be needed to provide a fairly basic standard of planting and recreation space. I consider this is more appropriately managed on a case-by-case basis, which is what the existing approach entails in any case.

223. The submission also requests that other proposed standards, such as garage locations, should not apply to retirement villages. Again, these will have the same impacts on the surrounding area from retirement villages as from other forms of development. If the zone standards are to be used for guidance, I

consider that all the standards should apply unless there is a particular circumstance that means they are not relevant.

224. However, I consider that the existing approach should be retained. The operative rule is explicit that zone built form standards do not apply to retirement villages.

225. Turning to the submitter's proposed assessment matters listed above, point (ii) is in relation to CPTED but is worded in such a way that it would not encourage good outcomes in line with the proposed policy. Residential development, and in particular large scale residential development, should contribute positively to a safe environment, for instance as is expressed in 14.15.1h, or in the existing matter 14.15.9a (v).

226. Point (iii) is not clear on the effects that it is concerned (in relation to street interface) with and how these might be assessed. It contrasts with rule 14.15.9 a (i) which is much more specific, listing 6 matters.

227. With regard to building bulk, the above standards would allow only the mitigation of bulk through *"articulation, modulation and materiality"*. This would not allow the consideration of the bulk of the building per se, only its mitigation. This strategy can be successful up to a point, but for larger buildings there can also be a need to reduce the bulk (for instance by splitting the building) or to hide the building behind smaller buildings (as is common practice) or orient it to the street as expected in the HRZ.

228. A particular issue with this is the impact of tall buildings in the HRZ on sunlight access, and I refer to the earlier discussion of this where the role of building separation is highlighted in providing for solar access under the HRZ rules.

229. I therefore recommend that the notified PC14 provisions for retirement villages are retained.

DEFINITIONS

230. The definition of 'Human scale' was queried[27]. This is a term widely used in Urban Design, but that has not been defined so far in the District Plan, but that also does not have a plain language meaning. It would be useful to

[27] Submitter 823.

define it because it would assist in Plan interpretation. The proposed definition is derived from Sims (2019):[28]

(a) ***Human scale*** *means incorporating dimensions that result in smaller built components and lower building heights, with attention to the human experience from eye level, relative to the physical size of a person.*

231. However, I do agree that, in this context, with the emphasis on increased intensification and building heights, it is not necessary or appropriate to focus on *"lower building heights"*. Instead the emphasis should be on the articulation and detailing provided by the building, which provide visual richness. Hence I consider that the definition could be altered to:

(a) ***Human Scale*** *means incorporating dimensions that result in smaller built components and ~~lower building heights~~* ***fine grain elements****, with attention to the human experience from eye level, relative to the physical size of a person.*

SUMMARY OF RECOMMENDATIONS

232. In the above analysis, I have recommended that the general approach notified in PC14 should be retained, but that some changes should be made in response to submissions. These recommended changes are as follows (these apply to both MRZ and HRZ unless otherwise noted):

(a) Allow small increases in height in the HRZ zone in combination with additional rules, providing for additional height in the form of a partial storey to be built in the roofspace.

(b) Allow additional height in the HRZ higher height precinct (allowing for 12 storeys), where land is particularly well located.

(c) Amend rule 14.6.2.12 a (i) (which allows 60% building coverage under certain circumstances in the HRZ) such that it only applies up to 12m in height.

(d) Amend front setback rules to allow an exception for porches with a width of 1.5m and a depth of 0.8m to be permitted in the front setback.

[28] See discussion on page 220 of Sims (2019) *Soft City.*

(e) Amend building coverage rules to allow eaves and guttering of up to 650mm to be excluded from the building coverage limit (as opposed to 500mm as notified).

(f) In the HRZ, introduce a 4m upper floor setback to the street boundary above a height of 12m where sites are adjacent to narrow streets (less than 16m wide).

(g) Amend fencing rules to allow for 1.8m high fencing for half of the street frontage.

(h) Amend the proposed mechanical ventilation rules to allow for these to be provided in front of the street boundary facade if screened; and to be otherwise permitted.

(i) Amend the windows to street rule so it is simpler and allows for multiple gables on the front façade to be excluded from the area calculation.

(j) Amend the ground floor habitable room rule to require 50% of the area of the ground floor to be habitable (rather than for 50% of the units to have ground floor habitable space).

(k) Amend the definition of Human Scale.

Dated: 11 August 2023

David Anthony Hattam

APPENDIX A - FURTHER SITE MODELLING – COMPARISON OF MDRS CAPACITY WITH PC14

This modelling has been undertaken to illustrate the impact of the notified PC14 recession planes on the development potential of narrow sites in the MRZ zone. Testing has been undertaken for various site widths for a site depth of 50m. The widths are 9m; 10m; 11m; 12m; 13m; 14m.

The tests indicate that maximum development capacity is 94% for the PC14 recession planes compared to the MDRS for sites of 14m or above. For sites of 12 or 13m, capacity is around 90%.

For sites of 10 and 11m, it drops to 70%-80% as a third storey becomes more difficult under the PC14 recession planes.

Below 10m, neither ruleset allows 3 storey dwellings and the development capacity is the same.

Results are summarised below:

Site Width	MDRS Scenario			PC14 Scenario			PC14 Capacity (% of MDRS scenario)
	Total Units	3 Storey	2 Storey	Total Units	3 Storey	2 Storey	
14m	6	6		6	5	1	94%
13m	6	5	1	5	5		88%
12m	5	5		5	4	1	90%
11m	4	4		4		4	70%
10m	3	3		3		3	80%
9m	4		4	4		4	100%

Method

The modelling uses houses with a footprint of 36m2, being sufficient for a small two-bedroom house on two levels, or a 3-bedroom house over 3 levels. These were placed on a site in the most efficient manner possible for both sets of rules for a variety of site widths. The following assumptions were made:

- Each site needed to be able to accommodate units and generally comply with district rules including requirements for outdoor living space and outlook spaces.
- Each site needed to also be able to accommodate bike storage, bin storage and access.

- Assumptions were made about the required space for access, that a path should be 3.5m wide if it includes bin storage or 3m if it does not (except for short sections).

In some cases, small first floor overhangs have been included where it helps to allow for an outlook space to be achieved. These are a common design feature and imply a slightly smaller ground floor than first floor. Similarly, up to half a metre of roof coving has been used where necessary.

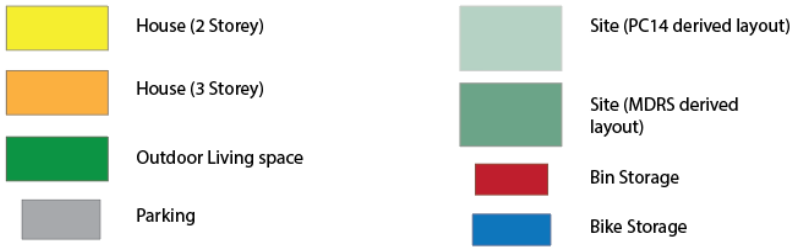
For the purpose of testing, car parking has been provided, usually at a rate of one less space than the number of units. In some cases, reductions occur and it is possible that the "cost" of the reduced recession planes could be one less parking space. For sites below 10m, on-site parking is no longer possible.

Cross sections and plans are shown below, for the most efficient site layout given each set of assumptions.

Some of the sites aligned east-west were somewhat harder to design for under PC14 because the south recession plane only allows development to the north of the site. This can be catered for through more complex buildings, providing outlook to the pathway rather than the outdoor living, and these are discussed throughout.

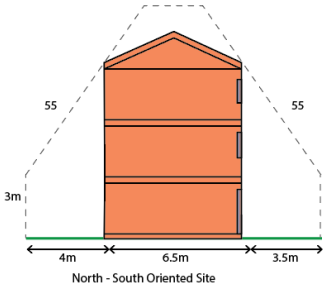
The following Legend is used in the diagrams:

Legend

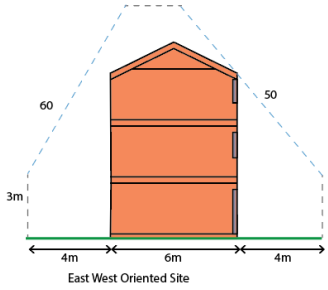


14m Wide Site

14m wide PC14

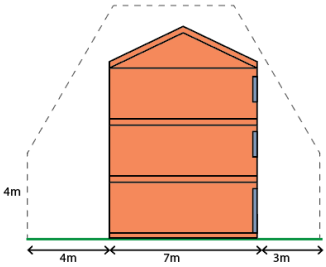


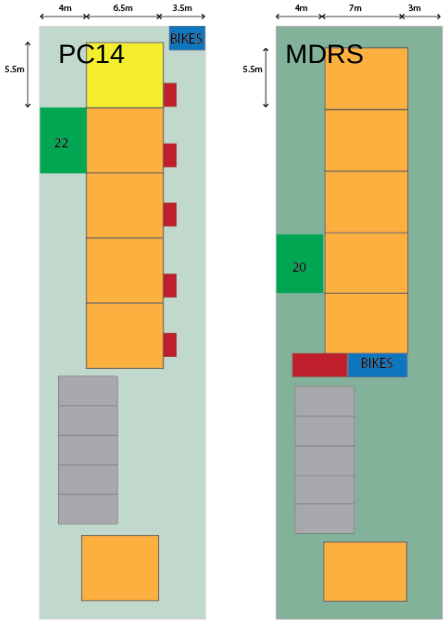
North - South Oriented Site



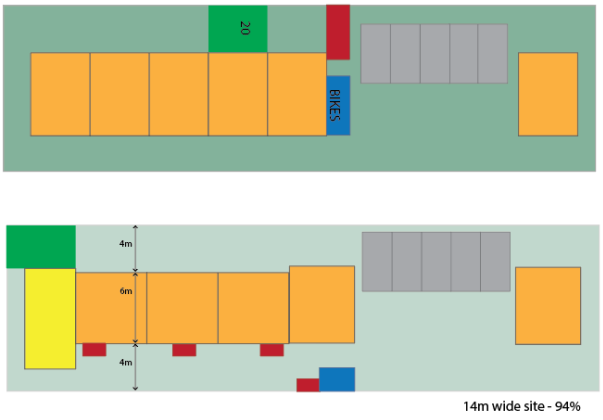
East West Oriented Site

14m wide MDRS





14m wide site - 94%



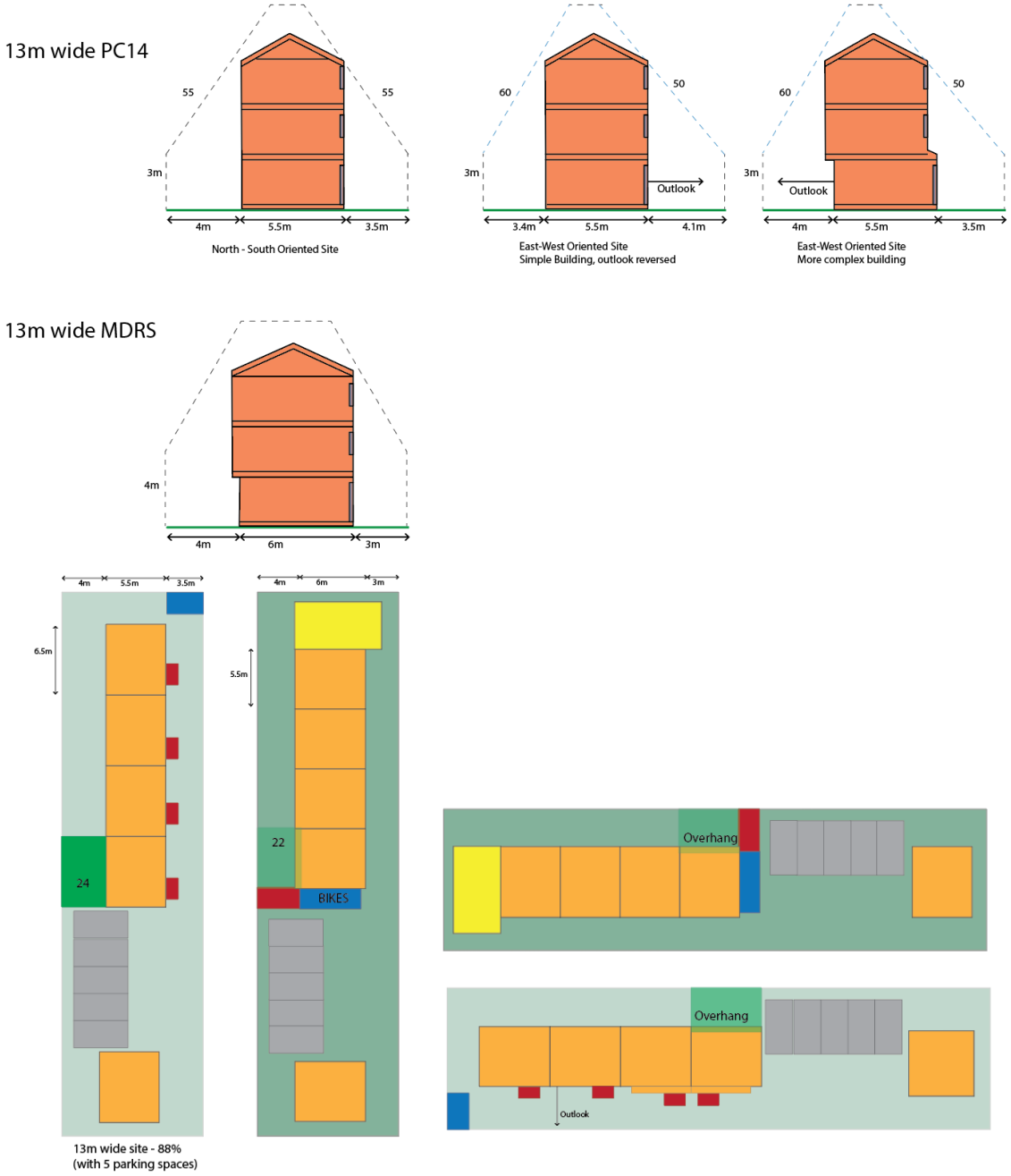
14m wide site - 94%

In both the above examples, the yield is reduced by a single storey for one house under the PC14 recession planes, in a similar manner to the 15m wide examples.

