



Wairarapa Flow Regimes

Economic impact assessment of draft Plan changes

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1 Background

Wellington Regional Council 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. This report updates that interim report. As it includes greater detail on method, and provides some small corrections and updates so should be relied upon in preference to the interim report.

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.

2 Key method and assumptions

2.1 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 different 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 of 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.

A single draft Plan provision (DNRP) flow regime was analysed for each catchment, and it was assumed that this 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 regime were introduced immediately.

The full set of current and DNRP scenarios is shown in Table 1 below.

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

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

2.2 Land use and areas irrigated

WRC supplied an extract from the consent database showing the area irrigated and DNRP 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 scenario equals the sum of the areas for the existing scenarios, on the basis that all irrigators would be placed on the DNRP 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
Mangatarere @ Gorge DNRP	150	0	40	0	0	190
Otaki @Pukehinau	0	4	69	11	0	85
Otaki @Pukehinau 2550	0	0	0	2	0	2
Otaki DNRP	0	4	69	13	0	86
Papawai @ Fabians Rd	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
Ruamahanga @ Waihenga	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 @ Wardells	194	0	84	6	0	283
Ruamahanga @ Wardells 2400	773	0	241	3	312	1329
Ruamahanga @ Wardells DNRP	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
Waingawa @ Kaituna	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
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
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
Grand Total	3822	20	1202	123	324	5491

2.3 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 Environmental¹ 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 Lincoln Environmental: Reliability of Supply for Irrigation in Canterbury. Report No 4465/1, Prepared for Environment Canterbury (June 2001)

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.

2.4 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:

$$\text{Irrigation days lost} \times \text{Weighted Average Daily Growth} = \text{Total Growth Lost}$$

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 data². 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.

2.4.1 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 days 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.

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.

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 operating profit (EBIT) for each land use. These per ha outcomes are shown in the fourth table for each catchment.

2.4.2 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 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

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

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 of direct, indirect and induced effects from each activity.

3 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.

3.1 Mangatarere

The Mangatarere has two regimes in place – 50% restrictions at 270l/s only, or 50% restrictions at 330l/s and 100% restrictions at 240l/s. The DNRP regime is the same as the latter regimes, and 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. 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 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 DNRP regime. Restrictions occur in both the first and second half of the year, although they are worse in the second half of the year.

The per ha outcomes as a result will be worse under the DNRP regime than most of those currently irrigating from the catchment, and there will be approximately 7% reduction in average operating profit and 6% reduction in average contribution to regional outcomes (GDP, household income and employment). In more severe restriction events operating profit reduces by 26% - 30% relative to the current aggregate, and contribution to regional economic activity by 13% - 15%.

3.2 Papawai

The Papawai has three current regimes, with 50% restrictions at either 160 l/s or 190 l/s, and a small area (26ha) is currently unrestricted. Slightly more of the current irrigated area with restrictions are restricted 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,

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 area with no

restrictions the difference between current and DNRP is significantly greater. The restrictions occur in both the first and second half of the year, which means that there are few opportunities for mitigating impacts with early crops or removing stock.

For landholders moving to the DNRP regime there will be significant reductions in per ha returns. These mean that the aggregate operating profit reduces by 21% in an average year and by 98% in the worst year with horticulture suffering significant negative operating profit. The contribution to GDP, household income and employment reduces by 13% in an average year and by 38 – 40% in the worst year. 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.

3.3 Ruamahanga River at Waihenga

The Ruamahanga at Waihenga has four different regimes in place. About a quarter (429ha) of irrigation is currently unrestricted, while the majority (1573ha) is restricted by 50% at 8500 l/s. Of the remainder 69 ha is restricted by 50% at 9200 l/s and fully at 8500l/s, while 86 ha is restricted by 50% at 9800 l/s. The DNRP regime is identical to the 9200 regime, with 50% restrictions at 9200 l/s and 100% restrictions at 8500 l/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. 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 an approximately 2% reduction in operating profit and regional outcomes on average by moving to the DNRP regime, and in the worst year this would rise to 26% reduction in operating profit and 13% reduction in regional outcomes.

3.4 Ruamahanga at Wardells

There are two regimes currently operating at the Wardells minimum flow site. There are 283 ha unrestricted, and a further 1329 ha which are 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.

The 2400 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. 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 apart from a small level of restrictions under the 9800 regime.

Because most of the catchment is on the 2400 regime, the reduction in operating profit and contribution to regional outcomes is very similar to the difference in reliability between the 2400 regime and the DNRP. There is a 4% reduction in operating profit on average, and a

3% reduction in regional outcomes. In the worst year this increases to an 11% reduction in operating profit and a 6% reduction in contribution to regional outcomes.

3.5 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.

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 1350 and 1100 regime has very similar but slightly worse outcomes, 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. 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 there is a reduction in operating profit of 2% with the DNRP regime, and a similar scale of reduction in contribution to regional outcomes (1%). In the worst year this increases to a 16% reduction in operating profit and an 8% reduction in contribution to regional outcomes.

3.6 Waingawa

The Waingawa river currently has four regimes in place for irrigators, with a small area (36ha) on unrestricted takes, and the approximately half (116ha/204ha) of the catchment on 25% restriction at 3500 l/s and 50% restrictions at 1900 l/s. 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 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. Restrictions occur in both the first and second half of the season under all scenarios, although the greater restrictions are in the second half of the season.

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

3.7 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 – at 3040 l/s (319ha), 3395 l/s (211 ha), and at

4000 l/s (14 ha). The DNRP regime would require full restriction at 3040 l/s, but would have no partial restrictions.

The DNRP regime has the same number of days of restriction as the 3040 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 in both the 3040 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 DNRP regime.

In aggregate terms on average there is almost no difference in contribution to regional outcomes, and only a 1% reduction in operating profit. Some irrigators on the higher frequency restriction regimes will be slightly better off, and others on the 3040 will be slightly worse off. In the more severe restriction events the operating profit decreases by 8% and contribution to regional outcomes by 3%.

