Before the Independent Hearings Panel
at Waimakariri District Council

under: the Resource Management Act 1991

in the matter of: Proposed private plan change RCP31 to the Operative Waimakariri District Plan

and: **Rolleston Industrial Developments Limited**
Applicant

Supplementary evidence of Gary Sellars

Dated: 5 September 2023

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SUPPLEMENTARY EVIDENCE OF GARY SELLARS

INTRODUCTION

1 My full name is Gary Russell Sellars.

2 My qualifications and experience are outlined in my evidence in chief dated 7 July 2023.

3 The purpose of this supplementary evidence is to:

3.1 Set out in writing the evidence that I gave orally at the hearing regarding the residential market supply in Waimakariri; and

3.2 Otherwise comment on the accuracy of the Waimakariri Capacity for Growth Modelling (*WCGM22*) prepared by Formative in the context of Mr Yeoman's responses to the Panel's questions.

4 In the preparation of this evidence, I have collaborated with Chris Sexton of Inovo Projects who prepared the memorandum titled 'Review of Formative WCGM22 Development Model' (the *Inovo Memo*) which is attached at **Appendix A**.

SUMMARY

5 Ohoka Village will provide larger lot sizes than is generally currently available throughout Greater Christchurch.

6 Detailed validation of the WCGM22 demonstrates a significant discrepancy following analysis and site inspection. The WCGM22 stated capacity for the medium term is 5,934 household units (HHUs). Following detailed validation, the Inovo Memo assessed medium term capacity at 4,361 HHUs. Therefore, there is a significant discrepancy of 1,573 HHUs.

7 My estimated medium-term demand including a 20% buffer allowance is 5,544 HHUs.[1] Therefore, the updated validation capacity of 4,361 HHUs is 1,183 HHUs short of the medium-term capacity requirement of 5,544 HHUs.

8 I consider that the Medium Density Rules (MDR) will have negligible impact on Waimakariri District urban areas and therefore, will unlikely provide any significant additional capacity in the foreseeable future.

[1] I note that Mr Akehurst's evidence in chief also identifies medium term demand plus competitive margin as being 5,600 HHUs.

EVIDENCE GIVEN ORALLY AT THE HEARING

9 In my oral evidence on 4 August 2023, I stated there are 2,598 sections in the medium term which is a supply of about 5.6 years.

10 The 2,598 lots referred to was my estimate at the time of the total number (within the Waimakariri District) of vacant residential lots available and offered for sale in developed subdivisions and those subdivisions under development, plus potential supply from land zoned for residential development and also the FDA area in Bellgrove:

Medium Term Available for Sale Supply	
Vacant Developed Lots – For Sale	57
Under Development Lots – For Sale	270
Zoned – Undeveloped Subdivisions	605
Zoned – Piecemeal	641
Unzoned – FDA (Bellgrove)	1,025
Total	**2,598 lots**

11 Adopting the average number of lots sold in the 11-year period from 2011 - 2021 of 462 per annum as a measure of demand (set out in further detail below), then there is on the face of it a supply of 5.6 years in the short to medium term. If the piecemeal zoned land is excluded, this reduces the supply to 4.2 years.

12 I note that the methodology I adopted to arrive at this analysis is different to the WCGM22/Inovo Memo as it excludes land that is vacant and not for sale, and therefore it is not appropriate to directly compare those numbers.

13 I do, however, throughout the balance of this evidence assess the accuracy of the WCGM22 using the appropriate methodology for that process.

METHODOLOGY

14 My research team at Colliers Valuation has physically inspected on the ground and identified the development status of the residential land in the major urban areas of Waimakariri District. This data has been processed in the Inovo GIS model.

15 The object of the research was to review and validate the household capacity set out in the WCGM22 relied upon by Mr Yeoman.

16 I refer to the Inovo Memo where a detailed description of the methodology adopted in terms of classification of household capacity is provided. This document also provides a detailed summary of the assumptions adopted in relation to the WCGM22 land geographic components.

RESIDENTIAL SECTION MARKET

Inner North Canterbury

17 PC31 will result in the regeneration of the Ohoka Village Centre and produce an enhanced village centre with additional facilities with provision for approximately 850 residential lots as well as a school, retirement village and polo facility. Of the approximately 850 residential lots, 150 will be large rural residential lots. Currently, Ohoka is a niche rural residential village located 19.5 kms northwest of the Christchurch CBD where there are very few properties with a land area of less than 3,000 sqm.

Land Market

18 I have completed research on the supply of residential sections in Inner North Canterbury analysing the number of sales and new dwelling building consents issued over the last 13 years.

19 The following table provides an analysis of the number of vacant residential section sales and new dwelling building consents in Inner North Canterbury for the period from 2010 – 2023.

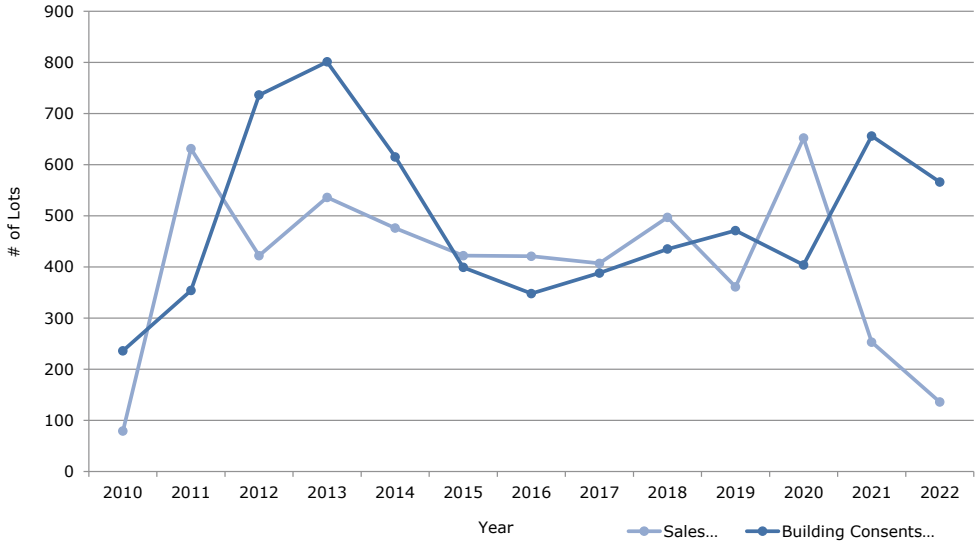
Location	Rangiora		Kaiapoi		Woodend		Oxford		Totals	
Year	Sales #	Building Consents #	Sales #	Building Consents #	Sales #	Building Consents #	Sales #	Building Consents #	Sales #	Building Consents #
2010	36	123	13	23	29	81	1	9	79	236
2011	220	172	194	79	189	93	28	10	631	354
2012	144	291	180	218	70	201	28	26	422	736
2013	148	240	228	300	127	226	33	35	536	801
2014	108	193	228	255	105	142	35	25	476	615
2015	124	115	186	190	89	77	23	17	422	399
2016	144	119	162	148	94	66	21	15	421	348
2017	111	157	117	123	166	96	13	12	407	388
2018	151	150	70	94	262	176	14	15	497	435
2019	83	135	57	59	218	266	3	11	361	471
2020	122	97	132	58	397	241	1	8	652	404
2021	31	153	75	139	140	358	7	6	253	656
2022	22	64	28	157	85	339	1	6	136	566
2023*	0	15	0	9	9	77	0	0	9	101

Sources : NZ Stats - New Dwelling consented by 2023 statistical area (Monthly) & Valpak(Headway Systems Limited)

* Part year

20 The summary information in the above table is shown in the following graph:

Township - Sales & New Dwelling Building Consents



21 The number of vacant residential section sales has fluctuated over the last 13 years from a low in 2010 of 79 immediately following the Global Financial Crisis, and rising to a peak in 2020 of 652. During the period from 2011 - 2019, there was a relatively consistent pattern of volume in a range of between 361 – 631 sales per annum. The sub-peak of 631 sales in 2011 can be attributed to relocating red zone owners purchasing sections in North Canterbury following the Canterbury earthquakes. In the 2019 – 2020 period, there was a sharp increase in sales volume from 361 to 652 which reflected the buoyant residential market at that time. From 2021, there has been a sharp decrease in volume resulting from initially constrained supply, but more latterly the residential market correction following significant interest rate rises.

22 The volume of sales is often a reflection of supply and demand. If supply is constrained, then this will affect volume. The decline in the volume of sales in 2021 was a result of constrained supply rather than a reflection of demand at that time. The low sales volume across all parts of Inner North Canterbury in 2023 was a reflection of both reduced demand following significant interest rate rises, but also the part year recording period.

23 In the 11-year period from 2011 – 2021, the average number of residential section sales in Inner North Canterbury townships was 462 per annum. If the analysis is completed over a five-year period from 2017 – 2021, the average number of residential section sales was 434 per annum.

24 New dwelling building consents in Inner North Canterbury have generally followed a similar trend line to the number of sales.

However, whenever there has been a surge in sale volumes, building consents have lagged behind. There is generally a catch-up in building consents in the following years. For example, in 2011, sale volume outstripped building consents, however the reverse situation occurred in 2012 and 2013 with building consents in catchup mode. The same situation occurred in 2020 – 2022.

25 The surge in building consents in the period from 2012 – 2014 potentially resulted from relocated red zone owners purchasing sections in Inner North Canterbury and then delaying construction while settling insurance claims. This explains why building consents outstripped section sales in these years.

26 The lag in building consents in 2020 is explained by the delay between section purchase, subdivision construction, title issue and consequential building consent applications.

27 The average number of new dwelling building consents in the 11-year period from 2011 – 2021 in Inner North Canterbury townships was 493 per annum. If the analysis is completed over a five-year period from 2017 – 2021, the average number of new dwelling consents was 470 per annum.

28 The number of section sales and consequential building consents often reflects the availability of residential sections rather than demand. For example, in the period from 2017 – 2021, Woodend which includes Ravenswood and Pegasus, accounted for 54.5% of all section sales in Inner North Canterbury. This is purely a reflection of the availability of residential sections in this location compared with Rangiora and Kaiapoi. Over that same period, Rangiora sales accounted for 22.9% and Kaiapoi 20.8%.

29 The following table provides an analysis of the average vacant residential section sale price in Inner North Canterbury townships for the period from 2010 – 2023.

Location	Rangiora		Kaiapoi		Woodend		Oxford		Total	
Year	Ave. Lot Area	Sale Price	Ave. Lot Area	Sale Price	Ave. Lot Area	Sale Price	Ave. Lot Area	Sale Price	Ave. Lot Area	Sale Price
2010	960	165,167	765	154,846	661	205,979	1,295	113,000	843	174,846
2011	777	167,269	717	162,609	633	174,048	850	147,147	722	167,071
2012	749	202,341	652	177,828	783	206,332	1,926	129,518	766	188,584
2013	808	222,435	574	163,796	700	218,424	1,018	131,114	701	191,159
2014	746	201,770	490	156,047	716	221,741	794	136,479	659	181,048
2015	804	183,265	542	176,753	723	204,648	926	159,792	717	184,696
2016	711	198,035	614	178,672	652	177,015	795	163,566	677	185,030
2017	664	189,636	656	190,151	707	171,045	1,273	168,182	762	184,842
2018	836	196,276	456	175,551	692	169,584	1,246	177,923	747	179,732
2019	690	210,859	437	180,252	670	177,029	900	155,000	704	186,620
2020	731	229,045	409	188,652	522	177,517	-	-	559	189,917
2021	840	310,039	597	261,725	773	300,307	2,207	382,917	816	290,672
2022	630	383,752	499	320,842	623	313,752	2,705	395,000	614	324,228
2023*	-	-	-	-	711	300,667	-	-	711	300,667

Source: Valpak (Headway Systems Limited)

* Part Year

30 This same information is shown on the following graph which illustrates the sale price trend line in Inner North Canterbury.

