Before the Selwyn District Council

*under:* the Resource Management Act 1991

*in the matter of:* Proposed Private Plan Change 66 to the Operative District Plan: Maddisons Road, Rolleston

*and:* **Rolleston Industrial Developments Limited**
*Applicant*

# Statement of Evidence of Victor Mkurutsi Mthamo (Versatile Soils)

Dated: 23 July 2021

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**STATEMENT OF EVIDENCE OF VICTOR MKURUTSI MTHAMO**

**INTRODUCTION**

1 My full name is Victor Mkurutsi Mthamo and 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 almost 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.

2 I have the following qualifications:

2.1 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 in Victoria, Australia); 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 (MEngNZ) and am a Chartered Professional Engineer (CPEng) and an International Professional Engineer (IntPE). I am a past National Technical Committee Member of (i) Water New Zealand and (ii) New Zealand Land Treatment Collective (NZLTC).

3 My experience and expertise includes:

3.1 The design and implementation of numerous on-farm irrigation schemes, soil investigations, land use assessments in New Zealand. Prior to this I was involved in irrigation scheme development projects and water resource investigations in most southern African countries and parts of Asia. As a Consultant for the Food and Agricultural Organisation (FAO), I have worked on land use projects in Papua New Guinea and The Maldives. I was also involved in the preparation of an irrigation design and management manual for FAO. While working as a Senior Consultant for the audit and consulting firm PricewaterhouseCoopers (Harare Office), I was involved in the preparation of feasibility studies for large scale irrigation/land use projects, conceptual and detailed designs, environmental impact assessments, capacity building, cost-benefit analyses and providing sustainable management expertise to the beneficiary communities. Some of the infrastructure development projects and assessment of environmental effects/environmental impact assessments, I have been involved in New Zealand include Hunter Downs Irrigation Scheme, North Bank Hydro Project, Mararoa-Waiau Rivers Irrigation Feasibility Study, North Canterbury Lower Waiau Irrigation Feasibility Assessment.

3.2 In the assessment of 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. This work is relevant to my input in this hearing as it demonstrates the ability to assess and present soil mitigation strategies associated with earthworks and rehabilitation of sites post development.

4 More recently I was the expert witness on quarry rehabilitation for:

4.1 The extension of the Road Metals Quarry on West Coast Road in Templeton. The proposed rehabilitation works involved topsoiling the extraction area to produce a minimum rehabilitated site that was at least 1.3 m above the highest groundwater level. In this work, I assessed the effectiveness of adopting a 300 mm topsoil layer and whether or not this was sufficient for (i) plant growth and (ii) providing contaminant attenuation, treatment and removal to protect the underlying groundwater. I also assessed the proposed quarrying operations, the rehabilitation using cleanfill materials and the possible land uses post development.

4.2 The proposed Roydon Quarry in Templeton. Fulton Hogan's proposal was for the establishment of a quarry and extraction aggregate and rehabilitation of the quarry to a minimum finished floor level of 1.3 m (made up of a minimum topsoil of 300 mm) above highest recorded ground water levels in the vicinity of the site. I provided an assessment of the soils' versatility and how the proposal would be able to maintain the soil versatility.

4.3 The proposed Fulton Hogan Miners Quarry extension. I provided an assessment of the soils, their versatility and productivity potential with and without mitigation post quarrying.

5 I have been involved with the proposed Plan Change 66 (PC66) since May 2021 when I was engaged by Rolleston Industrial Developments Limited (*RIDL*, the *Applicant*) to carry out a desktop study of the effects of the proposal on the potential loss of productive land resulting from change of land use from rural to business.

**CODE OF CONDUCT**

6 Although this is not an Environment Court hearing, I note that in preparing my evidence I have reviewed the Code of Conduct for Expert Witnesses contained in Part 7 of the Environment Court Practice Note 2014. I have complied with it in preparing my evidence. I confirm that the issues addressed in this statement of evidence are within my area of expertise, except were relying on the opinion or evidence of other witnesses. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

**SCOPE OF EVIDENCE**

7 My evidence addresses the following:

7.1 Assessment of the soils within the PC66 area.

7.2 Definition of versatile soils and the extent of versatile soils with the area.

7.3 Review of the existing land, the proposed land use under the plan change and the land's production potential.

7.4 Soils and environmental factors impacting the land's productive potential.

7.5 The effects of the proposal on the potential loss of productive land resulting from change of land use from rural to business.

7.6 Provides my expert opinion on the overall impact, if any, on the loss of the soil productive potential.

8 In preparing my evidence, I have reviewed the following:

8.1 The Section 42A Report prepared by the Council.

8.2 Issues raised by submitters.

**SUMMARY OF EVIDENCE**

9 I have carried out an assessment of versatile soils based on the Regional Policy Statement (*RPS*) definition. I used the RPS definition primarily because:

9.1 The proposed National Policy Statement – Highly Productive Land (*NPS-HPL*) is still in draft form and has no legal effect yet, and the provisions will likely change to some extent by the time it is adopted.

9.2 The NPS-HPL recognises LUC 1-3 soils as versatile soils while the RPS assumes that versatile soils are in LUC Classes 1 and 2. Therefore, the PC66 will likely be classed as versatile soils when the NPS-HPL is finalised. Therefore, defining the PC66 soils as versatile soils under the RPS is unlikely to be affected by the final form of the NPS-HPL.

10 I do not consider the proposed plan change will necessarily have a significant adverse effect on the district or region's versatile soil resource nor will it create a shortage of land or soil resource for other activities in the future. This is because:

10.1 The land is currently used for pasture production and is not intensely farmed. Under the Canterbury Regional Land and Water Plan (*CLWRP*) and the provisions in the Selwyn Te Waihora Sub-regional plan intensive farming may not be possible due to restrictions on nutrient losses – nutrient losses are tied to a nutrient loss baseline based on low intensity farming.

10.2 Advances in technology and farming techniques (crop cultivars, irrigation methods, land management etc) over the years have been such that the removal of 27.28 ha 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.

10.3 The developable area in the context of the total LUC 1 and LUC 2 soils in the district and the region is very small (0.05% and 0.009% respectively). The actual developed area is even smaller. Therefore, the reduction in agricultural productivity from the proposed change of 27.28 ha to business use will be insignificant and the productivity from this area can be made up elsewhere within the irrigated land.

10.4 The site is already bound by other industrial uses (IPort Business Park and LPC's Midland Port). The consented activities such as the application of effluent may no longer be possible due to possible reverse sensitivity issues as the block now adjoins the north-eastern boundary of IPort Business Park (IPort), and the northern boundary of the Lyttleton Port Company's (LPC) Midland Port.