3.8 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 50% restrictions at 250 l/s which matches the DNRP regime.

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 regime, 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 or full restriction under the DNRP, with 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 regime currently, 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 DNRP regime will reduce operating profit from the catchment by 7% and contribution to regional outcomes by 4%, while in the worst year there will be a 25% reduction in operating profit and 13% reduction in contribution to regional outcomes.

3.9 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 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 the DNRP regime make no discernible difference on average or for the 1 in 4 year event. In the 1 in 10 events there is a small reduction in revenue and a larger reduction in operating profit associated with the move to a minimum flow, indicating that the minimum flow really only has a significant effect in the drier years.

3.10 Overview

There is a considerable amount of data and it is difficult to determine simple conclusions for the analysis. There are some high level statements which can be made about the likely impacts from the DNRP changes.

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.

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 very severe.

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 DNRP reliability:

- Good reliability with small impact of DNRP changes – Ruamahanga at Wardells and Waihenga, Tauherenikau, Waiohine and Otaki
- Good reliability with moderate impact of DNRP changes – Waipoua
- Moderate current reliability and poor reliability under DNRP – Mangatarere, Papawai, Waingawa,

WRC should be aware of the impact to irrigators in the first two categories, but the greatest focus should be on the likely impacts for those in the Waipoua, Mangatarere, Papawai and Waingawa since these irrigators are likely to suffer considerable financial impact as a result of the changes.

Appendix A Mangatarere 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	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%

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
0	0	0	0	0	0	0
Mangatarere DNRP	13	14	0	1	1	0

Table 6: Mangatarere 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 DNRP	First half season (Sept - Dec)	5%	5%	0%
	Second half season (January - April)	24%	14%	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		\$2,300			\$8,000
	Expenses	\$4,800		\$1,300			\$3,900
	Cash Farm Surplus	\$5,400		\$1,000			\$4,200
Mangatarere @ Gorge 330	Revenue	\$9,300					\$9,300
	Expenses	\$4,400					\$4,400
	Cash Farm Surplus	\$4,900					\$4,900
Mangatarere DNRP	Revenue	\$9,300		\$2,100			\$7,800
	Expenses	\$4,400		\$1,200			\$3,800
	Cash Farm Surplus	\$4,900		\$900			\$4,000
1 in 4 year		Area = Mangatarere River at Gorge					
per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Mangatarere @ Gorge 270	Revenue	\$8,500		\$2,100		\$0	\$6,700
	Expenses	\$4,800		\$1,300		\$0	\$3,900
	Cash Farm Surplus	\$3,700		\$700		\$0	\$2,900
Mangatarere @ Gorge 330	Revenue	\$7,300				\$0	\$7,300

	Expenses	\$4,400				\$0	\$4,400
	Cash Farm Surplus	\$2,800				\$0	\$2,800
Mangatarere DNRP	Revenue	\$7,300		\$1,800		\$0	\$6,100
	Expenses	\$4,400		\$1,200		\$0	\$3,800
	Cash Farm Surplus	\$2,800		\$500		\$0	\$2,300

1 in 10 year		Area = Mangatarere River at Gorge					
per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Mangatarere @ Gorge 270	Revenue	\$8,300		\$2,000		\$0	\$6,600
	Expenses	\$4,800		\$1,300		\$0	\$3,900
	Cash Farm Surplus	\$3,500		\$700		\$0	\$2,700
Mangatarere @ Gorge 330	Revenue	\$6,800				\$0	\$6,800
	Expenses	\$4,400				\$0	\$4,400
	Cash Farm Surplus	\$2,400				\$0	\$2,400
Mangatarere DNRP	Revenue	\$6,800		\$1,600		\$0	\$5,700
	Expenses	\$4,400		\$1,200		\$0	\$3,800
	Cash Farm Surplus	\$2,400		\$400		\$0	\$2,000

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		\$2,000		\$0	\$6,500
	Expenses	\$4,800		\$1,300		\$0	\$3,900
	Cash Farm Surplus	\$3,400		\$600		\$0	\$2,600
Mangatarere @ Gorge 330	Revenue	\$6,600				\$0	\$6,600
	Expenses	\$4,400				\$0	\$4,400

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

Table 8: Mangatarere at Gorge - estimate of aggregate outcomes of Current vs DNRP 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	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	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			
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	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			
1 in 10 year	Current	Revenue	\$1.17	\$0.00	\$0.08	\$0.00	\$0.00	\$1.26	\$1.05	\$0.27	8
		Expenses	\$0.70	\$0.00	\$0.05	\$0.00	\$0.00	\$0.76			
		Cash Farm Surplus	\$0.47	\$0.00	\$0.03	\$0.00	\$0.00	\$0.50			
	DNRP	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			
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	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			

Appendix B 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	0	68	0	0	35	12%
	1 in 10 year	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	0	91	0	0	54	17%
	1 in 10 year	0	108	0	0	73	20%
	Maximum	0	127	0	0	89	23%
Papawai DNRP	Average	61	0	0	33	33	22%
	1 in 4 year	80	0	0	45	45	29%
	1 in 10 year	102	0	0	63	63	37%
	Maximum	119	0	0	89	89	43%

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 DNRP	7	0	0	1	0	0
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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 DNRP	First half season (Sept - Dec)	14%	0%	0%
	Second half season (January - April)	37%	0%	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					\$9,900
	Expenses	\$4,700					\$4,700
	Cash Farm Surplus	\$5,200					\$5,200
Papawai @ Fabians Rd 190	Revenue	\$9,600					\$9,600
	Expenses	\$4,500					\$4,500
	Cash Farm Surplus	\$5,000					\$5,000
Papawai DNRP	Revenue	\$8,600			\$28,200		\$10,800
	Expenses	\$4,100			\$23,100		\$6,300
	Cash Farm Surplus	\$4,400			\$5,100		\$4,500
1 in 4 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	\$8,000				\$0	\$8,000
	Expenses	\$4,700				\$0	\$4,700
	Cash Farm Surplus	\$3,300				\$0	\$3,300
Papawai @ Fabians Rd 190	Revenue	\$7,800				\$0	\$7,800
	Expenses	\$4,500				\$0	\$4,500

