Wairarapa Flow Regimes

Economic impact assessment of Proposed Plan changes

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1 Executive Summary

Greater Wellington Regional Council (GWRC) is undertaking a review of the flow regimes in the Wairarapa. A report was released in July 2015 that assessed the economic impacts of changes to reliability for irrigators under the Draft Natural Resources Plan (DNRP). GWRC has considered the impacts of the draft plan provisions and heard from stakeholders in the catchment. As a result it has made some changes to the draft plan provisions for the Proposed Natural Resources Plan (PNRP), most notably to introduce a 50% restriction for A class consent holders at the minimum flows rather than a 100% restriction on takes as proposed in the draft plan.

The modelling assesses a range of existing consent conditions against the DNRP and PNRP flow regimes. In general there are only minor effect of the PNRP in all catchments apart from the Papawai and Waingawa which are moderately affected, and the effects are much less severe than the DNRP effects across all catchments. It should be noted that there will be a number of consents who currently have no minimum flow specified who will be more severely affected than the aggregate suggests for the catchment. However the ability to continue irrigating under the PNRP even when the minimum flow is reached will provide significant benefits for those with arable and horticultural crops which have high potential for significant damage with complete restriction on irrigation takes.

2 Background

Greater Wellington Regional Council (GWRC) is undertaking a review of the flow regimes in the Wairarapa. There are a number of potential changes to rivers in the area, and these changes have the potential for significant effects on irrigators. These changes are detailed in the draft Natural Resources Plan for the Wellington region (DNRP) released for public comment in August 2014. An interim report was provided in June 2015 to give initial information from an analysis of the potential impacts of changes to the flow regime. A draft report was released in July 2015 that updated the interim report, and included greater detail on method, and provides some small corrections and updates, and it described the impacts of the Draft Natural Resources Plan.

GWRC has considered the impacts of the draft plan provisions and heard from stakeholders in the catchment. It has made some changes to the draft plan provisions, most notably to introduce a 50% restriction for A class consent holders at the minimum flows rather than a 100% restriction on takes as proposed in the DNRP. These conditions form the Proposed Natural Resources Plan (PNRP), and this report analyses the impacts of the proposed provisions, comparing them with the current state and the DNRP provisions.

Because there are a number of catchments that need to be assessed, and because irrigators in those catchments have a range of different consent conditions, there is also a considerable level of complexity in the analysis. The report comprises a discussion of the method, and then an overview of the results and trends that are apparent in each catchment, with a brief summary discussion of the trends across catchments. A set of results for each catchment and scenario are provided in the appendices, which comprises the bulk of the report.

3 Key method and assumptions

3.1 Flow regimes

Each catchment has a different set of flow data, and sometimes more than one based on different recorder sites or sites where minimum flows are set. The analysis therefore treats each controlling recorder site and associated flow record as a set of scenarios to be analysed.

For each catchment/flow record there are a range of current consent conditions, ranging from no minimum flow or restriction requirements to a complex set of stepped reductions in flow regimes. Each consent condition has the common feature of either 100% restriction, 50% restriction and/or 25% restriction, but these are imposed in different combinations and at different flow points. Common sets of consent conditions were grouped within each catchment/flow record, and each of these common consent conditions was analysed as a separate scenario.

The draft Plan provision (DNRP) and the proposed plan provisions (PNRP) flow regimes were analysed for each catchment, and it was assumed that the provisions applied to all consents in the catchment. Although it is likely that this would be introduced over time as consents were reviewed or renewed, the analysis treats them all as occurring at the same time. In this respect it is a snapshot in time of the difference between the current situation

and the situation that would occur if the DNRP or PNRP regimes were introduced immediately.

The current, DNRP and PNRP scenarios are shown in Table 1 below.

Table 1: Scenario for current and DNRP regimes, Wairarapa reliability assessment (flows in l/s)

	Flow at Level of restriction (l/s)		
Scenario	**25%**	**50%**	**100%**
Mangatarere @ Gorge 270		270	
Mangatarere @ Gorge 330		330	240
Mangatarere DNRP		330	240
Mangatarere DNRP		240	
Otaki @ Pukehinau 2550			2550
Otaki @Pukehinau unrestricted	0	0	0
Otaki DNRP		3975	2550
Otaki PNRP		2550	
Papawai @ Fabians Rd unrestricted			
Papawai @ Fabians Rd 160		160	
Papawai @ Fabians Rd 190		190	
Papawai DNRP			180
Papawai PNRP		180	
Ruamahanga @ Waihenga unrestricted	0	0	0
Ruamahanga @ Waihenga 8500		8500	
Ruamahanga @ Waihenga 9200		9200	8500
Ruamahanga @ Waihenga 9800		9800	
Ruamahanga DNRP		9200	8500
Ruamahanga PNRP		8500	
Ruamahanga @ Wardells unrestricted			
Ruamahanga @ Wardells 2400		2400	
Ruamahanga @ Wardells DNRP		2700	2400
Ruamahanga @ Wardells PNRP		2400	
Tauherenikau @ Gorge 1350		1350	
Tauherenikau @ Gorge 1350 and 1100		1350	1100
Tauherenikau DNRP			1300
Tauherenikau PNRP		1300	
Waingawa @ Kaituna unrestricted			
Waingawa @ Kaituna 1700			1700
Waingawa @ Kaituna 1900		1900	1700
Waingawa @ Kaituna 3500	3500	1900	
Waingawa @ Kaituna DNRP		1900	1700
Waingawa @ Kaituna PNRP		1700	
Waiohine @ Gorge 3040		3040	
Waiohine @ Gorge 3395		3395	
Waiohine @ Gorge 4000		4000	
Waiohine DNRP			3040
Waiohine PNRP		3040	
Waipoua @ Mikimiki 250		250	
Waipoua @ Mikimiki 300		300	250
Waipoua DNRP		300	250
Waipoua PNRP		250	

WRC supplied flow records to estimate availability of water for irrigation, and climate data to estimate demand. Demand was estimated using a 15 day rolling ratio of rainfall to PET – when rainfall exceeded PET over that period it was assumed that no significant impact would on production would arise as a result of an irrigation restriction.

3.2 Land use and areas irrigated

WRC supplied an extract from the consent database showing the area irrigated and land use for each consent, together with the conditions attached to that consent. This information was used to estimate land use and irrigated area for each scenario as shown in Table 2. Note that the area for the DNRP and PNRP scenarios are equal to the sum of the areas for the existing scenarios, on the basis that all irrigators would be placed on the DNRP or PNRP scenario under the Plan.

Table 2: Estimate of land use and irrigated area by scenario, Wairarapa reliability assessment (ha)

Catchment and scenario assessed	Dairy (ha)	Arable (ha)	Sheep and Beef (ha)	Horticulture (ha)	Vineyard (ha)	Total (ha)
Mangatarere @ Gorge 270	106	0	40	0	0	146
Mangatarere @ Gorge 330	43	0	0	0	0	43
Mangaterere @ Gorge DNRP	150	0	40	0	0	190
Mangaterere @ Gorge PNRP	150	0	40	0	0	190
Otaki @Pukehinau unrestricted	0	4	69	11	0	85
Otaki @Pukehinau 2550	0	0	0	2	0	2
Otaki DNRP	0	4	69	13	0	86
Otaki PNRP	0	4	69	13	0	86
Papawai @ Fabians Rd unrestricted	0	0	0	26	0	26
Papawai @ Fabians Rd 160	78	0	0	0	0	78
Papawai @ Fabians Rd 190	126	0	0	0	0	126
Papawai DNRP	203	0	0	26	0	229
Papawai PNRP	203	0	0	26	0	229
Ruamahanga @ Waihenga unrestricted	384	0	36	0	9	429
Ruamahanga @ Waihenga 8500	1226	0	344	0	3	1573
Ruamahanga @ Waihenga 9200	69	0	0	0	0	69
Ruamahanga @ Waihenga 9800	0	0	86	0	0	86
Ruamahanga @ Waihenga DNRP	1680	0	466	0	12	2158
Ruamahanga @ Waihenga PNRP	1680	0	466	0	12	2158
Ruamahanga @ Wardells unrestricted	194	0	84	6	0	283
Ruamahanga @ Wardells 2400	773	0	241	3	312	1329
Ruamahanga @ Wardells DNRP	967	0	325	8	312	1612
Ruamahanga @ Wardells PNRP	967	0	325	8	312	1612
Tauherenikau @ Gorge 1350	355	0	35	0	0	390
Tauherenikau @ Gorge 1350 and 1100	22	0	0	0	0	22
Tauherenikau DNRP	377	0	35	0	0	411
Tauherenikau PNRP	377	0	35	0	0	411
Waingawa @ Kaituna unrestricted	0	0	30	6	0	36
Waingawa @ Kaituna 1700	0	0	9	0	0	9
Waingawa @ Kaituna 1900	0	0	43	0	0	43
Waingawa @ Kaituna 3500	116	0	0	0	0	116
Waingawa DNRP	116	0	82	6	0	204
Waingawa PNRP	116	0	82	6	0	204
Waiohine @ Gorge 3,040	62	0	0	0	0	62
Waiohine @ Gorge 3040	221	0	40	58	0	319
Waiohine @ Gorge 3395	109	0	90	12	0	211
Waiohine @ Gorge 4000	0	0	14	0	0	14
Waiohine DNRP	392	0	144	70	0	606
Waiohine PNRP	392	0	144	70	0	606
Waipoua @ Mikimiki 250	0	16	28	0	0	44
Waipoua @ Mikimiki 300	0	0	13	0	0	13
Waipoua DNRP	0	16	41	0	0	57
Waipoua PNRP	0	16	41	0	0	57

3.3 Reliability modelling

The use of a percentage description of reliability at the point of take is a relatively crude indication of reliability and does not automatically indicate the degree of impact on a farmer's ability to apply water and maintain pasture or crop production. Lincoln Environmental[1]

[1] Lincoln Environmental: Reliability of Supply for Irrigation in Canterbury. Report No 4465/1, Prepared for Environment Canterbury (June 2001)

identified that *"In its broadest sense, reliability of supply of irrigation water describes the restrictions and water availability an enterprise can expect and the subsequent effect of these restrictions on farm profit. It has aspects of timeliness, steadiness, variability, predictability and is related to user expectations."* There are four aspects needed to accurately describe restrictions.

1. **Severity** or the amount of restriction.

2. **Frequency** or how many times a year that restrictions can be expected and how many years in which they will occur.

3. **Duration** or how long the restrictions last for.

4. **Timing** or when in the production season that the restrictions occur.

The model estimates how much water is available for each flow series and minimum flow point, and if the minimum flow point is breached the appropriate level of restriction is recorded. Note that the figures used assume that abstraction has no impact on flows, which WRC hydrologists have indicated is a reasonable high level approach to calculating the restriction regime for the groundwater takes in these catchments.

The collated data has been used to assess the nature of the irrigation restrictions according to the Lincoln Environmental descriptors in the following way:

- **Severity** is distinguished in this analysis as full or partial restrictions under each of the DNRP flows. Severity is indicated by the number of days in a year in which each of these types of restrictions occur during average, 1 in 4 year, 1 in 10 event and worst year events.

- **Frequency** is shown by the number and frequency of years in which restrictions occur at different severity. This is shown in the second table of results for each catchment in the appendices.

- **Duration** is shown by the highest number of consecutive days of restriction at any given severity. Consecutive days of full and 50% restrictions only are shown in the first table for each catchment in the appendices.

- **Timing** is shown by whether the restrictions occur in the first half of the year or the second half of the year. This is given in the third table of results for each catchment in the appendices.

3.4 Financial modelling

The financial analysis is based on the farm models developed by Baker and Associates (2015) for the Wairarapa Water Use Project for dairy, arable sheep and beef, and vineyard land uses. The horticulture land use model uses revenue and expenses as estimated by Ford (2012) for the hearings for the Tukituki plan change hearings.

Productivity capacity is calculated by the model based on an annual production of 16,100 kg DM consumed. Any days of irrigation capability that are lost from the base are then converted to production lost. This is calculated on a formula of:

Irrigation days lost X Weighted Average Daily Growth = Total Growth Lost

The weighted average growth is calculated by the average irrigated growth of the period when water is lost, with the estimates of irrigated growth derived from the Massey University irrigated pasture growth rates as reported in DairyNZ pasture growth data[2]. Growth lost is increased by 10% for 50% and full restriction events to account for management difficulties and potential dormancy associated with more severe restriction events.

The irrigation days lost are taken as the total of the restriction water days times the proportion of restriction.

3.4.1 On farm estimates

The Dairy model is set up to convert the utilisable feed grown to milksolids using the conversion factor of 11, in that is that it takes approximately 11 kg DM for every one kg of milksolids. All other revenue and variable expenditure items are driven by the feed consumed. Fixed expenditure is set out for all factors that don't change regardless of productivity.

The arable model is set up to respond to a percentage change in production from the possible model. This is set up to respond with a .05% change in yield for every day's water lost. This is in line with expected crop production which is a relatively straight line relationship between irrigation lost and expected yield. All other revenue and expenditure items are driven by the model figures. Thus it is only revenue which changes as the yield varies.

The horticulture model assumes the same crop response as the pasture model, and the viticulture model is driven by a straight line reduction in returns with reductions in water availability. The modelling is simplistic for these crops, in that it does not take into account impacts of timing or quality. The timing of restrictions and impacts on quality are likely to be of limited impact for viticulture[3] and olives[4] which are the largest horticultural crop in the catchment (2012 Agricultural Census data[5]). Without individual surveying of the impacts of the irrigators in the area to specify crops and production systems it is not possible to be more precise within the terms of this study. However a commentary is provided in the results summary for each catchment regarding the potential impacts on horticulture.

For the sheep and beef model the revenue performance is driven by the returns per kgDM consumed. Variable expenditure is altered by the stocking rate that is able to be run.

[2] Massey University irrigated farm cited in DairyNZ Lower NI pasture growth data http://www.dairynz.co.nz/feed/pasture/pasture-growth-data/. Accessed 8 June 2015

[3] Wine grapes are highly resilient to irrigation deficits, particularly in the later part of the season once ripening has commenced (e.g. see (Green, Greven, & Clothier, 2005). The majority of restrictions in the Wairarapa area are in the second half of the season.

[4] The majority of olives grown in New Zealand are for oil production. Yield reductions will occur, but the oil production system is more resilient than table olive production to reductions in size of fruit that may occur with irrigation restrictions.

[5] Statistics NZ. The only other non-confidential outdoor tree crops in the Wairarapa area are a small area of pears (13ha) and plums (13ha).

Table 3: Financial model key indicators and assumptions

Item	Dairy	Sheep and beef	Arable	Horticulture	Vineyard
Revenue	$10,906/ha	$2,342/ha	$3,431/ha	$33,317/ha	$15,716/ha
Revenue/unit	6.50/kgMS	0.145/kgDM consumed			
Fixed expenses	$655/ha	$393/ha	$866/ha	$23,101/ha	$8,609/ha
Variable expenses	$2.72/kgMS	$32.21/su			

The revenue and expense models are used to calculate a per ha revenue, expenses and cash operating surplus (EBIT) for each land use. These per ha outcomes are shown in the fourth table for each catchment.

3.4.2 Catchment and regional outcomes

The per ha outcomes are multiplied by the area in each land use for the catchment and scenario, and these are summed to represent the aggregate outcomes under the current and DNRP/PNRP regimes.

The regional outcomes were calculated using an Input/Output (I/O) table for the region supplied by Insight Economics. The dairy sector from the I/O table was used directly, the sheep, beef and arable sector from the I/O table was used to represent those sectors and vegetable production, while the horticulture sector from the I/O table was used to represent viticulture. Only the total regional outcomes were calculated, which represents the sum or direct, indirect and induced effects from each activity.

4 Results

A set of results is shown for each catchment/flow point and scenario in Appendix A to Appendix I below.

The results are provided as severity, duration and frequency of restrictions, timing of restrictions, the per ha financial outcomes for each scenario, and the aggregate outcome for the sum of the current regimes vs the DNRP regime.

Because the straight line modelling approach does not lend itself to the impacts of horticulture,

4.1 Mangatarere

The Mangatarere has two regimes currently in place for consented takes

- 50% restrictions at 270l/s only (270 regime)
- 50% restrictions at 330l/s and 100% restrictions at 240l/s (330 regime).

The DNRP regime is the same as the latter 330 regime, and the PNRP goes on 50% restriction at 240l/s.

There are no unrestricted consents in this catchment. The majority (146ha/190ha) of the land use is on the less restrictive 270 l/s regime while only 43 ha is on the same 330 regime as the DNRP. No irrigated horticulture is recorded for this catchment.

The 270 l/s regime experiences moderate to poor reliability, with 45 days of 50% restriction on average and 87 in the worst year. In the 330/DNRP regime however there are 37 days of full restriction and 26 of 50% restriction, indicating a greater number of restrictions and greater severity. The average loss in irrigable volume increases from 8% in the 270 current regime to 18% in the 330/DNRP regime.

Under the PNRP irrigators would experience better reliability than either of the current regimes, with only 37 days of 50% restriction and 7% volume restriction.

Restrictions occur in both the first and second half of the year under all scenarios, although they are worse in the second half of the year.

The aggregate outcomes as a result will be worse for most of those currently irrigating from the catchment under the DNRP regime, and better than for all current irrigators under the PNRP. Under the PNRP there will be approximately 4% increase in average cash operating surplus and 4% increase in average contribution to regional outcomes (GDP, household income and employment). In more severe restriction events cash operating surplus increases by 2% - 13% relative to the current aggregate, and contribution to regional economic activity by 3% -7%.

4.2 Papawai

The Papawai has three current regimes:

- 50% restrictions at either 160 l/s
- 50% restrictions at 190 l/s, and
- a small area (26ha) is currently unrestricted.

Slightly more of the current irrigated area is restricted at 190 l/s (126ha) than at 160 l/s (78 ha). The DNRP regime has more severe restrictions with full cut-off at 180 l/s, and the PNRP sits between the 160 and 190/s consent conditions with a 50% restriction at 180l/s.

The full restriction included in the DNRP regime means that although the overall number, frequency and duration of restrictions is similar to the current regimes for those restricted, the increased severity of restriction means that overall the reduction in volume available for irrigation is significantly greater on average (22% reduction for DNRP vs 9 – 13% for current regimes), and in the more severe restriction events. The worst year has a 43% reduction in volumes compared with 21 – 23% under the current regimes. Obviously for the small area (26ha) with no restrictions the difference between current and DNRP is significantly greater. It should be noted that with the DNRP regime imposing 61 days of full restriction in an average year and 119 in the worst year, irrigation becomes a marginal proposition.

The PNRP however has more similar outcomes to the current consent conditions, with all restrictions in the 50% category, and slightly greater volume restriction than the 10 consent conditions and slightly fewer than the 190 consent conditions. These characteristics carry through the 1 in 4, 1 in 10 and worst year events.

The restrictions occur in both the first and second half of the year, although they are worse in the second half of the year. The ability to continue with some irrigation even in severe events under the PNRP means that its impacts will be considerably less than the DNRP.

For landholders moving to the PNRP regime there will be insignificant reductions in per ha returns relative to the current consent conditions (apart from those currently unrestricted). These mean that the aggregate cash operating surplus reduces by 1% in an average year and by 8% in the worst year with horticulture suffering significant negative cash operating surplus. The contribution to GDP, household income and employment reduces by <1% in an average year and by 38 – 40% in the worst year.

