

IN THE MATTER OF

the Resource Management Act
1991

AND

IN THE MATTER OF

applications by Central Plains Water
Trust to:

Canterbury Regional Council for
resource consents to take and use
water from the Waimakariri and
Rakaia Rivers and for all associated
consents required for the
construction and operation of the
Central Plains Water Enhancement
Scheme

Selwyn District Council for resource
consents to construct and operate
the Central Plains Water
Enhancement Scheme

AND

IN THE MATTER OF

a notice of requirement by Central
Plains Water Limited to:

Selwyn District Council for the
designation of land for works
associated with the construction and
operation of the Central Plains
Water Enhancement Scheme

EVIDENCE OF PHILIP THOMAS DONNELLY

QUALIFICATIONS AND EXPERIENCE

1. My full name is Philip Thomas Donnelly. I am the principal of Philip Donnelly and Associates Limited, an economic consulting firm.
2. My qualifications and experience is set out in my June 2008 evidence which I previously presented in respect to Central Plains Water¹ (CPW) proposed scheme including the Waianiwaniwa storage.
3. I confirm that I have read the Code of Conduct for Expert Witnesses² contained in the Environment Court Consolidated Practice Note 2006. My evidence has been prepared to comply with that Code.

SCOPE OF EVIDENCE

4. I have been requested to update the relevant parts of my evidence concerning the economic effects resulting from the amended Central Plains scheme. This is to take account of Waianiwaniwa storage no longer being available to the proposed scheme and the impact this will have on post scheme farm management. The reduced water reliability affects the assumptions in respect to the total affected area (now assumed to be 76,000ha), of which 60,000ha will benefit from CPW water¹, and the farm types likely to develop to take advantage of the scheme² water. The detailed assumptions as to the change in farm management generated by the amended scheme are explained by Mr Macfarlane in his evidence.
5. The sections of my evidence that are most affected by change to the scheme are Section 7: Economic impact analysis (EIA) and Section 9: Costs and benefits. The latter summarises the results of my cost benefit analysis (CBA) of the scheme.

PRINCIPAL CHANGES TO ASSUMPTIONS

6. The main effect of removing the proposed off-farm storage is to reduce the area which is assumed to change to more intensive farming as a consequence of the scheme proceeding and to change the assumed mix of post irrigation farm types due to less reliable water being available.

¹ 16,000ha in the affected area will remain as dry land livestock.

7. The amended scheme also affects the capital expenditure of the proposed irrigation scheme, both off-farm and on-farm. Off-farm costs are reduced by removal of the storage reservoir and other associated infrastructure needed to get the water to the dam. On the other hand, reductions in some off-farm expenditure is offset by new on farm expenditure, namely, on-farm storage to improve reliability for farms that have to rely solely on run-of-the-river water.

8. The consequence of the changes in irrigated area and type of land use change resulting from the proposed scheme are summarised in Table 1 which is copied from Mr Macfarlane's evidence. Appendix 1 shows the new summary farm operating budgets prepared by Macfarlane Rural Business Limited reflecting the changes summarised in Table 1. My revisions in respect to the net change in farm operating expenses and revenues, due to the amended scheme, are based on Appendix 1.

Table 1: Irrigated area by farm type

	Pre scheme (ha)	2007 assumptions (ha)	2009 assumptions (ha)
Total affected area			
Dryland livestock	55,250		9,250
Mixed livestock/arable (50% water)		20,500	32,000
Mixed livestock/arable (100% water)	8,000		
Finishing livestock/arable		3,000	-
Dairy (100% water)	22,000	46,500	25,000
Arable and process crop		15,250	5,000
Arable/winter finishing		-	14,000
	85,250	85,250	85,250
Less dryland			9,250
Total area affected by irrigation			76,000

Source: Mr Macfarlane's evidence

9. In addition, Appendix 2, which is also prepared by Macfarlane Rural Business Limited, shows the capital expenditure assumptions that I have used to revise my estimated economic assessments in respect to the amended scheme. The on-farm capital expenditure estimates were supplied by Macfarlane Rural Business Limited and the off-farm estimates by Mr Lewthwaite, URS (NZ) Ltd.
10. In my analysis I have reduced Mr Lewthwaite's off-farm capital cost estimate by \$28M (i.e. from \$171.6M to \$144M) as his estimate includes payment of \$28M for land required for off-farm works. Land purchase is a transfer payment in economics and not a real cost, as it does not involve the consumption of scarce resources per se. The opportunity cost of using this land for canals and other irrigation infrastructure is reflected in the loss of revenue (and reduced farm costs) in the with scheme scenario, i.e compared to the without scheme scenario. Thus,

the cost to society of using land for irrigation infrastructure instead of being farmed is appropriately taken into account in my economic assessments.

