

Waimakariri District Plan Review

Rural Production Advice – Rural Land Zoning



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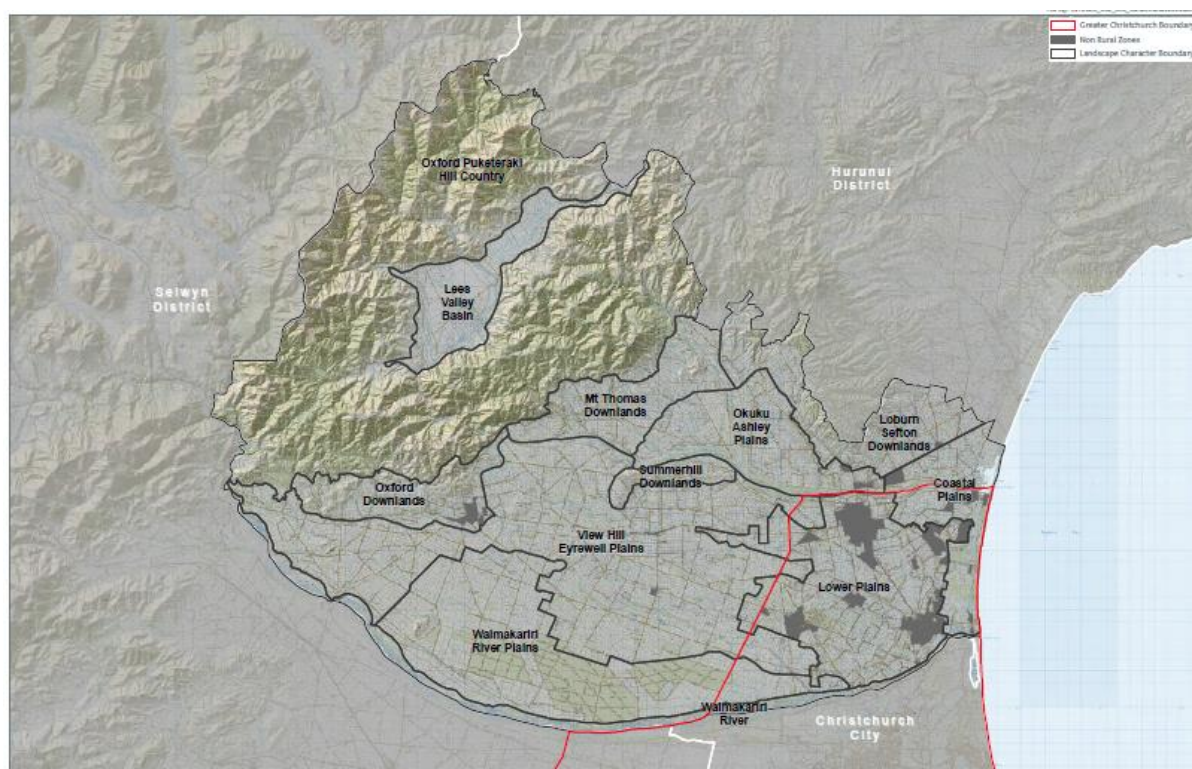
1. INTRODUCTION

The Waimakariri District is approximately 225,000 hectares in size of which 70 – 75% is considered rural farming land. The farm land encompasses a range of land types including extensive hill country farming systems in the North and West of the region, transitioning through rolling downlands to the plains that occupy large areas of the central and south-eastern parts. Currently the minimum rural lot size is four hectares and significant subdivision to this size for lifestyle blocks has occurred east of Swannanoa, Fernside and the Okuku river, and in the West Eyreton, Cust and Oxford areas.

The purpose of this report is to review the impact change in zoning of rural land, particularly minimum lot size will have on primary production. Whilst every endeavour has been made to provide an informed view on the effect land parcel size has on productivity and profitability, the intention is not to recommend precise land use and or zoning options.

12 Rural Character areas were identified in the Waimakariri District – Rural Character Assessment (6 June 2018), of which 10 of these are considered land suitable for agricultural or horticultural use. These areas have been assessed individually with regards the area boundaries and the most appropriate minimum lot size. Figure 1 displays the area boundaries presented in this report.

Figure 1: Proposed WDC Rural Character Area boundaries



Source: Waimakariri District – Rural Character Assessment (Boffa Miskell 2018)

In considering farm type and productivity in each zone the following factors were also reviewed:

- Soil type and depth;
- Land topography;
- Climate;
- Access to irrigation;
- Altitude and the impact this has on the seasonal variation and the “growing season”;
- Property Size with regards to the minimum critical size for a farming system to be viable;
- Proximity to further processors and markets – particularly for fresh produce and specialist seed crops;
- Availability of expertise and available infrastructure.

