BEFORE INDEPENDENT HEARINGS COMMISSIONERS AT SELWYN

IN THE MATTER OF	Clause 21 of the First Schedule of the Resource Management Act 1991 (Plan Change 75)
IN THE MATTER OF	YOURSECTION LIMITED (Applicant)

STATEMENT OF EVIDENCE OF VICTOR MKURUTSI MTHAMO ON BEHALF OF YOURSECTION LIMITED

VERSATILE SOILS

Dated: 18 October 2021

INTRODUCTION

1 My full name is Victor Mkurutsi Mthamo.

2 I am a Principal Consultant for the environmental science, engineering and project management consultancy Reeftide Environmental and Projects Limited (*Reeftide*). I have been in this role for over 9 years. Prior to this I was a Senior Associate with the surveying, environmental science and engineering, and resource management consulting firm CPG New Zealand Limited (now rebranded to Calibre Consulting Limited), where I was also the South Island Environmental Sciences Manager. I have worked in the area of environmental science and engineering for over 26 years.

3 I have the following qualifications: Bachelor of Agricultural Engineering (Honours) with a major in Soil Science and Water Resources (University of Zimbabwe); Master of Engineering Science in Water Resources (University of Melbourne); Master of Business Administration (University of Zimbabwe). I hold an Advanced Certificate in Overseer Nutrient Management modelling qualification. I am a member of Engineering New Zealand (*CMEngNZ*) and I am a Chartered Professional Engineer (*CPEng*) and an International Professional Engineer (*IntPE*). I am a past National Technical Committee Member of both Water New Zealand and New Zealand Land Treatment Collective (*NZLTC*).

4 My specific experience relevant to this evidence includes:

(a) Designing and implementing of numerous on-farm irrigation schemes, soil investigations and land use assessments. Examples of projects include Hunter Downs Irrigation Scheme, North Bank Hydro Project, Mararoa-Waiau Rivers Irrigation Feasibility Study and the North Canterbury Lower Waiau Irrigation Feasibility Assessment.

(b) Assessing large subdivisions in relation to stormwater management, earthworks and the associated actual and potential impacts on soils, groundwater and surface waterways and how to effectively use erosion and management control plans to mitigate the potential impacts that may occur during the construction works.

(c) Assessing effects on soils and groundwater associated with onsite and community wastewater discharge systems such as the Wainui Community wastewater discharge consent.

(d) Assessing actual and potential effects on groundwater and surface water associated with groundwater and surface water takes.

(e) Providing quarry soils and rehabilitation expert evidence for the extension of the Road Metals Quarry on West Coast Road in Templeton in 2018. My evidence at the hearing covered the effect on soils and groundwater resulting from the changes to site levels post rehabilitation. I assessed the effectiveness of adopting a 300 mm topsoil layer and whether or not this was sufficient for plant growth and providing contaminant attenuation, treatment and removal to protect the underlying groundwater.

(f) Acting as a soils and rehabilitation expert witness for the proposed Roydon Quarry in Templeton in 2019 and 2020. Fulton Hogan's proposal was for the establishment of a quarry and extraction aggregate. I provided an assessment of the soils' versatility and the effect of the requested changes to the land use on the land's productivity potential.

(g) Acting as an expert witness at the proposed Fulton Hogan Miners Quarry extension in 2020 and 2021. I provided an assessment of the soils, their versatility and productivity potential with and without mitigation post quarrying.

(h) More recently, I have been involved with the proposed Plan Changes 66 and 67 (*PC66, PC67*)[1] as a soil expert witness. I provided evidence regarding versatile soils and the respective plan change area's productivity potential at the district council hearings August and October 2021.

5 I have been involved with proposed Plan Change 75 (*PC75*) since the beginning of August 2021 when I was engaged by Yoursection Limited, (the *Applicant*) to carry out an assessment of the effects of the PC75 proposal on the potential loss of productive land.

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[1] Private plan change request 66: rezone approx. 27 hectares in Rolleston. Private plan change request 67: rezone approx.. 33.4 hectares in West Melton.

CODE OF CONDUCT

6 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

7 My evidence is presented on behalf of the Applicant and addresses the following:

(a) An overview of the existing PC75 area and the proposed land use under PC75.