This reflects the significance of other constraints in determining site layout. Being able to move the massing about on the site does not necessarily result in a large increase in capacity because recession planes are not the only limiting factor.

However, the recession plane is more significant for the south boundary and requires the use of coving in the top storey under PC14.

13m Wide Site



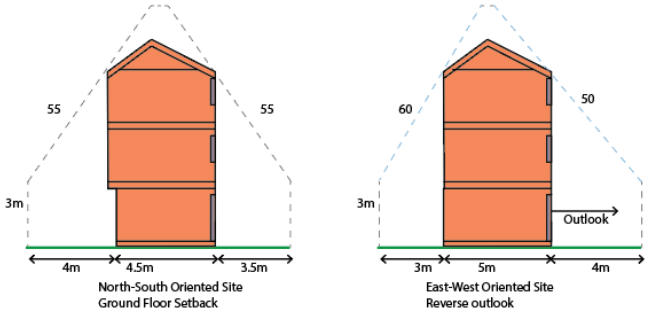
In both the above examples the yield on the PC14 example is 88% of the MDRS example. However, in this scenario it uses a simpler building, for the north-south example at least.

Both examples use slightly more complex buildings for the east-west example which reflects the interaction of the various constraints. It is harder to accommodate the outlook space on narrow sites, which is the reason overhangs have been used.

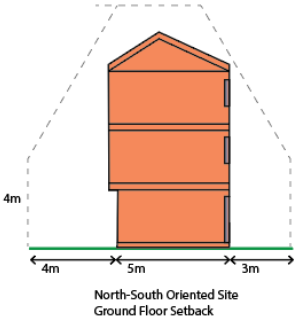
One way to avoid this and simplify the envelope is to have the outlook space over the accessway rather than the outdoor living space (shown on the PC14 layout). This is specifically permitted by the MDRS rules.

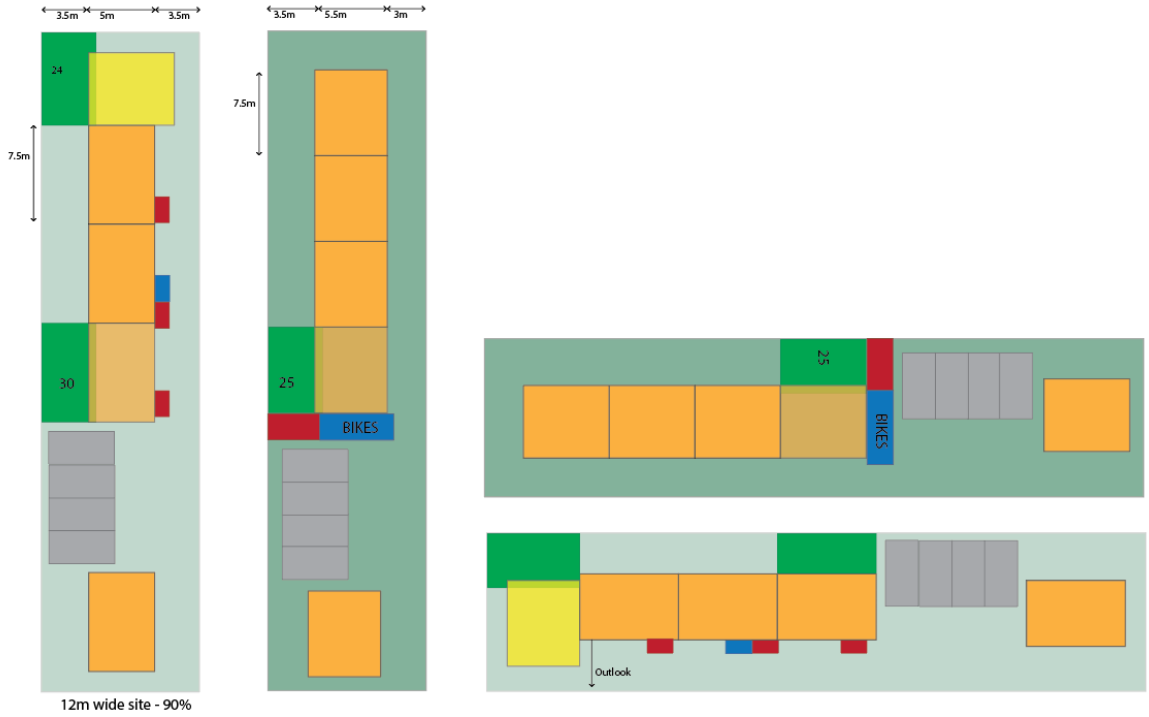
12m Wide Site

12m wide PC14



12m wide MDRS



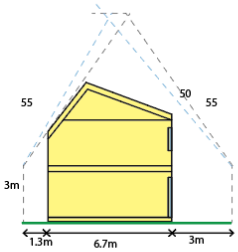


In these examples, capacity is 93% under the PC14 rules.

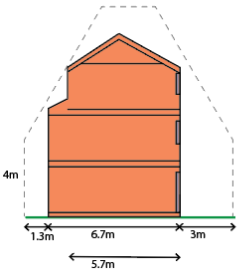
Both examples make use of overhangs to achieve outlook – although the east west PC14 example instead places it on the south side (there would be an option for a larger overhang but it may add some cost).

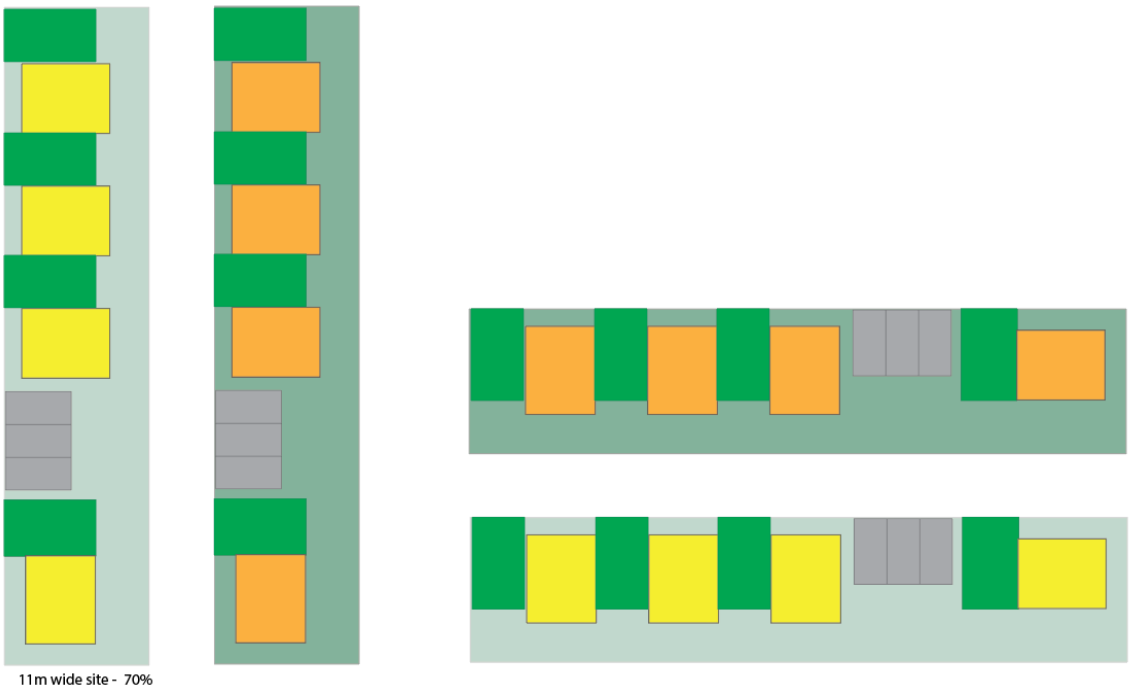
11m Wide Site

11m wide PC14



11m wide MDRS



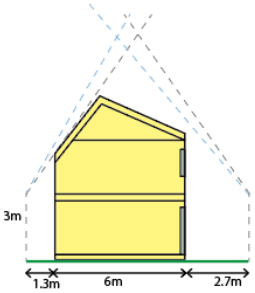


11m wide site - 70%

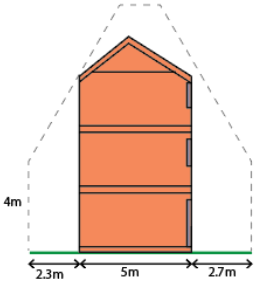
For these sites, the PC14 recession planes do make 3 storey development impractical, whilst it may be possible on MDRS sites, although slightly constrained. As a result, the PC14 capacity is about 70% of the MDRS.

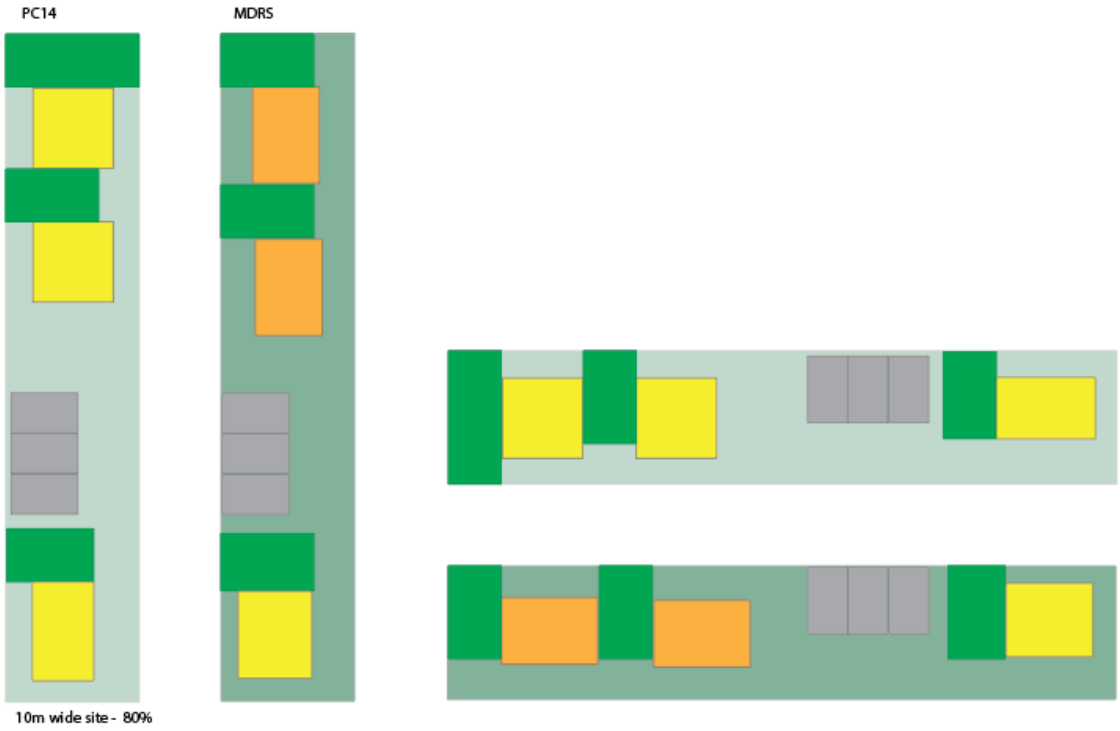
10m Wide Site

10m wide PC14



10m wide MDRS

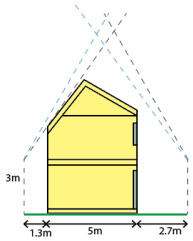




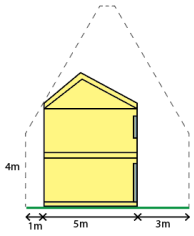
For these sites, the PC14 recession planes make 3 storey development impractical, whilst it may be possible on MDRS sites, although constrained. In this case the front house is constrained by the vehicle access. As a result, the PC14 capacity is about 80% of the MDRS in this example.

