BEFORE AN INDEPENDENT HEARINGS COMMISSIONER AT SELWYN

IN THE MATTER OF	Clause 21 of the First Schedule of the Resource Management Act 1991 (Plan Change 67)
IN THE MATTER OF	**GW WILFIELD LIMITED** (Applicant)

STATEMENT OF EVIDENCE OF VICTOR MKURUTSI MTHAMO ON BEHALF OF GW WILFIELD LIMITED

VERSATILE SOILS AND FLOOD HAZARD

Dated: 30 August 2021

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1 INTRODUCTION

1.1 My full name is Victor Mkurutsi Mthamo.

1.2 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.

1.3 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*).

1.4 In my role as an environmental consultant and charted environmental engineer I am involved in all areas of the Three Waters (water supply, stormwater and wastewater). This includes resource consent applications, assessments of environmental effects, modelling of flows, catchment hydraulic, hydrological analysis, soil assessments and irrigation engineering. In addition, I have specific expertise in the development of effective and sustainable rehabilitation plans for quarries. In that context I focus on ensuring that a rehabilitated site can be used for as many land use options as are possible and permissible under the current statutory planning requirements. Through this work I have built specific expertise in soil use, soil assessments and strategies to ensure the soil production potential is maintained or realised.

1.5 My specific experience relevant to this evidence includes:

(a) Stormwater planning, catchment hydraulic and hydrological modelling and design.

(b) Presenting evidence at a regional council hearing on catchment wide modelling that I carried out to assess the effects of flooding in the lower reaches of the Waitaki Catchment in South Canterbury.

(c) Regular engagement by Christchurch City Council (*CCC*) as a Three Waters Planning Engineer. In this role as a stormwater planning engineer I review stormwater designs and modelling by various engineers from consulting firms and I peer review their reports (concepts, calculations and detailed designs) and provide them with the required guidance for solutions that are acceptable to the CCC. As a result I am conversant with various hydrological modelling tools, flooding assessments and flood mitigation.

(d) 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.

(e) 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.

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

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

(h) 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.

(i) 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.

(j) 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.

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

1.6 I have been involved with proposed Plan Change 67 (*PC67*) since the beginning of August 2021 when I was engaged by GW Wilfield Limited, (the *Applicant*) to carry out an assessment of the effects of the PC67 proposal on the potential loss of productive land, and its susceptibility to, and implications for, flood hazard.

Code of Conduct

1.7 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

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

omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Scope of Evidence

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

(a) An overview of the existing PC67 area and the proposed land use under PC67.

(b) The productivity of the existing soils within the PC67 area, and the environmental factors affecting that classification.

(c) The effects of PC67 on highly productive soils.

(d) The susceptibility of the PC67 area to, and its implications for, flood hazard risk.

1.9 In preparing my evidence I have reviewed:

(a) The request for PC67, 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 PC67 relevant to my area of expertise.

2 SUMMARY

Versatile Soils

2.1 The PC67 area includes 13.7 ha of Land Use Capability (*LUC*) Class 2 soils and 19.7 ha of LUC Class 3 soils.

2.2 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 33.4 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 (0.004% and 0.024% respectively). The actual developed area is even smaller if the drinking water protection zone and other factors are taken into account.

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

2.3 For these reasons, it is my opinion that the effect of PC67 on district and regional agricultural productivity potential is insignificant or less than minor.

Flood Hazard

2.4 The majority of the PC67 site is not affected by large flooding depths, with only 1% of the area experiencing flooding depths of up to 960 mm. Over 80% of the plan change area has depths of <600 mm.

2.5 The area that is shown as being susceptible to flooding can be managed through detailed engineering design. Mitigation measures that can be implemented at the subdivision engineering stages include:

(a) raising the finished house floor levels to comply with the District Plan and the CRPS; and

(b) elevating the house sites or lowering the road corridors to convey secondary stormwater flows through the site.

2.6 In summary, my assessment shows that there are no areas of high flood hazard within the site boundary which would render it inappropriate for development.

3 OVERVIEW OF THE PC67 SITE AND PROPOSAL

3.1 The PC67 area comprises approximately 33.4 hectares located in a rural setting in West Melton, Selwyn, directly south of the existing Wilfield residential subdivision and east of Weedons Ross Road. The site is predominantly flat from north west to the east/south east but does have some pronounced undulations in places.