(b) The productivity of the existing soils within the PC75 area, and the environmental factors affecting that classification.

(c) The effects of PC75 on highly productive soils.

8 In preparing my evidence I have reviewed:

(a) The request for PC75, including the section 32 Evaluation Report and the Infrastructure Report accompanying it.

(b) The section 42A report and supporting technical reports prepared on behalf of the Selwyn District Council.

(c) Submissions on PC75 relevant to my area of expertise.

SUMMARY

9 The PC75 area includes 16.26 ha of Land Use Capability (*LUC*) Class 2 soils and 8.44 ha of LUC Class 3 soils.

10 A review of site specific factors relevant to the productivity of those soils indicates that:

(a) The climate in the area causes soil moisture deficits. Water is not available for irrigation to mitigate the effects of the deficits and

meet the crop demand. This severely constrains intensive crop production.

(b) Nutrient application rates will be limited by the nutrient limits set out in the Canterbury Land and Water Regional Plan. Reducing nutrient applications affects the crop yield potential. Therefore, the soil's productivity potential is not realised.

(c) Advances in technology and farming techniques over the years have been such that the removal of up to 24.7 ha of these soils is unlikely to result in any significant loss in production as this can be made up for elsewhere in the district, and even on soils of lower LUC classes.

(d) The developable area in the context of the total LUC 1 and LUC 2 soils in the district and the region is very small (0.003% and 0.018% respectively).

(e) The PC75 will not result in any significant cumulative loss of versatile soils both a district and a regional level. The change in LUC Classes 1-3 as a result of all plan changes (operative and proposed) between January 2018 and December 2020 (when PC75 was lodged) is <0.571%.

(f) The site is bound by existing subdivisions and lifestyle blocks. I expect significant resultant reverse sensitivity issues associated with intensifying agricultural production in such an area.

11 For these reasons, it is my opinion that the effect of PC75 on district and regional agricultural productivity potential is insignificant or less than minor.

OVERVIEW OF THE PC75 SITE AND PROPOSAL

12 The site Plan Change 75 area comprises approximately 24.7 hectares. The site is bound by newly subdivided residential properties to the west (Acland Park) and north-west (Falcon's Landing), while rural and rural residential land dominates the area to the south and east. Rolleston township is located approximately 2 km to the north-west of the site.

13 The proposal is located on relatively flat topography.

14 Historical and current land use within the plan change area includes:

14.1 Cropping and pastoral grazing.

14.2 A dwelling for residential accommodation.

14.3 Buildings utilised for an automotive engineering business.

15 The PC 75 request seeks to rezone the site from Rural (Inner Plains) to Living Z. The Living Z zone provides for a variety of lot sizes.

EXISTING SOILS

16 S-Maps Online[2] and Canterbury Maps[3] provide details of the soils under the PC75 site, which are predominantly Templeton silty loams (>95%). The soils are deep with moderate drainage.

17 The remainder of the soils are Eyre soils which are shallow, gravelly with moderate to rapid drainage.

CLASSIFICATION

18 As shown in Attachment 1 (and summarised in Table 1 below), the PC75 soils fall within Class 2 and 3 of the Land Use Capability (*LUC*) classifications under the New Zealand Land Resource Inventory (*NZLRI*). The NZLRI is a system that provides a default ranking for land according to its long term productive ability.

Table 1 – LUC Classes within the PC75 Area

LUC Class	Area (ha)	%age
LUC 2	16.26	65.8%
LUC 3	8.44	34.2%
Total	24.7	100.0%

19 Soils within Class 1 – Class 3 are classified in the NZLRI as "versatile soils" as they are generally suited for a range of land uses (arable cropping suitability, pastoral suitability etc.).

20 Under the Canterbury Regional Policy Statement (*CRPS*) and the operative Selwyn District Plan (*District Plan*), only soils in Class 1 and 2 are considered, by default, to be "versatile soils". It is noted however that soils within Class 1 – Class 3 will, by default, fall within the proposed

[2] https://smap.landcareresearch.co.nz/
[3] https://canterburymaps.govt.nz/

definition of "highly productive land" under the proposed National Policy Statement on Highly Productive Land (*NPS – HPL*).