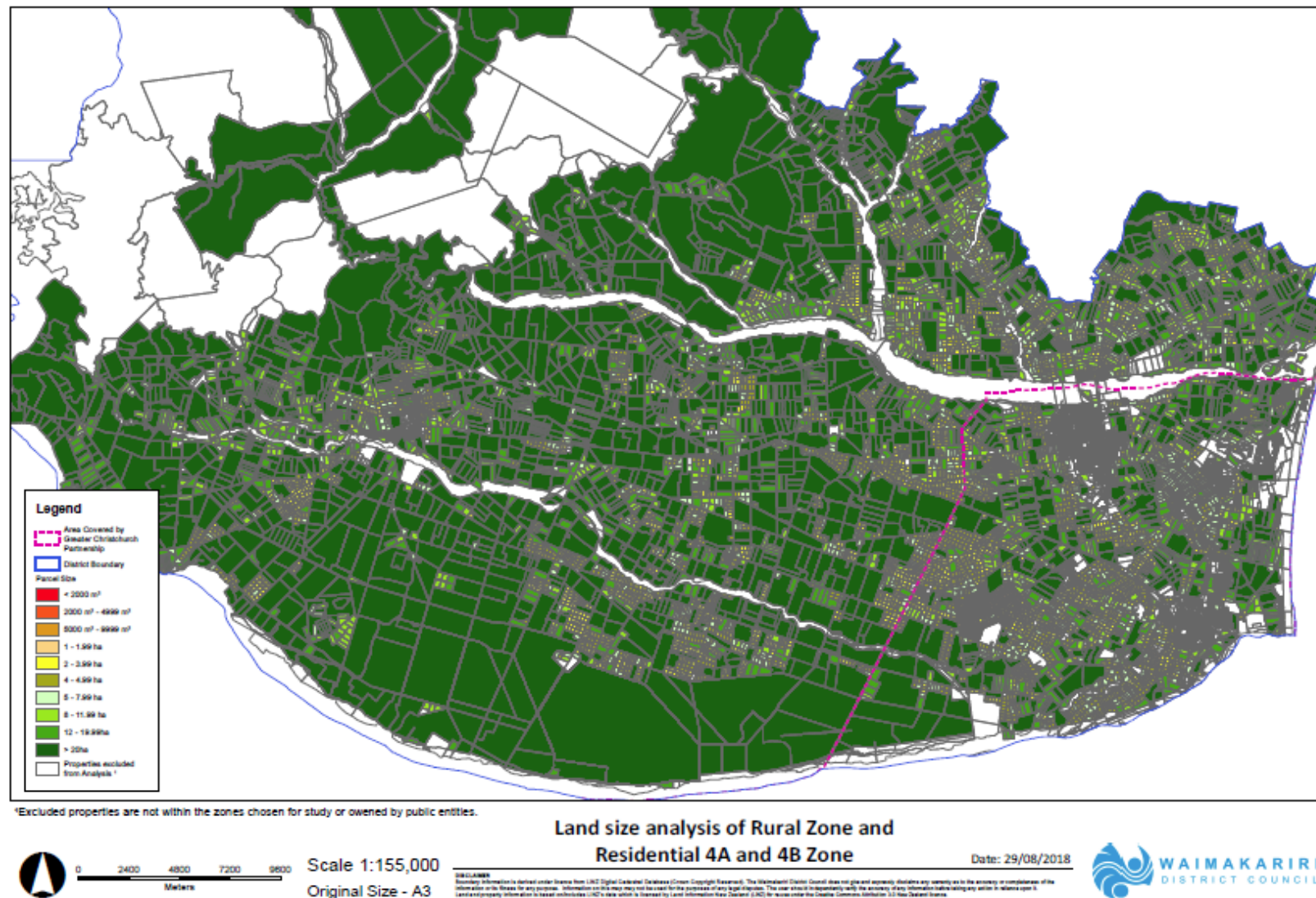
All of the above factors will influence the type of farming system that best suits the land class. Given the altitude in the majority of farming areas of the district (excluding Lees Valley and the upper reaches of the downland zones) is below 250m above sea level, this shouldn't impact on pastoral or arable farming between the zones. Soil type, climate, topography and access to irrigation are considered the most important factors likely to impact farm productivity and profitability.

The Waimakariri District is in close proximity to the South Islands largest city and as such there is good access to a large population as well as international shipping and airport distribution.

2. CURRENT LAND USE

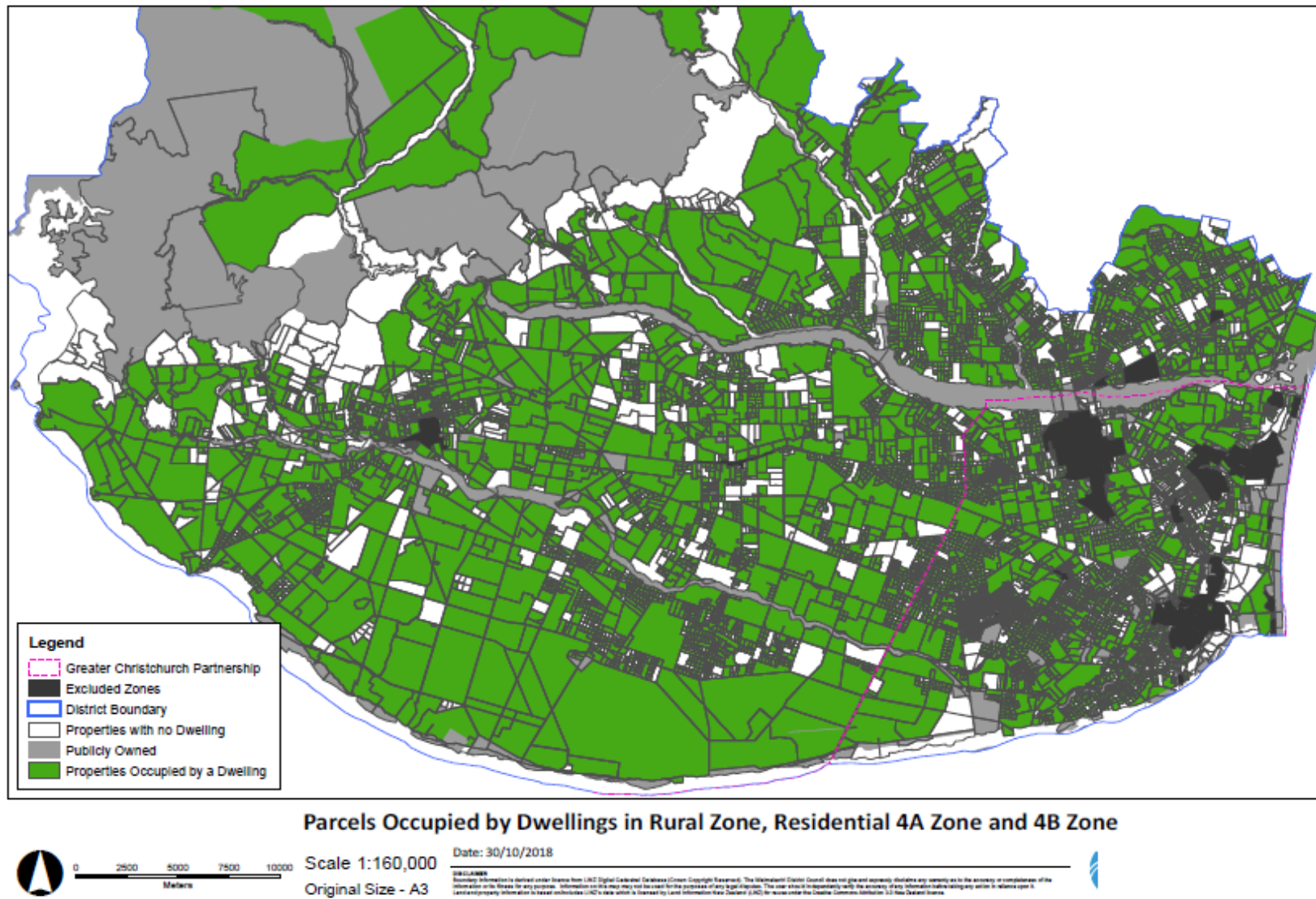
Figure 2 shows the extent of subdivision that has already occurred in the Waimakariri District and now 12% of the districts total area is utilised as lifestyle properties. However, when analysing figure 2, it appears that a large number of lots (based on land area) that do not have an established dwelling are in excess of 20 hectares and therefore a change in the minimum rural lot size would have a profound effect on future subdivision. Figure 3 also shows that if a line is drawn from the mouth of the Eyre river to the Okuku River, the majority of lots to the east of this transect are less than 20ha, and therefore a minimum lot size over 10 hectares would significantly reduce the ability to further subdivide.

