

**BEFORE THE INDEPENDENT HEARING PANEL**

**ATSELWYN DISTRICT COUNCIL**

<b>Under</b>	the Resource Management Act 1991
<b>In the matter of</b>	an application by KeaX Limited to construct and operate a 111ha solar array at 115 & 187 Buckleys Road, Leeston (RC235464).

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**BRIEF OF EVIDENCE OF SHARN BERNARD HAINSWORTH**

**23 January 2024**

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## QUALIFICATIONS AND EXPERIENCE

- 1 My name is Sharn Bernard Hainsworth.
- 2 I am Managing Director and Principal Pedologist at Whenua Kōrero Ltd.
- 3 I hold a Graduate Diploma and Bachelor of Earth Science (Massey University). I hold a Master of Earth Science (Waikato University). My thesis topic was devoted to mapping using S-map and LUC methods (according to the Land Use Capability Survey Handbook, 2009).
- 4 I am primary author and correlator of S-map for the Hawke's Bay region, and have produced regional-scale S-map coverage in Southland, Tasman, Wairarapa, Manawatu, Taranaki, Waikato, and Auckland and Northland.
- 5 I have been member of NZ Society of Soil Science since 2009.
- 6 I have been a Member of NZ Association of Resource Management since 2002.
- 7 I am the Secretary of the Middle Districts Branch of the New Zealand Farm Forestry Association.
- 8 Together with my wife we have owned a 108 ha hill country sheep farm in the Northern Manawatū since 2016.
- 9 I worked as a Pedologist at TopoClimate South, Southland from 1999-2001.
- 10 I worked as a Soil Conservator at Horizons Regional Council from 2001-2005.
- 11 I owned and operated Soil Suitability Assessments Ltd from 2006-2008.
- 12 I worked at CPG NZ Ltd, a Division of Downers (formerly Duffil Watts) from 2008 until approximately 2010.
- 13 My site-specific soil and LUC mapping is sought after by regional councils, such as Horizons Regional Council, as a means to make their mapping of HPL more accurate.

I have 24 years professional experience, including working as an author of LUC maps and S-map for Manaaki Whenua Landcare Research as pedologist for from 2012-2019.

## EXPERT WITNESS PRACTICE NOTE

- 14 While this is a Council hearing, I confirm that I have prepared this evidence in accordance with the Code of Conduct for Expert Witnesses Code of Conduct for Expert Witnesses contained in Part 7 of the Environment Court Practice Note 2023. The issues addressed in this statement of evidence are within my area of expertise except where I state that I am relying on the evidence or advice of another person. The data, information, facts and assumptions I have considered in forming my opinions are set out in my evidence. I have not omitted to consider material facts known to me that might alter or detract from the opinions I have expressed.

## SUMMARY STATEMENT

- 15 I have been engaged by Clark and Elizabeth Casey, Dave and Donna Kewish, Michael and Anneka Dalley, Corey Krygsman, Anne and Donald Green, Simon Robinson and Donna Irons (the **Brookside Submitters Group**)<sup>1</sup>, to provide evidence on the KeaX Limited proposal to

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<sup>1</sup> Who all lodged submissions in opposition to the grant of consent application RC235464.

construct and operate a 111ha solar array at 115 & 187 Buckleys Road, Leeston the **Application**).

- 16 The proposed installation of a solar array on this land will reduce many of the range of land uses able to be undertaken on this land, i.e. reduce the land's versatility and therefore the productive capacity of the land when referring to the provisions of the National Policy Statement for Highly Productive Land (**NPS-HPL**).
- 17 Land uses that will no longer be possible include the grazing of cattle, and an ability to establish various arable crops including hay and baylage (across the entire site), berries and other horticulture (as I understand that these present a high fire risk they would therefore be inappropriate to establish amongst panels), tree crops, and forestry. According to the NPS-HPL, "productive capacity" is in part defined by the versatility of land. To take away from a wide range of the potential uses that land is suitable for, detracts from the productive capacity of the subject site.
- 18 The site contains poorly drained and slowly permeable soils that are prone to periods of high water-tables during prolonged wet periods. These soils are at high risk of ponding and run-off of excess stormwater from the driplines of the solar arrays if the water is allowed to discharge to the land. Even on relatively flat land, this excess stormwater will run-off with a high amount of energy because of the height of the fall from the panels and the amount of catchment area of the panels and the zone of concentration and the base of the panels. Due to the nature of the soils, this is likely to lead to sheet and rill erosion and entrainment of sediment in stormwater. Sediment-rich stormwater is likely to discharge to receiving drains and nearby waterways. I have seen no Resource Consents for Discharge to Water for this purpose, only a Resource Consent for the Discharge to Land (CRC223909). To mitigate any risk of sediment or any potential contaminants bound to sediment entering receiving waterbodies, I recommend implementation of Stormwater Management and Sediment Control Plans on the site.