A small area (26 ha) of tree crop, which appears to be primarily pipfruit, is recorded for this catchment, and it is irrigated from the consent with no current restrictions. This consent would be most severely affected of all consents in the catchment, and the extended duration of restrictions that occur in this catchment have the potential to impact on horticultural operations, particularly given that the irrigated horticultural area has previously been unrestricted. Pipfruit is susceptible to impacts on both yields and quality if water is restricted at critical times of the year. However the consent allows for substantial takes relative to demand on both a take rate and volume basis (1.24 l/s/ha on a take rate or 0.6 l/s/ha on a daily volume rate), which would limit the impact of a 50% restriction in the Proposed Plan at minimum flows.

4.3 Ruamahanga River at Waihenga

The Ruamahanga at Waihenga has four different regimes in place.

- About a quarter (429ha) of irrigation is currently unrestricted
- The majority (1573ha) is restricted by 50% at 8500 l/s (8500 regime).
- 69 ha is restricted by 50% at 9200 l/s and fully at 8500l/s (9200 regime)
- 86 ha is restricted by 50% at 9800 l/ (9800 regime).

The DNRP regime is identical to the 9200 regime, with 50% restrictions at 9200 l/s and 100% restrictions at 8500 l/s. The PNRP however is identical to the 8500 regime, with 50% restrictions introduced at 8500l/s.

The majority of the catchment experiences very mild restrictions at present, with 10 days of 50% restriction on average, and 45 in the worst year for the 8500 regime. This experience would extend to all irrigators under the PNRP. The 9200 regime, which is the same as the DNRP, is approximately twice as bad with 10 days of 100% restriction and a further 3 days of 50% restriction on average, rising to 45 and 11 respectively in the worst year. The volume restrictions are approximately 2% on average currently under the 8500, and this rises to 4% on average under the 9200/DNRP. Those on the 9800 regime fall somewhere in between, while those on the unrestricted regime are obviously significantly better off.

Restrictions all occur in the second half of the year.

In aggregate terms summing up the outcomes for the current regime indicates that there would be no change cash operating surplus and regional outcomes on average by moving to the PNRP regime because the negative impacts for those current unrestricted are offset by improvements for those currently on more restrictive regimes. In the worst year the

significantly increased effects on previously unrestricted consents would results in an overall reduction of 10% in cash operating surplus and almost 5% reduction in regional outcomes.

There is no horticulture and 12 ha of viticulture in the catchment, of which 9ha is currently unrestricted. The scale of the restrictions is relatively small, and the take rate of 0.9l/s/ha is would allow continued take of reasonable quantities of water (although depending on the way the restrictions are implemented the daily volume restriction of 0.25 l/s/ha is limiting with a 50% restriction). It should also be noted that the restrictions for this catchment occur in the second half of the irrigation season, which is likely to have more limited impacts for viticulture once fruit set has occurred. The 50% restriction in the Proposed plan will allow for the continuation of some irrigation and on balance this should prevent any major impacts being experienced.

4.4 Ruamahanga at Wardells

There are two regimes currently operating at the Wardells minimum flow site. There is

- 283 ha of unrestricted irrigation, and
- A further 1329 ha which is restricted by 50% at 2400 l/s.

The DNRP regime would require irrigators to restrict by 50% at 2700 l/s, with full restrictions at 2400 l/s, while the PNRP would match the current conditions for consent holder with restrictions, with a 50% restriction at 2400 l/s.

The 2400/PNRP regime for current irrigators results in 8 days of 50% restriction on average, and 47 in the worst year, with an approximately 1% reduction in volume on average and 9 % in the worst year. The DNRP regime would see a reduction in reliability, with 8 days of full restriction on average, and 6 days of 50% restriction. The reduction in volumes available for irrigation would increase to 4% on average and 20% in the worst year under the DNRP regime.

Restrictions occur in the second half of the year.

Because most of the catchment is on the 2400 regime, the reduction in cash operating surplus and contribution to regional outcomes is very small or non-existent under the PNRP and entirely associated with those on no restrictions currently. This is an improvement for irrigators over the DNRP which would result in a 4% reduction in cash operating surplus on average, and a 3% reduction in regional outcomes. In the worst year the impact of the DNRP increases to an 11% reduction in cash operating surplus and a 6% reduction in contribution to regional outcomes relative to the current regime.

This catchment contains only limited areas of horticulture, but significant areas of irrigated viticulture in the catchment. However none of this is currently unrestricted, and the small or non-existent impacts under the PNRP are unlikely to affect the financial outcomes for this land use.

4.5 Tauherenikau

There are two restriction regimes in place on the Tauherenikau. The majority of the catchment (390 ha) has 50% restrictions in place at 1350 l/s, while the remainder (26ha) has

50% restriction at 1350 with a full restriction at 1100 l/s. The DNRP regime is for full restrictions at 1300 l/s, while the PNRP is very similar to the majority of the catchment and has 50% restrictions at 1300 l/s.

The 1350 regime has 14 days of 50% restriction on average and 55 in the worst year, with a 3% reduction in volume available on average. The alternate 1350/1100 regime has a very similar but slightly worse outcome, with a similar number of total restrictions but more severe because of the full restriction at 1100 l/s. The DNRP regime has 12 days on full restriction on average and 50 days in the worst year. The volume reduction in the DNRP regime is 4% on average and 18% in the worst year.

The PNRP has the least impact of all scenarios assessed, with 12 days of 50% restriction on average and 50 in the worst year. The volume restriction is 2% on average and 9% for the worst year.

Most restrictions occur in the second half of the year, although there is a small level of restriction in the first half of the year under all scenarios.

In aggregate terms the PNRP results in a very slight improvement over the current regime on an average basis and across all events, largely associated with the improvement for those irrigators currently experiencing full restrictions at 1100 l/s. For the DNRP regime there is a reduction in cash operating surplus of 2%, and a similar scale of reduction in contribution to regional outcomes (1%). In the worst year this increases to a 16% reduction in cash operating surplus and an 8% reduction in contribution to regional outcomes.

There appears to be no irrigated horticulture or viticulture recorded on consents in this catchment.

4.6 Waingawa

The Waingawa river currently has four regimes in place for irrigators, with:

- A small area (36ha) on unrestricted takes;
- A small area (9ha) on full restriction at 1700l/s (1700 regime);
- 43 ha on 50% restriction at 1900 l/s and 100% restriction at 1700l/s (1900 regime); and
- Approximately half (116ha/204ha) of the catchment on 25% restriction at 3500 l/s and 50% restrictions at 1900 l/s (3500 regime).

The DNRP regime is the same as the 1900 regime, with 50% restrictions at 1900 l/s and full restrictions at 1700 l/s. The PNRP proposes a 50% restriction at 1700 l/s which differs from all existing regimes.

The 3500 regime experiences 34 days of 50% restriction and 56 days of 25% restriction on average, with an 11% reduction in volume available. The DNRP regime has a fewer but more severe restrictions, with 25 days of full restriction on average and 9 days of 50% restriction. There is a similar average reduction in volume to the 3500 regime, but in the worst year there is a 19% reduction in volume under the 3500 regime but 28% reduction in the DNRP regime.

The PNRP has the fewest restrictions of all regimes, with 25 days of 50% restriction on average and 71 in the worst year. This results in a 5% volume restriction for the season and a 13% volume restriction in the worst year.

Restrictions occur in both the first and second half of the season under all scenarios, although the significantly greater proportion of restrictions are in the second half of the season.

In aggregate terms the PNRP results in a 4% improvement in cash operating surplus in the average year, and 24% improvement in the 1 in 10 year event. This is largely associated with the lower minimum flow and the fact that restrictions are only 50% rather than 100%. The improvement is a result of worse restriction for those currently unrestricted being more than offset by gains for those currently experiencing greater restrictions.

The DNRP regime gives approximately the same outcome as the current regime on average. However in more severe events the outcomes for the DNRP will be worse, at least partly because of the unrestricted irrigators will be significantly more severely impacted – in the 1 in 10 year there is a 33% lower cash operating surplus than current, and a 12% reduction in contribution to regional outcomes.

There appears to be 6ha of horticulture in this catchment, which is currently unrestricted. The move from no restrictions to full restriction would have severe impacts for this operation, with the extent and duration of restrictions (10 days of consecutive restriction even in an average year). The impact will be somewhat offset by a relatively high take rate for a horticultural operation (1.24 l/s/ha or 0.6 l/s/ha on a daily volume basis) and the allowance for a continued take at minimum flow. However there is potential for some significant impacts for this operation that should be noted and there will need to be some adaptation by the consent holder to the revised conditions.

4.7 Waiohine

There are three flow regimes in place for consents on the Waiohine. These all differ in the level at which 50% restrictions are introduced:

- 50% at 3040 l/s (319ha);
- 50% at 3395 l/s (211 ha); and
- 50% at 4000 l/s (14 ha).

The DNRP regime would require full restriction at 3040 l/s, but would have no partial restrictions, while the PNRP would match the 3040 regime.

The DNRP regime has the same number of days of restriction as the 3040/PNRP regime, with 4 on average and 22 in the worst year, with the restrictions being more severe at 100% rather than 50%. The number of restriction days increases for the 3395 and 4000 regimes, with the 4000 experiencing 19 days of 50% restriction on average and 40 in the worst year. The average volume restriction is only small (~1%) in both the 3040/PNRP and DNRP regimes, increasing to 2 – 3% in the other regimes. Restrictions occur in 2/3 of years in all but the 4000 regime, which experiences restrictions every year. The restrictions are largely in the second half of the year, with occasional restrictions in the first half under the 3395 and 4000 regimes, but not under the PNRP or DNRP regime.

In aggregate terms on average there is almost no difference in contribution to regional outcomes for the PNRP and DNRP when compared with the current situation, and only a 1% reduction in cash operating surplus for the DNRP. Some irrigators on the higher frequency restriction regimes will be slightly better off under both the PNRP and DNRP, and others on the 3040 will be slightly worse off under the DNRP but unaffected by the PNRP. In the more severe restriction events the cash operating surplus for the PNRP increases by 7 – 9% and contribution to regional outcomes by 3%.

There is 70ha of horticulture in the catchment of which 27 ha are vegetable and mushroom growing. Under the PNRP there are very few restriction events, and with a 50% continued take and a high allowed take rate the impact on these activities should be minimal

4.8 Waipoua

There is only a small area irrigated on the Waipoua, with most (44ha) experiencing 50% restrictions at 250 l/s, while the remainder (13ha) currently experiences 50% restrictions at 300 l/s and 100% restrictions at 250 l/s. The DNRP regime matches the latter regime with restrictions at 300 l/s and 250 l/s, while the PNRP matches the 250l/s regime, with 50% restrictions at 250 l/s.

Because of the higher minimum flow and the more severe restriction there is an increase in the number of and severity of restriction events under the DNRP regime for the majority of the catchment. There are 18 days of 50% restriction on average in the current 250 and PNRP regimes, which are all experienced as full restrictions under the DNRP regime. The DNRP regime also has an additional 7 days on average of 50% restriction. In the worst year there are 43 days of 50% restriction currently and under the PNRP, which are all full restriction under the DNRP plus an additional 19 days of 50% restriction under the DNRP regime. There is an average of 3% loss of irrigable volume from restrictions under the 250/PNRP regime, which increases to 8% under the DNRP regime.

Restrictions occur largely in the second half of the year, with only a small level of partial restriction in the first half of the year.

In aggregate terms on average the PNRP regime results in a slightly improved (1%) outcome in other cash operating surplus and regional outcomes relative to the current, which increases to a 4% improvement in operating surplus in the worst year events. This is a results of the small area which currently experiences full restrictions having improved reliability. The DNRP regime will reduce cash operating surplus from the catchment by 7% and contribution to regional outcomes by 4%, while in the worst year there will be a 25% reduction in cash operating surplus and 13% reduction in contribution to regional outcomes.

There is no horticulture or viticulture undertaken in this catchment according to consent records. There is a small area of cropping, but this is not affected by the change to the PNRP.

4.9 Otaki

There is only a very small (2ha) area currently on any flow management regime in the Otaki, but this appears not to have any impact because the minimum flows are not reached in the period of record. The PNRP imposes a 50% restriction at 2550 l/s, which is not reached during the period of record. The DNRP flow however has a higher flow at which 50% restrictions are imposed (3975l/s), and this is reached 2 years out of 5, with 3 days per year

on average and 34 days in the worst year. The volume restrictions are between 1% on average and 6% reduction in available volume in the worst year. The restrictions that do occur are in the second half of the year.

In aggregate terms there is no effect from the PNRP regime in any event, nor from the DNRP regime on average or for the 1 in 4 year event. In the 1 in 10 events for the DNRP there is a small reduction in revenue and a larger reduction in cash operating surplus associated with the move to a minimum flow, indicating that the minimum flow really only has a significant effect in the very dry years.

There are areas of horticulture in the Otaki catchment, but the lack of impact under the PNRP means there will be no effective change for these consents.

4.10 Overview

There is a considerable amount of data and it is difficult to determine simple conclusions for the analysis.

It should be noted that the analysis undertaken is high level, and contains some issues. The PET data for the Wairarapa is applied to the Otaki catchment, which is likely to have some small differences in outcomes as the demand profile for Otaki may differ from the Wairarapa. The flow records for the Waipoua and Papawai are less than 10 years in duration, and the Mangatarere record is only 15 years. Aggregate farm budgets are used, and these may not be applicable to all enterprises in all catchments. The reductions in production are assumed to be reasonably linear but this relationship may under or overestimate the actual production loss depending on the soil type, location and available soil moisture.

There are some high level statements which can be made about the likely impacts from the PNRP changes.

- The outcomes for those who are currently unrestricted are likely to be adverse from moving onto a flow regime with restrictions, unless the flow regime is very benign. It is important that the impacts to these individuals is not lost in the aggregation of data across all irrigators, and for the unreliable catchments such as Mangatarere, Papawai and Waingawa these impacts will be potentially severe (although they are mitigated by the fact that irrigation is not completely restricted under the PNRP).
- Restrictions occur in most catchments currently, although there are some catchments which have only a few irrigators on a flow regime. The severity and duration of restrictions varies by catchment, but generally they occur in the second half of the year, and where they do occur in the first half of the year are not as bad as the second half.
- For those currently on a flow regime with some restrictions, the results from the various catchments can be divided according to their current reliability and the PNRP reliability:
    - Good reliability with a positive impact of PNRP changes –Ruamahanga at Waihenga, Tauherenikau, Waiohine, and Waipoua;
    - Good reliability with nil or small negative impact of PNRP changes – Ruamahanga at Wardells and Otaki

- Moderate current reliability and small or positive impact from the PNRP – Mangatarere,
- Moderate current reliability and small to moderate negative impact from the PNRP – Papawai and Waingawa.

- The impact for irrigators across all catchments is much less significant under the PNRP than under the DNRP. Furthermore the ability to continue irrigating even when the minimum flow is reached will provide significant benefits, particularly for those with arable and horticultural crops which have high potential for significant damage with complete restriction on irrigation takes.
- The impact on horticultural and viticulture operations is not well modelled in the approach adopted here, and in order to fully ascertain the impacts would require individual interviewing of the consent holders regarding the nature of their operations, and potential impacts on quality as well as yield. However in general there is only a small area of horticulture, and the regimes have only a relatively small impact on horticultural operations, primarily for those who are currently unrestricted. No irrigated horticulture or viticulture is recorded in the Mangatarere, Tauherinikau, and Waipoua; and the impacts of restrictions or change of restrictions for horticulture and viticulture will be small or non-existent in the Otaki, Waiohine, and Ruamahanga at Wardells. The most severe potential impacts will be for horticultural operations in the Waingawa (6ha), Papawai (26ha of pipfruit), potentially for viticulture in Ruamahanga at Waihenga. The allowance for a continuance of some takes should ensure that the impacts can be mitigated somewhat, but it may require adaptation of management and will involve some impacts in the worst years.

Appendix A Results for Mangaterere at Gorge

Table 4: Mangatarere at Gorge estimates of severity and duration of restriction events

Area = Mangatarere River at Gorge		Full days lost (100% restriction)	50% restriction	25% restriction	Consecutive days of full restriction	Consecutive days of 50% restriction	Volume restriction
Mangatarere @ Gorge 270	**Average**	0	45	0	0	15	8%
	1 in 4 year	0	65	0	0	23	12%
	1 in 10 year	0	77	0	0	26	14%
	Maximum	0	87	0	0	29	16%
Mangatarere @ Gorge 330	**Average**	37	26	0	13	19	18%
	1 in 4 year	57	32	0	16	25	26%
	1 in 10 year	70	40	0	23	32	30%
	Maximum	81	44	0	27	36	34%
Mangatarere DNRP (100% cutback)	**Average**	37	26	0	13	19	18%
	1 in 4 year	57	32	0	16	25	26%
	1 in 10 year	70	40	0	23	32	30%
	Maximum	81	44	0	27	36	34%
Mangatarere proposed 50%	**Average**	0	37	0	0	13	7%
	1 in 4 year event	0	57	0	0	16	10%
	1 in 10 year event	0	70	0	0	23	13%
	Maximum	0	81	0	0	27	15%

Table 5: Mangatarere at Gorge - estimate of frequency of restrictions

Area = Mangatarere River at Gorge	Number of years when full restriction	Number of years when 50% restriction	Number of years when 25% restriction	Frequency of years with full days restriction	Frequency of years with 50% restriction	Frequency of years with 25% restriction
Mangatarere @ Gorge 270	0	14	0	0	1	0
Mangatarere @ Gorge 330	13	14	0	1	1	0
Mangatarere proposed 100%	13	14	0	1	1	0
Mangatarere proposed 50%	0	13	0	0	1	0

Table 6: Mangaterere River at Gorge - estimate of timing of restrictions

Area = Mangatarere River at Gorge		100% restriction	50% restriction	25% restriction
Mangatarere @ Gorge 270	**First half season (Sept - Dec)**	0%	6%	0%
	Second half season (January - April)	0%	29%	0%
Mangatarere @ Gorge 330	**First half season (Sept - Dec)**	5%	5%	0%
	Second half season (January - April)	24%	14%	0%
Mangatarere proposed 100%	**First half season (Sept - Dec)**	5%	5%	0%
	Second half season (January - April)	24%	14%	0%
Mangatarere proposed 50%	**First half season (Sept - Dec)**	0%	5%	0%
	Second half season (January - April)	0%	24%	0%

Table 7: Mangatarere at Gorge - estimate of per ha outcomes by scenario ($/ha/annum)

