BEFORE INDEPENDANT HEARING COMMISSIONERS
APPOINTED BY THE CANTERBURY REGIONAL COUNCIL

UNDER:	the Resource Management Act 1991
IN THE MATTER OF:	Proposed Plan Change 7 to the Canterbury Land and Water Regional Plan – Section 14: Orari-Temuka-Opihi-Pareora

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EVIDENCE IN CHIEF OF GRANT ALEXANDER PORTER ON BEHALF OF THE TEMUKA CATCHMENT GROUP INCORPORATED (SUBMITTER NO. PC7-319)

Dated: 17 July 2020

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GH-148305-1-4176-V1

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1. INTRODUCTION

1.1 My full name is Grant Alexander Porter. I am an independent farm management consultant based in Wanaka, Central Otago. I have a strong client base throughout the South Island of New Zealand. I have acted in advisory roles for the Lindis Catchment Group, Manuhurikia and North Otago Irrigation Company Irrigation schemes and provide consultancy work for many large scale irrigated farms throughout the South Island.

1.2 My services include a full range of farm consultancy and advisory as well as planning and business management. I also assist large scale commercial and family farming entities with governance and financial management.

Qualifications and experience

1.3 I have been working with farmers in an advisory capacity for twenty five years. Originally from a sheep and beef farm in Southland, I gained a Batchelor of Commerce and Management from Lincoln University in 1996. I then trained as a farm accountant, became a member of the Chartered Accountants Australia and New Zealand and Member of New Zealand Institute of Primary Industry Management. I have worked in private agribusiness companies, trading banks and am now an independent provider of rural consultancy services.

1.4 I specialise in advising and assisting customers in the capital raising process for agri-development projects. In addition, I sit alongside many of my customers as an independent advisor to provide strategic direction and general agribusiness advice. I combine my accountancy, finance and strategic skills to assist my customers with governance and succession planning.

1.5 In 2018 I was an expert witness for the Lindis Catchment Group in an Environment Court hearing of appeals concerning the minimum flow regime for the Lindis River proposed by Plan Change 5 to the Otago Regional Plan. My evidence provided an analysis of the financial impacts on irrigators of the proposed minimum flow regimes.

Background

1.6 I have been involved in Plan Change 7 to the Canterbury Land and Water Regional Plan (**PC7**) as an independent expert engaged by The Temuka Catchment Group Incorporated (**TCGI**) to assess the financial impacts of PC7's proposed minimum flow and partial restriction regimes for the Temuka catchment for Irrigated consent holders to inform the TCGI's position on PC7.

1.7 I am familiar with the provisions of PC7 to which these proceedings relate. In preparing my evidence, I have reviewed the relevant parts of the section 32 Report and the section 42A Report. In preparing my evidence, I have also reviewed:

(a) Economic Assessment of the Healthy Catchments Project Proposed Zone Implementation Programme Addendum (Harris, S (2019). Land and Water People, Christchurch, New Zealand (**Harris Report**).

Code of Conduct

1.8 I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court's Practice Note as updated in 2014. My evidence has been prepared in compliance with that Code. In particular, unless I state otherwise, this evidence is within my area of expertise and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

2. SCOPE OF EVIDENCE

2.1 In my evidence I evaluate the impacts of reduced water availability under PC7's proposed minimum flow regimes due to irrigation restrictions for TCGI's irrigators. I evaluate the financial impacts of four different farming systems that use water to irrigate for both A and B block consented irrigators.

2.2 My evidence is structured in the following way:

(a) An overview of the methodology and assumptions used in my analysis;

(b) A summary of the results of my analysis as to the effects on the farms profitability and effects on the farms value;

(c) An assessment of the cost to the Temuka Catchment for water consents reductions that are required as part of PC7;

(d) Comments on the Harris Report; and

(e) Comments on the Section 42A Report.

2.3 In my evidence, I refer a lot to the terms “viable” and “sustainable” as measures or references of how PC7’s proposed minimum flow and partial restriction regimes will impact these farming businesses. In my opinion, a viable and sustainable farm is one that provides a positive long-term return to all its stakeholders. Not just farmers and owners of the land but all the human capital that is associated with those farms, from the farm owners, farm staff, local communities who are directly and indirectly impacted and other investors in the farms. These impacts also affect the physical capital of the farm being the land, environment and its animals. Sustainability and viability to me includes the farm being able to provide long term positive cash returns and positive impacts on the people and communities and the environment.

2.4 While in my evidence I am only analysing the financial impacts on the farm business, my comments around its viability and sustainability are related not just to the financial returns that have been modelled but also the wider human and physical capital that is directly and indirectly associated with the farms. I believe that a positive financial impact allows for the farms to make a positive impact on the environment and the communities that are related to the farms.

3. EXECUTIVE SUMMARY

3.1 I have analysed the reduction in water availability resulting from PC7’s proposed minimum flow regimes for the Temuka River in financial models that I have developed using Microsoft Excel. My analysis focuses on the impacts of those regimes for TCGI consent holders and the following four irrigated farm systems:

(a) Sheep and Beef Finishing Farm

(b) Dairy Support Farm

(c) Dairy Farm

(d) Cropping Farm

3.2 The financial modelling has been based on pre covid 19 farm revenue returns, interest rates and farm input pricing, due to difficulties in forecasting the post-covid 19 trading environment. Restrictions under PC7's proposed minimum flow regimes have been determined using ECan water availability data for the Temuka catchment.

3.3 The over allocation of water in the Temuka catchment and PC7's attempts to remedy this over four steps through to 2035 shows as improved availability in ECAN's flow modelling for A Block consent holders whilst reducing the availability for B Block consent holders. This has a significant impact on B Block farms.

3.4 For A Block farmer consent holders of TCGI there would be minor increases in pasture growth and crop yields which provide better profitability and increases in EBIT for the 2030 and 2035 steps of PC7. The biggest increase in profitability relates to cropping farms which benefit from having better reliability during the period where their crops require water to improve yields. Dairy Farm returns improve but are the least impacted by the four PC7 steps.

3.5 The results only show a positive result for A Block consent holders because the availability modelling provided by ECAN does not account for reduced availability associated with the surrendering of allocation by irrigators that will need to occur to achieve PC7's time-staged allocation limits.

3.6 The impact that the PC7 steps and the surrendering of water rights have on all the four modelled A Block farming systems in the Temuka catchment is that under existing banking criteria which has a requirement for farms to be able to not only service the interest but also repay principal over a twenty year period the average farms would still be viable and able to meet bank criteria making them sustainable financially. Farms with low to no debt or running higher production with lower cost structures than I have modelled will be able to invest in more efficient irrigation systems given longer term security of water. This may enable them to grow more feed or reduce water usage and enhance their financial sustainability or viability as businesses.

3.7 The proviso to the A Block financial impacts is that the improved availability will come from reduced consented allocation to address the over allocation of irrigation water. Any reduction in consented water for irrigation that decreases the size of current irrigated areas will have an impact by reducing the productivity from an irrigated farm area to a dryland faming area. The reduction of 500l/s in water rights for A Block and 350l/s for B Block consents due to the increased minimum flows will have a significant impact on farm income and land values. If all these water rights are in use then I have assessed the cost to the Temuka Catchment could be a minimum of $3.1 million reduction in Gross Farm Incomes and a reduction in land values of $34 million for 1836 hectares that can no longer be irrigated. This is based on a sheep and beef scenario and the impact could be higher if the land no irrigated includes Dairy or Cropping farm land which produces higher revenues and has a higher land value.

3.8 The modelling of B Block farms shows very different results however with all farm systems becoming unsustainable from 2035. The reliability reductions mean that some farms will be overcapitalised in irrigation infrastructure that may be underutilised or redundant. Cropping Farms are affected the greatest with a 97% reduction in profitability and Dairy farms returns are reduced by 23%. This reduction in profitability will affect the land value and equity of all farms given the long term reliability and security of water is affected. It may mean that these types of farms will need to look to change or diversify into other and uses that require low to no water to sustain cash flows and land value.

3.9 When I say a farm is marginal for viability it means a farm which is breaking even or making small profits or losses. This leaves the farm no margin for error. A slight downturn in product prices or increase in farm working costs would mean this farm is unsustainable. Marginal farms would not be able to invest profits or borrow funds for upgrading infrastructure required to comply with PC7. PC7 also requires farmers withing the sub catchments to implement nutrient reductions under Good Management Practises (**GMP**) and/or nutrient management policies. Reductions in fertiliser use and possible grazing limitations will have a cumulative effect on farms profitability when coupled with irrigation restrictions from PC7.

3.10 I have extrapolated the reduction in Gross Farm Income and Land Values per hectare from my models across all the irrigated hectares for the TCGI consent holders within the catchment and the total reduction in Gross Farm Income across all TCGI farms would be $247,038 per annum as shown in **Table 1**. The increase in availability for A Block consent holders increases GFI by $199,059 per annum but B Block decreases by $446,547 per annum.

Table 1. Changes in Gross Farm Income and Farm Values 2035

	Change in GFI 2035			Change in Value 2035		
	A	B	Total	A	B	Total
Dairy	-$95,444	$321,459	$226,015	0	$ 2,016,750	$2,016,750
Sheep & Beef	-$16,313	$18,629	$2,317	0	$ 380,000	$380,000
Cropping	-$62,052	$53,229	-$8,822	-$631,250	$ 546,250	-$85,000
Dairy Support	-$25,700	$53,229	$27,529	0	$ 380,000	$380,000
	-$199,509	$446,547	$247,038	-$631,250	$3,323,000	$2,691,750

3.11 An additional impact of the minimum flow regimes of PC7 will be lower farm asset values for B Block consent holders as shown in **Table 1** above. Lower profitability and unsustainable farms will mean lower asset values with equity eroded due to the farm land being unsaleable at current values. This in turn would mean farmers wishing to exit the industry will be greatly impacted. My analysis shows that the impact could be a reduction in farm asset values of $2.6m. A Block cropping farms with higher cashflow and availability of water may rise in value.

3.12 My modelling shows “best case” under PC7 because:

(a) Water availability data has been based off flow data modelling from ECAN which is based on average flows and in the dryer than average years, there will be more restrictions and consequently lower revenues. This means that for those years the financial implications of the proposed increases in minimum flows under PC7 will be more than my models have forecast.

(b) I have not taken into account rising farm working costs or compliance costs for farm expenditure to comply with new minimum flow and nutrient management regimes.

