**Submission by A/Prof Tim Curran to hearing on Plan Change 69**

1. My name is Timothy John Curran.

2. I hold a PhD in Botany from the University of New England, Australia, and a BSc (Hons) from the University of New South Wales, Sydney.

3. I am an Associate Professor of Ecology at Lincoln University, where I have worked as an academic for the last 10 years. I have a total of 15 years experience lecturing in terrestrial ecology and natural resource management to university students in New Zealand and Australia, and 20 years experience conducting research in ecology, primarily focussing on plant species responses to disturbance.

4. I am the current President (2019-2021) of the New Zealand Ecological Society (NZES), the peak professional body for ecologists in NZ. I have previously served as Vice President (2017-2019) and Councillor (2015-2017) on the Council of the NZES.

5. I currently an Associate Editor on two academic journals relevant to ecology and natural resource management: the *New Zealand Journal of Ecology*, and *Ecological Management and Restoration*.

6. From 2001 to 2003 I was the NSW Ministerial appointee to represent the scientific community (Ecological Society of Australia) on two Regional Vegetation Management Committees. These committees, drawn from all stakeholders, were charged with developing management plans for native vegetation on private land in these regions. My role was to provide scientific advice on a range of conservation and management topics, including levels of conservation status of ecological communities. I have also served on other natural resource management committees in NSW.

7. These are my expert credentials, though I am appearing today as a submitter on the original proposal.

8. I appear today to oppose Plan Change 69 (PC69) on the basis that rezoning this land for urban development is not a sustainable use of this land, as it would result in the substantial loss of finite natural resources. I make this claim based on two strands of evidence: a) the loss of versatile soils, and b) the loss of land which could contribute to ecological restoration of two highly cleared and poorly conserved land units.

9. The evidence regarding the loss of versatile soils will largely be provided by Associate Professor Peter Almond, an expert in soil science. I will provide evidence related to my own field of expertise in ecology and natural resource management.

10. The Resource Management Act 1991 states (s7) that 'In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall have particular regard to … (s7g) any finite characteristics of natural and physical resources.' Versatile soils are one such finite natural resource.

11. I argue that PC69 would result in the loss of a much greater area of versatile soils than the 4.6 ha suggested by the applicant's expert witness Ms Katherine McCusker, and that the ongoing cumulative loss of this finite and important resource to housing development

means that there is a substantial reduction in the potential to grow food on highly productive lands in the district, or to use some of those lands for conservation and ecological restoration.

**Cumulative Loss of Versatile soils**

12. There have been several studies documenting the loss of versatile soils throughout NZ. For instance, the report 'Our Land 2021' (MfE and Stats NZ 2021) identified that between 2002 and 2019 there was a 54% increase in the amount of highly productive land made unavailable to agriculture because it had a house on it. Figure 2 of that report (reproduced in part below as Figure 1 of my evidence), identifies the area of Southwest Christchurch as one of six key areas nationwide where highly productive land has been lost to urban development from 1996 to 2018. There are two important things to note in Figure 1: i) that the land around Lincoln is identified as one of the areas where the 'highest proportion of highly productive land was converted to urban land cover for 1996-2018', having lost 261 ha; and ii) in the Selwyn District there are substantial areas to the west of Rolleston where urban expansion has occurred on land that is not highly productive (dark brown on the map), and there are substantial other areas in this vicinity which are also not on highly productive land (grey on the map) into which future residential development could expand without affecting highly productive land.

13. In her evidence on Tues 23 Nov, Ms McCusker acknowledged that there have been cumulative losses of versatile soils in the area due to previous land use change. She stated that PC69 would not have a 'large' cumulative effect, as the 4.6 ha of Templeton soils on site is relatively small compared to the amount of Templeton soils remaining in the area. As outlined in the expert evidence by A/Prof Almond, I contend that this estimate of 4.6 ha of versatile soils greatly underestimates the amount of such soils present on the site. Hence, I argue that the cumulative impact of loss of versatile soils due to PC69 will be much greater than that claimed by Ms McCusker.