Average year	**Area = Mangatarere River at Gorge**						
Per ha		**Dairy**	**Arable**	**Sheep and Beef**	**Horticulture and Vegetables**	**Viticulture**	**Total**
Mangatarere @ Gorge 270	Revenue	$10,200	$0	$2,300	$0	$0	$8,000
	Expenses	$4,800	$0	$1,300	$0	$0	$3,900
	Cash Farm Surplus	$5,400	$0	$1,000	$0	$0	$4,200
	Area irrigated at 0.45l/s	106	-	40	-	-	146
Mangatarere @ Gorge 330	Revenue	$9,300	$0	$0	$0	$0	$9,300
	Expenses	$4,400	$0	$0	$0	$0	$4,400
	Cash Farm Surplus	$4,900	$0	$0	$0	$0	$4,900
	Area irrigated at 0.45l/s	43	-	-	-	-	43
Mangatarere proposed 100%	Revenue	$9,300	$0	$2,100	$0	$0	$7,800
	Expenses	$4,400	$0	$1,200	$0	$0	$3,800
	Cash Farm Surplus	$4,900	$0	$900	$0	$0	$4,000
	Area irrigated at 0.45l/s	150	-	40	-	-	190
Mangatarere proposed 50%	Revenue	$10,300	$0	$2,400	$0	$0	$8,600
	Expenses	$4,900	$0	$1,300	$0	$0	$4,100
	Cash Farm Surplus	$5,500	$0	$1,000	$0	$0	$4,500
	Area irrigated at 0.45l/s	150	-	40	-	-	190

1 in 4 year event	**Area = Mangatarere River at Gorge**

per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Mangatarere @ Gorge 270	Revenue	$8,500	$0	$2,100	$0	$0	$6,700
	Expenses	$4,800	$0	$1,300	$0	$0	$3,900
	Cash Farm Surplus	$3,700	$0	$700	$0	$0	$2,900
Mangatarere @ Gorge 330	Revenue	$7,300	$0	$0	$0	$0	$7,300
	Expenses	$4,400	$0	$0	$0	$0	$4,400
	Cash Farm Surplus	$2,800	$0	$0	$0	$0	$2,800
Mangatarere proposed 100%	Revenue	$7,300	$0	$1,800	$0	$0	$6,100
	Expenses	$4,400	$0	$1,200	$0	$0	$3,800
	Cash Farm Surplus	$2,800	$0	$500	$0	$0	$2,300
Mangatarere proposed 50%	Revenue	$8,600	$0	$2,100	$0	$0	$7,200
	Expenses	$4,900	$0	$1,300	$0	$0	$4,100
	Cash Farm Surplus	$3,800	$0	$700	$0	$0	$3,100

1 in 10 year event | **Area = Mangatarere River at Gorge**

per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Mangatarere @ Gorge 270	Revenue	$8,300	$0	$2,000	$0	$0	$6,600
	Expenses	$4,800	$0	$1,300	$0	$0	$3,900
	Cash Farm Surplus	$3,500	$0	$700	$0	$0	$2,700
Mangatarere @ Gorge 330	Revenue	$6,800	$0	$0	$0	$0	$6,800

	Expenses	$4,400	$0	$0	$0	$0	$4,400
	Cash Farm Surplus	$2,400	$0	$0	$0	$0	$2,400
Mangatarere DNRP	Revenue	$6,800	$0	$1,600	$0	$0	$5,700
	Expenses	$4,400	$0	$1,200	$0	$0	$3,800
	Cash Farm Surplus	$2,400	$0	$400	$0	$0	$2,000
Mangatarere PNRP	Revenue	$8,400	$0	$2,000	$0	$0	$7,000
	Expenses	$4,900	$0	$1,300	$0	$0	$4,100
	Cash Farm Surplus	$3,500	$0	$700	$0	$0	$2,900

Worst Year **Area = Mangatarere River at Gorge**

per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Mangatarere @ Gorge 270	Revenue	$8,100	$0	$2,000	$0	$0	$6,500
	Expenses	$4,800	$0	$1,300	$0	$0	$3,900
	Cash Farm Surplus	$3,400	$0	$600	$0	$0	$2,600
Mangatarere @ Gorge 330	Revenue	$6,600	$0	$0	$0	$0	$6,600
	Expenses	$4,400	$0	$0	$0	$0	$4,400
	Cash Farm Surplus	$2,100	$0	$0	$0	$0	$2,100
Mangatarere DNRP	Revenue	$6,600	$0	$1,600	$0	$0	$5,500
	Expenses	$4,400	$0	$1,200	$0	$0	$3,800
	Cash Farm Surplus	$2,100	$0	$300	$0	$0	$1,700
Mangatarere PNRP	Revenue	$8,200	$0	$2,000	$0	$0	$6,900
	Expenses	$4,900	$0	$1,300	$0	$0	$4,100
	Cash Farm Surplus	$3,400	$0	$700	$0	$0	$2,800

Table 8: Mangatarere at Gorge - estimate of aggregate outcomes of Current vs DNRP vs PNRP flow regimes ($/annum)

Area = Mangatarere River at Gorge			Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total	Total regional GDP	Total regional household income	Total regional employment
	Area	Unrestricted	0	0	0	0	0	0			
		Modelled	150	0	40	0	0	190			
		DNRP (100% restriction)	150	0	40	0	0	190			
		PNRP (50% restriction)	150	0	40	0	0	190			
Average year	Current	Revenue	$1.49	$0.00	$0.09	$0.00	$0.00	$1.58	$1.32	$0.34	10
		Expenses	$0.70	$0.00	$0.05	$0.00	$0.00	$0.76			
		Cash Farm Surplus	$0.78	$0.00	$0.04	$0.00	$0.00	$0.83			
	DNRP (100% restriction)	Revenue	$1.39	$0.00	$0.08	$0.00	$0.00	$1.48	$1.23	$0.32	9
		Expenses	$0.66	$0.00	$0.05	$0.00	$0.00	$0.71			
		Cash Farm Surplus	$0.73	$0.00	$0.03	$0.00	$0.00	$0.76			
	PNRP (50% restriction)	Revenue	$1.54	$0.00	$0.10	$0.00	$0.00	$1.64	$1.37	$0.35	10
		Expenses	$0.73	$0.00	$0.05	$0.00	$0.00	$0.78			
		Cash Farm Surplus	$0.82	$0.00	$0.04	$0.00	$0.00	$0.86			
1 in 4 year	Current	Revenue	$1.22	$0.00	$0.08	$0.00	$0.00	$1.30	$1.08	$0.28	8
		Expenses	$0.70	$0.00	$0.05	$0.00	$0.00	$0.76			

		Cash Farm Surplus	$0.51	$0.00	$0.03	$0.00	$0.00	$0.54			
	DNRP (100% restriction)	Revenue	$1.09	$0.00	$0.07	$0.00	$0.00	$1.16	$0.97	$0.25	7
		Expenses	$0.66	$0.00	$0.05	$0.00	$0.00	$0.71			
		Cash Farm Surplus	$0.42	$0.00	$0.02	$0.00	$0.00	$0.44			
	PNRP (50% restriction)	Revenue	$1.29	$0.00	$0.08	$0.00	$0.00	$1.37	$1.14	$0.30	8
		Expenses	$0.73	$0.00	$0.05	$0.00	$0.00	$0.78			
		Cash Farm Surplus	$0.56	$0.00	$0.03	$0.00	$0.00	$0.59			
1 in 10 year	Current	Revenue	$1.22	$0.00	$0.08	$0.00	$0.00	$1.30	$1.08	$0.28	8
		Expenses	$0.70	$0.00	$0.05	$0.00	$0.00	$0.76			
		Cash Farm Surplus	$0.51	$0.00	$0.03	$0.00	$0.00	$0.54			
	DNRP (100% restriction)	Revenue	$1.02	$0.00	$0.07	$0.00	$0.00	$1.09	$0.91	$0.23	7
		Expenses	$0.66	$0.00	$0.05	$0.00	$0.00	$0.71			
		Cash Farm Surplus	$0.36	$0.00	$0.02	$0.00	$0.00	$0.37			
	PNRP (50% restriction)	Revenue	$1.25	$0.00	$0.08	$0.00	$0.00	$1.33	$1.11	$0.29	8
		Expenses	$0.73	$0.00	$0.05	$0.00	$0.00	$0.78			
		Cash Farm Surplus	$0.53	$0.00	$0.03	$0.00	$0.00	$0.55			
Worst year	Current	Revenue	$1.15	$0.00	$0.08	$0.00	$0.00	$1.23	$1.02	$0.26	8
		Expenses	$0.70	$0.00	$0.05	$0.00	$0.00	$0.76			
		Cash Farm Surplus	$0.45	$0.00	$0.03	$0.00	$0.00	$0.47			

	DNRP (100% restriction)	Revenue	$0.98	$0.00	$0.06	$0.00	$0.00	$1.04	$0.87	$0.23	6
		Expenses	$0.66	$0.00	$0.05	$0.00	$0.00	$0.71			
		Cash Farm Surplus	$0.32	$0.00	$0.01	$0.00	$0.00	$0.33			
	PNRP (50% restriction)	Revenue	$1.23	$0.00	$0.08	$0.00	$0.00	$1.31	$1.09	$0.28	8
		Expenses	$0.73	$0.00	$0.05	$0.00	$0.00	$0.78			
		Cash Farm Surplus	$0.51	$0.00	$0.03	$0.00	$0.00	$0.53			

Appendix B Results for Papawai Stream

Table 9: Papawai Stream estimates of severity and duration of restriction events

Area = Papawai Stream at U/S Oxi Pond Confl		Full days lost (100% restriction)	50% restriction	25% restriction	Consecutive days of full restriction	Consecutive days of 50% restriction	Volume restriction
Papawai @ Fabians Rd 160	**Average**	0	51	0	0	28	9%
	1 in 4 year event	0	68	0	0	35	12%
	1 in 10 year event	0	92	0	0	62	17%
	Maximum	0	114	0	0	88	21%
Papawai @ Fabians Rd 190	**Average**	0	73	0	0	39	13%
	1 in 4 year event	0	91	0	0	54	17%
	1 in 10 year event	0	108	0	0	73	20%
	Maximum	0	127	0	0	89	23%
Papawai proposed 100%	**Average**	61	0	0	33	33	22%
	1 in 4 year event	80	0	0	45	45	29%
	1 in 10 year event	102	0	0	63	63	37%
	Maximum	119	0	0	89	89	43%
Papawai proposed 50%	**Average**	0	61	0	0	33	11%
	1 in 4 year event	0	80	0	0	45	15%
	1 in 10 year event	0	102	0	0	63	19%
	Maximum	0	119	0	0	89	22%

Table 10: Papawai Stream - estimate of frequency of restrictions

Area = Papawai Stream at U/S Oxi Pond Confl	Number of years when full restriction	Number of years when 50% restriction	Number of years when 25% restriction	Frequency of years with full days restriction	Frequency of years with 50% restriction	Frequency of years with 25% restriction
Papawai @ Fabians Rd 160	0	7	0	0	1	0
Papawai @ Fabians Rd 190	0	7	0	0	1	0
Papawai proposed 100%	7	0	0	1	0	0
Papawai proposed 50%	0	7	0	0	1	0

Table 11: Papawai Stream - estimate of timing of restrictions

Area = Papawai Stream at U/S Oxi Pond Confl		100% restriction	50% restriction	25% restriction
Papawai @ Fabians Rd 160	**First half season (Sept - Dec)**	0%	11%	0%
	Second half season (January - April)	0%	32%	0%
Papawai @ Fabians Rd 190	**First half season (Sept - Dec)**	0%	15%	0%
	Second half season (January - April)	0%	44%	0%
Papawai proposed 100%	**First half season (Sept - Dec)**	14%	0%	0%
	Second half season (January - April)	37%	0%	0%
Papawai proposed 50%	**First half season (Sept - Dec)**	0%	14%	0%
	Second half season (January - April)	0%	37%	0%

Table 12: Papawai Stream - estimate of per ha outcomes by scenario ($/ha/annum)

Average year	**Area = Papawai Stream at U/S Oxi Pond Confl**						
Per ha		**Dairy**	**Arable**	**Sheep and Beef**	**Horticulture and Vegetables**	**Viticulture**	**Total**
Papawai @ Fabians Rd 160	Revenue	$9,900	$0	$0	$0	$0	$9,900
	Expenses	$4,700	$0	$0	$0	$0	$4,700
	Cash Farm Surplus	$5,200	$0	$0	$0	$0	$5,200
	Area irrigated at 0.45l/s	78	-	-	-	-	78
Papawai @ Fabians Rd 190	Revenue	$9,600	$0	$0	$0	$0	$9,600
	Expenses	$4,500	$0	$0	$0	$0	$4,500
	Cash Farm Surplus	$5,000	$0	$0	$0	$0	$5,000
	Area irrigated at 0.45l/s	126	-	-	-	-	126
Papawai proposed 100%	Revenue	$8,600	$0	$0	$28,200	$0	$10,800
	Expenses	$4,100	$0	$0	$23,100	$0	$6,300
	Cash Farm Surplus	$4,400	$0	$0	$5,100	$0	$4,500
	Area irrigated at 0.45l/s	203	-	-	26	-	229
Papawai proposed 50%	Revenue	$9,700	$0	$0	$32,600	$0	$12,300
	Expenses	$4,600	$0	$0	$23,100	$0	$6,700
	Cash Farm Surplus	$5,100	$0	$0	$9,500	$0	$5,600
	Area irrigated at 0.45l/s	203	-	-	26	-	229
1 in 4 year event	**Area = Papawai Stream at U/S Oxi**						

	Pond Confl						
per ha		**Dairy**	**Arable**	**Sheep and Beef**	**Horticulture and Vegetables**	**Viticulture**	**Total**
Papawai @ Fabians Rd 160	Revenue	$8,000	$0	$0	$0	$0	$8,000
	Expenses	$4,700	$0	$0	$0	$0	$4,700
	Cash Farm Surplus	$3,300	$0	$0	$0	$0	$3,300
Papawai @ Fabians Rd 190	Revenue	$7,800	$0	$0	$0	$0	$7,800
	Expenses	$4,500	$0	$0	$0	$0	$4,500
	Cash Farm Surplus	$3,200	$0	$0	$0	$0	$3,200
Papawai proposed 100%	Revenue	$6,100	$0	$0	$21,200	$0	$7,800
	Expenses	$4,100	$0	$0	$23,100	$0	$6,300
	Cash Farm Surplus	$1,900	$0	$0	-$1,900	$0	$1,500
Papawai proposed 50%	Revenue	$7,800	$0	$0	$27,700	$0	$10,000
	Expenses	$4,600	$0	$0	$23,100	$0	$6,700
	Cash Farm Surplus	$3,200	$0	$0	$4,600	$0	$3,300

1 in 10 year event

	Area = Papawai Stream at U/S Oxi Pond Confl						
per ha		**Dairy**	**Arable**	**Sheep and Beef**	**Horticulture and Vegetables**	**Viticulture**	**Total**
Papawai @ Fabians Rd 160	Revenue	$7,300	$0	$0	$0	$0	$7,300
	Expenses	$4,700	$0	$0	$0	$0	$4,700
	Cash Farm Surplus	$2,600	$0	$0	$0	$0	$2,600

Papawai @ Fabians Rd 190	Revenue	$7,200	$0	$0	$0	$0	$7,200
	Expenses	$4,500	$0	$0	$0	$0	$4,500
	Cash Farm Surplus	$2,600	$0	$0	$0	$0	$2,600
Papawai proposed 100%	Revenue	$5,000	$0	$0	$17,100	$0	$6,300
	Expenses	$4,100	$0	$0	$23,100	$0	$6,300
	Cash Farm Surplus	$800	$0	$0	-$6,000	$0	$100
Papawai proposed 50%	Revenue	$7,200	$0	$0	$25,600	$0	$9,300
	Expenses	$4,600	$0	$0	$23,100	$0	$6,700
	Cash Farm Surplus	$2,600	$0	$0	$2,500	$0	$2,600

Worst Year | **Area = Papawai Stream at U/S Oxi Pond Confl**

per ha		**Dairy**	**Arable**	**Sheep and Beef**	**Horticulture and Vegetables**	**Viticulture**	**Total**
Papawai @ Fabians Rd 160	Revenue	$7,300	$0	$0	$0	$0	$7,300
	Expenses	$4,700	$0	$0	$0	$0	$4,700
	Cash Farm Surplus	$2,600	$0	$0	$0	$0	$2,600
Papawai @ Fabians Rd 190	Revenue	$7,200	$0	$0	$0	$0	$7,200
	Expenses	$4,500	$0	$0	$0	$0	$4,500
	Cash Farm Surplus	$2,600	$0	$0	$0	$0	$2,600
Papawai proposed 100%	Revenue	$5,000	$0	$0	$17,100	$0	$6,300
	Expenses	$4,100	$0	$0	$23,100	$0	$6,300
	Cash Farm Surplus	$800	$0	$0	-$6,000	$0	$100
Papawai proposed 50%	Revenue	$7,200	$0	$0	$25,600	$0	$9,300
	Expenses	$4,600	$0	$0	$23,100	$0	$6,700

	Cash Farm Surplus	$2,600	$0	$0	$2,500	$0	$2,600

Table 13: Papawai Stream - estimate of aggregate outcomes of Current vs DNRP vs PNRP flow regimes ($/annum)

	Aggregate		Area								
Area = Papawai Stream at U/S Oxi Pond Confl			**Dairy**	**Arable**	**Sheep and Beef**	**Horticulture and Vegetables**	**Viticulture**	**Total**	**Total regional GDP**	**Total regional household income**	**Total regional employment**
	Area	Unrestricted	0	0	0	26	0	26			
		Modelled	203	0	0	0	0	203			
		DNRP (100% restriction)	203	0	0	26	0	229			
		PNRP (50% restriction)	203	0	0	26	0	229			
Average year	Current	Revenue	$1.97	$0.00	$0.00	$0.86	$0.00	$2.83	$2.36	$0.79	26
		Expenses	$0.93	$0.00	$0.00	$0.60	$0.00	$1.53			
		Cash Farm Surplus	$1.04	$0.00	$0.00	$0.26	$0.00	$1.30			
	DNRP (100% restriction)	Revenue	$1.74	$0.00	$0.00	$0.73	$0.00	$2.47	$2.06	$0.68	23
		Expenses	$0.84	$0.00	$0.00	$0.60	$0.00	$1.44			
		Cash Farm Surplus	$0.90	$0.00	$0.00	$0.13	$0.00	$1.03			
	PNRP (50% restriction)	Revenue	$1.98	$0.00	$0.00	$0.84	$0.00	$2.82	$2.35	$0.78	26
		Expenses	$0.94	$0.00	$0.00	$0.60	$0.00	$1.53			
		Cash Farm Surplus	$1.04	$0.00	$0.00	$0.25	$0.00	$1.29			
1 in 4 year	Current	Revenue	$1.60	$0.00	$0.00	$0.86	$0.00	$2.46	$2.05	$0.70	24
		Expenses	$0.93	$0.00	$0.00	$0.60	$0.00	$1.53			
		Cash Farm Surplus	$0.66	$0.00	$0.00	$0.26	$0.00	$0.93			