### Soil Classification

- 19 My evidence largely agrees with Mr Stuart Ford's in terms of what the fundamental properties and patterns of soils and LUC units in the subject site are classified as.
- 20 It is agreed that the property contains 104.8 ha of LUC 2 (LUC is 2 w1 updated as nzcu 2w 15) land and 9.7 ha of LUC 3 land (LUC 3w1 updated to nzcu 3w 20).

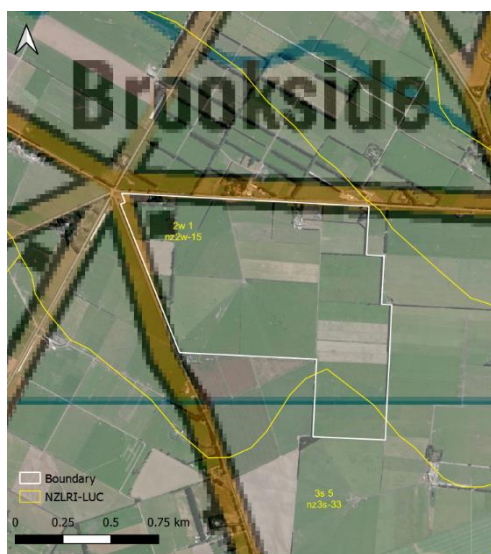


Figure 1: NZLRI layer showing LUC and the updated NZCU (prefix nz)

- 21 It is agreed that according to 1:50,000 scale S-map, the site contains poorly drained Argillic Orthic Gley Soil (GOJ). Argillic Orthic Gley Soil has a clayey texture. All the siblings labelled in Figure 2 have been classified as GOJ.

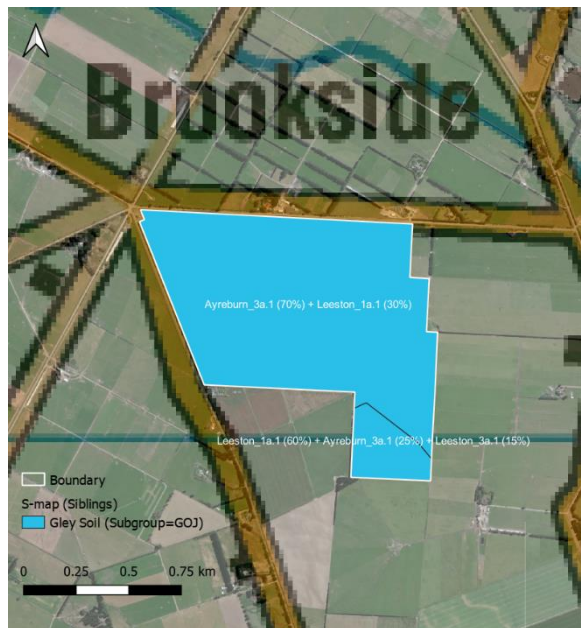


Figure 2: S-map siblings

### Productive Capacity of the Site

- 22 While Mr Stuart Ford makes a very persuasive argument around the productive capacity of the site once the solar farm is installed, Whenua Kōrero Ltd argue that the introduction of the solar farm on the property decreases the possible land uses to the extent that the farm is rendered less versatile (less arable, grazing would be limited to sheep, no ability to grow tree crops or use for production forestry).
- 23 According to the NPS-HPL, productive capacity in relation to the land means the ability of the land to support land-based primary production over the long term, and is based on an assessment of:
- a) Physical characteristics (such as soil type, properties, and versatility);
  - b) Legal constraints (such as consent notices, local authority covenants, and easements); and
  - c) The size and shape of existing and proposed land parcels
- 24 As per my expertise, I address the heads regarding physical characteristic aspects here.
- 25 The land is composed mostly of moderately deep Class 2 land, with some shallow, Class 3 land.
- 26 Currently, (pre solar farm), the LUC Class 2 land is suitable for many cultivated crops, and berry fields, pasture, tree crops (although phytophthora is a risk because of poor soil drainage), and production forestry (with trees that can tolerate poorly drained soils).
- 27 According to Lynn et al. (2021), LUC Class 2 land has slight physical limitations to arable use, readily controlled by management and soil conservation practices and suited to growing many