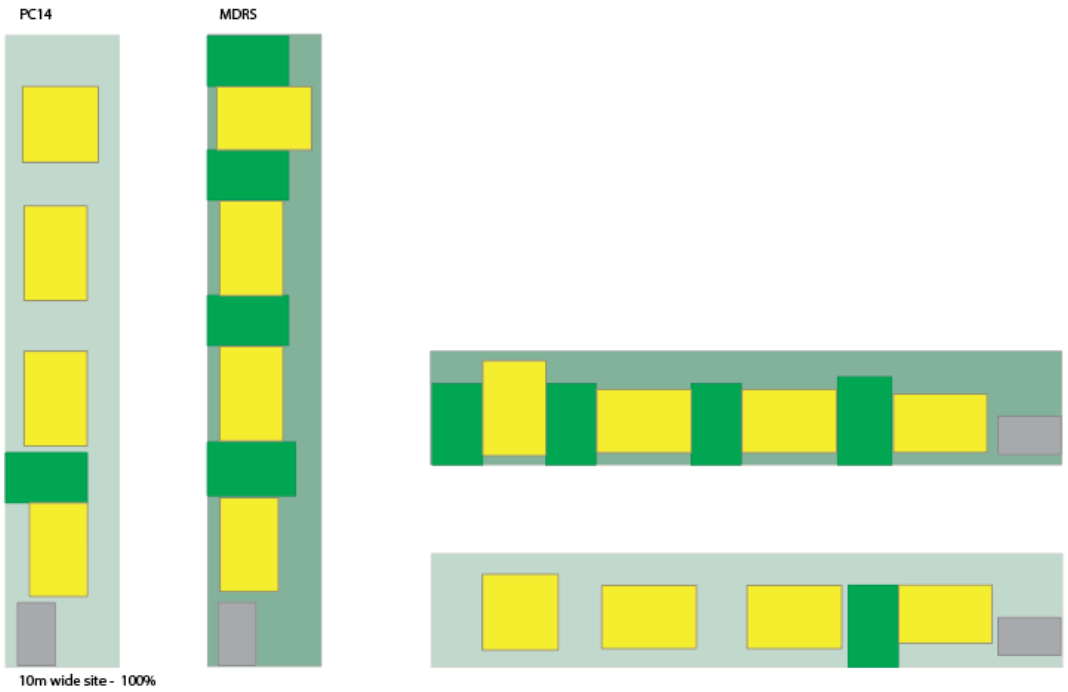
9m Wide Site

9m wide PC14



9m wide MDRS





In this example, both envelopes allow for only a 2-storey building and capacity is the same. On-site parking is no longer possible and instead a single parking space is provided to the street for both examples.

Conclusion

For sites between 12m and 15m, Implementing PC14 recession planes would reduce the maximum available capacity by between 5 and 12%, depending on site width and development decisions.

For sites between 10m and 11m, maximum capacity is reduced by up to 30%. For these widths, MDRS allows 3 storeys in situations where PC14 does not.

In the case of a 10m wide site the front MDRS unit is constrained by the width of a vehicle accessway and reduced to 2 storeys. Although this access is not a requirement, it is part of the scenario being tested. It illustrates that there are other constraints on site layout than recession planes which will interact with them to limit development in some cases.

For a 9m site, capacity is the same under both scenarios, because both easily allow for a 2 storey development but not 3 storeys. The impact of MDRS recession planes is such that It would not be possible to build a 3-storey house on sites much narrower than 10m.

The MDRS therefore has most impact on sites between 10m and 12m in width where it enables an extra storey across the site compared to PC14. For wider sites, other constraints (such as outlook spaces) have a more significant impact on capacity than recession planes. For narrower sites, both envelopes cater for 3 storeys but not 3.

APPENDIX B - HIGH DENSITY RESIDENTIAL ZONE SITE COVERAGE SCENARIOS

This study looks at the potential developable floor area for two scenarios under various potential district plan rules.

The rules are based on these three scenarios:

- Existing Residential Central City Rules
- The MDRS development envelope with a height of 6 storeys
- The notified HRZ rules

In all cases the scenarios must meet all rule constraints. The buildings are intended to maximise the developable area while complying with the rules in the plan. This means that the development will be limited by site coverage, height or recession planes.

In the RCC zone, the requirement for outdoor living space for each unit is a significant restriction.

The floor areas achieved are shown below:

Site	Rule Scenario	Floor Space	Site Coverage
750m^2 15m wide, 50m deep	RCC	1050	60
	MDRS	1270	50
	HRZ	1300	50
1500m^2 30m wide, 50m deep	RCC	3925	52.5
	MDRS	3825	50
	HRZ	4225	50
	HRZ (No site coverage)	4750	58.5

The modelling shows that HRZ is the most enabling of the three scenarios.

HRZ also allows for simpler building envelopes without steps.

Site coverage does constrain the bulk of buildings in this zone which is desirable in order to manage impacts on neighbours in the absence of recession planes. Small increases in building bulk can undermine the access to sunlight available for instance, especially as the building will likely be pushed out to all boundaries to achieve it. Sun access in high density zones really relies on gaps between the buildings, which are much less likely to be achieved if site coverage is so high.

A site coverage above 50% above 3 storeys will potentially have quite severe shading and enclosure impacts on neighbouring sites.

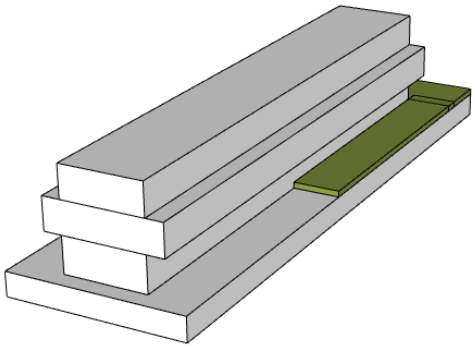
For 3 storey buildings, there can be a more significant increase in site coverage and the impacts would be lower (and 3 storey buildings can be more cost effective to build). It may be that the site coverage bonus should apply to 3 storey car free buildings only. Estimated 3 storey yields are shown below.

It should be noted that RCC is more enabling than other scenarios under particular circumstances (wide sites with 3-4 storeys with a roof garden for apartments with lifts). However, this does not mean it is more enabling overall.

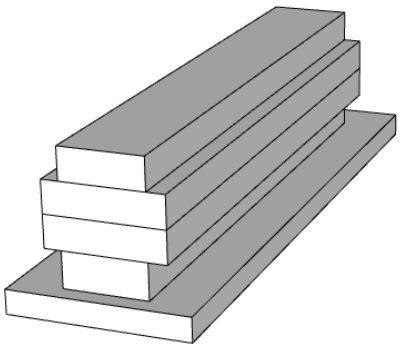
Scenario 1 - 15m wide site

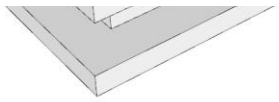
RCC

Floor Area: 1050m2
Site Coverage: 60%
Includes 150m2 required communal OLS;
Development is over 3 storeys.



MDRS
With 50 % site coverage limit:
Floor Area: 1270m2
(a 3 storey building would have an area of 1010m^2).



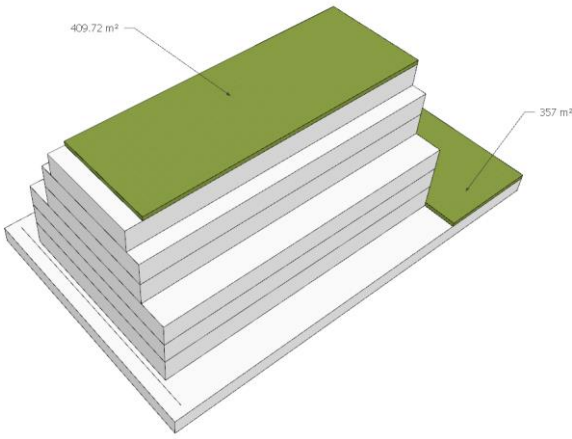


HRZ
Floor Area: 1300m2
Site Coverage: 50%
(would allow 1050m2 on 3 storeys)
Includes 8m * 8m communal space

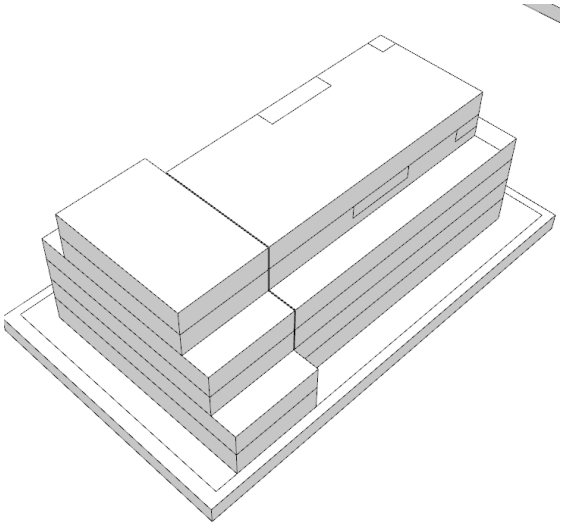
Scenario 2 – 30m Wide Site

RCC

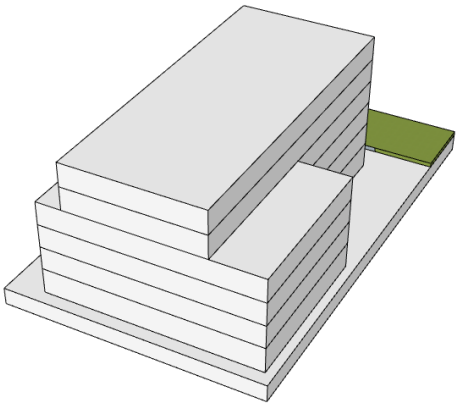
Floor Area: 3925m2
Site Coverage: 53%
Includes required 768m2 communal OLS – half is on roof.
(2250m^2 on 3 storeys – 50% site coverage; or if
a lift is provided could be 2500m^2 with half the space on the roof).



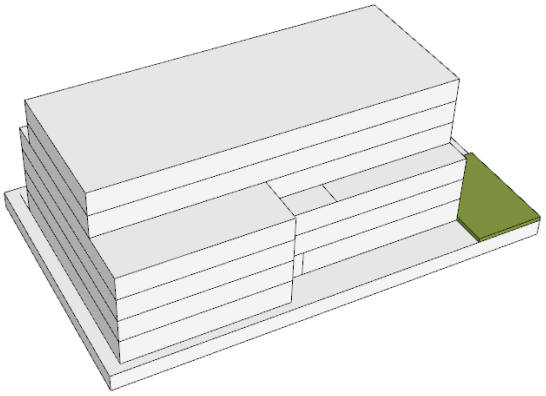
MDRS
Floor Area: 3825m2
Site Coverage: 50%
(2250m^2 on 3 storeys)



HRZ
Floor Area: 4225m2
Site Coverage: 50%
(2250m^2 on 3 storeys)



HRZ (No Site Coverage)
Floor Area: 4750m2
Site Coverage: 58%
(2600m^2 if 3 storeys).



APPENDIX C - HIGH DENSITY RESIDENTIAL ZONE: ANALYSIS OF SIX-STOREY BUILDING ENVELOPE SCENARIOS

1.0 Introduction

Modelling and analysis has been undertaken of a range of development scenarios to test the shading impacts of high density planning controls. In particular the study is concerned with the impact on internal sunlight received.

It is a characteristic of high-density housing that it will cause some shading of neighbours. The purpose of this analysis is to consider the impact of the MDRS provisions and the differences that can be achieved through alternative approaches to managing the building envelope, across a range of development scenarios.

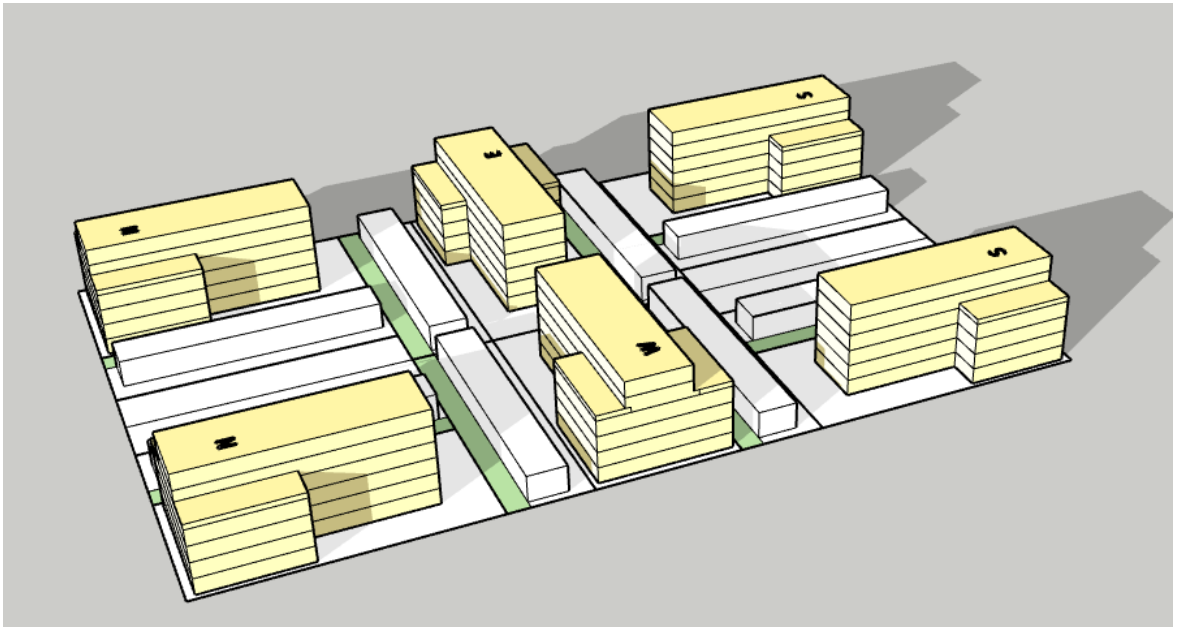
2.0 Method

Six models were created in Sketchup for high-density building envelope scenarios, each providing an approximation of a building that could be established under different circumstances. A floorspace of 3000m2 was sought. This is in line with development norms, where the floorspace for a six-storey building (excluding circulation space) is around twice the site area[29]. The models were based on a site width of 26m. This was chosen as a relatively narrow site suitable to accommodate 6 storeys.