14. In her evidence on Tues 23 Nov, Ms McCusker, who explained that her main field of expertise is farm consultancy, also acknowledged that in her experience there is '…less and less…' dairy farming being undertaken '…immediately around…' the local area, and that 'quite a lot of it has gone into small blocks…lifestyle blocks.' This evidence, coming from a farm consultant with extensive experience working in the Lincoln area, further highlights the cumulative loss of highly productive soils in the local area. This provides important local context to a nationwide trend of loss of highly productive soils via fragmentation associated with lifestyle blocks (Andrew & Dymond 2013; MfE and Stats NZ 2021). Indeed, if such trends in urbanisation continue, Rutledge et al. (2010) warn that in New Zealand 'a large percentage of LUC Class 1 and 2 lands could be lost to agricultural production over the next 50-100 years.'

**Validity of mapping of Versatile Soils on land affected by PC69**

15. I now refer to A/Prof Peter Almond for his expert advice on the validity of the identification of versatile soils on the land affected by PC69.

**Loss of versatile soils to urban development also precludes ecological restoration on such soils**

16. The alluvial Canterbury Plains is one of the most heavily cleared regions in New Zealand: less than 0.5% of indigenous vegetation remains (Leathwick et al. 2002; Ecroyd & Brockerhoff 2005). Because of these high levels of loss of indigenous vegetation there is a clear

conservation imperative to undertake ecological restoration on these lands, to halt and reverse the loss of indigenous biodiversity that has been associated with this. However, such restoration cannot take place if such land is under houses.

17. The very low percentage of remaining indigenous vegetation in these landscapes is seen on closer inspection of the Land Environments of New Zealand (LENZ) units found on the site for PC69. The LENZ project has classified land throughout New Zealand based on its soils, climate, topography, grouping together similar areas of land at four different scales (Leathwick et al. 2002). At the finest scale (Level 4) 500 units have been identified across the country.

18. Two units occur on the site of PC69: N1.1a and N1.2c (Figure 2). N1.1a is the equal second most cleared landscape in the country out of 500 units, with only 0.2% indigenous vegetation remaining in 2012. N1.2c is also highly cleared, with only 1% remaining in 2012 (equal 20$^{th}$ highest in NZ out of 500).

19. These high levels of clearing mean that the two highest priorities for biodiversity conservation in this region are protection of what little existing indigenous vegetation remains, and restoration of indigenous vegetation in areas where it has been lost. However, ecological restoration requires land to be set aside for this purpose, which, on the Canterbury Plains, would require retirement of agricultural land. If highly productive land is used for housing, it means that less of such land is available for either agriculture, conservation or ecological restoration.

20. A sustainable vision of land use on the Canterbury Plains would involve retaining existing indigenous vegetation, using much of the highly productive land for agriculture, to maximise yields (albeit in a way that minimises environmental impacts), while also seeking to restore native vegetation in parts of these landscapes. A sustainable vision of land use on the Canterbury Plains does not involve rezoning large parts of highly productive land to permit urban development.

Signed: A/Prof Tim Curran

24 November 2021

**References**

Andrew R, Dymond JR. 2013. Expansion of lifestyle blocks and urban areas onto high-class land: An update for planning and policy. *Journal of the Royal Society of New Zealand*. 43:128–140.

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Leathwick JR, Wilson G, Rutledge D, Wardle P, Morgan F, Johnston K, McLeod M, Kirkpatrick R 2002. *Land environments of New Zealand*. Auckland, David Bateman.

Ministry for the Environment & Stats NZ (2021). *New Zealand's Environmental Reporting Series: Our land 2021*. Available from environment.govt.nz and www.stats.govt.nz.

Rutledge, DT, Price, R, Ross, C, Hewitt, A, Webb, T and Briggs, C. 2010. Thought for food: impacts of urbanisation trends on soil resource availability in New Zealand. *Proceedings of the New Zealand Grassland Association*, 72: 241–246.


The squares highlight where the highest proportion of highly productive land was converted to urban land cover for 1996–2018, shown in dark green. Black lines enclose fragments of converted highly productive land that are within 1 kilometre of each other, with the total area of converted fragments shown in hectares. Only areas totalling 20 hectares or more are outlined and labelled.