(c) Currently most returns for product prices are lower than the averages I have used.

3.13 The economic impacts on farming, related businesses, communities and the region do not appear to have informed the recommendations made in the Section 42A Report to bring forward the timing of PC7's proposed increases in minimum flows. In my opinion, those recommended changes will disadvantage farmers by reducing their production and profitability of B Block consent holders along with their asset values and they will have little chance of remaining viable under PC7 minimum flows, as well as complying with PC7's nutrient management rules. The reduction in viability will not allow farmers to continue to invest in more efficient sustainable irrigation and farming practises. The on farm impacts will flow through to the local communities with lower spending and employment in the region.

3.14 The uncertainty created by covid 19 and the length of time it will affect markets will have an impact on how irrigators can adapt and adjust their farming systems to any changes proposed by PC7.

4. METHODOLOGY

4.1 The reduction in water availability resulting from PC7's proposed minimum flow regimes have been analysed in financial models using Microsoft Excel. I have been using Microsoft Excel for over twenty-five years and have built a farm financial model to analyse the effects of the change in water availability on the following four irrigated farming systems:

(a) Sheep and Beef Finishing Farm

(b) Dairy Support Farm

(c) Dairy Farm

(d) Cropping Farm

4.2 These four farm systems are representative of the main irrigated farming systems that currently use irrigation water within the Temuka catchment.

4.3 Restrictions under the minimum flow scenarios have been determined using monthly average availability data generated by modelling completed by ECAN and agreed by the TCGI. The availability data for PC7's 2025, 2030 and 2035 minimum flow scenarios has been modelled.

4.4 To compare the minimum flow scenarios a base model showing what fully irrigated farms can achieve and the current status quo farming system showing returns that existing irrigators are achieving is modelled to provide a base case to which comparisons can be drawn as to the implications on the farms from reduced water availability arising from PC7's proposed minimum flow regimes.

4.5 For the pastoral based farm systems (sheep and beef, dairy and dairy support), the farm financial model starts with a full farm feed budget to assess how much feed can be grown in terms of kilograms of dry matter (kgdm). A livestock model including a stock reconciliation is then added to the feed budget to convert the feed grown into a full farm financial budget.

4.6 For the cropping farm system, financial model works from a crop yield which is then reduced based on water availability.

4.7 The model farms are indicative of catchment farms given the land type, capital employed, and pasture growth and I have used four different farm systems which show the impact of reduced water availability across the sub-catchments. While there will be a wide variability in the size and type of farms in the catchments, my models take out this variability and shows what the average efficient farmer could achieve. Within the area, there will be farms doing better or worse than the models, but I believe that with capable management and adequate capital employed, the model is representative of what the sub-catchment farms are achieving in the current farming environment.

4.8 To model each and every farm within the catchment with regard to A and B block consent holders is a large and costly exercise, and I would argue that despite taking averages and making assumptions as to production and financial parameters the end result is close to current and actual farm performance when benchmarked.

4.9 For the pastoral farm systems, the base case unrestricted feed budget is modified under each minimum flow scenario to show the impacts of irrigation restrictions. To do this I have used research results from the pasture production model "Climate-driven, soil fertility dependant, pasture production model" Moir et al (2000)[1], which shows how a reduction in water moisture impacts on pasture

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[1] Climate-driven, soil fertility dependant, pasture production model. Moir et al (2000)

growth. This model has been referred to in pasture growth trials and models as the standard for evaluating the effects of reductions in water on pasture growth in New Zealand. This approach was also used and unchallenged in farm financial modelling evidence before the Environment Court in 2019 in appeals relating to proposed changes to minimum flow regimes within the Lindis River catchment in Central Otago.

4.10 Moir determined that for every 1mm of water reduction the growth rate of pasture decreased between 11kgdm to 18 kgdm per day. I have used the median growth rate of this range being 14kgdm which corelates to a medium fertile irrigated soil. Most spray irrigated farms are set up to apply between 3.5 to 4.5mm of water per hectare per day to achieve the optimum growth rates for pasture.

4.11 I have taken ECAN's availability data which shows the percentage of water available on average on a month by month basis (i.e. due to irrigation restrictions) under each minimum flow scenario and applied the availability as a percentage of the total irrigation water applied. Using Moir's model and a 14kgdm reduction in daily pasture growth rates per 1mm of water reduction from lower irrigation rates due to the reduced availability this flows through to lower stock numbers which flows into financial budget modelling to show the financial impacts of the reduced water availability.

4.12 For the cropping farms, I have relied on information supplied by Mr Dave Mitchell, who was previously a cropping farmer from Fairlie for 25 years and is now a farm consultant and cropping farmer in North Otago. Mr Mitchell provided average crop yields achieved in the catchment areas for the five main types of crops grown (Wheat, Barley, Ryegrass, Clover and Peas). I am not aware of any documented independent field trials that show the effects of irrigation restrictions on crop yields.

5. ASSUMPTIONS FOR FARM MODELS

5.1 The assumptions used have been based on current farming methods, returns and scenarios and on my own experience in working on and with pastoral farms within the region. While every farm is different, I have refined my information to base models which is what I see as a representative farm which can be easily translated and adapted to show the effects of variations in assumptions resulting from irrigation restrictions.

5.2 Due to the difficulties in accurately forecasting the implications of covid 19, the assumptions used in the financial modelling have all been based on pre covid 19 farm revenue returns, interest rates and farm input pricing.

5.3 The availability data for each of the sub-catchments under each scenario used in my models is summarised in **Table 2** below. The availability information is based on that supplied by ECAN.

Table 2 – Temuka Monthly reliability data - ECAN

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Current A	76	72	68	59	64	63	72	80	76	85	85	81
Current B	67	62	51	47	52	50	60	72	66	77	74	70
2025 A	75	73	65	51	58	58	67	77	72	81	87	82
2025 B	63	54	48	43	46	46	58	65	66	74	71	64
2027 A	81	75	67	53	59	61	70	80	75	86	93	89
2027 B	65	58	50	45	45	42	55	66	69	78	73	69
2030 A	81	79	69	55	60	63	73	83	79	90	95	91
2030 B	67	61	51	46	47	45	57	69	72	79	78	71
2035 A	80	72	59	52	57	60	71	82	81	91	93	88
2035 B	39	31	27	24	32	25	34	48	39	56	56	56

5.4 The modelled farms are based on a 300 hectare property which is fully irrigated.

5.5 The farm systems modelled are defined as follows:

(a) The Sheep and Beef Finishing Farm is an intensive operation which has no breeding stock and utilises the feed grown by trading and finishing bought in lambs from 32kg to 43kgs over late spring to late autumn along with finishing yearling cattle over a twelve month period at an average growth rate of 800 grams per day.

(b) The Dairy Support Farm is a grazing operation which owns no stock but grazes a mixture of weaned dairy calves for 26 weeks of the year from December to May. These weaned calves are carried over to yearling heifers for a further 12 months. In addition, Dairy Cows are also wintered on 40 hectares of winter crop and supplement for 8 weeks. All grazing rates are on a per head per week basis depending on age of the dairy stock.

(c) The Dairy Farm is a full 300 hectare milking platform with all replacement young stock grazed off farm and dairy cows grazed off farm for 8 weeks. Average stocking rates and production per cow for the area are used which is in line with actual farmer performance. An average of 700kgs of dry matter per cow is bought on farm to increase feed levels for milking cows and a small area of crop is grown as part of a pasture renovation which provides feed in the shoulders of the season.

(d) The Cropping Farm grows five main types of crop being Wheat and Barley which account for 75% of the farms income with the other 25% split between small seeds being ryegrass and clover along with field peas and a small number of trade lambs. These are the most common crops grown and provide a good average for a cropping farm.

5.6 The irrigated farm types used in my models have been supplied by TCGI and are summarised by the total water consented in litres per second in **Table 3**.

Table 3. Irrigated Farm Types

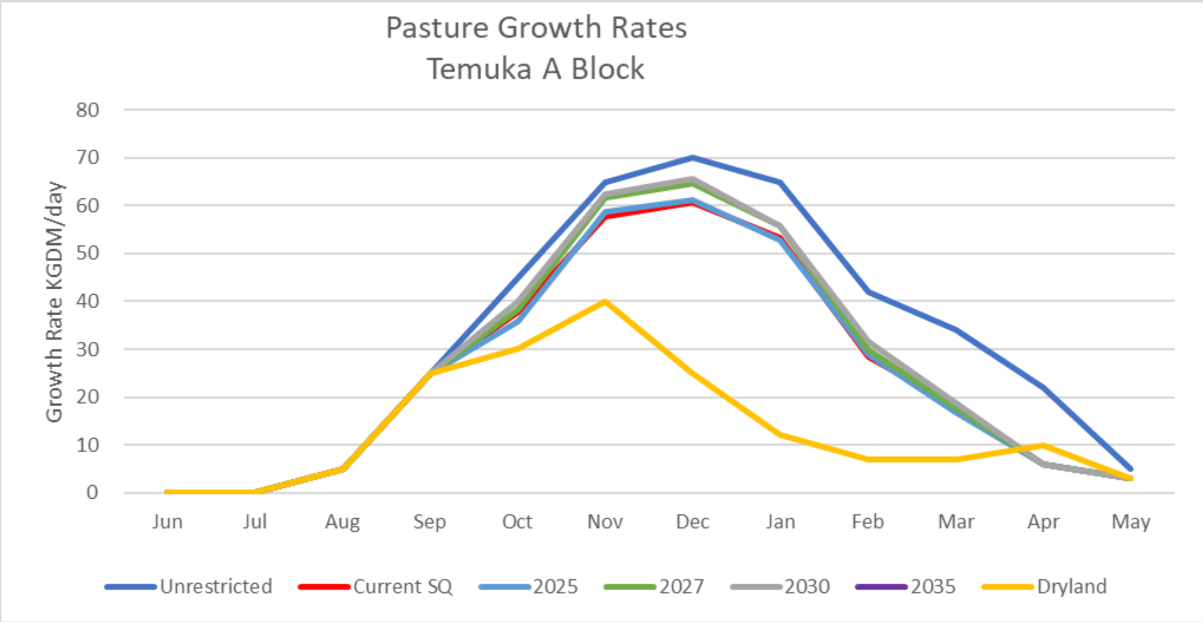
Temuka Water Users (l/s)				
		Total	**A**	**B**
Dairy		1700	1431	269
Sheep & Beef		300	253	48
Cropping		300	253	48
Dairy Support		300	253	48
TDC		240	228	12
Barkers		9	9	0
Lifestyle / Other		438	78	360
Total		**3286**	**2503**	**783**

Pasture Growth Rate Assumptions

5.7 The key to the livestock model is the pasture growth. When pasture is fully irrigated, I have used 14.4 tonnes of dry mater grown per hectare in my model. This is indicative and based on evidence from shareholder farmers within the catchments which forms part of the case studies shown in section 6 of my evidence. Of the total dry matter grown only 80% of the feed is utilised or consumed which is normal for well managed farms. The 20% not consumed is either trampled by stock, or not fully eaten and left behind in the paddock.