These models were then arranged to represent an area with a mixture of high and low scale buildings. Each six-storey building was placed next to a townhouse development of a two-storey form typically existing within Christchurch and anticipated to remain predominant. Models were geo-located in Christchurch.

A block model of this type is shown below:

[29] New South Wales Apartment Design Guide.



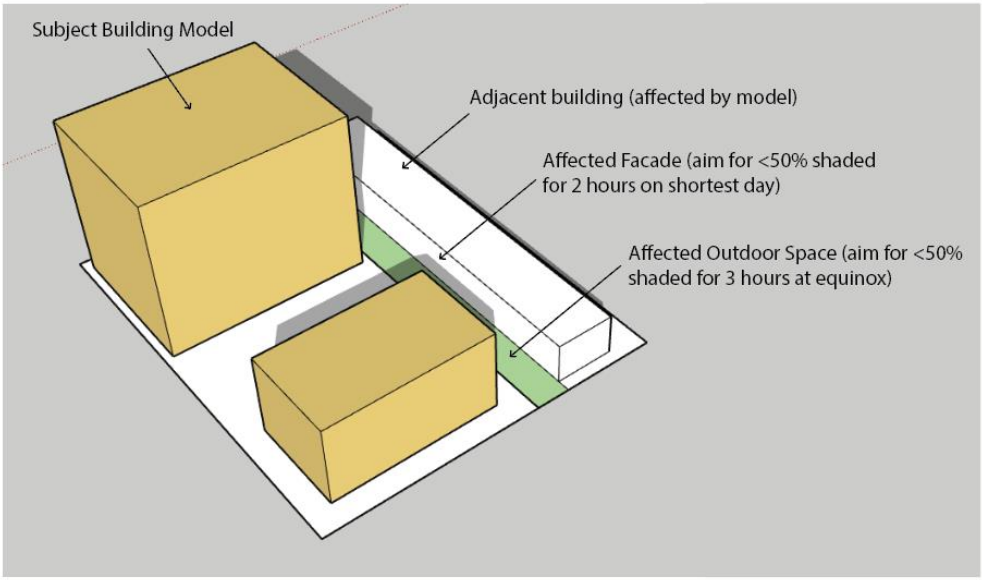
Example of a block model used to test shading.

For each scenario, the shading impact of the six-storey development on the adjoining townhouse development was tested at various orientations. The reasons for using this form are:

- This is the predominant recent form of high-density development in all zones, with many examples expected to be in place for at least the next 50 years.
- This is also expected to be the predominant form in the lifetime of the next plan. For a variety of reasons, there is limited appetite amongst developers to build apartments.

The living conditions within townhouses are therefore significant, as is the impact of tall buildings on the lower levels of other tall buildings.

A threshold was applied, being that more than half of the neighbouring building should be free of shading for a specified period of time (being 1 hour, 2 hours, or 3 hours). The testing was carried out for buildings oriented north, south, east and west (i.e. with the street facing façade facing that direction) for three key dates to indicate the level of shading of neighbouring buildings in the winter months. The model was then rotated 45 degrees, and the process repeated.



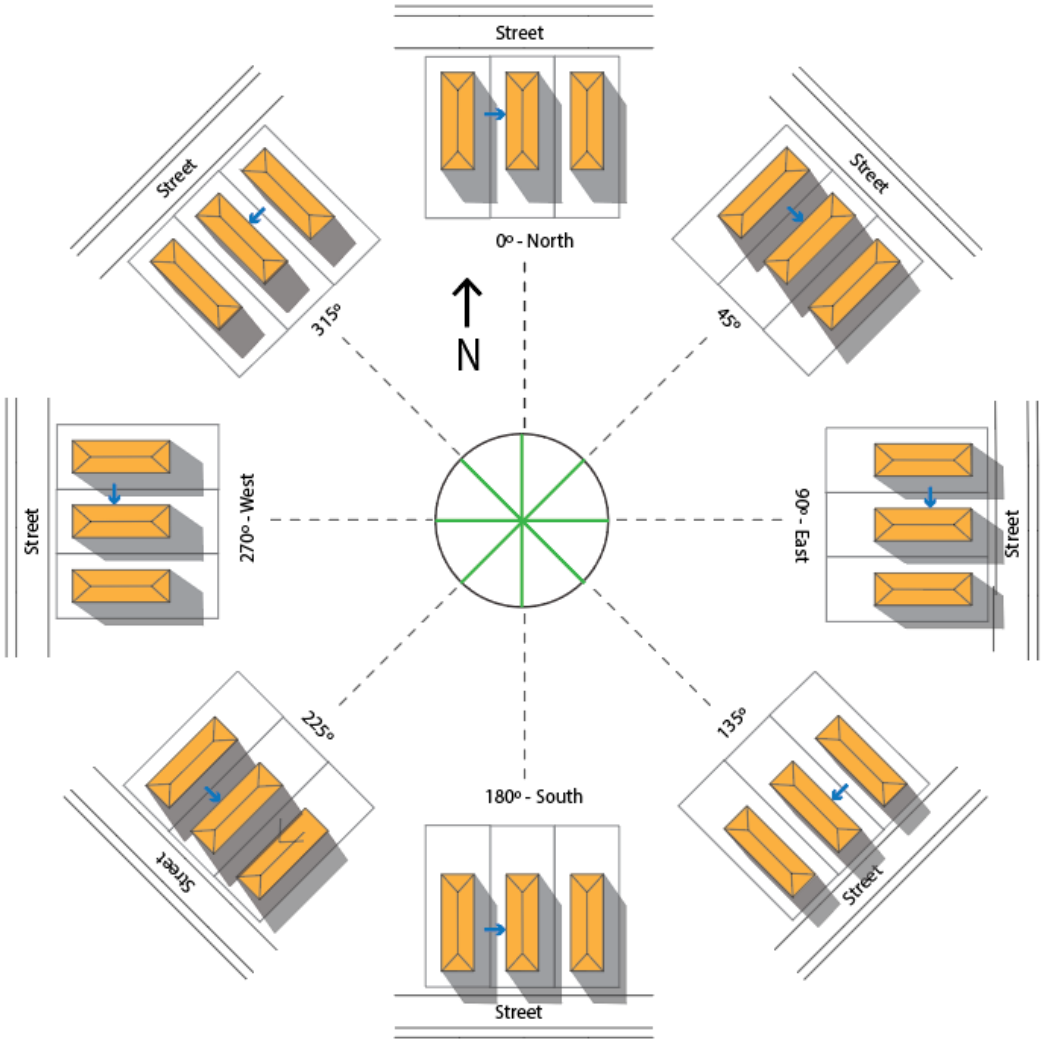
In all cases for this exercise we are interested in the impact of the building in the direction of the longest shadow cast – i.e. to the south, except for north south buildings when the east/west shadow is the most impactful. The assumption is that the building will have its main outlook towards the north.

For this study, the impact on the affected facade was modelled at 3 key dates throughout the year:

- Winter Solstice – 21 June
- Mid-point – 5 August
- Equinox – 21 September

The mid-point is useful because it gives an indication of solar seasonal access for a 3-month period (e.g. is there solar access for 9 months of the year even if not at the solstice).

This orientations used are shown below, with the blue arrow indicating the location of the façade being tested in each case. The diagram also shows how the orientations relate to the circle used to display results later in this document.



Site Orientations Used in Shade Testing

3.0 Models

The models developed are as follows:

1: MDRS: Based on MDRS recession planes and 50% site coverage, arranged in a typical format that might be built in Christchurch at present.

2: MDRS 6 storey: Based on an MDRS style development envelope, with 60 degree recession planes, 50% site coverage, and 3,100m2 of floorspace.

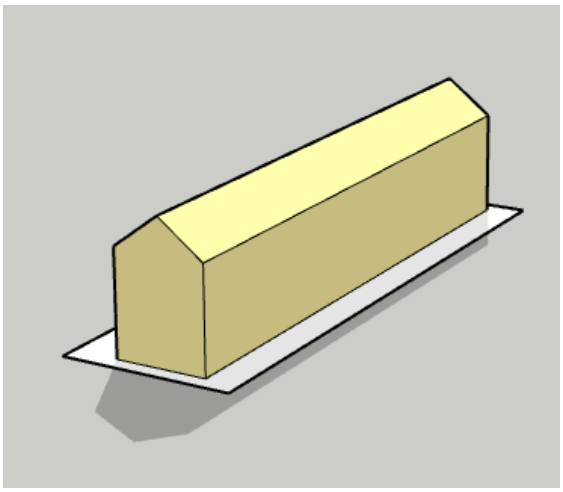
3: Perimeter Block with secondary building: 18m deep frontage building with a height of 18m and a secondary building to the rear with a height of 12m and otherwise complies with the notified planning provisions.

4: Shallow Perimeter Block model: This is a model that follows the notified rules and assessment matter design principles. It has a depth of 30m, which allows for separation with the block to the rear. It also provides.

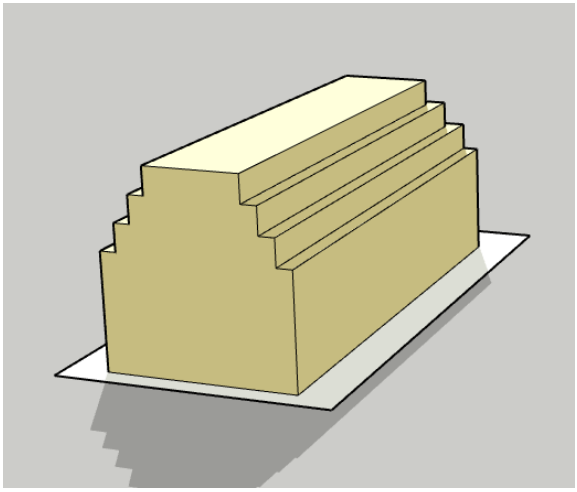
5: Deep Perimeter Block Model: This is similar to scenario 4, but with a depth of 40m. It provides increased floorspace, but reduced separation to the rear.

6: Modified shallow block, with increased side setback: Responds to the orientation by increasing side setbacks at the front and reducing the upper floor setbacks to compensate. The modified block with increased set back was designed to test whether modifications to the Shallow Block would improve its performance in the northern segment. The recession plane exceptions at the front have been reduced (increasing the building setback) and the remaining side setbacks increased to preserve a similar floorspace.