31 The above data is for titled sections only. The sale data for 2022 provides only part of the true picture of the current situation. Many sections sold in 2022 have not been constructed or titled and therefore this sale data has not been captured by the recorded data.

32 The average section sale price in the four locations generally increased incrementally in the period from 2010 – 2020. From 2020, the average section sale price increased substantially. In Rangiora, the average section sale price increased from $229,045 in 2020 to $383,752 in 2022 (67.5%). In Kaiapoi, the average section sale price increased from $188,652 in 2020 to $320,842 in 2022 (70.1%) and in Woodend, the average section sale price increased from $177,517 in 2020 to $313,752 in 2022 (76.7%).

33 The substantial increase in residential land prices in this period in the Greater Christchurch area resulted from a mix of unprecedented demand fuelled by low interest rates and constrained supply where insufficient land was zoned and available for development. The level of increase in Greater Christchurch was influenced by the degree of constrained supply. For example, in Rolleston in 2021, there were virtually no sections available for sale and accordingly land prices increased by 140% in the space of 12 months. The situation in Inner North Canterbury and also Christchurch City was not as dramatic, nevertheless, limited supply did contribute to significant price escalation.

34 In 2021 there were numerous examples of entire stages in subdivisions in Greater Christchurch selling out of stock within hours of release. This occurred in a number of stage releases at Ravenswood.

WCGM22 Validation

35 I have assisted Mr Sexton of Inovo in the validation of the WCGM22 provided in Mr Yeoman's response to Minute 5. Full details of this validation are set out in the Inovo Memo.

36 The medium-term capacity in the WCGM22 as outlined in Mr Yeoman's response is 5,934 HHUs.

37 My research team at Colliers Valuation has physically inspected on the ground the land described as 'Vacant Lots' in Mr Yeoman's table. There are a number of discrepancies between the WCGM22 and what is in existence on the ground.

38 For clarification, where the lot is vacant, the WCGM22 has generally ascribed 2 HHUs on the assumption of MDR intensification. Where the lot is small, one HHU has been allocated and where the lot is larger, a higher HHU has been allocated.

39 For the purposes of the Inovo Memo, where a single dwelling was found to be under construction on a 'vacant lot' counted in the WCGM22, but is not finished in terms of code compliance, this lot has been assessed at 1 HHU with no further intensification potential. Where there was found to be a dwelling completed on a 'vacant lot' counted in the WCGM22, then this lot has been excluded (given a value of 0) in the Inovo Memo.

40 In a number of cases, for example in Ravenswood, there are covenants on the title which prevent the sale of the lot prior to a dwelling being completed and/or restricting further subdivision of the land. In many cases, the WCGM22 has assessed 2 HHUs per lot, however this is not possible with the existence of the restrictive covenant. Where this situation occurs, the HHU capacity has been corrected to 1 for that lot in the Inovo Memo.

41 The following are case studies which provide a sample of discrepancies discovered in the WCGM22 resulting from onsite inspection.

Case Study 1 – Pegasus (Mike Greer)

Block Wakatipu St / Solander Rd / Hodgkinson Rd & Infinity Dr

42 This large block is currently under development. The WCGM22 assessed 85 HHUs. However, site inspection reveals that 53

dwellings have been completed (and therefore should not be counted as medium-term capacity) resulting in a residual incomplete dwelling and/or vacant lot total of 32 HHUs. Therefore, there is a discrepancy of 53 HHUs.

Case Study 2 – Pegasus
Corner Infinity Dr & Nga Tupuna St

43 The WCGM22 assessed a capacity of 11 HHUs for the 10 lots in this block. One of the lots is actually a Waimakariri District Council pump station. All of the residual nine lots in this block at 149-153 Infinity Drive, 99 & 101 Pegasus Main Street, 36 Kawari Drive and 2, 4 & 6 Piwakawaka Lane, have been built on with completed dwellings (and therefore should not be counted as medium-term capacity) and therefore the HHU capacity given in the Inovo Memo is 0. The discrepancy in the WCGM22 is 11 HHUs.

Case Study 3 – Townsend Fields, Rangiora

44 I have reviewed the block in Townsend Fields located on the western side of Townsend Road and including the streets of Hotere Street, McCahon Drive and Lusk Street. The WCGM22 generally included 2 HHUs per lot, although in the case of some of the larger lots, a capacity up to 4 HHUs was counted. The total capacity for this block included in the WCGM22 was 140 HHUs. Site inspection revealed this particular site has now been divided into 30 vacant lots all of which are subject to a covenant which restricts any further subdivision either by way of unit plan, cross-lease or fee simple. Therefore, the discrepancy in the WCGM22 is 110 HHUs.

Case Study 4 – Stage 3 Ravenswood

45 I have reviewed the land in Stage 3 of Ravenswood located on the eastern side of Bob Robertson Drive. The WCGM22 assessed 1 HHU per lot for each of the 146 lots on the basis that they were all vacant. A site inspection has revealed that there are now only 19 vacant lots or HHUs, therefore, there is a discrepancy in the WCGM22 of 127 HHUs. Constructed residential dwellings should not be counted as medium-term capacity.

Case Study 5 – Mansfield Drive & Edwin Lane, Kaiapoi

46 Within the developed areas of existing housing, the WCGM22 assessed additional HHU intensification capacity generally on existing developed sites where there is deemed to be surplus land available. The following case study examines a small group of properties in Kaiapoi which have been treated in this was by the WCGM22.

47 This small residential hamlet is located near the Kaiapoi High School to the south of Ohoka Road with frontages to Mansfield Drive and

Edwin Lane. The properties are at 32, 34, 49, 51 & 53 Mansfield Drive and 10 Edwin Lane. Individual land areas range from 4,167 – 5,412 sqm and sited on the properties are large modern residential dwellings with significant site improvements. The WCGM22 assessed an additional potential capacity of 43 HHUs for these 6 properties. All the properties in this development are subject to a covenant which effectively prevents any further dwelling construction and buildings/improvements are too modern for these residences to be viable for demolition in the medium term. Therefore, this results in a deficit in the WCGM22 of 43 HHUs.

ADJUSTED WCGM 22 – MEDIUM TERM CAPACITY

48 The WCGM22 capacity is 5,934 HHUs. Following detailed validation, the Inovo Memo assesses medium term capacity at 4,361 HHUs. Therefore, there is a significant discrepancy of 1,573 HHUs.

49 Analysis of the average number of residential section sales in Inner North Canterbury over the 11-year period from 2011 – 2021 indicated 462 per annum. This number is to a large extent, validated by the number of new dwelling building consents in the same 11-year period at 493 per annum. My adopted demand of 462 dwellings per annum equates to 4,620 dwellings in the medium term, which falls within the range of the WCGM22 estimate of 4,143 dwellings and the GCP 2023 HCA estimate of 4,682 dwellings.

50 The NPS-UD requires councils to include a competitive margin, which is an additional buffer above the demand of 20% in the medium term. Adopting my medium term estimated demand of 4,620 dwellings, this would mean that the Waimakariri District Council needs to provide a capacity of at least 5,544 HHUs.

51 The results of the validation of the WCGM22 outlined in the Inovo Memo finds a medium term capacity of 4,361 HHUs which is 1,573 less than the original WCGM22 capacity of 5,934 HHUs. The updated validated capacity of 4,361 HHUs is 1,183 HHUs short of the medium-term demand requirement of 5,544 HHUs.

52 Adoption of building consents as a basis for estimating demand at 493 per annum produces a higher medium term estimated demand of 4,930 dwellings which, following an allowance for an additional buffer of 20%, indicates a capacity of 5,916 HHUs. Accordingly, my adopted medium term demand estimate of 5,544 dwellings is at the conservative end of the range.

MEDIUM DENSITY RULES (MDR)

53 My evidence in chief dated 7 July 2023 details my view that the MDR will have negligible impacts on Waimakariri Urban areas. Those conclusions remain the same, as I elaborate below.

54 In Mr Yeoman's Summary Statement dated 7 August 2023, he stated at paragraph 179 that development intensity in Waimakariri District has been increasing over the decades and that he considers that it is likely that the MDR will ensure that this trend continues.

55 There has historically always been an element of higher development density in the new subdivisions in Waimakariri District. Examples include in Silverstream, where two level two terrace housing are constructed on sites comprising 100 – 300 sqm, in Beachgrove where two level terrace houses have been constructed on lots of 168 sqm, at Pegasus where two level terrace houses have been constructed on lots between 150 – 250 sqm, and at Bellgrove – Stage 1, lots of between 200 – 300 sqm are being developed.

56 All of these developments predate the MDR and form a standard component of modern subdivision development.

57 Building consent statistics for Waimakariri District indicate that the proportion of town houses and apartments remained relatively static over the previous 13-year period from 2010 – 2022.

58 Attached at **Appendix B** is a detailed summary schedule of building consent statistics for Christchurch City, Selwyn District, Waimakariri District and combined Greater Christchurch. The building consent data is split into standalone houses and attached townhouses/apartments.

59 The 13-year average proportion of townhouse/apartment consents in Christchurch City is 40.2%, although in the 2022 year, it was at 64.4%. In Selwyn District, the long term average was 2.8% although in 2022 the average was 5.7%. In Waimakariri District the long term overall average was 6.7%, and in 2022 the average was 4.8%. It is notable that in 2014, there was a spike in Waimakariri District at 14.8% which resulted from the higher density development in Pegasus, Silverstream and Beach Grove. Overall, in Greater Christchurch, the average proportion of townhouse/apartment consents was 25.2%, although in the 2022 year, it was 43.8%.

60 The following are summary tables of this data:

Building Consent Statistics – Average 2010-2022		
Location	Dwg %	TH/Apmt %
Christchurch City	59.8%	40.2%
Selwyn District	97.2%	2.8%
Waimakariri District	93.3%	6.7%
Greater Christchurch	74.8%	25.2%

Building Consent Statistics – Average 2022		
Location	Dwg %	TH/Apmt %
Christchurch City	35.6%	64.4%
Selwyn District	94.3%	5.7%
Waimakariri District	95.2%	4.8%
Greater Christchurch	56.2%	43.8%

Source: NZ Stats – New Dwelling consented by 2023 Statistical area 2 (Monthly)

61 Higher density development in Waimakariri has not shown any perceived increase over the 13-year period apart from the anomaly in 2014. In actual fact, the proportion of townhouse/apartment building consents has reduced from 9.1% in 2018 to 8.0% in 2019, to 6.0% in 2022, to 4.4% in 2021 and 4.8% in 2022. This compares with Christchurch City in 2022 of 64.4%.

62 Quantifying dwelling capacity enabled by MDR is extremely difficult. Forming part of the Section 32 documentation for the Christchurch City Council Plan Change 14, the Proposed Housing and Business Choice Plan Change is a report prepared by The Property Group (TPG) dated January 2022. TPG was engaged by Christchurch City Council to undertake an analysis of the impact of the MDR for Christchurch City. TPG estimated the total plan enabled capacity, in other words, the potential number of new medium density dwellings that could be constructed in Christchurch City. Once that was determined, TPG then narrowed the estimate down to a projected feasible capacity.

63 TPG completed a financial feasibility analysis as part of the assessment which demonstrated that, whilst medium density is enabled across the city's residential areas, it is generally more feasible in those areas where residential values are high enough to offset the costs associated with land acquisition and construction. TPG concluded that, based on a review of land values and development costs, current medium density seems to be feasible in those suburbs in close proximity to the central city.

64 TPG outline the theoretical dwelling capacity for 26 suburbs in Christchurch and arrived at a total 222,478 theoretical dwelling capacity, but following feasibility analysis, narrowed that down to a feasible dwelling capacity of 58,188 theoretical dwelling capacity.

65 TPG stated feasibility of medium density development is influenced by the underlying land value of the property, if the underlying land value is too low, this impacts on the sale price of the finished units and therefore constrains the profit margin obtainable by the developer.