	Cash Farm Surplus	\$3,200				\$0	\$3,200
Papawai DNRP	Revenue	\$6,100			\$21,200	\$0	\$7,800
	Expenses	\$4,100			\$23,100	\$0	\$6,300
	Cash Farm Surplus	\$1,900			-\$1,900	\$0	\$1,500

1 in 10 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	\$7,300
	Expenses	\$4,700				\$0	\$4,700
	Cash Farm Surplus	\$2,600				\$0	\$2,600
Papawai @ Fabians Rd 190	Revenue	\$7,200				\$0	\$7,200
	Expenses	\$4,500				\$0	\$4,500
	Cash Farm Surplus	\$2,600				\$0	\$2,600
Papawai DNRP	Revenue	\$5,000			\$17,100	\$0	\$6,300
	Expenses	\$4,100			\$23,100	\$0	\$6,300
	Cash Farm Surplus	\$800			-\$6,000	\$0	\$100

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	\$7,300
	Expenses	\$4,700				\$0	\$4,700
	Cash Farm Surplus	\$2,600				\$0	\$2,600
Papawai @ Fabians Rd 190	Revenue	\$7,200				\$0	\$7,200
	Expenses	\$4,500				\$0	\$4,500
	Cash Farm Surplus	\$2,600				\$0	\$2,600
Papawai DNRP	Revenue	\$5,000			\$17,100	\$0	\$6,300

	Expenses	\$4,100			\$23,100	\$0	\$6,300
	Cash Farm Surplus	\$800			-\$6,000	\$0	\$100

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

	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	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	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			
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	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			
1 in 10 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	\$0.60	\$0.00	\$1.53			
		Cash Farm Surplus	\$0.54	\$0.00	\$0.00	\$0.26	\$0.00	\$0.80			
	DNRP	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			
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	\$0.60	\$0.00	\$1.53			
		Cash Farm Surplus	\$0.54	\$0.00	\$0.00	\$0.26	\$0.00	\$0.80			
	DNRP	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			

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	0	0	0	0	0	0%
	1 in 10 year	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	0	10	0	0	6	2%
	1 in 10 year	0	19	0	0	13	3%
	Maximum	0	47	0	0	27	9%
Ruamahanga @ Wardells DNRP	Average	8	6	0	5	7	4%
	1 in 4 year	10	10	0	6	9	6%
	1 in 10 year	19	15	0	13	17	10%
	Maximum	47	20	0	27	27	20%

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
0	0	0	0	0	0	0

Ruamahanga @ Wardells DNRP	11	14	0	5/9	2/3	0
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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 DNRP	First half season (Sept - Dec)	0%	0%	0%
	Second half season (January - April)	6%	5%	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		\$2,300	\$33,300		\$8,800
	Expenses	\$5,100		\$1,300	\$23,100		\$4,300
	Cash Farm Surplus	\$5,800		\$1,000	\$10,200		\$4,500
Ruamahanga @ Wardells 2400	Revenue	\$10,800		\$2,300	\$32,900	\$15,400	\$10,400
	Expenses	\$5,000		\$1,300	\$23,100	\$8,600	\$5,200
	Cash Farm Surplus	\$5,700		\$1,000	\$9,800	\$6,800	\$5,100
Ruamahanga @ Wardells DNRP	Revenue	\$10,600		\$2,300	\$32,200	\$14,800	\$9,800
	Expenses	\$5,000		\$1,300	\$23,100	\$8,600	\$5,000
	Cash Farm Surplus	\$5,600		\$1,000	\$9,100	\$6,200	\$4,800
1 in 4 year		Area = Ruamahanga River at Wardells					
per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Ruamahanga @ Wardells unrestricted	Revenue	\$9,500		\$2,200	\$30,700	\$0	\$7,800
	Expenses	\$5,100		\$1,300	\$23,100	\$0	\$4,300
	Cash Farm Surplus	\$4,400		\$800	\$7,600	\$0	\$3,400

Ruamahanga @ Wardells 2400	Revenue	\$9,000		\$2,000	\$29,000	\$0	\$9,000
	Expenses	\$5,000		\$1,300	\$23,100	\$0	\$5,200
	Cash Farm Surplus	\$4,000		\$700	\$5,900	\$0	\$3,800
Ruamahanga @ Wardells DNRP	Revenue	\$8,400		\$1,900	\$26,900	\$0	\$7,900
	Expenses	\$5,000		\$1,300	\$23,100	\$0	\$5,000
	Cash Farm Surplus	\$3,400		\$600	\$3,800	\$0	\$2,900

1 in 10 year

Area = Ruamahanga River at Wardells

per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Ruamahanga @ Wardells unrestricted	Revenue	\$9,500		\$2,200	\$30,700	\$0	\$7,800
	Expenses	\$5,100		\$1,300	\$23,100	\$0	\$4,300
	Cash Farm Surplus	\$4,400		\$800	\$7,600	\$0	\$3,400
Ruamahanga @ Wardells 2400	Revenue	\$9,000		\$2,000	\$29,000	\$0	\$9,000
	Expenses	\$5,000		\$1,300	\$23,100	\$0	\$5,200
	Cash Farm Surplus	\$4,000		\$700	\$5,900	\$0	\$3,800
Ruamahanga @ Wardells DNRP	Revenue	\$8,400		\$1,900	\$26,900	\$0	\$7,900
	Expenses	\$5,000		\$1,300	\$23,100	\$0	\$5,000
	Cash Farm Surplus	\$3,400		\$600	\$3,800	\$0	\$2,900