11. The following updates the affected paragraphs of my evidence resulting from the changes to farm area irrigated and change to farm management systems, i.e. it takes account of the revised farm operating and capital expenditure budgets summarised in Appendix 1 and Appendix 2.

IMPORTANCE OF EXPORTS TO ECONOMIC WELL-BEING – AMENDED PARAGRAPH 4.8

12. In my evidence of June 2008 I estimated the total unprocessed and processed output of the Central Plains water scheme at \$734M per annum and that, having regard to current and historic ratios of exports to GDP, the proposed scheme could enable a sustainable expansion in national economic activity of \$2.2B to \$2.9B or an expansion of around 2 percent in New Zealand's GDP. Total processed and unprocessed output is now estimated at \$328M per annum while the impact on wider economic activity is assessed at about \$1B to \$1.3B per annum.

AMENDED EIA – SECTION 7 OF JUNE 2008 EVIDENCE

13. The subheadings below are the same as I used in Section 7 of my June 2008 evidence. I have included the relevant paragraph numbers beside the subheadings for reference purposes. In the amended tables I have generally included the results presented in my June 2008 evidence to aid comparison.

Economic impact assumptions – paragraphs 7.6 to 7.13

14. The assumptions set out in paragraphs 7.6 to 7.13 of my June 2008 evidence are replaced by those set out in Mr Macfarlane's evidence and are effectively summarised in financial terms in Appendix 1 and Appendix 2 costs and/or revenues.

Agriculture and associated processing impacts – paragraphs 7.14 to 7.19

15. Table 2² shows the annual estimated direct and indirect agricultural and processing impacts generated by the scheme once it is fully developed and operational.

Table 2: Annual regional impacts of scheme at full production

<i>Activity</i>	<i>Output \$M</i>	<i>GDP \$M</i>	<i>Jobs</i>
	Direct with dam		
Agriculture	327	219	560
Processing	407	71	417
Total	734	290	977
	Direct plus indirect with dam		
Agriculture	554	347	1,218
Processing	755	237	1,466
Total	1,308	584	2,684
	Direct without dam		
Agriculture	149	92	129
Processing	179	36	284
Total	328	129	413
	Direct plus indirect without dam		
Agriculture	263	154	416
Processing	329	107	714

² Updates Table 3 of my initial evidence in chief,

<i>Activity</i>	<i>Output \$M</i>	<i>GDP \$M</i>	<i>Jobs</i>
Total	592	261	1130

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16. Regional direct and indirect agricultural output is expected to increase by \$263M per annum once the scheme is at full production. A proportion of this additional agricultural output will be processed and this is conservatively estimated, based on analysis of Statistics New Zealand input output study, to generate an additional \$328M per annum. This is a combined increase of about \$592M per annum. As a consequence of those output increases, direct plus indirect regional GDP is estimated to rise by \$261M per annum with agriculture contributing about \$154M and processing \$107M of that amount. Direct plus indirect employment is estimated to increase by 1130 jobs with 416 of this increase being created by the expansion in agricultural output and about 714 from processing.
17. Table 3³ shows the direct and direct plus indirect output, GDP and employment impact of the increased production created by the scheme over 35 years, the maximum consent period permitted under the RMA. This period is made up of a three-year off-farm construction period and a 33-year irrigation period. The total for the 35-year analysis period is shown in undiscounted and discounted values (i.e. NPV).⁴

³ Updates Table 4 of my June 2008 evidence)

⁴ Discounting enables costs and benefits occurring at different points in time to be compared, as it recognises the time value of money and, therefore, the fact that the value of money in the future is not the same as the equivalent sum of money now. For example, at 10 percent discount rate \$1000 in year 20 and year 30 is the equivalent of \$164 and \$63, respectively, in year one. The effect of discounting is to give more weight to current rather than future financial flows. The sum of discounted costs and benefits is referred to as net present value (NPV). Selection of the discount rate tends to be problematic, but for the purpose of analysis of the scheme, 10 percent is used as this rate is commonly used in New Zealand with respect to public sector project evaluation. A lower discount rate increases NPV while a higher percentage reduces it.

Table 3: Accumulated direct and indirect impacts

Year	Direct output \$M	Direct & indirect output \$M	Direct GDP \$M	Direct & indirect GDP \$M	Direct jobs	Direct + Indirect jobs
With dam proposal						
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	183	327	72	146	244	671
4	404	720	159	321	537	1,476
5	624	1,112	246	497	831	2,282
6	734	1,308	290	584	977	2,684
7	734	1,308	290	584	977	2,684
8 to 35	734	1,308	290	584	977	2,684
Total	23,230	41,405	9,166	18,499	30,925	84,960
NPV	5,607	9,994	2,212	4,465		
Without dam						
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	180	326	71	144	227	622
4	279	503	109	222	351	961
5	328	592	129	261	413	1,130
6	328	592	129	261	413	1,130
7	328	592	129	261	413	1,130
8 to 35	328	592	129	261	413	1,130
Total	10,622	19,175	4,167	8,454	13,367	36,620
NPV	2,693	4,862	1,057	2,143		

18. Over the total analysis period, direct plus indirect agriculture and processed output increases by \$19.2B (\$4.9B NPV) and GDP by \$4.2B (\$1.1B NPV). The incremental employment created by agriculture and associated processing is estimated at more than 36,000 job-years over the total analysis period.