	DNRP (100% restriction)	Revenue	$1.23	$0.00	$0.00	$0.55	$0.00	$1.78	$1.49	$0.50	17
		Expenses	$0.84	$0.00	$0.00	$0.60	$0.00	$1.44			
		Cash Farm Surplus	$0.39	$0.00	$0.00	-$0.05	$0.00	$0.35			
	PNRP (50% restriction)	Revenue	$1.59	$0.00	$0.00	$0.71	$0.00	$2.30	$1.92	$0.64	22
		Expenses	$0.94	$0.00	$0.00	$0.60	$0.00	$1.53			
		Cash Farm Surplus	$0.65	$0.00	$0.00	$0.12	$0.00	$0.77			
1 in 10 year	Current	Revenue	$1.60	$0.00	$0.00	$0.86	$0.00	$2.46	$2.05	$0.70	24
		Expenses	$0.93	$0.00	$0.00	$0.60	$0.00	$1.53			
		Cash Farm Surplus	$0.66	$0.00	$0.00	$0.26	$0.00	$0.93			
	DNRP (100% restriction)	Revenue	$1.01	$0.00	$0.00	$0.44	$0.00	$1.45	$1.21	$0.40	14
		Expenses	$0.84	$0.00	$0.00	$0.60	$0.00	$1.44			
		Cash Farm Surplus	$0.17	$0.00	$0.00	-$0.16	$0.00	$0.01			
	PNRP (50% restriction)	Revenue	$1.47	$0.00	$0.00	$0.66	$0.00	$2.13	$1.78	$0.60	20
		Expenses	$0.94	$0.00	$0.00	$0.60	$0.00	$1.53			
		Cash Farm Surplus	$0.54	$0.00	$0.00	$0.07	$0.00	$0.60			
Worst year	Current	Revenue	$1.47	$0.00	$0.00	$0.86	$0.00	$2.33	$1.94	$0.68	23
		Expenses	$0.93	$0.00	$0.00	$0.86	$0.00	$1.79			
		Cash Farm Surplus	$0.54	$0.00	$0.00	$0.86	$0.00	$1.40			

	DNRP (100% restriction)	Revenue	$1.01	$0.00	$0.00	$0.44	$0.00	$1.45	$1.21	$0.40	14
		Expenses	$0.84	$0.00	$0.00	$0.60	$0.00	$1.44			
		Cash Farm Surplus	$0.17	$0.00	$0.00	-$0.16	$0.00	$0.01			
	PNRP (50% restriction)	Revenue	$1.47	$0.00	$0.00	$0.66	$0.00	$2.13	$1.78	$0.60	20
		Expenses	$0.94	$0.00	$0.00	$0.60	$0.00	$1.53			

Appendix C Results for Ruamahanga River at Wardells

Table 14: Ruamahanga at Wardells estimates of severity and duration of restriction events

Area = Ruamahanga River at Wardells		Full days lost (100% restriction)	50% restriction	25% restriction	Consecutive days of full restriction	Consecutive days of 50% restriction	Volume restriction
Ruamahanga @ Wardells unrestricted	**Average**	0	0	0	0	0	0%
	1 in 4 year event	0	0	0	0	0	0%
	1 in 10 year event	0	0	0	0	0	0%
	Maximum	0	0	0	0	0	0%
Ruamahanga @ Wardells 2400	**Average**	0	8	0	0	5	1%
	1 in 4 year event	0	10	0	0	6	2%
	1 in 10 year event	0	19	0	0	13	3%
	Maximum	0	47	0	0	27	9%
Ruamahanga @ Wardells proposed 100%	**Average**	8	6	0	5	7	4%
	1 in 4 year event	10	10	0	6	9	6%
	1 in 10 year event	19	15	0	13	17	10%
	Maximum	47	20	0	27	27	20%
Ruamahanga @ Wardells proposed 50%	**Average**	0	8	0	0	5	1%
	1 in 4 year event	0	10	0	0	6	2%
	1 in 10 year event	0	19	0	0	13	3%
	Maximum	0	47	0	0	27	9%

Table 15: Ruamahanga at Wardells - estimate of frequency of restrictions

Area = Ruamahanga River at Wardells	Number of years when full restriction	Number of years when 50% restriction	Number of years when 25% restriction	Frequency of years with full days restriction	Frequency of years with 50% restriction	Frequency of years with 25% restriction
Ruamahanga @ Wardells unrestricted	0	0	0	0	0	0
Ruamahanga @ Wardells 2400	0	11	0	0	5/9	0
Ruamahanga @ Wardells proposed 100%	11	14	0	5/9	2/3	0
Ruamahanga @ Wardells proposed 50%	0	11	0	0	5/9	0

Table 16: Ruamahanga at Wardells - estimate of timing of restrictions

Area = Ruamahanga River at Wardells		100% restriction	50% restriction	25% restriction
Ruamahanga @ Wardells unrestricted	**First half season (Sept - Dec)**	0%	0%	0%
	Second half season (January - April)	0%	0%	0%
Ruamahanga @ Wardells 2400	**First half season (Sept - Dec)**	0%	0%	0%
	Second half season (January - April)	0%	6%	0%
Ruamahanga @ Wardells proposed 100%	**First half season (Sept - Dec)**	0%	0%	0%
	Second half season (January - April)	6%	5%	0%
Ruamahanga @ Wardells proposed 50%	**First half season (Sept - Dec)**	0%	0%	0%
	Second half season (January - April)	0%	6%	0%

Table 17: Ruamahanga at Wardells - estimate of per ha outcomes by scenario ($/ha/annum)

Average year	**Area = Ruamahanga River at Wardells**						
Per ha		**Dairy**	**Arable**	**Sheep and Beef**	**Horticulture and Vegetables**	**Viticulture**	**Total**
Ruamahanga @ Wardells unrestricted	Revenue	$10,900	#DIV/0!	$2,300	$33,300	#DIV/0!	$8,800
	Expenses	$5,100	#DIV/0!	$1,300	$23,100	#DIV/0!	$4,300
	Cash Farm Surplus	$5,800	#DIV/0!	$1,000	$10,200	#DIV/0!	$4,500
	Area irrigated at 0.45l/s	194	-	84	6	-	283
Ruamahanga @ Wardells 2400	Revenue	$10,800	#DIV/0!	$2,300	$32,900	$15,400	$10,400
	Expenses	$5,000	#DIV/0!	$1,300	$23,100	$8,600	$5,200
	Cash Farm Surplus	$5,700	#DIV/0!	$1,000	$9,800	$6,800	$5,100
	Area irrigated at 0.45l/s	773	-	241	3	312	1,329
Ruamahanga @ Wardells proposed 100%	Revenue	$10,600	#DIV/0!	$2,300	$32,200	$14,800	$9,800
	Expenses	$5,000	#DIV/0!	$1,300	$23,100	$8,600	$5,000
	Cash Farm Surplus	$5,600	#DIV/0!	$1,000	$9,100	$6,200	$4,800
	Area irrigated at 0.45l/s	967	-	325	8	312	1,612
Ruamahanga @ Wardells proposed 50%	Revenue	$10,800	#DIV/0!	$2,300	$32,900	$15,400	$10,100
	Expenses	$5,000	#DIV/0!	$1,300	$23,100	$8,600	$5,100
	Cash Farm Surplus	$5,700	#DIV/0!	$1,000	$9,800	$6,800	$5,000

	Area irrigated at 0.45l/s	967	-	325	8	312	1,612
per ha		**Dairy**	**Arable**	**Sheep and Beef**	**Horticulture and Vegetables**	**Viticulture**	**Total**
Ruamahanga @ Wardells unrestricted	Revenue	$9,500	#DIV/0!	$2,200	$30,700	#DIV/0!	$7,800
	Expenses	$5,100	#DIV/0!	$1,300	$23,100	#DIV/0!	$4,300
	Cash Farm Surplus	$4,400	#DIV/0!	$800	$7,600	#DIV/0!	$3,400
Ruamahanga @ Wardells 2400	Revenue	$9,000	#DIV/0!	$2,000	$29,000	$14,200	$9,000
	Expenses	$5,000	#DIV/0!	$1,300	$23,100	$8,600	$5,200
	Cash Farm Surplus	$4,000	#DIV/0!	$700	$5,900	$5,600	$3,800
Ruamahanga @ Wardells proposed 100%	Revenue	$8,400	#DIV/0!	$1,900	$26,900	$12,400	$7,900
	Expenses	$5,000	#DIV/0!	$1,300	$23,100	$8,600	$5,000
	Cash Farm Surplus	$3,400	#DIV/0!	$600	$3,800	$3,800	$2,900
Ruamahanga @ Wardells proposed 50%	Revenue	$9,000	#DIV/0!	$2,000	$29,000	$14,200	$8,700
	Expenses	$5,000	#DIV/0!	$1,300	$23,100	$8,600	$5,100
	Cash Farm Surplus	$4,000	#DIV/0!	$700	$5,900	$5,600	$3,600
1 in 10 year event	**Area = Ruamahanga River at Wardells**						
per ha		**Dairy**	**Arable**	**Sheep and Beef**	**Horticulture and Vegetables**	**Viticulture**	**Total**
Ruamahanga @ Wardells unrestricted	Revenue	$9,500	#DIV/0!	$2,200	$30,700	#DIV/0!	$7,800

	Expenses	$5,100	#DIV/0!	$1,300	$23,100	#DIV/0!	$4,300
	Cash Farm Surplus	$4,400	#DIV/0!	$800	$7,600	#DIV/0!	$3,400
Ruamahanga @ Wardells 2400	Revenue	$9,000	#DIV/0!	$2,000	$29,000	$14,200	$9,000
	Expenses	$5,000	#DIV/0!	$1,300	$23,100	$8,600	$5,200
	Cash Farm Surplus	$4,000	#DIV/0!	$700	$5,900	$5,600	$3,800
Ruamahanga @ Wardells proposed 100%	Revenue	$8,400	#DIV/0!	$1,900	$26,900	$12,400	$7,900
	Expenses	$5,000	#DIV/0!	$1,300	$23,100	$8,600	$5,000
	Cash Farm Surplus	$3,400	#DIV/0!	$600	$3,800	$3,800	$2,900
Ruamahanga @ Wardells proposed 50%	Revenue	$9,000	#DIV/0!	$2,000	$29,000	$14,200	$8,700
	Expenses	$5,000	#DIV/0!	$1,300	$23,100	$8,600	$5,100
	Cash Farm Surplus	$4,000	#DIV/0!	$700	$5,900	$5,600	$3,600
Worst Year	**Area = Ruamahanga River at Wardells**						
per ha		**Dairy**	**Arable**	**Sheep and Beef**	**Horticulture and Vegetables**	**Viticulture**	**Total**
Ruamahanga @ Wardells unrestricted	Revenue	$9,500	#DIV/0!	$2,200	$30,700	#DIV/0!	$7,800
	Expenses	$5,100	#DIV/0!	$1,300	$23,100	#DIV/0!	$4,300

	Cash Farm Surplus	$4,400	#DIV/0!	$800	$7,600	#DIV/0!	$3,400
Ruamahanga @ Wardells 2400	Revenue	$9,400	#DIV/0!	$2,100	$30,300	$15,400	$9,500
	Expenses	$5,000	#DIV/0!	$1,300	$23,100	$8,600	$5,200
	Cash Farm Surplus	$4,400	#DIV/0!	$800	$7,200	$6,800	$4,300
Ruamahanga @ Wardells proposed 100%	Revenue	$9,000	#DIV/0!	$2,000	$29,000	$14,200	$8,700
	Expenses	$5,000	#DIV/0!	$1,300	$23,100	$8,600	$5,000
	Cash Farm Surplus	$4,000	#DIV/0!	$700	$5,900	$5,600	$3,700
Ruamahanga @ Wardells proposed 50%	Revenue	$9,400	#DIV/0!	$2,100	$30,300	$15,400	$9,200
	Expenses	$5,000	#DIV/0!	$1,300	$23,100	$8,600	$5,100
	Cash Farm Surplus	$4,400	#DIV/0!	$800	$7,200	$6,800	$4,100

Table 18: Ruamahanga at Wardells - estimate of aggregate outcomes of Current vs DNRP vs PNRP flow regimes ($/annum)

Area = Ruamahanga River at Wardells			**Dairy**	**Arable**	**Sheep and Beef**	**Horticulture and Vegetables**	**Viticulture**	**Total**	**Total regional GDP**	**Total regional household income**	**Total regional employment**
	Area	Unrestricted	0	0	0	0	0	0			
		Modelled	967	0	325	8	312	1612			
		DNRP (100% restriction)	967	0	325	8	312	1612			
		PNRP (50% restriction)	967	0	325	8	312	1612			
Average year	Current	Revenue	$10.45	$0.00	$0.75	$0.28	$4.79	$16.27	$13.49	$4.49	153
		Expenses	$4.88	$0.00	$0.43	$0.19	$2.68	$8.19			
		Cash Farm Surplus	$5.57	$0.00	$0.32	$0.08	$2.11	$8.09			
	DNRP (100%	Revenue	$10.23	$0.00	$0.74	$0.27	$4.60	$15.83	$13.13	$4.36	148

	restriction)										
		Expenses	$4.79	$0.00	$0.42	$0.19	$2.68	$8.09			
		Cash Farm Surplus	$5.44	$0.00	$0.31	$0.08	$1.92	$7.74			
	PNRP (50% restriction)	Revenue	$10.43	$0.00	$0.75	$0.27	$4.79	$16.24	$13.47	$4.48	153
		Expenses	$4.87	$0.00	$0.43	$0.19	$2.68	$8.18			
		Cash Farm Surplus	$5.56	$0.00	$0.32	$0.08	$2.11	$8.07			
1 in 4 year	Current	Revenue	$8.81	$0.00	$0.67	$0.25	$4.44	$14.17	$11.74	$3.96	136
		Expenses	$4.88	$0.00	$0.43	$0.19	$2.68	$8.19			
		Cash Farm Surplus	$3.93	$0.00	$0.24	$0.06	$1.76	$5.99			
	DNRP (100% restriction)	Revenue	$8.10	$0.00	$0.61	$0.22	$3.86	$12.79	$10.60	$3.55	121
		Expenses	$4.79	$0.00	$0.42	$0.19	$2.68	$8.09			
		Cash Farm Surplus	$3.31	$0.00	$0.19	$0.03	$1.18	$4.71			
	PNRP (50% restriction)	Revenue	$8.71	$0.00	$0.66	$0.24	$4.44	$14.05	$11.64	$3.93	135
		Expenses	$4.87	$0.00	$0.43	$0.19	$2.68	$8.18			
		Cash Farm Surplus	$3.84	$0.00	$0.23	$0.05	$1.76	$5.88			
1 in 10 year	Current	Revenue	$8.81	$0.00	$0.67	$0.25	$4.44	$14.17	$11.74	$3.96	136
		Expenses	$4.88	$0.00	$0.43	$0.19	$2.68	$8.19			
		Cash Farm Surplus	$3.93	$0.00	$0.24	$0.06	$1.76	$5.99			
	DNRP (100% restriction)	Revenue	$8.10	$0.00	$0.61	$0.22	$3.86	$12.79	$10.60	$3.55	121
		Expenses	$4.79	$0.00	$0.42	$0.19	$2.68	$8.09			
		Cash Farm Surplus	$3.31	$0.00	$0.19	$0.03	$1.18	$4.71			
	PNRP (50% restriction)	Revenue	$8.71	$0.00	$0.66	$0.24	$4.44	$14.05	$11.64	$3.93	135
		Expenses	$4.87	$0.00	$0.43	$0.19	$2.68	$8.18			

		Cash Farm Surplus	$3.84	$0.00	$0.23	$0.05	$1.76	$5.88			
Worst year	Current	Revenue	$9.12	$0.00	$0.70	$0.25	$4.79	$14.85	$12.31	$4.18	144
		Expenses	$4.88	$0.00	$0.43	$0.19	$2.68	$8.19			
		Cash Farm Surplus	$4.23	$0.00	$0.26	$0.06	$2.11	$6.67			
	DNRP (100% restriction)	Revenue	$8.70	$0.00	$0.66	$0.24	$4.43	$14.03	$11.63	$3.93	135
		Expenses	$4.79	$0.00	$0.42	$0.19	$2.68	$8.09			
		Cash Farm Surplus	$3.91	$0.00	$0.24	$0.05	$1.74	$5.94			
	PNRP (50% restriction)	Revenue	$9.09	$0.00	$0.69	$0.25	$4.79	$14.83	$12.28	$4.17	144
		Expenses	$4.87	$0.00	$0.43	$0.19	$2.68	$8.18			
		Cash Farm Surplus	$4.22	$0.00	$0.26	$0.06	$2.11	$6.65			

Appendix D Results for Ruamahanga River at Waihenga Bridge

Table 19: Ruamahanga at Waihenga estimates of severity and duration of restriction events

Area = Ruamahanga River at Waihenga Bridge		Full days lost (100% restriction)	50% restriction	25% restriction	Consecutive days of full restriction	Consecutive days of 50% restriction	Volume restriction
Ruamahanga @ Waihenga 8500	**Average**	0	10	0	0	5	2%
	1 in 4 year event	0	13	0	0	7	2%
	1 in 10 year event	0	24	0	0	13	4%
	Maximum	0	45	0	0	27	8%
Ruamahanga @ Waihenga 9200	**Average**	10	3	0	5	6	4%
	1 in 4 year event	13	4	0	7	9	6%
	1 in 10 year event	24	6	0	13	13	10%
	Maximum	45	11	0	27	27	17%
Ruamahanga @ Waihenga 9800	**Average**	0	15	0	0	7	3%
	1 in 4 year event	0	24	0	0	11	4%
	1 in 10 year event	0	36	0	0	14	7%
	Maximum	0	53	0	0	27	10%
Ruamahanga @ Waihenga proposed 100%	**Average**	10	3	0	5	6	4%
	1 in 4 year event	13	4	0	7	9	6%
	1 in 10 year event	24	6	0	13	13	10%
	Maximum	45	11	0	27	27	17%
Ruamahanga @ Waihenga proposed	**Average**	0	10	0	0	5	2%

50%							
	1 in 4 year event	0	13	0	0	7	2%
	1 in 10 year event	0	24	0	0	13	4%
	Maximum	0	45	0	0	27	8%

Table 20: Ruamahanga at Waihenga - estimate of frequency of restrictions

Area = Ruamahanga River at Waihenga Bridge	**Number of years when full restriction**	**Number of years when 50% restriction**	**Number of years when 25% restriction**	**Frequency of years with full days restriction**	**Frequency of years with 50% restriction**	**Frequency of years with 25% restriction**
Ruamahanga @ Waihenga 8500	0	13	0	0	2/3	0
Ruamahanga @ Waihenga 9200	13	15	0	2/3	3/4	0
Ruamahanga @ Waihenga 9800	0	15	0	0	3/4	0
Ruamahanga @ Waihenga proposed 100%	13	15	0	2/3	3/4	0
Ruamahanga @ Waihenga proposed 50%	0	13	0	0	2/3	0

Table 21: Ruamahanga at Waihenga - estimate of timing of restrictions

Area = Ruamahanga River at Waihenga Bridge		**100% restriction**	**50% restriction**	**25% restriction**
Ruamahanga @ Waihenga 8500	**First half season (Sept - Dec)**	0%	0%	0%
	Second half season (January - April)	0%	8%	0%
Ruamahanga @ Waihenga 9200	**First half season (Sept - Dec)**	0%	0%	0%

	Second half season (January - April)	8%	2%	0%
Ruamahanga @ Waihenga 9800	**First half season (Sept - Dec)**	0%	1%	0%
	Second half season (January - April)	0%	12%	0%
Ruamahanga @ Waihenga proposed 100%	**First half season (Sept - Dec)**	0%	0%	0%
	Second half season (January - April)	8%	2%	0%
Ruamahanga @ Waihenga proposed 50%	**First half season (Sept - Dec)**	0%	0%	0%
	Second half season (January - April)	0%	8%	0%