66 Feasible capacity in a number of suburbs in Christchurch was very low, including desirable suburbs such as Avonhead, Bishopdale and Ilam. Property values in these suburbs of Christchurch are higher than the likes of Rangiora and Kaiapoi.

67 PWC prepared a report for Ministry of Environment dated 14 July 2022 named 'The Medium Density Residential Standards under the Resource Management Act – Estimates of development impacts at Statistical Area 2 level'. The purpose of this report was to provide a spatial estimate of the development impacts of MDRS.

68 The report provided estimates of the additional new dwelling consents in residential areas subject to MDRS policy during the 5 to 8 years following policy enactment for various local authority areas in New Zealand. Additional dwellings are defined as those dwellings over and above what would be expected to have otherwise occurred without MDRS.

69 For Waimakariri District, the mean impact over a 5 to 8 year period was an additional 269 dwellings and in the case of the median impact, 255 dwellings.

70 Therefore, the PWC report estimates a very low uptake over 5 – 8 years which is essentially in the medium term.

71 I accept that the MDR will result in some higher density residential development in Waimakariri District, however in my opinion in the medium term, this will be relatively limited, in all likelihood it will be little more than has currently occurred in specific high-density areas within modern subdivisions such as has occurred in those outlined earlier.

72 I remain of the view that the MDR will have negligible impact on Waimakariri urban areas in the medium term.

CONCLUSIONS

73 In Greater Christchurch, most of the rural townships (e.g. Woodend, Prebbleton, West Melton) have now grown into relatively large urban areas with commercial centres and a large component of recently developed residential housing with smaller section sizes (i.e. <600m2).

74 Ohoka, following the development of PC31, will be a unique boutique township providing low density residential housing on larger lots in a rural residential village community setting.

75 The NPS-UD requires councils to provide sufficient medium-term capacity to meet future demand over the next 10 years. In the case of Waimakariri District, this capacity is estimated to be at or about

5,544 HHUs. The validated capacity outlined in the Inovo Memo is 4,361 HHUs which is a shortfall of 1,183 HHUs in the medium-term.

76 I consider that the MDR will have negligible impact on Waimakariri District urban areas and, therefore, will be unlikely to provide any significant additional capacity in the foreseeable future.

Dated: 5 September 2023

Gary Sellars

APPENDIX A

30 August 2023

MEMO

TO: Garry Sellars, Greg Akehurst, Tim Walsh

FROM: Chris Sexton, Civil Engineer, B.E.(Hons.), MEngNZ

Review of Formative WCGM22 Development Model

EXECUTIVE SUMMARY

The following memo summarises the findings from our review and validation of the household capacities set out in the WCGM22 model and relied on by Mr Yeoman in his response to Minute #5 on Plan Change 31 (PC31). That review has included desktop / GIS analysis of the WCGM22 and physical inspections of sites.

In summary, this analysis finds that actual capacity in the medium term is approximately 4361 households. This is 1573 households (26.5%) less than the 5934 households anticipated in the WCGM22, and translates into a 1239 household shortfall (rather than 350 surplus[1]) for the medium term. Whilst our analysis does not examine the long term, this shortfall and the inherent errors in the model described below will affect long term calculations of capacity, irrespective of reliance on potentially uncertain areas such as the Kaiapoi NDA.

This conclusion potentially underestimates the shortfall and/or supply, as described in further detail below. However, such variance is unlikely to materially alter the conclusion above that the WCGM22 model overstates household capacity.

METHODOLOGY

Our review of the WCGM22 has entailed desktop analysis and physical inspections of areas and sites in order to confirm or revise the assumed housing capacities, as follows:

Desktop Review

Firstly, GIS was used to identify any of the following areas that cannot be developed or intensified in a way that provides additional residential capacity:

- Recreation Reserve Lots
- Utility Reserve Lots
- Council Owned Facilities (i.e. water treatment plants)
- Parcels featuring heritage buildings or protected trees
- Parcels with community facilities (e.g. Pre-Schools/early learning centres, Churches/Places of Worship)
- Land covenants and/or encumbrances that prevent further subdivision or intensification
- Land where a dwelling or development had been completed therefore removing any potential future capacity in the medium term (e.g. individual homes, Kāinga Ora Multi Lot Developments, etc)

Secondly, the household capacity stated in the WCGM22 for new subdivisions in Greenfield areas was reviewed and validated, by either:

- Adopting yields in publicly available and consented subdivision master plans, or otherwise
- Deducting 12.5% of the gross site area (per exclusions from 'net density' such as stormwater management & commercial areas), and then multiplying the remaining area by 15 houses/hectare applied to determine capacity. This is consistent with the methodology set out in the Canterbury

[1] Per the HDCA2023, medium term supply of 5950 hh, less demand with margin of 5600 = 350hh surplus.

Regional Policy Statement ('CRPS')), Our Space, the HDCA 2021, HDCA2023, and the independent review of greenfield densities commissioned by the Greater Christchurch Partnership and undertaken by Harrison Grierson Limited ('HGL') as detailed in **Appendix A**.

The approach above can be contrasted with Mr Yeoman's calculation of capacity in greenfield areas where he allows only 25% of the gross area for all infrastructure, including stormwater management and commercial areas which is specifically excluded by the statutory and non-statutory documents listed above. Mr Yeoman's allowance of only 25% is also considerably less than the 40.2% average area for all infrastructure in the case studies identified by HGL. Subject to excluding stormwater, etc from gross areas, the 15hh/ha density calculation we have then applied to greenfield areas is otherwise equivalent to Mr Yeoman's approach, and that set out in the HDCA2023, of allowing 25% of the net area for local infrastructure and an average 500m^2 lot size for the balance, to determine capacity. This is explained in further detail in Mr Walsh's memo in **Appendix A**.

Physical Review and 'Ground truthing'

Following the GIS analysis described above, physical inspections of sites and areas were undertaken (in the week of 21 August 2023) in order to validate findings and provide real time / current verification of the potential future capacity of land. In undertaking those site inspections, particular attention was given to:

- Land identified as vacant, that has since been developed and occupied (and cannot provide capacity);
- Land identified as vacant, that has been partially developed and appears incomplete and/or unoccupied (and can therefore provide capacity);
- Land identified as providing capacity by way of infill, that has attributes indicating such infill is unlikely to materialise (e.g. recently completed development where redevelopment is unlikely, building position limiting infill potential, lifestyle properties with areas of open space that appear unlikely to be developed, other site specific or environmental attributes indicating infill unlikely).
- Land where capacity has been underestimated.

Photographic examples of the above are included in **Appendix B**. The maps in **Appendix C** show where some of the differences between our assessment and the WCGM22 model occur and some of the deficiencies within the WCGM22 model. The numbers shown on each area of land/lot on the maps show the difference between the assumed WCGM22 modelled capacity and our validated capacity.

CONCLUSION & RESULTS

The table on the following page summarises the results of the analysis described above. In summary, this analysis finds that:

- Actual household capacity is approximately 4361 households, which is 1573 households (or 26.5%) less than the 5934 households anticipated by the WCGM22 and translates into 1239 household shortfall (rather than 350 surplus) in the medium term based on the HDCA 2023.
- This conclusion potentially:
    - underestimates the shortfall insofar that feasible yield from infill lots (lot shape), economic benefit from the existing dwelling values, ability to develop to the densities in WCGM22 due to downstream constraints (i.e. existing infrastructure network constraints constraining development) has not been considered in my review.
    - underestimates the supply insofar that some developers may achieve higher yields than 15 houses/hectare and the WCGM22 Model may have missed some lots as was found with a very small number missed in Pegasus.

  However, such variance is unlikely to materially alter the conclusion above that the WCGM22 model overstates household capacity.

In our view, Mr Yeoman's response still fails to acknowledge major errors in the WCGM22 which clearly overstates capacity. The appendices provide further detailed information underpinning the summary and conclusions above, as follows:

- **Appendix A | Memo re: Calculation of Greenfield Capacity**
- **Appendix B | Photographic Examples of Sites**
- **Appendix C | WCGM22 Development Area Maps**
- **Appendix D | Detailed Methodology and Findings**
- **Appendix E | Land Covenant Examples**

Location	WCGM 22 Capacity per Mr Yeoman's Minute 5 response	Validated Capacity (Based on subdivision plan)	Validated Capacity (Gross area - 12.5% x 15hh/ha)	Difference in Capacity (Validated vs WCGM22)
Rangiora:				
Bellgrove	**952**		800	**-152**
Townsend Fields	**419**		370	**-49**
Summerset Retirement Village	**211**		182	**-29**
Flaxton Village	**59**		52	**-7**
East Rangiora	**76**		66	**-10**
Kaiapoi:				
Beach Grove	**332**	330		**-2**
Silver Stream	**89**		65	**-24**
Future Silver Stream	**44**		41	**-3**
The Sterling	**137**		90	**-47**
Momentum	**116**		0 (not med term)	**-116**
Woodend/Pegasus:				
Ravenswood	**969**	677		**-292**
Commons Lifestyle Village	**131**		114	**-17**
Woodland Estate	**104**	75		**-29**
Eders	**42**		45	**+3**
Parsonage/Gladstone North	**148**		119	**-29**
Gladstone South	**18**		73	**+55**
Pegasus	**369**	86		**-283**
Vacant/Infill	**WCGM 22 Capacity per Mr Yeoman's Minute 5 response**	**Validated Capacity (desktop and site inspections)**		**Difference in Capacity (Validated vs WCGM22)**
Rangiora Vacant lots	**379**	248		**-131**
Rangiora infill	**355**	270		**-85**
Kaiapoi Vacant lots	**277**	174		**-103**
Kaiapoi infill	**292**	273		**-19**
Woodend/Pegasus Vacant lots	**413**	209		**-204**
Woodend/Pegasus Infill /intensification	**2**	2		**0**
Total Medium Term Household Capacity	**5934**	**4361**		**-1573**

Appendix A | Memo re: Calculation of Greenfield Capacity

24 August 2023

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MEMO

TO: Chris Sexton, Inovo Projects

FROM: Tim Walsh, Senior Planner

PRIVATE PLAN CHANGE PC31 ŌHOKA GREENFIELD DENSITY & CAPACITY CALCULATIONS

Executive Summary

1. This memo sets out the correct methodology for determining development capacity for greenfield areas as set out in the Canterbury Regional Policy Statement including Plan Change 1 ('**CRPS**'), Our Space[1], the Greater Christchurch Housing Development Capacity Assessments of July 2021 and March 2023 ('**HDCA 2021**' and '**HDCA 2023**'), and the independent review of greenfield densities commissioned by the Greater Christchurch Partnership and undertaken by Harrison Grierson Limited ('**HGL**')[2].

2. Based on these documents the correct approach to determine household capacity is to:

   i. Define the gross area of the greenfield area being considered (in hectares).

   ii. Deduct areas required for stormwater retention & treatment and local retail/commercial purposes from this gross area, per the definition of 'net density' in the CRPS[3]. Based on the HGL report and the advice of Mr Tim McLeod, we consider 12.5% is an appropriate allowance for stormwater and commercial purposes, recognising that some areas may ultimately require more or less than this.

   iii. Multiply the remaining (net) greenfield area by 15 households/hectare ('**hh/ha**') to determine capacity. This ratio is equivalent to an average 500m^2 residential lot size and an allowance of 25% of net area for community infrastructure including local roads and road corridors, pedestrian and cycleways, and local (neighbourhood) reserves. The latter is the approach adopted by Mr Yeoman, albeit he does not account for the exclusions in the CRPS definition of 'net density' – stormwater in particular.

3. The formula below shows our calculation of capacity (per the CRPS, Our Space, and HDCA 2021) is equivalent to Mr Yeoman's approach (and that set out in the HDCA 2023), provided that for both methods, stormwater should first be deducted from the gross area:

[1] "Our Space – Greater Christchurch Settlement Pattern Update 2019"
[2] Harrison Grierson Greenfield Density Analysis Technical Report – 4 February 2021,
[3] Other exclusions per the definition of 'net density' are not known to be extensive in the greenfield areas in the district and therefore are not considered further here. However, site specific assessment may warrant further reductions to the gross area.