Scheme construction impacts – paragraphs 7.18 and 7.19

19. The scheme's off-farm and on-farm construction activities will also generate economic activity in the region. Table 3⁵ shows the activity that the scheme's construction is estimated to directly plus indirectly sustain. The total for the 35-year analysis period is shown in undiscounted and discounted (NPV) values.

⁵ Updates Table 5 of my June 2008 evidence

Table 4: Construction impacts of proposed scheme:

Year	Direct output \$M	Direct + indirect output \$M	Added value \$M	Direct +indirect GDP \$M	Direct jobs	Direct +indirect jobs
With dam						
1	137	272	37	94	566	1007
2	164	334	44	115	624	1234
3	207	427	54	148	535	1584
4	86	188	22	66	93	707
5	73	160	19	57	80	604
6	30	66	8	23	34	251
7	2	3	1	2	2	15
8	1	2	0	1	0	7
9-35	0	1	0	0	0.2	4
Total	699	1,453	184	507	1,933	5,412
NPV	591	1,224	156	426		
Without dam						
1	48	96	13	33	199	353
2	77	158	21	56	264	596
3	110	230	29	81	278	866
4	47	107	12	38	46	406
5	29	69	7	24	22	252
6	13	30	3	11	9	113
7	1	2	0	1	1	9
8	0	0	0	0	0	0
9-35	0	0	0	0	0	0
Total	325	693	86	244	818	2595
NPV	272	577	72	203		

20. The scheme's total off-farm, on-farm (including associated development expenditure (e.g plant and equipment, livestock, dairy specific (e.g. milking sheds) and Fonterra shares) is estimated at \$325M (\$272M NPV. The direct and indirect regional output generated by this expenditure is estimated at \$693M (\$577M

NPV) while the GDP is estimated at \$244M (\$203M NPV). The regional activity created by construction is estimated to sustain about 2600-job years of work.

Combined construction, agriculture and processing impacts – paragraphs 7.20 and 7.21

21. Table 5⁶ combines the construction, irrigation and processing impacts for the analysis period.
22. The construction and ongoing farm impact is estimated to directly and indirectly increase regional output by \$19.9B (\$5.4B NPV), GDP by around \$8.7B (\$2.3B NPV) and to create around 39,000 job-years of work.

Table 5: Combined agriculture processing and construction impacts

<i>Year</i>	<i>Direct output \$M</i>	<i>Direct +indirect output \$M</i>	<i>Direct GDP \$M</i>	<i>Direct +indirect GDP \$M</i>	<i>Direct jobs</i>	<i>Direct + indirect jobs</i>
With dam scenario						
1	137	272	37	94	566	1,006
2	164	334	44	115	624	1,253
3	390	754	127	294	779	2,181
4	489	908	181	388	631	2,884
5	697	1,272	265	553	910	2,934
6	764	1,374	297	608	1011	2,700
7	736	1,312	290	586	979	2,691
8	735	1,310	290	585	977	2,688
9	734	1,309	290	584	977	2,684
10-35	734	1,308	290	584	977	2,684
Total	23,929	42,858	9,350	19,006	32,858	90,363
NPV	6,198	11,217	2,368	4,891		
Without dam scenario						
1	48	96	13	33	199	353
2	77	158	21	56	264	596

⁶ Table 5 updates Table 6 of my June 2008 evidence.

Year	Direct output \$M	Direct +indirect output \$M	Direct GDP \$M	Direct +indirect GDP \$M	Direct jobs	Direct + indirect jobs
3	290	555	100	224	505	1,488
4	326	610	121	260	396	1,366
5	357	661	135	285	434	1,382
6	341	622	132	272	422	1,243
7	329	594	129	262	413	1,139
8	328	592	129	261	413	1,131
9	328	592	129	261	413	1,131
10-35	328	592	129	261	413	1,130
Total	10,947	19,868	4,253	8,698	14,185	39,215
NPV	2,966	5,439	1,129	2,347		

COSTS AND BENEFITS

23. The following amends the relevant sections of the proposed scheme's CBA. The sub-headings are the same as I used in my June 2008 evidence. Reference is made to the relevant paragraph numbers of that evidence.