10.5 My review of the site-specific details indicate that the soils do contain silty material which has the potential to limit root growth and water permeability. Limitations to the rooting depth can reduce the range of crops that can be ground and this reduces the production potential of the land as assumed in the LUC Classes.

10.6 My review of the available water for irrigation and the water demands shows that there is sufficient water to irrigate the consented area 91% of the time (in simple terms this means 91% reliability). If the proposed 27.28 ha changes to Business 2A Zone, the existing consented irrigation water would then be used to irrigate the remaining gross 117 ha (or 114-115 ha net). This water would be sufficient to irrigate the remaining area 100% of the time even with restrictions due to low bore water levels. The ability to irrigate the remaining area 100% of the time is a significant improvement of the irrigation water reliability. Increase in reliability is accompanied by an increase in agricultural productivity. Depending on the crop types, it is also possible that the increase in productivity may compensate for the removal of the 27.28 ha that would have been changed from rural to business use.

**DESCRIPTION OF THE SITE, CURRENT AND PROPOSED LAND USES**

11 The PC66 land is a 27.28 ha block of land located on the south side of Maddisons Road, adjoining the north-eastern boundary of IPort Business Park (*IPort*), and the northern boundary of the Lyttleton Port Company's (*LPC*) Midland Port.

12 The property is owned by IPort Rolleston Holdings Limited (a related company) and is leased back to the previous farming owner who uses it for pasture production.

13 RIDL proposes to extend IPort Business Park as Business 2A zoning. This would likely involve construction of some warehouse and office buildings and some hard stand.

## DESCRIPTION OF EXISTING SOILS

14 S-Maps Online[1] and Canterbury Maps[2] provide details of the soils under the PC66 site. An extract of the soils map is provided as **Attachment 1** and summarised in Table 1.

15 The soils are predominantly (99.8-99.9%) Templeton soils and these are described as follows:

15.1 Templeton Deep Silts (Temp 1a.1).

15.2 Soil Texture – Silty Loams.

15.3 Permeability – moderate over slow.

15.4 Soil Depth > 100 cm.

15.5 Drainage – moderately well drained.

15.6 Profile Available Water – 56.3-157 mm

16 The remaining approximately 0.1-0.2% is attributed to a small encroachment of the Eyre soils towards the north-western corner of the site.

17 Table 1 provides details of the Templeton and Eyre soils subtypes under the site, the proportion of each soil type and subtype, the profile available water at 0.6 m depth and 1.0 m depth.

**Table 1 – Overview of Soils at the PC66 Site**

| **Soil Type** | **Area (ha)** | **% Area** | **0.6 m – Profile Available Water (PAW)** | **1.0 m - Profile Available Water (PAW)** |
|---|---|---|---|---|
| **Templeton Soils** | | | | |
| S-Map Name | | | | |
| Temp 1a.1 | 27.220 | 99.80% | 100.8 | 157 |
| **Eyre Soils** | | | | |
| S-Map Name | | | | |
| Eyre 4a.1 | 0.0535 | 0.20% | 61 | 77.3 |
| **Totals** | **27.2755** | **100%** | | |

## DEFINING HIGHLY PRODUCTIVE LAND AND VERSATILE SOILS

18 The primary purpose of my evidence is to discuss the effect of the proposed plan change on the land's productive potential. Land productive potential encompasses many facets of which soil is one of them.

19 Most discussions on soils as relates to its ability to support a multitude of productive uses refer to the soils as being versatile. The words high productive land/soil, high class land/soils, versatile soils/land are always used interchangeably (though there could be some technical differences between them). In my evidence I have adopted the general approach where the words are used interchangeably.

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

20 High productive land or versatile soils are regarded as the best possible land or soils for agricultural production because of their properties. Various documents and statutory planning tools in New Zealand provide definitions of versatile soils. Therefore, it is necessary to provide a common understanding of what versatile soils are. Some of the most pertinent definitions are discussed in the following sections.

**The New Zealand Land Resource Inventory (NZLRI)**

21 The Land Use Capability (*LUC*) is described by Lynn et al. (2009)[3]. It is a general purpose, qualitative evaluation system which has been widely applied in New Zealand for land use planning, especially for management and conservation. The land use capability:

21.1 Is the broadest grouping in the capability classification.

21.2 Classifies land according to properties that determine its capacity for sustainable production for cropping, pastoral farming, forestry and soil/water conservation.

21.3 Reflects general versatility of the land and gives the general degree of limitation to use, taking into account the physical limitations to sustained production.

22 LUC classification system defines eight LUC classes. Classes 1–4 are classified as arable land, while LUC Classes 5–8 are non-arable. Versatile soils are defined as Class 1, 2, or 3 soils as delineated by the New Zealand Land Resource Inventory (New Zealand Soil Bureau amended 1986).

23 Figure 1 shows the potential land uses and the relationship between the versatility and LUC classes.

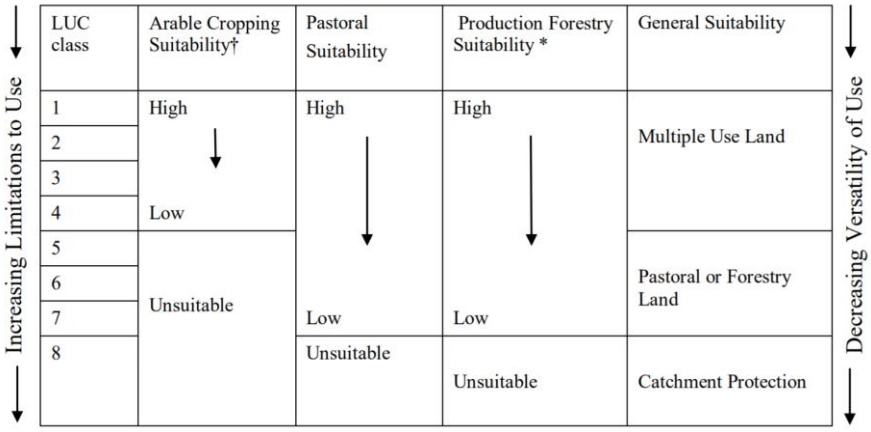


**Figure 1 – Relationship between the Versatility and LUC Classes (Lynn et al, 2009[4])**

**Canterbury Regional Council (*CRC*)**

24 The Regional Policy Statement (RPS) states that "*Soil versatility is an expression used to describe the land use capability of soils. A highly versatile soil has few limitations for use, that is it will be suitable for primary production with few inputs such as additional water or nutrients. Less*

[3] *Lynn IH, Manderson AK, Page MJ, Harmsworth GR, Eyles GO, Douglas GB, Mackay AD, Newsome PJF 2009. Land Use Capability survey handbook: a New Zealand handbook for the classification of land, 3 rd ed. Hamilton, AgResearch; Lincoln, Landcare Research; Lower Hutt, GNS Science. 163 p.*

[4] *http://envirolink.govt.nz/assets/Envirolink/83-mldc7-MarlboroughSoilsAdvice.pdf*

*versatile soil will need more inputs to achieve similar production or will simply be unsuitable for agriculture or forestry. In the Canterbury Regional Policy Statement, versatile soils are those soils that are classified as Land Use Capability I or II in the New Zealand Land Resource Inventory*".