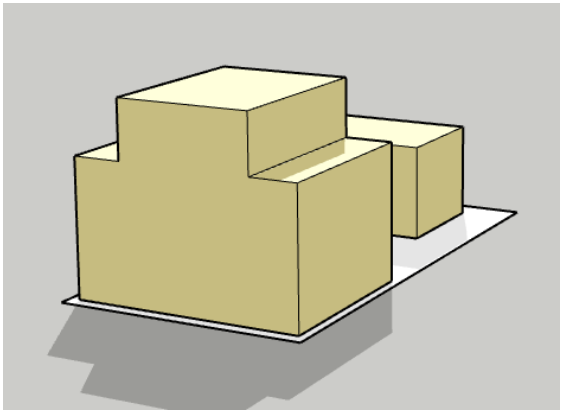
These models are shown below:



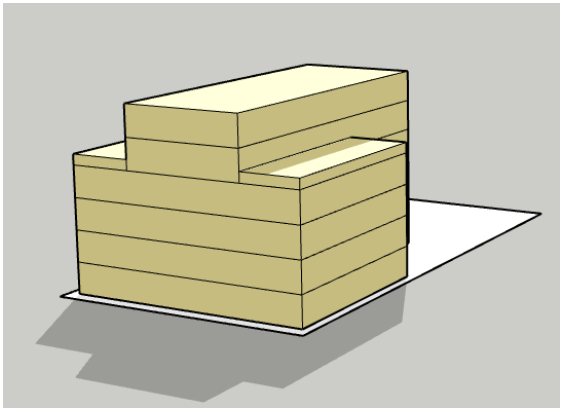
1: MDRS



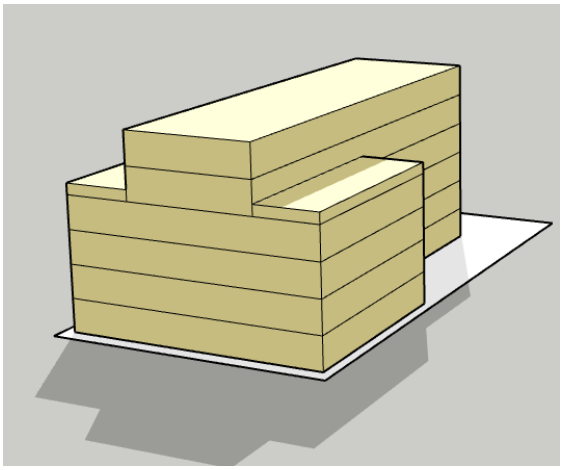
2: MDRS 6 Storey



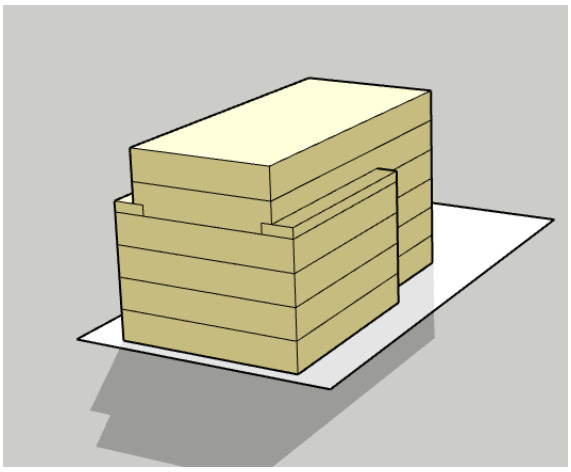
3: Perimeter Block with Secondary Building



4: Shallow Perimeter Block Model



5: Deep Perimeter Block Model



6: Modified Block with Increased Setbacks

4.0 Results

The results are shown in the table below:

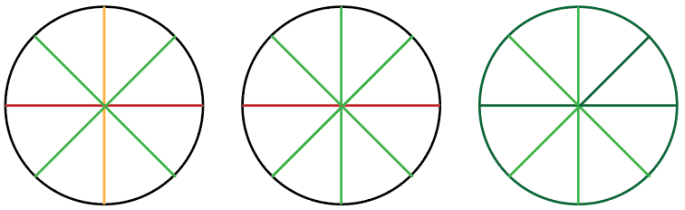
		Hours of Sunshine (>50% of façade area)		
Model	**Orientation**	**Solstice**	**Mid-Point**	**Equinox**
1: MDRS	0 - North	1.75	2	2
	45	2	2	3
	90 - East	0	0	9
	135	0	1.5	3.5
	180 - South	1.75	2	2
	225	0	0	2.75
	270 - West	0	0	9
	315	2	2	2.5
2: Six Storey 60 degree Recession Plane	0 - North	1.75	1.75	2
	45	1.75	2	2.75
	90 - East	0	0	1
	135	1	1.75	3
	180 - South	1.75	1.75	2
	225	0	2	2.75
	270 - West	0	0	1
	315	1	1.75	3
3: Perimeter Block with secondary building	0 - North	1	1.25	2
	45	1	1.25	2.25
	90 - East	0	0	3
	135	1	3.5	4.5
	180 - South	1.5	1.75	2.5
	225	1	2.75	3.5
	270 - West	0	0	3
	315	0	0	5

		Hours of Sunshine (>50% of façade area)		
Model	**Orientation**	**Solstice**	**Mid-Point**	**Equinox**
4: Shallow Perimeter Block (30m depth)	0 - North	1	1.25	1.5
	45	1	1	2.5
	90 - East	1.5	2.5	3.25
	135	2.5	4	3.5
	180 - South	2	3.5	3.5
	225	3	4	5
	270 - West	1.25	1.5	3
	315	1	1.25	2.5
5: Deep Perimeter Block (40m depth)	0 - North	1	1.25	1.25
	45	0	1.25	2
	90 - East	0	0	0.25
	135	0	0	2.25
	180 - South	1.5	1.75	2
	225	0	0	2.25
	270 - West	0	0	0.25
	315	0	0	2
6: Modified Shallow Block (6m side setback; 4m setback at front of site)	0 - North	1.25	1.5	1.75
	45	1.5	1.5	2.5
	90 - East	1	1.25	3
	135	2.75	4	3.25
	180 - South	1.75	2.5	3.5
	225	3	3.75	5
	270 - West	1	1.25	3
	315	1.5	1.75	2.5

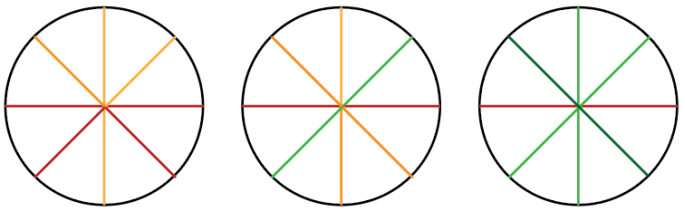
These results are shown on the graphic that follows. In this diagram, the colour of the lines indicates the hours of sunshine received (as expressed in the above table) for the different building orientations. Buildings are orientated to the edge of the circle, which can be thought of as the street frontage.

Hours of Sunlight where over 50% of receiving building is free of Shading

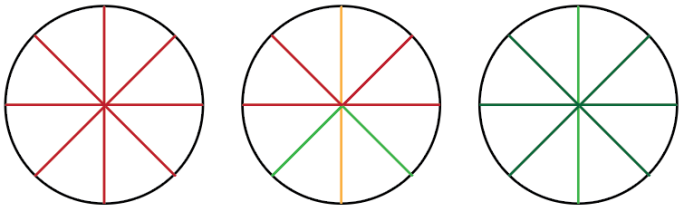
MDRS



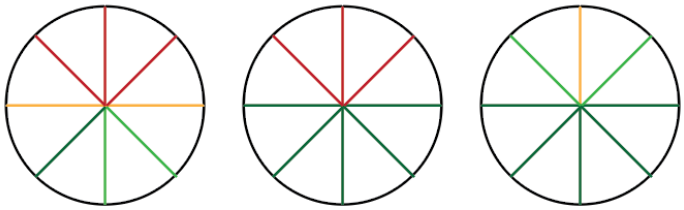
MDRS 6 storey - 60 degree recession plane (3100 m²)



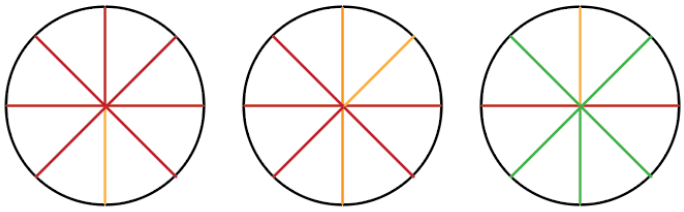
Perimeter Block with Secondary Building (2900 m²)



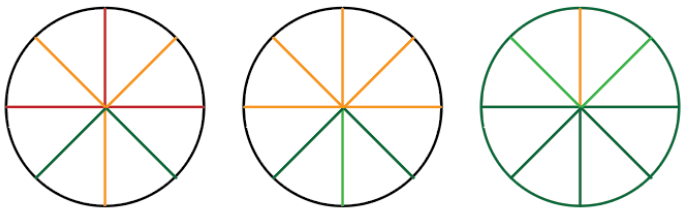
Notified Perimeter Block (30m depth) (3100 m²)

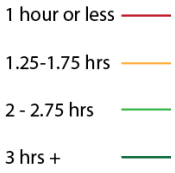


Deep Perimeter Block (40m depth) (3750 m²)



Modified Notified with 6m side setback and 4m road wall (3000 m²)





5.0 Discussion

A good outcome for solar access is three hours per day in the winter direct sunlight to interior living spaces[30]. In the analysis, achieving 2 hours of sunlight per day is regarded as meeting a basic threshold which indicates a reasonable level of solar access. For an east west facing window, the amount of available sunlight is 4.5 hours per day. This means that for a north-south site, achieving 2 hours of solar access is almost half of that available. In the diagrams, a green line indicates meeting this threshold. However, it should be noted that this would only be for half the building length.

The MDRS scenario meets the 2 hour benchmark at the solstice in the diagonal scenarios, but not for the cardinal directions. Of particular note is the poor performance for east-west oriented lots, due to the ability to build long and thin blocks with no breaks to allow winter sun in between the buildings. At the mid-point there is no sun access, and the MDRS guarantees only 7 months of solar access per year. At the equinox all orientations have good solar access.

The performance of the other scenarios is discussed below:

Scenario 2: MDRS Six Storey 60 degree Recession Plane

- No orientation meets the 2-hour benchmark for winter sun.
- At the mid-point, two orientations meet the benchmark but the rest fail it.
- Even at the equinox, the east-west oriented building has only an hour of sun access.

Overall this scenario has poor winter sun and good summer sun except for sites oriented east-west. However, the main objective is that the envelope provides for some winter sun access to the building.

Scenario 3: Perimeter Block with secondary building

- All orientations have poor winter sun access (an hour or less)
- Half the orientations are poor at the mid-point, with two being good.
- At the equinox, most orientations have 3 hours of sun

[30] See for instance North Shore City Council (2002) *Good Solutions Guide for Apartments* pp84.

Overall this scenario has poor winter sun but good summer sun. It is less successful than scenario 2 in winter, but more successful in summer.

Scenario 4: Shallow Perimeter Block (30m depth)

- At the winter solstice, the southern quartile receives good solar access, whilst the northern is poor (with the east-west receiving over an hour of sun).
- At the mid-point, there is good sun access for all but the northern quartile (which is poor)
- At the solstice, there is good solar access for all orientations (mostly over 3 hours per day) except for north where the perimeter block exceptions mean that there is only 1.5 hours of solar access.

This envelope performs quite well overall, but the northern quartile has quite poor winter performance.

Scenario 5: Deep Perimeter Block (40m Depth)

- The winter solstice has very low solar access.
- At the midpoint, outcomes remain poor, with only 3 orientations allowing more than 1 hours solar access
- At the equinox, there is reasonable solar access except for east-west, reflecting the depth of building and low level of separation.

This scenario has particularly poor outcomes, allowing little winter sun, and illustrates the problems caused by long buildings that cast large shadows, without allowing for solar access between the buildings.

Scenario 6: Modified Shallow Block (with 6m side setback and 4m side setback at the front of the site)

- Winter solstice performance is good around the southern quartile, but the remainder of the directions are poor.
- At the midpoint, the outcomes are better away from the south, but do not meet the threshold.
- Outcomes are generally good at the equinox, although the north direction still does not meet the threshold.

This scenario, designed to test a modified version of the shallow block model, does have a better performance than scenario 4 for northern orientations, generally gaining 15-30 minutes of solar access, but its east west performance is not as good.

One option could be to adopt this envelope for the north quadrant, instead of the current 7m setbacks. However, it is not MDRS compliant and if a developer was to build to MDRS (or PC14 recession planes) at the front of the site, it would take away most of the gains in sunlight access, which rely on building separation.

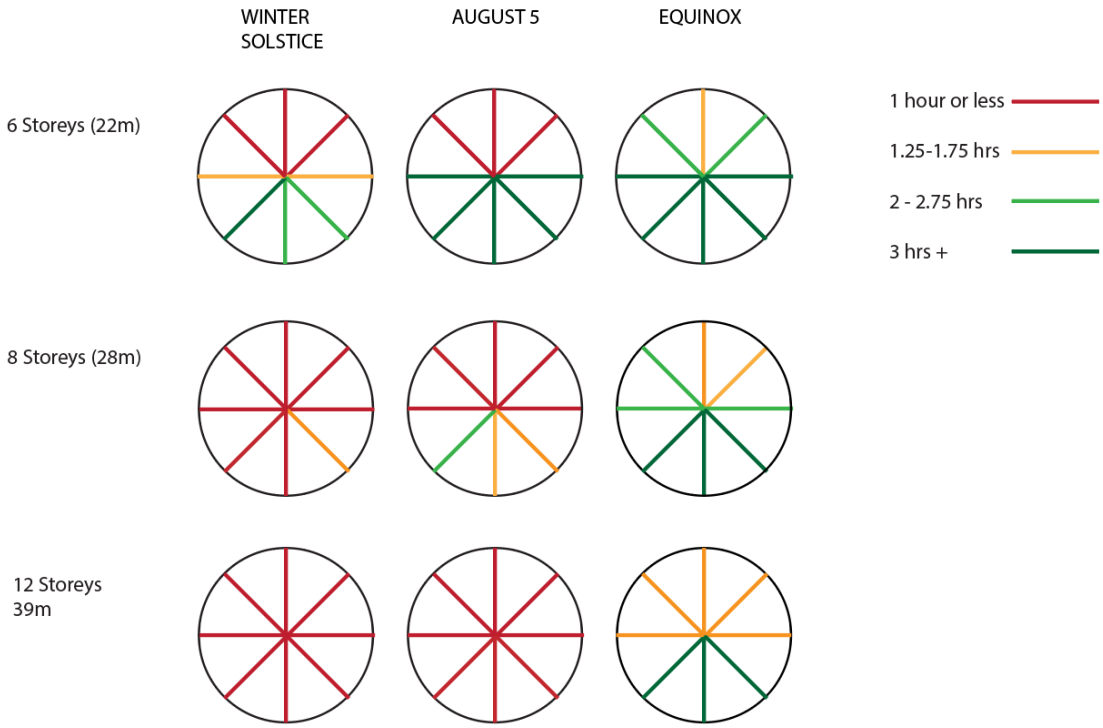
6.0 Taller Buildings

Further consideration was given to the effect of increasing the height of buildings. The height of the models was increased in line with the proposed district plan provisions, to simulate buildings at 8 storeys and 12 storeys.