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		\$2,200	\$30,700	\$0	\$7,800
	Expenses	\$5,100		\$1,300	\$23,100	\$0	\$4,300
	Cash Farm Surplus	\$4,400		\$800	\$7,600	\$0	\$3,400

Ruamahanga @ Wardells 2400	Revenue	\$9,400		\$2,100	\$30,300	\$0	\$9,500
	Expenses	\$5,000		\$1,300	\$23,100	\$0	\$5,200
	Cash Farm Surplus	\$4,400		\$800	\$7,200	\$0	\$4,300
Ruamahanga @ Wardells DNRP	Revenue	\$9,000		\$2,000	\$29,000	\$0	\$8,700
	Expenses	\$5,000		\$1,300	\$23,100	\$0	\$5,000
	Cash Farm Surplus	\$4,000		\$700	\$5,900	\$0	\$3,700

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

			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	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	Revenue	\$10.23	\$0.00	\$0.74	\$0.27	\$4.60	\$15.83	\$13.13	\$4.36	148
		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			
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	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			
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	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			
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	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			

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	0	13	0	0	7	2%
	1 in 10 year	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	13	4	0	7	9	6%
	1 in 10 year	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	0	24	0	0	11	4%
	1 in 10 year	0	36	0	0	14	7%
	Maximum	0	53	0	0	27	10%
Ruamahanga @ Waihenga DNRP	Average	10	3	0	5	6	4%
	1 in 4 year	13	4	0	7	9	6%
	1 in 10 year	24	6	0	13	13	10%
	Maximum	45	11	0	27	27	17%

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 DNRP	13	15	0	2/3	3/4	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 DNRP	First half season (Sept - Dec)	0%	0%	0%
	Second half season (January - April)	8%	2%	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		\$2,300		\$15,300	\$8,900
	Expenses	\$5,000		\$1,300		\$8,600	\$4,200
	Cash Farm Surplus	\$5,700		\$1,000		\$6,700	\$4,700
Ruamahanga @ Waihenga 9200	Revenue	\$10,600					\$10,600
	Expenses	\$5,000					\$5,000
	Cash Farm Surplus	\$5,600					\$5,600
Ruamahanga @ Waihenga 9800	Revenue			\$2,300			\$2,300
	Expenses			\$1,300			\$1,300
	Cash Farm Surplus			\$1,000			\$1,000
Ruamahanga @ Waihenga DNRP	Revenue	\$10,600		\$2,300		\$14,800	\$8,800
	Expenses	\$5,000		\$1,300		\$8,600	\$4,200
	Cash Farm Surplus	\$5,600		\$1,000		\$6,100	\$4,600
1 in 4 year	Area = Ruamahanga River at Waihenga Bridge						
per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Ruamahanga @ Waihenga 8500	Revenue	\$9,300		\$2,100		\$0	\$7,800

	Expenses	\$5,000	\$1,300	\$0	\$4,200
	Cash Farm Surplus	\$4,300	\$800	\$0	\$3,500
Ruamahanga @ Waihenga 9200	Revenue	\$9,000		\$0	\$9,000
	Expenses	\$5,000		\$0	\$5,000
	Cash Farm Surplus	\$4,100		\$0	\$4,100
Ruamahanga @ Waihenga 9800	Revenue		\$2,100	\$0	\$2,100
	Expenses		\$1,300	\$0	\$1,300
	Cash Farm Surplus		\$800	\$0	\$800
Ruamahanga @ Waihenga DNRP	Revenue	\$9,000	\$2,100	\$0	\$7,500
	Expenses	\$5,000	\$1,300	\$0	\$4,200
	Cash Farm Surplus	\$4,100	\$800	\$0	\$3,400

1 in 10 year	Area = Ruamahanga River at Waihenga Bridge						
per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Ruamahanga @ Waihenga 8500	Revenue	\$9,000		\$2,100		\$0	\$7,500
	Expenses	\$5,000		\$1,300		\$0	\$4,200
	Cash Farm Surplus	\$3,900		\$700		\$0	\$3,200
Ruamahanga @ Waihenga 9200	Revenue	\$8,400				\$0	\$8,400
	Expenses	\$5,000				\$0	\$5,000
	Cash Farm Surplus	\$3,400				\$0	\$3,400
Ruamahanga @ Waihenga 9800	Revenue			\$2,000		\$0	\$2,000
	Expenses			\$1,300		\$0	\$1,300
	Cash Farm Surplus			\$700		\$0	\$700
Ruamahanga @ Waihenga DNRP	Revenue	\$8,400		\$1,900		\$0	\$7,000

	Expenses	\$5,000		\$1,300		\$0	\$4,200
	Cash Farm Surplus	\$3,400		\$600		\$0	\$2,800
	Area = Ruamahanga River at Waihenga Bridge						
Worst Year							
per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Ruamahanga @ Waihenga 8500	Revenue	\$8,800		\$2,000		\$0	\$7,400
	Expenses	\$5,000		\$1,300		\$0	\$4,200
	Cash Farm Surplus	\$3,800		\$700		\$0	\$3,100
Ruamahanga @ Waihenga 9200	Revenue	\$8,100				\$0	\$8,100
	Expenses	\$5,000				\$0	\$5,000
	Cash Farm Surplus	\$3,200				\$0	\$3,200
Ruamahanga @ Waihenga 9800	Revenue			\$2,000		\$0	\$2,000
	Expenses			\$1,300		\$0	\$1,300
	Cash Farm Surplus			\$700		\$0	\$700
Ruamahanga @ Waihenga DNRP	Revenue	\$8,100		\$1,900		\$0	\$6,800
	Expenses	\$5,000		\$1,300		\$0	\$4,200
	Cash Farm Surplus	\$3,200		\$500		\$0	\$2,600