5.8 A summary of the total pasture grown used in the modelling is shown in **Figure 1** below. The graph shows the change in pasture growth as the irrigation changes due to the water availability. I have assumed higher pasture growth rates for a dairy farm due to the use of nitrogen and dairy effluent nutrients.

Figure 1. Pasture Growth Rates Temuka A Block



5.9 The graphs show the impacts of the water availability by way of restrictions to irrigation on pasture growth. It highlights that the PC7 scenarios are all very close and the improvement in reliability from the scenarios from 2027, 2030 and 2035 all improve farms ability to grow more feed. The actual total amounts of feed grown are shown more clearly in **Table 5** below.

Table 5: Total Tonnes Dry Matter Grown Temuka A Block

Annual Pasture Yields (T DM / Ha) Total Grown	
Unrestricted	14.4
Current SQ	11.2
2025	11.2
2027	11.7
2030	11.9
2035	11.5
Dryland	5.1

Irrigation & Water Availability Assumptions

5.10 The irrigation on the farm is in the form of spray irrigation. This is either Centre Pivot, Traveling irrigator, K Line or Static Sprinklers. I have used an average of 3.5mm/ha/day of water applied over a 3360-hour irrigation season which is a total of 560mm/ha/year. This is consistent with actual catchment farms irrigation systems which are consented for an average rate of 3.5mm per day for pasture.

5.11 To determine the effects on pasture growth of water restrictions, I have used the industry benchmark (Moir) and a decrease in 14KgDM/day grown for every 1mm of water not applied. This is an industry recognised benchmark initially determined by Moir et al (2000) (as discussed earlier in my evidence) and is a figure which I have seen to be very accurate in actual on farm scenarios.

5.12 **Table 6** below shows by way of example the restrictions that would apply under PC7 to affiliated consents in the South Opuha sub catchment from ECAN's modelling. Each sub catchment has different availability resulting in an irrigation restriction in millimetres as a percentage of the 3.5mm delivered by the irrigation system which is then converted to a reduction in pasture growth rates using 14kgdm / 1mm of irrigation restriction as determined by Moir.

Table 6. Example of Irrigation restrictions for the Temuka Catchment A Block consents and resultant pasture growth reduction for PC 7 Steps.

	Monthly Average Restrictions					Irrigation Restrictions (mm)					Pasture Growth Reduction (Kgdm day)				
Month	Current	2025	2027	2030	2035	Current	2025	2027	2030	2035	Current	2025	2027	2030	2035
October	15%	19%	14%	10%	9%	0.53	0.67	0.49	0.35	0.32	7	9	7	5	4
November	15%	13%	7%	5%	7%	0.53	0.46	0.25	0.18	0.25	7	6	3	2	3
December	19%	18%	11%	9%	12%	0.67	0.63	0.39	0.32	0.42	9	9	5	4	6
January	24%	25%	19%	19%	20%	0.84	0.88	0.67	0.67	0.70	12	12	9	9	10
February	28%	27%	25%	21%	28%	0.98	0.95	0.88	0.74	0.98	14	13	12	10	14
March	32%	35%	33%	31%	41%	1.12	1.23	1.16	1.09	1.44	16	17	16	15	20
April	41%	49%	47%	45%	48%	1.44	1.72	1.65	1.58	1.68	20	24	23	22	24
May	36%	42%	41%	40%	43%	1.26	1.47	1.44	1.40	1.51	18	21	20	20	21

Cropping and Supplementary Feed Assumptions in Pastoral Models

5.13 In the dairy support and sheep and beef finishing farm models a combined area of 40ha of Fodder Beet is grown as a winter crop to supplement feed supply from June to August when pasture growth is low or below feed demand from stock. The cropped area remains the same, even with less stock when irrigation restrictions are imposed under the scenarios however the crop yields would be compromised which means that less feed would be available. Winter feed levels are supplemented with up to 1000 bales of baleage or 250,000kgdm of silage fed out. This has been harvested over the late spring / early summer in the models to support the winter-feed requirements.

6. SUMMARY OF RESULTS – A BLOCK CONSENT HOLDERS

Sheep & Beef Finishing Farm Model – A Block

6.1 Table **7** outlines the key farm system production assumptions for each scenario in my excel model for the sheep and beef finishing farm in the Temuka catchment.

Table 7. Farm system assumptions for the sheep and beef finishing farm model.

Key Farm System Assumptions - Sheep & Beef	Unrestricted	Current SQ	2025	2027	2030	2035
Sheep						
Lambs traded	9,500	4,900	4,800	5,700	5,850	5,500
Per head gross margin	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30
Cattle						
Steers traded	950	910	910	910	920	910
Per head gross margin	$ 633	$ 633	$ 633	$ 633	$ 633	$ 633
Pasture						
Irrigated Pasture Yield (TDm/ha)	14.4	11.2	11.2	11.7	11.9	11.5

6.2 The unrestricted policy modelled as a base case allows for the finishing of 9500 lambs per annum through December to May. These lambs are bought in at 32kgs liveweight and grown out to 43kgs liveweight. In addition, there is enough feed for 950 rising one-year old steers which are bought in April / May each year at 250kgs liveweight and grown out at an average of 800 grams per day to be finished and sold during the Autumn of the following season. Forty hectares of fodder beet is grown to support all stock during the winter.

6.3 The feed budgets under each scenario indicate that the drop-in pasture production from the irrigation restrictions would mean that the number of lambs and steers traded annually drops reducing income and some costs with lower pasture growth and quality limiting the ability of the farm to finish the number of stock it could handle under current irrigation.

6.4 The stocking rate and stock performance in these models have been matched to feed supply. However, one key factor which has not been highlighted is the effect of water restrictions on pasture quality. When the irrigation restrictions are incurred, the plant comes under moisture stress which causes the grass to go reproductive going to seed. This reduces the palatability of the feed and the metabolisable energy content of the pasture, which flows through to a decrease in animal performance such as growth rates and reproductive performance.

Financial Return Sheep & Beef Finishing Farm – A Block

6.5 The feed budgets and stocking policies developed have been flowed through into financial budgets to determine the effects of PC7 steps on the financial viability of the farms. The summary shown below (**table 8**) summarises the returns under each step for the affiliated consent holders with the irrigation restrictions modelled by ECAN.

Table 8. Budget summary for A Block Sheep & Beef Finishing Farm.

Budget Summary - Sheep & Beef Temuka A Block												
	Unrestricted		Current SQ		2025		2027		2030		2035	
	Total	per ha	Total	per ha	Total	per ha	Total	per ha	Total	per ha	Total	per ha
Income	$891,007	$2,970	$718,327	$2,394	$715,097	$2,384	$744,169	$2,481	$755,037	$2,517	$737,709	$2,459
Farm Expenses	$490,901	$1,636	$408,520	$1,362	$407,891	$1,360	$414,904	$1,383	$416,193	$1,387	$413,346	$1,378
Trading Surplus	**$400,106**	**$1,334**	**$309,807**	**$1,033**	**$307,206**	**$1,024**	**$329,265**	**$1,098**	**$338,844**	**$1,129**	**$324,363**	**$1,081**
Interest and Rent	$170,000	$567	$170,000	$567	$170,000	$567	$170,000	$567	$170,000	$567	$170,000	$567
Business Surplus	**$230,106**	**$767**	**$139,807**	**$466**	**$137,206**	**$457**	**$159,265**	**$531**	**$168,844**	**$563**	**$154,363**	**$515**
Loan Principal	$150,000	$500	$150,000	$500	$150,000	$500	$150,000	$500	$150,000	$500	$150,000	$500
CAPEX & Drawings	$85,000	$283	$85,000	$283	$85,000	$283	$85,000	$283	$85,000	$283	$85,000	$283
Depreciation	$50,000	$167	$50,000	$167	$50,000	$167	$50,000	$167	$50,000	$167	$50,000	$167
Financial Surplus	**-$54,894**	**-$183**	**-$145,193**	**-$484**	**-$147,794**	**-$493**	**-$125,735**	**-$419**	**-$116,156**	**-$387**	**-$130,637**	**-$435**
Interest Coverage Ratio	2.35		1.82		1.81		1.94		1.99		1.91	

6.6 **Table 8** shows the finishing farms changes in profitability from the stepped reliability changes under the scenarios. The change in EBIT ranges from a drop of 1% in 2025 to an improvement of 5% for 2035. The 2030 scenario provides a better EBIT up 9% from current. This is all in line with the improved availability of water that comes about for A Block consent holders from PC7. This tables does show a deficit which is not a cash deficit as it takes into account depreciation. It also allows for capital, drawings and paying back loan principal over twenty years on an average debt of $3,000,000. Farms with low to no debt will show positive results on the bottom line. The farms interest coverage ratios are all borderline for meeting current banking guidelines for debt servicing however banks tend to look favourably at high equity lending which sheep and beef farms have, most sheep and beef farms have other elements of cashflow with breeding components which increases profitability on some of the finished lambs and steers which are home bred and are therefore a lower input cost. **Table 9** below shows the equity position of 58%. The 2030 step of PC7 would be the preferred scenario.

6.7 As well as analysing the profitability my model also looks the effects on the value of the farm assets from changes in irrigation reliability under each scenario. The balance sheet (**table 9**) below shows the effect on asset value and the impact on the owners return on investment from the changes in water availability. The assumption for the changes in land values comes from the discounts or premiums applied by registered rural valuers in other irrigated farming areas where irrigated land comes under restrictions due to reliability issues. Farms irrigating from the Waimakariri Irrigation Scheme and Amuri Irrigation Scheme in North Canterbury typically sell at a discount of between $4,000 and $7,000 per hectare. These schemes have supply reliability of between 80% to 90% similar to the Temuka reliability modelled by ECAN. In my model I have used a value for the current status quo irrigated land price of $24,000 per hectare, I have adjusted the land value in line with reliability.