21 Importantly however, the proposed NPS-HPL recognises that the LUC classification is simply a default position or a starting point for identifying the productive value in soils, given identified limitations with the LUC classification system[4] including that the classifications are based on high level soil properties to ascertain productivity potential and these do not necessarily drive land and soil quality.

22 Critically, soil properties such as physical limitations, land use suitability, slope limitations, characteristic soil stoniness, depth and workability, texture, drainage salinity and elevation, can change over very short distances, and the mapping which has informed the LUC classifications is simply too imprecise to captures these differences.

23 Given this, the proposed NPS-HPL leaves open the prospect that more detailed information/analysis of the soils in question or other environmental factors relating to their productivity may impact the overall assessment of their value.

24 The proposed NPL-HPL includes examples of the kinds of factors which would be relevant to this inquiry, including the current or future potential availability of water, the suitability of the climate and the size and cohesiveness of the area to support production. These factors echo those identified by Environment Court Judge Treadwell in *Canterbury Regional Council v Selwyn District Council*[5], where His Honour ruled that the term versatile soils/land should not be based just on the soil's inherent properties (which is the LUC approach), but must be defined based on broader considerations than the land use capability by including the list of factors in Table 2 below.

Table 2 – List of Factors Determining Versatility (Treadwell, 1997[5])

Soil texture	Soil structure	Soil water holding capacity
Soil organic matter stability	Site's slope	Site drainage
Temperature of the site	Aspect of the site	Stormwater movements
Floodplain matters	Wind exposure	Shelter planted
Availability of irrigation water	Transport, both ease and distance	Effect of the neighbours on the use

4 As described in the proposed NPS-HPL consultation document.

5 *Canterbury Regional Council v Selwyn District Council* [1997] NZRMA 25.

Access from the road	Proximity to airport	Proximity to port
Supply of labour	Previous cropping history	Soil contamination
Sunlight hours	Electricity supply	District scheme
Economic and resale factors		

25 In accordance with this approach, I have undertaken a more detailed assessment of the soils and other factors that are likely to impact intensive agricultural productivity in the PC75 area. Having undertaken that assessment, it is my opinion that the area (and the soils within it) should not be categorised as having high agricultural or pastoral production potential. Further, even if such potential existed and could be realised, I do not consider that the loss of that potential as caused by PC75 (and the land uses it intends to facilitate) could be considered significant, given the abundant available land/soils with high production potential in the Selwyn district and wider Canterbury. I say this for the following reasons.

Irrigation Water

26 As shown on Table 3 below, the soils in the PC75 area experience water deficits in most months of the year.

Table 3 – Month Maximum Moisture Deficits Based on the Selwyn District Council Pines Wastewater Treatment Plant

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	135	135	127	112	84	47	23	21	45	81	115	129
Min	101	75	61	46	5	2	2	4	6	23	56	86
Max	149	147	146	146	144	112	88	74	105	142	140	146

27 Table 3 shows that water deficits can be up to 149 mm with a range of 140-19 mm between November and February when plant water demands are the highest.

28 Intensive agricultural production in these soils and in this area needs irrigation to overcome the soil moisture deficits during the growing season. Without such irrigation water, the productivity potential of the soils cannot be realised.

29 There are only two consented wells within the PC75 area and these are for domestic water supply.

30 The PC75 site is within a groundwater zone where the groundwater is overallocated. The implications of this are:

(a) Applications for new consents in an overallocated groundwater zone are prohibited. In other words, no new consents to take water will be granted.

(b) Transfer of consents from one property to another trigger a reduction of up to 50% of the annual volume. The PC75 area would need to secure twice (300,000 - 342,000 m^3)[6] as much water as it needs to allow for the 50% reduction. Furthermore, there are very few tradeable consents[7] and most these are have very small volumes available.

30.2 Therefore, constraints on irrigation water availability would present a considerable hurdle for any person looking to secure productive value from this land given the criticality of irrigation water.