The 8 storey model had a wall height of 25m and a roof height of 28m, whilst the 12 storey model had a wall height of 36m and a roof height of 39m. See paragraph 123 of the main report for details of measuring wall and roof height.

The results are shown below:

		Hours of Sunshine (>50% of façade area)		
Model	**Orientation**	**Solstice**	**Mid-Point**	**Equinox**
Six Storey (same as model 4: Shallow Perimeter Block	0 - North	1	1.25	1.5
	45	1	1	2.5
	90 - East	1.5	2.5	3.25
	135	2.5	4	3.5
	180 - South	2	3.5	3.5
	225	3	4	5
	270 - West	1.25	1.5	3
	315	1	1.25	2.5
Eight Storey	0 - North	1	1	1.5
	45	1	1	1.75
	90 - East	0.25	1	2
	135	1.75	1.75	4
	180 – South	0	1.25	4
	225	1.25	2	3
	270 - West	0.25	1	2
	315	1	1	2
Twelve Storey	0 - North	1	1	1.5
	45	1	1	1.25
	90 - East	0	0	1.5
	135	1	1	3
	180 - South	0	0	3
	225	1	1	3
	270 - West	0	0	1.5
	315	1	1	1.5

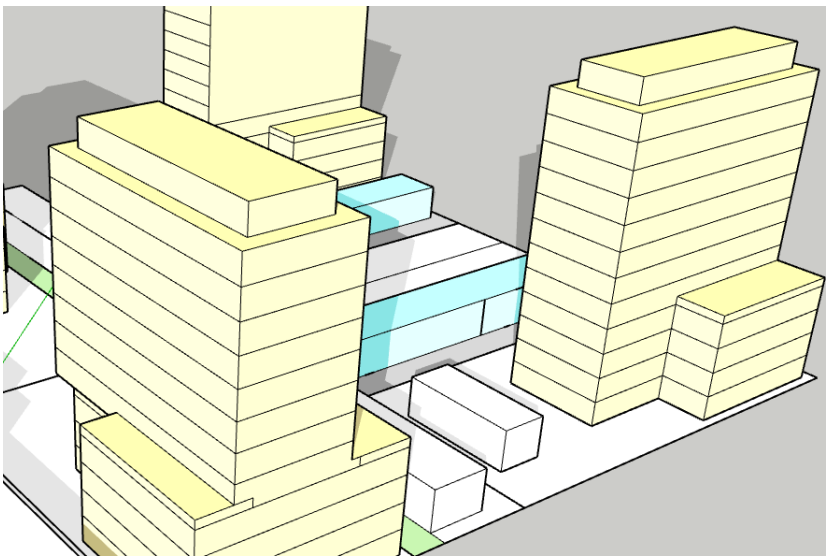


The results show an increase in the number of hours that have an hour or less of solar access per day.

The 12 storey models showed the receiving house to be shaded throughout the winter months (with all orientations receiving an hour or less of sunlight).

For the 8 storey model, the was a slightly better performance in mid-winter for two of the eight orientations, but over half of the wheel is still shaded at the mid-point.

At these taller heights, the impact of shading is more widespread because it is not confined to adjacent sites: the receiving models were often shaded by more than one of the tall buildings. This shows that it is harder to predict and manage the impacts of buildings above six storeys.



Above: Shadows from 12 storey buildings affect a wider area than for less tall buildings

6.0 Conclusion

The modelling and analysis demonstrates that MDRS creates quite a poor level of winter solar access, although it does provide better access at the equinox. However, a 6-storey envelope based on MDRS creates poor sunlight access and in particular for east west orientations.

The best overall envelope is Scenario 4, the Shallow Perimeter Block which performs quite well, except for the northern quadrant due to the combined impact of the height and the road wall (recession plane exception). Attempts to mitigate this through modifications to the envelope show only minor advantages.

A key finding is the importance of limiting the length of buildings, which the notified envelope restricts to 30m. The main determinant of solar access is the depth of building and the level of separation between buildings.

Perimeter block envelopes tend to have worse results in the north quartile, whilst recession plane scenarios are more problematic at the east-west quartile.

For buildings taller than 6 storeys, shading is more widespread and affects sites beyond the immediate neighbour. This was the reason that shading was more prevalent for 8 storey buildings and in particular for 12 storeys, which would not receive much sun through the winter.

APPENDIX D

Medium Density Housing Research

Additional Case Studies

Christchurch City Council

Technical Report

1 Introduction

This report has been produced to support the original research carried out in 2020 and summarised in the report *Medium and High Density Housing in Christchurch: Urban Design Review 2020.*

A number of gaps were identified in that research, relating in particular to the Central City due to the variety of development types; as well as to higher density RMD developments which were an emerging typology at the time. Whilst some trends were able to be observed in the sample, it was considered that more examples were needed to confirm how prevalent the issues are.

This research is aimed at providing more evidence to confirm the observations in the original paper.

The sample includes sites in the following zones of the Christchurch District Plan:

- 5 Residential Medium Density (RMD) sites
- 4 Residential Central City (RCC) sites
- 3 Commercial Central City Mixed Use (CCMU) sites

1.1 Methodology

The research uses the same "Urban Scales" methodology as the original study. A site visit was carried out for each site in the sample, and a score allocated to various criteria. For each site, comments were also noted in relation to the points and these form a valuable dataset that highlights issues and allows comparison of how the scores were reached in each case.

The methodology scored each attribute from 1 to 5. A score of 3 indicated a basic standard of urban design, and a score of 4 that a development was "well-considered". The district plan seeks "high quality" which is more than a basic response and considered to be more akin to a score of 4 than 3. Attributes that do not reach the threshold of a score of 3 indicate that there is a low quality of design.

The assessment matrix is provided in Section 3.2 of the original report.

2 Summary of Findings

2.1 Residential Medium Density Areas

Additional sites were surveyed because it was observed that a 2 storey 2 bedroom townhouse typology was becoming prevalent in the RMD areas, which was not well represented in the sample.

The outcome of the new survey revealed that, for this new typology:

- The newly surveyed RMD sites were consistently at a basic standard, with one site reaching a high standard.
- There was at least a small improvement in all 4 scales compared to the original sample. This appears to be in part due to features of the change in typology (such as centralised car parking, which splits the built form into two blocks, and ground floor living space).
- Both Building and Site scores were significantly higher than previously, across a range of categories. This largely appears to be due to the typology.
- CPTED issues, previously noted as a concern, were much improved, in part due to overlooking public and communal space from kitchens.
- As previously, some street interfaces were affected by confusion over "fronts and backs" – where outdoor living space is in the front setbacks and there is not clear point of entry. Resident's desire for privacy sometimes resulted in screening of the space.

2.2 Central City Areas

Additional central city types were surveyed to broaden the range of typologies in the original sample. Mixed with the original surveys from 2020, the following trends were evident:

- Overall scores were in line with the 2020 survey, with a basic standard reached on average, but relying on good performance in the Neighbourhood scale (with shortfalls in the Street, Building and in particular the Site scales). This indicates that much of the good outcomes is related to location rather than the development itself.
- There was significant variability in scores between sites, particularly noticeable in the CCMU sample. Outcomes ranged from poor to best-practice.
- In both zones, Street was around the basic level. Developments tended to provide a good sense of enclosure, but did not always create a sense of ownership of the street due to issues of fencing and poor transition space.
- In the RCC zone, site scores were significantly below the basic threshold with problem areas being the quality of accessways and communal space and CPTED issues. This is a continuation of the theme that private amenity is well provided for, but that communal spaces and servicing are neglected.
- There are some particular traits evident in the CCMU zone. These include problems related to internal layouts of houses, and poor resolution of communal areas and in one case, an almost total absence of usable outdoor living space. In this zone, there is more scope for very poor outcomes to eventuate.

- Some particular CPTED issues also arose in the CCMU zone, relating to privacy conflicts, lack of surveillance and very narrow accesses.

2.3 Taller Buildings

Bulkier buildings are unique to the central city and particular issues of integration were identified for these tall buildings. To investigate this, some analysis was carried out in relation to the taller buildings in the sample as a whole. Particular issues identified in this study include:

- Overlooking of neighbours
- Examples of monolithic buildings with poor design mitigation
- A shortfall of outdoor living space

These buildings also provided particular benefits:

- The sense of enclosure of the street and the potential for positive visual interest
- Variety in housing choice.

As for other samples, site layout issues and street issues were areas of under-performance.

3 Residential Medium Density Zone Examples

3.1 Overview

The RMD examples were predominantly 2 bed sites (of the 5 examples, 2 also included 1 or 2 1 bed units). This was to consider the impact of an observed trend: that there has been an increase in the number of 2 bedroom developments over the past 2 years.

	2021 (New Examples)	2020 (Previous Sample)
RMD Average	3.3	3.1
Neighbourhood	3.8	3.7
Street	3.0	2.9
Site	3.2	2.7
Building	3.3	3.1

Urban Scale scoring for the RMD zone, for this study and the 2020 sample

The overall averages for the new 2022 sample are for the most part slightly higher than for the previous one, with the exception of "site" which has shown a marked improvement, reflecting better outcomes in a number of the criteria. Particular improvements are related to CPTED outcomes and to general site layout. This is thought to be related to the typologies used, as well as a potentially greater awareness of street scene issues.

Two-bedroom-two-storey units usually have some of these attributes:

- Ground floor living areas and upper floor bedrooms (there is a good balance between ground and first floor accommodation because two bedrooms on the first floor fit easily over ground floor living).
- Due to the above, kitchen windows can easily overlook public space (this reduces adverse privacy impacts whilst achieving engagement and surveillance).
- There is often a central carpark rather than garaging which splits the block in two, avoiding long "sausage blocks".
- Where there is attached garaging, there are not usually bedrooms above it – meaning that there are breaks in the first floor façade.
- Where there is a central car park, there is often a wide walking access to the rear units, which allows space for planting.

For this analysis, the scores in this zone have not been combined with the previous sample. This is because the new study uses selected examples to fill an identified niche in the research rather than a random selection. The purpose is to identify if the general trends also apply to this new product.

3.2 Analysis by Urban Scales

Neighbourhood

For three of the sites, the developments were observed to be incongruous in areas with with predominantly single housing. This issue was noted in the original study: new developments do not fit into "traditional" areas because of visual dominance and a change in the rhythm of development along the street. Where they were in more

established RMD suburbs, the developments fitted with the pattern of development. This is an issue of transition.

More generally, the density was found to be appropriately located and contribute to housing choice.

Street

This attribute was found to be marginally higher for the new (higher density) sample than for the main sample.

Issues with the previous sample were related to the prevalence of fencing, location of entrances and issues around transition space. These were observed in all zones and summarised as "an ill-considered transition between public and private areas", evident in lower scores for B2 and B4. The new sample recorded improved scores for these categories.

Ref	Outcome	2021 Sample	2020 RMD Av
B1	Creating an appropriate sense of enclosure along the street	3.6	3.0
B2	Fostering a sense of ownership of the street.	2.8	2.5
B3	Activation and articulation of the street façade through openings	2.8	2.8
B4	Property boundaries are well defined and enable views of the street.	3.0	2.7
B5	Building layout and form appropriately responds to the urban context	3.0	3.2
	Overall Score	3.0	2.8

Urban Scale scoring for the RMD zone, for this study and the 2020 sample (Street scale)

Creating a sense of enclosure

The most striking difference between the samples is in B1 (sense of enclosure), where 3 of the sample were regarded as being in the "well-considered" category with a score of 4 in the 2021 sample. This may be in part due to the two-storey scale of the housing, which is enough to create enclosure – the built form was more consistent in the new sample.

Fronts and Backs

One trend that was evident was that there was confusion over fronts and backs of houses, with internally facing front doors and private space at the street. Sometimes screening had been used to block views through transparent fencing, indicating a poor balance between privacy and street engagement.

However, other sites showed some awareness of managing the issue with thoughtfully placed transparent fencing in front of the house (which is less privacy sensitive than the outdoor living area).