25 Policy 5.3.12 in Chapter 5 of the RPS notes that "*Different soils are valued for different reasons. Versatile soils (Classes I and II under the Land-use Capability Classification System) are that part of the soil resource that will support the widest range of productive uses with the least inputs. Soils with lower versatility can be valued for other rural productive activities, such as vineyards*".

26 Therefore, in summary CRC defines versatile soils as those that are in LUC Classes 1 and 2. Class 3 is not included. The total area in LUC Classes 1 and 2 in Canterbury is 293,700 ha[5].

**Selwyn District Council**

27 Various SDC statutory documents make reference to versatile soils. For example, in the Township Volume of the District Plan:

27.1 Objective B1.1.2 seeks to ensure that the Plan achieves s.5(2) of the RMA by ensuring that new residential or business activities do not create shortages of land or soil resources for other activities in the future.

27.2 Policy B1.1.8 seeks to avoid rezoning land which contains versatile soils if the land is appropriate for other activities and there are other areas adjoining townships which are appropriate for residential or business development which do not contain versatile soils.

27.3 The current Rural Volume of the district plan is concerned with the irreversible use of versatile soils.

28 SDC's definition of versatile soils or highly productive land relies a lot on the definition in the RPS (Paragraphs 24-25). Therefore, versatile soils are those soils that are in LUC 1 and 2 as per the RPS. According to SDC[6] there are 6,522 hectares of Class 1 land and 46,111 hectares of Class 2 land giving a total of 52,633 ha that are classified as versatile soils in the Selwyn District.

**Proposed National Policy Statement for Highly Productive Land (proposed NPS-HPL)**

29 The proposed NPS-HPL defines versatile soils as "...*those soils that fall into land use capability classes (LUC) 1, 2 and 3, meaning those soils with the fewest limitations to their use".*

30 The stated purpose of the proposed NPS-HPL is to improve the way that highly productive land is managed under the RMA and to protect it from inappropriate use, development, or subdivision.

31 The proposed NPS-HPL also discusses the importance of specific agricultural production on soil versatility and intends "….*to give councils and their communities the flexibility to identify land that has a lower LUC class rating (i.e. the less versatile land of LUC Classes 4–8), but also contains special*

[5] https://www.tandfonline.com/doi/full/10.1080/00288233.2015.1092996
[6] https://www.selwyn.govt.nz/__data/assets/pdf_file/0006/288312/Versatile-Soils-Baseline-Report.pdf

*properties that make it highly productive and worth protecting (e.g. suitability of the climate, water availability, size of the area of land)*".

32 I note that the proposed NPS-HPL is still at the consultative stage and has no legal effect yet, and the provisions will likely change to some extent at least.

33 In summary, the proposed NPS-HPL considers land that is in LUC classes 1-3 as highly productive land or versatile soils. In its draft phase the proposed NPS-HPL also seeks to have land in LUC classes 4-8 where specific crops can be grown as highly productive land for those types of crops.

**Definitions by Various Other Authors**

34 I reviewed various literature and found other definitions by other authors. I summarise some of these below:

35 Hewitt[7] describes a versatile soil as one that is capable of many uses and such a soil *"…needs to be deep, fine-textured, moist, free-draining, loamy, and have an organic-rich topsoil. These properties best enable plant roots to take up nutrients, water and oxygen, and get enough support for rapid growth. Fertility is highest in soils young enough not to have been leached and old enough to have built up organic matter. They are also derived from parent rocks that are well supplied with essential nutrients.*"

36 Chapman[8] defines a versatile soil as one that has "..*the ability to support production and management of a wide range of crops. It is mainly assessed in terms of soil and land physical characteristics, which have few limitations, such as poor drainage or slope instability*".

37 According to Hewitt (2013)[9] "*Our best soils – are called 'versatile' or 'high class soils' and are the soils that would be regarded as having the highest soil natural capital".*

**Case Law**

38 Over the years the issue of loss of productive land to development has been before the courts. Various court decisions have provided their interpretation of what versatile soils are and the effects of developments on the productive soils.

39 Of particular note is the case of *Canterbury Regional Council v Selwyn District Council* [W142/96], Environment Court Judge Treadwell[10] ruled that the term versatile soils/land should not be based just on the soils inherent properties (which is the LUC approach) but must be defined based on broader considerations than the land use capability. The comprehensive list of factors suggested by Judge Treadwell when defining versatile soils is provided in Table 2 below.

**Table 2 – List of Factors Determining Versatility (Treadwell, 1997[10])**

| | | |
|---|---|---|
| Soil texture | Soil structure | Soil water holding capacity |

[7] *Hewitt, A. E. 'Soils - What makes a good soil?', Te Ara - the Encyclopedia of New Zealand, updated 1-Mar-09 URL: http://www.TeAra.govt.nz/en/soils/*

[8] *Chapman, R. K. 2010. Soil Assessment for the Kingseat Village Structure Plan site - May - 2010. Evidence submitted to Franklin District Council.*

[9] *Hewitt A. 2013. Survey of New Zealand soil orders. In Dymond JR ed. Ecosystem services in New Zealand – conditions and trends. Manaaki Whenua Press, Lincoln, New Zealand.*

[10] *Canterbury Regional Council v Selwyn District Council [1997] NZRMA 25, Judge Treadwell presiding.*

| | | |
|---|---|---|
| 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 |
| 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 | | |

40 Judge Treadwell's commentary clearly confirms the fact that the productive potential of the land should not be based on the LUC classes alone but should take into account other factors relevant the overall success of the farming enterprise.

**Summary Commentary of the Definitions of Soils Versatility**

41 Use of LUC classes appear to be the main method of defining versatile soils. Depending on the reference document versatile soils are either in Class 1 and 2 (Canterbury Regional Council Regional Policy Statement) or in Classes 1, 2 and 3 (NZLRI and the proposed NPS-HPL).