cultivated crops, vineyards, berry fields, pasture, and tree crops. The main limitation of 2w (shown in the NZLRI map above) refers to the wetness limitation after drainage.

- 28 The shallower, Class 3 land has moderate physical limitations to arable use. LUC Class 3 is suitable for shallow rooted cultivated crops (e.g. lettuces, brassicas and process peas), berry fields, pasture, tree crops (although phytophthora is a risk because of poor soil drainage), and production forestry (with trees that can tolerate poorly drained soils). The main limitation of 3w (land shown in the NZLRI map above) refers to the wetness or waterlogging after drainage.
- 29 Essentially, LUC Class 2 and 3 land is arable land in its natural state, and is classified as Highly Productive Land.

### **Impacts of the proposal on the productive capacity of the site**

- 30 When a solar farm is established on the Class 2 and 3 land, the pasture productivity might go up under the panels due to a reduction in evapotranspiration, and microclimates created around the site, but in general terms there are some key detrimental issues to consider:
- a) Grazing options are decreased from dairy cows to small-framed drystock options such as sheep.
  - b) Options for arable crops such as process peas, grain crops, hay & baylage are substantially reduced.
  - c) Tree crops and production forestry are no longer viable options with the introduction of solar panels on the site.
- 31 I also consider that some of the options identified by Mr Ford (such as berry fruits) would be inappropriate to grow among panels given the highly flammable nature of the plants, and the fire risks already associated with solar arrays generally. There is a lot of commentary around the flammable nature of crops and horticulture, including a 2023 abstract thesis paper presented by Tanmayi Pagadala of Lincoln University<sup>2</sup> which addresses the flammable nature of many crops and horticulture grown in Canterbury. On that basis, I consider that before it is determined that the highly productive nature of a site is not impacted due to various possible uses still available, the appropriateness of these options also needs to be considered and I consider that highly flammable plants among solar arrays would be wholly inappropriate, and therefore should not be considered as viable options.
- 32 Therefore, when applying the NPS-HPL, which uses at its heart, the NZLRI and the LUC Survey Handbook (Lynn et al, 2021), I have to conclude that the proposed solar farm installation will prevent the land on the site from retaining its pre solar array productive capacity, as assessed in terms of the definition in the NPS-HPL.