Table 22: Ruamahanga at Waihenga - estimate of per ha outcomes by scenario ($/ha/annum)

Average year	**Area = Ruamahanga River at Waihenga Bridge**						
Per ha		**Dairy**	**Arable**	**Sheep and Beef**	**Horticulture and Vegetables**	**Viticulture**	**Total**
Ruamahanga @ Waihenga 8500	Revenue	$10,800	#DIV/0!	$2,300	#DIV/0!	$15,300	$8,900
	Expenses	$5,000	#DIV/0!	$1,300	#DIV/0!	$8,600	$4,200
	Cash Farm Surplus	$5,700	#DIV/0!	$1,000	#DIV/0!	$6,700	$4,700
	Area irrigated at 0.45l/s	1,226	-	344	-	3	1,573
Ruamahanga @ Waihenga 9200	Revenue	$10,600	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	$10,600
	Expenses	$5,000	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	$5,000
	Cash Farm Surplus	$5,600	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	$5,600
	Area irrigated at 0.45l/s	69	-	-	-	-	69
Ruamahanga @ Waihenga 9800	Revenue	#DIV/0!	#DIV/0!	$2,300	#DIV/0!	#DIV/0!	$2,300
	Expenses	#DIV/0!	#DIV/0!	$1,300	#DIV/0!	#DIV/0!	$1,300
	Cash Farm Surplus	#DIV/0!	#DIV/0!	$1,000	#DIV/0!	#DIV/0!	$1,000
	Area irrigated at 0.45l/s	-	-	86	-	-	86
Ruamahanga @ Waihenga proposed 100%	Revenue	$10,600	#DIV/0!	$2,300	#DIV/0!	$14,800	$8,800
	Expenses	$5,000	#DIV/0!	$1,300	#DIV/0!	$8,600	$4,200
	Cash Farm Surplus	$5,600	#DIV/0!	$1,000	#DIV/0!	$6,100	$4,600
	Area irrigated at 0.45l/s	1,680	-	466	-	12	2,158
Ruamahanga @ Waihenga proposed 50%	Revenue	$10,800	#DIV/0!	$2,300	#DIV/0!	$15,300	$9,000
	Expenses	$5,000	#DIV/0!	$1,300	#DIV/0!	$8,600	$4,200
	Cash Farm Surplus	$5,700	#DIV/0!	$1,000	#DIV/0!	$6,700	$4,700
	Area irrigated at		-	466	-	12	

	0.45l/s	1,680					2,158
1 in 4 year event	**Area = Ruamahanga River at Waihenga Bridge**						
per ha		**Dairy**	**Arable**	**Sheep and Beef**	**Horticulture and Vegetables**	**Viticulture**	**Total**
Ruamahanga @ Waihenga 8500	Revenue	$9,300	#DIV/0!	$2,100	#DIV/0!	$15,100	$7,800
	Expenses	$5,000	#DIV/0!	$1,300	#DIV/0!	$8,600	$4,200
	Cash Farm Surplus	$4,300	#DIV/0!	$800	#DIV/0!	$6,500	$3,500
Ruamahanga @ Waihenga 9200	Revenue	$9,000	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	$9,000
	Expenses	$5,000	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	$5,000
	Cash Farm Surplus	$4,100	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	$4,100
Ruamahanga @ Waihenga 9800	Revenue	#DIV/0!	#DIV/0!	$2,100	#DIV/0!	#DIV/0!	$2,100
	Expenses	#DIV/0!	#DIV/0!	$1,300	#DIV/0!	#DIV/0!	$1,300
	Cash Farm Surplus	#DIV/0!	#DIV/0!	$800	#DIV/0!	#DIV/0!	$800
Ruamahanga @ Waihenga proposed 100%	Revenue	$9,000	#DIV/0!	$2,100	#DIV/0!	$14,200	$7,500
	Expenses	$5,000	#DIV/0!	$1,300	#DIV/0!	$8,600	$4,200
	Cash Farm Surplus	$4,100	#DIV/0!	$800	#DIV/0!	$5,600	$3,400
Ruamahanga @ Waihenga proposed 50%	Revenue	$9,500	#DIV/0!	$2,200	#DIV/0!	$0	$8,000
	Expenses	$5,000	#DIV/0!	$1,300	#DIV/0!	$0	$4,200
	Cash Farm Surplus	$4,500	#DIV/0!	$800	#DIV/0!	$0	$3,700
1 in 10 year event	**Area = Ruamahanga River at Waihenga Bridge**						
per ha		**Dairy**	**Arable**	**Sheep and Beef**	**Horticulture and Vegetables**	**Viticulture**	**Total**

Ruamahanga @ Waihenga 8500	Revenue	$9,000	#DIV/0!	$2,100	#DIV/0!	$14,100	$7,500
	Expenses	$5,000	#DIV/0!	$1,300	#DIV/0!	$8,600	$4,200
	Cash Farm Surplus	$3,900	#DIV/0!	$700	#DIV/0!	$5,500	$3,200
Ruamahanga @ Waihenga 9200	Revenue	$8,400	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	$8,400
	Expenses	$5,000	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	$5,000
	Cash Farm Surplus	$3,400	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	$3,400
Ruamahanga @ Waihenga 9800	Revenue	#DIV/0!	#DIV/0!	$2,000	#DIV/0!	#DIV/0!	$2,000
	Expenses	#DIV/0!	#DIV/0!	$1,300	#DIV/0!	#DIV/0!	$1,300
	Cash Farm Surplus	#DIV/0!	#DIV/0!	$700	#DIV/0!	#DIV/0!	$700
Ruamahanga @ Waihenga proposed 100%	Revenue	$8,400	#DIV/0!	$1,900	#DIV/0!	$12,300	$7,000
	Expenses	$5,000	#DIV/0!	$1,300	#DIV/0!	$8,600	$4,200
	Cash Farm Surplus	$3,400	#DIV/0!	$600	#DIV/0!	$3,700	$2,800
Ruamahanga @ Waihenga proposed 50%	Revenue	$9,500	#DIV/0!	$2,200	#DIV/0!	$0	$8,000
	Expenses	$5,000	#DIV/0!	$1,300	#DIV/0!	$0	$4,200
	Cash Farm Surplus	$4,500	#DIV/0!	$800	#DIV/0!	$0	$3,700
Worst Year per ha **Ruamahanga @ Waihenga 8500**	Area = Ruamahanga River at Waihenga Bridge **Revenue**	Dairy $8,800	Arable #DIV/0!	Sheep and Beef $2,000	Horticulture and Vegetables #DIV/0!	Viticulture $13,800	Total $7,400
	Expenses	**$5,000**	**#DIV/0!**	**$1,300**	**#DIV/0!**	**8,600**	**$4,200**
	Cash Farm Surplus	$3,800	#DIV/0!	$700	#DIV/0!	$5,200	$3,100
Ruamahanga @ Waihenga 9200	Revenue	$8,100	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	$8,100
	Expenses	$5,000	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	$5,000
	Cash Farm Surplus	$3,200	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	$3,200

Ruamahanga @ Waihenga 9800	Revenue	#DIV/0!	#DIV/0!	$2,000	#DIV/0!	#DIV/0!	$2,000
	Expenses	#DIV/0!	#DIV/0!	$1,300	#DIV/0!	#DIV/0!	$1,300
	Cash Farm Surplus	#DIV/0!	#DIV/0!	$700	#DIV/0!	#DIV/0!	$700
Ruamahanga @ Waihenga proposed 100%	Revenue	$8,100	#DIV/0!	$1,900	#DIV/0!	$11,700	$6,800
	Expenses	$5,000	#DIV/0!	$1,300	#DIV/0!	$8,600	$4,200
	Cash Farm Surplus	$3,200	#DIV/0!	$500	#DIV/0!	$3,000	$2,600
Ruamahanga @ Waihenga proposed 50%	Revenue	$8,800	#DIV/0!	$2,000	#DIV/0!	$0	$7,400
	Expenses	$5,000	#DIV/0!	$1,300	#DIV/0!	$0	$4,200
	Cash Farm Surplus	$3,800	#DIV/0!	$700	#DIV/0!	$0	$3,100

Table 23: Ruamahanga at Waihenga - estimate of aggregate outcomes of Current vs DNRP vs PNRP flow regimes ($/annum)

Area = Ruamahanga River at Waihenga Bridge			Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total	Total regional GDP	Total regional household income	Total regional employment
	Area	Unrestricted	384	-	36	-	9	429			
		Modelled	1295	0	430	0	3	1729			
		Proposed	1680	0	466	0	12	2158			
Average year	Current	Revenue	18	0	1	0	0	19	$16.18	$4.23	120
-		Expenses	$8.47	$0.00	$0.62	$0.00	$0.11	$9.19			
		Cash Farm Surplus	$9.65	$0.00	$0.47	$0.00	$0.09	$10.20			
	DNRP (100% restriction)	Revenue	$17.76	$0.00	$1.07	$0.00	$0.18	$19.01	$15.86	$4.14	118
		Expenses	$8.32	$0.00	$0.61	$0.00	$0.11	$9.04			
		Cash Farm Surplus	$9.44	$0.00	$0.46	$0.00	$0.08	$9.97			
	PNRP (50% restriction)	Revenue	$3.58	$0.00	$0.34	$2.32	$0.00	$6.23	$5.16	$1.79	63
		Expenses	$1.67	$0.00	$0.19	$1.61	$0.00	$3.48			
		Cash Farm Surplus	$1.91	$0.00	$0.14	$0.70	$0.00	$2.76			
1 in 4 year	Current	Revenue	$16.23	$0.00	$1.00	$0.00	$0.19	$17.42	$14.53	$3.80	108
-		Expenses	$8.47	$0.00	$0.62	$0.00	$0.11	$9.19			
		Cash Farm Surplus	$7.77	$0.00	$0.38	$0.00	$0.09	$8.23			
	DNRP (100% restriction)	Revenue	$15.14	$0.00	$0.96	$0.00	$0.18	$16.28	$13.57	$3.55	101
		Expenses	$8.32	$0.00	$0.61	$0.00	$0.11	$9.04			
		Cash Farm	$6.82	$0.00	$0.35	$0.00	$0.07	$7.24			

		Surplus									
	PNRP (50% restriction)	Revenue	$3.14	$0.00	$0.31	$2.15	$0.00	$5.60	$4.63	$1.62	57
		Expenses	$1.67	$0.00	$0.19	$1.61	$0.00	$3.48			
		Cash Farm Surplus	$1.47	$0.00	$0.12	$0.53	$0.00	$2.12			
1 in 10 year	Current	Revenue	$15.76	$0.00	$0.97	$0.00	$0.19	$16.92	$14.11	$3.69	105
		Expenses	$8.47	$0.00	$0.62	$0.00	$0.11	$9.19			
		Cash Farm Surplus	$7.30	$0.00	$0.34	$0.00	$0.08	$7.72			
	DNRP (100% restriction)	Revenue	$14.03	$0.00	$0.89	$0.00	$0.15	$15.07	$12.57	$3.28	94
		Expenses	$8.32	$0.00	$0.61	$0.00	$0.11	$9.04			
		Cash Farm Surplus	$5.71	$0.00	$0.28	$0.00	$0.05	$6.04			
	PNRP (50% restriction)	Revenue	$3.14	$0.00	$0.31	$2.15	$0.00	$5.60	$4.63	$1.62	57
		Expenses	$1.67	$0.00	$0.19	$1.61	$0.00	$3.48			
		Cash Farm Surplus	$1.47	$0.00	$0.12	$0.53	$0.00	$2.12			
Worst year	Current	Revenue	$15.60	$0.00	$0.95	$0.00	$0.19	$16.74	$13.96	$3.65	104
		Expenses	$8.47	$0.00	$0.62	$0.00	$0.11	$9.19			
		Cash Farm Surplus	$7.13	$0.00	$0.33	$0.00	$0.08	$7.55			
	DNRP (100% restriction)	Revenue	$13.63	$0.00	$0.86	$0.00	$0.14	$14.63	$12.20	$3.19	91
		Expenses	$8.32	$0.00	$0.61	$0.00	$0.11	$9.04			
		Cash Farm Surplus	$5.31	$0.00	$0.25	$0.00	$0.04	$5.60			
	PNRP (50% restriction)	Revenue	$3.12	$0.00	$0.31	$2.13	$0.00	$5.56	$4.60	$1.61	56
		Expenses	$1.67	$0.00	$0.19	$1.61	$0.00	$3.48			
		Cash Farm Surplus	$1.45	$0.00	$0.12	$0.52	$0.00	$2.08			

Appendix E Results for Tauherenikau at Gorge

Table 24: Tauherenikau at Gorge estimates of severity and duration of restriction events

Area = Tauherenikau at Gorge		Full days lost (100% restriction)	50% restriction	25% restriction	Consecutive days of full restriction	Consecutive days of 50% restriction	Volume restriction
Tauherenikau @ Gorge 1350	**Average**	0	14	0	0	6	3%
	1 in 4 year event	0	18	0	0	7	3%
	1 in 10 year event	0	36	0	0	11	7%
	Maximum	0	55	0	0	27	10%
Tauherenikau @ Gorge 1350 and 1100	**Average**	4	9	0	3	6	3%
	1 in 4 year event	6	11	0	4	7	4%
	1 in 10 year event	13	18	0	5	11	10%
	Maximum	21	42	0	21	27	12%
Tauherenikau proposed 100%	**Average**	12	0	0	5	5	4%
	1 in 4 year event	16	0	0	7	7	6%
	1 in 10 year event	34	0	0	10	10	12%
	Maximum	50	0	0	26	26	18%
Tauherenikau proposed 50%	**Average**	0	12	0	0	5	2%
	1 in 4 year event	0	16	0	0	7	3%
	1 in 10 year event	0	34	0	0	10	6%
	Maximum	0	50	0	0	26	9%

Table 25: Tauherenikau at Gorge - estimate of frequency of restrictions

Area = Tauherenikau at Gorge	Number of years when full restriction	Number of years when 50% restriction	Number of years when 25% restriction	Frequency of years with full days restriction	Frequency of years with 50% restriction	Frequency of years with 25% restriction
Tauherenikau @ Gorge 1350	0	17	0	0	6/7	0
Tauherenikau @ Gorge 1350 and 1100	10	17	0	1/2	6/7	0
Tauherenikau proposed 100%	15	0	0	3/4	0	0
Tauherenikau proposed 50%	0	15	0	0	3/4	0

Table 26: Tauherenikau at Gorge - estimate of timing of restrictions

Area = Tauherenikau at Gorge		100% restriction	50% restriction	25% restriction
Tauherenikau @ Gorge 1350	**First half season (Sept - Dec)**	0%	1%	0%
	Second half season (January - April)	0%	10%	0%
Tauherenikau @ Gorge 1350 and 1100	**First half season (Sept - Dec)**	0%	1%	0%
	Second half season (January - April)	4%	7%	0%
Tauherenikau proposed 100%	**First half season (Sept - Dec)**	1%	0%	0%
	Second half season (January - April)	9%	0%	0%
Tauherenikau proposed 50%	**First half season (Sept - Dec)**	0%	1%	0%
	Second half season (January - April)	0%	9%	0%

Table 27: Tauherenikau at Gorge - estimate of per ha outcomes by scenario ($/ha/annum)

Average year	**Area = Tauherenikau at Gorge**						
Per ha		**Dairy**	**Arable**	**Sheep and Beef**	**Horticulture and Vegetables**	**Viticulture**	**Total**
Tauherenikau @ Gorge 1350	Revenue	$10,700	$0	$2,300	$0	$0	$10,000
	Expenses	$5,000	$0	$1,300	$0	$0	$4,700
	Cash Farm Surplus	$5,700	$0	$1,000	$0	$0	$5,300
	Area irrigated at 0.45l/s	355	-	35	-	-	390
Tauherenikau @ Gorge 1350 and 1100	Revenue	$10,600	$0	$0	$0	$0	$10,600
	Expenses	$5,000	$0	$0	$0	$0	$5,000
	Cash Farm Surplus	$5,700	$0	$0	$0	$0	$5,700
	Area irrigated at 0.45l/s	22	-	-	-	-	22
Tauherenikau proposed 100%	Revenue	$10,500	$0	$2,300	$0	$0	$9,900
	Expenses	$4,900	$0	$1,300	$0	$0	$4,600
	Cash Farm Surplus	$5,600	$0	$1,000	$0	$0	$5,200
	Area irrigated at 0.45l/s	377	-	35	-	-	411
Tauherenikau proposed 50%	Revenue	$10,700	$0	$2,300	$0	$0	$10,000
	Expenses	$5,000	$0	$1,300	$0	$0	$4,700
	Cash Farm Surplus	$5,700	$0	$1,000	$0	$0	$5,300
	Area irrigated at 0.45l/s	377	-	35	-	-	411

per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Tauherenikau @ Gorge 1350	Revenue	$9,200	$0	$2,100	$0	$0	$8,600
	Expenses	$5,000	$0	$1,300	$0	$0	$4,700
	Cash Farm Surplus	$4,200	$0	$800	$0	$0	$3,900
Tauherenikau @ Gorge 1350 and 1100	Revenue	$9,100	$0	$0	$0	$0	$9,100
	Expenses	$5,000	$0	$0	$0	$0	$5,000
	Cash Farm Surplus	$4,100	$0	$0	$0	$0	$4,100
Tauherenikau proposed 100%	Revenue	$9,000	$0	$2,100	$0	$0	$8,400
	Expenses	$4,900	$0	$1,300	$0	$0	$4,600
	Cash Farm Surplus	$4,100	$0	$800	$0	$0	$3,800
Tauherenikau proposed 50%	Revenue	$9,300	$0	$2,100	$0	$0	$8,700
	Expenses	$5,000	$0	$1,300	$0	$0	$4,700
	Cash Farm Surplus	$4,300	$0	$800	$0	$0	$4,000

1 in 10 year event | **Area = Tauherenikau at Gorge**

per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Tauherenikau @ Gorge 1350	Revenue	$8,800	$0	$2,000	$0	$0	$8,200

	Expenses	$5,000	$0	$1,300	$0	$0	$4,700
	Cash Farm Surplus	$3,800	$0	$700	$0	$0	$3,500
Tauherenikau @ Gorge 1350 and 1100	Revenue	$8,600	$0	$0	$0	$0	$8,600
	Expenses	$5,000	$0	$0	$0	$0	$5,000
	Cash Farm Surplus	$3,600	$0	$0	$0	$0	$3,600
Tauherenikau proposed 100%	Revenue	$8,100	$0	$1,900	$0	$0	$7,600
	Expenses	$4,900	$0	$1,300	$0	$0	$4,600
	Cash Farm Surplus	$3,200	$0	$500	$0	$0	$3,000
Tauherenikau proposed 50%	Revenue	$8,800	$0	$2,000	$0	$0	$8,300
	Expenses	$5,000	$0	$1,300	$0	$0	$4,700
	Cash Farm Surplus	$3,800	$0	$700	$0	$0	$3,500

Worst Year

	Area = Tauherenikau at Gorge						
per ha		**Dairy**	**Arable**	**Sheep and Beef**	**Horticulture and Vegetables**	**Viticulture**	**Total**
Tauherenikau @ Gorge 1350	Revenue	$8,700	$0	$2,000	$0	$0	$8,100
	Expenses	$5,000	$0	$1,300	$0	$0	$4,700
	Cash Farm Surplus	$3,700	$0	$700	$0	$0	$3,400