Nutrient Limits

31 Regardless of the LUC classification or inherent soil fertility, soils need nutrient enhancements, for example, through the application of fertilisers, to realise their productivity potential. One of the most important nutrients is nitrogen. Virtually all soils require some degree of nitrogen enhancement for maximum crop productivity. This applies to the Templeton and Eyre soils in the PC75 area which have very low organic matter and are very permeable. This means nitrates move through the soil easily (i.e. they are not retained within the root zone) and regular or seasonal applications are necessary.

32 The Canterbury Land and Water Regional Plan's Selwyn Te Waihora Sub-Regional Plan (Section 11) however imposes limits on the discharge of nitrates and phosphorus from various farming activities[8].

33 Specifically, future nitrogen leaching rates are required to avoid exceeding the baseline rates (from the 2009-2013 farming years) and where they exceed the 15 kg N/ha/year, the Plan requires reductions be implemented by 2022.

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6 Calculated from IrriCal
7 http://hydrotrader.co.nz/trade-history
8 For example Policies 11.4.13-11.4.17 and Rules 11.5.7-11.5.14.

34 From my experience (and supported by work undertaken by Landcare and the Agribusiness Group[9,10]) reducing nitrogen applications is accompanied by a decrease in yields, revenues and profitability. By way of example, in its 2014 report, Agribusiness included budgets showing losses for some crops, concluding that:

> *"The 10% reduction in the amount of nitrogen applied the Gross Margin result is reduced to approximately one third to a half of that under the Status Quo situation[11], and from there, it dips towards a close to breakeven scenario which means that it would not be economic to grow the crop. This reflects the relatively tight margins which these crops are grown under"*.

Reverse Sensitivity and Fragmentation

35 The PC75 area is adjacent to Falcons Landing and Acland Park. Acland Park is in the process of being extended towards the PC75 site.

36 Given the various constraints with the soils (described above) intensive farming would be necessary to achieve any level of productivity from the PC75 area. That activity would however inevitably be constrained due to the need to minimise the effects (dust associated with ploughing, odour and noise) on the surrounding existing residential properties. Those constraints would, in my opinion, further reduce the productivity potential of the PC75 area.

37 In addition, the PC75 site is bound by the existing subdivisions and smaller land parcels (mostly 4-6 ha lots). These small lots are owned by different individuals and entities.

38 Fragmentated ownership is well documented as a hinderance to intensive land use productivity because the smaller lots are inefficient and unsustainable in terms of their productive capability, economic viability and utility.

39 The fragmentation of ownership and size of the land parcels around the PC75 area means that will be nearly impossible for the applicant to

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9 The Agribusiness Group (2014). Nutrient Performance and Financial Analysis of Lower Waikato Horticulture Growers. Prepared for MPI.

10 The Agribusiness Group (June 2014). Nutrient Performance and Financial Analysis of Horticultural Systems in the Horizons Region. Prepared for MPI.

11 Status Quo option which modelled what they were doing now i.e. their normal farming practices,

secure large contiguous blocks of >50 ha which are the typical arable farm sizes in Canterbury. Merrilees (2021)[12] reports that in the early 2000's the majority of arable farms in the Canterbury region had average sizes of between 190 ha – 220 ha with small seed and grain farms with average farm sizes of 270–300 ha.

40 As set out above, the cohesiveness and size of the land is also identified in the proposed NPS-HPL as a factor influencing the productivity of land. In that context and taking into account the other constraints, I consider it is unlikely that the size of the PC75 area would, on its own, warrant the investment required to turn it into productive land.

41 Improvements in Farming Techniques, Technology and Inputs Further, it is also my opinion that, through the use of improved agricultural technology and farming techniques and/or the availability of irrigation in other areas, any such losses can be readily compensated by production elsewhere in the district or region. These technologies and techniques (which include precision farming, soil management, improved plant/crop varieties and cultivars) have improved immensely over the last two decades.

42 This now enables a range of pastoral and arable activities to be undertaken and successfully managed for genuine high productivity on a range of soils. For example, soils in LUC Classes >4 can achieve productivity potential greater than that in soils with LUC Classes <4 by applying one more technological advances (e.g. cultivation, irrigation, fertiliser uses, better crop cultivars etc).

