

**BEFORE INDEPENDENT HEARING COMMISSIONERS APPOINTED BY THE
WAIMAKARIRI DISTRICT COUNCIL**

IN THE MATTER OF

The Resource Management Act 1991 (**RMA** or
the Act)

AND

IN THE MATTER OF

Hearing of Submissions and Further
Submissions on the Proposed Waimakariri
District Plan (**PWDP** or **the Proposed Plan**)

AND

IN THE MATTER OF

Hearing of Submissions and Further
Submissions on Variations 1 and 2 to the
Proposed Waimakariri District Plan

AND

IN THE MATTER OF

Submissions and Further Submissions on the
Proposed Waimakariri District Plan by **Mark
and Melissa Prosser**

**EVIDENCE OF SHARN BERNARD HAINSWORTH
ON BEHALF OF MARK AND MELISSA PROSSER**

DATED: 5 March 2024

Presented for filing by:
Chris Fowler
Saunders & Co
PO Box 18, Christchurch
T 021 311 784
chris.fowler@saunders.co.nz

INTRODUCTION

- 1 My name is Sharn Bernard Hainsworth
- 2 I am the Managing Director and Principal Pedologist at Whenua Kōrero Ltd, formerly known as LUC Assessments Ltd.
- 3 I am an independent scientist, and a senior pedologist and have the following qualifications and experience relevant to my evidence:
 - (a) I hold a Graduate Diploma and Bachelor of Earth Science from Massey University and a Master of Earth Science from Waikato University. My thesis topic was devoted to mapping using S-map and Land Use Capability (**LUC**) methods (according to the Land Use Capability Survey Handbook, 2009).
 - (b) I am the primary author and correlator of S-map for the Hawke's Bay region, and have produced regional-scale S-map coverage across several regions in New Zealand.
 - (c) I have also spent the last 20 years producing paddock-scale S-map and LUC maps (mainly for farm plans) in the Horizons, Hawke's Bay, Waikato, Wairarapa, and Tasman districts between 2002-2023.
 - (d) I have been member of NZ Society of Soil Science since 2009.
 - (e) I have been a Member of NZ Association of Resource Management since 2002.
 - (f) I am a member of the inter-agency LUC Governance Group. This group advises government about matters associated to LUC and Highly Productive Land (**HPL**) in New Zealand.
- 4 I have 24 years professional experience soil and LUC mapping at farm and regional scale throughout Aotearoa, including working as an author of LUC maps and S-map for Manaaki Whenua Landcare Research as pedologist for from 2012-2019.
- 5 Although this is not an Environment Court proceeding, I have read the Environment Court's Code of Conduct and agree to comply with it. My qualifications as an expert are set out above. The matters addressed in my evidence are within my area of expertise, however where I make statements on issues that are not in my area of expertise, I will state whose evidence I have

relied upon. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in my evidence.

SCOPE OF EVIDENCE

- 6 In my evidence I detail the LUC assessment prepared for Mark and Melissa Prosser of Ohoka Farm Holdings Limited (**the Submitters**) for their property located at 2 Ashworth Road and 9 Aschens Road, Mandeville. The LUC assessment undertaken for the site has been completed for the purpose of informing the agricultural productivity evidence prepared by Mr Stuart Ford.
- 7 In preparing this statement I have considered the National Policy Statement for Highly Productive Land (**NPS-HPL**).

SUMMARY OF MY EVIDENCE

- 8 The LUC Assessment completed for the Site has found that from a soil and LUC perspective, 11.8 ha of the Site is classified as HPL according to the NPS-HPL definition (located to the north of the site), and a further 65.6 ha of land is not classified as HPL (refer Figure 5 below).

CONTEXT

- 9 The Submitters are seeking the rezoning of an approximately 73ha block of land (Lot 6 DP 2038 at 2 Ashworths Road) situated directly north of Mandeville as part of the proposed Waimakariri District Plan Review. The site has been zoned Rural Lifestyle Zone in the proposed Waimakariri District Plan (**pWDP**) with the Submitters seeking it to be zoned Large Lot Residential (LLZ). This would enable the site to be developed into lots ranging in size from 2,500 m², with an average of 5,000 m².
- 10 The adjacent 9 Aschens Road (Lot 8 DP 314202) would remain Rural Lifestyle zoned with a portion (approx. 1.5ha) required for stormwater management of the large lot residential area.
- 11 For the purposes of the LUC assessment the full extent of both 2 Ashworths Road and 9 Aschens Road have been assessed, comprising a total area of 78 ha (consequently referred to as **the Site**).
- 12 An existing resource consent (RC205106) granted October 2020 provides for a 20-lot subdivision of the site to 4ha lots.