3.2 There are no waterways/water bodies within the site boundary. However, some natural preferential flow paths exist due to the topography of the land as demonstrated by the site spot heights presented in **Attachment 1**.

3.3 Historical and current land uses within the PC67 area include:

(a) Chicken farming - this activity has been discontinued however, the old chicken farming buildings and an existing dwelling are still in place.

(b) Producing pasture for grazing – this comprises native browntop, poa grass and broadleaf species (some clover and weeds).

3.4 A small utility allotment exists at the northern edge of the site adjoining Ridgeland Way, which contains a municipal water supply well and pump station.

3.5 If granted, PC67 will provide the opportunity to enable the development of approximately 130 residential lots.

4 EXISTING SOILS

4.1 S-Maps Online[2] and Canterbury Maps[3] provide details of the soils under the PC67 site, which are predominantly Templeton silt loam. The soils are deep with moderate drainage.

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

4.2 The remainder of the soils are Eyre silty loams. These occupy less than 10% of the area and are generally shallow and stony and well drained. These soils have a sandy matrix at >450 mm.

Classification

4.3 As shown in **Attachment 2** (and summarised in Table 1 below), the PC67 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 PC67 Area

LUC Class	Area (ha)	%age
LUC 2	13.7	41%
LUC 3	19.7	59%
Total	**33.4**	**100%**

4.4 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).

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

4.6 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.

4.7 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.

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

4.8 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.

4.9 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
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		

4.10 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 PC67 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 PC67 (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.

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

Irrigation Water

4.11 As shown on Table 3 below, the soils in the PC67 area experience water deficits in most months of the year.

Table 3 – Month Maximum Moisture Deficits

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

4.12 This is particularly critical in the peak summer months when maximum monthly moisture deficits range from 140-149 mm. Given the moisture deficits inherent in the area, irrigation water is required to ensure maximum crop yields. For example, the average deficit of 135 mm in January would need at least an equivalent amount of irrigation water to ensure that the soil moisture stayed between field capacity and the allowable depletion point. Without such irrigation water, the productivity potential of the soils cannot be realised.

4.13 Selwyn District Council (*SDC*) currently holds a water take consent (CRC192996) for irrigation in the PC67 area. The consent is available for community water supply, irrigation of reserves and irrigation of pasture and crops. However, given the demand for potable water in Selwyn, I do not expect SDC to use the consent for crop and pasture irrigation or cede any part of the consented volume to such uses by others. It is my opinion that SDC will seek to increase the volume allocated for community water supply from the volume currently allocated to the irrigation of crops and pasture when the consent expires in 2026. This will be necessary due to the growing population in West Melton and increasing demands for potable use due to climate change.

4.14 Further, the PC67 site is within a 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 PC67 area would need to secure twice as much water as it needs to allow for the

50% reduction. Furthermore, there are very few tradeable consents[6] and most these are have very small volumes available.

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

Nutrient Limits

4.16 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 PC67 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.

4.17 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[7].

4.18 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.

4.19 From my experience (and supported by work undertaken by Landcare and the Agribusiness Group[8,9]) 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*

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6 http://hydrotrader.co.nz/trade-history

7 For example Policies 11.4.13-11.4.17 and Rules 11.5.7-11.5.14.

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

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

under the Status Quo situation[10], 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

4.20 The PC67 area is adjacent to earlier stages of the Wilfield residential subdivision, which are in the process of being developed.

4.21 Given the various constraints with the soils (described above) intensive farming would be necessary to achieve any level of productivity from the PC67 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 PC67 area.

4.22 In addition, the PC67 site is bound by the existing subdivision and smaller land parcels (mostly 4-5 ha lots) on all the other sides including across Weedons Ross Road. These small lots are owned by different individuals and entities.

4.23 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.

4.24 The fragmentation of ownership and size of the land parcels around the PC67 area means that will be nearly impossible for the applicant to secure large contiguous blocks of >50 ha which are the typical arable farm sizes in Canterbury. Merrilees (2021)[11] 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.

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[10] Status Quo option which modelled what they were doing now i.e. their normal farming practices.