6.8 The assumed level of debt of $3 million has been used in this model given A Block farms have invested in consents and infrastructure associated with having greater irrigation certainty. This level of debt is 42% of the current asset value.

6.9 The balance sheet (**table 9**) below shows that there would not be any changes in farm values due to the reliability.

Table 9. Asset value changes due to PC7.

Balance Sheet - Sheep & Beef Temuka A Block																		
Assets	**Unrestricted**			**Current SQ**			**2025**			**2027**			**2030**			**2035**		
Irrigated Land	300	$ 24,000	7,200,000	300	$ 20,000	6,000,000	300	$ 20,000	6,000,000	300	$ 20,000	6,000,000	300	$ 20,000	6,000,000	300	$ 20,000	6,000,000
Dryland	0		0	0		0	0		0	0		0	0		0	0		0
Plant and Machinery			300,000			300,000			300,000			300,000			300,000			300,000
Livestock	950	$ 880	836,000	910	$ 880	800,800	910	$ 880	800,800	910	$ 880	800,800	920	$ 880	809,600	910	$ 880	800,800
			8,336,000			**7,100,800**			**7,100,800**			**7,100,800**			**7,109,600**			**7,100,800**
Liabilities																		
Term Loan		36%	3,000,000		42%	3,000,000		42%	3,000,000		42%	3,000,000		42%	3,000,000		42%	3,000,000
Net Worth		64%	**5,336,000**		58%	**4,100,800**		58%	**4,100,800**		58%	**4,100,800**		58%	**4,109,600**		58%	**4,100,800**
Return on Capital			3.8%			3.2%			3.1%			3.4%			3.6%			3.4%
Return on Equity			1.8%			0.1%			0.1%			0.6%			0.8%			0.5%

Dairy Support Farm Model – A Block

6.10 The second farm system model presented is the Dairy Support system. To be consistent this farm is a 300-hectare spray irrigated farm. **Table 10** outlines the key farm system production assumptions for each scenario in my excel model.

Table 10. Farm system assumptions for dairy support farm model – A Block

Key Farm System Assumptions - Dairy Support						
	Unrestricted	**Current SQ**	**2025**	**2027**	**2030**	**2035**
Grazing Rates /week						
Calves	$7.50	$7.50	$7.50	$7.50	$7.50	$7.50
R1 Heifers	$11.00	$11.00	$11.00	$11.00	$11.00	$11.00
R2 Heifers - Winter	$22.00	$22.00	$22.00	$22.00	$22.00	$22.00
MA Cows - Winter	$28.00	$28.00	$28.00	$28.00	$28.00	$28.00
Stock Numbers						
Calves	800	630	615	675	675	675
R1 Heifers	780	600	600	620	640	610
R2 Heifers - Winter	245	200	200	230	230	230
MA Cows - Winter	780	700	700	740	740	740

6.11 The total feed grown is the same as in the sheep and beef model, but the use of this feed is for growing out dairy heifers and calves and the fodder beet is used for wintering dairy cows and heifers. **Table 10** shows as water availability improves through the steps stocking rates can increase in line with higher feed grown on farm.

Financial Return Dairy Support Farm

6.12 The increased reliability for the A Block consent holders under the plan change from current shows similar results to the sheep and beef system. The summary is shown in **Table 11**.

Table 11. Budget summary for Dairy Support Farm - A Block.

Budget Summary - Dairy Support Temuka A Block												
	Unrestricted		Current SQ		2025		2027		2030		2035	
	Total	per ha	Total	per ha	Total	per ha	Total	per ha	Total	per ha	Total	per ha
Income	$841,360	$2,805	$682,850	$2,276	$679,925	$2,266	$718,665	$2,396	$729,225	$2,431	$713,385	$2,378
Farm Expenses	$412,026	$1,373	$411,099	$1,370	$411,099	$1,370	$411,597	$1,372	$411,597	$1,372	$411,597	$1,372
EBIT	**$429,334**	**$1,431**	**$271,751**	**$906**	**$268,826**	**$896**	**$307,068**	**$1,024**	**$317,628**	**$1,059**	**$301,788**	**$1,006**
Interest and Rent	$165,000	$550	$165,000	$550	$165,000	$550	$165,000	$550	$165,000	$550	$165,000	$550
NPBTD	**$264,334**	**$881**	**$106,751**	**$356**	**$103,826**	**$346**	**$142,068**	**$474**	**$152,628**	**$509**	**$136,788**	**$456**
Loan Principal	$150,000	$500	$150,000	$500	$150,000	$500	$150,000	$500	$150,000	$500	$150,000	$500
CAPEX & Drawings	$85,000	$283	$85,000	$283	$85,000	$283	$85,000	$283	$85,000	$283	$85,000	$283
Depreciation	$50,000	$167	$50,000	$167	$50,000	$167	$50,000	$167	$50,000	$167	$50,000	$167
Surplus	**-$20,666**	**-$69**	**-$178,249**	**-$594**	**-$181,174**	**-$604**	**-$142,932**	**-$476**	**-$132,372**	**-$441**	**-$148,212**	**-$494**
Interest Coverage Ratio	2.60		1.65		1.63		1.86		1.93		1.83	

6.13 **Table 11** shows under this system there are increases in EBIT up to 11% for the 2035 scenario from current, the 2030 scenario shows a 17% lift in EBIT. However the returns show that a dairy support system would not be financially sustainable or viable long term under PC7.

6.14 The balance sheet (**table 12**) below is like that of the sheep and beef model however there are no livestock owned. The same assumptions have been used for land values and capital employed with no livestock owned but an assumed higher land value due to the type of farm and its reliability I have kept the assumed debt level at $3 million.

6.15 The balance sheet (**table 12**) shows that the changes in reliability are probably not significant enough to lift property prices however long term security of water under these reliability scenarios may have an impact.

Table 12. Asset value changes due to PC7.

Balance Sheet - Dairy Support Temuka A Block																		
Assets	**Unrestricted**			**Current SQ**			**2025**			**2027**			**2030**			**2035**		
Irrigated Land	300	$35,000	10,500,000	300	$30,000	9,000,000	300	$30,000	9,000,000	300	$30,000	9,000,000	300	$30,000	9,000,000	300	$30,000	9,000,000
Dryland	0		0	0		0	0		0	0		0	0		0	0		0
Plant and Machinery			300,000			300,000			300,000			300,000			300,000			300,000
Livestock																		
			10,800,000			**9,300,000**			**9,300,000**			**9,300,000**			**9,300,000**			**9,300,000**
Liabilities																		
Term Loan		28%	**3,000,000**		32%	**3,000,000**		32%	**3,000,000**		32%	**3,000,000**		32%	**3,000,000**		32%	**3,000,000**
Net Worth		72%	**7,800,000**		68%	**6,300,000**		68%	**6,300,000**		68%	**6,300,000**		68%	**6,300,000**		68%	**6,300,000**
Return on Capital			3.2%			2.0%			2.0%			2.4%			2.5%			2.3%
Return on Equity			1.7%			-0.4%			-0.5%			0.1%			0.3%			0.0%

Dairy Farm Model – A Block

6.16 The third farm system model presented is the Dairy Farm system which is also a 300-hectare milking platform with all cows and young stock grazed off farm. **Table 13** outlines the key farm system production assumptions for each scenario in my excel model. I have used a $6.25/kgms dairy pay out with a 25c per share dividend for a fully shared pay out for income.

Table 13. Farm system assumptions for the dairy farm model – A Block.

Key Farm System Assumptions - Dairy Temuka A Block						
	Unrestricted	Current SQ	2025	2027	2030	2035
Dairy						
Area (ha)	300	300	300	300	300	300
Cows Milked	989	860	850	868	883	865
Milk Solids Produced	430,128	374,100	369,750	377,580	384,105	376,275
Cows/ha	3.30	2.87	2.83	2.89	2.94	2.88
KGMS/Ha	1,434	1,247	1,233	1,259	1,280	1,254
Costs/kgms	4.34	4.53	4.55	4.52	4.49	4.52
Pasture						
Irrigated Pasture Yield (TDm/ha)	18.4	15.3	15.0	15.4	15.8	15.4

6.17 The total feed grown is higher than the other two farm systems due to higher use of nitrogen fertiliser, effluent and more intensive grazing systems. In addition, there is 700kgs of supplement feed per cow bought in to the dairy platform.

Financial Return Dairy Farm – A Block

6.18 **Table 14** below shows the budget summary of an irrigated dairy farm for TCGI A Block shareholder.

Table 14. Budget summary for Temuka Dairy Farm - A Block

Budget Summary - Temuka A Block												
	Unrestricted		**Current SQ**		**2025**		**2027**		**2030**		**2040**	
	Total	**per ha**	**Total**	**per ha**	**Total**	**per ha**	**Total**	**per ha**	**Total**	**per ha**	**Total**	**per ha**
Income	$2,965,078	$9,884	$2,584,580	$8,615	$2,555,621	$8,519	$2,613,018	$8,710	$2,655,169	$8,851	$2,604,587	$8,682
Farm Expenses	$1,867,514	$6,225	$1,695,180	$5,651	$1,681,800	$5,606	$1,705,884	$5,686	$1,725,954	$5,753	$1,701,870	$5,673
EBIT	**$1,097,564**	**$3,659**	**$889,400**	**$2,965**	**$873,821**	**$2,913**	**$907,134**	**$3,024**	**$929,215**	**$3,097**	**$902,717**	**$3,009**
Interest and Rent	$425,000	$1,417	$400,000	$1,333	$400,000	$1,333	$400,000	$1,333	$400,000	$1,333	$400,000	$1,333
NPBTD	**$672,564**	**$2,242**	**$489,400**	**$1,631**	**$473,821**	**$1,579**	**$507,134**	**$1,690**	**$529,215**	**$1,764**	**$502,717**	**$1,676**
Loan Principal	$400,000	$1,333	$375,000	$1,250	$375,000	$1,250	$375,000	$1,250	$375,000	$1,250	$375,000	$1,250
CAPEX & Drawings	$110,000	$367	$110,000	$367	$110,000	$367	$110,000	$367	$110,000	$367	$110,000	$367
Depreciation	$100,000	$333	$100,000	$333	$100,000	$333	$100,000	$333	$100,000	$333	$100,000	$333
Surplus	**$62,564**	**$209**	**-$95,601**	**-$319**	**-$111,179**	**-$371**	**-$77,866**	**-$260**	**-$55,785**	**-$186**	**-$82,283**	**-$274**
Interest Coverage Ratio	2.58		2.22		2.18		2.27		2.32		2.26	

6.19 **Table 14** shows very minimal changes to farm EBIT and profitability. The changes in pasture growth is not as large and with bought in feed and other insulating factors to help grow feed such as nitrogen and effluent dairy farms viability under the PC7 steps remains sound. The improved availability of water under the 2030 step provides the best returns under PC7. Dairy farms with adequate equity levels and strong cashflow may be able to invest in more efficient irrigation techniques to grow more feed and reduce costs on less water to remain viable as this is the most profitable farming system.