Figure 2: Lot Size Analysis of Rural and Residential 4A & 4B Zones



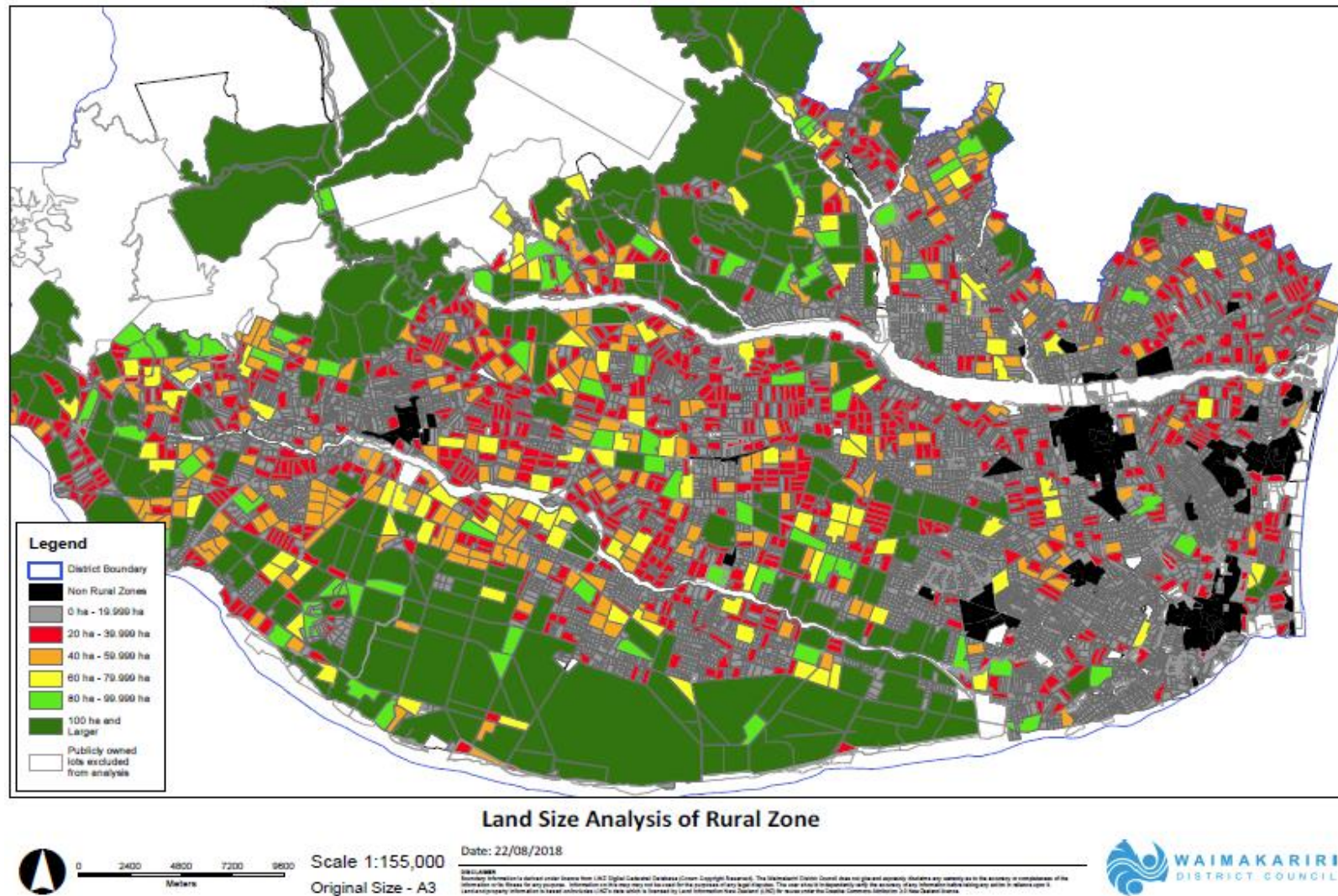
Source: Waimakariri District Council

Figure 3: Rural and Residential 4A & 4B Lots Occupied by Dwellings



Source: Waimakariri District Council

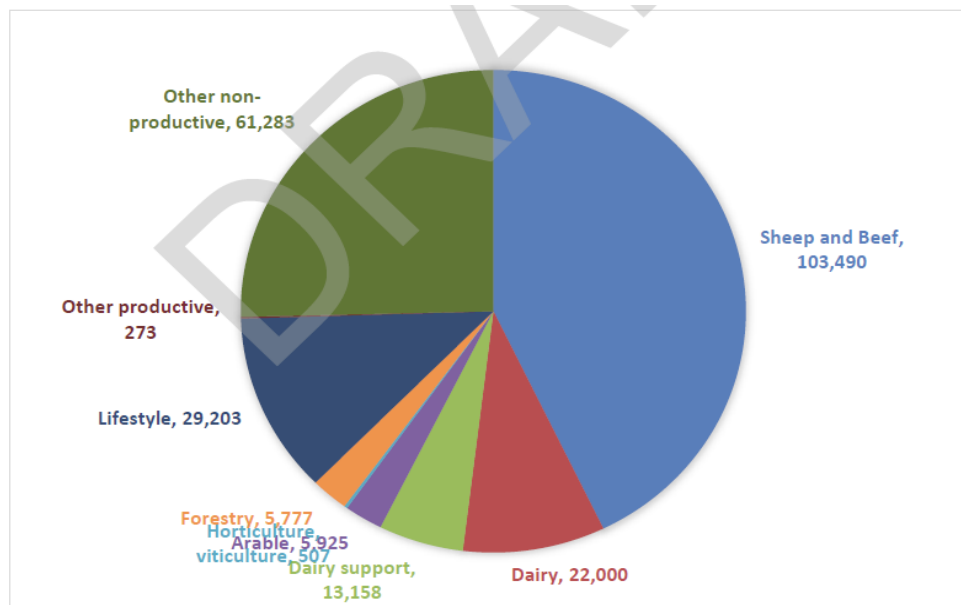
Figure 4: Land Size Analysis in 20ha Increments



Source: Waimakariri District Council

The vast majority of rural land in the Waimakariri district is used for pastoral farming as displayed by figure 5, showing an estimate by Ecan in 2015 for the Waimakariri zone.

Figure 5: Estimated Land Use in Waimakariri Zone (Ecan)



Note: Total area (Hectares) not effective area.

Source: Waimakariri land and water programme: Economic assessment of the current state Draft Report prepared for Environment Canterbury by LWP.

