In the matter of Private Plan Change RCP031, of Waimakariri District Council

Evidence of Associate Professor Peter Almond (Highly Productive Land)

Dated: July 13, 2023

STATEMENT OF EVIDENCE OF PETER ALMOND

INTRODUCTION

1. My name is Peter Craig Almond.

2. I am an Associate Professor at Lincoln University who has been engaged in teaching, research and administration for 31 years. I have a B.Sc. (Hons) from Massey University and a PhD in Soil Science from Lincoln University. I am a member and past President of the Australasian Quaternary Association and a member of the New Zealand and American Societies of Soil Science and Geosciences New Zealand. I am a past Head of the Department of Soil and Physical Sciences at Lincoln University (2012-2017). Before my employment at Lincoln University, I worked for DSIR Soil Bureau and the NZ Forest Service as a soil surveyor.

3. My research and teaching experience is in the areas of pedology, geomorphology, Quaternary geology and natural hazards. My speciality is in deciphering the patterns and properties of the soil in the landscape, both natural and agricultural; I have researched and published in the area of soil physics as well. I was involved in Canterbury Earthquake science response and recovery, focusing on ameliorating and understanding earthquake-induced liquefaction. In 2019 I was the lead author of a report to the Canterbury Regional Council reviewing their soil quality monitoring programme.

CODE OF CONDUCT

4. I have read and am familiar with the Environment Court's Code of Conduct for Expert Witnesses, contained in the Environment Court Practice Note 2014, and agree to comply with it. My qualifications as an expert are set out above. Other than where I state that I am relying on the advice of another person, I confirm that the issues addressed in this statement of evidence are within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

SCOPE OF EVIDENCE

5. I have been requested by Dr Timothy Curran to provide expert commentary on his submission.

6. Dr Curran's submission speaks to the need to prevent the loss of versatile soils that RCP31 would cause if approved. He refers to 1) the loss to housing of Highly Productive Land as defined in the Proposed (at the time of his submission) National Policy Statement on Highly Productive Land (NPS-HPL), i.e. Land Use Capability classes 1, 2 and 3; and 2) the national issue of increasing fragmentation and cumulative loss of HPL in Aotearoa-NZ at large.

7. In preparing my evidence I have reviewed information on soils provided by:

    i. Manaaki Whenua Landcare Research's (MWLCR) S-Map spatial database;

    ii. The Land use Capability mapping downloaded from the Manaaki Whenua Landcare research website (MOE, 2023);

iii. National Science Challenge Our Land and Water Data Supermarket (https://landuseopportunities.nz/#about)

iv. The Land Use Capability (LUC) Survey Handbook (Lynn, 2009)

8. I reference some of my statements to the report prepared by Victor Mthamo (Reeftide Environmental and Projects Ltd) for the applicant because many points raised in the report address aspects of the quality of the soil and the magnitude of loss of highly productive land.

EVIDENCE

9. Dr Curran contended as of 22 August 2022 that if approved, RCP031 would represent a loss of highly productive land (HPL) according to the definition of HPL in the proposed National Policy Statement for Highly Productive Land.

10. As of 12 September 2022, the NPS-HPL was approved by the Governor General as an amendment to the Resource Management Act. The NPS-HPL confirms HPL as land of Land Use Capability (LUC) classes 1, 2 or 3, with mapping to be derived from the Land Resource Inventory available from MWLCR.

11. I accept the Land Use Capability mapping of Victor Mthamo, which shows 100% of the 156 ha involved in the application is HPL (comprising LUC classes 2 and 3).

12. Dr Curran is therefore correct in his contention that if approved, the plan change will amount to a loss of HPL constituting 156 ha, or at least 109 ha if areas unavailable for primary production are excluded (See Mthamo report Table 6)

13. Mr Mthamo's report, dated 23 November 2021, predates the passing of the NPS-HPL and consequently enters into a discussion of the meaning of HPL because at that time the draft NPS-HPL was not definitive. His discussion couches HPL in terms of another concept of land "quality", namely *Versatile soils*. He cites statements from Environment Canterbury's Regional Policy Statement defining versatile soils as being limited to LUC classes 1 and 2. He also uses an informal definition from Te Ara – the Encyclopaedia of New Zealand (Hewitt, 2008) which also equates versatile soils to LUC classes 1 and 2, (although that is not explicit). This discussion now is irrelevant because as far as the legislation is concerned the transitional definition of HPL is explicit (LUC 1-3) and it is not conflated with the concept of soil versatility.

14. I posit that the reference to case law Mthamo reviews (Canterbury Regional Council vs Selwyn District Council [W142/96]) defining versatile soils is probably obsolete now the NPS-HPL is in place, although I claim no legal expertise.