6.20 The balance sheet (**table 15**) below also is like that of the other farm system models it is conceivable that these dairy units values will not change and having long term security of water may be more appealing to owners and buyers.

Table 15. Asset value changes due to PC7.

Balance Sheet - Temuka A Block																		
Assets	**Unrestricted**			**Current SQ**			**2025**			**2027**			**2030**			**2035**		
Irrigated Land	300	$45,000	13,500,000	300	$42,500	12,750,000	300	$42,500	12,750,000	300	$42,500	12,750,000	300	$42,500	12,750,000	300	$42,500	12,750,000
Dryland	0		0	0		0	0		0	0		0	0		0	0		0
Plant and Machinery			400,000			400,000			400,000			400,000			400,000			400,000
Livestock			2,286,400			1,891,750			1,861,500			1,902,250			1,932,250			1,896,250
			16,186,400			**15,041,750**			**15,011,500**			**15,052,250**			**15,082,250**			**15,046,250**
Liabilities																		
Term Loan		49%	**8,000,000**		50%	**7,500,000**		50%	**7,500,000**		50%	**7,500,000**		50%	**7,500,000**		50%	**7,500,000**
Net Worth		51%	**8,186,400**		50%	**7,541,750**		50%	**7,511,500**		50%	**7,552,250**		50%	**7,582,250**		50%	**7,546,250**
Return on Capital			6.1%			5.2%			5.1%			5.3%			5.4%			5.3%
Return on Equity			5.7%			3.7%			3.5%			3.9%			4.2%			3.9%

CROPPING FARM MODEL – A BLOCK

6.21 The fourth farm system model presented is the Cropping Farm system which is also a 300 hectare irrigated farm. **Table 16** below outlines the key farm system production assumptions for each scenario in my excel model.

Table 16. Farm system assumptions for Temuka Cropping Farm – A Block

Key Farm System Assumptions - Cropping A Block						
	Unrestricted	**Current SQ**	**2025**	**2027**	**2030**	**2035**
Sheep						
Lambs traded	1,500	1,500	1,500	1,500	1,500	1,500
Per head gross margin	$ 25	$ 25	$ 25	$ 25	$ 25	$ 25
Cropping						
Barley Yield / ha	9.50	7.77	7.72	8.29	8.48	8.36
Barley Price / Tonne	$ 375	$ 375	$ 375	$ 375	$ 375	$ 375
Wheat Yield / ha	11.50	9.40	9.34	10.03	10.26	10.12
Wheat Price / Tonne	$ 400	$ 400	$ 400	$ 400	$ 400	$ 400
Peas Yield / ha	3.0	2.5	2.4	2.6	2.7	2.6
Peas Price / Tonne	$960	$ 960	$ 960	$ 960	$ 960	$ 960
Clover Yield / ha	0.70	0.57	0.57	0.61	0.62	0.62
Clover Price / Tonne	$ 5,400	$ 5,400	$ 5,400	$ 5,400	$ 5,400	$ 5,400
Grass Yield / ha	2.00	1.64	1.63	1.75	1.79	1.76
Grass Price / Tonne	$ 1,900	$ 1,900	$ 1,900	$ 1,900	$ 1,900	$ 1,900

6.22 The impacts of the irrigation restrictions for the period October to January have been applied to the crop yields.

Financial Return Cropping Farm

6.23 **Table 17** below shows the budget summary of an irrigated cropping unit for a TCGI member.

Table 17. Budget summary for Temuka Cropping Farm - A Block.

Cropping Budget Summary - Temuka A Block												
	Unrestricted		Current SQ		2025		2027		2030		2035	
	Total	per ha	Total	per ha	Total	per ha	Total	per ha	Total	per ha	Total	per ha
Income	$1,229,475	$4,098	$1,014,198	$3,381	$1,008,300	$3,361	$1,079,076	$3,597	$1,102,668	$3,676	$1,087,923	$3,626
Farm Expenses	$669,164	$2,231	$669,164	$2,231	$669,314	$2,231	$669,314	$2,231	$669,314	$2,231	$669,314	$2,231
EBIT	**$560,311**	**$1,868**	**$345,034**	**$1,150**	**$338,986**	**$1,130**	**$409,762**	**$1,366**	**$433,354**	**$1,445**	**$418,609**	**$1,395**
Interest and Rent	$195,000	$650	$195,000	$650	$195,000	$650	$195,000	$650	$195,000	$650	$195,000	$650
NPBTD	**$365,311**	**$1,218**	**$150,034**	**$500**	**$143,986**	**$480**	**$214,762**	**$716**	**$238,354**	**$795**	**$223,609**	**$745**
Loan Principal	$175,000	$583	$175,000	$583	$175,000	$583	$175,000	$583	$175,000	$583	$175,000	$583
CAPEX & Drawings	$135,000	$450	$135,000	$450	$135,000	$450	$135,000	$450	$135,000	$450	$135,000	$450
Depreciation	$50,000	$167	$50,000	$167	$50,000	$167	$50,000	$167	$50,000	$167	$50,000	$167
Surplus	**$5,311**	**$18**	**-$209,966**	**-$700**	**-$216,014**	**-$720**	**-$145,238**	**-$484**	**-$121,646**	**-$405**	**-$136,391**	**-$455**
Interest Coverage Ratio	2.87		1.77		1.74		2.10		2.22		2.15	

6.24 **Table 17** shows that the cropping farm system benefits the most from improved reliability given ECAN's models show greater reliability over the summer months when cropping farms yields are impacted the most. EBIT's improve by 21% from 2035 plan change.

6.25 The balance sheet (**table 18**) below also is like that of the other farm system models with improved reliability and water security these cropping units will may be more appealing to buyers with more secure and better income streams in the future. Cropping farms have a higher level of investment in plant and equipment. The balance sheet table shows the impact of the lower returns on the Return on Equity of the farm.

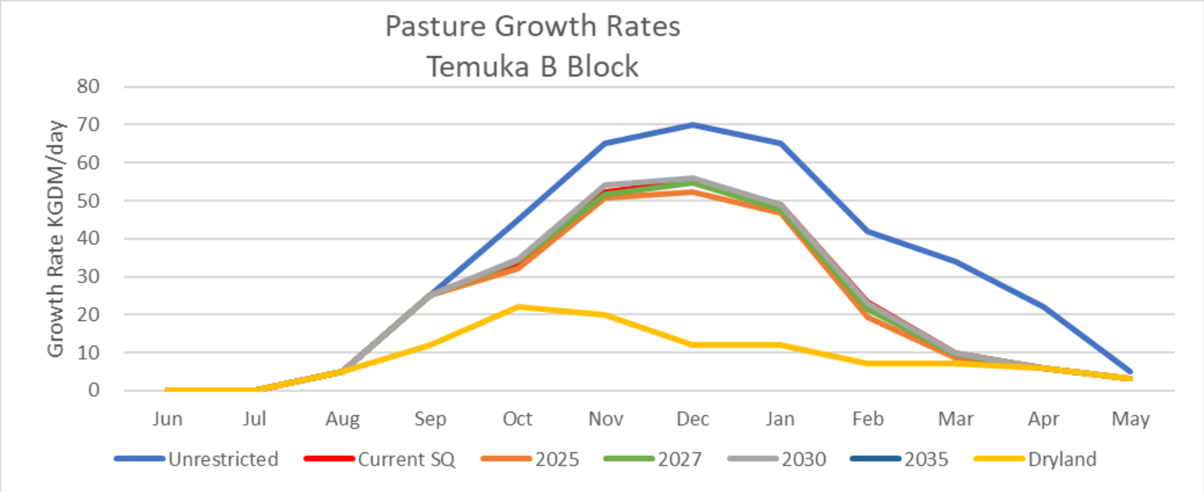
Table 18. Asset value change due to PC7.

Balance Sheet - Cropping Temuka A Block																		
Assets	Unrestricted			Current SQ			2025			2027			2030			2035		
Irrigated Land	300	$ 30,000	9,000,000	300	$ 25,000	7,500,000	300	$ 25,000	7,500,000	300	$ 27,500	8,250,000	300	$ 27,500	8,250,000	300	$ 27,500	8,250,000
Dryland	0		0	0		0	0		0	0		0	0		0	0		0
Plant and Machinery			1,500,000			1,500,000			1,500,000			1,500,000			1,500,000			1,500,000
Livestock			0			0			0			0			0			0
			10,500,000			**9,000,000**			**9,000,000**			**9,750,000**			**9,750,000**			**9,750,000**
Liabilities																		
Term Loan		$ 0	3,500,000		$ 0	3,500,000		$ 0	3,500,000		$ 0	3,500,000		$ 0	3,500,000		$ 0	3,500,000
Net Worth		67%	**7,000,000**		61%	**5,500,000**		61%	**5,500,000**		64%	**6,250,000**		64%	**6,250,000**		64%	**6,250,000**
Return on Capital			4.1%			2.3%			2.3%			2.8%			3.1%			3.1%
Return on Equity			2.6%			-0.6%			-0.7%			0.5%			0.9%			0.6%

Summary of Results – B Block Consent Holders

6.26 While the changes in reliability for the first three steps for B Block consent holders are minimal up to 2030 the 2035 scenario shows a large drop in reliability which has a major impact on these farms. Figure 2 below shows the graph of pasture growth rates for B block irrigators

Figure 2 Pasture Growth Rates Temuka B Block



The pasture growth table for B block pastoral farms under PC7 steps is

Annual Pasture Yields (T DM / Ha) Total Grown	
Unrestricted	14.4
Current SQ	10.0
2025	9.5
2027	9.9
2030	10.1
2035	7.8
Dryland	5.1

Sheep & Beef Finishing Farm Model – B Block

6.27 **Table 19** outlines the key farm system production assumptions for each scenario in my excel model for the b block sheep and beef finishing farm in the Temuka catchment. The same base case assumptions and farm system setups have been used as for A Block consent holders with a 300 hectare farm which matches feed supply to stocking rates.