Summary of CBA results – paragraphs 9.19 to 9.22

24. Table 6⁷ shows the costs and benefits of the amended scheme.⁸ Non-market costs and benefits are included in the table to highlight those elements that have not been valued. For comparison purposes the with dam scenario results are also shown.

Table 6: NPV benefits and costs at 10 percent discount rate

Costs	With dam \$M	Without dam \$M	Comment
Net change in off-farm capital expenditure	373	131	
Net change in on-farm development	99	45	

⁷ Table 7 of my June 2008 evidence.

⁸ This updates Table 7 of my June 2008 evidence

Costs	With dam \$M	Without dam \$M	Comment
expenditure			
Net change in farm water storage	0	68	
Associated on-farm capital development	24	23	
Specific on-farm capital expenditure	80	58	
Plant & equipment	13	14	
Livestock	130	12	
Fonterra shares	242	48	
Net change replacement capital expenditure	32	30	
Net change on-farm operating expenditure	1,130	504	
Total net change in market costs	2,124	935	
Costs - non-market			
Anoxic reservoir	not valued	na	
Rakaia take	not valued	not valued	no more than minor
Salmon . Waimakariri	not valued	not valued	measure by transfer benefit
Increased drainage problems	not valued	not valued	likely small cost
Increased groundwater nitrates	not valued	not valued	Requires willingness to pay survey
Increased surface water nitrates	not valued	not valued	Requires willingness to pay survey
Total non-market costs	not valued	not valued	
Total market and non-market costs	2,124	935	
Benefits market			
Net change increased farm gate output	2,449	1223	
Benefits - non market	not valued	not valued	
Scheme reservoir	not valued	na	
Increased flows lowland streams	not valued	not valued	Requires willingness to pay survey
Lower pumping costs to existing users	not valued	not valued	Requires willingness to pay survey
Improved West Melton groundwater access			potentially measurable
Scheme recreational opportunities	not valued	not valued	requires willingness to pay survey

Costs	With dam \$M	Without dam \$M	Comment
New scheme related wetlands	not valued	not valued	requires willingness to pay survey
Net national welfare gain	375	288	

25. The analysis shows that, discounted at 10 percent, the gross farm gate benefits of the scheme over 35 years are \$1,223M NPV while costs are \$935M NPV. Thus, the irrigation scheme is estimated to generate a net welfare gain to society of \$288M NPV which indicates the scheme is efficient.
26. However, that estimate excludes the scheme's non-market costs and benefits. Regardless, for the scheme to be judged inefficient (and, therefore, welfare reducing) at 10 percent discount rate, non-market costs would have to exceed non-market benefits by \$228M NPV. This proposition seems very unlikely given the apparent potential to avoid, remedy or mitigate some potential adverse effects (e.g. increased wetness and nitrate levels) by good farm management practices while still capturing prospective non-market gains.
27. Another measure of the scheme's efficiency is its internal rate of return (IRR). This shows the maximum interest rate that can be applied to a series of net cash flows without yielding a negative NPV. The IRR for the proposed scheme was assessed at 20 percent

Sensitivity assessment of discount rates – paragraphs 9.23 to 9.25

28. The sensitivity of the CBA to variations in the base case (i.e. scenario (i)) assumptions was tested. The revised assumptions were selected to examine the impact of realistic variations in key categories of costs and benefits, individually and together. The purpose was to see by how much base case assumptions and estimates would have to be altered before the conclusions drawn from the analysis would change. The variations in assumptions involved the following:
- scenario (ii) - off-farm development cost increased by 20 percent
 - scenario (iii) - all costs other than Fonterra shares increased by 20 percent

- scenario (iv) - revenue decreased by 10 percent while cost remain the same as the base case
 - scenario (v) - revenue decreased by 20 percent, while costs remain the same as the base case
 - scenario (vi) - all cost, excluding Fonterra shares, increased by 20 percent, with revenue 10 percent lower
 - scenario (vii) - all cost, excluding Fonterra shares, increased by 20 percent, with revenue 20 percent higher
 - scenario (viii) - revenue stream lagged by two years.
29. In addition to the above, the sensitivity of the discount rate was also tested, using rates of 12 percent, eight percent and five percent, as the selection of the appropriate discount rate can be problematic.
30. Arguments favouring very low discount rates are generally based on intergenerational equity issues or concerns. That is, higher discount rates give far less weight to future costs and benefits and, therefore, for example, encourage projects with more rapid rates of resource depletion than low discount rates. The argument in New Zealand for a 10 percent discount rate was in part based on the avoidance of bias in favour of public sector investment, i.e. favouring public sector over private sector investment. For example, low discount rates encourage Government investment in activities considered uneconomic by the private sector. The purpose of selecting several rates was to examine the impact on the base case results and thereby determine just how sensitive the conclusion drawn from the analysis was to variations in the discount rate. Only one rate above 10 percent was selected as the arguments in economic literature are generally for discount rates lower than this. The results of the analysis showed that there was no purpose in testing rates below five percent as lower discount rates enhanced the estimated net gain of the proposed irrigation scheme to society.