3. KEY IMPACTS ON FARM PRODUCTIVITY

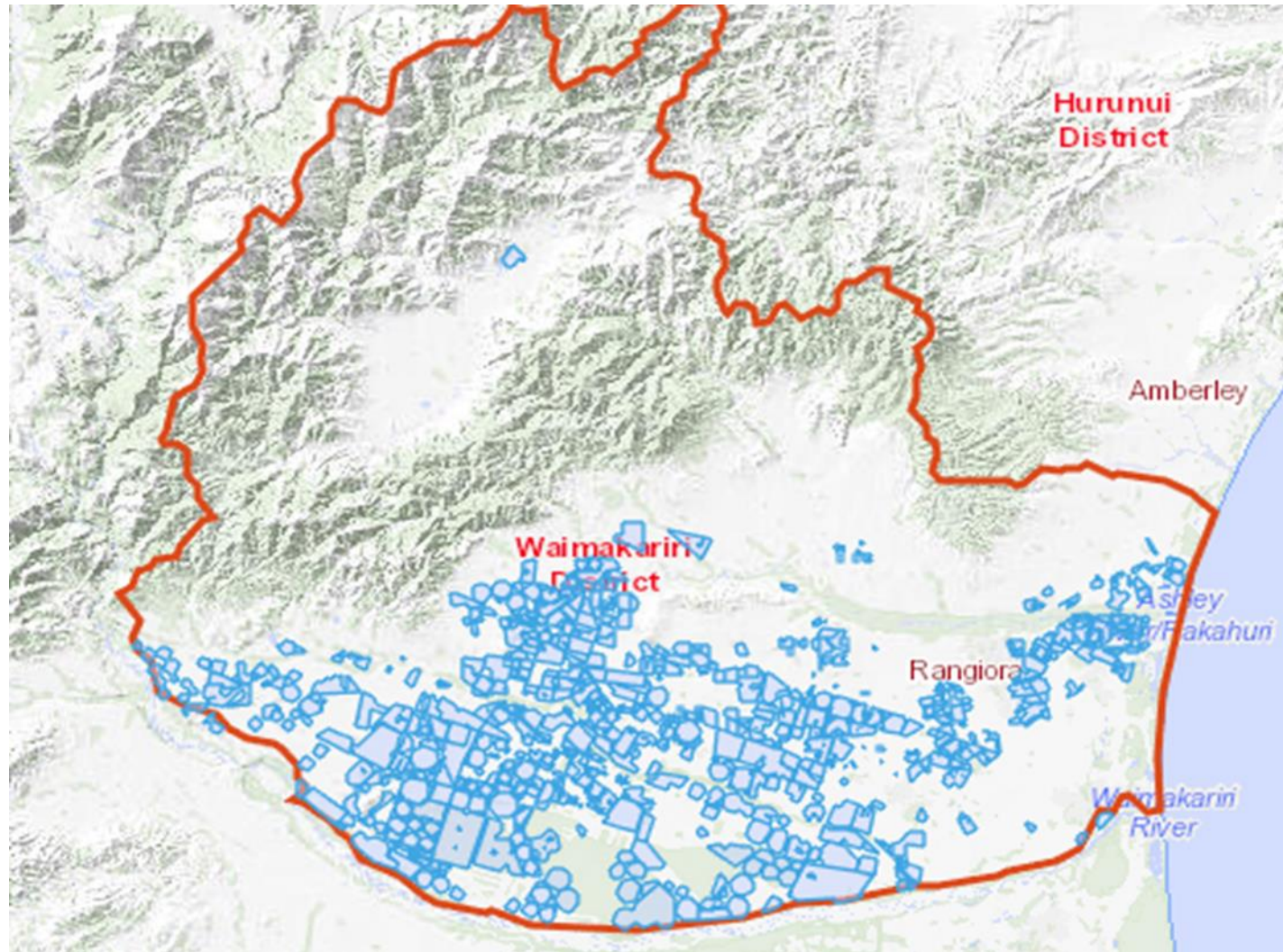
3.1. Irrigation

Approximately 37,000 hectares of land is currently irrigated with approximately 50% of this supplied by three irrigation schemes, Waimakariri Irrigation Ltd (18,000ha), Loburn Irrigation Company and the Moy Flat scheme. There are also significant areas irrigated by Ngai Tahu and Spencer Bower & Prattley farming businesses as well as other smaller surface water and ground water systems. The introduction of irrigation schemes sourced from the Waimakariri river transformed much of the area, particularly on the lighter soils between the Waimakariri and Eyre rivers and this has seen a significant change in land use from dryland sheep and beef farming and forestry to intensive dairying. Approximately 1,700ha of the irrigated area is utilised by lifestyle properties.

Figure 6 displays the land areas irrigated within the Waimakariri district with the majority of irrigation taking place between the Waimakariri and Ashley rivers and on both sides of the Ashley river below State Highway 1. There are also two small irrigation schemes north of the Ashley river which source water from the Okuku river. There is generally limited irrigation adjacent to the Ashley river, west of Rangiora and farming productivity is reliant on the deeper soils prevalent in this area.

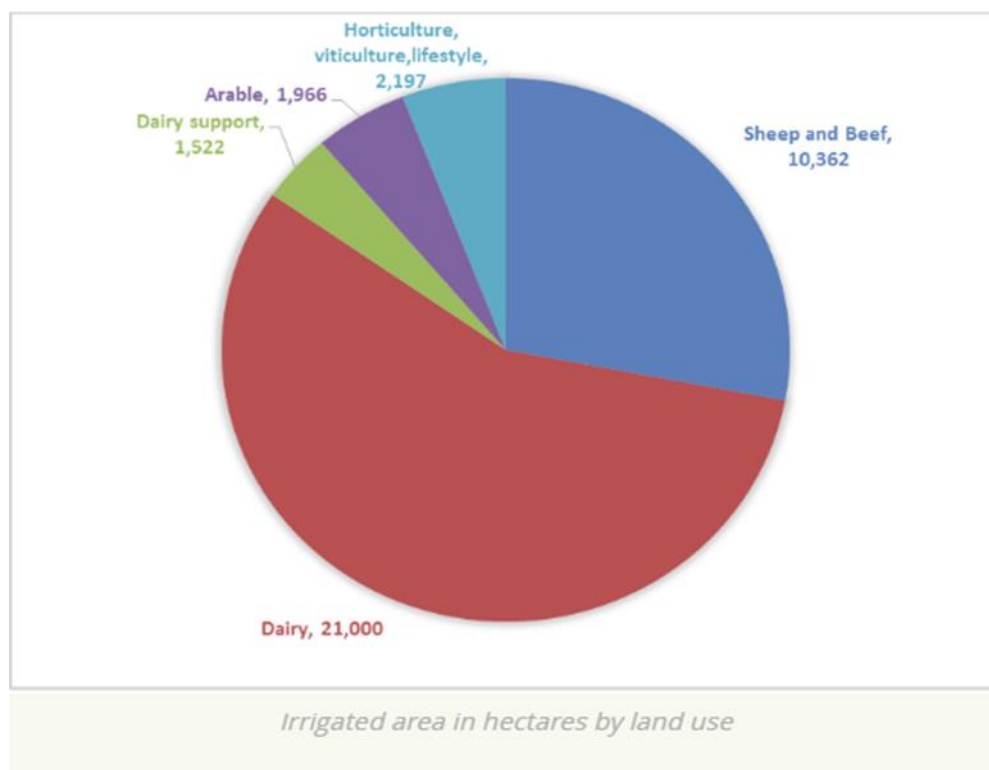
Figure 7 shows that dairy farming and the associated support farms are the largest users of irrigation.