Table 19. Farm system assumptions for Temuka Sheep and Beef Finishing Farm – B Block.

Key Farm System Assumptions - Sheep & Beef						
	Unrestricted	Current SQ	2025	2027	2030	2035
Sheep						
Lambs traded	9,500	3,900	3,650	3,700	4,100	3,800
Per head gross margin	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30
Cattle						
Steers traded	950	850	820	850	850	660
Per head gross margin	$ 633	$ 633	$ 633	$ 633	$ 633	$ 633
Pasture						
Irrigated Pasture Yield (TDm/ha)	14.4	10.0	9.5	9.9	10.1	7.8

Financial Return Sheep & Beef Finishing Farm – B Block

6.28 The feed budgets and stocking policies developed have been flowed through into financial budgets to determine the effects of the changes on the financial viability of the farms. The summary shown below (**table 20**) summarises the returns under each scenario for the affiliated consent holders with the irrigation restrictions modelled by ECAN.

Table 20. Budget summary for B Block Sheep & Beef Finishing Farm.

Budget Summary - Sheep & Beef Temuka B Block												
	Unrestricted		Current SQ		2025		2027		2030		2035	
	Total	per ha	Total	per ha	Total	per ha	Total	per ha	Total	per ha	Total	per ha
Income	$891,007	$2,970	$649,890	$2,166	$623,747	$2,079	$643,430	$2,145	$656,351	$2,188	$532,233	$1,774
Farm Expenses	$490,901	$1,636	$400,008	$1,333	$397,850	$1,326	$398,600	$1,329	$401,716	$1,339	$358,459	$1,195
Trading Surplus	**$400,106**	**$1,334**	**$249,882**	**$833**	**$225,897**	**$753**	**$244,830**	**$816**	**$254,634**	**$849**	**$173,774**	**$579**
Interest and Rent	$170,000	$567	$145,000	$483	$120,000	$400	$145,000	$483	$145,000	$483	$145,000	$483
Business Surplus	**$230,106**	**$767**	**$104,882**	**$350**	**$105,897**	**$353**	**$99,830**	**$333**	**$109,634**	**$365**	**$28,774**	**$96**
Loan Principal	$150,000	$500	$125,000	$417	$100,000	$333	$125,000	$417	$125,000	$417	$125,000	$417
CAPEX & Drawings	$85,000	$283	$85,000	$283	$85,000	$283	$85,000	$283	$85,000	$283	$85,000	$283
Depreciation	$50,000	$167	$50,000	$167	$50,000	$167	$50,000	$167	$50,000	$167	$50,000	$167
Financial Surplus	**-$54,894**	**-$183**	**-$155,118**	**-$517**	**-$129,103**	**-$430**	**-$160,170**	**-$534**	**-$150,366**	**-$501**	**-$231,226**	**-$771**
Interest Coverage Ratio	2.35		1.72		1.88		1.69		1.76		1.20	

6.29 **Table 20** shows the finishing farms reduced profitability from the reduced reliability under the PC7 stepped scenarios. The change in EBIT ranges from a drop of 10% in 2025 with current profitability maintained under 2027 and 2030 steps but a major decrease in reliability from 2035 drops farm profitability by 30%. This would have a severe impact and make farms unsustainable. B Block farms may run lower debt scenarios and farms with low to no debt will show closer to break even or small surpluses on the bottom line. The farms interest coverage ratios are not within current banking guideline for debt servicing.

6.30 Like the A Block analysis I have looked at effects on the farms balance sheet using the same methodology. In the B Block model I have used a value for the current status quo irrigated land price of $20,000 per hectare given lower water availability and I have adjusted the land values in line with reliability.

6.31 The assumed level of debt of $2.5 million has been used in this model given B Block farms may not have the same level of investment in consents and irrigation infrastructure as A Block consent holders. This level of debt is 35% of the current asset value.

6.32 The balance sheet (**table 21**) below shows that there would be a significant decrease in farm values due to the reliability changes in 2035.

Table 21. Asset value changes due to PC7.

Balance Sheet - Sheep & Beef Temuka B Block																		
Assets	**Unrestricted**			**Current SQ**			**2025**			**2027**			**2030**			**2035**		
Irrigated Land	300	$ 24,000	7,200,000	300	$ 20,000	6,000,000	300	$ 16,000	4,800,000	300	$ 20,000	6,000,000	300	$ 20,000	6,000,000	300	$ 12,000	3,600,000
Dryland	0		0	0		0	0		0	0		0	0		0	0		0
Plant and Machinery			300,000			300,000			300,000			300,000			300,000			300,000
Livestock	950	$ 880	836,000	850	$ 880	748,000	820	$ 880	721,600	850	$ 880	748,000	850	$ 880	748,000	660	$ 880	580,800
			8,336,000			**7,048,000**			**5,821,600**			**7,048,000**			**7,048,000**			**4,480,800**
Liabilities																		
Term Loan		36%	3,000,000		35%	2,500,000		34%	2,000,000		35%	2,500,000		35%	2,500,000		56%	2,500,000
Net Worth		64%	**5,336,000**		65%	**4,548,000**		66%	**3,821,600**		65%	**4,548,000**		65%	**4,548,000**		44%	**1,980,800**
Return on Capital			3.8%			2.3%			2.4%			2.3%			2.4%			2.0%
Return on Equity			1.8%			-0.7%			-0.8%			-0.8%			-0.6%			-5.4%

Dairy Support Farm Model – B Block

6.33 The second farm system model presented is the Dairy Support system. To be consistent this farm is also 300-hectare spray irrigated farm. **Table 22** outlines the key farm system production assumptions for each scenario in my excel model.

Table 22. Farm system assumptions for Temuka Dairy Support Farm – B Block

Key Farm System Assumptions - Dairy Support						
	Unrestricted	**Current SQ**	**2025**	**2027**	**2030**	**2035**
Grazing Rates /week						
Calves	$7.50	$7.50	$7.50	$7.50	$7.50	$7.50
R1 Heifers	$11.00	$11.00	$11.00	$11.00	$11.00	$11.00
R2 Heifers - Winter	$22.00	$22.00	$22.00	$22.00	$22.00	$22.00
MA Cows - Winter	$28.00	$28.00	$28.00	$28.00	$28.00	$28.00
Stock Numbers						
Calves	800	575	555	560	575	435
R1 Heifers	780	530	500	525	540	410
R2 Heifers - Winter	245	150	140	150	150	125
MA Cows - Winter	780	650	640	650	650	600

6.34 The total feed grown is the same as in the sheep and beef model, but the use of this feed is for growing out dairy heifers and calves and the fodder beet is used for wintering dairy cows and heifers.

Financial Return Dairy Support Farm – B Block

6.35 The changes for B Block consent holders under the plan change from current shows similar results to the sheep and beef system with major drops in farm profitability from 2035. The summary is shown in **Table 23**.

Table 23. Budget summary for Dairy Support Farm - B Block.

Budget Summary - Dairy Support Temuka B Block												
	Unrestricted		Current SQ		2025		2027		2030		2035	
	Total	per ha	Total	per ha	Total	per ha	Total	per ha	Total	per ha	Total	per ha
Income	$841,360	$2,805	$612,365	$2,041	$588,065	$1,960	$606,800	$2,023	$617,645	$2,059	$503,305	$1,678
Farm Expenses	$412,026	$1,373	$411,099	$1,370	$411,099	$1,370	$411,064	$1,370	$411,133	$1,370	$410,484	$1,368
EBIT	**$429,334**	**$1,431**	**$201,266**	**$671**	**$176,966**	**$590**	**$195,736**	**$652**	**$206,512**	**$688**	**$92,821**	**$309**
Interest and Rent	$165,000	$550	$140,000	$467	$140,000	$467	$140,000	$467	$140,000	$467	$140,000	$467
NPBTD	**$264,334**	**$881**	**$61,266**	**$204**	**$36,966**	**$123**	**$55,736**	**$186**	**$66,512**	**$222**	**-$47,179**	**-$157**
Loan Principal	$150,000	$500	$125,000	$417	$125,000	$417	$125,000	$417	$125,000	$417	$125,000	$417
CAPEX & Drawings	$85,000	$283	$85,000	$283	$85,000	$283	$85,000	$283	$85,000	$283	$85,000	$283
Depreciation	$50,000	$167	$50,000	$167	$50,000	$167	$50,000	$167	$50,000	$167	$50,000	$167
Surplus	**-$20,666**	**-$69**	**-$198,734**	**-$662**	**-$223,034**	**-$743**	**-$204,264**	**-$681**	**-$193,488**	**-$645**	**-$307,179**	**-$1,024**
Interest Coverage Ratio	2.60		1.44		1.26		1.40		1.48		0.66	

6.36 **Table 23** shows under this system EBIT drops under the 2025 scenario and then returns to current levels for 2027 and 2030 but has a 54% drop in the 2035 scenario which again affects the dairy support farms viability with it unable to meet banking criteria to remain viable.

6.37 The balance sheet (**table 24**) below is like that of the sheep and beef model however there are no livestock owned. The same assumptions have been used for land values and capital employed with no livestock owned but an assumed higher land value due to the type of farm and its reliability I have kept the assumed debt level at $2.5 million.

6.38 The balance sheet (**table 24**) shows that the changes in reliability from 2035 have a major impact on farm value.

Table 24. Asset value changes due to PC7

Balance Sheet - Dairy Support Temuka B Block																		
Assets	Unrestricted			Current SQ			2025			2027			2030			2035		
Irrigated Land	300	$35,000	10,500,000	300	$24,000	7,200,000	300	$22,000	6,600,000	300	$24,000	7,200,000	300	$24,000	7,200,000	300	$16,000	4,800,000
Dryland	0		0	0		0	0		0	0		0	0		0	0		0
Plant and Machinery			300,000			300,000			300,000			300,000			300,000			300,000
Livestock																		
			10,800,000			**7,500,000**			**6,900,000**			**7,500,000**			**7,500,000**			**5,100,000**
Liabilities																		
Term Loan		28%	**3,000,000**		33%	**2,500,000**		36%	**2,500,000**		33%	**2,500,000**		33%	**2,500,000**		49%	**2,500,000**
Net Worth		72%	**7,800,000**		67%	**5,000,000**		64%	**4,400,000**		67%	**5,000,000**		67%	**5,000,000**		51%	**2,600,000**
Return on Capital			3.2%			1.6%			1.3%			1.5%			1.6%			0.2%
Return on Equity			1.7%			-1.5%			-2.2%			-1.6%			-1.4%			-7.0%

Dairy Farm Model – B Block

6.39 The third farm system model presented is the Dairy Farm system which is also a 300-hectare milking platform with all cows and young stock grazed off farm. **Table 25** outlines the key farm system production assumptions for each scenario in my excel model. I have used a $6.25/kgms dairy pay out with a 25c per share dividend for a fully shared pay out for income.