Tauherenikau @ Gorge 1350 and 1100	Revenue	$8,500	$0	$0	$0	$0	$8,500
	Expenses	$5,000	$0	$0	$0	$0	$5,000
	Cash Farm Surplus	$3,500	$0	$0	$0	$0	$3,500
Tauherenikau proposed 100%	Revenue	$8,000	$0	$1,800	$0	$0	$7,500
	Expenses	$4,900	$0	$1,300	$0	$0	$4,600
	Cash Farm Surplus	$3,100	$0	$500	$0	$0	$2,900
Tauherenikau proposed 50%	Revenue	$8,800	$0	$2,000	$0	$0	$8,200
	Expenses	$5,000	$0	$1,300	$0	$0	$4,700
	Cash Farm Surplus	$3,800	$0	$700	$0	$0	$3,500

Table 28: Tauherenikau at Gorge - estimate of aggregate outcomes of Current vs DNRP vs PNRP flow regimes ($/annum)

Area = Tauherenikau at Gorge			Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total	Total regional GDP	Total regional household income	Total regional employment
	Area	Unrestricted	0	0	0	0	0	0			
		Modelled	377	0	35	0	0	411			
		DNRP (100% restriction)	377	0	35	0	0	411			
		PNRP (50% restriction)	377	0	35	0	0	411			
Average year	Current	Revenue	$4.03	$0.00	$0.08	$0.00	$0.00	$4.11	$3.45	$0.90	25
		Expenses	$1.88	$0.00	$0.05	$0.00	$0.00	$1.93			
		Cash Farm Surplus	$2.15	$0.00	$0.03	$0.00	$0.00	$2.18			
	DNRP (100% restriction)	Revenue	$3.97	$0.00	$0.08	$0.00	$0.00	$4.05	$3.40	$0.89	25
		Expenses	$1.86	$0.00	$0.05	$0.00	$0.00	$1.91			
		Cash Farm Surplus	$2.11	$0.00	$0.03	$0.00	$0.00	$2.15			
	PNRP (50% restriction)	Revenue	$4.04	$0.00	$0.08	$0.00	$0.00	$4.12	$3.46	$0.90	25
		Expenses	$1.89	$0.00	$0.05	$0.00	$0.00	$1.94			
		Cash Farm Surplus	$2.15	$0.00	$0.03	$0.00	$0.00	$2.19			
1 in 4 year	Current	Revenue	$3.48	$0.00	$0.07	$0.00	$0.00	$3.55	$2.98	$0.78	22
		Expenses	$1.88	$0.00	$0.05	$0.00	$0.00	$1.93			
		Cash Farm Surplus	$1.59	$0.00	$0.03	$0.00	$0.00	$1.62			
	DNRP (100% restriction)	Revenue	$3.40	$0.00	$0.07	$0.00	$0.00	$3.47	$2.91	$0.76	21

		Expenses	$1.86	$0.00	$0.05	$0.00	$0.00	$1.91			
		Cash Farm Surplus	$1.54	$0.00	$0.03	$0.00	$0.00	$1.56			
	PNRP (50% restriction)	Revenue	$3.49	$0.00	$0.07	$0.00	$0.00	$3.57	$2.99	$0.78	22
		Expenses	$1.89	$0.00	$0.05	$0.00	$0.00	$1.94			
		Cash Farm Surplus	$1.60	$0.00	$0.03	$0.00	$0.00	$1.63			
1 in 10 year	Current	Revenue	$3.48	$0.00	$0.07	$0.00	$0.00	$3.55	$2.98	$0.78	22
		Expenses	$1.88	$0.00	$0.05	$0.00	$0.00	$1.93			
		Cash Farm Surplus	$1.59	$0.00	$0.03	$0.00	$0.00	$1.62			
	DNRP (100% restriction)	Revenue	$3.06	$0.00	$0.06	$0.00	$0.00	$3.12	$2.62	$0.68	19
		Expenses	$1.86	$0.00	$0.05	$0.00	$0.00	$1.91			
		Cash Farm Surplus	$1.20	$0.00	$0.02	$0.00	$0.00	$1.22			
	PNRP (50% restriction)	Revenue	$3.32	$0.00	$0.07	$0.00	$0.00	$3.39	$2.84	$0.74	21
		Expenses	$1.89	$0.00	$0.05	$0.00	$0.00	$1.94			
		Cash Farm Surplus	$1.43	$0.00	$0.02	$0.00	$0.00	$1.46			
Worst year	Current	Revenue	$3.27	$0.00	$0.07	$0.00	$0.00	$3.34	$2.80	$0.73	20
		Expenses	$1.88	$0.00	$0.05	$0.00	$0.00	$1.93			
		Cash Farm Surplus	$1.39	$0.00	$0.02	$0.00	$0.00	$1.41			
	DNRP (100% restriction)	Revenue	$3.03	$0.00	$0.06	$0.00	$0.00	$3.09	$2.59	$0.68	19
		Expenses	$1.86	$0.00	$0.05	$0.00	$0.00	$1.91			

		Cash Farm Surplus	$1.16	$0.00	$0.02	$0.00	$0.00	$1.18			
	PNRP (50% restriction)	Revenue	$3.31	$0.00	$0.07	$0.00	$0.00	$3.38	$2.83	$0.74	21
		Expenses	$1.89	$0.00	$0.05	$0.00	$0.00	$1.94			
		Cash Farm Surplus	$1.42	$0.00	$0.02	$0.00	$0.00	$1.44			

Appendix F Results for Waingawa at Kaituna

Table 29: Waingawa at Kaituna estimates of severity and duration of restriction events

Area = Waingawa River at Kaituna		Full days lost (100% restriction)	50% restriction	25% restriction	Consecutive days of full restriction	Consecutive days of 50% restriction	Volume restriction
Waingawa @ Kaituna 1700	**Average**	25	0	0	10	10	9%
	1 in 4 year event	34	0	0	13	13	12%
	1 in 10 year event	43	0	0	18	18	16%
	Maximum	71	0	0	27	27	26%
Waingawa @ Kaituna 1900	**Average**	25	9	0	10	12	11%
	1 in 4 year event	34	12	0	13	15	14%
	1 in 10 year event	43	14	0	18	19	17%
	Maximum	71	15	0	27	27	28%
Waingawa @ Kaituna 3500	**Average**	0	34	56	0	12	11%
	1 in 4 year event	0	45	61	0	15	14%
	1 in 10 year event	0	52	68	0	19	16%
	Maximum	0	83	81	0	27	19%
Waingawa proposed 100%	**Average**	25	9	0	10	12	11%
	1 in 4 year event	34	12	0	13	15	14%
	1 in 10 year event	43	14	0	18	19	17%
	Maximum	71	15	0	27	27	28%
Waingawa proposed 50%	**Average**	0	25	0	0	10	5%
	1 in 4 year	0	34	0	0	13	6%

	event						
	1 in 10 year event	0	43	0	0	18	8%
	Maximum	0	71	0	0	27	13%

Table 30: Waingawa at Kaituna - estimate of frequency of restrictions

Area = Waingawa River at Kaituna	**Number of years when full restriction**	**Number of years when 50% restriction**	**Number of years when 25% restriction**	**Frequency of years with full days restriction**	**Frequency of years with 50% restriction**	**Frequency of years with 25% restriction**
Waingawa @ Kaituna 1700	20	0	0	1	0	0
Waingawa @ Kaituna 1900	20	20	0	1	1	0
Waingawa @ Kaituna 3500	0	20	20	0	1	1
Waingawa proposed 100%	20	20	0	1	1	0
Waiohine proposed 50%	0	14	0	0	2/3	0

Table 31: Waingawa at Kaituna - estimate of timing of restrictions

Area = Waingawa River at Kaituna		**100% restriction**	**50% restriction**	**25% restriction**
Waingawa @ Kaituna 1700	**First half season (Sept - Dec)**	3%	0%	0%
	Second half season (January - April)	17%	0%	0%
Waingawa @ Kaituna 1900	**First half season (Sept - Dec)**	3%	1%	0%
	Second half season (January - April)	17%	5%	0%

Waingawa @ Kaituna 3500	**First half season (Sept - Dec)**	0%	4%	17%
	Second half season (January - April)	0%	22%	26%
Waingawa proposed 100%	**First half season (Sept - Dec)**	3%	1%	0%
	Second half season (January - April)	17%	5%	0%
Waingawa proposed 50%	**First half season (Sept - Dec)**	0%	3%	0%
	Second half season (January - April)	0%	17%	0%
Waiohine proposed 50%	**First half season (Sept - Dec)**	0%	0%	0%

Table 32: Waingawa at Kaituna - estimate of per ha outcomes by scenario ($/ha/annum)

Average year	**Area = Waingawa River at Kaituna**						
Per ha		**Dairy**	**Arable**	**Sheep and Beef**	**Horticulture and Vegetables**	**Viticulture**	**Total**
Waingawa @ Kaituna 1700	Revenue	$0	$0	$2,300	$0	$0	$2,300
	Expenses	$0	$0	$1,300	$0	$0	$1,300
	Cash Farm Surplus	$0	$0	$1,000	$0	$0	$1,000
	Area irrigated at 0.45l/s	$0	$0	$9	$0	$0	$9
Waingawa @ Kaituna 1900	Revenue	$0	$0	$2,300	$0	$0	$2,300
	Expenses	$0	$0	$1,300	$0	$0	$1,300
	Cash Farm Surplus	$0	$0	$1,000	$0	$0	$1,000
	Area irrigated at 0.45l/s	$0	$0	$43	$0	$0	$43
Waingawa @ Kaituna 3500	Revenue	$9,900	$0	$0	$0	$0	$9,900
	Expenses	$4,700	$0	$0	$0	$0	$4,700
	Cash Farm Surplus	$5,200	$0	$0	$0	$0	$5,200
	Area irrigated at 0.45l/s	$116	$0	$0	$0	$0	$116
Waingawa proposed 100%	Revenue	$10,000	$0	$2,300	$32,800	$0	$7,600
	Expenses	$4,700	$0	$1,300	$23,100	$0	$3,900
	Cash Farm Surplus	$5,300	$0	$1,000	$9,700	$0	$3,700
	Area irrigated at 0.45l/s	$116	$0	$82	$6	$0	$204
Waingawa proposed 50%	Revenue	$10,500	$0	$2,200	$32,000	$0	$7,800
	Expenses	$4,900	$0	$1,300	$23,100	$0	$4,000
	Cash Farm Surplus	$5,600	$0	$900	$8,900	$0	$3,800
	Area irrigated at 0.45l/s	116	-	82	6	-	204
1 in 4 year event	**Area = Waingawa River at Kaituna**						
per ha		**Dairy**	**Arable**	**Sheep and Beef**	**Horticulture and Vegetables**	**Viticulture**	**Total**
Waingawa @ Kaituna 1700	Revenue	$0	$0	$2,100	$0	$0	$2,100
	Expenses	$0	$0	$1,300	$0	$0	$1,300
	Cash Farm Surplus	$0	$0	$700	$0	$0	$700

Waingawa @ Kaituna 1900	Revenue	$0	$0	$2,000	$0	$0	$2,000
	Expenses	$0	$0	$1,300	$0	$0	$1,300
	Cash Farm Surplus	$0	$0	$700	$0	$0	$700
Waingawa @ Kaituna 3500	Revenue	$8,300	$0	$0	$0	$0	$8,300
	Expenses	$4,700	$0	$0	$0	$0	$4,700
	Cash Farm Surplus	$3,600	$0	$0	$0	$0	$3,600
Waingawa proposed 100%	Revenue	$8,200	$0	$2,000	$28,600	$0	$6,300
	Expenses	$4,700	$0	$1,300	$23,100	$0	$3,900
	Cash Farm Surplus	$3,500	$0	$700	$5,500	$0	$2,400
Waingawa proposed 50%	Revenue	$9,500	$0	$2,100	$30,500	$0	$7,100
	Expenses	$4,900	$0	$1,300	$23,100	$0	$4,000
	Cash Farm Surplus	$4,500	$0	$800	$7,400	$0	$3,100

1 in 10 year event **Area = Waingawa River at Kaituna**

per ha		**Dairy**	**Arable**	**Sheep and Beef**	**Horticulture and Vegetables**	**Viticulture**	**Total**
Waingawa @ Kaituna 1700	Revenue	$0	$0	$1,900	$0	$0	$1,900
	Expenses	$0	$0	$1,300	$0	$0	$1,300
	Cash Farm Surplus	$0	$0	$600	$0	$0	$600
Waingawa @ Kaituna 1900	Revenue	$0	$0	$1,900	$0	$0	$1,900
	Expenses	$0	$0	$1,300	$0	$0	$1,300
	Cash Farm Surplus	$0	$0	$600	$0	$0	$600
Waingawa @ Kaituna 3500	Revenue	$8,100	$0	$0	$0	$0	$8,100
	Expenses	$4,700	$0	$0	$0	$0	$4,700
	Cash Farm Surplus	$3,400	$0	$0	$0	$0	$3,400
Waingawa proposed 100%	Revenue	$7,700	$0	$1,900	$26,800	$0	$5,900

	Expenses	$4,700	$0	$1,300	$23,100	$0	$3,900
	Cash Farm Surplus	$3,000	$0	$600	$3,700	$0	$2,000
Waingawa proposed 50%	Revenue	$9,500	$0	$2,100	$30,500	$0	$7,100
	Expenses	$4,900	$0	$1,300	$23,100	$0	$4,000
	Cash Farm Surplus	$4,500	$0	$800	$7,400	$0	$3,100

Worst Year **Area = Waingawa River at Kaituna**

per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Waingawa @ Kaituna 1700	Revenue	$0	$0	$1,800	$0	$0	$1,800
	Expenses	$0	$0	$1,300	$0	$0	$1,300
	Cash Farm Surplus	$0	$0	$400	$0	$0	$400
Waingawa @ Kaituna 1900	Revenue	$0	$0	$1,700	$0	$0	$1,700
	Expenses	$0	$0	$1,300	$0	$0	$1,300
	Cash Farm Surplus	$0	$0	$400	$0	$0	$400
Waingawa @ Kaituna 3500	Revenue	$7,700	$0	$0	$0	$0	$7,700
	Expenses	$4,700	$0	$0	$0	$0	$4,700
	Cash Farm Surplus	$3,100	$0	$0	$0	$0	$3,100
Waingawa proposed 100%	Revenue	$7,100	$0	$1,700	$24,400	$0	$5,400
	Expenses	$4,700	$0	$1,300	$23,100	$0	$3,900
	Cash Farm Surplus	$2,400	$0	$400	$1,300	$0	$1,500
Waingawa proposed 50%	Revenue	$8,400	$0	$1,900	$26,900	$0	$6,300
	Expenses	$4,900	$0	$1,300	$23,100	$0	$4,000
	Cash Farm Surplus	$3,500	$0	$600	$3,800	$0	$2,300

Table 33: Waingawa at Kaituna - estimate of aggregate outcomes of Current vs DNRP vs PNRP flow regimes ($/annum)

Area = Waingawa River at Kaituna			Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total	Total regional GDP	Total regional household income	Total regional employment
	Area	Unrestricted	0	0	30	6	0	36			
		Modelled	116	0	52	0	0	167			
		Proposed	116	0	82	6	0	204			
Average year	Current	Revenue	$1.14	$0.00	$0.19	$0.20	$0.00	$1.53	$1.26	$0.36	11
		Expenses	$0.54	$0.00	$0.11	$0.14	$0.00	$0.79			
		Cash Farm Surplus	$0.60	$0.00	$0.08	$0.06	$0.00	$0.75			
	DNRP (100% restriction)	Revenue	$1.15	$0.00	$0.19	$0.20	$0.00	$1.54	$1.27	$0.36	11
		Expenses	$0.54	$0.00	$0.11	$0.14	$0.00	$0.79			
		Cash Farm Surplus	$0.61	$0.00	$0.08	$0.06	$0.00	$0.75			
	PNRP (50% restriction)	Revenue	$1.21	$0.00	$0.18	$0.19	$0.00	$1.59	$1.31	$0.37	$11.71
		Expenses	$0.57	$0.00	$0.11	$0.14	$0.00	$0.81			
		Cash Farm Surplus	$0.65	$0.00	$0.08	$0.05	$0.00	$0.78			
1 in 4 year	Current	Revenue	$0.96	$0.00	$0.17	$0.20	$0.00	$1.33	$1.10	$0.32	10
		Expenses	$0.54	$0.00	$0.11	$0.14	$0.00	$0.79			
		Cash Farm Surplus	$0.42	$0.00	$0.07	$0.06	$0.00	$0.55			
	DNRP (100% restriction)	Revenue	$0.95	$0.00	$0.17	$0.17	$0.00	$1.29	$1.06	$0.30	10
		Expenses	$0.54	$0.00	$0.11	$0.14	$0.00	$0.79			
		Cash Farm Surplus	$0.41	$0.00	$0.06	$0.03	$0.00	$0.50			
	PNRP (50% restriction)	Revenue	$1.09	$0.00	$0.18	$0.18	$0.00	$1.45	$1.20	$0.34	$10.77

		Expenses	$0.57	$0.00	$0.11	$0.14	$0.00	$0.81			
		Cash Farm Surplus	$0.52	$0.00	$0.07	$0.04	$0.00	$0.64			
1 in 10 year	Current	Revenue	$0.94	$0.00	$0.17	$0.20	$0.00	$1.30	$1.07	$0.31	10
		Expenses	$0.54	$0.00	$0.11	$0.14	$0.00	$0.79			
		Cash Farm Surplus	$0.40	$0.00	$0.06	$0.06	$0.00	$0.52			
	DNRP (100% restriction)	Revenue	$0.89	$0.00	$0.15	$0.16	$0.00	$1.21	$0.99	$0.28	9
		Expenses	$0.54	$0.00	$0.11	$0.14	$0.00	$0.79			
		Cash Farm Surplus	$0.35	$0.00	$0.05	$0.02	$0.00	$0.41			
	PNRP (50% restriction)	Revenue	$1.09	$0.00	$0.18	$0.18	$0.00	$1.45	$1.20	$0.34	$10.77
		Expenses	$0.57	$0.00	$0.11	$0.14	$0.00	$0.81			
		Cash Farm Surplus	$0.52	$0.00	$0.07	$0.04	$0.00	$0.64			
Worst year	Current	Revenue	$0.89	$0.00	$0.16	$0.20	$0.00	$1.25	$1.03	$0.30	10
		Expenses	$0.54	$0.00	$0.11	$0.14	$0.00	$0.79			
		Cash Farm Surplus	$0.35	$0.00	$0.05	$0.06	$0.00	$0.47			
	DNRP (100% restriction)	Revenue	$0.82	$0.00	$0.14	$0.15	$0.00	$1.10	$0.91	$0.26	8
		Expenses	$0.54	$0.00	$0.11	$0.14	$0.00	$0.79			
		Cash Farm Surplus	$0.27	$0.00	$0.03	$0.01	$0.00	$0.31			
	PNRP (50% restriction)	Revenue	$0.97	$0.00	$0.16	$0.16	$0.00	$1.29	$1.06	$0.30	$9.53
		Expenses	$0.57	$0.00	$0.11	$0.14	$0.00	$0.81			
		Cash Farm Surplus	$0.40	$0.00	$0.05	$0.02	$0.00	$0.47			