Figure 6: Waimakariri Water Zone - Irrigated land area



Source: Canterbury Maps – Waimakariri Land and Water Solutions Programme

Figure 7: Waimakariri Water Zone – Land Use on Irrigated land area



Source: Canterbury Maps – Waimakariri Land and Water Solutions Programme

An Agribase analysis of farm type undertaken in 2016 (Report to Matt Dodson (Ecan) - Land Use Modelling for the Waimakariri land and water solutions programme, 20 Feb 2017) shows that the majority of dairy farms are located between the Waimakariri and Eyre rivers, and has been made possible due to the introduction of surface water schemes from the Waimakariri river.

3.2. Climate

The main climatic impact on primary production is rainfall during critical growing periods. The annual rainfall over the past 20 years was compared between the NIWA weather stations at Glentui, Woodend and the Christchurch Airport and this clearly shows the higher rainfall in the Western downland regions compared to the more eastern areas on the plains. It would be expected that the rainfall in the Lee's Valley would be higher again than that recorded at Glentui. The results are shown in table 1.

Table 1: Historic Annual Rainfall at Three Sites

Weather Station Site	Average Annual Rainfall (mm) 2008 - 2017
Glentui	977
Woodend	606
Christchurch Airport	614

Source: NIWA

The other climatic factor that will influence land use capability across the region is air and soil temperatures at critical times of the year, primarily spring and autumn. This will impact on the ability to produce some crops in the more western parts of the district. Wind speed and frequency has not been considered but this could influence the areas suitable for horticultural establishment.

3.3. Soil Type

Figure 9 displays the range of soil depths in the Waimakariri District and when compared to figure 10, shows that land use, particularly arable and horticulture, is historically reflective of the soil depth and moisture holding capacity. However, the incursion of lifestyle properties has significantly reduced the area of productive cropping and horticulture on the moderate to deeper soils.

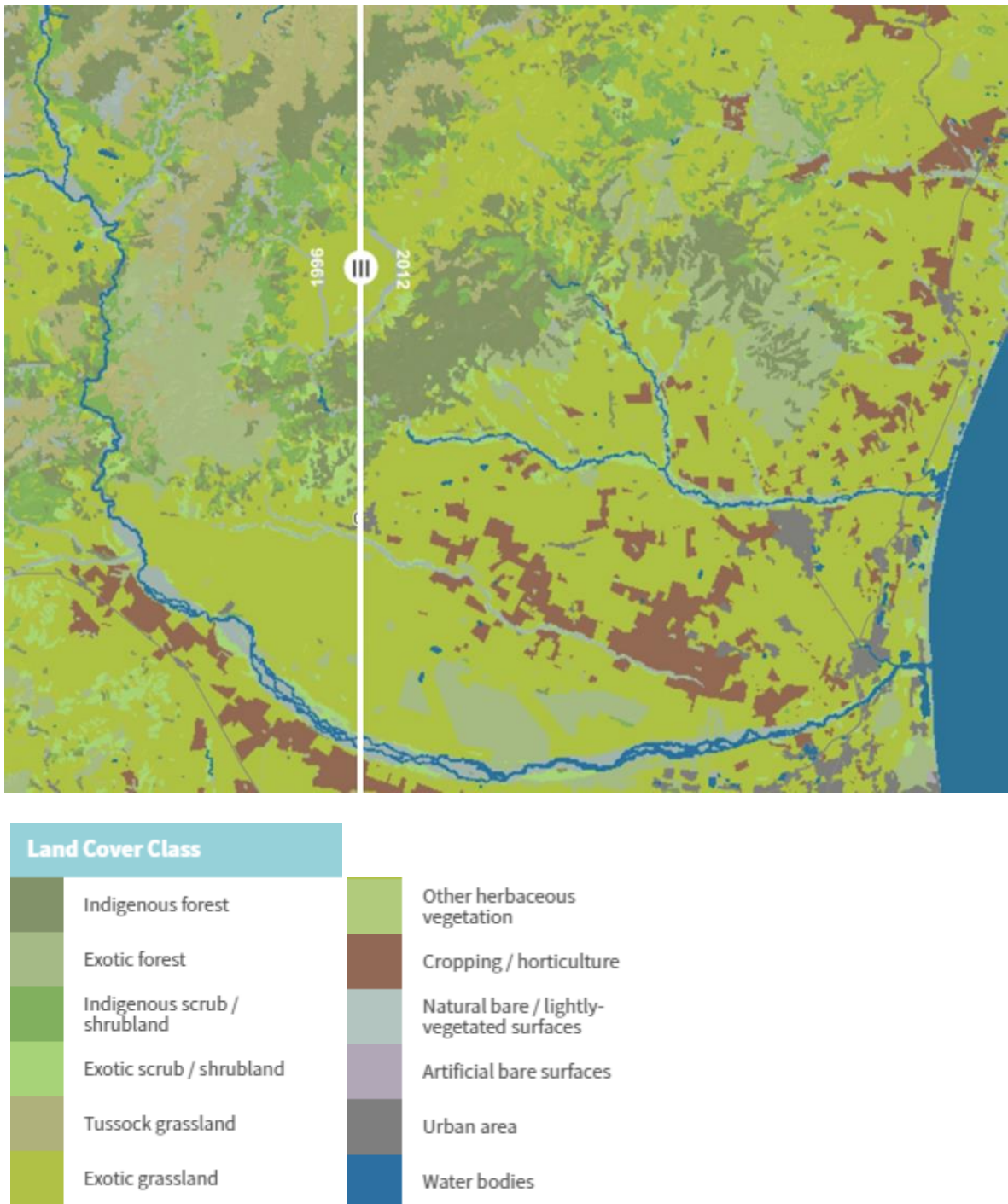
The lighter soils between the Waimakariri and Eyre Rivers have been enhanced by irrigation and are now extensively used for dairying.