- 13 The land parcel lies 14 km inland of Pegasus Bay in between the Waimakariri and Ashley River. The site is located across a flat, low alluvial terrace. The Site is currently used for grazing (beef). Although there is the capability to irrigate, there is currently no horticultural land use occurring.

METHODOLOGY

- 14 The current version of 1:50,000 (regional) scale New Zealand Land Resource Inventory (NZLRI) layer showed that the entire site was covered in LUC Class 3s5 and Class 3w1 land (Figure 1). This could potentially be construed as being Highly Productive Land, on the basis that the Site contains LUC Class 3 land in the 1:50,000 scale NZLRI map.

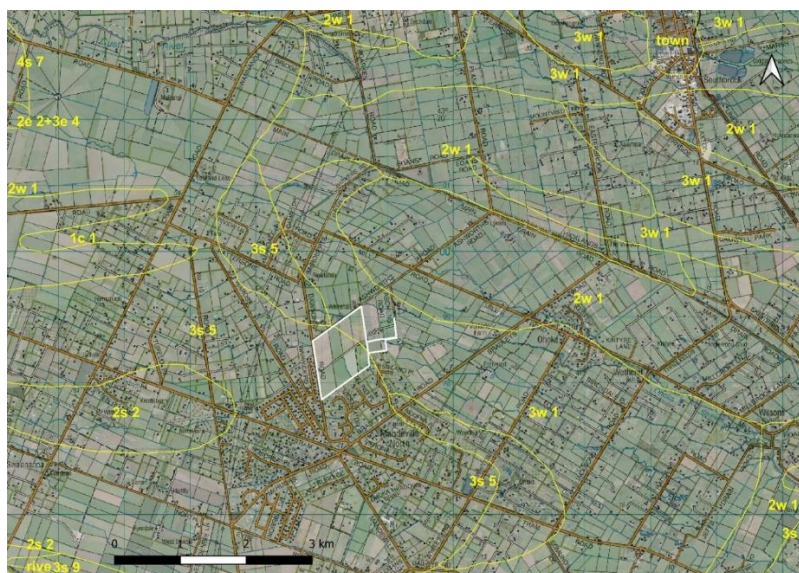


Figure 1: LUC units from the 1:50,000 NZLRI map (fitted to page and no longer to scale)

- 15 However, the current version of the 1:50,000 (regional) scale S-map layer suggests that there is a mixture of soil siblings with varying soil depths on the higher part of the Site and varying degrees of wetness limitation on the lower part of the Site (Figure 2).



Figure 2: Highly Productive Land map according to the 1:50,000 scale NZLRI map (fitted to page and no longer to scale)

- 16 As a result, I considered it important to undertake a more detailed map of the Site to determine if the classification of LUC map units and the classification of LUC map units were accurate at this Site. This detailed mapping would ascertain how much of this land is LUC Class 1-3 land and how much is not LUC Class 4-8 land.

LUC ASSESSMENT

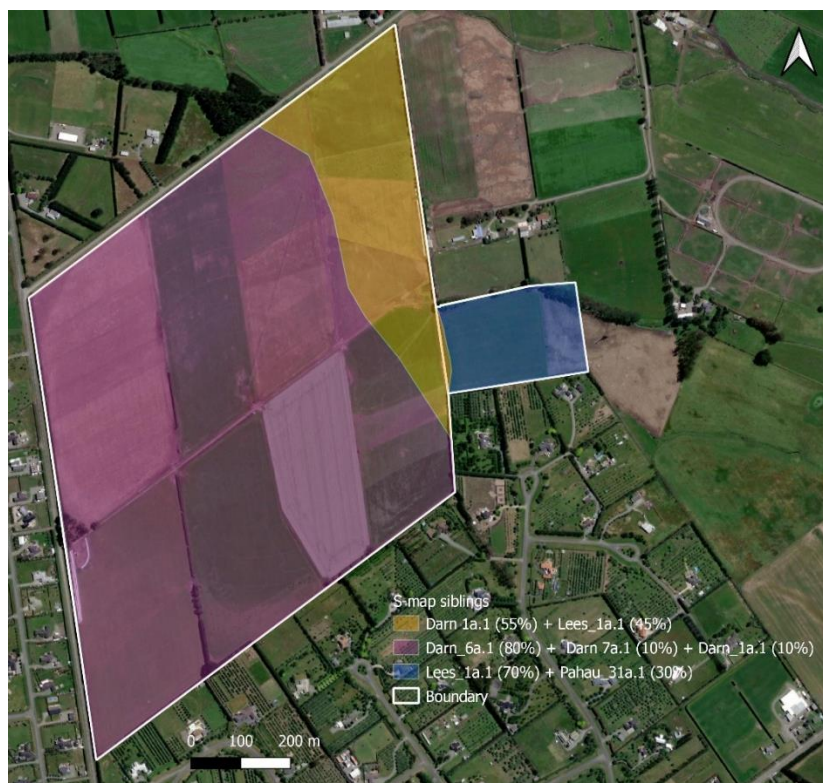
- 17 In September 2023 a Land Use Capability assessment report was prepared for the Submitters regarding the site at 2 Ashworth Road, Ohoka (**Technical Report**). A copy of that Technical Report is attached at **Appendix A**.
- 18 To comply with the Technical Report, a detailed soil and LUC assessment was undertaken for the site at 1:12,500 scale over on the 9-10 August 2023 (16 times more detailed than the regional scale maps). 133 observations were made of soils and land site to produce a 1:12,500 scale site specific LUC map of the Site.
- 19 The resultant 1:12,500 LUC map was then reclassified into LUC Class 1-3 land (HPL) and LUC Class 4-8 land (Other Land).
- 20 Figure 3 shows the locations of all the sites of these observations.



