PC 31 Ohoka – Productivity Assessment and comment on the NPS-HPL - Technical specialist report to contribute towards Council's section 42A hearing report.

1 Introduction

The Waimakariri District Council (WDC) has received a private plan change request (PC31) to change the Operative Waimakariri District Plan to rezone approximately 156 hectares of Rural zoned land to Residential 3, 4A and 8 Zone and Business 4 Zone at Ohoka. WDC have invited Stuart Ford of The AgriBusiness Group (TAG) to provide specialist advice to them in terms of comment on PC 31's s32, a supporting assessment of the potential loss of productive land, comment on the impact of the National Policy Statement on Highly Productive Land (NPS-HPL) and identified relevant submissions. This output is a technical report that will support the Council's s42A report to an independent hearing panel.

I have had access to:

- PC 31 Plan Change documentation, including Appendix A: Assessment of Potential Loss of Productive Land
- Access to the Operative Waimakariri District Plan and Planning Maps
- Submissions on PC31 by R Luisetti, Waimakariri District Council, L Grofski-Duck, L McConchie, D B Leslie, L Rau and R Pegler.

1.1 Description of the property.

The property is listed as approximately 156 ha which is bound by Mill Road, Whites Road and Bradleys Road Ohoka which is made up of 152.5 ha owned by Sherraine Holsteins which is an operative dairy farm and some lifestyle blocks.

Figure 1 shows the location and surrounds of the site. The areas to the south, south west, east and north east of the site are in lifestyle blocks while the area to the north and west are in pastoral land use.

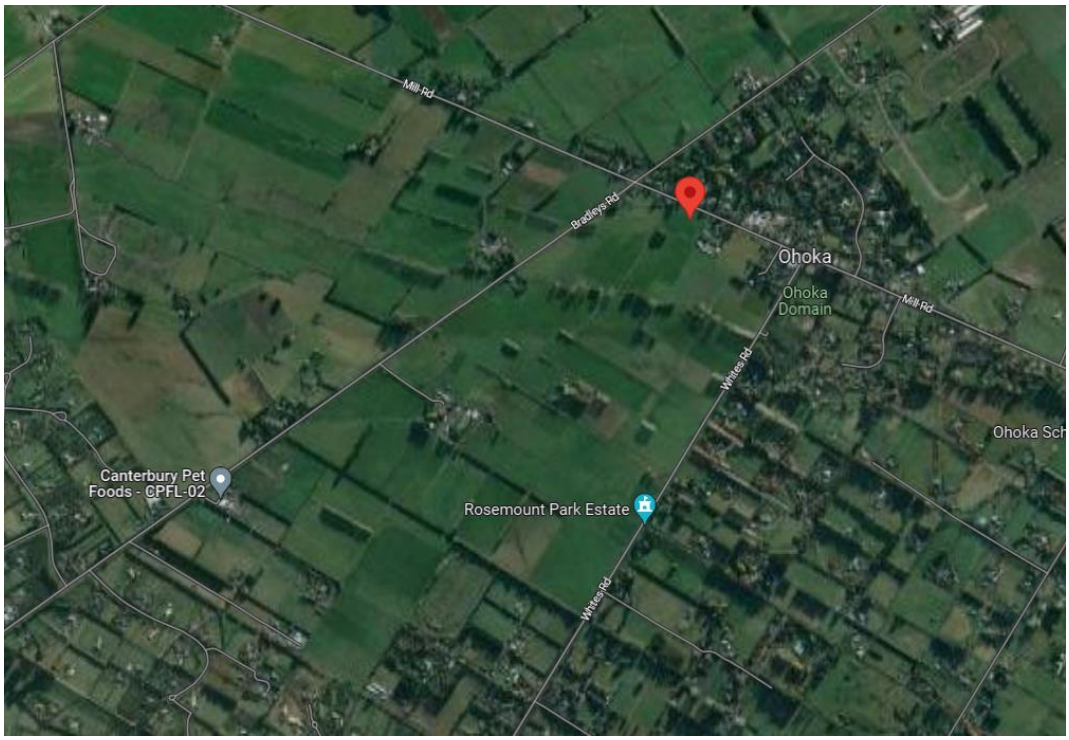

Figure 1: Location and surrounding areas of the site.