[11] 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

4.25 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 PC67 area would, on its own, warrant the investment required to turn it into productive land.

Drinking Water Protection Zone

4.26 I would have expected the Council water supply well within the PC67 area to have a drinking water protection zone, however I have checked on Canterbury Maps and there does not appear to be one for this well. I consider this to be an oversight.

4.27 I have read the section 42A report for the community water consent (CRC192996) to confirm what the intended protection zone was meant to be. A 100 m protection zone was intended.

4.28 A 100 m protection zone would limit some agricultural activities necessary for intensification to achieve maximum productivity. In other words the protection could potentially remove 2-3 ha from the 13.7 ha LUC Class soils reducing the area of highly productive soils to 10.7-11.7 ha (under the CRPS) or 30.4-31.4 ha (under the proposed NPS-HPL).

4.29 Therefore, when the drinking water protection zone is taken into account the area of land falling under the CRPS and the proposed NPS definitions of highly productive soils is not as high as initially assumed. This reduction in areas available for production increases the adverse effects related to the fragmentation of the land.

4.30 Against these factors, it is unlikely that the productive potential of the LUC Class 2 and 3 soils will ever be realised even if other constraints such as lack of irrigation water can be addressed.

4.31 In summary, taking into account both the natural capital of these soils (recognised by their LUC classes) and the site specific factors, it is my opinion that the PC67 soils should not be considered "highly productive", such that their protection from the impacts of residential development is warranted.

5 PC67 LAND/SOILS IN CONTEXT

5.1 Even if the soils were classified as "highly productive" which I dispute, I do not consider that the loss of these soils would be significant. I say this for the following reasons.

5.2 As set out above, depending on which LUC classes are included within the relevant definitions, the area of PC67 soils classed as "highly productive" or "versatile" is either 13.7 ha (using the CRPS definition) or 33.4 ha (using the proposed NPS-HPL default definition).

5.3 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.

5.4 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 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	**0.0040%**	**0.024%**
LUC 2	270,500	46,111	13.7		
LUC3	543,000	87,927	19.7		
Total Area	**836,700**	**140,560**	**33.4**		

5.5 I note that the 0.024% reduction in productive land in Selwyn is conservative as this does not account for the impact of any potential water protection zone extending over part of the PC67 area.

5.6 In short, if the LUC classes are relied on to determine the productivity of the PC67 soils, then the reduction in "highly productive" land as a result of PC67 in the district and region would be 0.024% and 0.004% respectively. I would further note, as the Council Officer does, that there is also an abundance of Class 2 and 3 land immediately adjoining West Melton township.

5.7 When viewed in this context, it is my opinion that any loss in productive soils as a result of PC67 is insignificant.

5.8 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.

5.9 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 or more technological advances (e.g. cultivation, irrigation, fertiliser uses, better crop cultivars etc).

5.10 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, which can produce high yields when appropriate agricultural practices are in place.

6 RESPONSE TO SECTION 42A REPORT AND SUBMISSIONS - SOILS

6.1 I have read the section 42A report and the submissions by Environment Canterbury and Christchurch City Council.

6.2 As noted in the Council Officer's report, neither the proposed NPS-HPL nor the Selwyn District Plan require that urban expansion onto highly productive land is avoided at all costs. Rather, the implications of that expansion for productive land are to be considered alongside other factors such as availability of alternatives.

6.3 For the reasons set out in the preceding paragraphs, I do not consider that the PC67 soils should be considered "highly productive" such that protection of them from urban expansion is warranted. Further, I consider that development in the PC67 area and the consequent loss of those soils will not adversely affect the availability of productive or versatile soils in the district or the region. As the versatility of this land is overstated by just considering the LUC classification, I do not think the consideration of alternatives is needed. Further there are areas in Selwyn and in Canterbury with less constraints than the PC67 area that

are able to make up for any perceived loss of productivity resulting from the PC67 area.

6.4 The Council Officer references Policy B1.1.8 which 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. West Melton soils are all LUC Classes 2 and 3 i.e. there is no land that is not classed as "highly productive" under the proposed NPS-HPL. Without other alternatives, the proposed PC67 land is the best available area for residential development because:

(a) Most of the soils are in LUC Class 3. The inherent fertility of LUC Class 3 soils is less than LUC 2 soils. Given the constraints I have discussed above, the productivity potential of these soils is low.