43 In summary, because of technology there is now more land potentially available as high value land i.e. land that is in the higher LUC Classes can produce high yields when appropriate agricultural practices are in place.

PC75 LAND/SOILS IN CONTEXT

44 From the foregoing, I do not consider that the loss of these soils would be significant. I say this for the following reasons.

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[12] Merrilees, Richard. 2021. Novel Pathways to Farm Ownership within the Arable Sector. "The Pros, the Cons and the Realities". Kellogg Rural Leadership Programme. https://ruralleaders.co.nz/wp-content/uploads/2021/07/Merrilees-Richard_novel-pathways-to-farm-ownership-in-the-arable-sector_K43-1.pdf

44.1 As set out above, depending on which LUC classes are included within the relevant definitions, the area of PC75 soils classed as "highly productive" or "versatile" is either 16.26 ha (using the CRPS definition) or 27.4 ha (using the proposed NPS-HPL default definition).

44.2 That quantum is a very small proportion of the overall area of "highly productive" land or land with "versatile" soils in both the Selwyn district and the Canterbury region.

44.3 In Table 3 below I give a sense of the proportional loss of "highly productive" soil as a result of the proposed plan change under the proposed NPS-HPL definition.

Table 3 – Potential Loss in HPL As a Result of the Proposed Plan Change

LU Class	Canterbury (ha)	Selwyn (ha)	Plan Change Area (ha)	Percentage of HPL Loss	
				Canterbury	Selwyn
LUC 1	23,200	6,522	0	0.0030%	0.018%
LUC 2	270,500	46,111	16.26		
LUC3	543,000	87,927	8.44		
Total Area	836,700	140,560	24.7		

45 If the LUC classes are relied on to determine the productivity of the PC75 soils, then the reduction in "highly productive" land as a result of PC75 in the district and region would be 0.018% and 0.003% respectively.

46 When viewed in this context, it is my opinion that any loss in productive soils as a result of PC75 is insignificant.

CUMMULATIVE CHANGES IN HPL

47 I have gone through all the Selwyn District Plan Changes (operative and proposed) to estimate the amount of LUC Classes 1- 3 soils to help me understand the net changes or loss in versatile soils since 2018 when Selwyn District published the baseline report[13] on versatile soils which quantified the amount of versatile soils at that time to when PC75 was lodged. This covers Plan Changes 49 to 75 (inclusive).

48 I searched through the Selwyn District Council and Canterbury Regional Council websites for land use consents that would also result in potential

[13] *Selwyn District Council. 2018. Baseline Assessment. Versatile Soils. Report DW015. https://www.selwyn.govt.nz/property-And-building/planning/strategies-and-plans/selwyn-district-plan/selwyn-district-plan-review/supporting-information/baseline-reports2*

losses in versatile soils between January 2018 and December 2020. The significant land use consents related to quarrying activities of which Roydon Quarry was the largest within LUC Classes 1-3. The other quarrying activities were outside of LUC Classes 1-3. I have listed the relevant ones in Attachment 2. Finding the relevant information from these websites was difficult. Therefore, it is possible that my list is not exhaustive as there are some small consents that I may not have been able to pick up. If they are, these would be few and of such a small scale that they would not change the total areas in Attachment 2 by anything greater than a percentage point.

49 Tables 4 and 5 below provide summaries of (Attachment 2) the total loss in versatile soils in Selwyn and the cumulative loss from the regional pool as a result of the Selwyn District LUC1-3 plan changes that I was able to identify.

Table 4 – Changes in Versatile Soils in Selwyn Since 2018-PC75

LUC Class	Area	PC49-75	Net HPL after PCs	%age HPL Losses
LUC Class 1	6,522	41.80	6,480.20	0.641%
LUC Class 2	46,111	414.42	45,696.58	0.899%
LUC Class 3	87,927	345.91	87,581.09	0.393%
Total	140,560	802.13	139,757.87	0.571%

Table 5 – Regional Changes in Versatile Soils Due to LUC1-3 Changes in Selwyn Since 2018-PC75

LUC Class	Area	PC49-75	Net HPL after PCs	%age HPL Losses
LUC Class 1	23,200	41.80	23,158.20	0.180%
LUC Class 2	270,500	414.42	270,085.58	0.153%
LUC Class 3	543,000	345.91	542,654.09	0.064%
Total	836,700	802.13	835,897.87	0.096%

50 Table 4 shows that the cumulative potential loss in productive soils since January 2018 (PC49) up to December 2020 when PC75 was lodged is 0.57%. Therefore, any concerns regarding cumulative effects would be overstated.