Appendix G Results for Waiohine River at Gorge

Table 34: Waiohine River at Gorge estimates of severity and duration of restriction events

Area = Waiohine River at Gorge		Full days lost (100% restriction)	50% restriction	25% restriction	Consecutive days of full restriction	Consecutive days of 50% restriction	Volume restriction
Waiohine @ Gorge 3040	**Average**	0	4	0	0	3	1%
	1 in 4 year event	0	5	0	0	3	1%
	1 in 10 year event	0	7	0	0	4	1%
	Maximum	0	22	0	0	22	4%
Waiohine @ Gorge 3395	**Average**	0	9	0	0	5	2%
	1 in 4 year event	0	13	0	0	5	2%
	1 in 10 year event	0	18	0	0	7	3%
	Maximum	0	27	0	0	27	5%
Waiohine @ Gorge 4000	**Average**	0	19	0	0	8	3%
	1 in 4 year event	0	29	0	0	11	5%
	1 in 10 year event	0	38	0	0	15	7%
	Maximum	0	40	0	0	27	7%
Waiohine proposed 100%	**Average**	4	0	0	3	3	1%
	1 in 4 year event	5	0	0	3	3	2%
	1 in 10 year event	7	0	0	4	4	3%
	Maximum	22	0	0	22	22	8%
Waiohine proposed 50%	**Average**	0	4	0	0	3	1%
	1 in 4 year	0	5	0	0	3	1%

	event						
	1 in 10 year event	0	7	0	0	4	1%
	Maximum	0	22	0	0	22	4%

Table 35: Waiohine River at Gorge - estimate of frequency of restrictions

Area = Waiohine River at Gorge	**Number of years when full restriction**	**Number of years when 50% restriction**	**Number of years when 25% restriction**	**Frequency of years with full days restriction**	**Frequency of years with 50% restriction**	**Frequency of years with 25% restriction**
Waiohine @ Gorge 3040	0	14	0	0	2/3	0
Waiohine @ Gorge 3395	0	14	0	0	2/3	0
Waiohine @ Gorge 4000	0	19	0	0	1	0
Waiohine proposed 100%	14	0	0	2/3	0	0
Waiohine proposed 50%	0	14	0	0	2/3	0

Table 36: Waiohine River at Gorge - estimate of timing of restrictions

Area = Waiohine River at Gorge		**100% restriction**	**50% restriction**	**25% restriction**
Waiohine @ Gorge 3040	**First half season (Sept - Dec)**	0%	0%	0%
	Second half season (January - April)	0%	3%	0%
Waiohine @ Gorge 3395	**First half season (Sept - Dec)**	0%	1%	0%
	Second half season (January - April)	0%	6%	0%
Waiohine @ Gorge 4000	**First half season (Sept - Dec)**	0%	2%	0%
	Second half season (January - April)	0%	13%	0%
Waiohine proposed 100%	**First half season (Sept - Dec)**	0%	0%	0%
	Second half season (January - April)	3%	0%	0%

Table 37: Waiohine River at Gorge - estimate of per ha outcomes by scenario ($/ha/annum)

Average year	**Area = Waiohine River at Gorge**						
Per ha		**Dairy**	**Arable**	**Sheep and Beef**	**Horticulture and Vegetables**	**Viticulture**	**Total**
Waiohine @ Gorge 3040	Revenue	$10,900	$0	$2,300	$33,300	$0	$13,900
	Expenses	$5,100	$0	$1,300	$23,100	$0	$7,900
	Cash Farm Surplus	$5,800	$0	$1,000	$10,200	$0	$6,000
	Area irrigated at 0.45l/s	$221	$0	$40	$58	$0	$319
Waiohine @ Gorge 3395	Revenue	$10,800	$0	$2,300	$33,100	$0	$8,400
	Expenses	$5,000	$0	$1,300	$23,100	$0	$4,500
	Cash Farm Surplus	$5,700	$0	$1,000	$10,000	$0	$4,000
	Area irrigated at 0.45l/s	$109	$0	$90	$12	$0	$211
Waiohine @ Gorge 4000	Revenue	$0	$0	$2,300	$0	$0	$2,300
	Expenses	$0	$0	$1,300	$0	$0	$1,300
	Cash Farm Surplus	$0	$0	$1,000	$0	$0	$1,000
	Area irrigated at 0.45l/s	$0	$0	$14	$0	$0	$14
Waiohine proposed 100%	Revenue	$10,800	$0	$2,300	$33,100	$0	$11,400
	Expenses	$5,000	$0	$1,300	$23,100	$0	$6,400
	Cash Farm Surplus	$5,800	$0	$1,000	$10,000	$0	$5,000
	Area irrigated at 0.45l/s	$330	$0	$144	$70	$0	$544
Waiohine proposed 50%	Revenue	$10,900	$0	$2,300	$33,100	$0	$11,500
	Expenses	$5,100	$0	$1,300	$23,100	$0	$6,400
	Cash Farm Surplus	$5,800	$0	$1,000	$10,000	$0	$5,100
	Area irrigated at 0.45l/s	330	-	144	70	-	544
1 in 4 year event	**Area = Waiohine River at Gorge**						

per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Waiohine @ Gorge 3040	Revenue	$9,400	$0	$2,200	$30,600	$0	$12,400
	Expenses	$5,100	$0	$1,300	$23,100	$0	$7,900
	Cash Farm Surplus	$4,400	$0	$800	$7,500	$0	$4,500
Waiohine @ Gorge 3395	Revenue	$9,400	$0	$2,100	$30,500	$0	$7,500
	Expenses	$5,000	$0	$1,300	$23,100	$0	$4,500
	Cash Farm Surplus	$4,400	$0	$800	$7,400	$0	$3,000
Waiohine @ Gorge 4000	Revenue	$0	$0	$2,100	$0	$0	$2,100
	Expenses	$0	$0	$1,300	$0	$0	$1,300
	Cash Farm Surplus	$0	$0	$800	$0	$0	$800
Waiohine proposed 100%	Revenue	$9,400	$0	$2,100	$30,300	$0	$10,100
	Expenses	$5,000	$0	$1,300	$23,100	$0	$6,400
	Cash Farm Surplus	$4,300	$0	$800	$7,200	$0	$3,800
Waiohine proposed 50%	Revenue	$9,500	$0	$2,200	$30,700	$0	$10,300
	Expenses	$5,100	$0	$1,300	$23,100	$0	$6,400
	Cash Farm Surplus	$4,500	$0	$800	$7,600	$0	$3,900

1 in 10 year event | **Area = Waiohine River at Gorge**

per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Waiohine @ Gorge 3040	Revenue	$9,200	$0	$2,100	$29,900	$0	$12,100
	Expenses	$5,100	$0	$1,300	$23,100	$0	$7,900
	Cash Farm Surplus	$4,200	$0	$800	$6,800	$0	$4,200

Waiohine @ Gorge 3395	Revenue	$9,100	$0	$2,100	$29,600	$0	$7,300
	Expenses	$5,000	$0	$1,300	$23,100	$0	$4,500
	Cash Farm Surplus	$4,100	$0	$700	$6,500	$0	$2,800
Waiohine @ Gorge 4000	Revenue	$0	$0	$2,000	$0	$0	$2,000
	Expenses	$0	$0	$1,300	$0	$0	$1,300
	Cash Farm Surplus	$0	$0	$700	$0	$0	$700
Waiohine proposed 100%	Revenue	$8,900	$0	$2,000	$28,900	$0	$9,700
	Expenses	$5,000	$0	$1,300	$23,100	$0	$6,400
	Cash Farm Surplus	$3,900	$0	$700	$5,800	$0	$3,300
Waiohine proposed 50%	Revenue	$9,500	$0	$2,200	$30,700	$0	$10,300
	Expenses	$5,100	$0	$1,300	$23,100	$0	$6,400
	Cash Farm Surplus	$4,500	$0	$800	$7,600	$0	$3,900

Worst Year

per ha	**Area = Waiohine River at Gorge**	**Dairy**	**Arable**	**Sheep and Beef**	**Horticulture and Vegetables**	**Viticulture**	**Total**
Waiohine @ Gorge 3040	Revenue	$9,200	$0	$2,100	$29,900	$0	$12,100
	Expenses	$5,100	$0	$1,300	$23,100	$0	$7,900
	Cash Farm Surplus	$4,200	$0	$800	$6,800	$0	$4,200
Waiohine @ Gorge 3395	Revenue	$9,100	$0	$2,100	$29,600	$0	$7,300
	Expenses	$5,000	$0	$1,300	$23,100	$0	$4,500
	Cash Farm Surplus	$4,100	$0	$700	$6,500	$0	$2,800
Waiohine @ Gorge 4000	Revenue	$0	$0	$2,000	$0	$0	$2,000
	Expenses	$0	$0	$1,300	$0	$0	$1,300
	Cash Farm Surplus	$0	$0	$700	$0	$0	$700

Waiohine proposed 100%	Revenue	$8,900	$0	$2,000	$28,900	$0	$9,700
	Expenses	$5,000	$0	$1,300	$23,100	$0	$6,400
	Cash Farm Surplus	$3,900	$0	$700	$5,800	$0	$3,300

Waiohine proposed 50%	Revenue	$9,500	$0	$2,100	$30,500	$0	$10,200
	Expenses	$5,100	$0	$1,300	$23,100	$0	$6,400
	Cash Farm Surplus	$4,400	$0	$800	$7,400	$0	$3,800

Table 38: Waiohine River at Gorge - estimate of aggregate outcomes of Current vs DNRP vs PNRP flow regimes ($/annum)

Area = Waiohine River at Gorge			Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total	Total regional GDP	Total regional household income	Total regional employment
	Area	Unrestricted	0	0	0	0	0	0			
		Modelled	330	0	144	70	0	544			
		Proposed	330	0	144	70	0	544			
Average year	Current	Revenue	$3.57	$0.00	$0.34	$2.33	$0.00	$6.24	$5.16	$1.79	63
		Expenses	$1.67	$0.00	$0.19	$1.61	$0.00	$3.48			
		Cash Farm Surplus	$1.91	$0.00	$0.14	$0.71	$0.00	$2.76			
	DNRP (100% restriction)	Revenue	$3.56	$0.00	$0.34	$2.32	$0.00	$6.22	$5.14	$1.78	62
		Expenses	$1.66	$0.00	$0.19	$1.61	$0.00	$3.47			
		Cash Farm Surplus	$1.90	$0.00	$0.14	$0.70	$0.00	$2.75			
	PNRP (50% restriction)	Revenue	$3.58	$0.00	$0.34	$2.32	$0.00	$6.23	$5.16	$1.79	63
		Expenses	$1.67	$0.00	$0.19	$1.61	$0.00	$3.48			
		Cash Farm Surplus	$1.91	$0.00	$0.14	$0.70	$0.00	$2.76			
1 in 4 year	Current	Revenue	$3.11	$0.00	$0.31	$2.14	$0.00	$5.56	$4.60	$1.61	57
		Expenses	$1.67	$0.00	$0.19	$1.61	$0.00	$3.48			
		Cash Farm Surplus	$1.44	$0.00	$0.12	$0.52	$0.00	$2.08			
	DNRP (100% restriction)	Revenue	$3.09	$0.00	$0.31	$2.12	$0.00	$5.52	$4.56	$1.60	56
		Expenses	$1.66	$0.00	$0.19	$1.61	$0.00	$3.47			
		Cash Farm Surplus	$1.42	$0.00	$0.12	$0.51	$0.00	$2.05			

	PNRP (50% restriction)	Revenue	$3.14	$0.00	$0.31	$2.15	$0.00	$5.60	$4.63	$1.62	$56.88
		Expenses	$1.67	$0.00	$0.19	$1.61	$0.00	$3.48			
		Cash Farm Surplus	$1.47	$0.00	$0.12	$0.53	$0.00	$2.12			
1 in 10 year	Current	Revenue	$3.03	$0.00	$0.30	$2.09	$0.00	$5.42	$4.48	$1.57	55
		Expenses	$1.67	$0.00	$0.19	$1.61	$0.00	$3.48			
		Cash Farm Surplus	$1.37	$0.00	$0.11	$0.47	$0.00	$1.94			
	DNRP (100% restriction)	Revenue	$2.95	$0.00	$0.29	$2.02	$0.00	$5.26	$4.35	$1.52	53
		Expenses	$1.66	$0.00	$0.19	$1.61	$0.00	$3.47			
		Cash Farm Surplus	$1.28	$0.00	$0.10	$0.40	$0.00	$1.78			
	PNRP (50% restriction)	Revenue	$3.14	$0.00	$0.31	$2.15	$0.00	$5.60	$4.63	$1.62	57
		Expenses	$1.67	$0.00	$0.19	$1.61	$0.00	$3.48			
		Cash Farm Surplus	$1.47	$0.00	$0.12	$0.53	$0.00	$2.12			
Worst year	Current	Revenue	$3.03	$0.00	$0.30	$2.09	$0.00	$5.42	$4.48	$1.57	55
		Expenses	$1.67	$0.00	$0.19	$1.61	$0.00	$3.48			
		Cash Farm Surplus	$1.37	$0.00	$0.11	$0.47	$0.00	$1.94			
	DNRP (100% restriction)	Revenue	$2.95	$0.00	$0.29	$2.02	$0.00	$5.26	$4.35	$1.52	53
		Expenses	$1.66	$0.00	$0.19	$1.61	$0.00	$3.47			
		Cash Farm Surplus	$1.28	$0.00	$0.10	$0.40	$0.00	$1.78			
	PNRP (50% restriction)	Revenue	$3.12	$0.00	$0.31	$2.13	$0.00	$5.56	$4.60	$1.61	$56.46
		Expenses	$1.67	$0.00	$0.19	$1.61	$0.00	$3.48			
		Cash Farm Surplus	$1.45	$0.00	$0.12	$0.52	$0.00	$2.08			

Appendix H Results for Waipoua River at Mikimiki Bridge

Table 39: Waipoua River estimates of severity and duration of restriction events

Area = Waipoua River at Mikimiki Bridge		Full days lost (100% restriction)	50% restriction	25% restriction	Consecutive days of full restriction	Consecutive days of 50% restriction	Volume restriction
Waipoua @ Mikimiki 250 l/sec unless flow at boundary demonstrated to be > 250	**Average**	0	18	0	0	9	3%
	1 in 4 year event	0	36	0	0	13	7%
	1 in 10 year event	0	43	0	0	20	8%
	Maximum	0	43	0	0	27	8%
Waipoua @ Mikimiki 300	**Average**	18	7	0	9	12	8%
	1 in 4 year event	36	12	0	13	22	15%
	1 in 10 year event	43	16	0	20	25	18%
	Maximum	43	19	0	27	27	19%
Waipoua proposed 100%	**Average**	18	7	0	9	12	8%
	1 in 4 year event	36	12	0	13	22	15%
	1 in 10 year event	43	16	0	20	25	18%
	Maximum	43	19	0	27	27	19%
Waipoua proposed 50%	**Average**	0	18	0	0	9	3%
	1 in 4 year event	0	36	0	0	13	7%
	1 in 10 year event	0	43	0	0	20	8%
	Maximum	0	43	0	0	27	8%

Table 40: Waipoua River - estimate of frequency of restrictions

Area = Waipoua River at Mikimiki Bridge	Number of years when full restriction	Number of years when 50% restriction	Number of years when 25% restriction	Frequency of years with full days restriction	Frequency of years with 50% restriction	Frequency of years with 25% restriction
Waipoua @ Mikimiki 250 l/sec unless flow at boundary demonstrated to be > 250	0	4	0	0	2/3	0
Waipoua @ Mikimiki 300	4	4	0	2/3	2/3	0
Waipoua proposed 100%	4	4	0	2/3	2/3	0
Waipoua proposed 50%	0	4	0	0	2/3	0

Table 41: Waipoua River - estimate of frequency of restrictions

Area = Waipoua River at Mikimiki Bridge		100% restriction	50% restriction	25% restriction
Waipoua @ Mikimiki 250 l/sec unless flow at boundary demonstrated to be > 250	**First half season (Sept - Dec)**	0%	0%	0%
	Second half season (January - April)	0%	15%	0%
Waipoua @ Mikimiki 300	**First half season (Sept - Dec)**	0%	1%	0%
	Second half season (January - April)	15%	5%	0%
Waipoua proposed 100%	**First half season (Sept - Dec)**	0%	1%	0%
	Second half season (January - April)	15%	5%	0%
Waipoua proposed 50%	**First half season (Sept - Dec)**	0%	0%	0%
	Second half season (January - April)	0%	15%	0%

Table 42: Waipoua River - estimate of per ha outcomes by scenario ($/ha/annum)

Average year	**Area = Waipoua River at Mikimiki Bridge**						
Per ha		**Dairy**	**Arable**	**Sheep and Beef**	**Horticulture and Vegetables**	**Viticulture**	**Total**
Waipoua @ Mikimiki 250 l/sec unless flow at boundary demonstrated to be > 250	Revenue	$0	$3,300	$2,300	$0	$0	$2,700
	Expenses	$0	$900	$1,300	$0	$0	$1,200
	Cash Farm Surplus	$0	$2,400	$1,000	$0	$0	$1,500
	Area irrigated at 0.45l/s	-	16	28	-	-	44
Waipoua @ Mikimiki 300	Revenue	$0	$0	$2,200	$0	$0	$2,200
	Expenses	$0	$0	$1,300	$0	$0	$1,300
	Cash Farm Surplus	$0	$0	$900	$0	$0	$900
	Area irrigated at 0.45l/s	-	-	13	-	-	13
Waipoua proposed 100%	Revenue	$0	$3,000	$2,200	$0	$0	$2,500
	Expenses	$0	$900	$1,300	$0	$0	$1,200
	Cash Farm Surplus	$0	$2,200	$900	$0	$0	$1,300
	Area irrigated at 0.45l/s	-	16	41	-	-	57
Waipoua proposed 50%	Revenue	$0	$3,300	$2,300	$0	$0	$2,600
	Expenses	$0	$900	$1,300	$0	$0	$1,200
	Cash Farm Surplus	$0	$2,400	$1,000	$0	$0	$1,400
	Area irrigated at 0.45l/s	-	16	41	-	-	57

per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Waipoua @ Mikimiki 250 l/sec unless flow at boundary demonstrated to be > 250	Revenue	$0	$3,000	$2,100	$0	$0	$2,400
	Expenses	$0	$900	$1,300	$0	$0	$1,200
	Cash Farm Surplus	$0	$2,200	$700	$0	$0	$1,300
Waipoua @ Mikimiki 300	Revenue	$0	$0	$1,800	$0	$0	$1,800
	Expenses	$0	$0	$1,300	$0	$0	$1,300
	Cash Farm Surplus	$0	$0	$500	$0	$0	$500
Waipoua proposed 100%	Revenue	$0	$2,500	$1,800	$0	$0	$2,000
	Expenses	$0	$900	$1,300	$0	$0	$1,200
	Cash Farm Surplus	$0	$1,600	$500	$0	$0	$900
Waipoua proposed 50%	Revenue	$0	$3,000	$2,100	$0	$0	$2,300
	Expenses	$0	$900	$1,300	$0	$0	$1,200
	Cash Farm Surplus	$0	$2,200	$700	$0	$0	$1,100