2 The applicant's assessment.

The applicants evidence as to the loss of productive land is provided by Mr V Mthamo of Reeftide Environmental and Projects Ltd. It was furnished in November 2021 which means that it was written prior to the adoption of the NPS-HPL. While he notes the requirements of the proposed NPS-HPL which determined that the HPL includes Land Use Capability (LUC) classes 1, 2 and 3, he notes that it wasn't legislation at the time of writing and so he has considered the application on the basis of Environment Canterbury's Regional Policy Statement which refers to the soils as being highly versatile and defines them as LUC 1 and 2 only which effectively excludes a large proportion of the property from his analysis.

He then proceeds to list the constraints, as he sees them, to the productive potential of the land.

2.1 Land use.

Mr Mthamo describes the land use of the dairy farming operation as a 111 ha milking platform on which 170 cows are peak milked and a 41 ha support block which runs the heifer replacements and the bulls and winters all of the milking herd. He also notes that the milking herd spend time on a feed pad during autumn, winter and spring to avoid compaction. While I am happy to use his description of the farming system, I would suggest that the main reason for the use of the feed pad would be to avoid pugging of the soil during wet periods and to achieve a higher utilisation of the supplementary feed fed to them during these periods rather than to avoid compaction of the soil.

It is my opinion that the productive capacity of land should be determined by reference to *Federated Farmers of New Zealand (Inc) Mackenzie Branch v Mackenzie District Council* where it is stated that "*The viability of a farm should be assessed objectively rather than on a landowner's subjective view*".

Although the current land use should be taken into account when assessing the productive capacity of land that assessment should be made on an objective view of the highest and best use of the land regardless of what the current owner is achieving or thinks that the productive potential of the land is.

2.1.1 Groundwater

Mr Mthamo lists the highest ground water readings within the plan change area as being between 0.6 and 0.645m below ground level from two bores. I am aware that some deeper bores are subject to increased water pressure which means that their static water level would be enhanced by this factor which would mean that their readings would not be a reliable measure of the actual groundwater levels.

I am not sure exactly what we are to take from Mr Mthamo's listing of the highest ground water readings and posit that it may have been more appropriate for him to list the average groundwater readings on the site which would have given us a more realistic idea of the extent of any constraint on the land's productivity that can be attributed to groundwater levels if any.

2.1.2 Area Soils

Mr Mthamo lists the range of soils that are present on the land and reports some of their characteristics in his Tables 2 and 3. He notes that the majority of the soils are classified as being poorly drained. He then comments on the permeability of the soils which is listed in his Table 2 and then makes the comment that most were trending towards the slower scale. There is nothing in his table which would indicate that any of the soils, which are all labelled as Moderate to Slow apart from 6.2 ha which is 10% of the area, are "trending towards" the Slower scale and he doesn't explain exactly what that scale is.

He then comments that poor drainage has a significant impact on the soils productive potential but doesn't clarify exactly how much it would affect the productive potential of the property or even whether in commenting on this site whether it would affect it positively or negatively. I would note that presumably the use of the feed pad for the majority of the season would have eliminated the constraint of drainage on the property.

2.1.3 Versatility of the soils/ LUC

Mr Mthamo then relies on the information that is available on Canterbury Maps, S-Maps and the LRIS portal to map and table the locations and areas of LUC Classes on the site. The data which is available on LUC in the New Zealand Land Resources Inventory Series (LRIS) portal is mapped at the 1:50,000 level. We are of the opinion that this level of mapping is not appropriate for blocks the size of the one being considered here. It is Dr Reece Hills opinion that "*the NZLRI information provides excellent physical base data for planners (a planning tool) but is not fit for purpose as a plan (map) unless undertaken at the correct scale.*"

I am positive that an area the size of the site deserves to be mapped at a much finer scale than the 1:50,000 scale used by the LRIS and Mr Mthamo which would better define the limitations and therefore the constraints on the property in order to allow us to carry out an assessment of the land's productive potential.