Figure 8: Soil Depth



Source: S Map – Landcare Research

Figure 9: Land Use



Source: Canterbury Maps – Land, Air, Water, Aotearoa (LAWA).

4. IMPACTS ON PRODUCTIVE LAND PARCEL SIZE

There are a number of factors that influence the minimum land area required to maintain sufficient production and profitability. Whilst whole business profitability is often investigated, performance per hectare is equally important as a number of properties are leased to larger operators, or the income earned off the land may be only part of the household or business income.

4.1. Current Minimum Rural Lot Size

The Waimakariri District currently has a single rural land zone of 4 hectares. This has resulted in a large increase in lifestyle blocks since 2006 as Christchurch commuters were able to purchase lifestyle properties at comparable values to a house in town. Unfortunately, these properties replaced productive farm land and with a general lack of expertise and scale, production off these properties is generally sub-optimal. Also, a large proportion of the land area is used for domestic purposes including housing, sheds, horse grazing etc.

When reviewing the minimum size, consideration needs to be given to what the effective average lot size will be. For example, if there is a predominance of existing properties in the 10 to 20 hectare range, a minimum lot size of 10ha will mean that properties of 19 hectares will not be able to be subdivided, and that the median size of these could be 15 hectares or higher.

4.2. Irrigation, Soils, Climate and Topography

Section 3 outlined the variation in soil type, climate and access to irrigation. These factors will have a significant impact on the type of land use within each of the proposed zones and this is already evident with the large increase in dairy farming where irrigation is available. Future demand for high value crops, fresh produce and vegetables, fruit and potentially flowers could sustain smaller properties, however water availability, soil type and growing season will impact on where these crops can be grown.

4.3. Management Expertise

When reviewing the ability to efficiently farm smaller properties, the expertise level of the owner/operator is important. Many lifestyle owners have limited agricultural knowledge with regards to simple crop husbandry, irrigation, grazing management etc. As small farm sizes increase, the standard of operator knowledge generally raises and/or there is sufficient scale to employ outside expertise. More specialist high value crops whilst making small properties more viable, generally require a significantly higher level of expertise and it is important this expertise exists in the locality.

4.4. Scale

As discussed previously, scale is not necessarily determined by the area required to sustain a profitable business, but sufficient scale is required to implement production systems that optimises the performance per hectare. Some examples why minimum scale is required include:

- Infrastructure Investment. A minimum level of scale is required to invest in critical infrastructure such as advanced irrigation systems. Whilst many lifestyle properties will have irrigation it may not be of sufficient quality to grow specialist crops.
- Compliance: With an increasing focus on environmental sustainability and the impact of farming, monitoring and auditing costs have increased significantly. Whilst lifestyle properties individually have minimal impact, collectively they could be of greater significance given many are irrigated and most will have an individual sewerage system.
- Production Costs: There are a number of fixed costs associated with primary production that become excessively high per hectare when farming small areas. For example, contractors, transport companies and service people will charge at a higher rate per hectare on small properties due to travel time and the increased time per hectare required to cultivate, spray etc. small paddocks. Furthermore, agricultural equipment has increased in size to gain efficiencies and are generally not suited to small paddocks.
- Leasing of Land: Some larger operators and end users who grow high value seed crops or vegetables, lease ground to grow annual crops. Discussions with a prominent seed producer and marketer indicated that 10 ha would be the minimum area he would lease to grow a crop of speciality seed. A potato grower spoken to indicated a minimum size of 20ha. Land leased for livestock grazing (e.g dairy support) could be smaller paddocks but an area of at least 20 ha would be required for a reasonable mob (50 – 100 head) of dairy heifers.
- Pasture Renewal and Cropping Rotations: To maintain pasture productivity, regular grass renewal needs to be undertaken. This is seldom done on lifestyle properties and as a result the annual herbage production will be significantly less on these properties than a larger commercially operated farm. Pasture renewal is often part of a cropping cycle and this is important as many crops can not be grown in successive years, for example, potatoes require a 6 – 8 year gap between crops. On smaller properties, sufficient scale is required to introduce a cropping and re-grassing programme.
- Grazing Management: It is often difficult on small lifestyle properties to graze the properties in a manner that maximises feed utilisation. Often on lifestyle properties, longer poor-quality feed can be seen of which a significant amount is wasted and/or mown.

Following literature reviews, gross margin analyses and discussions with relevant industry personal, table 2 presents a personal view on the minimum land size for a range of primary production enterprise's.

Table 2: Minimum Area by Land use

Production System	Minimum Productive Area (Hectares)
Speciality Small Seeds (e.g. Carrot)	10 - 15
Horticulture (e.g. Apples)	10 - 15
Vegetables (e.g. Potatoes)	15 - 20
Dairy Support and Dairy	20 - 40
Mixed Cropping/Livestock	20 - 40
Intensive Breeding Finishing	40
Extensive Breeding and Finishing	100

Smaller lot sizes may be sustainable for fresh produce, glasshouses etc. Feedback from Horticulture New Zealand in response to the issues and options consultation for the District Plan Review stated;

“the Waimakariri District is becoming a more desirable location for horticulture. Of particular appeal to vegetable growers are the large land parcels (20 – 50ha) that remain in the Waimakariri District. However, some crops, and in particular covered crops, are economically viable when grown on smaller land parcels (2ha – 10ha).”

The general trend in fruit and vegetable production is for fewer, larger producers. From 2006 to 2016 New Zealand’s area of fruit and vegetable production was relatively stable but the number of growers decreased by over 20%. The larger operations tended to increase productivity through yield improvements.

4.5. Access to End Users, Markets and Labour

The Waimakariri District is in a good position with regards to domestic and international markets, being adjacent to the South Islands largest city and in close proximity to international air and sea ports.

The increased demand for fresh produce and potentially that produced locally, could open up niche opportunities for rural agricultural and horticultural commodities. However, these products will still need to be produced at an acceptable cost to the consumer. Currently there are limited markets and development of these and the associated infrastructure will take time to establish. There will also be competition from other regions such as the Selwyn and Ashburton Districts that have also undergone significant irrigation expansion and are also in close proximity to Christchurch. The infrastructure in these regions for small seed production, particularly Ashburton, is also arguably more advanced. There is also well-established vegetable production in the Timaru, Ashburton and Selwyn districts.

Horticultural Enterprises often have large permanent and seasonal labour requirements and being located within commuting distance to Christchurch will be beneficial with regards to labour supply.

4.6. Enterprise Profitability

This section aims to analyse the relative profitability per hectare of different farming enterprises so that a more objective decision can be made on the minimum productive size of land parcels in the proposed zones.