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

			Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total	Total regional GDP	Total regional household income	Total regional employment
	Area	Unrestricted	384	0	36	0	9	429			
		Modelled	1295	0	430	0	3	1729			
		DNRP	1680	0	466	0	12	2158			
Average year	Current	Revenue	\$18.11	\$0.00	\$1.09	\$0.00	\$0.19	\$19.39	\$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	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			
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	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 Surplus	\$6.82	\$0.00	\$0.35	\$0.00	\$0.07	\$7.24			
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	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			

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	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			

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	0	18	0	0	7	3%
	1 in 10 year	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	6	11	0	4	7	4%
	1 in 10 year	13	18	0	5	11	10%
	Maximum	21	42	0	21	27	12%
Tauherenikau DNRP	Average	12	0	0	5	5	4%
	1 in 4 year	16	0	0	7	7	6%
	1 in 10 year	34	0	0	10	10	12%
	Maximum	50	0	0	26	26	18%

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
0	0	0	0	0	0	0
Tauherenikau DNRP	15	0	0	3/4	0	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 DNRP	First half season (Sept - Dec)	1%	0%	0%
	Second half season (January - April)	9%	0%	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		\$2,300			\$10,000
	Expenses	\$5,000		\$1,300			\$4,700
	Cash Farm Surplus	\$5,700		\$1,000			\$5,300
Tauherenikau @ Gorge 1350 and 1100	Revenue	\$10,600					\$10,600
	Expenses	\$5,000					\$5,000
	Cash Farm Surplus	\$5,700					\$5,700
Tauherenikau DNRP	Revenue	\$10,500		\$2,300			\$9,900
	Expenses	\$4,900		\$1,300			\$4,600
	Cash Farm Surplus	\$5,600		\$1,000			\$5,200
1 in 4 year	Area = Tauherenikau at Gorge						
per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Tauherenikau @ Gorge 1350	Revenue	\$9,200		\$2,100		\$0	\$8,600
	Expenses	\$5,000		\$1,300		\$0	\$4,700
	Cash Farm Surplus	\$4,200		\$800		\$0	\$3,900
Tauherenikau @ Gorge 1350 and 1100	Revenue	\$9,100				\$0	\$9,100

	Expenses	\$5,000				\$0	\$5,000
	Cash Farm Surplus	\$4,100				\$0	\$4,100
Tauherenikau DNRP	Revenue	\$9,000		\$2,100		\$0	\$8,400
	Expenses	\$4,900		\$1,300		\$0	\$4,600
	Cash Farm Surplus	\$4,100		\$800		\$0	\$3,800

1 in 10 year		Area = Tauherenikau at Gorge					
per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Tauherenikau @ Gorge 1350	Revenue	\$8,800		\$2,000		\$0	\$8,200
	Expenses	\$5,000		\$1,300		\$0	\$4,700
	Cash Farm Surplus	\$3,800		\$700		\$0	\$3,500
Tauherenikau @ Gorge 1350 and 1100	Revenue	\$8,600				\$0	\$8,600
	Expenses	\$5,000				\$0	\$5,000
	Cash Farm Surplus	\$3,600				\$0	\$3,600
Tauherenikau DNRP	Revenue	\$8,100		\$1,900		\$0	\$7,600
	Expenses	\$4,900		\$1,300		\$0	\$4,600
	Cash Farm Surplus	\$3,200		\$500		\$0	\$3,000

Worst Year		Area = Tauherenikau at Gorge					
per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Tauherenikau @ Gorge 1350	Revenue	\$8,700		\$2,000		\$0	\$8,100
	Expenses	\$5,000		\$1,300		\$0	\$4,700
	Cash Farm Surplus	\$3,700		\$700		\$0	\$3,400
Tauherenikau @ Gorge 1350 and 1100	Revenue	\$8,500				\$0	\$8,500

	Expenses	\$5,000				\$0	\$5,000
	Cash Farm Surplus	\$3,500				\$0	\$3,500
Tauherenikau DNRP	Revenue	\$8,000		\$1,800		\$0	\$7,500
	Expenses	\$4,900		\$1,300		\$0	\$4,600
	Cash Farm Surplus	\$3,100		\$500		\$0	\$2,900

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

			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	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	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			
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	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			
1 in 10 year	Current	Revenue	\$3.31	\$0.00	\$0.07	\$0.00	\$0.00	\$3.38	\$2.83	\$0.74	21
		Expenses	\$1.88	\$0.00	\$0.05	\$0.00	\$0.00	\$1.93			
		Cash Farm Surplus	\$1.42	\$0.00	\$0.02	\$0.00	\$0.00	\$1.45			
	DNRP	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			
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	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			

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	34	0	0	13	13	12%
	1 in 10 year	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	34	12	0	13	15	14%
	1 in 10 year	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	0	45	61	0	15	14%
	1 in 10 year	0	52	68	0	19	16%
	Maximum	0	83	81	0	27	19%
Waingawa DNRP	Average	25	9	0	10	12	11%
	1 in 4 year	34	12	0	13	15	14%
	1 in 10 year	43	14	0	18	19	17%
	Maximum	71	15	0	27	27	28%

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 DNRP	20	20	0	1	1	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 DNRP	First half season (Sept - Dec)	3%	1%	0%
	Second half season (January - April)	17%	5%	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			\$2,300			\$2,300
	Expenses			\$1,300			\$1,300
	Cash Farm Surplus			\$1,000			\$1,000
	Area irrigated at 0.45l/s	\$0	\$0	\$9	\$0	\$0	\$9
Waingawa @ Kaituna 1900	Revenue			\$2,300			\$2,300
	Expenses			\$1,300			\$1,300
	Cash Farm Surplus			\$1,000			\$1,000
	Area irrigated at 0.45l/s	\$0	\$0	\$43	\$0	\$0	\$43
Waingawa @ Kaituna 3500	Revenue	\$9,900					\$9,900
	Expenses	\$4,700					\$4,700
	Cash Farm Surplus	\$5,200					\$5,200
	Area irrigated at 0.45l/s	\$116	\$0	\$0	\$0	\$0	\$116
Waingawa DNRP	Revenue	\$10,000		\$2,300	\$32,800		\$7,600
	Expenses	\$4,700		\$1,300	\$23,100		\$3,900
	Cash Farm Surplus	\$5,300		\$1,000	\$9,700		\$3,700
	Area irrigated at 0.45l/s	\$116	\$0	\$82	\$6	\$0	\$204
1 in 4 year	Area = Waingawa River at Kaituna						
per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Waingawa @ Kaituna 1700	Revenue			\$2,100		\$0	\$2,100
	Expenses			\$1,300		\$0	\$1,300
	Cash Farm Surplus			\$700		\$0	\$700