Mr Mthamo recognises this fact in his Section 6 Short Coming of the LUC Classification System yet he hasn't sought to rectify the considerable shortcomings of using the 1:50,000 scale mapping by carrying out a more detailed assessment of the soils classification and then converting that to a LUC classification.

2.1.4 Available and Proportions of Productive land.

In this section Mr Mthamo comes to the conclusion when discussing the area of non – productive land that "*The exact area of these and tracks etc has not been delineated as part of the desktop study but will likely be the order of 10-25%...*". It is my opinion that his estimate of the area of non productive land being between 10 and 25% is not helpful in determining the area that is available for productive purposes because it expresses too great a spread to be able to afford us any comfort in its accuracy. It is my experience with similar dairy farms in Canterbury that when they quote the area of the milking platform they include the whole area of the property which is used for that purpose while understanding that up to 10% of the area is taken up with buildings, fenced off streams, races etc.

2.1.5 Effect of the Community Drinking Water Exclusion Zone

I have carried out a search of the ECan website to try and determine exactly what "limitations" there are under the Community Drinking Water Protection Zone to "intensive agricultural activity" but cannot locate any reference to the fact that ECan has developed any rules on this activity at all. I wonder at the validity of Mr Mthamo's removal of an area that is designated if there are no restrictions.

2.1.6 Scale of Reduction in High Productive Soils

Mr Mthamo diminishes the amount of land by comparing it to the total amount of land of each LUC class within the WDC. He justifies it by citing the High Court case of Jay Gock and Fay Gock v Auckland Council [2019] NZHC 276 where the High Court said "*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).*"

What the High Court was saying was that the Environment Court had erred in not "*taking into account the insignificant area of such soils*" and what they did was refer the decision back to the Environment Court. In the Environment Court's 2020 decision when considering the issue of what would be an appropriate quantitative comparator that could be used in determining the significance of the Elite and Prime soils they concluded that "*….simple (single) quantitative measure of regional significance, such as a regional percentage figure, is not considered a sufficient or appropriate criterion by itself….".* The Environment Court traversed a range of potential metrics and settled on the fact that none gave them sufficient confidence in its single use and that they should be used in conjunction with each other.

2.1.7 Effects of High Groundwater

Mr Mthamo's discussion on the effects of high groundwater only reference his earlier report of the highest groundwater readings in two wells. Nowhere does he discuss the likely impact of the average groundwater levels. Therefore I am of the opinion that the discussion is theoretical and he doesn't apply it to the site in question.

2.1.8 Effects of poor drainage.

Again the discussion on poor drainage is highly theoretical and doesn't relate to the site directly. He states that "*Poor management and excessively poor drainage as some crops do not do well in these soils*". I am of the opinion that there is no evidence that support Mr Mthamos suggestion that the soils on the site are soils that could be classified as excessively poorly drained. In his Table 3

Mr Mthamo indicates that 87.5% of the soils are Poorly drained and that only 10.5% of the soils are Very Poorly Drained which at the most could possibly fit onto Mr Mthamo's definition of excessively poor drainage.

He then goes onto conflate poor drainage with waterlogged soils without justifying his use of the term waterlogged with the site therefore that discussion is highly theoretical. For example he earlier described the fact that the farm currently grows approximately 10 ha of maize per year. By reference to his Appendix A Overseer Results we find that they harvest 22 Tonnes of maize silage per ha per year off that area. Maize is a very deep rooting plant and the yield that they are getting off it is a very good yield which would not be contemplated by a farmer who knew that his soil was excessively poorly drained or waterlogged.