1ha net area x 15 hh/ ha = 15 households

=

(1ha net area– 25% local infrastructure) / 500m^2 avg lot size = 15 households

4. We note that Mr Yeoman's approach and the WCGM22 suggests 25% of the gross area is sufficient for all infrastructure, including stormwater and commercial areas. That is not consistent with the planning documents described above and is at odds with the average area of 40.2% for all infrastructure identified in the HGL report.

5. Mr Yeoman's response to Question 10 in Minute 5 also suggests that the WCGM22 uses variable average lot sizes for different parts of the district. However, that differs from the clear assumption in the HDCA 2023 of a 500m^2 average lot size and 25% allowance for local infrastructure, and a 15hh/ha density in the other planning documents analysed.

Scope

6. This memo reviews, and seeks to confirm, the correct methodology for determining development capacity for greenfield areas as set out in the CRPS, Our Space, the HDCA 2021 and HDCA 2023, and the independent review of greenfield densities commissioned by the Greater Christchurch Partnership and undertaken by HGL.

7. These findings are then contrasted to the approach in the WCGM22 as described by Mr Yeoman in his response to Minute 5 for PC31.

The CRPS

8. CRPS Policy 6.3.7 requires that:

> *development in greenfield priority areas shall achieve at least the following residential **net densities** averaged over the whole of an ODP area (except where subject to an existing operative ODP with specific density provisions):*
>
> *a. 10 household units per hectare in greenfield areas in Selwyn and Waimakariri District;*
>
> *b. 15 household units per hectare in greenfield areas in Christchurch City.*

9. Policy 6.3.12 (Future Development Areas) seeks to "*Enable urban development in the Future Development Areas identified on Map A…"* and the methods described for implementing this policy notes that local authorities will:

> *Undertake an evaluation of the appropriateness of existing minimum densities specified in the Regional Policy Statement and whether any changes to minimum densities are likely to be desirable and achievable across the Future Development Areas.*

10. The CRPS definition of 'net density' is relevant to the policies above (and other provisions in Chapter 6) and this term is defined as set out at Figure 1 below.

Net density	is the number of lots or household units per hectare (whichever is the greater). The area (ha) includes land for: • Residential purposes, including all open space and on-site parking associated with residential development; • Local roads and roading corridors, including pedestrian and cycle ways, but excluding State Highways and major arterial roads; • Local (neighbourhood) reserves. The area (ha) excludes land that is: • Stormwater retention and treatment areas; • Geotechnically constrained (such as land subject to subsidence or inundation); • Set aside to protect significant ecological, cultural, historic heritage or landscape values; • Set aside for esplanade reserves or access strips that form part of a larger regional or sub-regional reserve network; • For local community services and retail facilities, or for schools, hospitals or other district, regional or sub-regional facilities.

Figure 1: CRPS definition of net density

11. In summary, the provisions above show that the CRPS seeks the achievement of minimum densities for greenfield areas and Future Development Areas, where the term 'net density' (used interchangeably with 'density' or 'densities') is specifically defined to include certain land and exclude other land. Relevantly, land required for stormwater retention and treatment is excluded.

Our Space

12. In section 5.3 of Our Space, the description of the Settlement Pattern for Greater Christchurch states that for Selwyn and Waimakariri (with my emphasis in bold):

> *it is expected that new urban housing in Waimakariri and Selwyn will achieve a minimum* ***net density*** *of 12 households per hectare where any Future Development Area is subsequently zoned.* ***For this purpose, net density has the same meaning as set out in the Canterbury Regional Policy Statement. This will also provide strong guidance for the development of District Plans for both Waimakariri and Selwyn districts****.*

13. Table 5 in this section of Our Space (see Figure 2) sets out Selwyn and Waimakariri density scenarios and anticipated yields from future development areas. An associated note expressly states that the density scenarios and anticipated yields from FDAs are ***"derived from a total 'gross' hectare and does not take into account infrastructure requirements and structure planning that may reduce the developable area and total dwelling count".***

14. From the extracts above, it is clear that Our Space also expressly refers to the CRPS definition of 'net density' and that infrastructure requirements and structure planning may reduce development capacity.

Table 5: Selwyn and Waimakariri density scenarios and anticipated yields from future development areas

Selwyn long term shortfall: 5,475
Waimakariri long term shortfall: 7,675

	Density scenarios and anticipated yields from FDAs^					
	Selwyn			Waimakariri		
Theoretical additional capacity enabled in existing urban areas*	Density 10 hh/ha	Density 12 hh/ha	Density 15 hh/ha	Density 10 hh/ha	Density 12 hh/ha	Density 15 hh/ha
0	4,700	5,650	7,050	4,500	5,400	6,750
500	5,200	6,150	7,550	5,000	5,900	7,250
1,000	5,700	6,650	8,050	5,500	6,400	7,750
1,500	6,200	7,150	8,550	6,000	6,900	8,250
2,000	6,700	7,650	9,050	6,500	7,400	8,750
2,500				7,000	7,900	9,250

** Subject to enabling this additional capacity via the District Plan Review and using other mechanisms outside of the District Plan to encourage infill/intensification development. Whilst more theoretical capacity may be enabled through District Plan Reviews, robustly calculating feasibility is also limited by a lack of comparable development that provides data (e.g. house sales) within zoned areas.*

^ This is derived from a total 'gross' hectare and does not take into account infrastructure requirements and structure planning that may reduce the developable area and total dwelling count.

Figure 2: Table 5 from Our Space

HDCA 2021

15. At page 6, the HDCA 2021 sets out the projected 3,100 household shortfall in housing sufficiency for the medium term for Waimakariri District in Table 2. As highlighted in Figure 3, the discussion which follows the table clearly notes that greenfield housing capacities are calculated on the basis of an assumed density of 12hh/ha or 15hh/ha, with reference to the CRPS and Our Space which both rely on the specific definition of 'net density' as described above.

16. To the extent that the HDCA selects a density of 15hh/ha for FUDAs, based on the HGL report, this is addressed below.

HGL review of greenfield densities for the GCP

17. An independent review of greenfield densities was commissioned by the Greater Christchurch Partnership and undertaken by HGL[4].

18. Section 5.3.2 of that report presents a number of case studies to help inform the likely density yield for greenfield areas. Those case studies set out land use coverage for these areas, as summarised in Table 1.

[4] Greater-Christchurch-Partnership-Greenfield-Density-Analysis-Technical-Report-Final_Optimized.pdf (greaterchristchurch.org.nz)

Table 2: Urban Housing Sufficiency within Greater Christchurch in the Medium Term 2021 – 2031 – excluding Selwyn and Waimakariri Future Urban Development Areas

Area	Feasible Capacity	Medium term demand + 20% short term margin	Surplus / Shortfall
Waimakariri	2,273	5,410	-3,137
Christchurch	101,994	18,215	83,779
Selwyn	6,452	8,541	-2,089
Total	110,719	32,166	78,553

In response to the medium term shortfall, Future Urban Development Areas (FUDA's) were identified under "Our Space – Greater Christchurch Settlement Pattern Update 2019". On the 28 July 2021, the Minister for the Environment approved Proposed Change 1 to Chapter 6 of the CRPS which identifies new urban housing development (FUDA) areas in Rolleston (additional capacity of 5,756 at 12.5hh/ha and 7,050 at 15hh/ha), Rangiora and Kaiapoi (combined at 12hh/ha is 5,400 and at 15hh/ha is 6,850). Change 1 also adds associated policy provisions to enable Selwyn and Waimakariri District Councils to consider rezoning land within these areas through their district planning processes to meet shortfalls in housing capacity.

Our Space (2019) provided density scenarios and anticipated yields from the FUDAs at 12hh/ha and 15hh/ha[2]. On the basis that the FUDA's are rezoned within the medium term at density yield of 15hh/ha, Table 3 provides an adjustment (scenario) for the medium term sufficiency calculation. A 15hh/ha density yield has been selected based upon an independent review of greenfield densities commissioned by the Greater Christchurch Partnership and undertaken by Harrison Grierson Limited. This report concluded that any identified constraints and issues can be overcome to enable the minimum net densities to be increased to 15hh/ha to optimise greenfield land and meet the longer term housing demand profile[3].

Figure 3: Table 2 from the HDCA 2021

19. In respect of the examples in Table 1, the following relevant points are noted:

    i. An average of 9% of the (gross) study area was set aside for commercial use and stormwater management (albeit the latter does not account for off-site stormwater facilities[5]). The CRPS requires these areas to be excluded from 'net density' and as set out in previous evidence on PC31, 12.5% has been excluded from gross areas to define a net area upon which density can be determined.

    ii. An average of 31.2% of the (gross) study area was set aside for streets and lanes and local parks. The CRPS requires these areas to be include in 'net density' and this average compares to the 25% figure suggested by Mr Yeoman.

20. The case studies supported a conclusion in the report that a target minimum net density (per the CRPS definition) of 15hh/ha was appropriate.

[5] If the Sovereign Palms and Longhurst are excluded noting they benefit from off site stormwater management, the area required for stormwater management in the case studies accounts for an average area of 10.6%. If added to the 0.9% average commercial area the total amounts to an average of 11.5%.

Table 1: Land use coverage from the HGL report

	Included in 'net density' and hh/ha calculation (per CRPS			Excluded from 'net density' (per CRPS definition)	
	Residential	**Streets & Lanes**	**Parks**	**Commercial**	**Stormwater reserve**
Spring Grove, Belfast, Christchurch	53	29	0.4	0	18
Golden Sands, Papamoa, Tauranga	58	29	3	1	9
Huapai Triangle, Kumeu, Auckland	58	34	1	1	6
Longhurst, Halswell, Christchurch	63	28	3	2	4*
Greenhill Park, Chartwell, Hamilton	53	29	3	0	15
Faringdon, Rolleston	63	28	3	1	5
Sovereign Palms, Kaiapoi, Christchurch	71	24	4	1	0*
Average	**59.9**	**28.7**	**2.5**	**0.9**	**8.1**
*** Note – stormwater facilities provided outside of the defined case study area**					

HDCA 2023

21. The HDCA 2023 does not explicitly reference the term 'net density' but uses the term 'hh/ha' extensively and refers to the 15hh/ha target set out in the documents summarised above[6]. The HDCA 2023 also states that:

> *For both the SCGM and WCGM the following assumptions have been applied:*
>
> - *'Undevelopable' lots have been removed, including roads and railways, hydrological features, vested roads and reserves and designated sites;*
> - *Dwelling typology is assumed to be what the District Plans enable;*
> - *Estimates are rounded down to the nearest whole number;*
> - *Amalgamation of parcels is not accounted for;*
> - ***That 25% of land area is set aside for infrastructure;***
> - *That no commercial buildings will be constructed in residential zones.*

22. The HDCA also sets out the 25% infrastructure assumption and 500m^2 lot size in its residential density assumptions for Waimakariri greenfield areas as shown in Figure 4.

[6] See section 3.2.1

Table 39: Waimakariri Residential Density Assumptions

Assumption	Reasonably Expected to be Realised
Infrastructure	25%
Medium Density Residential Zone Greenfield Sites	Rangiora – 500m² Kaiapoi – 500m² Woodend – 500m² Pegasus – 500m²

Figure 4: Table 39 from the 2023 HDCA

23. The HDCA 2023 does not define what 'infrastructure' means in the context that it is described in Figure 4. However, with reference to the HGL case studies, 'infrastructure' is evidently the local road and reserve network that is expressly included in the CRPS definition of 'net density', noting that the 25% is comparable (albeit less than) the 31.2% average extent of these areas in the HGL report. For the same rationale, it is concluded that the 25% cannot be for all infrastructure, including commercial areas and stormwater management which are excluded in the CRPS definition of net density, noting that the HGL case studies averaged 40.2% for all infrastructure.