Waingawa @ Kaituna 1900	Revenue			\$2,000		\$0	\$2,000
	Expenses			\$1,300		\$0	\$1,300
	Cash Farm Surplus			\$700		\$0	\$700
Waingawa @ Kaituna 3500	Revenue	\$8,300				\$0	\$8,300
	Expenses	\$4,700				\$0	\$4,700
	Cash Farm Surplus	\$3,600				\$0	\$3,600
Waingawa DNRP	Revenue	\$8,200		\$2,000	\$28,600	\$0	\$6,300
	Expenses	\$4,700		\$1,300	\$23,100	\$0	\$3,900
	Cash Farm Surplus	\$3,500		\$700	\$5,500	\$0	\$2,400

1 in 10 year	Area = Waingawa River at Kaituna						
per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Waingawa @ Kaituna 1700	Revenue			\$1,900		\$0	\$1,900
	Expenses			\$1,300		\$0	\$1,300
	Cash Farm Surplus			\$600		\$0	\$600
Waingawa @ Kaituna 1900	Revenue			\$1,900		\$0	\$1,900
	Expenses			\$1,300		\$0	\$1,300
	Cash Farm Surplus			\$600		\$0	\$600
Waingawa @ Kaituna 3500	Revenue	\$8,100				\$0	\$8,100
	Expenses	\$4,700				\$0	\$4,700
	Cash Farm Surplus	\$3,400				\$0	\$3,400
Waingawa DNRP	Revenue	\$7,700		\$1,900	\$26,800	\$0	\$5,900
	Expenses	\$4,700		\$1,300	\$23,100	\$0	\$3,900
	Cash Farm Surplus	\$3,000		\$600	\$3,700	\$0	\$2,000
Worst Year	Area = Waingawa						

	River at Kaituna						
per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Waingawa @ Kaituna 1700	Revenue			\$1,800		\$0	\$1,800
	Expenses			\$1,300		\$0	\$1,300
	Cash Farm Surplus			\$400		\$0	\$400
Waingawa @ Kaituna 1900	Revenue			\$1,700		\$0	\$1,700
	Expenses			\$1,300		\$0	\$1,300
	Cash Farm Surplus			\$400		\$0	\$400
Waingawa @ Kaituna 3500	Revenue	\$7,700				\$0	\$7,700
	Expenses	\$4,700				\$0	\$4,700
	Cash Farm Surplus	\$3,100				\$0	\$3,100
Waingawa DNRP	Revenue	\$7,100		\$1,700	\$24,400	\$0	\$5,400
	Expenses	\$4,700		\$1,300	\$23,100	\$0	\$3,900
	Cash Farm Surplus	\$2,400		\$400	\$1,300	\$0	\$1,500

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

			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			
		DNRP	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	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			
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	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			
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	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			

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	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			

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	0	5	0	0	3	1%
	1 in 10 year	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	0	13	0	0	5	2%
	1 in 10 year	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	0	29	0	0	11	5%
	1 in 10 year	0	38	0	0	15	7%
	Maximum	0	40	0	0	27	7%
Waiohine DNRP	Average	4	0	0	3	3	1%
	1 in 4 year	5	0	0	3	3	2%
	1 in 10 year	7	0	0	4	4	3%
	Maximum	22	0	0	22	22	8%

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 DNRP	14	0	0	2/3	0	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 DNRP	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		\$2,300	\$33,300		\$13,900
	Expenses	\$5,100		\$1,300	\$23,100		\$7,900
	Cash Farm Surplus	\$5,800		\$1,000	\$10,200		\$6,000
	Area irrigated at 0.45l/s	\$221	\$0	\$40	\$58	\$0	\$319
Waiohine @ Gorge 3395	Revenue	\$10,800		\$2,300	\$33,100		\$8,400
	Expenses	\$5,000		\$1,300	\$23,100		\$4,500
	Cash Farm Surplus	\$5,700		\$1,000	\$10,000		\$4,000
	Area irrigated at 0.45l/s	\$109	\$0	\$90	\$12	\$0	\$211
Waiohine @ Gorge 4000	Revenue			\$2,300			\$2,300
	Expenses			\$1,300			\$1,300
	Cash Farm Surplus			\$1,000			\$1,000
	Area irrigated at 0.45l/s	\$0	\$0	\$14	\$0	\$0	\$14
Waiohine DNRP	Revenue	\$10,800		\$2,300	\$33,100		\$11,400
	Expenses	\$5,000		\$1,300	\$23,100		\$6,400
	Cash Farm Surplus	\$5,800		\$1,000	\$10,000		\$5,000
	Area irrigated at 0.45l/s	\$330	\$0	\$144	\$70	\$0	\$544
1 in 4 year		Area = Waiohine River at Gorge					
per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Waiohine @ Gorge 3040	Revenue	\$9,400		\$2,200	\$30,600	\$0	\$12,400
	Expenses	\$5,100		\$1,300	\$23,100	\$0	\$7,900