(b) It borders the existing Wilfield subdivision. This enables a more integrated development.

(c) There is already an existing water supply well and potable water is able to be supplied to the area without the need for new water supply consents, as would be the case if the development occurred elsewhere in West Melton.

6.5 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. For its part Christchurch City Council seeks a more detailed assessment of the impact on versatile soils from development in the PC67 area and wants to see how impacts will be mitigated.

6.6 In my evidence I have provided an assessment of the impact of the PC67 on soil productivity potential based on both the 13.7 ha under the CRPS and the 33.4 ha under the NPS-HPL. That assessment concludes that the LUC classifications of the PC67 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 PC67 is insignificant.

Conclusion on PC67 Versatile Soils

6.7 For the reasons set out above, I do not consider that there are any matters relating to the versatility or productivity of the PC67 area which should preclude the approval of this plan change.

7 FLOOD HAZARD RISK

7.1 **Attachments 3** and **4** are extracts from the Environment Canterbury portal[12] for flood data in Selwyn District which show the 1 in 200 Year (0.5% AEP) and 1 in 500-Year (0.2% AEP) pluvial flood depths and the potential for flooding within the PC 67 area. In short, they reveal that:

(a) 50-60% of the areas with flood depths in the range 200-500 mm have flood depths of <300 mm. The other 20-30% is <400 mm.

(b) The maximum flood depth was 0.96 m and this was only in two spots implying specific depressions. Most (>80%) of the flood depths >500 mm are less than 600 mm.

(c) 99% of the depths >500 mm and 60-70% of the depths in the range 200-500 mm occur at the toe of the bund which is an area of localised low points and water collects at these points until it soaks into the soil.

(d) There are no definite flow paths from neighbouring properties into the PC67 area. Therefore, the PC67 area does not serve a flood flow path from upstream properties to downstream properties. I do, however, note that the area below the bund (as shown on Figure 1 - extracted from **Attachment 1**) generally slopes towards the south eastern boundary. Such natural grades, if enhanced, offer opportunities for use as secondary stormwater flows paths post development.

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12 https://ecanmaps.ecan.govt.nz/portal/apps/webappviewer/index.html?id=57c74073c2f14a85ac0caf30073ae48a

Figure 1 – Area of the Largest Flooding Depth

7.2 In that context, and for the following reasons, I do not consider that flooding will be an issue within the PC67 area post development because:

(a) Most of the identified potential flooding points would produce small depths of water inundation. I expect any standing water to soak through the permeable soils within a few hours unless a particular spot has compacted soil.

(b) There are mitigation measures that can easily be implemented at the subdivision engineering stages to ensure that flooding does not occur either within the PC67 area or beyond the boundaries. In particular:

(i) The developed lots will either be elevated or the roads will be lowered or a combination of these strategies to ensure that the road act as effective secondary flow paths to mitigate the potential effects of floods. The road corridor will serve to convey the flood flows away from the houses.

(ii) The finished house floor levels will be required to comply with the Selwyn District Plan and the CRPS requirements.

7.3 Delivering these outcomes can be done without affecting flood flows on any of the neighbouring sites, given the soils permeabilities in the PC67 and the wider catchment.

Conclusion on PC67 Flood Hazard

7.4 For the reasons set out above, I do not consider that the development enabled by PC67 will be susceptible to significant flooding, or will increase any potential risk from, flooding hazards.