Pastoral farming analyses have been undertaken on an Earnings Before Interest, Tax & Depreciation (EBITD) basis given they are based on a whole farm system. Industry information has been used from the Beef and Lamb NZ, Sheep and Beef Farm Survey Data and the Dairy NZ Economic Survey 2016-17. A summary of these analyses are displayed in Table 3 (Sheep and Beef) and Table 4 (Dairy).

Examples of horticulture and cropping have also been assessed based on either EBITD or a Gross Margin basis (Income less variable crop growing costs). These estimates are presented in table 5 and come from a combination of personal communication with industry experts and/or have been calculated.

Table 3: Beef and Lamb South Island Farm Survey Data.

Farm Class	EBITD per Hectare	Applicable Zones
2. S.I. Hill Country	\$ 171.21	Lees Valley and parts of the Downland zones
6. S.I. Breeding Finishing	\$ 398.02	Lees Valley / Downland Zones
7. S.I Intensive Finishing	\$ 689.73	Plains
8. Mixed Finishing	\$ 1000.44	Plains

Source: Beef and Lamb New Zealand

Table 4: Dairy NZ Economic Survey 2016 – 2017 Data.

Average Payout 2012.13 - 2016.17*	\$5.90 per Kg Milk Solid
Other Income 2016.17***	\$0.48 per Kg Milk Solids
Average South Island Production 2016.2017**	1252 Milk Solids per Ha
Farm Working Expenses – South Island 2016.2017***	\$3.72 per Kg Milk Solid
Calculated EBITD per Hectare	\$3,330 per hectare

* Table 5.6 Page 34, Dairy NZ Economic Survey 2016 - 2017

** Table 5.10 & 6.5 Pages 39 & 50, Dairy NZ Economic Survey 2016 - 2017

*** Table 5.10 Page 39, Dairy NZ Economic Survey 2016 - 2017

Whilst the analysis provides some indication on operational profitability, there is a wide distribution across individual farming enterprises and many farms will perform at a significantly higher level than quoted in tables 1 and 2.

Table 5: Cropping and Horticulture Financial Analysis

Crop Type	EBITD per Hectare	Gross Margin per Ha*
Apples	>\$20,000	
Vineyard (Leased)	>\$10,000	
Potatoes		>\$9,000
Carrot Seed - Hybrid		>\$7,000
Vining Peas		>\$2,600

*Does not include fixed overheads

5. REVIEW OF PROPOSED ZONES

5.1. Coastal Plains

Strengths	Weaknesses
Coastal Influence – long growing season	Easterly Winds
Proximity to Christchurch and other towns	Prone to Flooding in Areas
Some Irrigation below Rangiora	Some wetlands and sand dunes not suitable for farming
Some Heavy Soils	

Significant areas of this zone are made up of wetlands and sand dunes and is not particularly suitable for agriculture. It is also prone to flooding. The most significant farming area appears to be between the Rangiora Woodend Road and the Northern boundary of the zone and below Waikuku. The soils in this area are deep and there is some irrigation available and it is conceivable that these areas could be used for intensive cropping and/or vegetable production.

Based on the better farming areas in this zone and the potential to intensify, the minimum lot size could be as low as 10 – 15ha and still be economically viable as the EBITD per hectare could be up to \$10,000 per hectare. It is desirable that a minimum effective area (not total lot size) of 10 ha is available for production.

Given the high predominance of non-agricultural land and the expectation of future rises in sea levels, the minimum lot size may be determined for non-agricultural reasons.

5.2. Lower Plains

Strengths	Weaknesses
Coastal Influence – long growing season	Heavily Populated
Proximity to Christchurch and other towns	
Some Irrigation South and East of Rangiora	
Good Soils	

The rural land in this zone is dominated by lifestyle properties, With small areas of productive land south-east and south-west of Rangiora and west of Clarkville. These areas appear to have access to some irrigation and have deep soils.

The non-lifestyle rural areas in this zone could support high returning fruit and vegetable production systems and therefore a minimum lot size of 10 – 15 hectares should be economically viable.

5.3. Waimakariri River Plains

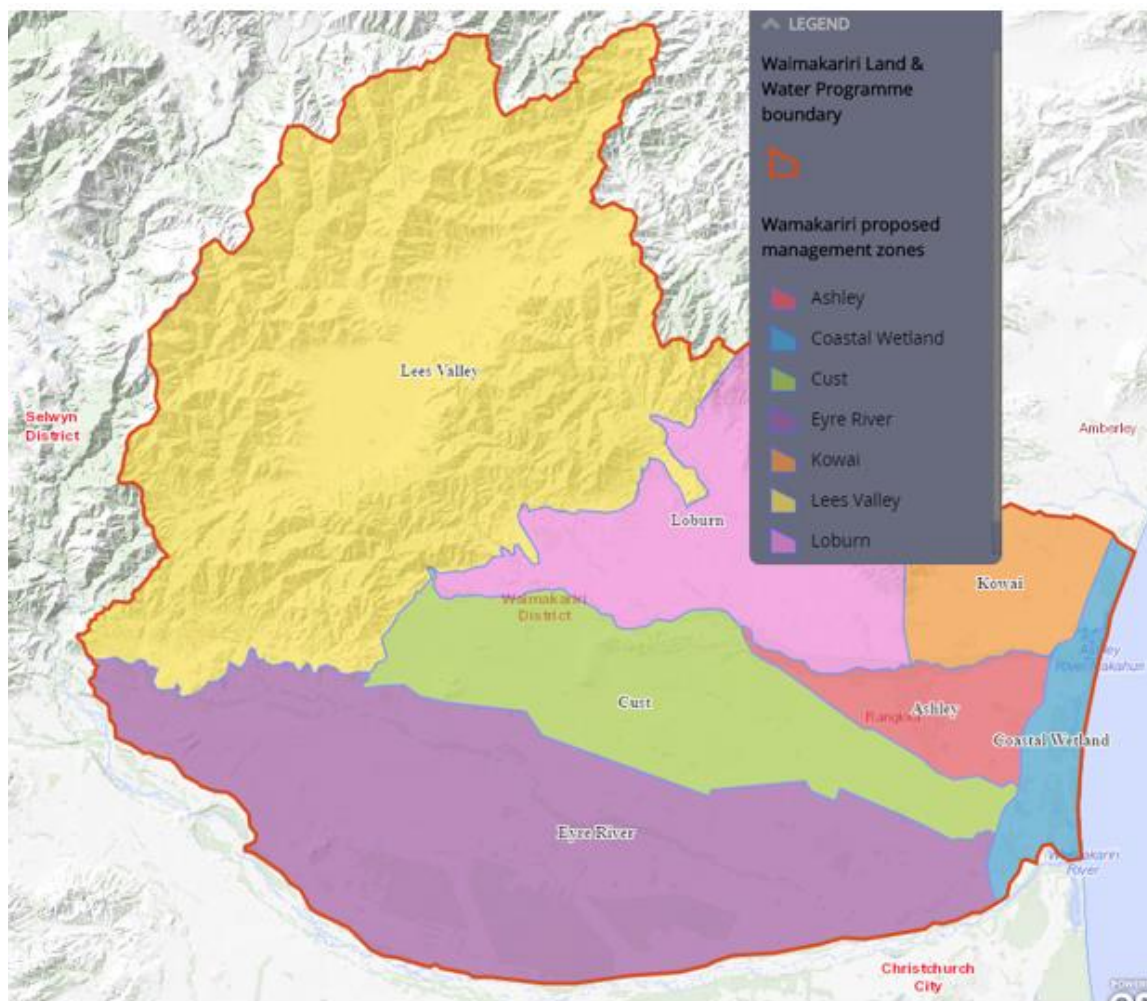
Strengths	Weaknesses
Widespread Irrigation	
Large areas of productive rural land	
	Low water holding capacity