Figure 3: Location of soil & LUC assessments on site, refer to Appendix 1 in Technical Report for detailed description of findings and classifications at each location

Soil Map

- 21 The new site-specific 1:12,500 scale soil map (S-map format) is provided in Figure 4.
- 22 This map shows the Site contains very shallow (Darn_6a.1) and shallow stoney Pallic Soil (Darn 7a.1 and Darn_1a.1) on most of the Site (western section), shallow Pallic Soil (Darn_1a.1) with moderately deep Gley Soil in the northern part of the section and Orthic Gley Soil (Lees_1a equivalent) and Perched Gley Pallic Soil (Pahau_31a.1 equivalent) in the most eastern part of the Site (refer to Appendix 1 & 2 in the Technical Report, for more details about the S-map Soil Families, Siblings and Base properties).



LUC & HPL Map

- 23 Figure 5 shows the new site-specific 1:12,500 scale LUC map and associated site-specific 1:12,500 scale HPL map (HPL as defined by LUC Classes 1-3).



Figure 4: More detailed (1:12,500 scale) map of LUC & HPL

- 24 There are two dominant limitations denoted on the LUC map. One subclass has been denoted an "s" indicating a soil limitation. The "s" limitation is related to

soil depth and represents limited available soil moisture due to gravels present at very shallow to shallow depths.

- 25 The definition of soil limitation is defined in section 3.3.3 of Lynn et al., (2009) and a stylised depiction of a soil limitation due to stones shown in Figure 10 of the LUC Handbook by Lunn et al., (2009). The difference between stoney soil with a classification of LUC Class 3s and Class 4s is whether the gravels occur 20-45 below the surface (3s) or <20 cm (4s).
- 26 The other subclass shown on the map is denoted with "w" indicating a wetness limitation. When assessing wetness limitation, LUC Assessments factor in the presence or absence and depth of hydromorphic features shown in the soil profile. The texture of the soil is also considered when allocating the LUC Class. Loamy textured soil is more readily drained (removable limitation) than clay textured soils and therefore has a "better" LUC Class.
- 27 On the higher terrace of the Site (western side), the assessment found 60.8 ha of land classified as LUC 4s (which correlated to the regional NZLRI LUC classification of 4s7) and LUC 3s (which correlated to the regional NZLRI LUC classification of 3s5).
- 28 Figure 6 shows an example of an exposed cutting of a very shallow, very stony topsoil in LUC 4s (4s7) land.
- 29 According to the LUC Survey Handbook, LUC Class 4s land has severe physical limitations to arable use and is suitable for no more than 1-in-5 year arable cropping and is suitable for pasture and forestry. It is unsuitable for market gardening. There are high risks of drought impacting on yield at harvest and even crop survival in LUC Class 4s land units.