Victor Mthamo

16 August 2021

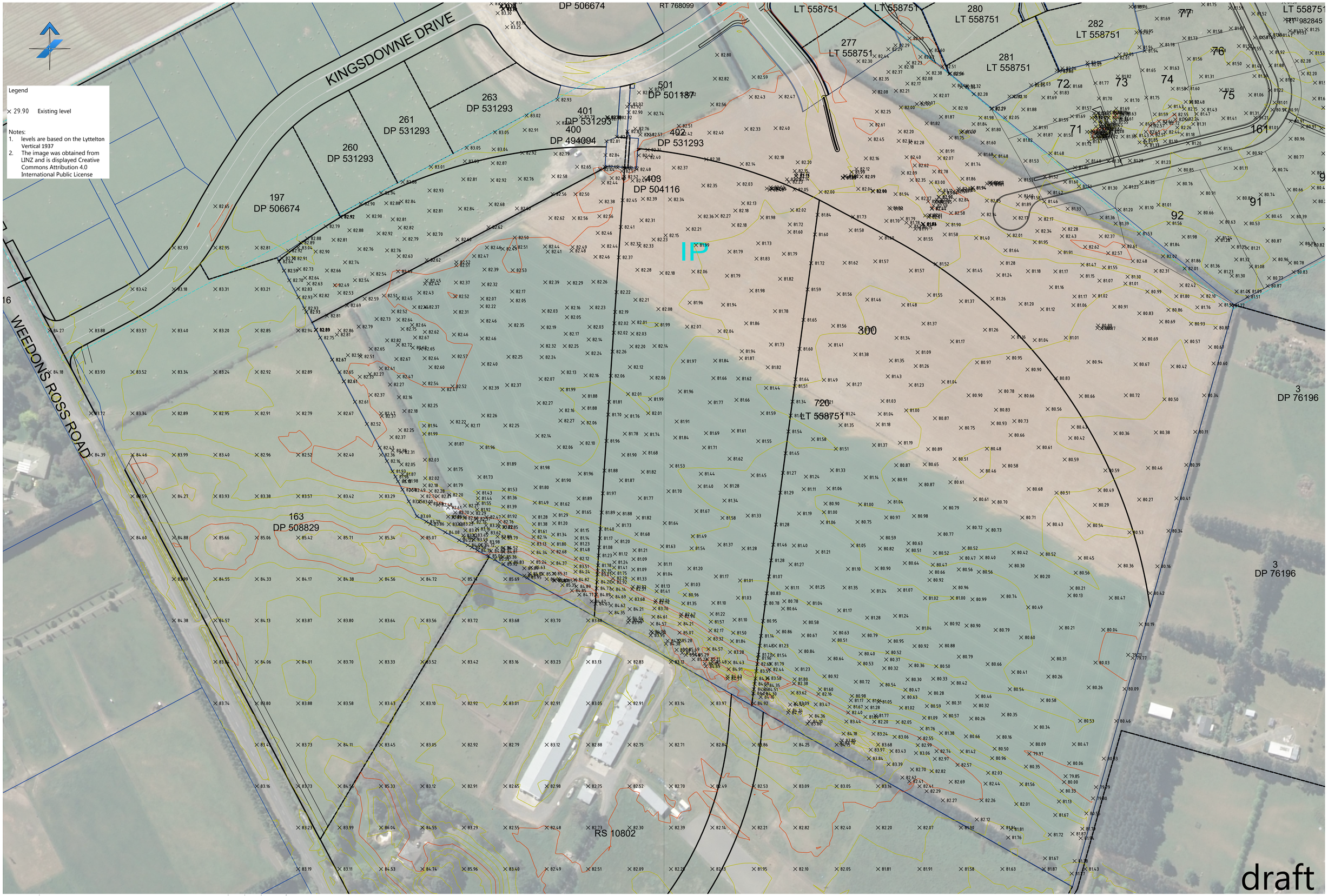
ATTACHMENT 1 – PC67 SITE TOPOGRAPHY

Issue	Description	by	App	Date
1	for information	kb		05.08.2021

CIVIL ENGINEERS
SITE SOLUTIONS

Design	Drawn	Approved	Scales
kb	kb		1:2000 @ A1 1:4000 @ A3

Client	Project Title	Drawing Title	Project No.	Drawing No.	Revision
Yoursection WF Ltd	Wilfield Plan Change	Existing Site	2803	PC1.0	1



Legend

× 29.90 Existing level

Notes:

1. levels are based on the Lyttelton Vertical 1937
2. The image was obtained from LINZ and is displayed Creative Commons Attribution 4.0 International Public License

Issue	Description	by	App	Date
1	for information	kb		05.08.2021

CIVIL ENGINEERS
SITE SOLUTIONS

Design	Drawn	Approved	Scales
kb	kb		1:1000 @ A1 1:2000 @ A3

Client	Project Title	Drawing Title	Project No.	Drawing No.	Revision
Yoursection WF Ltd	Wilfield Plan Change	Existing Site sheet 1 of 2	2803	PC1.1	1