Sensitivity results – paragraphs 9.26 to 9.29

31. Table 7⁹ shows the results of variations to the key assumptions and discount rate.

Table 7: Sensitivity of CBA to discount rate

<i>Summary Sensitivity</i>	<i>Costs</i>	<i>Benefits</i>	<i>Net gain</i>	<i>Difference net gain to base case</i>	<i>IRR</i>
• (i) base case	935	1,223	288	0	20.24%
(ii) - off-farm development cost 20% higher	961	1,223	262	-26	18.62%
(iii) - all cost excl Fonterra 20% higher	1,011	1,223	212	-76	16.73%
(iv) - revenue 10% lower	935	1,101	166	-122	16.20%
(v) - revenue 20% lower	935	979	44	-244	12.08%
(vi) costs excl Fonterra 20% higher, revenue 10% lower	1,011	1,101	90	-198	13.22%
(vii) - costs excl Fonterra 20% higher, revenue 20% higher	1,011	1,468	457	169	23.63%
(viii) - costs same, deferred revenue stream	935	1,092	157	-131	14.53%
Base case 12% discount rate	823	1,012	189	-99	20.24%
Base case 8% discount rate	1,084	1,512	428	140	20.24%
Base case 5% discount rate	1,424	2,189	765	477	20.24%

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32. Increasing off-farm development cost by 20 percent (scenario (ii)) reduces the net gain to society by \$26M NPV to \$262M NPV. Assuming all costs other than Fonterra shares are 20 percent higher (scenario (iii)) reduces the net gain to society by \$76M NPV to \$212M NPV. The IRR falls to 16.62 percent and 16.73 percent, respectively, under scenarios (ii) and (iii).
33. A 10 percent reduction in revenue (scenario (iv)) lowers the net gain by \$122M to \$166M (IRR to 16.2 percent), while a loss of more than 23 percent reduction (scenario (v)) causes net gain to fall by \$244M NPV to \$44M NPV (IRR 12.08 percent). Increasing all costs other than Fonterra shares by 20 percent while lowering revenue by 10 percent (scenario (vi)) reduces the net gain by \$198M NPV

⁹ Table 8 of my June 2008 evidence

to \$90M NPV. Assuming all costs other than Fonterra shares and revenues are 20 percent higher (scenario (vii)) increases net gain by \$169M NPV to \$457M NPV (IRR 23.63 percent). Lagging the growth in revenue by two years to full development (scenario (viii)) lowers net gain by \$131M NPV to \$157M NPV (IRR 14.53 percent). At a 12 percent discount rate the project's net national gain declines by \$99M NPV to \$189M NPV.

34. Discount rates lower than 10 percent make the project more favourable as, while market costs increase as the discount rate falls, market benefits increase by even greater amounts. Consequently, the net national gain from the project rises from \$288M NPV at 10 percent to \$428M NPV at eight percent and \$765M NPV at five percent. Thus, the principal conclusion drawn from the CBA analysis, namely, that the proposed irrigation project improves society's economic well-being, is enhanced by discount rates below 10 percent. A two percent lift in the rate to 12 percent reduces the net gain by about a third, but it does not change the conclusion that the project is efficient and enhances economic well-being.

Sensitivity analysis conclusions – paragraphs 9.30 to 9.32

35. Several conclusions can be drawn from the sensitivity analysis. First, the analysis is not sensitive to the selected discount rate; especially, as the general debate in economic literature is that rates lower, rather than higher, than 10 percent are applicable from society's perspective. Second it shows that the scheme's capital and operating cost could be much higher than estimated while still producing a strongly positive welfare gain to society. In fact, estimated costs could increase by more than 75 percent before the scheme created a net loss to society. Third, the analysis is far more sensitive to variations in revenue than cost assumptions, with a fall more than 23 percent in revenue creating a net welfare loss to society. Fourth, the scheme is not particularly sensitive to the uptake assumption. The rate of uptake could be much slower than assumed while still being assessed as efficient.
36. The sensitivity analysis highlights the importance of the revenue assumptions to the overall conclusion. In this respect, it is noteworthy that the revenue assumptions have been based on a exchange rate of NZ\$1 = US\$0.70. Historically, this is a very high rate and, therefore, in the medium to long term there

is a far greater potential for the New Zealand dollar to fall against the USA dollar rather than to increase in value against that currency. This means that the analysis is more likely to be understating rather than overstating likely revenue receipts and thus net welfare gains.