### **Stormwater and Contamination**

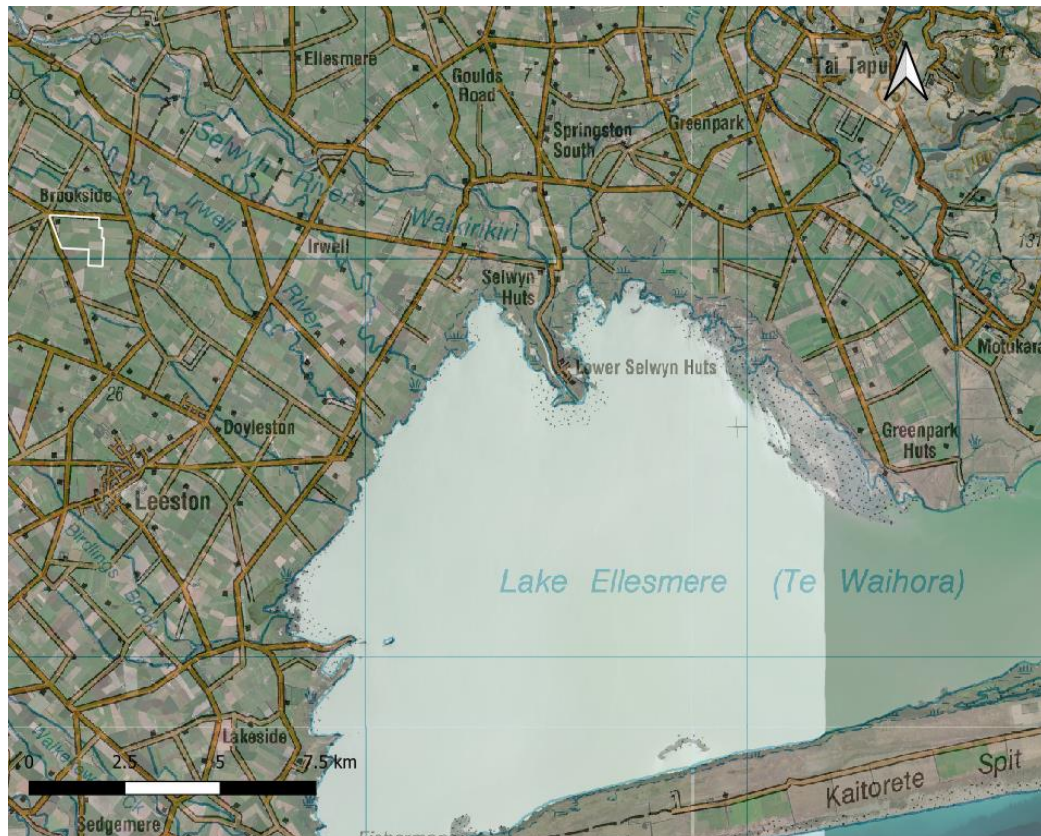
- 33 There are other soil and land related risks to consider also, including:
- a) Risks of erosion from concentration of stormwater,

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<sup>2</sup> Tanmayi Pagadala *How flammable is your farm? Measuring the flammability of crops and pastures, and other plant species commonly found on farms in Canterbury, New Zealand (Lincoln University, Abstract of a thesis, 2023).*

- b) Risk of contamination from where panels crack and stormwater is incorrectly managed, especially on poorly drained and slowly permeable Gley Soils

34 The soils on the site are mapped as poorly drained with moderate over slow permeability, so when the water tables are high during wet periods, they are at high risk of ponding and therefore accelerated runoff and rill and sheet erosion, because of the added concentration of stormwater from panels on the proposed solar array. This increased risk of accelerated rill and sheet erosion will cause sedimentation in receiving waterways if mitigation measures are not proactively put in place. If contamination from cracked panels ever occurs this can combine with the sediment and end up in those receiving waterways (Figure 3).



35 *Figure 3: Map of nearby waterways. Site is located less than 10 km of Lake Ellesmere*

- 36 New research by Pagadala et al., (2024)<sup>3</sup> examined the shoot and whole-plant flammability of 47 plant taxa commonly grown on farms in Canterbury, New Zealand. The research has demonstrated that fruit crops such as raspberries and cereals had higher flammability than vegetable crops, grazing herbs, pasture grasses, pasture legumes, and weeds.
- 37 Furthermore, although the applicants have successfully applied for Resource Consent for the Discharge to Land (CRC223909), there is no application for discharge to water (close proximity to Irwell River and Lake Ellesmere).

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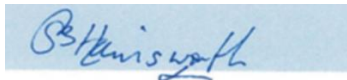
<sup>3</sup> T. Pagadala, M.A. Alam, T.M.R. Maxwell, T. J. Curran, (2024). Measuring flammability of crops, pastures, fruit trees, and weeds: A novel tool to fight wildfires in agricultural landscapes. Published in Science of The Total Environment  
<https://www.sciencedirect.com/science/article/pii/S0048969723061168?via%3Dihub>



## CONCLUSION

- 38 The proposed solar farm will decrease the productive capacity of the subject site by decreasing the option to graze cattle , grow various arable crops, cut hay from the whole farm, establish horticulture activities, and limits the opportunity to have tree crops or production forestry on the site. In my opinion, the decrease in land based primary production options that could reasonably be undertaken on the property would significantly impact the productive capacity of the highly productive land.
- 39 Without effective mitigation measures this proposal could lead to erosion and sedimentation in receiving waterbodies. It is important to have Stormwater and Sediment Control Plans in place. This is important for capturing any contaminants that enter the environment and bind to particles of sediment.

**23 February 2024**



**Sharn Bernard Hainsworth**