Legend

× 29.90 Existing level

Notes:

1. levels are based on the Lyttelton Vertical 1937
2. The image was obtained from LINZ and is displayed Creative Commons Attribution 4.0 International Public License

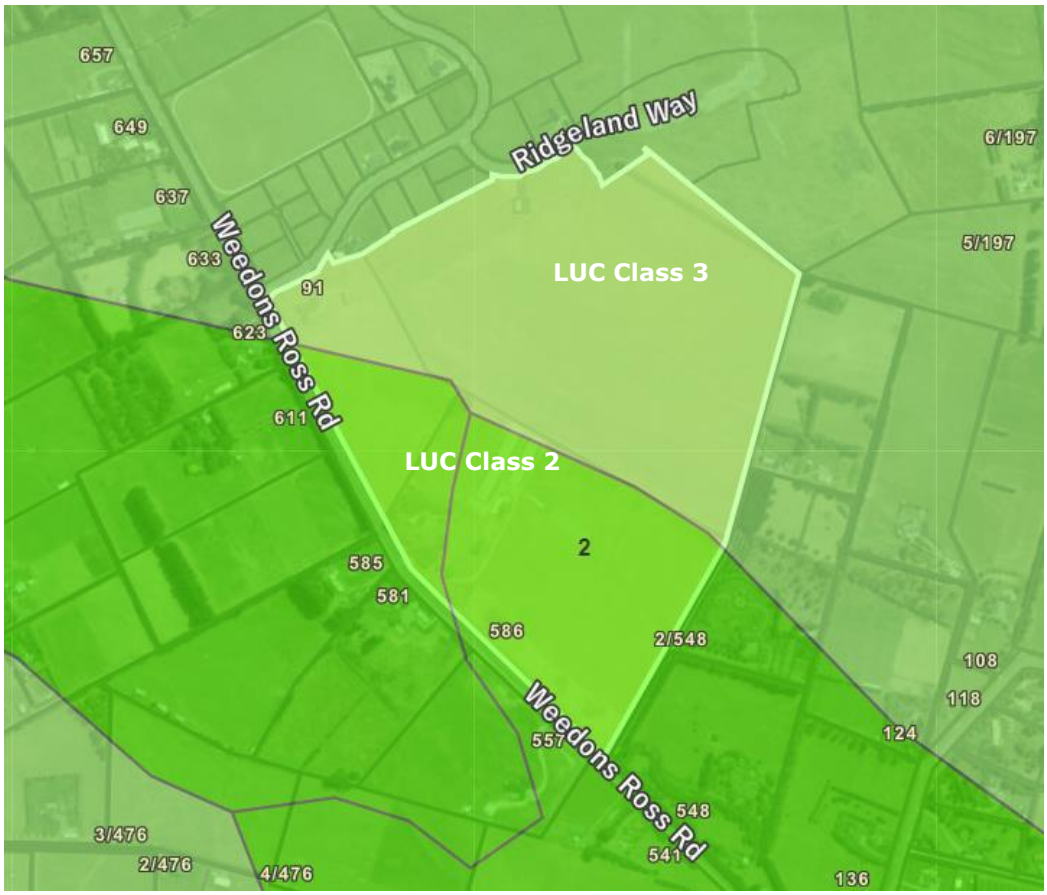
RS 10802

2
DP 76196

1
DP 76196

draft

ATTACHMENT 2 – PC67 LUC CLAASIFICATION



ATTACHMENT 3 – 200 YEAR FLOOD MAP

Find address or place

Layer List

Layers

Land Parcels

Current District Plan

200-year ARI rainfall flood depth (m)

200-year ARI Selwyn River flood depth (m)

500-year ARI rainfall flood depth (m)

- < 0.2
- 0.2 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- > 1.5

500-year ARI Selwyn River flood depth (m)

100m

ATTACHMENT 4 – 500 YEAR FLOOD MAP

Find address or place

Layer List

Layers

Land Parcels

Current District Plan

200-year ARI rainfall flood depth (m)

200-year ARI Selwyn River flood depth (m)

500-year ARI rainfall flood depth (m)

- < 0.2
- 0.2 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- > 1.5

500-year ARI Selwyn River flood depth (m)