42 While the proposed NPS-HPL is still in draft form, it is likely to come into effect in late 2021 or in 2022. The proposed NPS-HPL ultimately delegates the responsibility of classifying versatile soils to the regional councils. While some submitters to the proposed NPS-HPL supported the use of LUC Classes 1–3 as the basis for the transitional definition of HPL there were other submitted who expressed a contrary view that the transitional definition of HPL should be narrower, based on LUC Classes 1 and 2.

43 While, I am of the opinion that productivity potential depends on many factors and not just the soil/land classification, in my assessment and in the discussion that follows I have assumed the RPS definition of versatile soils.

**VERSATILITY OF THE SOILS AT THE PC66 SITE**

44 The general soil properties at the PC66 site based on information from Canterbury Maps, S-Maps and LRIS Portal[11] indicate that the site falls predominantly in LUC Class 2.

45 The LUC system defines Class 2 land as "*..land that is very good land with slight limitations to arable use which are readily controlled by management and soil conservation practices. Most Class 2 land is flat or gently undulating, with moderate soil depth. The most common limitations which may occur include unfavourable soil structure, difficulties in working the land and susceptibility to erosion and flooding"*.

46 The definition above does not specify to what extent the limitations or unfavourable conditions have to manifest before the soils cease to be highly productive.

[11] https://soils.landcareresearch.co.nz/soil-data/the-lris-portal/

## SHORTCOMINGS OF THE LUC CLASSIFICATION METHODOLOGY

47 The use of the LUC based on information from S-Maps, NZLRI and Canterbury Maps provides a high-level description of the land and soils. While this is a good planning tool, it is important to note that:

47.1 The NZLRI LUC map information should be treated with caution due to the scale (which can be 1:30,000 to 1:50,000 scale), especially with regard to the accuracy of LUC map unit boundaries. Applying regional scale LUC (and soil) map information at property scale should only be used as a guide rather than assumed to represent the definitive soils and LUC map units for the property. I, however, note that the site specific information is unlikely to change the overall presence of the soils and LUC maps for the PC66 site given the predominance of the LUC2 soils.

47.2 The LUC alone does not drive land and soil quality. 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. These other factors and those listed by Treadwell[10] (Paragraphs 39-40) are very likely to restrict the soil/land's capability to support a wider range of horticulture and cropping land uses.

47.3 The NPS-HPL also recognises that an assessment based purely on LUC classes is not sufficient to quantify the productive potential of the land (Paragraph 31). For example some LUC Class 4-8 soils can be more productive under certain crop types than LUC Class 1-2 soils could. For example, vineyards can do well in LUC 4-8 Class soil under the good climate and moisture conditions that they could under LUC Class 1-2 soils.

47.4 Judge Treadwell's list shows that a good soil that falls into the LUC Classes 1-3 can still be disqualified for a farming use by one of several of the factors.

## THE PLAN CHANGE AND THE POTENTIAL LOSS OF PRODUCTIVE SOILS

48 In this section I discuss the actual and potential effects of the proposed plan change on versatile soils and why the classification of the PC66 as productive land and versatile soils should not necessarily preclude the proposed plan change and development.

### Site Specific Soil Properties

49 Given the importance of site-specific soil information it is important to consider the soils and the land within the PC66 site.

50 To this end, I reviewed the available soil information from geotech studies carried out by Eliot Sinclair (2016)[12] and Engineering Design Consultants (EDC)[13] for parts of the development for the neighbouring sites.

51 I reviewed the soil investigations carried out by EDC. **Attachment 2** shows the Test Pits TP5, TP10 and TP13 and Bores BH04 and BH06 which were logged as part of the EDC investigations. These specific bores and tests pits are closest to the PC66 site.

52 While the soil descriptions provided in the two reports are not within the PC66 area, the soils are generally consistent, and I expect that the PC66 soils will be quite similar.

53 The silts and clays within the topsoil appear, in some test pits and bores, to be tight enough to potentially affect rooting depths as can be seen in some of the logs presented in the Eliot Sinclair report. The logs in the Eliot Sinclair report show that the plant rooting depths falls sharply within the top 300 mm with only minor rootlets below these depths. However, this could be in part due to the type of plant species currently grown in the area.

54 The rooting depth observed would appear to favour shallow rooted crops (if the silts are tight enough to restrict root growth beyond 300 mm). I am aware that some management strategies to can be implemented (e.g. ripping) to rectify the soil tightness but these are usually cost efficient and effective if the rooting is affected by localised hard pans and not inherent and widespread soil tightness due to high clay and silt contents.

55 Therefore, productive potential of the soils will be limited to crops/plants that are shallow rooted.

**Moisture Deficits and Availability of Irrigation Water**

56 Water availability is an important limiting factor for primary production in some climates. This part of Canterbury can be dry and experiences significant soil moisture deficits which can be mitigated by irrigating.

57 The PC66 site is part of a larger area that holds a consent for irrigation. Canterbury Regional Consent CRC141462 is a consent that permits water to "….*only be used for irrigation of crops and pasture for grazing sheep, beef cattle, deer or non-milking dairy cows*". The area permitted for irrigation is shown in Figure 2 below. The total irrigable area is 145 ha which includes the PC66 27.28 ha.

[12] *Eliot Sinclair Limited. 2016. Geotechnical Investigation Report IPort Industrial Development, Rolleston Prepared for Rolleston Industrial Holdings Ltd.*

[13] *Engineering Design Consultants Limited. 2013. Rolleston Subdivision. Phase 1 Geotechnical Report. Maddisons Road, Rolleston.*