51 Table 5 shows that the reduction in LUC1-3 soils in the region resulting from the Selwyn District LUC1-3 changes is 0.096%.

RESPONSE TO SECTION 42A REPORT AND SUBMISSIONS

52 I have reviewed the various submissions, and in particular submissions by Environment Canterbury and Carole Greenfield.

52.1 Ms Greenfield expresses concern the proposal's "*..damage to versatile soils and reduction in good agricultural land*".

52.2 I note that Environment Canterbury is also generally concerned about the reduction in versatile soils in the context of Policy 5.3.12 of the CRPS, and is particularly concerned that consideration of highly productive soils would be based only on the CRPS when regard should also be given to the impending NPS-HPL.

53 In my evidence I have provided an assessment of the impact of the PC75 on soil productivity potential based on both the 16.26 ha under the CRPS and the 24.7 ha under the NPS-HPL. That assessment concludes that the LUC classifications of the PC75 soils misrepresent their actual versatility for productive use, and that when all possible factors are taken into account, it should not be considered "highly productive". Further, taking into account the availability of "highly productive" land in Selwyn and Canterbury, I conclude that any loss of soil productivity resulting from PC75 is insignificant.

54 I have also reviewed the s42A report. The Officer concludes that:

54.1 The proposal is not inconsistent with Policy 5.3.12 of the CRPS and Policy B1.1.8 of the proposed district plan

54.2 The proposed NPS-HPL "*does not have any statutory weight at this point in time or establish how it may be balanced with the NPS-UD in respect to prioritising versatile soils over urban development*" and that it should not be considered. I agree with the conclusions drawn by the Officer in this regard.

54.3 The PC75 area was already identified as a future greenfield area and the soils had already been taken into account in the SDC Baseline Report (2018)[13]. It is on this basis that the relief sought by the two submitters (Paragraph 52) is opposed by the Officer. I agree with the Officer.

55 In summary, I agree with the assessment by the Officer that the proposed plan change does not result in any significant loss in versatile soils within the Selwyn District. In addition to the rational applied by the Officer in their report, Paragraphs 21-51 of my evidence provide reasons why the soils within the Plan Change 75 area should not be considered highly productive soils.