37. Downward movements in the exchange rate, which is likely over the medium to long-term, could offset other potential revenue risks such as commodity prices being lower than assumed. For this reason the revenue assumptions are considered relatively robust and, therefore, unlikely to overstate the financial benefits of the scheme. Because the analysis is not very sensitive to significant variations in cost assumptions, it is very likely that the scheme will involve an efficient use of society's resources and result in a substantial welfare gain, i.e. even if costs proved to be understated. The non-quantified, non-market costs, would have to be substantial for this conclusion to change

SUMMARY OF CHANGE IN IMPACT

38. Table 8 summarises the change in the EIA analysis as a consequence of the change in assumption compared to my June 2008 evidence.

Table 8: Summary of change in EIA impacts with no dam compared to with dam

	<i>Direct output</i>	<i>Direct +indirect output</i>	<i>Direct GDP</i>	<i>Direct +indirect GDP</i>	<i>Direct jobs</i>	<i>Direct + indirect jobs</i>
With dam						
Total	23,929	42,858	9,350	19,006	32,858	90,363
NPV	6,198	11,217	2,368	4,891		
Without dam						
Total	10,947	19,868	4253	8,698	14,185	39,215
NPV	2,966	5,439	1129	2,347		
Change with and without dam						
Total	-12,982	-22,990	-5,097	-10,308	-18,673	-51,148
NPV	-3,232	-5,778	-1,239	-2,544	0	0
Change percent with and without dam						
Total	46%	46%	45%	46%	43%	43%
NPV	48%	48%	48%	48%		

39. Table 8 summarises the changes caused by the amended assumptions to the proposed scheme. Direct output falls by about \$1.9B (\$3.2B NPV). The direct plus indirect impacts decline by \$22.9B (\$5.8B NPV). Direct GDP declines by \$5.1B (\$1.2B NPV) while the fall in direct and indirect GDP is \$10.3B (\$2.5B NPV). The direct job-years of work declines by almost 19,000 while the direct plus indirect job-years declines by about 51,000. In percentage terms the impacts of the amended scheme are less than half of the dam scenario.
40. Table 9 summarises the change in the CBA analysis caused by the amended assumptions.

Table 9: Summary of change in CBA with no dam compared to with dam - \$M NPV

	<i>Cost</i>	<i>Revenue</i>	<i>Net gain</i>	<i>IRR</i>
(i) base case with dam	2,124	2,499	375	14%
(i) base case without dam	935	1,223	288	20%
Difference	-1,189	-1,276	-87	6%
Percent difference	-56%	-51%	-23%	

41. The table shows a substantial reduction in cost with the amended scheme (\$1,189M) and revenue (\$1,278M). However, the net gain declines by a smaller percentage due to the decline in cost being greater (56 percent) than revenue (51 percent). This is reflected in a higher IRR for the amended proposal (20 percent) than the proposed scheme with the dam.

CONCLUSION

42. The amended scheme substantially reduces the scale of positive economic impacts on the community, but it does not change the previous conclusion that the scheme is likely to involve an efficient use of society's scarce resources.
43. While the amended scheme reduces the level of estimated output it will still produce significant new exports as the bulk of its \$328M production will be exported. In this respect, export earnings and growth in export earnings are vital to the health of the national economy and to New Zealand's economic well-being, but

as a country we are not exporting enough. Historically, New Zealand's ratio of exports to GDP was about \$1 of exports to \$4 of GDP. More recently this ratio had changed to \$1 of exports to \$3 of GDP. This change in the ratio has been associated with a blowout in the balance of payments with the deficit now being around eight to nine percent of GDP.

44. New Zealand needs to export more to rectify this unsustainable balance of payments situation and to raise the country's standard of living, as the latter cannot be achieved by being inwardly focused. The CPW scheme provides a means of helping to grow New Zealand's exports and GDP. It will assist Government policies that are aimed at addressing New Zealand's balance of payments problem. Those policies include promoting free trade agreements with other countries and the removal of barriers to agricultural exports through World Trade Organisation discussions.

- Appendix 1: Summary farm operating budgets
- Prior to Commissioning C.P.I.