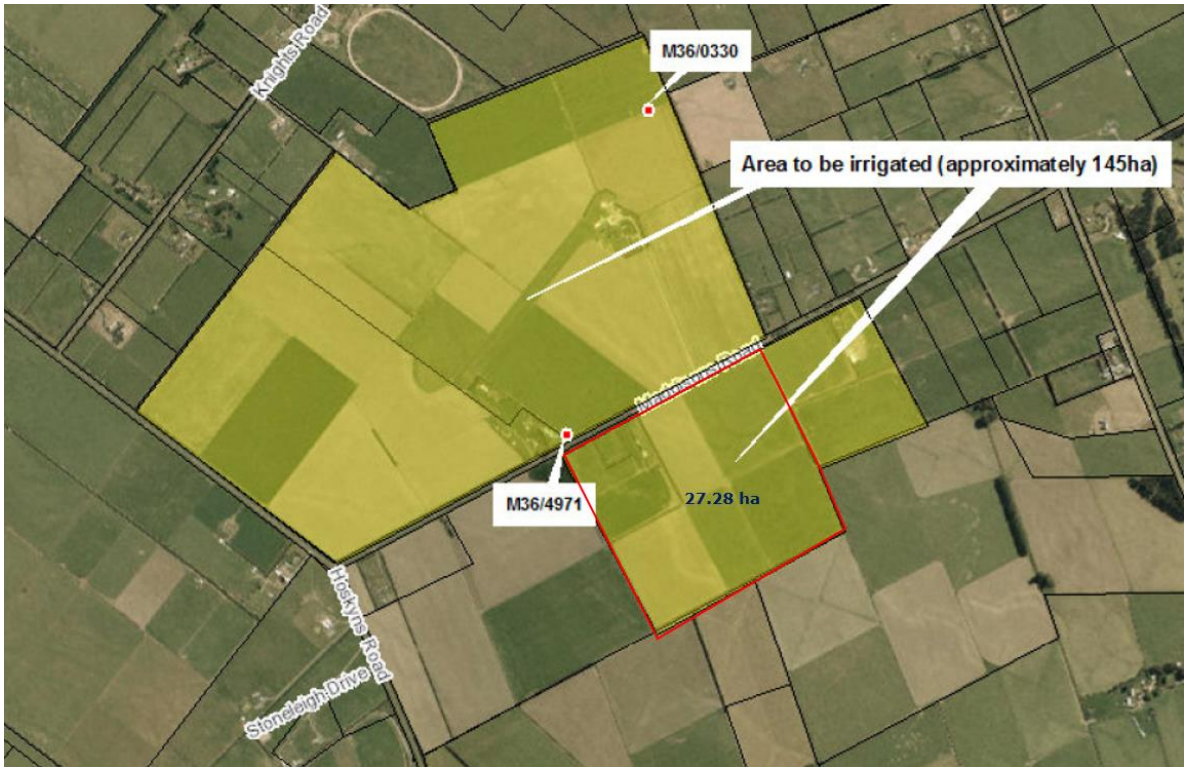


**Figure 2 – Consented Irrigation Area from CRC141462**

58 CRC141462 is a complex consent in the sense that the taking of water from the two consented bores (M36/0330 and M36/4971) is linked to the water levels in another well (M36/0217) as follows:

58.1 The maximum combined annual volume from M36/4971 and M36/0330 exceeding 1,102,300 cubic metres between 1 July and the following 30 June if the water level in M36/0217 is between 0 and 20.1 m below ground level (mbgl).

58.2 This reduces to:

- 734,873 $m^3$ when the water level in M36/0217 is between 20.1 and 21.9 mbgl.
- 367,427 $m^3$ when the water level in M36/0217 is between 21.9 and 23.6 mbgl.
- 0 $m^3$ when the water level in M36/0217 is more than 23.6 mbgl.

59 To assess the frequency with which the consented volumes have been limited by the water levels in M36/0217, I assessed the water levels in the M36/0217[14]. I extracted Figure 3 from the ECan Well Search tool.

[14] https://www.ecan.govt.nz/data/well-search/welldetails/TTM2LzAyMTc%3D/bTM2LzAyMTc%3D

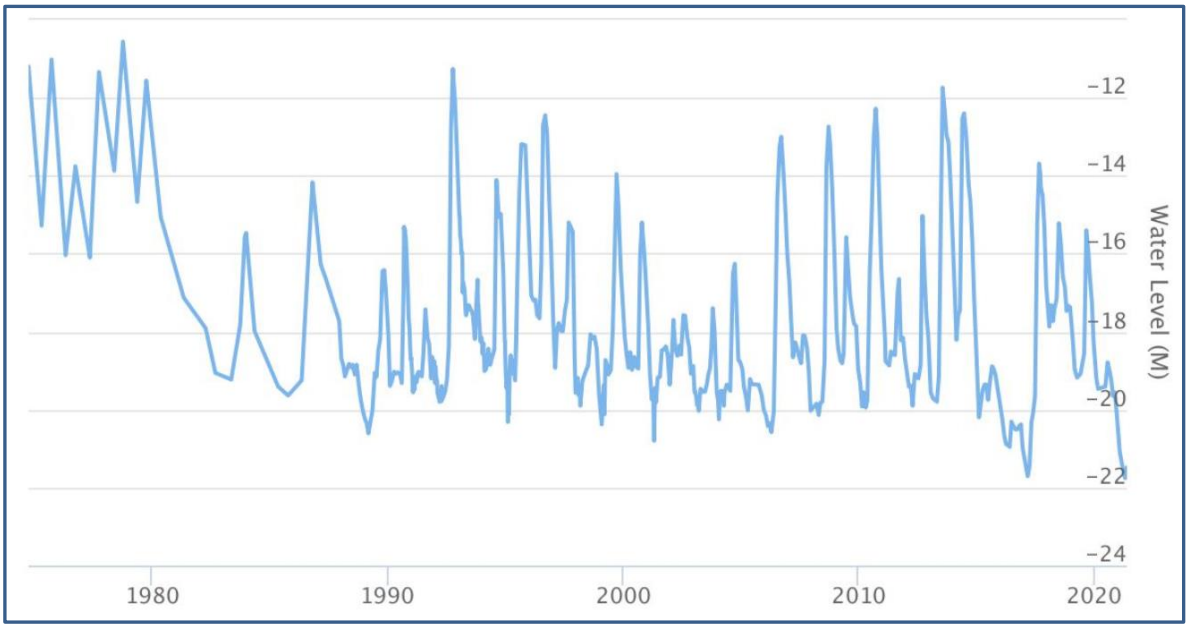


**Figure 3 – Historical Water Levels in Well M36/0217**

60 As of the 9th of April 2021, there were a total of 505 groundwater level readings for the well. These were taken between September 1974 and April 2021. If I assume that a typical irrigation season in the district is from 1 September to 30 April then the number of water level readings during the irrigation seasons over the period is 364. Of the 364 readings:

60.1 332 readings were within 20.1 m of the ground level. This means that 91% of the time the consent would have been able to take the full consented volume. It should be noted that this reliability assessment is high level.

60.2 The remaining 32 readings were between 20.1 and 21.9 m of the ground level. This means that only 9% of the time the annual volume abstracted for irrigation would have been restricted to 734,873 $m^3$.