15. I accept Mr Mthamo's analysis of soil drainage conditions in the block, which states ~98% of the block is poorly drained or very poorly drained and this condition of the soil limits the range of crops that can be grown. Nonetheless, the block is well suited to pastoral farming as current land use attests, and that involves at times cultivation and planting of crops, presumably for animal feed. Legacy Google Earth imagery shows cultivation and planting of crops occurred in the block in the years 2014, 2015, 2016, 2017, 2020, 2021 and 2022.

16. The dominant soils in the block have high to very high water holding capacity, which gives them resilience to drought, and they have low or very low vulnerability to nitrate leaching. This makes them ideal soils for pastoral farming in Canterbury where ground and surface

water suffer from over-allocation (loss of quantity) and contamination by leached nutrients and pathogens (loss of quality). Soils that are effective at storing rainfall (high water holding capacity) limit the necessity for irrigation, and low N leaching vulnerability reduces N passing the soil into groundwater.

17. I take issue strongly with Mr Mthamo's argument that the loss of soils of high class (classes 2 and 3 in this case) is unimportant because the level of production on them can be compensated for by soils of lower capability (higher LUC class) with more inputs (Section 7.5). He disingenuously cites a report of Horizons Regional Council (Mackay et al., 2008), which shows lower capability soils can produce as much as higher capability soils when greater technological input is used. However, he neglects to include the statements from the report which effectively say that such compensation comes at a disproportionately high financial and environmental cost. These statements (pp 29-30) include:

    i. *"Technologies (i.e. cultivation, drainage and irrigation) used as substitutes for the lack of productive capacity (weakly developed soil structure, limited plant available water) of soils will lead to increased N loss, through a combination of increased production and greater leaching volumes."*

    ii. *"The number and efficiency of mitigation options for compensating for the limited capacity of soils to retain N in the topsoil horizons, declines as the natural capital* [read capability] *of soils becomes more limited."*

    iii. *The soils on which the production technologies have their biggest impact on production levels will be the landscapes that provide the greatest challenge in mitigating N losses.*

18. Point three above (17iii) is highly relevant to the Canterbury Plains: the shift of intensive dairying onto "leaky" stony soils of LUC class 4 has had a dramatic deleterious effect on water quantity and quality. Class 4 soils leach twice as much N under cow urine patches than Class 1 soils (Carrick et al., 2013). Farmers on these soils are now suffering under the increasingly demanding limits on N leaching losses imposed by the Canterbury Regional Council because of poor planning of land use in relation to soil capability.

19. I concur with Dr Curran's point that the loss and fragmentation of HPL is an important and growing problem of strategic importance to NZ, whose economy is underpinned by agricultural production

    i. Agriculture in 2022 was projected to comprise 82% of trade, 11% of GDP, and contribute to 14% of employment.

    ii. HPL in unfragmented blocks close to markets and ports (i.e. large towns and cities) is vital

    iii. In Canterbury, between 2002 and 2019 there was a 23,000 ha <u>increase</u> in 2-8 ha blocks with a dwelling, with a more than 3 times higher rate on HPL compared to lower class land(Curran-Cournane et al., 2021). This is quantitative evidence of cumulative fragmentation and loss of HPL from efficient production of food and fibre.

    iv. Fragmentation happens incrementally. The statistics for Canterbury equates to around 1,300 ha lost per year over the 17 years between 2002 and 2019.

v. RCP031 if approved would represent ~110 ha, or nearly 10% of the average annual loss from 2002 to 2019.

vi. Loss of HPL represented by RCP031 must be seen in this light and not as some fraction of the total area of HPL in Canterbury. This myopic approach ignores the trend and most importantly the endpoint.

20. In summary, I support the contention of Dr Curran that approval of RCP031 would represent a loss of HPL that continues an alarming loss of land to efficient agricultural production over the last two or more decades. The evidence presented by Victor Mthalmo is substantively correct concerning the characterization of the land, but 1) makes some inappropriate interpretations, 2) fails to identify the favourable characteristics of the land (why it is considered Class 3), and 3) misrepresents the accepted knowledge about the influence of land use capability on the economics and environmental impacts of intensive agriculture.

21. References

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Carrick, S., Palmer, D., Webb, T., Scott, J., Lilburne, L., 2013. Stony soils are a major challenge for nutrient management under irrigation development. Accurate and efficient use of nutrients on farms, 8.

Lynn, I., 2009. Land use capability survey handbook: A New Zealand handbook for the classification of land, 3rd ed. Hamilton, AgResearch; Lincoln, Landcare Research; Lower Hutt, GNS Science.

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