2.1.9 Moisture Availability and Irrigation

In this section Mr Mthamo acknowledges the fact that irrigation is required on the site and that is provided by two consented takes one of which, the smaller at between 16- 22.8 l / s, has restrictions on the rate of take depending on the flow in the Ohoka stream. He notes that there are no available statistics that are able to determine the probability of the Ohoka stream being below the flow rates stated. If there are no statistics available on the Ohoka stream then that would suggest that the flow rate is not monitored or measured which would then pose the question of exactly what is the trigger which would require that the irrigation take should be reduced. He then goes on to explain that the period of peak irrigation demand is in the months of January and February which "*is likely to coincide with the periods of the lowest Ohoka Stream flows."*

I am aware that the impact of restrictions on irrigation availability are dependent on the severity of the restrictions, the timing, the length and the available water within the soil profile at the time of the restriction.

Mr Mthamo is incorrect in his statement that "*When these restrictions come into effect during the peak growing period for any crops the productivity is significantly impacted*". In my opinion the impact would be determined by a range of factors if a restriction were to occur, it is not automatic.

2.1.10 Canterbury Land and Water Regional Plan (CLWRP)

In this section of the report Mr Mthamo states that under policy 4.38 of the CLWRP "*restricts increases in nitrogen loss from farming activities to no more than a total of 5kg/ha/yr above the Baseline GMP Loss Rate*."

He then goes onto discuss the implication of an Overseer nutrient budget supplied by the client.

A Baseline GMP Loss Rate, is based on a properties nitrogen baseline which is the properties nitrogen loss averaged over 2009-2013.

The Overseer budget is not helpful in determining the Baseline GMP loss for the farm because it was done in the 2020 year and therefore is not an indication of the property's nitrogen loss averaged over 2009-2013.

The purpose of using the Overseer model is to as accurately as possible model exactly the soils, climate, farming infrastructure and system which is present on the farm. The Overseer model presented differs from the description of the farm given in Mr Mthamos' introduction with the following being some of the key inconsistencies ;

- The productive block is given as 146.2 ha and it is not separated into a milking platform (110 ha) and dairy support block (41 ha).

- The milking herd size is given as peak cows being 1 per ha which would mean that there are 146 peak cows milked which is different from the 170 stated by Mr Mthamo.

These two differences alone would make a very large difference to any assessment of nutrient losses from the property.

Mr Mthamo has not stated what the Baseline GMP loss rate for the farm is and the Overseer file which is attached to his statement has some major inconsistencies with the farming system which he described.

2.2 Summary

In summary we find that Mr Mthamos statement relies on the Environment Canterbury's Regional Policy Statement definition of versatile soils rather than the NPS-HPL to identify the range of LUC classification which could guide his assessment of the productive capacity of the site. He fails to convince us of the veracity of the constraints that he has identified because:

- In my view an assessment of the productivity of land should be carried out on its highest and best use which may not necessarily be its current use.
- The majority of the constraints he has identified are theoretical and he hasn't proven the connection between his theoretical constructs and what is possible on the site.
- The LUC classification is based on a 1 to 50,000 scale map which is too coarse for a property of this size.
- For the majority of his constraints, he has presented a worst possible example rather than an average situation.
- He has not stated what the properties Baseline GMP loss rate is and the example that he has included is not helpful in determining what it is.

3 Productivity and Viability

The productivity of the land is determined by a number of factors including the nature of the soils, the availability of irrigation and the scale of the operation. The viability[1] of the land is determined by the ability of the land to return sufficient profits from the farming of the land to offer the owners a sufficient return.

3.1 Productivity

3.1.1 Soils

In Figure 2 I have included a screen shot of the data held in Manaaki Whenua Landcare Research's SMap online portal of the soils of New Zealand[2].

[1] We use the definition for viability that is used in the Cambridge dictionary which is "*the ability of a business, product, or service to compete effectively and to make a profit*".