61 To understand whether or not the available volume is sufficient for irrigation I used the IrriCal[15] tool to estimate the irrigation volumes for the area. The consent permits the irrigation of pasture and crops. However, IrriCal does not have data for arable crops for the Canterbury region in general and the PC66 area in particular. Therefore, I did not carry out an analysis of the arable crop irrigation requirements.

62 Figure 4 provides the annual irrigation requirements if the areas consented (Figure 2) were under pasture and assuming default profile available water values. The annual volume required is 929,436 $m^3$. Therefore, the consented annual volume of 1,102,300 $m^3$ would have been sufficient to ensure that moisture was not a limiting factor 91% of the time.

[15] https://www.irrigationnz.co.nz/PracticalResources/IrrigationDevelopment/AllocationCalculator

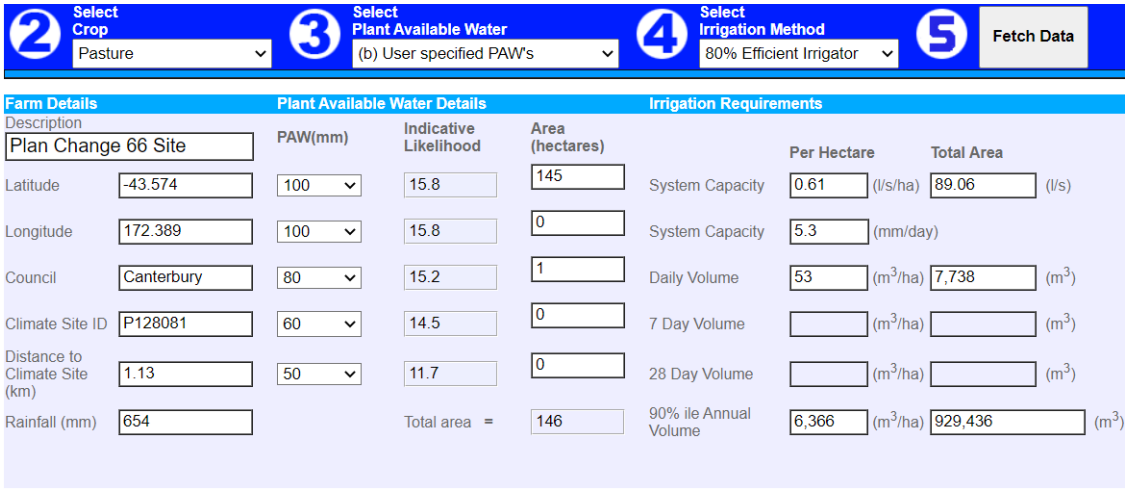


**Figure 4 – IrriCal Annual Volume Estimates for Pasture for 145 ha**

63 As I discuss, 9% of the time the available annual volume is restricted to 734,873 $m^3$ when the water level in M36/0217 falls below 20.1 m below the ground level. Figure 5 shows that if the irrigable area was scaled back to 114-115 ha the annual volume required would be 738,572 $m^3$.

64 In other words, if the 27.28 ha area that makes up the Plan Change 66 site was excluded from irrigation this would leave a gross area of 117 ha or a net area of 114-115 ha if 2 ha was taken off for laneways, houses etc this means full irrigation would still be possible when the water levels in M36/0217 fell below 20.1 m below the ground level. Stated differently, the remaining irrigable area would receive 100% irrigation under all water level conditions recorded in M36/0217.

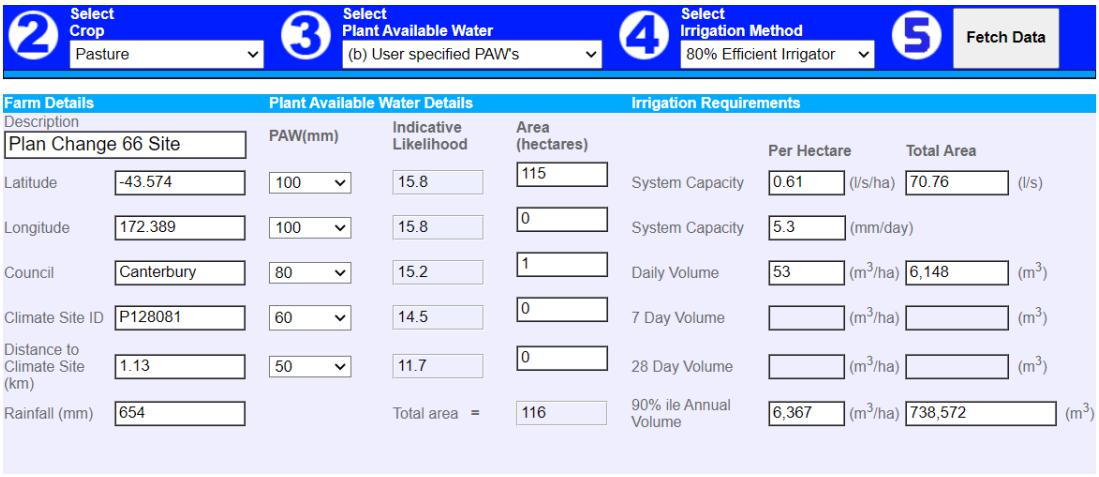


**Figure 5 – IrriCal Annual Volume Estimates for Pasture for 115 ha**

65 It could be argued that removing 27.28 ha from the consented area would result in full irrigation and possibly increased productivity in the remaining gross 117 ha (or 114-115 ha net) that is outside of the PC66 area.

**Statutory Considerations – Canterbury Land & Water Regional Plan**

66 The CLWRP's Selwyn Te Waihora Sub-regional plan has limits on the discharge of nitrates and phosphorus from various farming activities. For example, according to the plan, if the nitrogen loss for a property is more than 15 kgN/ha/yr, further reductions are required by 2022. These reductions are sector specific, with dairy farmers being required to reduce by 30%, dairy support by 22%, pigs by 20%, irrigated sheep, beef or deer by 5%, dryland sheep and beef by 2%, arable by 7%, fruit, viticulture or

vegetables by 8% and all other sectors 0%. Properties do not need to reduce if their nitrogen loss is below 15kgN/ha/yr.

67 The proposed CLWRP Plan Change 7 will also limit some farming activities (e.g. commercial vegetable growing operations) due to the proposed nutrient limits.

68 These statutory requirements limit the maximum productivity that can be attained as the baseline nitrogen loss limits (based on the 2009-2013 farming seasons) cannot be exceeded. Furthermore, the reductions (in Paragraph 66) required under the plan have to be achieved which means farming inputs and hence productivity will have to decrease. Therefore, while the LUC Classes imply that the soils are highly productive, the productivity of the land will reduce over time due to the restrictions on nutrient leaching imposed by the CLWRP.