CONCLUSION ON PC75 VERSATILE SOILS

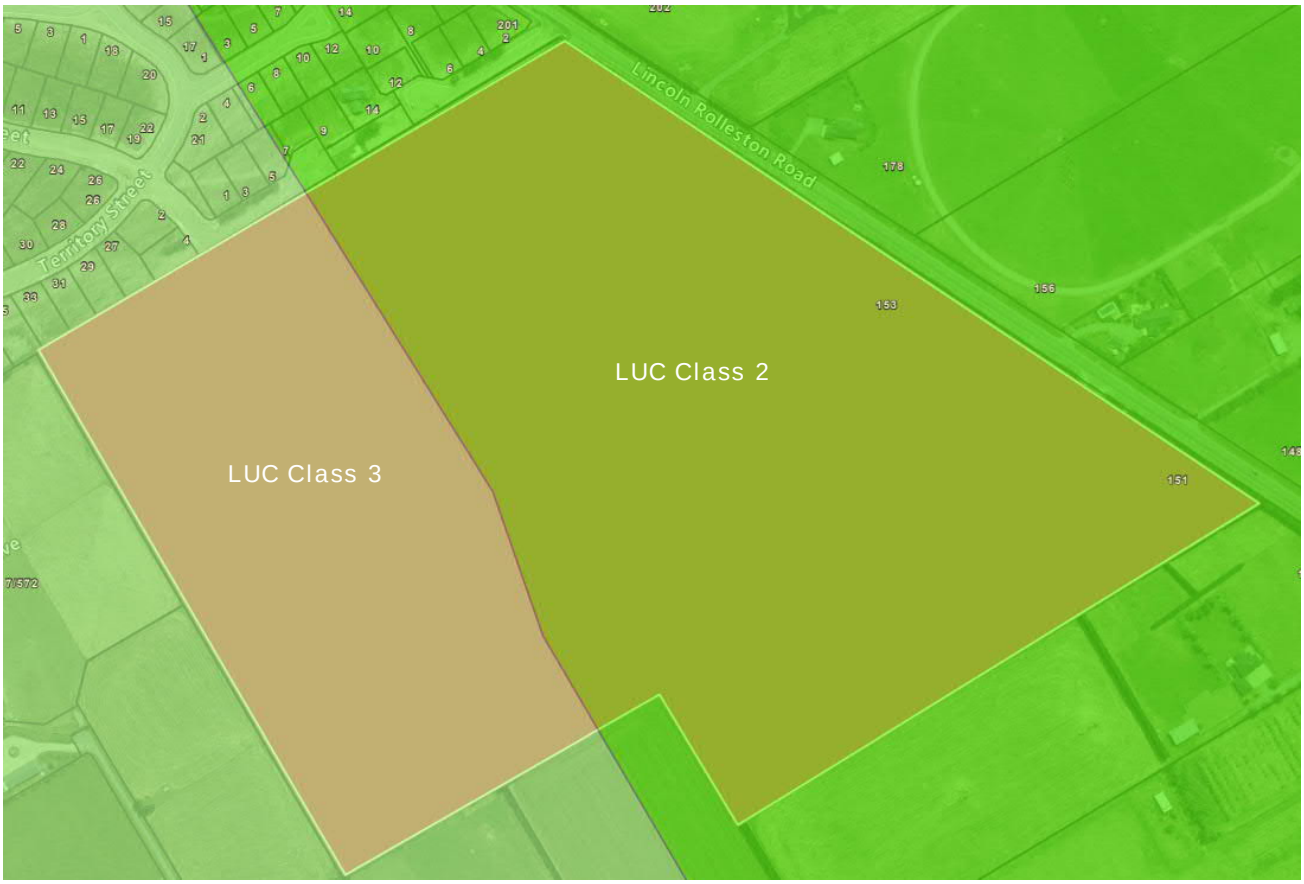
56 For the reasons set out above, I do not consider that there are any matters relating to the versatility or productivity of the PC75 area which should preclude the approval of this plan change.

57 Furthermore, the net changes in LUC1-3 soils within the district and the regional resulting from the proposed plan change is insignificant.

Victor Mthamo

18 October 2021

ATTACHMENT 1 – LUC SOILS CLASSES IN THE PC75 AREA



ATTACHMENT 2 – QUANTIFICATION OF CHANGES IN VERSATILE SOILS IN SELWYN DISTRICT

Plan Change	LUC 1	LUC 2	LUC 3	Total	Comments
PC49	2.3	5.8		8.1	
PC50					Fonterra Darfield - no new loss of land
PC54			31.3	31.3	
PC59			19.5	19.5	Total PC59 area = 31.4 ha but 11.9 ha developed prior to 2018.
PC60			17.9	17.9	
PC61			30.76	30.76	Industrial
PC62		42.9	17.1	60	
PC63			60.6	60.6	
PC64	0	0	0	0	All in LUC Class 4
PC66		27.28		27.28	Commercial
PC67		13.7	19.7	33.4	
PC68		36.13	7.57	43.7	23.8 ha in LUC4. No LUC1
PC69	33.8	111.1	45.3	190.2	
PC70	0	0	0	0	All in LUC Class 4
PC71		51.85	2.04	53.89	
PC72	5.7	6.46	0	12.16	There are no LUC 3 soils. The rest of the soils >LUC1-3.
PC73	0	0	0	0	All in LUC Class 4
PC74		3.24	17.5	20.74	
PC75		16.26	8.44	24.7	
Roydon Quarry		99.7	68.2	167.9	Fulton Hogan. 2.9 ha is in LUC4
Total	41.8	414.42	345.91	802.13	