Figure 5: An exposed fence line found at the Site shows the gravel content at the surface which stops the auger from being able to be driven into the soil i.e., LUC Class 4s (correlated to 4s7)

- 30 According to the LUC Survey Handbook, LUC Class 3s land on stony flats and terraces (3s5 land in this case situation) has moderate physical limitations to arable use with low moisture holding capacity (droughty) and is vulnerable to leaching nitrogen when intensively used. It has moderate physical limitations to arable use. It is suitable for cultivated crops, vineyards and berry fields (if there is available irrigation water), pasture (grazing is the current land use), and tree crops.
- 31 Having a mixture of Class 4s and 3s (4s7 and 3s5 equivalent) land adds complexity in terms of differential germination times, differences in ability for the soil to store plant available moisture across the site at key growing times for crops and ultimately differences in yield where expensive differential irrigation is not used. Soils with varying soil depths (also indicated in S-map) means the productive capacity of this site is low if measured by the range of land uses that can be sustainably supported on the site. Versatility and productive capacity involve consideration of the frequency of cropping that can occur, and the risk that the crop will have a low yield, fail, or require costly

inputs. A mixture of 80% very shallow LUC 4s (4s7 equivalent) and 20% shallow LUC 3s (3s5 equivalent) land underlain by gravel means that it can only be cropped occasionally (1 in 5 years or less), is limited to direct drilling techniques, and crops have a higher risk of failure due to drought if differential irrigation is not available. Although this portion of land contains some shallow 3s land, it also contains patches of non-contiguous LUC 4s land cumulatively making up 20% of the LUC map unit. I consider that this section should not be considered HPL given the limitations imposed by the LUC 4s portion.

- 32 The north section of the site contained 11.8 ha of a mixture of 3w (correlates with the 3w1 regional scale LUC classification) and 3s land. This area in the north contained clay loam textured Gley Soil with gravels occurring between 20-45 cm (Figure 7). This meets the definition of HPL (LUC 1-3).



Figure 6: A drain near the north of the Site shows loamy textures Gley Soil over gravels

- 33 The most eastern portion of the Site contained Typic Orthic Gley, Argillic Orthic Gley (clay textured) and Typic Perched-Gley Pallic Soil. It was found that 4.8 ha of land was noticeably different to the rest of the Site in terms of soil and this is reflected in the LUC Classification i.e., the limitation is wetness rather than depth of gravels and stoniness of the soil. This portion of the section is classified as 4w and does not meet the criteria for HPL. This part was allocated 4w rather than 3w given that the soil wetness limitation could not easily be removed through drainage (see section 3.3.5.2 from the LUC Handbook Lynn et al., 2009). Figure 8 shows the change in elevation across the Site; the wettest part of the

Site is on the lowest elevation. The change in soil and therefore LUC is also reflected in the regional scale mapping however more detailed mapping shows the change in soil and LUC occurs further east of the Site.



Figure 7: Coloured DEM over a topographic map illustrating the change in elevation from the west (highest part) to east side (lowest part) of the Site.

Overall Finding

34 The detailed LUC mapping (based on protocols from Lynn et al (2023), Grealish et al (2017) and Hewitt (2010), Webb and Lilburne (2011), and Milne et al (1995)), found that only 11.8 ha of the Site should be classified as HPL according to the NPS-HPL definition and 65.6 ha of land should not be classified as HPL.

CONCLUSION

35 A soil and LUC assessment was undertaken at 1:12,500 scale on the 9-10 August 2023 (16 times more detailed than the regional scale maps) by Whenua Kōrero Ltd (formerly known as LUC Assessments Ltd).

36 On the higher terrace of the Site (western side), the detailed mapping assessment found 60.8 ha of land classified as LUC 4s (which correlated to the

regional NZLRI LUC classification of 4s7) and LUC 3s (which correlated to the regional NZLRI LUC classification of 3s5).

- 37 Although this western side contains some shallow 3s land it also contains patches of non-contiguous LUC 4s land cumulatively making up 20% of the LUC map unit. I consider that this section should not be considered HPL given the limitations imposed by the LUC 4s portion.
- 38 The northern section of Site contained 11.8 ha of a mixture of 3w (correlates with the 3w1 regional scale LUC classification) and 3s land. The area in the north contained clay loam textured Gley Soil with gravels occurring between 20-45 cm. This meets the definition of HPL (LUC Class 1-3 land).
- 39 It was found that 4.8 ha of land is noticeably different to the rest of the farm (eastern portion of farm) in terms of soil and is reflected in the LUC Classification i.e., the limitation is wetness rather than depth of gravels and stoniness of the soil. This portion is assessed as 4w and therefore does not meet the criteria for HPL.
- 40 Overall, from a soil and LUC perspective, 11.8 ha of the Site is classified as HPL according to the NPS-HPL definition and 65.6 ha of land was not classified as HPL.
- 41 Thank you for the opportunity to present my evidence.

Sharn Hainsworth
5 March 2024