[2] https://smap.landcareresearch.co.nz/maps-and-tools/app/

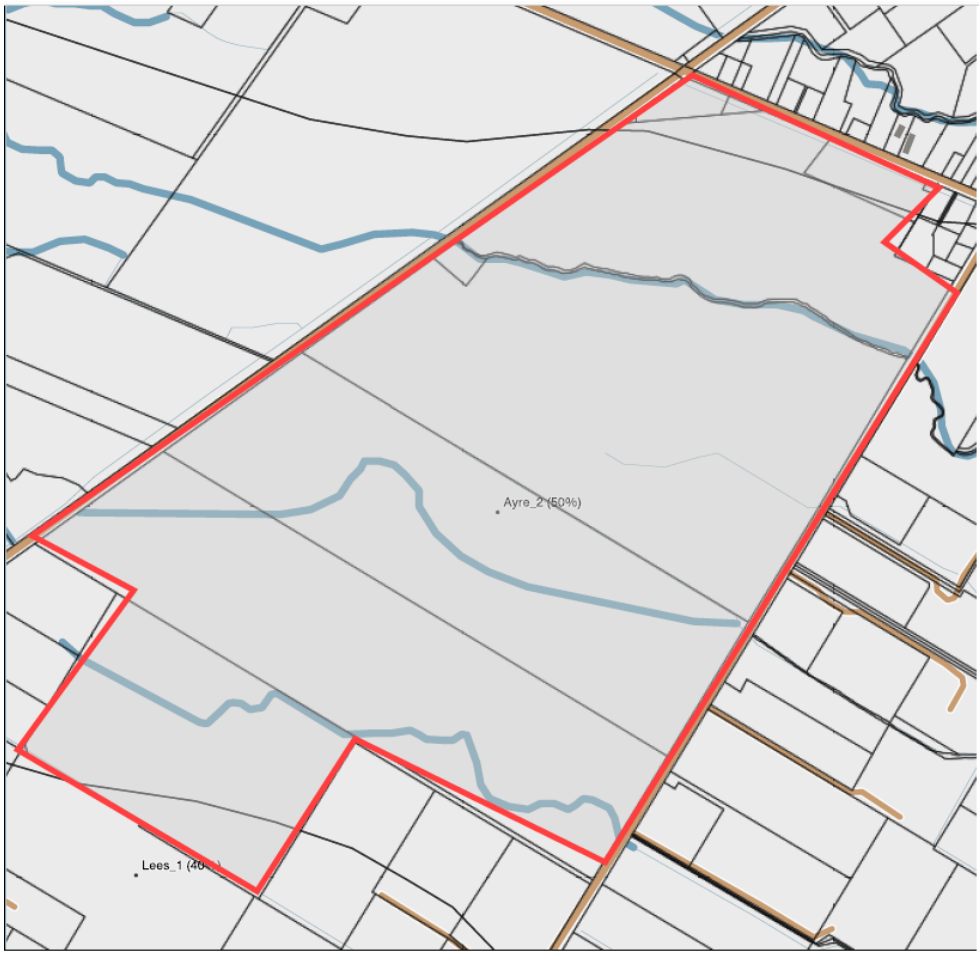

Figure 2: SMap data for the site.

The areas and proportions of the soils are shown in **Table 1**.

Table 1: Soils present and area and proportion of the site.

Soil Sibling	Area (ha)	Proportion (%)
Ayre_2a.1	74.3	47.6%
Ayre_1a.1	32.1	20.6%
Lees_1a.1	31.4	20.1%
Payn_6a.1	16.4	10.5%
Assorted	1.9	1.2%

The assorted soils are represented by the Pah_31a.1 soil sibling.

Definitions of the key soil physical properties that are listed in the SMap soils report are shown in Table 2.

Table 2: Physical properties of the soil types present as listed in SMap.