69 As current use of the land is not intense, this means that the baseline leaching rates are low to start with and the productive potential is not as high as assumed by the LUC classes. This land could not be used intensely under the restrictions of the CWLRP.

70 Furthermore, the reduction in area by 27.28 ha could be easily compensated for by providing full irrigation to the area outside of the PC66 area as I discussed in Paragraphs 56-65.

**Statutory Considerations – Reverse Sensitivity Issues**

71 The PC66 site shares property boundaries with IPort which is west of the site, and LPC's Midland Port which is south of the site as I have discussed in Paragraph 11.

72 I have discussed aspects of the consent to take water permit held for the property in Paragraphs 57-65. The consent permits:

72.1 Taking of water for irrigation of crops and pasture for grazing sheep, beef cattle, deer or non-milking dairy cows.

72.2 Use of the irrigation system to distribute diluted effluent, fertiliser or added contaminants.

73 Given the proximity to the industrial activities it is now likely the application of effluent, the resulting spray drifts and odour will have an adverse effect on the existing industrial activities and people working at these sites. Therefore, the PC66 site will now have a low productive value because of reverse sensitivity effects from existing industrial developments. This is consistent with judgement in *Canterbury Regional Council v Selwyn District Council*[10] where the court acknowledged that low productivity would arise because of reserve sensitivity effects from residential neighbours.

74 Reverse sensitivity issues are unlikely to occur on the land that is across Madisons Road (**Attachment 1**) as the road acts as an effective buffer between the farming activities to the north and the proposed IPort extension. Effluent application across Madisons Road would comply with the minimum separation distances stipulated in CLWRP and this will not be the case with applications within the 27.28 ha.

**Impact of Advancing Farming Techniques**

75 Further to comments in the SDC discussion document[6] on versatile soils, I note that farming techniques which include technology, soil management, improved plant/crop varieties and cultivars have improved immensely over the last two decades. This now enables a range of pastoral and arable activities to be undertaken and successfully managed for high productivity on a range of soils.

76 In summary, because of technology there is now more land potentially available as high value land. Therefore, the proposed change of the 27.28 ha from rural to industrial within Selwyn and Canterbury in general will not necessarily reduce the district or the region's agricultural productivity or output as I discuss in Paragraph 77-85.6.

**Scale of the Change in Versatile Soils – Based on the RPS Definition**

77 The proposed plan change of the 27.28 ha is unlikely to have a significant change to the productivity in the:

77.1 **Selwyn District** – As I noted in Paragraph 28, the total area in LUC Classes 1 and 2 in Selwyn is 52,633 ha. The 27.28 ha is only 0.05% of the total area with versatile soils in the district.

77.2 **Canterbury region in general**. The 27.28 ha is only 0.009% of the total LUC Class 1 and 2 soils (Paragraph 26).

78 The potential small reductions in versatile land as a result of the proposed plan changes is also supported by case law:

79 In *Jay Gock and Fay Gock v Auckland Council* [2019] NZHC 276, the High Court in that case found the Environment Court in error for not considering the proportion of soils on the site relative to the wider region. The bench summarised the case as follows:

79.1 "*The Environment Court, in assessing whether the relevant areas of premium soils were significant for their ability to sustain food production, had erred by failing to take into account the insignificant area of such soils involved in the present case (100 ha) in the context of the total area of such soils in the Auckland region (63,000 ha)".*

**Scale of the Change in Versatile Soils – Based on the NPS-HPL**

80 If the proposed NPS-HPL comes into effect and becomes legal with the currently proposed definition in place LUC Class 3 soils will become versatile soils. This will increase the total areas under versatile soils.

81 As a result, the proportions of versatile soils under PC66 become even smaller compared to the current proportions (Paragraph 77).

**Summary Comments of the Scale of the Changes in Versatile Soils**

82 The above comments on scale notwithstanding, the SDC document[6] on versatile soils makes the following conclusion:

82.1 *It is presently considered that the Selwyn district is not currently facing an issue of the loss of versatile soils or the loss of productive capacity of rural soils in relation to urban development. However,*

*there may come a time where, should there be a need to rezone land, the loss of versatile soils may occur on the fringes of a number of townships in order to provide for urban growth. Nonetheless, it is recognised that the protection of these soils is not absolute and must be balanced against a wide range of factors, as established through case law.*

82.2 In the *Gock and Fay Gock v Auckland* decision the judge ruled that the scale of the change should be taken into account in making a decision on a plan change (Paragraph 79).

**SUMMARY AND CONCLUSIONS**

83 I have based my assessment of versatile soils on the RPS definition and not on the proposed NPS-HPL. This is because the proposed NPS-HPL is still in draft form and has no legal effect yet, and the provisions will likely change to some extent at least. The RPS recognises LUC 1 and 2 soils as versatile soils.

84 The soils in the proposed PC66 area fall in the LUC Class 2 and are defined as versatile soils in the RPS and in the proposed NPS-HPL.

85 I do not consider that the proposed plan change has a significant adverse effect on the district or region's versatile soil resource and that it will create a shortage of land or soil resource for other activities in the future. This is because:

85.1 The land is currently used for pasture production and is not intensely farmed. Under the CLWRP and the provisions in the Selwyn Te Waihora Sub-regional plan intensive farming may not be possible due to restrictions on nutrient losses.

85.2 Advances in technology and farming techniques over the years have been such that the removal of 27.28 ha 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.

85.3 The developable area in the context of the total LUC 1 and LUC 2 soils in the district and the regional is very small (0.05% and 0.009% respectively). The actual developed area is even smaller. Therefore, the reduction in agricultural productivity from the proposed change of 27.28 ha to business use will be insignificant and the productivity from this area can be made up elsewhere within the irrigated land.

85.4 The site is already bound by other industrial uses (IPort Business Park and LPC's Midland Port). The consented activities such as the application of effluent may no longer be possible due to possible reverse sensitivity issues.

85.5 Review of the site-specific details indicate that the soils do contain silty material which has the potential to limit water permeability. The heavy soils also impact plant rooting depth thus restrict the range of plants that can be grown to just shallow rooted crops. This reduces the land's productive potential to levels below what is assumed by the LUC classes.