Table 25. Farm system assumptions for Temuka Dairy Farm – B Block.

Key Farm System Assumptions - Dairy Temuka B Block						
	Unrestricted	Current SQ	2025	2027	2030	2035
Dairy						
Area (ha)	300	300	300	300	300	300
Cows Milked	989	798	767	787	801	670
Milk Solids Produced	430,128	347,130	333,645	342,345	348,435	291,450
Cows/ha	3.30	2.66	2.56	2.62	2.67	2.23
KGMS/Ha	1,434	1,157	1,112	1,141	1,161	972
Costs/kgms	4.34	4.64	4.71	4.67	4.64	4.94
Pasture						
Irrigated Pasture Yield (TDm/ha)	18.4	13.8	13.2	13.6	13.9	11.2

6.40 The total feed grown is higher than the other two farm systems due to higher use of nitrogen fertiliser, effluent and more intensive grazing systems. In addition, there is 700kgs of supplement feed per cow bought in to the dairy platform.

Financial Return Dairy Farm – B Block

6.41 **Table 26** below shows the budget summary of an irrigated dairy farm for B Block consent holders.

Table 26. Budget summary for Temuka Dairy Farm B Block.

Budget Summary - Temuka B Block												
	Unrestricted		Current SQ		2025		2027		2030		2035	
	Total	per ha	Total	per ha	Total	per ha	Total	per ha	Total	per ha	Total	per ha
Income	$2,965,078	$9,884	$2,395,157	$7,984	$2,303,313	$7,678	$2,365,301	$7,884	$2,404,643	$8,015	$2,036,520	$6,788
Farm Expenses	$1,867,514	$6,225	$1,612,224	$5,374	$1,570,746	$5,236	$1,597,506	$5,325	$1,616,238	$5,387	$1,440,960	$4,803
EBIT	**$1,097,564**	**$3,659**	**$782,933**	**$2,610**	**$732,567**	**$2,442**	**$767,795**	**$2,559**	**$788,405**	**$2,628**	**$595,560**	**$1,985**
Interest and Rent	$425,000	$1,417	$375,000	$1,250	$375,000	$1,250	$375,000	$1,250	$375,000	$1,250	$337,500	$1,125
NPBTD	**$672,564**	**$2,242**	**$407,933**	**$1,360**	**$357,567**	**$1,192**	**$392,795**	**$1,309**	**$413,405**	**$1,378**	**$258,060**	**$860**
Loan Principal	$400,000	$1,333	$350,000	$1,167	$350,000	$1,167	$350,000	$1,167	$350,000	$1,167	$312,500	$1,042
CAPEX & Drawings	$110,000	$367	$110,000	$367	$110,000	$367	$110,000	$367	$110,000	$367	$110,000	$367
Depreciation	$100,000	$333	$100,000	$333	$100,000	$333	$100,000	$333	$100,000	$333	$100,000	$333
Surplus	**$62,564**	**$209**	**-$152,067**	**-$507**	**-$202,433**	**-$675**	**-$167,205**	**-$557**	**-$146,595**	**-$489**	**-$264,440**	**-$881**
Interest Coverage Ratio	2.58		2.09		1.95		2.05		2.10		1.76	

6.42 **Table 26** shows very minimal changes to farm EBIT and profitability up until 2035 at which point the dairy farm viability becomes unviable. The changes in pasture growth is not as large until 2035. With bought in feed and other insulating factors to help grow feed such as nitrogen and effluent the dairy farms viability under the 2025, 2027 and 2030 steps remains the same. Dairy farmers with adequate equity levels and strong cashflow may be able to invest in more efficient irrigation techniques to grow more feed and reduce costs on less water to remain viable as this is the most profitable farming system.

6.43 The balance sheet (**table 27**) below also is like that of the other farm system models. The farm debt in 2035 has reduced given the need for lower number of dairy company shares and capital stock. It is conceivable that dairy farm values will reduce pre 2035 given the long term security of irrigation water availability is reduced under PC7.

Table 27. Asset value changes due to PC7.

Balance Sheet - Temuka B Block																		
Assets	**Unrestricted**			**Current SQ**			**2025**			**2027**			**2030**			**2035**		
Irrigated Land	300	$45,000	13,500,000	300	$37,500	11,250,000	300	$37,500	11,250,000	300	$37,500	11,250,000	300	$37,500	11,250,000	300	$30,000	9,000,000
Dryland	0		0	0		0	0		0	0		0	0		0	0		0
Plant and Machinery			400,000			400,000			400,000			400,000			400,000			400,000
Livestock			2,286,400			1,767,750			1,690,750			1,740,250			1,768,250			1,477,750
			16,186,400			**13,417,750**			**13,340,750**			**13,390,250**			**13,418,250**			**10,877,750**
Liabilities																		
Term Loan		49%	**8,000,000**		52%	**7,000,000**		52%	**7,000,000**		52%	**7,000,000**		52%	**7,000,000**		57%	**6,250,000**
Net Worth		51%	**8,186,400**		48%	**6,417,750**		48%	**6,340,750**		48%	**6,390,250**		48%	**6,418,250**		43%	**4,627,750**
Return on Capital			6.1%			5.0%			4.7%			4.9%			5.1%			4.5%
Return on Equity			5.7%			3.1%			2.3%			2.9%			3.2%			1.0%

Cropping Farm Model - B Block

6.44 The fourth farm system model presented is the Cropping Farm system which is also a 300 hectare irrigated farm. **Table 28** below outlines the key farm system production assumptions for each scenario in my excel model.

Table 28. Farm system assumptions for Temuka Cropping Farm B Block.

Key Farm System Assumptions - Cropping						
	Unrestricted	**Current SQ**	**2025**	**2027**	**2030**	**2035**
Sheep						
Lambs traded	1,500	1,500	1,500	1,500	1,500	1,500
Per head gross margin	$ 25	$ 25	$ 25	$ 25	$ 25	$ 25
Cropping						
Barley Yield / ha	9.50	7.77	6.46	6.77	7.01	5.06
Barley Price / Tonne	$ 375	$ 375	$ 375	$ 375	$ 375	$ 375
Wheat Yield / ha	11.50	9.40	7.82	8.19	8.48	6.12
Wheat Price / Tonne	$ 400	$ 400	$ 400	$ 400	$ 400	$ 400
Peas Yield / ha	3.0	2.5	2.0	2.1	2.2	1.6
Peas Price / Tonne	$960	$ 960	$ 960	$ 960	$ 960	$ 960
Clover Yield / ha	0.70	0.57	0.48	0.50	0.52	0.37
Clover Price / Tonne	$ 5,400	$ 5,400	$ 5,400	$ 5,400	$ 5,400	$ 5,400
Grass Yield / ha	2.00	1.64	1.36	1.43	1.48	1.07
Grass Price / Tonne	$ 1,900	$ 1,900	$ 1,900	$ 1,900	$ 1,900	$ 1,900

6.45 The impacts of the irrigation restrictions for the period October to January have been applied to the crop yields.

Financial Return Cropping Farm B Block

6.46 **Table 29** below shows the budget summary of an irrigated cropping unit for a TCGI B Block.

Table 29. Budget summary for Temuka Cropping Farm – B Block.

Budget Summary - Temuka B Block												
	Unrestricted		**Current SQ**		**2025**		**2027**		**2030**		**2035**	
	Total	**per ha**	**Total**	**per ha**	**Total**	**per ha**	**Total**	**per ha**	**Total**	**per ha**	**Total**	**per ha**
Income	$1,229,475	$4,098	$1,014,198	$3,381	$852,003	$2,840	$890,340	$2,968	$919,830	$3,066	$678,012	$2,260
Farm Expenses	$669,164	$2,231	$669,164	$2,231	$669,314	$2,231	$669,314	$2,231	$669,314	$2,231	$669,314	$2,231
EBIT	**$560,311**	**$1,868**	**$345,034**	**$1,150**	**$182,689**	**$609**	**$221,026**	**$737**	**$250,516**	**$835**	**$8,698**	**$29**
Interest and Rent	$195,000	$650	$145,000	$483	$145,000	$483	$145,000	$483	$145,000	$483	$145,000	$483
NPBTD	**$365,311**	**$1,218**	**$200,034**	**$667**	**$37,689**	**$126**	**$76,026**	**$253**	**$105,516**	**$352**	**-$136,302**	**-$454**
Loan Principal	$175,000	$583	$125,000	$417	$125,000	$417	$125,000	$417	$125,000	$417	$125,000	$417
CAPEX & Drawings	$135,000	$450	$135,000	$450	$135,000	$450	$135,000	$450	$135,000	$450	$135,000	$450
Depreciation	$50,000	$167	$50,000	$167	$50,000	$167	$50,000	$167	$50,000	$167	$50,000	$167
Surplus	**$5,311**	**$18**	**-$109,966**	**-$367**	**-$272,311**	**-$908**	**-$233,974**	**-$780**	**-$204,484**	**-$682**	**-$446,302**	**-$1,488**
Interest Coverage Ratio	2.87		2.38		1.26		1.52		1.73		0.06	

6.47 **Table 29** shows that the cropping farm system is affected the most by the changes in reliability over the summer months when cropping farms yields are impacted the most. EBIT drops by 97%from 2035 plan change which makes it uneconomic to continue as a cropping farm. Returns under the 2025, 2027 and 2030 steps are marginal which would suggest that only cropping farms with no debt would be able to continue farming.

6.48 The balance sheet (**table 30**) below also is like that of the other farm system models but cropping farms have a higher level of investment in plant and equipment. The balance sheet table shows the impact of the lower returns on the Return on Equity of the farm. The fact that these farms become unsustainable is shown in the drop in land value.

Table 30. Asset value changes due to PC7.