24. It is also relevant to note that the 500m^2 average lot size and 25% infrastructure allowance referred to in the table above aligns with the 15hh/ha target density applied in accordance with the exclusions and inclusions in the CRPS definition of 'net density'. For example, a 500m^2 lot size x 15 households = 7,500m^2 of residential area, with the 2,500m^2 area for local infrastructure comprising the balance 25% of the 1 hectare. The counterfactual (of 25% for all infrastructure) would mean that for a 7,500m^2 area of residential lots, 2,500m^2 would remain for local roads, reserves, commercial areas and stormwater retention and treatment – where that is clearly not consistent with the HGL analysis, or the statutory definition of net density.

Mr Yeoman's Response and the WCGM22

Question 9

25. Question 9(c) of the Panel's Minute 5 sought confirmation of the percentage of land subtracted for stormwater, infrastructure and reserves when assessing capacity in NDAs/FDAs.

26. Mr Yeoman's response stated that "*a total of 25% of raw land is removed, which accounts for* ***all types of non-developable land****, and* ***there is in the WCGM22 no disaggregation of that 25% aggregate figure****"*.

27. Mr Yeoman's approach is not consistent with that set out in the statutory and non-statutory documents described above, which all exclude stormwater and commercial areas from the gross area of land as a first step. Local road and reserve infrastructure is then accounted for as part of the 15hh/ha density calculation, or the 25% infrastructure ratio.

28. As stated above, the HGL case studies show that an average of approximately 40.2% of the raw land area is required for stormwater, infrastructure, reserves and commercial purposes – which is considerably higher than the 25% ratio adopted by Mr Yeoman.

Question 10

29. Question 10 of the Panel's Minute 5 asked for the assumed lot size or hh/ha yield.

30. Mr Yeoman's response states that "*the average lot sizes applied in the WCGM22 are as follows for South East Rangiora (501m^2), North East Rangiora (543m^2), North West Rangiora (693m^2), South West Rangiora (499m^2), and North Kaiapoi (384m^2)"*.

31. It is unclear if Mr Yeoman is stating that variable lot sizes have been applied in different locations in the WCGM22 or the rationale for doing so, however Table 39 of the HDCA 2023 is clear that a 500m^2 lot size is assumed for all of Waimakariri's greenfield areas. As set out above, this is consistent with a 15hh/ha yield applied in accordance with the definition of 'net density'.

Conclusion

32. The following statutory and non-statutory documents provide a clear and consistent approach to the calculation of net density and household capacity for greenfield areas, where stormwater and commercial areas are excluded from the 'gross area':

    i. The CRPS (including Plan Change 1);

    ii. Our Space;

    iii. The HDCA 2021;

    iv. The HDCA 2023 (albeit, it used a 500m^2 average lot size and 25% allowance for local infrastructure)

    v. The independent review of greenfield densities commissioned by the Greater Christchurch Partnership and undertaken by HGL.

33. In contrast, Mr Yeoman's approach and the WCGM22 suggests 25% of the gross area is sufficient for all infrastructure, including stormwater and commercial areas. That is not consistent with the documents described above and is at odds with the average area of 40.2% for all infrastructure identified in the HGL report.

34. Mr Yeoman's response to Question 10 in Minute 5 also suggests that the WCGM22 uses variable average lot sizes for different parts of the district. However, that differs from the clear assumption in the HDCA 2023 of a 500m^2 average lot size and 25% allowance for local infrastructure, and a 15hh/ha density in the other planning documents analysed.

35. Given the above, we consider the correct approach to determine household capacity is to:

    i. Define the gross area of the greenfield area being considered (in hectares).

    ii. Deduct areas required for stormwater retention & treatment and local retail/commercial purposes from this gross area, per the definition of 'net density' in the CRPS. Based on the HGL report and the advice of Mr Tim McLeod, we consider 12.5% is an

appropriate allowance for stormwater and commercial purposes, recognising that some areas may ultimately require more or less than this.

iii. Multiply the remaining (net) greenfield area by 15hh/ha to determine capacity. This ratio is equivalent to an average 500m^2 residential lot size and an allowance of 25% of net area for community infrastructure including local roads and roading corridors, pedestrian and cycle ways, and local (neighbourhood) reserves. The latter is the approach adopted by Mr Yeoman, albeit he fails to account for the exclusions in the CRPS definition of 'net density', and stormwater in particular.

36. The formula below shows our calculation of capacity (per the CRPS, Our Space, and HDCA 2021) is equivalent to Mr Yeoman's approach (and that set out in the HDCA 2023), provided that for both methods stormwater should first be deducted from the gross area:

1ha net area x 15 hh/ ha = 15 households

=

(1ha net area– 25% local infrastructure) / 500m^2 avg lot size = 15 households

Appendix B | Photographic Examples of Sites

[Note: Photos taken week of 21 August 2023]

Figure 1 – Completed Houses in previous stages of Townsend Fields Rangiora - Overcount in WCGM22 of 107 Lots in 'Rangiora Vacant lots'

Figure 2- Completed Rangiora Housing New Zealand Multi Lot Development (High Street) – Overcount in WCGM22 of 6 Lots

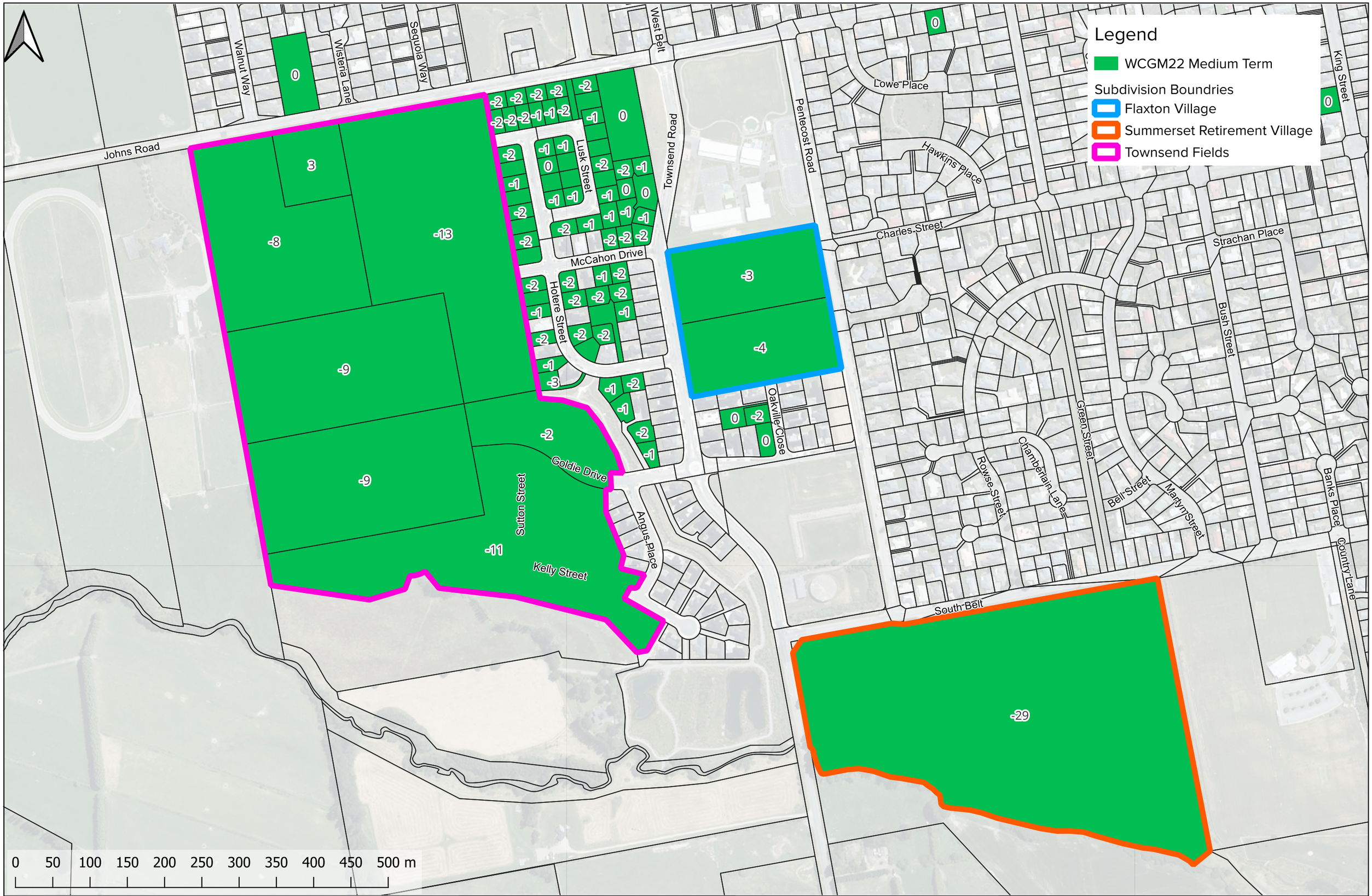
Figure 3 – Completed Houses Built within Mike Greer Development in Pegasus – Overcount in WCGM22 of 53 Lots

Figure 4 - Developed Lots and completed houses within previous stages of Ravenswood – Overcount in WCGM22 of 178 Lots as vacant lots

Figure 5 - Completed Houses within previous stages of Woodland Estate- Overcount in WCGM22 of 71 Lots in 'Woodend/Pegasus Vacant lots'

Figure 6 - Completed Houses in previous stages of Beach Grove Subdivision – Kaiapoi – Overcount in WCGM22 of 98 Lots in 'Kaiapoi Vacant lots'

Appendix C | WCGM22 Development Area Maps



Prepared By: Chris Sexton
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Client
ROLLESTON INDUSTRIAL DEVELOPMENTS LTD.

Project
MILL ROAD OHOKA
PRIVATE PLAN CHANGE 31

Drawing Title
WCGM22 SUBDIVISION AREAS
RANGIORA WEST

Status
FOR INFORMATION

Map No.
14895-M-WCGM22-01

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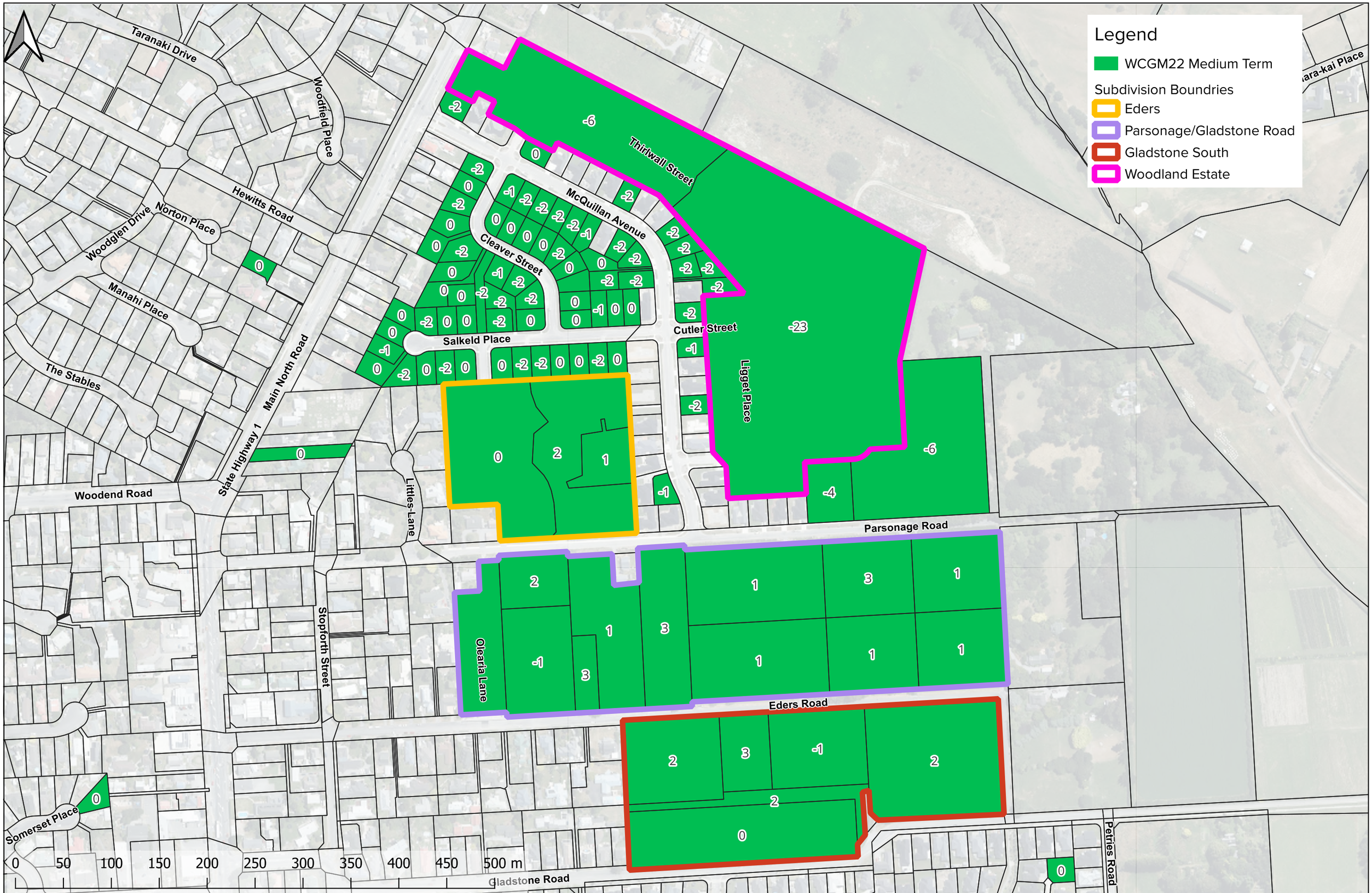