Farm Type		1. Livestock (Dr)		2. Mixed (Ir)		* Arable & Process		3. Dairy (Ir)		TOTAL	
Area		per ha	46,000	per ha	8,000	per ha	0	per ha	22,000	per ha	76,000
			\$K		\$K		\$K		\$K		\$K
SHEEP		510.4	23,477	1,005.0	8,040		0		0	414.7	31,517
WOOL		86.4	3,976	96.7	774		0		0	62.5	4,750
CATTLE		0.0	0	0.0	0		0	381.0	8,382	110.3	8,382
MILK		0.0	0	0.0	0		0	7,315.0	160,930	2,117.5	160,930
DEER		0.0	0	0.0	0		0		0	0.0	0
VELVET		0.0	0	0.0	0		0		0	0.0	0
GRAIN AND PULSE PRODUCE			0		0		0		0	0.0	0
Previous Yr Sales		0.0	0	0.0	0		0		0	0.0	0
Current Yr Sales		205.6	9,459	935.4	7,483		0		0	222.9	16,943
Unsold At Year End			0		0		0		0	0.0	0
SMALL SEED PRODUCE			0		0		0		0	0.0	0
Previous Yr Sales		0.0	0	0.0	0		0		0	0.0	0
Current Yr Sales		0.0	0	668.7	5,350		0		0	70.4	5,350
Unsold At Year End			0		0		0		0	0.0	0
MISCELLANEOUS INCOME		28.7	1,321	161.4	1,291		0		0	34.4	2,612
										0.0	0
STOCK PURCHASES										0.0	0
	Sheep	-9.2	-425	-279.2	-2,234		0		0	-35.0	-2,658
	Cattle	0.0	0	0.0	0		0	-38.0	-836	-11.0	-836
	Deer	0.0	0	0.0	0		0		0	0.0	0

	Other	0.0	0	0.0	0	0	0	0	0.0	0	
										0	
CASH FARM INCOME		821.9	37,809	2,588.0	20,704	0.0	0	7,658.0	168,476	2,986.7	226,989
Change in value of stock on hand			0		0		0		0	0.0	0
Change in value of produce on hand		0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
GROSS FARM INCOME		822	37,809	2,588	20,704	0	0	7,658	168,476	2,987	226,989
WAGES							0				0
ANIMAL HEALTH		200.2	9,209	248.8	1,990		0	1,064.5	23,419	455.5	34,618
STOCKFEED PURCHASED		24.0	1,102	27.2	217		0	350.0	7,700	118.7	9,020
OTHER STOCK EXPENSES		13.8	637	3.1	25		0	1,553.3	34,172	458.3	34,833
FEED CONSERVATION		7.3	336	7.3	58		0	201.3	4,428	63.4	4,822
CONTRACTING		40.2	1,849	0.0	0		0	268.0	5,896	101.9	7,745
CARTAGE		0.0	0	8.7	70		0	11.0	242	4.1	312
FERTILISER & LIME		15.7	723	49.8	398		0	24.6	540	21.9	1,662
SEEDS & TREATMENT		100.6	4,627	284.8	2,278		0	768.0	16,896	313.2	23,801
SACKS & SEED DRESSING		33.9	1,559	107.9	863		0	28.0	616	40.0	3,038
WEED & PEST CONTROL		0.0	0	66.7	533		0	0.0	0	7.0	533
REPAIRS & MAINTENANCE		74.7	3,438	141.0	1,128		0	26.7	586	67.8	5,153
VEHICLE EXPENSES		44.9	2,064	80.8	646		0	322.5	7,095	129.0	9,805
ELECTRICITY		49.7	2,288	109.0	872		0	152.5	3,355	85.7	6,515
OTHER WORKING EXPS		5.1	236	261.5	2,092		0	580.0	12,760	198.5	15,088
ADMINISTRATION		0.0	0	0.0	0		0	0.0	0	0.0	0
STANDING CHARGES		23.1	1,062	38.5	308		0	129.9	2,858	55.6	4,227
		37.2	1,710	49.5	396			70.0	1,540	48.0	3,647
											0
CASH FARM WORKING EXPENSES		670	30,842	1,485	11,876	0	0	5,550	122,102	2,169	164,820
							0				

Depreciation		51.3	2,360	159.0	1,272			113.0	2,486	80.5	6,118
Earnings Before Interest and Tax:		\$100	\$4,607	\$944	\$7,556	\$0	\$0	\$1,995	\$43,888	\$738	\$56,051

- Post Commissioning C.P.I.

Farm Type		4. Mixed L/s (50% Ir)		6a Arable		6b Arable		7. Dairy (Ir)		TOTAL	
Area		per ha	32000	per ha	5000	per ha	14000	per ha	25,000	per ha	76,000
			\$K		\$K		\$K		\$K		\$K
SHEEP		686.2	21,959	1,399.6	6,998	2,007.0	28,098	0.0	0	750.7	57,055
WOOL		94.3	3,019	34.7	173	34.7	485	0.0	0	48.4	3,677
CATTLE		0.0	0	0.0	0	0.0	0	404.8	10,121	133.2	10,121
MILK		0.0	0	0.0	0	0.0	0	8,869.4	221,735	2,917.6	221,735
DEER		0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
VELVET		0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
GRAIN AND PULSE PRODUCE			0		0		0		0	0.0	0
Previous Yr Sales		0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Current Yr Sales		604.0	19,328	3,785.0	18,925	1,770.0	24,780	0.0	0	829.4	63,033
Unsold At Year End			0		0		0		0	0.0	0
SMALL SEED PRODUCE			0		0		0		0	0.0	0
Previous Yr Sales		0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Current Yr Sales		0.0	0	1,310.0	6,550	1,310.0	18,340	0.0	0	327.5	24,890
Unsold At Year End			0		0		0		0	0.0	0
MISCELLANEOUS INCOME		643.8	20,602	0.0	0	0.0	0	0.0	0	271.1	20,602
					0				0	0.0	0
STOCK PURCHASES					0				0	0.0	0