Soil Name	Ayreburn	Ayreburn	Leeston	Paynter	Pahau
SMap Name	Ayre_2a.1	Ayre_1a.1	Lees_1a.1	Payn_6a.1	Pahau_31a.1
Depth Class	Moderately Deep (45 - 90cm)	Deep (>1m)	Shallow (20 to 45 cm)	Deep (>1m)	Moderately Deep (45 - 90cm)
Rooting Depth	70 – 100cm	unlimited	shallow	50 to 100 cm	unlimited
Depth to stony layer	Moderately deep	Not present	Shallow	Not present	Moderately deep
Texture profile	Clay	Clay	Clay	Peat over clay.	Silt over clay
Topsoil stoniness	Stoneless	Stoneless	Slightly stony	Stoneless	Stoneless
Drainage class	Poorly drained	Poorly drained	Poorly drained	Very poorly drained	Imperfectly drained.
Profile Available Water[3] (0 to 100 cm)	127 mm	147 mm	111 mm	224 mm	103 mm

The Ayreburn soils which make up 68% of the site are relatively deep clay soils that are stoneless but poorly drained with a relatively high profile available water which are suitable for both pastoral and arable land uses. The Leeston soils which make up 20% of the site are shallow clay soils that are slightly stony, poorly drained with a relatively high profile available water these soils are suited to pastoral land uses. The Paynter soils are deep peat over clay soils which are stoneless, very poorly drained with an exceptionally high profile available water these soils are suitable for pastoral land uses.

3.1.2 Land Use Capability

The data which is available on LUC in the New Zealand Land Resources Inventory Series (LRIS) portal is mapped at the 1:50,000 level and it is shown in Figure 3. We are of the opinion that this level of mapping is not generally appropriate for blocks the size of the one being considered here but in the absence of more detailed mapping have used the 1:50,000 data.

The dark green Class 2 land consists of 4 ha or 3% of the site and the light green which is the Class 3 land consists of 152 ha or 97% of the land.

In the NPS-HPL all land which is classified as LUC 1,2 and 3 is automatically considered to be HPL.

[3] Profile Available Water is a measure of the volume of water that is able to be stored in the soil profile.

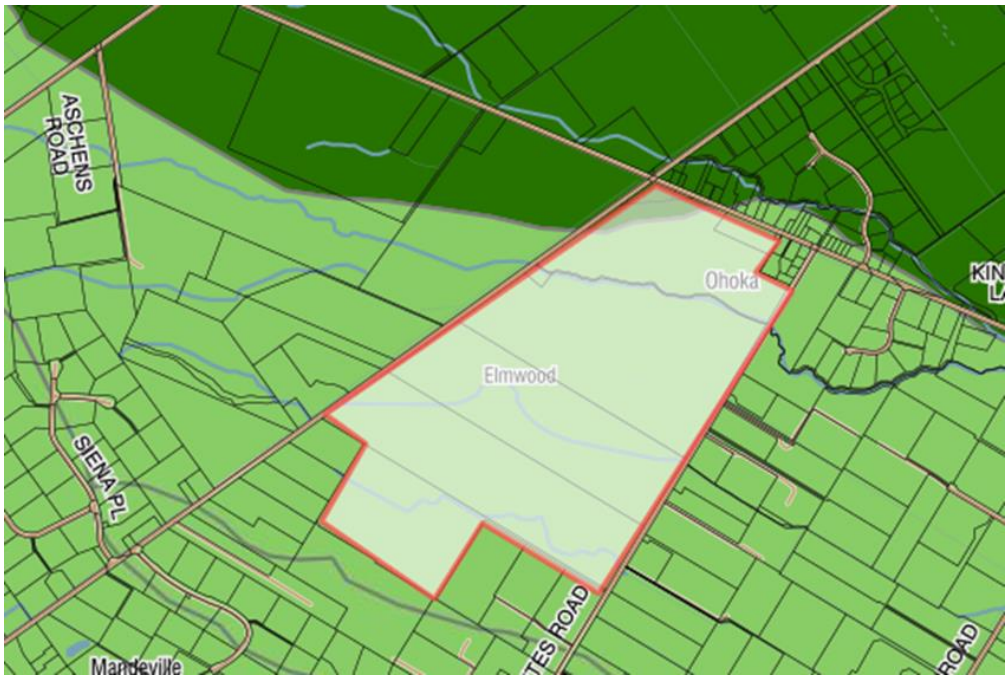

Figure 3: LUC classes of the subject land. Light green is Class 3 the darker green is Class 2.