This graphic was created using Manaaki Whenua – Landcare Research LCDBv5.0 and NZLRI Land Use Capability layers. Built and urban areas are categorised as a built-up area (settlement) or urban parkland/open space in the LCDBv5.0. Highly productive land is in land use capability categories 1–3.

**Figure 1.** Map showing the loss of highly productive land (versatile soils) lost to housing in the period 1996-2018. The area around Lincoln is at the centre bottom of the figure, and shows 261 ha of highly productive land has been lost to housing during this period. Map extracted from MfE and Stats NZ (2021) *New Zealand's Environmental Reporting Series: Our Land 2021*.

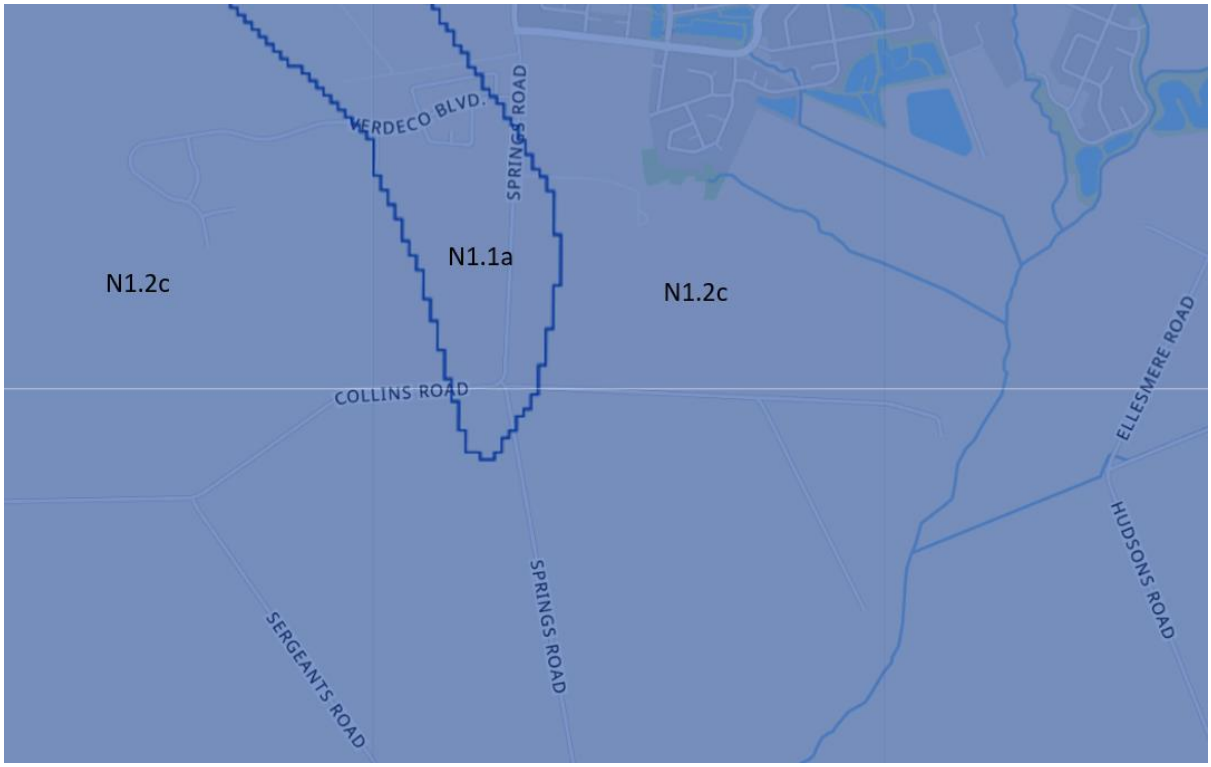


Figure 2. Distribution of Level 4 LENZ environments on the site of PC69. Derived from: https://data.mfe.govt.nz/layer/52358-land-environments-new-zealand-lenz-level-4-polygons-2009/