	Cash Farm Surplus	\$4,400		\$800	\$7,500	\$0	\$4,500
Waiohine @ Gorge 3395	Revenue	\$9,400		\$2,100	\$30,500	\$0	\$7,500
	Expenses	\$5,000		\$1,300	\$23,100	\$0	\$4,500
	Cash Farm Surplus	\$4,400		\$800	\$7,400	\$0	\$3,000
Waiohine @ Gorge 4000	Revenue			\$2,100		\$0	\$2,100
	Expenses			\$1,300		\$0	\$1,300
	Cash Farm Surplus			\$800		\$0	\$800
Waiohine DNRP	Revenue	\$9,400		\$2,100	\$30,300	\$0	\$10,100
	Expenses	\$5,000		\$1,300	\$23,100	\$0	\$6,400
	Cash Farm Surplus	\$4,300		\$800	\$7,200	\$0	\$3,800

1 in 10 year
Area = Waiohine River at Gorge

per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Waiohine @ Gorge 3040	Revenue	\$9,200		\$2,100	\$29,900	\$0	\$12,100
	Expenses	\$5,100		\$1,300	\$23,100	\$0	\$7,900
	Cash Farm Surplus	\$4,200		\$800	\$6,800	\$0	\$4,200
Waiohine @ Gorge 3395	Revenue	\$9,100		\$2,100	\$29,600	\$0	\$7,300
	Expenses	\$5,000		\$1,300	\$23,100	\$0	\$4,500
	Cash Farm Surplus	\$4,100		\$700	\$6,500	\$0	\$2,800
Waiohine @ Gorge 4000	Revenue			\$2,000		\$0	\$2,000
	Expenses			\$1,300		\$0	\$1,300
	Cash Farm Surplus			\$700		\$0	\$700
Waiohine DNRP	Revenue	\$8,900		\$2,000	\$28,900	\$0	\$9,700
	Expenses	\$5,000		\$1,300	\$23,100	\$0	\$6,400

	Cash Farm Surplus	\$3,900		\$700	\$5,800	\$0	\$3,300
Worst Year	Area = Waiohine River at Gorge						
per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Waiohine @ Gorge 3040	Revenue	\$9,200		\$2,100	\$29,900	\$0	\$12,100
	Expenses	\$5,100		\$1,300	\$23,100	\$0	\$7,900
	Cash Farm Surplus	\$4,200		\$800	\$6,800	\$0	\$4,200
Waiohine @ Gorge 3395	Revenue	\$9,100		\$2,100	\$29,600	\$0	\$7,300
	Expenses	\$5,000		\$1,300	\$23,100	\$0	\$4,500
	Cash Farm Surplus	\$4,100		\$700	\$6,500	\$0	\$2,800
Waiohine @ Gorge 4000	Revenue			\$2,000		\$0	\$2,000
	Expenses			\$1,300		\$0	\$1,300
	Cash Farm Surplus			\$700		\$0	\$700
Waiohine DNRP	Revenue	\$8,900		\$2,000	\$28,900	\$0	\$9,700
	Expenses	\$5,000		\$1,300	\$23,100	\$0	\$6,400
	Cash Farm Surplus	\$3,900		\$700	\$5,800	\$0	\$3,300

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

			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			
		DNRP	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	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			
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	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			
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	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			

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	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			

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	Average	0	18	0	0	9	3%
	1 in 4 year	0	36	0	0	13	7%
	1 in 10 year	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	36	12	0	13	22	15%
	1 in 10 year	43	16	0	20	25	18%
	Maximum	43	19	0	27	27	19%
Waipoua DNRP	Average	18	7	0	9	12	8%
	1 in 4 year	36	12	0	13	22	15%
	1 in 10 year	43	16	0	20	25	18%
	Maximum	43	19	0	27	27	19%

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
0	0	0	0	0	0	0

Waipoua DNRP	4	4	0	2/3	2/3	0
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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	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 DNRP	First half season (Sept - Dec)	0%	1%	0%
	Second half season (January - April)	15%	5%	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	Revenue		\$3,300	\$2,300			\$2,700
	Expenses		\$900	\$1,300			\$1,200
	Cash Farm Surplus		\$2,400	\$1,000			\$1,500
Waipoua @ Mikimiki 300	Revenue			\$2,200			\$2,200
	Expenses			\$1,300			\$1,300
	Cash Farm Surplus			\$900			\$900
Waipoua DNRP	Revenue		\$3,000	\$2,200			\$2,500
	Expenses		\$900	\$1,300			\$1,200
	Cash Farm Surplus		\$2,200	\$900			\$1,300
1 in 4 year	Area = Waipoua River at Mikimiki Bridge						
per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Waipoua @ Mikimiki 250	Revenue		\$3,000	\$2,100		\$0	\$2,400
	Expenses		\$900	\$1,300		\$0	\$1,200
	Cash Farm Surplus		\$2,200	\$700		\$0	\$1,300
Waipoua @ Mikimiki 300	Revenue			\$1,800		\$0	\$1,800
	Expenses			\$1,300		\$0	\$1,300

	Cash Farm Surplus			\$500		\$0	\$500
Waipoua DNRP	Revenue		\$2,500	\$1,800		\$0	\$2,000
	Expenses		\$900	\$1,300		\$0	\$1,200
	Cash Farm Surplus		\$1,600	\$500		\$0	\$900

1 in 10 year
Area = Waipoua River at Mikimiki Bridge

per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Waipoua @ Mikimiki 250	Revenue		\$3,000	\$2,100		\$0	\$2,400
	Expenses		\$900	\$1,300		\$0	\$1,200
	Cash Farm Surplus		\$2,200	\$700		\$0	\$1,300
Waipoua @ Mikimiki 300	Revenue			\$1,800		\$0	\$1,800
	Expenses			\$1,300		\$0	\$1,300
	Cash Farm Surplus			\$500		\$0	\$500
Waipoua DNRP	Revenue		\$2,400	\$1,800		\$0	\$2,000
	Expenses		\$900	\$1,300		\$0	\$1,200
	Cash Farm Surplus		\$1,600	\$500		\$0	\$800