Balance Sheet - Cropping Temuka A Block																		
Assets	**Unrestricted**			**Current SQ**			**2025**			**2027**			**2030**			**2035**		
Irrigated Land	300	$ 30,000	9,000,000	300	$ 27,500	8,250,000	300	$ 22,500	6,750,000	300	$ 22,500	6,750,000	300	$ 25,000	7,500,000	300	$ 16,000	4,800,000
Dryland	0		0	0		0	0		0	0		0	0		0	0		0
Plant and Machinery			1,500,000			1,500,000			1,500,000			1,500,000			1,500,000			1,500,000
Livestock			0			0			0			0			0			0
			10,500,000			**9,750,000**			**8,250,000**			**8,250,000**			**9,000,000**			**6,300,000**
Liabilities																		
Term Loan		33%	3,500,000		26%	2,500,000		$ 0	2,500,000		30%	2,500,000		28%	2,500,000		40%	2,500,000
Net Worth		67%	**7,000,000**		74%	**7,250,000**		70%	**5,750,000**		70%	**5,750,000**		72%	**6,500,000**		60%	**3,800,000**
Return on Capital			4.1%			2.2%			0.6%			1.0%			1.3%			1.8%
Return on Equity			2.6%			0.2%			-2.6%			-1.9%			-1.2%			-2.1%

7. COST OF WATER RIGHTS REDUCTION UNDER PC7 2035

7.1 My previous analysis looks at the reduction in productivity from when water availability changes and is modelled on ECAN's availability data over the time staged PC7 steps. If a water right is being used and has to be fully surrendered to provide greater availability to existing consent holders then there is an additional cost to the surrender of this water. The value reduction to this water right no longer being available is the lost revenue which is the difference in production of a dryland farm versus an irrigated farm and the reduction in land value of an irrigated farm versus a dryland farm.

7.2 In order to put a value on the surrendered water rights that will need to occur under PC7 I have used the following table provided by the Temuka Catchment Working Party (TCWP) which shows minimum flows and the reduction in water rights over the PC7 steps.

Table 31 – Reduction in Water Available due to increased Minimum Flows - TCWP

Regime	A Allocation	Total Reduction	B Allocation	Total Reduction
Current	2500	0	750	0
3 years from operative plan	2350	150 l/s (6%)	600	150 l/s (20%)
5 years from operative plan	2150	250 l/s (10%)	400	350 l/s (47%)
8 years from operative plan	1900	500 l/s (20%)	400	350 l/s (47%)
8 years from operative plan	Habitat restoration block of 100 L/s			

7.3 To place a value on the reduction in water is to value and the difference in Gross Farm Income for a dryland farm versus an irrigated farm and the change in land value for a dryland farm versus an irrigated farm.

7.4 By way of an example I have used the Ministry for Primary Industries (MPI) Annual Farm Financial Survey Data[2] for Sheep and Beef Farms to evaluate the total value from a reduction in water rights. Based on the 2035 scenario which will see 500l/s of A Block and 350l/s of B Block consents reduced. 1 Litre per second per hectare per day equates to an application rate of 8.64mm/ha/day if the average application rate in the Temuka catchment is 4mm/ha/day then 1 litre per second would irrigate 2.15 hectares and so a loss of 850 litres per second would mean 1836 hectares of irrigable land is lost through the reduction in water rights under PC7 by 2035.

7.5 The most recent MPI survey data for 2018/19 financial year for a Class 8 South Island irrigated sheep and beef mixed finishing farm shows a Gross Farm Income of $3,111.87 per hectare versus a class 6 non irrigated breeding finishing farm Gross Farm Income of $1,252.33. **The difference in income over 1836 hectares is $3,414,115.44.**

7.6 The difference in land values from the MPI survey data for the two farms which shows a Class 8 Farm land value at $32,518.16 versus the Class 6 Farm land value of $13,708.32. **The difference in land values over 1836 hectares is $34,534,866,24.**

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[2] https://beeflambnz.com/data-tools/sheep-beef-farm-survey

7.7 This is one example based on the data available from sheep and beef farms. Not all farms losing water rights will be sheep and beef but dairy and cropping farms have higher income and land values as my models have previously shown so depending on what type of farms lose water rights then the impact of water rights being surrendered or lost could be much greater.

8. HARRIS REPORT

8.1 In the following section of my evidence, I comment on aspects of the Harris Report, which is a supporting document for PC7.

General comments

8.2 Mr Harris's assessed financial impacts on farm and his farm financials[3] do not include any capital replacement costs or wages of management; his tables in Appendix B stop at Operating Profit. Capital, Wages of Management and Depreciation Charges are standard costs and provisions that are required to be considered when assessing farm profitability.

8.3 The provision for maintaining the level of capital employed on farm is essential to ensure that the farm continues to be sustainable and operate. In future, there will be additional capital requirements on farms to allow for increased efficiencies required of irrigators to implement new water way fencing requirements, riparian planting, and other on-farm mitigations to comply with nutrient management policies, along with new emissions trading liabilities. In addition, not allowing for wages of management overstates the profitability of the farm financials. Farm owners require adequate returns to ensure the farm provides for them otherwise the model falls over with no management employed. Mr Harris has also not allowed for any debt repayment in his financials either.

8.4 These three omissions can represent up to a third of Gross Farm Surpluses in some farming operations. I believe that by omitting them Mr Harris' report underestimates the effect on farm profitability of the irrigation restrictions modelled. Without having access to his financial models, it is hard to draw absolute comparisons, but the numbers presented appear to be rounded.

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[3] Page 11, Point 2.3.2 and Appendix B – Summary of Results

8.5 Notwithstanding the above, I agree with Mr Harris conclusions for Temuka on page 13 of his report that "*For the A block, reliability increases, which appears to occur despite the higher minimum flow, and appears to be associated with a move away from a stepped reduction regime under the current and the reduced allocation block. As a result, the on-farm outcomes for the remaining irrigators are improved. However, the reduced allocation leads to lower regional outcomes, including less aggregate operating profit, GDP and employment. For the B block, reliability decreases. There is an increase in minimum flow and decrease in allocation, and regional outcomes decrease significantly. The B block under the new regime is a very marginal resource for run-of-river irrigation. In aggregate, there will be a significant reduction in contribution to the regional economy from the Temuka economy*", which is consistent with my findings[4].

Mr Harris' Pasture Growth Assumption

8.6 One of the keys to determining production loss for the farming systems is the loss of pasture or feed from any model. In his report, Mr Harris provides no growth assumptions in terms of total dry matter grown excepting to say that he has used Lincoln University Dairy Farm pasture growth rates[5]. I have two main concerns with this approach.

8.7 Firstly, Lincoln University Dairy Farm is not directly comparable to the tributary/catchment zones assessed for South Canterbury in terms of pasture growth. Lincoln University will have higher pasture growth as evidenced by Dairy NZ pasture growth rates data for 2018[6]. That data shows Lincoln University Dairy Farm is growing 21.4 tonnes of dry matter and the case study farms used in my evidence, which I consider to all be indicative of the sub catchments, have pasture growth rates of 15.3 to 16.0 tonnes of dry matter. The overstatement of pasture grown overstates the productive capacity of the farms.

8.8 Secondly, in my opinion, utilising Dairy Farm growth rates for all farm types is inappropriate. In my experience, dairy farm growth rates are not comparable to growth rates for sheep and beef, and dairy support, farms.

[4] Page 13 Point 2.4.1
[5] Page 6 Harris Report
[6] Source Dairy NZ Pasture Growth Rate Data 2018

8.9 Mr Harris uses the following methodology[7] for applying irrigation restrictions:

"Full restriction = 100% loss of growth, 10-50% restriction = 70% loss of growth, and 50-90% restriction = 30% loss of growth"

8.10 This may be a typo but it is incorrect to have a higher loss of growth from a lower restriction as highlighted in bold. There appears to be no sound basis for the 100%, 70% and 30% reductions and it is not true that pasture will not grow at all if there is no irrigation. There will always be some residual growth, which would equate to an unirrigated dryland farm.

8.11 On Page 8 of his report Mr Harris states that if irrigation restrictions are applied then irrigated land area will be reduced and replaced with dryland sheep and beef. This may be the case, but if land is irrigated already, then the farm becomes over capitalised with redundant irrigation infrastructure and may struggle under a dryland farming scenario. Further, if the farm is already setup as a dairy unit, it will have further redundant dairy infrastructure and may require capital to allow it to return to sheep and beef (by building fences, a woolshed etc) that make it prohibitive to reconvert to a dryland sheep and beef farm. Other alternatives such as water storage / more efficient irrigation methods may be better alternatives to going back to dryland farming. Depending on the duration of the water restriction, purchasing in feed may be an option which increases farm cost structures.

8.12 Mr Harris has not commented on how farmers who are in financial hardship due to irrigation restrictions may not be able to apply GMP or otherwise comply with nutrient management policies (e.g. nutrient reductions beyond GMP). Nor has he commented on the fact that farms that are under capitalised may be very inefficient in terms of nutrient management, which is a consequence of the irrigation restrictions.

8.13 Mr Harris acknowledges that "*The results of this study should be taken with caution.*[8]" I agree with Mr Harris' comment in this regard. In my opinion caution with Mr Harris' result is needed due to the large variations in assumptions around pasture growth rates, irrigation application rates used and the non-

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[7] Page 6 Note 3 Harris Report
[8] Page 14 Harris Report

scientific linear impact of water restrictions on the growth rates as described above, and the cumulative impact this has on the results presented.

9. SECTION 42A REPORT

9.1 In terms of the Section 42A Report, the changes recommended bring forward the PC7 minimum flow increases and reductions in allocation, and the recommended increases in the B minimum flows at “current” are huge and there is no reference in the report to availability modelling having been completed for these new minimum flows.

9.2 Bringing forward the timeframes for implementing the PC7 Steps only exacerbates the pain inflicted on farmers giving them less time to plan and fund any water saving practices, infrastructure and other mitigations like on farm storage.

Economic considerations in Section 42A Report recommendations

9.3 Neither the Section 42A Report on the 26 June 2020 Supplementary Report make any reference to the economic or financial impacts of the minimum flow and partial restriction regimes proposed by PC7 or the recommendations made in those reports on farmers, the wider community or the New Zealand economy. I therefore infer that the Harris Report, which was prepared prior to the Section 42A Report, has not been taken into account and there are no other details of the financial impacts which in my opinion should have been evaluated.

9.4 This is especially concerning given the gravity of the impacts reported in my evidence, and the importance of agriculture and food production at a time when the New Zealand economy currently requires productivity, jobs and economic well-being to be preserved from the negative impacts of covid 19.

Grant Porter

Date 17th July 2020