1 in 10 year event | **Area = Waipoua River at Mikimiki Bridge**

per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Waipoua @ Mikimiki 250 l/sec unless flow at boundary demonstrated to be > 250	Revenue	$0	$3,000	$2,100	$0	$0	$2,400

	Expenses	$0	$900	$1,300	$0	$0	$1,200
	Cash Farm Surplus	$0	$2,200	$700	$0	$0	$1,300
Waipoua @ Mikimiki 300	Revenue	$0	$0	$1,800	$0	$0	$1,800
	Expenses	$0	$0	$1,300	$0	$0	$1,300
	Cash Farm Surplus	$0	$0	$500	$0	$0	$500
Waipoua proposed 100%	Revenue	$0	$2,400	$1,800	$0	$0	$2,000
	Expenses	$0	$900	$1,300	$0	$0	$1,200
	Cash Farm Surplus	$0	$1,600	$500	$0	$0	$800
Waipoua proposed 50%	Revenue	$0	$3,000	$2,100	$0	$0	$2,300
	Expenses	$0	$900	$1,300	$0	$0	$1,200
	Cash Farm Surplus	$0	$2,200	$700	$0	$0	$1,100

Worst Year

	Area = Waipoua River at Mikimiki Bridge						
per ha		**Dairy**	**Arable**	**Sheep and Beef**	**Horticulture and Vegetables**	**Viticulture**	**Total**
Waipoua @ Mikimiki 250 l/sec unless flow at boundary demonstrated to be > 250	Revenue	$0	$3,000	$2,100	$0	$0	$2,400
	Expenses	$0	$900	$1,300	$0	$0	$1,200
	Cash Farm Surplus	$0	$2,200	$700	$0	$0	$1,300

Waipoua @ Mikimiki 300	Revenue	$0	$0	$1,800	$0	$0	$1,800
	Expenses	$0	$0	$1,300	$0	$0	$1,300
	Cash Farm Surplus	$0	$0	$500	$0	$0	$500
Waipoua proposed 100%	Revenue	$0	$2,400	$1,800	$0	$0	$2,000
	Expenses	$0	$900	$1,300	$0	$0	$1,200
	Cash Farm Surplus	$0	$1,600	$500	$0	$0	$800
Waipoua proposed 50%	Revenue	$0	$3,000	$2,100	$0	$0	$2,300
	Expenses	$0	$900	$1,300	$0	$0	$1,200
	Cash Farm Surplus	$0	$2,200	$700	$0	$0	$1,100

Table 43: Waipoua River - estimate of aggregate outcomes of Current vs DNRP vs PNRP flow regimes ($/annum)

Area = Waipoua River at Mikimiki Bridge			Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total	Total regional GDP	Total regional household income	Total regional employment
	Area	Unrestricted	0	0	0	0	0	0			
		Modelled	0	16	41	0	0	57			
		DNRP (100% restriction)	0	16	41	0	0	57			
		PNRP (50% restriction)	0	16	41	0	0	57			
Average year	Current	Revenue	$0.00	$0.05	$0.09	$0.00	$0.00	$0.15	$0.11	$0.02	1
		Expenses	$0.00	$0.01	$0.05	$0.00	$0.00	$0.07			
		Cash Farm Surplus	$0.00	$0.04	$0.04	$0.00	$0.00	$0.08			
	DNRP (100% restriction)	Revenue	$0.00	$0.05	$0.09	$0.00	$0.00	$0.14	$0.10	$0.02	1
		Expenses	$0.00	$0.01	$0.05	$0.00	$0.00	$0.07			
		Cash Farm Surplus	$0.00	$0.03	$0.04	$0.00	$0.00	$0.07			
	PNRP (50% restriction)	Revenue	$0.00	$0.05	$0.10	$0.00	$0.00	$0.15	$0.11	$0.02	1
		Expenses	$0.00	$0.01	$0.05	$0.00	$0.00	$0.07			
		Cash Farm Surplus	$0.00	$0.04	$0.04	$0.00	$0.00	$0.08			
1 in 4 year	Current	Revenue	$0.00	$0.05	$0.08	$0.00	$0.00	$0.13	$0.10	$0.02	1
		Expenses	$0.00	$0.01	$0.05	$0.00	$0.00	$0.07			
		Cash Farm Surplus	$0.00	$0.03	$0.03	$0.00	$0.00	$0.06			
	DNRP (100% restriction)	Revenue	$0.00	$0.04	$0.08	$0.00	$0.00	$0.12	$0.09	$0.02	1

		Expenses	$0.00	$0.01	$0.05	$0.00	$0.00	$0.07			
		Cash Farm Surplus	$0.00	$0.03	$0.02	$0.00	$0.00	$0.05			
	PNRP (50% restriction)	Revenue	$0.00	$0.05	$0.08	$0.00	$0.00	$0.13	$0.10	$0.02	1
		Expenses	$0.00	$0.01	$0.05	$0.00	$0.00	$0.07			
		Cash Farm Surplus	$0.00	$0.03	$0.03	$0.00	$0.00	$0.06			
1 in 10 year	Current	Revenue	$0.00	$0.05	$0.08	$0.00	$0.00	$0.13	$0.10	$0.02	1
		Expenses	$0.00	$0.01	$0.05	$0.00	$0.00	$0.07			
		Cash Farm Surplus	$0.00	$0.03	$0.03	$0.00	$0.00	$0.06			
	DNRP (100% restriction)	Revenue	$0.00	$0.04	$0.07	$0.00	$0.00	$0.11	$0.08	$0.02	1
		Expenses	$0.00	$0.01	$0.05	$0.00	$0.00	$0.07			
		Cash Farm Surplus	$0.00	$0.03	$0.02	$0.00	$0.00	$0.05			
	PNRP (50% restriction)	Revenue	$0.00	$0.05	$0.08	$0.00	$0.00	$0.13	$0.10	$0.02	1
		Expenses	$0.00	$0.01	$0.05	$0.00	$0.00	$0.07			
		Cash Farm Surplus	$0.00	$0.03	$0.03	$0.00	$0.00	$0.06			
Worst year	Current	Revenue	$0.00	$0.05	$0.08	$0.00	$0.00	$0.13	$0.10	$0.02	1
		Expenses	$0.00	$0.01	$0.05	$0.00	$0.00	$0.07			
		Cash Farm Surplus	$0.00	$0.03	$0.03	$0.00	$0.00	$0.06			
	DNRP (100% restriction)	Revenue	$0.00	$0.04	$0.07	$0.00	$0.00	$0.11	$0.08	$0.02	1
		Expenses	$0.00	$0.01	$0.05	$0.00	$0.00	$0.07			

		Cash Farm Surplus	$0.00	$0.03	$0.02	$0.00	$0.00	$0.05			
	PNRP (50% restriction)	Revenue	$0.00	$0.05	$0.08	$0.00	$0.00	$0.13	$0.10	$0.02	1
		Expenses	$0.00	$0.01	$0.05	$0.00	$0.00	$0.07			
		Cash Farm Surplus	$0.00	$0.03	$0.03	$0.00	$0.00	$0.06			

Appendix I Results for Otaki River

Table 44: Otaki River estimates of severity and duration of restriction events

Area = Otaki at Pukehinau		Full days lost (100% restriction)	50% restriction	25% restriction	Consecutive days of full restriction	Consecutive days of 50% restriction	Volume restriction
Otaki @ Pukehinau 2550	**Average**	0	0	0	0	0	0%
	1 in 4 year event	0	0	0	0	0	0%
	1 in 10 year event	0	0	0	0	0	0%
	Maximum	0	0	0	0	0	0%
Otaki @Pukehinau unrestricted	**Average**	0	0	0	0	0	0%
	1 in 4 year event	0	0	0	0	0	0%
	1 in 10 year event	0	0	0	0	0	0%
	Maximum	0	0	0	0	0	0%
Otaki Proposed 100%	**Average**	0	3	0	0	2	1%
	1 in 4 year event	0	2	0	0	2	0%
	1 in 10 year event	0	8	0	0	7	2%
	Maximum	0	34	0	0	15	6%
Otaki Proposed 50%	**Average**	0	0	0	0	0	0%
	1 in 4 year event	0	0	0	0	0	0%
	1 in 10 year event	0	0	0	0	0	0%
	Maximum	0	0	0	0	0	0%

Table 45: Otaki River - estimate of frequency of restrictions

Area = Otaki at Pukehinau	Number of years when full restriction	Number of years when 50% restriction	Number of years when 25% restriction	Frequency of years with full days restriction	Frequency of years with 50% restriction	Frequency of years with 25% restriction
Otaki @ Pukehinau 2550	0	0	0	0	0	0
Otaki @Pukehinau unrestricted	0	0	0	0	0	0
Otaki Proposed 100%	0	8	0	0	2/5	0
Otaki Proposed 50%	0	0	0	0	0	0

Table 46: Otaki River - estimate of timing of restrictions

Area = Otaki at Pukehinau		100% restriction	50% restriction	25% restriction
Otaki @ Pukehinau 2550	**First half season (Sept - Dec)**	0%	0%	0%
	Second half season (January - April)	0%	0%	0%
Otaki @Pukehinau unrestricted	**First half season (Sept - Dec)**	0%	0%	0%
	Second half season (January - April)	0%	0%	0%
Otaki Proposed 100%	**First half season (Sept - Dec)**	0%	0%	0%
	Second half season (January - April)	0%	3%	0%
Otaki Proposed 50%	**First half season (Sept - Dec)**	0%	0%	0%
	Second half season (January - April)	0%	0%	0%

Table 47: Otaki River - estimate of per ha outcomes by scenario ($/ha/annum)

Average year	**Area = Otaki at Pukehinau**						
Per ha		**Dairy**	**Arable**	**Sheep and Beef**	**Horticulture and Vegetables**	**Viticulture**	**Total**
Otaki @ Pukehinau 2550	Revenue	$0	$3,400	$2,300	$33,300	$0	$6,600
	Expenses	$0	$900	$1,300	$23,100	$0	$4,200
	Cash Farm Surplus	$0	$2,600	$1,000	$10,200	$0	$2,300
	Area irrigated at 0.45l/s	-	4	69	11	-	85
Otaki @Pukehinau unrestricted	Revenue	$0	$0	$0	$33,300	$0	$33,300
	Expenses	$0	$0	$0	$23,100	$0	$23,100
	Cash Farm Surplus	$0	$0	$0	$10,200	$0	$10,200
	Area irrigated at 0.45l/s	-	-	-	2	-	2
Otaki Proposed 100%	Revenue	$0	$3,400	$2,300	$33,200	$0	$7,100
	Expenses	$0	$900	$1,300	$23,100	$0	$4,600
	Cash Farm Surplus	$0	$2,500	$1,000	$10,100	$0	$2,500
	Area irrigated at 0.45l/s	-	4	69	13	-	86
Otaki Proposed 50%	Revenue	$0	$3,400	$2,300	$33,300	$0	$7,100
	Expenses	$0	$900	$1,300	$23,100	$0	$4,600
	Cash Farm Surplus	$0	$2,600	$1,000	$10,200	$0	$2,500
	Area irrigated at 0.45l/s	-	4	69	13	-	86

per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Otaki @ Pukehinau 2550	Revenue	$0	$3,400	$2,200	$30,700	$0	$6,100
	Expenses	$0	$900	$1,300	$23,100	$0	$4,200
	Cash Farm Surplus	$0	$2,600	$800	$7,600	$0	$1,800
Otaki @Pukehinau unrestricted	Revenue	$0	$0	$0	$30,700	$0	$30,700
	Expenses	$0	$0	$0	$23,100	$0	$23,100
	Cash Farm Surplus	$0	$0	$0	$7,600	$0	$7,600
Otaki Proposed 100%	Revenue	$0	$3,300	$2,100	$30,400	$0	$6,500
	Expenses	$0	$900	$1,300	$23,100	$0	$4,600
	Cash Farm Surplus	$0	$2,500	$800	$7,300	$0	$1,900
Otaki Proposed 50%	Revenue	$0	$3,400	$2,200	$30,700	$0	$6,600
	Expenses	$0	$900	$1,300	$23,100	$0	$4,600
	Cash Farm Surplus	$0	$2,600	$800	$7,600	$0	$1,900

1 in 10 year event | **Area = Otaki at Pukehinau**

per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Otaki @ Pukehinau 2550	Revenue	$0	$3,400	$2,200	$30,700	$0	$6,100

	Expenses	$0	$900	$1,300	$23,100	$0	$4,200
	Cash Farm Surplus	$0	$2,600	$800	$7,600	$0	$1,800
Otaki @Pukehinau unrestricted	Revenue	$0	$0	$0	$30,700	$0	$30,700
	Expenses	$0	$0	$0	$23,100	$0	$23,100
	Cash Farm Surplus	$0	$0	$0	$7,600	$0	$7,600
Otaki Proposed 100%	Revenue	$0	$3,300	$2,100	$30,400	$0	$6,500
	Expenses	$0	$900	$1,300	$23,100	$0	$4,600
	Cash Farm Surplus	$0	$2,500	$800	$7,300	$0	$1,900
Otaki Proposed 50%	Revenue	$0	$3,400	$2,200	$30,700	$0	$6,600
	Expenses	$0	$900	$1,300	$23,100	$0	$4,600
	Cash Farm Surplus	$0	$2,600	$800	$7,600	$0	$1,900

Worst Year

	Area = Otaki at Pukehinau						
per ha		**Dairy**	**Arable**	**Sheep and Beef**	**Horticulture and Vegetables**	**Viticulture**	**Total**
Otaki @ Pukehinau 2550	Revenue	$0	$3,400	$2,200	$30,700	$0	$6,100
	Expenses	$0	$900	$1,300	$23,100	$0	$4,200
	Cash Farm Surplus	$0	$2,600	$800	$7,600	$0	$1,800

Otaki @Pukehinau unrestricted	Revenue	$0	$0	$0	$30,700	$0	$30,700
	Expenses	$0	$0	$0	$23,100	$0	$23,100
	Cash Farm Surplus	$0	$0	$0	$7,600	$0	$7,600
Otaki Proposed 100%	Revenue	$0	$3,400	$2,200	$30,600	$0	$6,500
	Expenses	$0	$900	$1,300	$23,100	$0	$4,600
	Cash Farm Surplus	$0	$2,500	$800	$7,500	$0	$1,900
Otaki Proposed 50%	Revenue	$0	$3,400	$2,200	$30,700	$0	$6,600
	Expenses	$0	$900	$1,300	$23,100	$0	$4,600
	Cash Farm Surplus	$0	$2,600	$800	$7,600	$0	$1,900

Table 48: Otaki River - estimate of aggregate outcomes of Current vs DNRP vs PNRP flow regimes ($/annum), only currently unrestricted on DNRP

Area = Otaki at Pukehinau			Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total	Total regional GDP	Total regional household income	Total regional employment
	Area	Unrestricted	0	0	0	0	0	0			
		Modelled	0	4	69	13	0	86			
		DNRP (100% restriction)	0	4	69	13	0	86			
		PNRP (50% restriction)	0	4	69	13	0	86			
Average year	Current	Revenue	$0.00	$0.01	$0.16	$0.44	$0.00	$0.61	$0.49	$0.21	8
		Expenses	$0.00	$0.00	$0.09	$0.30	$0.00	$0.40			
		Cash Farm Surplus	$0.00	$0.01	$0.07	$0.13	$0.00	$0.21			
	DNRP (100% restriction)	Revenue	$0.00	$0.01	$0.16	$0.44	$0.00	$0.61	$0.49	$0.20	8
		Expenses	$0.00	$0.00	$0.09	$0.30	$0.00	$0.40			
		Cash Farm Surplus	$0.00	$0.01	$0.07	$0.13	$0.00	$0.21			
	PNRP (50% restriction)	Revenue	$0.00	$0.01	$0.16	$0.44	$0.00	$0.61	$0.49	$0.21	8
		Expenses	$0.00	$0.00	$0.09	$0.30	$0.00	$0.40			
		Cash Farm Surplus	$0.00	$0.01	$0.07	$0.13	$0.00	$0.21			
1 in 4 year	Current	Revenue	$0.00	$0.01	$0.15	$0.40	$0.00	$0.57	$0.45	$0.19	8
		Expenses	$0.00	$0.00	$0.09	$0.30	$0.00	$0.40			
		Cash Farm Surplus	$0.00	$0.01	$0.06	$0.10	$0.00	$0.17			

	DNRP (100% restriction)	Revenue	$0.00	$0.01	$0.15	$0.40	$0.00	$0.56	$0.45	$0.19	8
		Expenses	$0.00	$0.00	$0.09	$0.30	$0.00	$0.40			
		Cash Farm Surplus	$0.00	$0.01	$0.06	$0.10	$0.00	$0.16			
	PNRP (50% restriction)	Revenue	$0.00	$0.01	$0.15	$0.40	$0.00	$0.57	$0.45	$0.19	8
		Expenses	$0.00	$0.00	$0.09	$0.30	$0.00	$0.40			
		Cash Farm Surplus	$0.00	$0.01	$0.06	$0.10	$0.00	$0.17			
1 in 10 year	Current	Revenue	$0.00	$0.01	$0.15	$0.40	$0.00	$0.57	$0.45	$0.19	8
		Expenses	$0.00	$0.00	$0.09	$0.30	$0.00	$0.40			
		Cash Farm Surplus	$0.00	$0.01	$0.06	$0.10	$0.00	$0.17			
	DNRP (100% restriction)	Revenue	$0.00	$0.01	$0.15	$0.40	$0.00	$0.56	$0.45	$0.19	8
		Expenses	$0.00	$0.00	$0.09	$0.30	$0.00	$0.40			
		Cash Farm Surplus	$0.00	$0.01	$0.06	$0.10	$0.00	$0.16			
	PNRP (50% restriction)	Revenue	$0.00	$0.01	$0.15	$0.40	$0.00	$0.57	$0.45	$0.19	8
		Expenses	$0.00	$0.00	$0.09	$0.30	$0.00	$0.40			
		Cash Farm Surplus	$0.00	$0.01	$0.06	$0.10	$0.00	$0.17			
Worst year	Current	Revenue	$0.00	$0.01	$0.15	$0.40	$0.00	$0.57	$0.45	$0.19	8
		Expenses	$0.00	$0.00	$0.09	$0.30	$0.00	$0.40			
		Cash Farm Surplus	$0.00	$0.01	$0.06	$0.10	$0.00	$0.17			

	DNRP (100% restriction)	Revenue	$0.00	$0.01	$0.15	$0.40	$0.00	$0.56	$0.45	$0.19	8
		Expenses	$0.00	$0.00	$0.09	$0.30	$0.00	$0.40			
		Cash Farm Surplus	$0.00	$0.01	$0.06	$0.10	$0.00	$0.17			
	PNRP (50% restriction)	Revenue	$0.00	$0.01	$0.15	$0.40	$0.00	$0.57	$0.45	$0.19	8
		Expenses	$0.00	$0.00	$0.09	$0.30	$0.00	$0.40			
		Cash Farm Surplus	$0.00	$0.01	$0.06	$0.10	$0.00	$0.17			

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