Figure 1: Front Outdoor living space has been screened in this example

Site

The RMD sites scored well for site layout averaging over 3.2, indicating more than basic outcomes. This good scoring indicates that site layout is generally well thought through, even if there are some aspects that are not, in some cases.

Scores in the new RMD sample were considerably higher than in 2020 in some categories. C1, C3, C4, C5 and C9 were at least half a point higher), while other categories were quite similar.

Site	Outcome	2021 Average	2020 RMD Average
C1	An integrated and comprehensive approach to the layout of buildings and spaces	3.6	2.7
C2	Provides for housing choice	3.2	3.0
C3	Respectful and responsive design of interfaces and activities relating to neighbouring properties	4	3.1
C4	Comprehensive approach taken to the design and quality of paving, landscaped areas and open space.	3.0	2.2
C5	Reduce opportunities for crime by ensuring an effective layout and provision of other features to maximise safety (including the perception of safety)	3.6	2.7
C6	Appropriate provision and location of private outdoor living spaces	3.4	3.2
C7	Appropriate provision, location and design of communal open space	2.8	2.7
C8	Provide for the safe and efficient movement of pedestrians, cyclists and vehicles	3.2	3.0
C9	A sound car parking strategy is utilised, and the visual impact car parking where provided is minimised.	3.4	2.9
C10	Efficient and effective provision of services and storage areas	3	3.1
C11	Incorporation and promotion of sustainability across the site	2	1.8
	Overall	3.2	2.8

Urban Scale scoring for the RMD zone, for this study and the 2020 sample (Site Scale)

Most sites in the previous study had poor site layout. Particular observations were that:

- Sites had poor CPTED outcomes and privacy issues, due to the location of outdoor living spaces and bedrooms next to public areas.
- Accessways were poorly landscaped and communal space was of poor quality
- Private amenity (eg outdoor living spaces and solar access) was well provided for.

Observations made in relation to these improved categories were:

Improved Site Layouts

Category C1 relates to overall site layout, which was almost a whole point higher, a very significant increase, albeit for a small sample size. There was usually a good basic layout with some pedestrian priority and a satisfactory relationship with the accessway. Some sites had outdoor living in front of the house, which reduced the scores somewhat.

Improvements with the way buildings fit with Neighbours

Category C3 is concerned with privacy and the impact on neighbours. For many sites, there was more than one building, usually due to centralised car parking. This avoided the common issues of a long building sideways to the street, dominating views and outlook. Prominent overlooking was also avoided and the scale of building was also not considered overbearing.

Figure 2: A common typology is two buildings with central car parking

Better CPTED related Outcomes

For category C5, (CPTED) there was a big improvement in an area that was noted as being of concern. The examples had a high frequency of doors and often overlooked spaces through kitchen windows. In all cases bedrooms were upstairs and kitchens faced the accessways. Several examples had relatively generous planting in front of the houses to provide separation and protect internal privacy. Direct sightlines were also noted as a positive. This is a very positive finding, which may reflect improved implementation of the District Plan, or may simply be due to the typology. In all, 4 of the 5 sites had a well-considered outcome.

Better Car-Parking but Landscaping still variable

Catergory C9 concerns car parking, which was generally well managed, either in garages or centralised car parking areas which were not visually prominent. Parking was usually provided in a sensitive manner in these examples. Communal landscaping (catergory C4) was another of the main issues previously identified and results were better than previous, but still below the basic threshold. Performance was highly variable and there was a shortage of provision in some cases.

Sustainability still not well provided

The main category where there is site-layout underperformance is sustainability (about which the district plan has little to say).

Building

This category is made up of three distinct sets of outcomes: Appearance related matters (catergory D1-D5), Functional outcomes (catergory D6-D10) and Sustainability and Innovation (catergory D11 and D12). In the RMD zone, matters were generally met quite well except for sustainability and innovation.

Scores for the new 2022 examples were somewhat higher than for the previous study. This was due to appearance related matters averaging 3.6 as opposed to 3.3 in the 2020 study; whilst Functional outcomes were identical at 3.5.

For appearance related matters, performance was variable with 2 examples scoring almost 4, and others achieving around 3 or less.

Good Site Layout resulted in good built outcomes.

In part, the good scores were driven by the form of developments as previously discussed under "Site" (generally not in a single run and so the roofline and building line were broken into two or more buildings). One good example with a long terrace broke it into two blocks at first floor by stepping a unit down (ie inserting a single storey studio unit into the centre of the row). Sometimes the buildings were quite blocky, but the larger (longer) building was usually at the rear.

Figure 3: This development consisted of several smaller buildings (duplexes)

There was generally a good amount of glazing and detailing. Rather than the detailing being used to try and cover site layout issues as for the previous examples, the site layout in these cases was generally satisfactory.

For functional outcomes, storage emerged as a shortcoming in some cases, likely due to the lack of a garage (and nothing being provided to make up for it).

Sub - Category	Building	Outcome	2021 RMD Average	2020 RMD Average
Appearance Related	D1	A visually interesting and cohesive approach to the building form	3.6	3.05
	D2	Variation and steps in the building line	4	3.4
	D3	Sufficient breaks in the roofline	3.8	3.4
	D4	Designing to a domestic scale	3.6	3.2
	D5	Use high quality materials	3.2	3.3
Functional	D6	Coordinated internal/ external relationship	3.8	3.4
	D7	Provision of adequate storage	3	3.75
	D8	Logical and efficient layout	3.6	3.5
	D9	Protecting privacy and minimising overlooking	3.4	3.1
	D10	Enabling of natural ventilation, solar gain and daylight penetration	3.6	3.65
Innovation and Sustainability	D11	Promotes energy efficiency and incorporates sustainability features	2	1.55
	D12	Demonstrates innovation and creativity in build design, form and function	2	1.35
		Overall	3.3	3.1

Urban Scale scoring for the RMD zone, for this study and the 2020 sample (Building Scale)

3 Central City Examples

3.1 Overview

The purpose of this part of the study is to augment the sample size of the 2020 study. It was noted that there was a shortage of examples in the central city given the variety of typologies. As a result, the new examples have been combined with data from the previous study.

The study has included four higher density RCC examples to augment the previous sample, as well as three randomly selected CCMU developments.

Unlike the 2020 study, this study also breaks down the two central city zones. The more "hands-off" approach in the CCMU does have the potential for poor outcomes to eventuate and the question is whether this is happening.

	RCC Combined (Both Samples)	CCMU Combined (Both Samples)	Central City Combined	Central City 2021	Central City 2020	RCC 2020
Average	3.0	3.1	3.0	3.0	3.1	2.9
Neighbourhood	3.5	3.6	3.5	3.6	3.5	3.4
Street	2.9	3.3	3.0	3.0	3.0	2.8
Site	2.7	2.7	2.7	2.5	2.8	2.7
Building	2.8	3.0	2.8	2.8	2.8	2.7

Urban Scale scoring in the Central City, for this study and the 2020 sample

As a whole, the results are not greatly different to the previous sample except that site layout has not scored so highly. This appears to be due to lower scores in the CCMU sample which are discussed later in this section.

There is also not much difference between the headline scores of the two zones. However, scores in the CCMU zone are much more variable, indicating a potential for poor quality outcomes. This is shown in the chart below, although it is notable that RCC also records a range of outcomes.

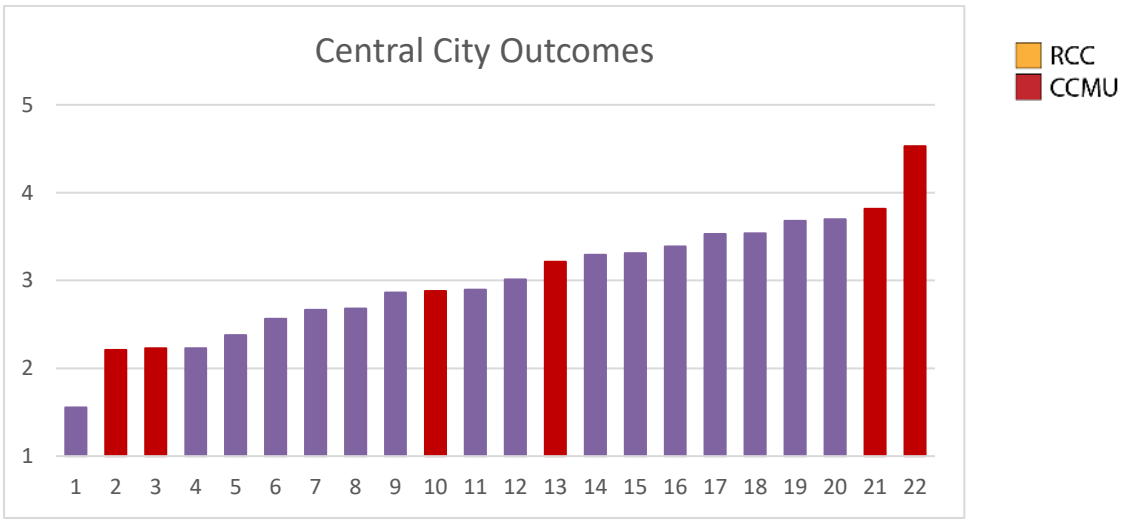


Figure 1: Overall scores for RCC and CCMU zone examples

3.2 Residential Central City

This analysis relates to the combined scores for all RCC sites. More detailed analysis is provided in Section 4 (Tall Apartment Buildings), because these were a focus of the sample.

The sample demonstrates that the sites were generally complimentary at the neighbourhood scale, but did not have a good street interface or function well at the building scale. The site scale recorded the lowest scores due to poorly conceived communal spaces and servicing, combined with intensive overlooking of neighbours in some cases. Some of these issues are more prevalent in taller buildings, which are considered separately.

	RCC Combined
Average	3.0
Neighbourhood	3.5
Street	2.9
Site	2.7
Building	2.8

Urban Scale scoring for the RCC zone, Combined Samples

Neighbourhood

Scores are consistently high in this scale due to the facilities available in the central city. One issue noted, however, was that there was often an integration issue because buildings were bulky and often very visible in the existing surroundings. This is a result of the scale of building and discussed further in the next section.

Street

Combined scores are marginally short of the basic threshold. The reasons previously described, to do with the location of outdoor living spaces, privacy issues and the lack of a public interface for development continue to be observed. These are reflected in low scores in the B2 and B3 categories.

Ref	Outcome	Combined Average
B1	Creating an appropriate sense of enclosure along the street	3.4
B2	Fostering a sense of ownership of the street.	2.5
B3	Activation and articulation of the street façade through openings	2.6
B4	Property boundaries are well defined and enable views of the street.	2.9
B5	Building layout and form appropriately responds to the urban context	3.0
	Overall Score	2.9

Urban Scale scoring for the RCC zone (Street Scale)

Site

Combined scores are in line with what was seen in 2020 and significantly below the basic threshold. Problem areas are categories C3 (neighbouring amenity), C5 (CPTED) and C4 and C7, which relate to the quality of accessways and communal space.

Site	Outcome	Combined Average
C1	An integrated and comprehensive approach to the layout of buildings and spaces	2.9
C2	Provides for housing choice	3
C3	Respectful and responsive design of interfaces and activities relating to neighbouring properties	2.5
C4	Comprehensive approach taken to the design and quality of paving, landscaped areas and open space.	2.3
C5	Reduce opportunities for crime by ensuring an effective layout and provision of other features to maximise safety (including the perception of safety)	2.6
C6	Appropriate provision and location of private outdoor living spaces	3.1
C7	Appropriate provision, location and design of communal open space	2.3
C8	Provide for the safe and efficient movement of pedestrians, cyclists and vehicles	3.3
C9	A sound car parking strategy is utilised, and the visual impact car parking where provided is minimised.	2.9
C10	Efficient and effective provision of services and storage areas	2.8
C11	Incorporation and promotion of sustainability across the site	2
	Overall	2.7

Urban Scale scoring for the RCC zone (Street Scale)

The first of these is due to overlooking and loss of outlook, from large buildings built along the boundaries, usually perpendicular to the street. This is an issue with the shape of sites and the predominant “sausage block” development, the impacts of which increase with height – for example several rows of balconies overlooking neighbours. These contrast with the lower scale RMD zone that recorded good outcomes in relation to this matter.

Four storey development built lengthways on a narrow section creates issues of overlooking and enclosure for neighbours

The second issue (CPTED) was highlighted in the previous study and was due to the lack of a functional relationship between the houses and public or communal areas, in many cases. Whilst there was often surveillance and engagement via windows, a shortage of separation between the public and private realm lead to screening. There was also a lack of a sense of ownership of public or communal space.

The remaining two issues are a continuation of the theme that private amenity is well provided for, but that communal spaces and servicing are neglected, likely because these are of less direct interest to buyers of individual units.

Building

The overall scores were marginally below the basic threshold and the sample as a whole. The driver of this was the five appearance related outcomes, which were mostly below the threshold. Larger developments were seen as being monolithic. The low score for category D3 is symptomatic of the issue of bulky buildings.