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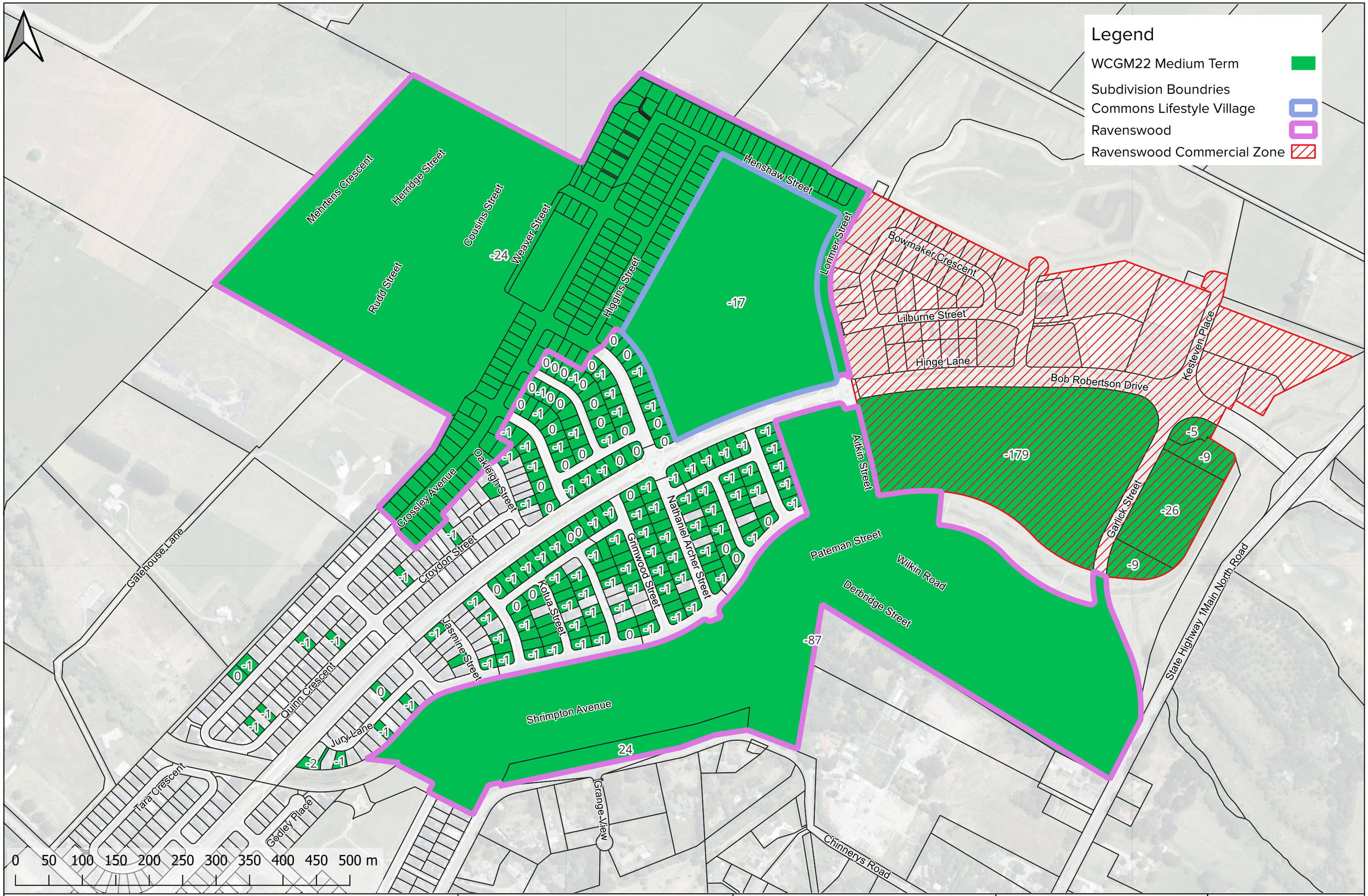

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Legend

WCGM22 Medium Term

Subdivision Boundries

N - Pegasus

0 50 100 150 200 250 300 350 400 450 500 m

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Appendix D | Detailed Methodology and Findings

1 Introduction

This Appendix outlines the detailed methodology and findings of a further investigation into the WCGM22 model as developed by Formative as part of their economic assessment for the Waimakariri District.

Further investigation of the model has focused only on areas identified in the Medium Term, noting PC31 will provide housing capacity within the medium term.

2 Methodology

The WCGM22 data was analysed in QGIS and combined with other open-source data[2] to provide further information. This included matching the ID's in the WCGM22 with the LINZ Data Service Primary Parcel Dataset allowing further information such as address, parcel appellation, title reference, legal owner etc to be identified.

The WCGM22 data was then analysed to check for the following:

- Recreation Reserve Lots
- Utility Reserve Lots
- Council Owned Facilities (i.e. water treatment plants)
- Parcels featuring heritage buildings
- Parcels featuring protected trees
- Pre-Schools/early learning centres
- Churches/Places of Worship.

A number of areas were then checked for land covenants and/or encumbrances that would prevent further subdivision or intensification. Examples of these can be found in **Appendix E** for Ravenswood, Townsend Fields, Pegasus and Mansfield Drive (Kaiapoi).

Vacant lots were identified in the WCGM22 dataset as lots with 0 buildings on the parcels. These vacant lots were then checked to confirm they are still in fact vacant. This was initially done using the latest aerial imagery flown in early 2023 over the urban areas by Waimakariri District Council/ECan. Vacant lots were then verified by driving the district and confirming if the sites were vacant or if a dwelling had been completed therefore removing any potential future capacity in the medium term.

Sites in areas where there were no restrictive covenants with dwellings under construction were also checked to confirm capacity, and in most cases were assessed as only being able or likely to provide a single housing unit in the medium term on the basis that redevelopment or infill development resulting in additional dwellings on the site was highly unlikely (due to the recent/new establishment of the dwelling).

Greenfield Development was identified by Mr Yeoman as being the following:

A) Bellgrove
B) Townsend Fields
C) Summerset Retirement Village
D) Flaxton Village
E) East Rangiora
F) Beach Grove
G) Silver Stream & Future Silver Stream
H) The Sterling

[2] For example: LINZ Data service, Waimakariri District Council GIS Data, ECan Open Data Portal (Canterbury Maps).

I) Momentum
J) Ravenswood
K) Commons Lifestyle Village
L) Woodland Estate
M) Eders
N) Pegasus

Along with:

Parsonage/Gladstone North
Gladstone South

It is important to note that the extent of these subdivisions as identified in Mr Yeoman's response to Minute 5 by the Commissioners do not necessarily match the extent or naming of the subdivisions as assigned by the developers. For example, greenfield capacity identified within Pegasus by Mr Yeoman (as depicted on his map with the letter "N") related to only a small part of the Pegasus subdivision, with vacant land capacity in other parts of Pegasus then attributed to the Woodend-Pegasus area. Despite this, we have adopted a consistent approach to our review and validation of capacity below to ensure that our findings can be directly correlated with the WCGM22.

For areas A-N above, medium-term household capacity was confirmed by either:

a. Adopting yields in publicly available and consented subdivision master plans; or otherwise

b. Deducting 12.5% of the gross site area for stormwater management, and then multiplying the remaining area by 15 houses/hectare applied to determine capacity. This is consistent with the methodology set out in the Canterbury Regional Policy Statement ('CRPS')), Our Space, the HDCA 2021, HDCA2023, and the independent review of greenfield densities commissioned by the Greater Christchurch Partnership and undertaken by Harrison Grierson Limited ('HGL') as detailed in **Appendix A**.

The approach above can be contrasted with Mr Yeoman's calculation of capacity in greenfield areas where he allows only 25% of the gross area for all infrastructure, including stormwater management areas which is specifically excluded by the statutory and non-statutory documents listed above. Mr Yeoman's allowance of only 25% is also considerably less than the 40.2% average area for all infrastructure in the case studies identified by HGL. Subject to excluding stormwater from gross areas, the 15hh/ha density calculation we have then applied to greenfield areas is otherwise equivalent to Mr Yeoman's approach, and that set out in the HDCA2023, of allowing 25% of the net area for local infrastructure and an average 500m^2 lot size for the balance, to determine capacity. This is explained in further detail in Mr Walsh's memo in **Appendix A**.

3 Results

3.1 Rangiora

3.1.1 Area A – Bellgrove

No master plan for the entire Bellgrove development could be found that was publicly available. The predicted yield for Bellgrove was therefore calculated using the gross site area (61.0 ha), minus a 12.5% allowance for stormwater management and allowing for 15 houses per hectare over the remainder of the site. This resulted in a predicted yield of 800 lots, 152 less than WCGM22 predicted in the medium term.

3.1.2 Area B – Townsend Fields

No master plan for the area identified as Townsend Fields within Mr Yeomans Maps could be found that was publicly available. The predicted yield for the area identified as Townsend Fields was calculated using the gross site area (28.2 ha), minus a 12.5% allowance for stormwater management and allowing for 15 houses per hectare over the remainder of the site. This resulted in a predicted yield of 370 lots, 49 less than WCGM22 predicted in the medium term.

3.1.3 Area C – Summerset Retirement Village

Mr Yeoman clarified within his response to Minute 5 that WCGM22 considered retirement villages, although not at their ultimate yield, but instead as the yield that would be realised under normal development. This approach has been taken when assessing these areas, with the same methodology used as when assessing

greenfield sites with a 12.5% allowance made for stormwater treatment. This resulted in a predicted yield of 182 lots on the Summerset Retirement Village site as identified by Mr Yeoman in his Maps attached to his response to Minute 5. This result is 29 lots less than originally predicted by WCGM22.

3.1.4 Area D – Flaxton Village

Mr Yeoman clarified within his response to Minute 5 that WCGM22 considered retirement villages, although not at their ultimate yield, but instead as the yield that would be realised under normal development. This approach as been taken when assessing these areas, with the same methodology used as when assessing greenfield sites with a 12.5% allowance made for stormwater treatment. This resulted in a predicted yield of 52 lots on the Flaxton Village site as identified by Mr Yeoman in his Maps attached to his response to Minute 5. This result is 7 lots less than originally predicted by WCGM22.