85.6 My review of available water for irrigation and the water demands which showed that there is sufficient water to irrigate the consented area 91% of the time. If the proposed 27.28 ha changes to Business 2A Zone, the existing consented irrigation water could then be used to irrigate the remaining gross 117 ha (or 114-115 ha net). This water would be sufficient to irrigate the remaining area 100% of the time even with restrictions due to low bore water levels. The ability to irrigate the remaining area 100% of the time is a significant improvement of the irrigation water reliability for that area. Increase in reliability is accompanied by an increase in agricultural productivity. It is also possible that the increase in productivity will compensate for the removal of the 27.28 ha that would be changed from rural to business use under this plan change.

85.7 In the *Canterbury Regional Council v Selwyn District Council*[10] case the court also found that the removal of the land in question from productivity would not affect the ability of future generations to feed themselves. I do not consider the removal of this particular site in question would affect the ability of future generations to feed themselves.

**RESPONSE TO THE S42A REPORT**

86 I have read the s42A report by the Ms Elizabeth Jane White. Below I address specific comments in the s42A report that are relevant to my area of expertise.

87 In Paragraphs 70, 95 and 116 of the report Ms White expresses concern at the potential loss of productive soils. For example, in Paragraph 70 she writes:

"*I also consider it important to note that Policy B1.1.8 of the District Plan explicitly directs that the rezoning of land for new business development is avoided, if it is appropriate for other activities and there are other areas adjoining the township that which are appropriate for new business development which do not contain versatile soils. In this case, there is nothing to indicate that the land is unsuitable for ongoing rural use. However, as noted above, any expansion of the industrial area into the immediately adjoining area would include some highly productive soils*".

88 I have discussed in Paragraphs 48-85 how the fact that the soils are mapped as LUC Classes 2 does not necessarily mean that they are high productive as factors such as moisture availability, the CLWRP statutory limitations on nutrient loss have a significant impact on the land's productive potential.

89 Future intensification on the land is not possible given these constraints. This means that the land may not be able to be farmed more intensely than what the LUC Classes seems to indicate. It is possible that there is land elsewhere within the district and the region that has LUC Classes >3 which can be farmed more intensely because of the availability of water and favourability of the other factors highlighted by Judge Tredwell[10]. Use of such LUC Class land can easily replace the potential production change resulting from the proposed plan change given the small proportions of the LUC 2 and 3 land within the plan change area.

90 Setting aside the factors that potentially reduce the productivity of the land as I have outlined, in Paragraph 77 I have discussed the proportional reduction in versatile soils within the district and within the region should the plan change go ahead. Given the small proportional change, there is no reason to preclude the proposed plan change based on the ruling in the *Jay Gock and Fay Gock v Auckland Council* [2019] NZHC 276 where the judge ruled that scale of the change should be taken into account (Paragraph 79.1).

91 In Paragraph 129, the Officer writes "*While I accept that the proposal is an efficient use of physical resources*" and goes on to note the concerns by various submitters on the potential loss of versatile soils. I agree with Ms White that given the proposal seeks to extend the existing Business zone and the operation of an existing port facility it is more efficient to make the extension than to find a new site on which the proposed activities can be carried out.

**RESPONSE TO THE ISSUES RAISED BY SUBMITTERS**

92 I have reviewed the various submissions. Below, I offer comments on these submissions.

93 Submissions by Mr Sam Carrick, Ms Davina Penny, Ms Carole Greenfield and Environment Canterbury. The main concern by submitters was in regard to the loss of "*productive land and the need to protect it for food production*." Some of the more specific concerns the submitters are summarised below:

93.1 Mr Sam Carrick's submission states that "..*the effect on highly productive land is not minor as per that stated in the applicant s32 report in the context of the cumulative loss that has already occurred in the Selwyn District as evidenced in Our Land 2021 report*"

93.2 Ms Greenfield expressed concern at that "..*once land is built on, we can't use it for food production, which is why we need to act now. We cannot afford to lose our most productive land*".

93.3 Ms Davina Penny refers to the proposed NPS-HPL and states that "..*There is forthcoming national policy statement directing councils to protect such soils for long term/future production to account for future population growth. Only 14% of the country's available soil is LUC 1 & 2. Therefore, it is vital this is not subject to development. SDC only recognise LUC 1 & 2, but is it important to note that the Land Inventory and national policy statement documents recognise LUC 1-3*".

93.4 Environment Canterbury is generally concerned about the reduction in versatile soils in the context of Policy 5.3.12 of the RPS.

94 In my evidence I have directly or indirectly addressed the concerns raised by the submitters when I discussed various aspects of the soils, the land use, the production potential and their relevance to the proposed plan change. Below I summarise how my evidence addresses the issues raised by the submitters:

94.1 The LUC classification system on which the LUC classes are based is a good national planning tool. However, where site specific information is available this needs to be used to better understand the soils' productive potential.

94.2 In Paragraphs 49-54, I discussed the soil properties in the area. I discussed the potential effect of the high clay and silt contents on soil permeability which in turn affects root penetration.

94.3 In Paragraphs 56-65 I assessed the effects of the moisture deficits, availability of irrigation, and their adverse impact of the soils' production potential.

94.4 In Paragraphs 66-68 I outlined the constraints of land use intensification as a result of the statutory provisions in the regional plan.

94.5 Paragraphs 71-74 of my evidence discuss how future productivity potential will be affected by reverse sensitivity issues. Some activities permitted under the consent to take water will not be able to be carried out due to possible effects on neighbouring developed properties.

94.6 The classification of soils using land use classes is not a perfect reflection of the soils' productive potential especially in this day of increasing technological improvements in agronomic practices, crop/plant cultivars, fertiliser use, irrigation methods and general farm management. Soils that do not necessarily fall into LUC Classes 1-3 can now be as productive as the soils that are in Classes 1-3. I have discussed the effects of technology on the land's productive potential in Paragraphs 75-76.

94.7 As I noted in Paragraphs 77-81 the scale of the developable area in the context of the total LUC 1 and LUC 2 soils in the district and the regional is very small (0.05% and 0.009% respectively). This is able to be compensated for by utilising the available irrigation resources on the remaining consented irrigation area and the continuous improvements in agricultural technology.

95 As set out in my summary Paragraphs 83-85, I conclude that the proposed loss of the soils is not considered to have a significant adverse effect on the district or region's versatile soil resource and will not create a shortage of land or soil resource for other activities in the future.

Dated: 22 July 2021

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Victor Mthamo

**ATTACHMENT 1 – SOILS TYPES**

**ATTACHMENT 2 - LOCATION OF THE TEST PITS AND BORES RELATIVE TO THE PC66 SITE (EXTRACTED FROM ELIOT SINCLAIR (2016) AND EDC (2013))**