3.1.3 Land use potential.

It is my opinion that the highest and best use of the land as a primary productive land use is for dairy farming. I have reached that conclusion after considering a range of factors including the size of the site, the soil type including the drainage, the availability of irrigation and the LUC classes of land available.

While the potential for intensive horticultural land use has been considered it has been rejected for a number of important reasons including:

- The fact that the land has poor drainage means that it is less suitable as a site for the establishment of intensive horticulture.
- The cold winters limit the potential range of horticultural crops.
- The site is remote from any post harvest packaging and processing facilities which would add large additional growing costs.
- The potential for reverse sensitivity from neighbours that are situated in a lifestyle area would mean that investors in intensive horticultural activities are most likely to seek alternative production areas where there isn't the threat of reverse sensitivity becoming a production issue.

3.1.4 Viability

In order to test the commercial viability of the site I have tested it by applying two financial models of farm systems to the 146 ha which are shown in the Overseer report as the effective area of farm land. The two financial models that I have tested it on are the two most common dairy farm systems within the Waimkarariri District which are the DairyNZ System 3 which imports 10% of the total feed used from external sources and the DairyNZ System 4 which imports 25% of the total feed used from external sources. I have set the production per cow at 436 kg milksolids per cow which is the average production of dairy farms in the Waimkarariri District which is taken from the LIC's New Zealand Dairy Statistics 202-21. This means that the stocking rate is 3.1 cows / ha for

System 3 and 3.5 cows / ha for System 4. The system 4 stocking rate is just above the average stocking rate for the Waimkarariri District which is 3.48 cows / ha and below it for the System 3. This would indicate to me that the System 4 is the most dominant system in the District.

The financial models that I have used have been taken from some recent work that I have completed for ECan which is designed to provide an economic model that will be used in their planning for the development of their new Land and Water Regional Plan. These models have been peer reviewed internally within The AgriBusiness Group and externally by ECan.

The key financial metrics of both of these models are shown in Table 3.

Table 3: Financial performance of System 3 and System 4 ($)

	System 3	System 4
Gross Farm Revenue	1,619,167	1,839,963
Farm Operating Expenses	1,018,437	1,170,369
Earnings Before Interest and Tax	600,730	669,594

In order to be judged as commercially viable the figures which you can see in Table 3 which represent the Earnings Before Interest and Tax (EBIT) should provide a sufficient amount to provide for interest, taxation and a return for management. It is my opinion that there is a sufficient amount in the EBIT row for both systems to consider the land as being commercially viable from a production perspective. These financial results are reflective of the average results of dairy farms within the Waimkarariri District.

4 Consideration of the HPS-HPL

I have been asked to comment on relevant matters in the NPS-HPL to the productivity and viability findings in this report.

Clause 3.10 Exemption for highly productive land subject to permanent or long-term constraints the NPS-HPL states that:

(1) *Territorial authorities may only allow highly productive land to be subdivided, used, or developed for activities not otherwise enabled under clauses 3.7, 3.8, or 3.9 if satisfied that:*

there are permanent or long-term constraints on the land that mean the use of the highly productive land for land-based primary production is not able to be economically viable for at least 30 years;

It is my conclusion, taken from 3.1.4 Viability, that this site does not meet the requirement that it is not able to be economically viable for at least 30 years.

5 Comment on submissions.

I have read the submissions of R Luisetti (67), Waimakariri District Council (216), L Grofski-Duck (254), L McConchie (289), D B Leslie (382), L Rau (395) and R Pegler (502) which all oppose PC 31 because of the loss of highly productive land.

I am in agreement with their comments that the land is able to be used for a wide range of potential land uses and I believe that my evidence above supports their opposition.