3.1.5 Area E – East Rangiora

No master plan for the area identified as East Rangiora within Mr Yeoman's Maps could be found that was publicly available. The predicted yield for the area identified as East Rangiora was calculated using the gross site area (5.1 ha), minus a 12.5% allowance for stormwater management and allowing for 15 houses per hectare over the remainder of the site. This resulted in a predicted yield of 66 lots, 10 less than WCGM22 predicted in the medium term.

3.1.6 Rangiora Vacant Lots

For the Rangiora area (outside of the Greenfield areas as per Mr Yeoman's maps), Vacant Lots were identified as lots with 0 buildings on them in the WCGM22 dataset.

However, a number of the vacant lots in the WCGM22 were found to have houses or buildings already on them due to buildings being constructed over multiple parcels.

It was also found that a number of vacant lots were subject to restrictive covenants that prevent further subdivision of the land that would preclude intensification beyond one additional dwelling per vacant lot, as otherwise assumed by the WCGM22. The Townsend Fields Development is one such example, with other examples of covenants precluding further capacity being realised on vacant lots provided in **Appendix E**.

WCGM22 also featured multiple utility reserves (stormwater basins) and recreation reserves in the vacant land category, despite such land being unsuitable for residential development in the medium term or otherwise.

Vacant lots were verified by first reviewing aerial imagery flown at the beginning of 2023 by the Waimakariri District Council to identify if a dwelling had been constructed on the remaining viable vacant sites. This was then confirmed by visiting the sites to confirm the buildings had been completed along with checking to see if any additional lots had completed buildings on them since the aerial imagery was flown.

This resulted in a vacant lot yield of 248 lots within Rangiora, 131 lots less than originally predicted by WCGM22.

3.1.7 Rangiora Infill/Intensification

It was assumed that infill/intensification would include lots that had 1 or more building on them within the WCGM22 model and were not included within the identified subdivisions. A number of lots were identified in the WCGM22 model that had been included in error. These lots were identified on the following criteria:

- Pre-Schools
- Lots already intensified or developed with completed buildings, thus precluding further capacity

Examples of lots already developed that cannot provide for further infill or intensification include the Kāinga Ora high-density development built in 2019 on High Street/White Street in Rangiora (assumed as 6 additional/new lots in the WCGM22) (see Figure 2 photo in **Appendix B**) and the existing Holmwood retirement village (assumed as 4 additional/new lots in the medium term in WCGM22) in Rangiora (village built over multiple parcels). The preschool at 62 Percival Street (assumed as 2 additional/new lots in the WCGM22) is another example of a site that is unlikely to yield capacity through infill or intensification in the medium term.

These errors resulted in the total available amount of lots available for infill/intensification within Rangiora being 270, a reduction of 85 lots from the original WCGM22 model.

3.2 Kaiapoi

3.2.1 Area F – Beach Grove

The area identified as Beach Grove in WCGM22 as identified by Mr Yeoman within his response to Minute 5 when referenced back to the master plan for Beach Grove results in a future yield of 330 residential lots. This is 2 lots lower than that predicted by WCGM22. A reason why this difference is smaller than for other areas is that the required area for stormwater management is far smaller due to the works undertaken by Waimakariri District Council to construct a stormwater pump station at the end of Macintosh Drain, removing attenuation requirements for the development.

3.2.2 Area G - Silver Stream

No master plan for the area identified as Silver Stream within Mr Yeoman's Maps could be found that was publicly available. The predicted yield for the area identified as Silver Stream was calculated using the gross site area (5.0 ha), minus a 12.5% allowance for stormwater management and allowing for 15 houses per hectare over the remainder of the site. This resulted in a predicted yield of 65 lots, 24 less than WCGM22 predicted in the medium term.

3.2.3 Future Silver Stream

No master plan for the area identified as Future Silver Stream within Mr Yeomans Maps could be found that was publicly available. The predicted yield for the area identified as Future Silver Stream was calculated using the gross site area (3.13 ha), minus a 12.5% allowance for stormwater management and allowing for 15 houses per hectare over the remainder of the site. This resulted in a predicted yield of 41 lots, 3 less than WCGM22 predicted in the medium term.

3.2.4 Area H – The Sterling

Mr Yeoman clarified within his response to Minute 5 that WCGM22 considered retirement villages, although not at their ultimate yield, but instead as the yield that would be realised under normal development. This approach has been taken when assessing these areas, with the same methodology used as when assessing greenfield sites with a 12.5% allowance made for stormwater treatment. This resulted in a predicted yield of 90 lots on The Sterling site as identified by Mr Yeoman in his Maps attached to his response to Minute 5. This result is 47 lots less than originally predicted by WCGM22.

3.2.5 Area I – Momentum

Mr Yeoman mentioned that Future Development/New Development areas as identified by Waimakariri District Council should not be included in the medium term, and instead be included as long-term yield. We agree.

The Momentum site as identified by Mr Yeoman in his response to Minute 5 and within WCGM22 shows that the site has been identified as proposing medium-term development capacity. This site is zoned as Rural in the current operative district plan, and is also zoned as rural lifestyle zone in the proposed district plan. For these reasons this site has been excluded from the medium term in our analysis. This site also falls within the Airport Noise Contour and is covered by High Flood Hazard, both qualifying matters in regards to the MDRS. This results in an overestimation by WCGM22 of 116 lots within the medium term.

3.2.6 Kaiapoi Vacant Lots

For the Kaiapoi area (outside of the Greenfield areas as per Mr Yeoman's maps), vacant Lots were identified as lots with 0 buildings on them in the WCGM22 dataset.

A number of these lots were found to have houses or buildings already on them. A majority of the vacant lots were found to be within the Beach Grove Subdivision (outside of area "F" as outlined in Mr Yeoman's maps).

WCGM22 featured multiple utility reserves (wastewater pump stations) and recreation reserves in the vacant land category, despite such land being unsuitable for residential development.

Vacant lots were verified by first reviewing aerial imagery flown at the beginning of 2023 by the Waimakariri District Council to identify if a dwelling had been constructed on the remaining viable vacant sites. This was then confirmed by visiting the sites to confirm the buildings had been completed along with checking to see if any additional lots had completed buildings on them since the aerial imagery was flown.

The vacant lot housing capacity was found to be 174 within Kaiapoi, 103 less than predicted by WCGM22.

3.2.7 Kaiapoi Infill/Intensification

It was assumed that infill/intensification would include lots that had 1 or more buildings on them within the WCGM22 model and were not included within the identified subdivisions. A number of lots were identified in the WCGM22 model that had been included in error. These lots were identified on the following criteria:

- Pre-Schools
- Lots already intensified (including completed homes, and multi-unit developments by Kainga Ora)
- Lots with restrictive covenants/encumbrances preventing intensification and/or further subdivision
- Lots featuring buildings with heritage status
- Lots featuring protected trees
- Churches/places of worship
- Council owned utilities (water treatment plants etc.)

Some examples of these errors include the Kaiapoi Congregation of Jehovah's Witnesses (assumed as 3 additional/new lots in the WCGM22), the Church Square Water Supply headworks between Cass St and Sewell Street (assumed as 3 additional/new lots in the WCGM22), Peraki Street Wastewater Pump Station(assumed as 2 additional/new lots in the WCGM22), the preschool at 58 Williams Street (assumed as 2 additional/new lots in the WCGM22) and established houses within the Mansfield Drive development (assumed as 43 additional/new lots in the WCGM22) that feature encumbrances that prevent further subdivision and intensification.

The completed Kainga Ora multi-lot residential development on the corner of Williams Street and Dale Street (assumed as 5 additional/new lots in the WCGM22) is an example of a developed lot, where further infill or intensification in the medium term is unlikely.

These errors resulted in the total available amount of lots available for infill/intensification within Kaiapoi being 273, a reduction of 19 lots from the original WCGM22 model.

3.3 Woodend-Pegasus

3.3.1 Area J – Ravenswood

The area identified as Ravenswood in WCGM22 included the commercial areas of Ravenswood that were rezoned as part of Plan Change 30 that was notified in November 2020 and became operative on 26 June 2023. This resulted in 12.8 hectares of land being rezoned from Residential 6a to Business 1 within the Ravenswood Development. The available yield within area "J" as identified by Mr Yeoman within his response to Minute 5 when referenced back to the master plan for Ravenswood results in a future yield of 703 residential lots. This is 266 lots lower than that predicted by WCGM22 due to the removal of the commercial areas, along with the slightly lower density achieved over Stages 5 and 6 compared to what WCGM22 predicted.

On site validation found that 26 of these lots have since had houses been completed on them, further reducing the available capacity that WCGM22 predicts. This results in a medium-term capacity of 677 households for this area, a reduction of 292 from the original WCGM22 prediction.

3.3.2 Area K – Commons Lifestyle Village

Mr Yeoman clarified within his response to Minute 5 that WCGM22 considered retirement villages, although not at their ultimate yield, but instead as the yield that would be realised under normal development. This approach as been taken when assessing these areas, with the same methodology used as when assessing greenfield sites with a 12.5% allowance made for stormwater treatment. This resulted in a predicted yield of 114 lots on the Commons Lifestyle Village site as identified by Mr Yeoman in his Maps attached to his response to Minute 5. This result is 17 lots less than originally predicted by WCGM22.

3.3.3 Area L – Woodland Estate

The master plan for the Woodland Estate development was available online. Mr Yeoman has identified the Woodland Estate Subdivision as being Stage 3 based upon the map he provided in his response to Minute 5.

The yield from Stage 3 is found to be 75 lots. This is lower than WCGM22 by 29 lots. Woodland Estate Stage 3 will have its stormwater managed in the downstream stormwater management area as constructed as part of the earlier stage. This stormwater management area also makes allowance for Area M – Eders as identified by Mr Yeoman.

3.3.4 Area M – Eders

As mentioned above, this area will have its stormwater managed by the downstream stormwater management area, this means that a density of 15 houses/hectare has been applied over the gross site area (i.e. a 12.5% deduction is not necessary here). This results in a yield of 45 lots, 3 more than predicted by WCGM22.

It should be noted that a dwelling has been constructed on this site and completed at the beginning of 2023. This dwelling has a floor area of 320m² and may impact the potential yield from the site due to the dwelling's location and size. This has not been considered in either assessment.

3.3.5 Parsonage/Gladstone North

This area identified by Mr Yeoman in his maps attached to his response to Minute 5 relates to the lots identified in WCGM22 between Parsonage Road and Eders Road. The WCGM22 model predicted 101 lots within this area (when referring to the mapped area presented in Appendix 1 of Mr Yeoman's response to Minute 5). However, accounting for the gross area of 9.07ha, a 12.5% allowance for stormwater management, and a density of 15 houses/hectare, this results in a predicted yield of 119 lots. This estimated yield is 18 lots more than WCGM22 predicts. When comparing the predicted yield of 119 lots to the listed capacity in Mr Yeoman's table of 148 lots, the estimated yield is 29 lots less. The differing numbers here are a result of what lots are allocated to certain areas in the table and on the maps.

3.3.6 Gladstone South

This area identified by Mr Yeoman in his maps attached to his response to Minute 5 relates to the lots identified in WCGM22 between Eders Road and Gladstone Road. This is a total of 5.57ha, and after a 12.5% allowance for stormwater management and a density of 15 houses/hectare, this results in a predicted yield of 73 lots. The WCGM22 model predicted 65 lots within this area (when referring to the mapped area presented in Appendix 1 of Mr Yeomans response to Minute 5). This estimated yield is 8 lots more than WCGM22 predicts. When comparing the predicted yield of 73 lots to the listed capacity in Mr Yeoman's table of 18 lots, the estimated yield is 55 lots more. The differing numbers here are a result of what lots are allocated to certain areas in the table and on the maps.