Functional outcomes were similar to the wider sample, as were sustainability outcomes.

Sub -Category	Building	Outcome	Combined Score
Appearance Related	D1	A visually interesting and cohesive approach to the building form	2.7
	D2	Variation and steps in the building line	2.7
	D3	Sufficient breaks in the roofline	2.3
	D4	Designing to a domestic scale	2.8
	D5	Use high quality materials	3.1
Functional	D6	Coordinated internal/ external relationship	3.1
	D7	Provision of adequate storage	3.3
	D8	Logical and efficient layout	3.4
	D9	Protecting privacy and minimising overlooking	2.8
	D10	Enabling of natural ventilation, solar gain and daylight penetration	3.6
Innovation and Sustainability	D11	Promotes energy efficiency and incorporates sustainability features	1.8
	D12	Demonstrates innovation and creativity in build design, form and function	1.6
		Overall	2.8

Urban Scale scoring for the RCC zone (Building Scale)

3.3 Commercial Central City Mixed Use

The sample size for this zone is six developments. This is not a large size, but is sufficient to see emerging trends in the zone and identify any particular problem areas.

Whilst the average urban scale scores are similar (or indeed higher) than the RCC, there is a lot of variability in the sample, indicating potential for poor quality development. Overall scores range from 2.1 (amongst the lowest in the entire sample) to 4.5 (the highest). There were 2 inadequate developments, 2 basic and 2 well-conceived or better. This indicates some validity in the concern that CCMU allows for poor quality to be constructed. To a significant extent, the results have been skewed by one high performing site.

There are some particular traits evident in the zone that are not necessarily evident in RCC. These include problems related to internal layouts of houses, and poor resolution of communal areas and in one case, an almost total absence of usable outdoor living space. In this zone, there is more scope for very poor outcomes to eventuate. By contrast, there was one very good example with innovative layout.

Neighbourhood

Scores are consistently high in this scale due in part to the facilities available in the central city. Observations were that there is consistent appropriate scale but sometimes poor quality street interface due to inward looking sites. Sites in this sample are generally better positioned for residential development than the CCMU as a whole (often at the edge of the zone, opposite existing residential).

Street

CCMU sites had a combined score of 3.3 for category B3, which is comfortably meeting the "basic" threshold. However, there was considerable variability, including 2 developments that rated inadequate. These low-performing sites did enclose the street, but were rated at most inadequate for all other measures. Issues with poor street interface were evident, along with some poor detailed resolution. The units had quite a commercial appearance in one case, although the area was clearly predominantly residential and becoming more so. The zoning does not reflect the transition to residential which is apparent in this particular area.

Ref	Outcome	Combined Average
B1	Creating an appropriate sense of enclosure along the street	3.8
B2	Fostering a sense of ownership of the street.	3.2
B3	Activation and articulation of the street façade through openings	3.3
B4	Property boundaries are well defined and enable views of the street.	3.5
B5	Building layout and form appropriately responds to the urban context	2.8
	Overall Score	3.6

Urban Scale scoring for the CCMU zone (Site Scale)

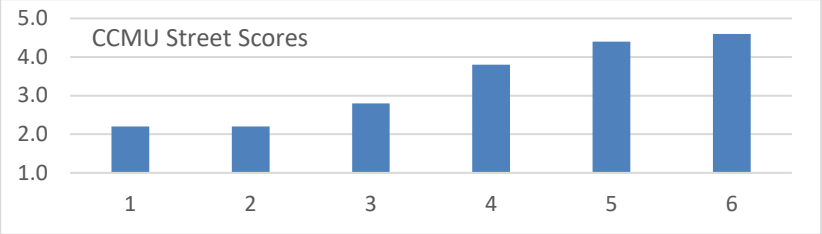


Figure 2: There is a variable range of street outcomes in the CCMU zone

Above: Two storey housing encloses the street, but with outdoor living space at the street front which has created a lack of privacy and led to screening

Site

Site layout results were generally not good for CCMU. Results ranged from "poor" site layout to "well-considered", but generally fell well below the basic threshold, including two scores below 2. Scores were low for category C1, indicating that site layout was not well conceived or integrated, and for category C5 (CPTED), for which no site received more than a basic score.

Developments did generally have a good relationship with neighbours, reflecting the generally low scale of development in the zone.

Site	Outcome	Combined Average
C1	An integrated and comprehensive approach to the layout of buildings and spaces	2.2
C2	Provides for housing choice	2.8
C3	Respectful and responsive design of interfaces and activities relating to neighbouring properties	3.5
C4	Comprehensive approach taken to the design and quality of paving, landscaped areas and open space.	2.7
C5	Reduce opportunities for crime by ensuring an effective layout and provision of other features to maximise safety (including the perception of safety)	2.2
C6	Appropriate provision and location of private outdoor living spaces	2.8
C7	Appropriate provision, location and design of communal open space	2.5
C8	Provide for the safe and efficient movement of pedestrians, cyclists and vehicles	3.2
C9	A sound car parking strategy is utilised, and the visual impact car parking where provided is minimised.	2.8
C10	Efficient and effective provision of services and storage areas	2.5
C11	Incorporation and promotion of sustainability across the site	2.2
	Overall	2.7

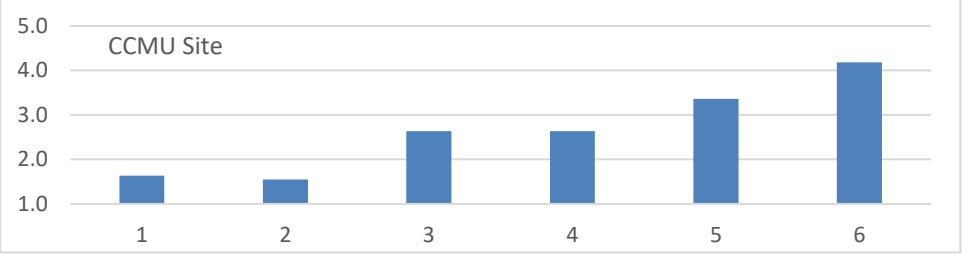


Figure 3: Range of site outcomes in the CCMU zone

The CPTED issues were:

- a lack of surveillance within the sites, communal spaces that lacked ownership and purpose
- a lack of privacy that is likely to discourage surveillance (curtains were often closed). In two cases, ranchsliders overlooked car parks, in one with no separation from passers-by at all.
- The car-free sites usually had narrow accessways with little space for passing or avoidance.

Other low scores were for categories C4 and C7, which relate to the quality of communal areas. Where there was centralised car parking, the car parks were poorly landscaped, vehicle dominated and communal spaces were not useful, due to narrow dimensions and poor location at the margins of the site.

Vehicle dominated accessway

Storage was often not provided, and sometimes not in a practical fashion, for instance bins were located at the front of car parks and bike storage was in between buildings with little surveillance. Again, these functions were relegated to the margins of the site.

Building

Scores were an average of 3 over the scale, although this disguises some of the variability in the CCMU zone. The overall results indicate a basic standard on the appearance and function sub-criteria on average. However, more detailed look at the data reveals that only 2 sites recorded this basic standard, indicating that this apparently satisfactory performance is not usually achieved.

Sub - Category	Building	Outcome	Combined Score
Appearance Related	D1	A visually interesting and cohesive approach to the building form	3.5
	D2	Variation and steps in the building line	3.0
	D3	Sufficient breaks in the roofline	3.3
	D4	Designing to a domestic scale	3.5
	D5	Use high quality materials	3.3
Functional	D6	Coordinated internal/ external relationship	3.5
	D7	Provision of adequate storage	2.7
	D8	Logical and efficient layout	3.3
	D9	Protecting privacy and minimising overlooking	2.8
	D10	Enabling of natural ventilation, solar gain and daylight penetration	3.7
Innovation and Sustainability	D11	Promotes energy efficiency and incorporates sustainability features	2.2
	D12	Demonstrates innovation and creativity in build design, form and function	1.5
		Overall	3.0

A Basic Standard of Appearance

The appearance criteria were usually met to a basic extent, with category D2 (variation and steps in the building line) recording the lowest score. Note that in contrast to RCC, there was only 1 apartment building in the survey.

Shortage of Storage and Privacy

Of the functional criteria, categories D7 and D9 were not usually well met (storage and privacy). Internal storage is not generally well provided. Some units had external storage (sheds) in visually intrusive locations in front of the units. One development provided leasable storage cupboards, which is a higher quality and practical solution.

Poor management of privacy was in part due to the views into apartments from communal and public space without adequate separation or planting. These privacy issues were sometimes reflected in poor scores for category D8, where unusual layouts had been employed (including one example where houses were accessed through the bedrooms), as well as the more common front and back issue where entrances are internalised.

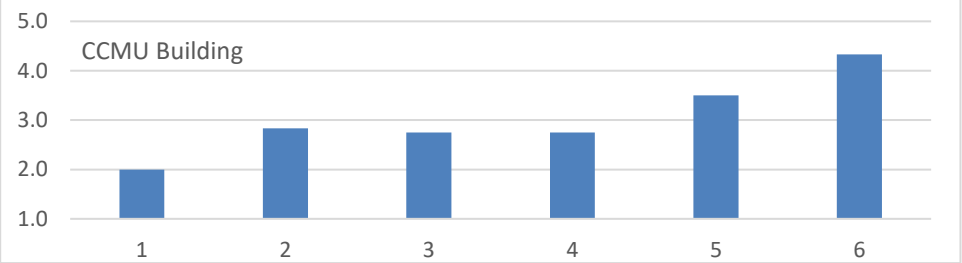


Figure 4: Range of building outcomes in the CCMU zone

4 Taller Apartment Buildings

4.1 Overview

The additional case studies provide a more meaningful sample of taller buildings and the issues that have occurred with recent examples. Combined together, the surveys have six sites and the scores and comment have been analysed as a separate dataset below.

These sites were all of horizontally divided apartment buildings of at least 3 stories.

Overall, these examples have an average score of 3.1 which indicates that a basic standard has been achieved on average. However, a deeper look at the data indicates that there are some pervasive problems and also some buildings that did not perform well, indicating that the Plan is not providing consistent performance.

Tall Building Average	**3.1**
Neighbourhood	3.8
Street	3.2
Site	2.6
Building	2.8

Urban Scale scoring for taller buildings (Combined)

The taller buildings exhibited many of the same issues that were evident in the wider sample. These include:

- Issues with street interface, due to the location of outdoor living space at the front, and insufficient consideration of privacy in general.
- Poor CPTED outcomes
- Site planning issues that prioritise vehicle access, with much better results where separate access is provided.

Some issues were evident that were not identified in the wider sample. These include:

- Overlooking of neighbours
- Examples of monolithic buildings with poor mitigation
- A shortfall of outdoor living space

Particular benefits were:

- The sense of enclosure of the street and the potential for positive visual interest
- Variety in housing choice.

As for other samples, site layout issues were a notable under-performance. Interestingly, scores for street related matters were higher than for the site average.

4.2 Urban Scale Analysis

Some comments on the individual scales are as follows:

Neighbourhood

It is not surprising that the neighbourhood score was quite high as all the examples were in the Central City and have access to a wide range of amenities.

Street

The street score was heavily influenced by the "creating a sense of enclosure" score (4.3) which was influenced by the scale of building. This was seen as positive for the context because of the greater scale of building, which encloses the street at a scale more appropriate to an urban area (generally with a ratio of around 1:2).

Points of weakness were creating a sense of ownership (category B2) and "property boundaries are well defined and enable views of the street" (category B4). The taller buildings have the same issues as the wider sample, with some buildings being inward looking, or with outdoor living space and fencing at the street front.

Site

Site layout scores were very variable with high scores in some categories and low in others. There was also a difference in scores between buildings.

Notable trends were that:

- parking in higher density developments is associated with low amenity communal space and poor quality pedestrian access. This seems to be due to the competition for space on the ground plane, with planting and amenity being sacrificed. Where there was a separate pedestrian access, results tended to be better.

- Some developments, those built lengthways down a deep block, were observed to be efficient in terms of layout, but at the expense of public and communal areas.
- Most developments overlooked neighbours and created privacy issues. There was usually too much outlook concentrated to one side.
- There were poor outcomes in relation to CPTED due to poor design of internal spaces (for instance entrapment spaces were common and there was often little overlooking of internal areas). Street interfaces were often problematic for the same reasons as observed more generally (privacy conflicts).
- Outdoor living space was often under-provided and was not usually compensated by adequate communal space.
- Housing choice is noted as being a benefit of apartments because they generally provide a range of options (eg 1 and 2 beds).

This building demonstrates visual interest and good materiality (but does overlook neighbours)

Building

The building scale is marked by variability, indicating that good design is perhaps not required (but sometimes provided because it is valued by some market segments).

Particular observations were:

- Some bulky buildings used tack-on features to try and create some visual interest but this was not successful. Partly as a result of this, some buildings were regarded as monolithic and clumsy.
- Sometimes breezeways created an awkward interface because of the difficulty of glazing next to them (fire rating). One building has bedrooms without external glazing.