This area is characterised by free draining soils that prior to irrigation was generally lower producing sheep and beef farming or forestry. With the introduction of irrigation, improved pasture species have been introduced and the major land use is now dairying. Whilst organic matter will increase in the soil over time this zone is likely to remain a high producing pastoral region.

From an agricultural perspective this zone should better match the soil type and the northern boundary should follow the Eyre river (or South Eyre Road). It could also take in the western area of the View Hill -Eyrewell Plains Zone, south-west of Oxford. Changing the zone boundaries would also better align with the Eyre River zone within the Waimakariri Land and Water Programme (refer figure 10).

Given this zone is likely to remain predominantly as a pastoral production area, a minimum lot size of 40ha should be investigated.

Figure 10: Waimakariri Land & Water Programme Boundaries



Source: Canterbury Maps – Waimakariri Land and Water Solutions Programme

5.4. Waimakariri River

This zone has limited areas of agriculturally productive land.

5.5. View Hill – Eyrewell Plains

Strengths	Weaknesses
Widespread Irrigation	Significant Lifestyle Populations

This zone has a large variation in soil type from the light soils south of the Eyre river to the heavier soils north of the Eyre river, adjacent to Highway 72 and between Springbank and Summerhill. There is also significant variation in altitude and the associated growing season for some crops.

Given the areas of better soil type and access to irrigation, these areas could be further developed into more intensive cropping and in some cases vegetable and fruit production. Given the higher returns per hectare of these operations a minimum lot size of 20ha would be justifiable. However, consideration should be given to changing the zone boundaries as outlined in section 5.3. Alternatively, if the current zone boundaries are maintained, increasing the minimum lot area in the upper plains segment of this zone could be considered.

5.6. Okuku Ashley Plains

Strengths	Weaknesses
Proximity to Rangiora	Highly Populated
	Limited Irrigation
Good Soils in the Loburn Area	Some Lighter Soils

This zone has a mixture of very good soils (near Loburn and west of Okuku), that are capable of supporting intensive cropping and horticulture and very light soils west of the Okuku river. There is also some irrigation supplied from two small irrigation schemes.

Given the proximity to Rangiora of some high quality soils and the fact the area has already undergone significant subdivision, a minimum lot size of 20ha could be justified.

5.7. Oxford Downlands / Mt Thomas Downlands

These two zones represent the downlands on the Western side of the District bounded by Mt Oxford, the Ashley Gorge and Mt Thomas. The rainfall is significantly higher in these zones compared to the plains, and this sustains the predominantly sheep and beef farming businesses. Given the topography and climate these areas would be considered a mixture of Class 2 and Class 6, with some Class 7 where they transfer onto the upper plains. (refer table 3).

Given the lower profitability per hectare of this land class a minimum lot area of at least 40 ha could be introduced.

5.8. Loburn-Sefton Downlands

This zone borders the Northern end of the District transitioning from the plains to Mt Grey and the Ashley Forest. It generally has a lower rainfall than the two other downland zones, has larger tracts of forestry and increased incidence of small land holdings. It would be considered a similar class of land as the Oxford and Mt Thomas downland zones and therefore the same minimum lot size of 40 hectares could be introduced.

5.9. Summerhill Downlands

This relatively small area of land has many similar production characteristics as the Loburn-Sefton Downlands and should therefore have the same minimum lot size of 40 hectares.

5.10. Lees Valley Basin

The Lees Valley is the Western most farmland in the Waimakariri District and whilst it is at a higher altitude (450m) and correspondingly has a shorter growing season, large parts of it are relatively

flat. Whilst there is some high country in this location much of it would be considered Class 2 and 6 sheep and beef farm land. Based on this a minimum lot area of 40ha is justified although given the isolation and the relative inability to diversify, a larger minimum size could be implemented.

6. SUMMARY

In summary, there are very few agricultural or horticultural farming practises that would justify a farming business of 4ha (with the exception of very intensive vegetable production or glasshouse operations), even if they are operated to the highest level. The reality is that most properties under 10ha have been purchased for lifestyle purposes and the majority of the household income is derived off farm. Furthermore, once the house and amenities are deducted from the total area, the effective farming area on a 4ha property could be as low as 2ha. Whilst in theory a group of 4ha properties could be operated in conjunction to achieve scale, this is unlikely to be successful given owners will often have differing priorities and the fact that the small paddock sizes will limit operational efficiency.

Whilst the proposed zone boundaries have been designed to fit with the rural character and in many cases the lifestyle property communities, consideration should also be given to the land type and the effect this has on land use. With this in mind it is recommended the zone boundary between the Waimakariri River Plains and the View Hill Eyrewell Plains is reviewed.

When reviewing the impact of any Plan changes on farm profitability, consideration needs to be given to the fact that some farming systems have relatively low rates of return on capital and a significant amount of the medium to long term financial viability has been based on increased land values over time. It is probable that increasing the minimum lot size will raise the operational productivity and profitability per hectare, however given a premium is often paid for smaller lifestyle properties, the inability to subdivide could reduce the land value and therefore lower the landowners potential longer term financial return. This will only affect those landowners who have purchased land with a view to future subdivision and not those that are maximising operational performance. It is more likely that smaller landowners (8 – 30 hectares) would be considering the potential of future subdivision. Whilst increasing the minimum lot size could affect future land values in some areas and therefore impact on the capital gain potential for the current landowner, in the longer term the land values should be more aligned to operational farming returns and will therefore encourage future buyers to purchase land for productive rather than lifestyle purposes.