The overall result of our assessment to this area (Parsonage/Gladstone North and Gladstone South) is the same either way it is calculated. 18 lots more + 8 lots more = 26 lots more overall. Alternatively, 29 lots less (-29) + 55 lots more = 26 lots more overall.

3.3.7 Area N – Pegasus

The area identified as Pegasus in Mr Yeoman's Map was easily identified in the WCGM22 data. Our assessment found that a number of lots in this area had been developed with houses completed already. There was also a reserve identified in this area (assumed as 2 additional/new lots in the WCGM22). The larger of the areas identified within Pegasus entailed the largely completed Mike Greer Homes development, where the WCGM22 model predicted a yield of 85 lots. However, this development is nearing completion with most of the dwellings already completed and occupied.

The Maps provided by Mr Yeoman identified a number of lots on Lakeside Drive as being included in the "Pegasus" subdivision area N. Reviewing the raw model data and historic parcel ID's (Parcel ID's are updated if a lot is subdivided) there was no match found for these lots within WCGM22. On this basis, we added an additional 16 allotments to the capacity for this area, noting it had otherwise been overlooked in the WCGM22.

Accounting for the above, the total number of available lots to provide household capacity (i.e. lots not already developed with completed houses) was found to be 86 lots. This was found to be significantly lower (by 283 lots) than the 369 lots predicted by WCGM22.

3.3.8 Woodend/Pegasus Vacant Lots

For the Woodend/Pegasus area (outside the Greenfield areas as per Mr Yeoman's maps), vacant Lots were identified as lots with 0 buildings on them in the WCGM22 dataset. A number of these lots were found to have houses or buildings already on them. It was also found that a number of lots had been included that are subject to restrictive covenants that prevent further subdivision of the land. WCGM22 had identified a number of these lots as being able to provide 2 or more additional lots in the medium term. This, along with the fact that many of these parcels now have dwellings completed on them further reduces the capacity available in the medium term as it has already been realised.

WCGM22 featured multiple utility reserves (wastewater pump stations) and recreation reserves in the vacant land category (assumed as 14 additional/new lots in the medium term in WCGM22).

Vacant lots were verified by first reviewing aerial imagery flown at the beginning of 2023 by the Waimakariri District Council to identify if a dwelling had been constructed on the remaining viable vacant sites. This was then confirmed by visiting the sites to confirm the buildings had been completed along with checking to see if any additional lots had completed buildings on them since the aerial imagery was flown.

The yield potential was also checked for multiple developments by checking the restrictive covenants to see if there was anything to prohibit further development. It was found that within Pegasus (inside and outside of Area "N") a number of lots identified by Mr Yeoman in WCGM22 featured restrictive covenants that specified minimum floor area for buildings and prohibited further subdivision of the land. The vacant lots within the Ravenswood development (outside of Area J) are covered by restrictive covenants that prevent further subdivision or sale of the land without improvements. This meant that lots could only have a yield of 1 if there was not a house already completed due to the inability to further subdivide. Examples of the covenants are included in **Appendix E**.

Lots within the existing stages of the Woodland Estate subdivision (inside and outside of Area "L") are subject to covenants however, there are no apparent restrictions on further subdivision based on our review. Lots that had been completed were removed from the capacity assessment, and lots under construction were considered as providing only a single dwelling in the medium term. This assumption that dwellings under construction would only provide a single lot was based on the assumption that a brand-new dwelling would not be demolished to create 2 lots in the medium term.

This resulted in a vacant lot yield of 209 lots within Woodend, Ravenswood and Pegasus, 204 lots less than originally predicted by WCGM22.

3.3.9 Woodend/Pegasus Infill/Intensification

There were only 2 lots identified as providing infill/intensification in WCGM22. Both lots identified could support further subdivision to allow intensification.

4 Mr Yeoman's evidence & response to Minute 5

Mr Walsh's memo in **Appendix A** notes the errors in Mr Yeoman's approach to including stormwater areas within the 25% allowance for local infrastructure and this has been accounted for in our review and analysis above.

We otherwise note that Mr Yeoman has stated multiple times within his summary of evidence and in his response to Minute 5 that he believed in our original evidence we had identified only 53 dwellings in the medium term that had been included in error. We are unsure as to how he came to this conclusion of the number 53, noting we identified the following in our initial examples:

- Recreation Reserves – 39 Lots
- Utility Reserves – 22 Lots
- Streams and Rivers (Northbrook) – 3 Lots
- Council Property (Water treatment plant etc.) – 5 Lots

This accounts for 69 lots before taking into consideration the other factors that were investigated as part of this memo. In our view, Mr Yeoman's response still fails to acknowledge major errors in the WCGM22 which clearly overstates capacity as evident in the table above and analysis which follows.

As a concluding comment, we note that whilst our analysis does not examine the long term, the capacity shortfall and inherent errors in the model described above will affect long term calculations of capacity in the same way. Those calculation errors and reliance on capacity in uncertain areas such as the Kaiapoi NDA risk compounding the overestimation of capacity and the underestimation of any shortfall in supply.

5 Conclusion

In summary, this analysis finds that:

- Actual household capacity is approximately 4361 households, which is 1573 households (or 26.5%) less than the 5934 households anticipated by the WCGM22 and translates into 1239 household shortfall (rather than 350 surplus) in the medium term based on the HDCA 2023.
- This conclusion potentially:
    - underestimates the shortfall insofar that feasible yield from infill lots (lot shape), economic benefit from the existing dwelling values, ability to develop to the densities in WCGM22 due to downstream constraints (i.e. existing infrastructure network constraints constraining development) has not been considered in my review.
    - underestimates the supply insofar that some developers may achieve higher yields than 15 houses/hectare and the WCGM22 Model may have missed some lots as was found with a very small number missed in Pegasus.

  However, such variance is unlikely to materially alter the conclusion above that the WCGM22 model overstates household capacity.

Appendix E | Land Covenant Examples

RAVENSWOOD RESTRICTIVE COVENENTS

Land Use Restrictions

3.36 No Lot shall be used for any form of temporary residential purposes either by the construction of temporary Buildings or by the placement of caravans, modular homes, mobile homes, motor homes, house trailers, buses, tractors, huts, tents and/or vehicles able to be used for human habitation except for a builder's shed at the commencement of, and for the duration of construction, of any dwelling being erected on the Lot.

3.37 Lot Owners must not use any Lot for any primary purpose other than for residential occupation unless previously agreed in writing by a duly authorised representative of Ravenswood. Ancillary purposes are governed by the planning provisions under any regulatory land use controls applicable from time to time.

3.38 No Lot shall be sold, leased, transferred, assigned or otherwise disposed of to any Governmental agency or Territorial Authority for the purposes of public or institutional housing without the prior approval of Ravenswood.

3.39 No inflammable, explosive or noxious materials are to be stored or used on any Lot or in any Building. The Lot Owner must not allow any offensive activity to be conducted or permitted to exist upon any Lot, or in any Building, nor shall anything be done or permitted to exist on any Lot or in any Building that may be or may become an annoyance or private or public nuisance. An annoyance or private or public nuisance includes loud sounds or noises or offensive smells.

3.40 No Lot, driveway or common area shall be used for the purpose of long term vehicle parking, repair or maintenance. No unregistered, non-licensed or expired license or inoperable vehicles of any kind shall be permitted to remain on any Lot (unless parked inside the garage).

3.41 No recreational or commercial vehicles boats or trailers are to be regularly located on the road or in front of the Building line of the main Building constructed or to be constructed on the Lot.

3.42 No Lot may be further subdivided nor shall any further easements be agreed to, granted or registered on any Lot, including rights of way.

TOWNSEND FIELDS RESTRICTIVE COVENENTS:

ANNEXURE SCHEDULE

The Covenantor:

1. **No Subdivision**

   Shall not further subdivide the land either by way of unit plan, cross-lease or fee simple subdivision, but this shall not apply to a boundary adjustment between two lots which does not create any additional record of title.

PEGASUS RESTRICTIVE COVENENTS

(3.44) No Lot may be further subdivided nor shall any further easements be agreed to, granted or registered on any Lot, including rights of way.

MANSFIELD DRIVE RESTRICTIVE ENCUMBRANCE

1. (a) The Grantor shall not cover the surface of any of the said lots with more than 300m2 of any substance impervious to water (including buildings).

(b) The Grantor shall not further subdivide any of the lots by any means whatsoever including Cross-Lease Titles and the Unit Titles Act 1972.

(These covenants shall be called "the secured covenant" provided that the secured covenant shall be enforceable only against the registered proprietors and occupiers for the time being of the said lots and not otherwise against the Grantor and its successors).

APPENDIX B

Location	Christchurch City					Selwyn District					Waimakariri District					Greater Christchurch				
Year	Dwelling	TH & Apt	Total	% Dwelling	% HD	Dwelling	TH & Apt	Total	% Dwelling	% HD	Dwelling	TH & Apt	Total	% Dwelling	% HD	Dwelling	TH & Apt	Total	% Dwelling	% HD
2010	1,071	350	1,421	75.4%	24.6%	393	1	394	99.7%	0.3%	423	34	457	92.6%	7.4%	1,887	385	2,272	83.1%	16.9%
2011	710	195	905	78.5%	21.5%	439	4	443	99.1%	0.9%	478	47	525	91.0%	9.0%	1,627	246	1,873	86.9%	13.1%
2012	967	222	1,189	81.3%	18.7%	766	6	772	99.2%	0.8%	1,045	26	1,071	97.6%	2.4%	2,778	254	3,032	91.6%	8.4%
2013	1,868	532	2,400	77.8%	22.2%	1,270	4	1,274	99.7%	0.3%	1,127	74	1,201	93.8%	6.2%	4,265	610	4,875	87.5%	12.5%
2014	3,115	968	4,083	76.3%	23.7%	1,284	34	1,318	97.4%	2.6%	819	142	961	85.2%	14.8%	5,218	1,144	6,362	82.0%	18.0%
2015	2,303	1,445	3,748	61.4%	38.6%	1,210	21	1,231	98.3%	1.7%	577	17	594	97.1%	2.9%	4,090	1,483	5,573	73.4%	26.6%
2016	1,914	1,060	2,974	64.4%	35.6%	1,179	78	1,257	93.8%	6.2%	465	42	507	91.7%	8.3%	3,558	1,180	4,738	75.1%	24.9%
2017	1,475	794	2,269	65.0%	35.0%	1,227	19	1,246	98.5%	1.5%	524	27	551	95.1%	4.9%	3,226	840	4,066	79.3%	20.7%
2018	1,248	856	2,104	59.3%	40.7%	1,016	16	1,032	98.4%	1.6%	579	58	637	90.9%	9.1%	2,843	930	3,773	75.4%	24.6%
2019	1,305	948	2,253	57.9%	42.1%	1,258	13	1,271	99.0%	1.0%	587	51	638	92.0%	8.0%	3,150	1,012	4,162	75.7%	24.3%
2020	1,480	1,320	2,800	52.9%	47.1%	1,605	45	1,650	97.3%	2.7%	515	33	548	94.0%	6.0%	3,600	1,398	4,998	72.0%	28.0%
2021	1,612	2,108	3,720	43.3%	56.7%	1,763	91	1,854	95.1%	4.9%	839	39	878	95.6%	4.4%	4,214	2,238	6,452	65.3%	34.7%
2022	1,755	3,173	4,928	35.6%	64.4%	1,746	106	1,852	94.3%	5.7%	753	38	791	95.2%	4.8%	4,254	3,317	7,571	56.2%	43.8%
Grand Total	**20,823**	**13,971**	**34,794**	**59.8%**	**40.2%**	**15,156**	**438**	**15,594**	**97.2%**	**2.8%**	**8,731**	**628**	**9,359**	**93.3%**	**6.7%**	**44,710**	**15,037**	**59,747**	**74.8%**	**25.2%**

New dwelling consented by 2023 Statistical area 2 (Monthly) Source NZ Statisitcs