Worst Year
Area = Waipoua River at Mikimiki Bridge

per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Waipoua @ Mikimiki 250	Revenue		\$3,000	\$2,100		\$0	\$2,400
	Expenses		\$900	\$1,300		\$0	\$1,200
	Cash Farm Surplus		\$2,200	\$700		\$0	\$1,300
Waipoua @ Mikimiki 300	Revenue			\$1,800		\$0	\$1,800

	Expenses			\$1,300		\$0	\$1,300
	Cash Farm Surplus			\$500		\$0	\$500
Waipoua DNRP	Revenue		\$2,400	\$1,800		\$0	\$2,000
	Expenses		\$900	\$1,300		\$0	\$1,200
	Cash Farm Surplus		\$1,600	\$500		\$0	\$800

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

			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	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	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			
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	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			
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	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			

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	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			

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	0	0	0	0	0	0%
	1 in 10 year	0	0	0	0	0	0%
	Maximum	0	0	0	0	0	0%
Otaki DNRP	Average	0	3	0	0	2	1%
	1 in 4 year	0	2	0	0	2	0%
	1 in 10 year	0	8	0	0	7	2%
	Maximum	0	34	0	0	15	6%

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 DNRP	0	8	0	0	2/5	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 DNRP	First half season (Sept - Dec)	0%	0%	0%
	Second half season (January - April)	0%	3%	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				\$33,300		\$33,300
	Expenses				\$23,100		\$23,100
	Cash Farm Surplus				\$10,200		\$10,200
Otaki DNRP	Revenue		\$3,400	\$2,300	\$33,200		\$7,100
	Expenses		\$900	\$1,300	\$23,100		\$4,600
	Cash Farm Surplus		\$2,500	\$1,000	\$10,100		\$2,500
1 in 4 year	Area = Otaki at Pukehinau						
per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Otaki @ Pukehinau 2550	Revenue				\$30,700	\$0	\$30,700

	Expenses				\$23,100	\$0	\$23,100
	Cash Farm Surplus				\$7,600	\$0	\$7,600
Otaki DNRP	Revenue		\$3,300	\$2,100	\$30,400	\$0	\$6,500
	Expenses		\$900	\$1,300	\$23,100	\$0	\$4,600
	Cash Farm Surplus		\$2,500	\$800	\$7,300	\$0	\$1,900
1 in 10 year	Area = Otaki at Pukehinau						
per ha		Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total
Otaki @ Pukehinau 2550	Revenue				\$30,700	\$0	\$30,700
	Expenses				\$23,100	\$0	\$23,100
	Cash Farm Surplus				\$7,600	\$0	\$7,600
Otaki DNRP	Revenue		\$3,300	\$2,100	\$30,400	\$0	\$6,500
	Expenses		\$900	\$1,300	\$23,100	\$0	\$4,600
	Cash Farm Surplus		\$2,500	\$800	\$7,300	\$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				\$30,700	\$0	\$30,700
	Expenses				\$23,100	\$0	\$23,100
	Cash Farm Surplus				\$7,600	\$0	\$7,600
Otaki DNRP	Revenue		\$3,400	\$2,200	\$30,600	\$0	\$6,500
	Expenses		\$900	\$1,300	\$23,100	\$0	\$4,600
	Cash Farm Surplus		\$2,500	\$800	\$7,500	\$0	\$1,900

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

			Dairy	Arable	Sheep and Beef	Horticulture and Vegetables	Viticulture	Total	Total regional GDP	Total regional household income	Total regional employment
	Area	Unrestricted	0	4	69	11	0	85			
		Modelled	0	0	0	2	0	2			
		DNRP	0	4	69	13	0	86			
Average year	Current	Revenue	\$0.00	\$0.01	\$0.16	\$0.50	\$0.00	\$0.67	\$0.53	\$0.23	9
		Expenses	\$0.00	\$0.00	\$0.09	\$0.34	\$0.00	\$0.44			
		Cash Farm Surplus	\$0.00	\$0.01	\$0.07	\$0.15	\$0.00	\$0.23			
	DNRP	Revenue	\$0.00	\$0.01	\$0.16	\$0.49	\$0.00	\$0.67	\$0.53	\$0.23	9
		Expenses	\$0.00	\$0.00	\$0.09	\$0.34	\$0.00	\$0.44			
		Cash Farm Surplus	\$0.00	\$0.01	\$0.07	\$0.15	\$0.00	\$0.23			
1 in 4 year	Current	Revenue	\$0.00	\$0.01	\$0.16	\$0.49	\$0.00	\$0.66	\$0.53	\$0.23	9
		Expenses	\$0.00	\$0.00	\$0.09	\$0.34	\$0.00	\$0.44			
		Cash Farm Surplus	\$0.00	\$0.01	\$0.07	\$0.15	\$0.00	\$0.23			
	DNRP	Revenue	\$0.00	\$0.01	\$0.15	\$0.45	\$0.00	\$0.61	\$0.49	\$0.21	9
		Expenses	\$0.00	\$0.00	\$0.09	\$0.34	\$0.00	\$0.44			
		Cash Farm Surplus	\$0.00	\$0.01	\$0.06	\$0.11	\$0.00	\$0.17			
1 in 10 year	Current	Revenue	\$0.00	\$0.01	\$0.16	\$0.49	\$0.00	\$0.66	\$0.53	\$0.23	9
		Expenses	\$0.00	\$0.00	\$0.09	\$0.34	\$0.00	\$0.44			
		Cash Farm Surplus	\$0.00	\$0.01	\$0.07	\$0.15	\$0.00	\$0.23			
	DNRP	Revenue	\$0.00	\$0.01	\$0.15	\$0.45	\$0.00	\$0.61	\$0.49	\$0.21	9
		Expenses	\$0.00	\$0.00	\$0.09	\$0.34	\$0.00	\$0.44			
		Cash Farm Surplus	\$0.00	\$0.01	\$0.06	\$0.11	\$0.00	\$0.17			

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