	Sheep	-9.2	-295	-975.6	-4,878	-1,365.6	-19,119	0.0	0	-319.6	-24,292
	Cattle	0.0	0	0.0	0	0.0	0	-37.5	-938	-12.3	-938
	Deer	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
	Other	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
					0		0		0	0.0	0
	CASH FARM INCOME	2,019.2	64,613	5,553.6	27,768	3,756.0	52,584	9,236.7	230,918	4,945.8	375,883
	Change in value of stock on hand		0		0		0		0	0.0	0
	Change in value of produce on hand	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
	GROSS FARM INCOME	2,019	64,613	5,554	27,768	3,756	52,584	9,237	230,918	4,945.8	375,883
					0				0	0.0	0
	WAGES	186.4	5,964	271.8	1,359	286.2	4,006	1,064.5	26,612	499.2	37,942
	ANIMAL HEALTH	27.4	876	15.4	77	15.4	215	375.0	9,375	138.7	10,544
	STOCKFEED PURCHASED	3.1	98	3.1	15	3.1	43	2,023.7	50,593	667.8	50,749
	OTHER STOCK EXPENSES	7.3	234	2.6	13	2.6	36	201.3	5,031	69.9	5,314
	FEED CONSERVATION	34.3	1,096	0.0	0	0.0	0	224.3	5,606	88.2	6,702
	CONTRACTING	0.0	0	210.8	1,054	15.0	210	11.0	275	20.3	1,539
	CARTAGE	39.6	1,267	283.4	1,417	137.1	1,920	26.1	652	69.2	5,256
	FERTILISER & LIME	204.4	6,539	816.3	4,081	445.4	6,236	768.0	19,200	474.4	36,056
	SEEDS & TREATMENT	44.3	1,416	398.3	1,992	163.3	2,287	28.0	700	84.1	6,395
	SACKS & SEED DRESSING	0.0	0	130.1	651	130.1	1,822	0.0	0	32.5	2,472
	WEED & PEST CONTROL	82.0	2,625	386.7	1,933	267.5	3,745	26.7	666	118.0	8,969
	REPAIRS & MAINTENANCE	60.3	1,928	133.3	667	128.2	1,795	322.5	8,063	163.8	12,452
	VEHICLE EXPENSES	53.8	1,723	139.1	696	130.1	1,822	152.5	3,813	106.0	8,053
	ELECTRICITY	105.1	3,364	333.3	1,667	210.3	2,944	405.0	10,125	238.1	18,099
	OTHER WORKING EXPS	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
	ADMINISTRATION	38.5	1,231	51.3	256	51.3	718	138.4	3,459	74.5	5,665
	STANDING CHARGES	87.0	2,784	121.2	606	121.2	1,697	133.0	3,325	110.7	8,412

Additional opex on bore irrigated land		0.0	0		0	0.0			0	0.0	0
					0		0		0	0.0	0
CASH FARM WORKING EXPENSES		973	31,146	3,297	16,483	2,107	29,495	5,900	147,495	2,955.5	224,619
Depreciation		79.5	2,544	210.3	1,052	210.3	2,944	113.0	2,825	123.2	9,364
Earnings Before Interest and Tax:		\$966	30,923	\$2,047	10,233	\$1,439	20,146	\$3,224	\$80,598	1,867.1	141,900

- **Appendix 2: Summary capital budgets by farm type**

- **Pre C.P.I capital Investment per hectare**

Farm number	1	2	3	*	Total
Area (ha)	46,000	8,000	22,000	0	76,000
Farm Class	Livestock	Mixed	Dairy	Non eff	
Land	\$17,250	\$22,000	\$22,000	\$0	\$1,454
Off farm development	x				
On farm development	x	\$3,500	\$3,000		
Associated			\$550		\$12
Dairy Specific			\$4,300		\$95
Plant & Equipment	\$500	\$550	\$640		\$41
Livestock	\$596	\$596	\$5,766		\$159
Fonterra Shares	x		\$5,619		
Working capital	\$293	\$773	\$664		\$34
Total per hectare	\$18,639	\$27,419	\$42,539	\$0	
Total Investment (\$m)	\$857.38	\$219.35	\$935.86	\$0.00	\$2,013
Total/ha (excl Land)	\$1,389	\$5,419	\$20,539	\$0	
Tot Inv (\$m excl Land)	\$63.88	\$43.35	\$451.86	\$0.00	\$559.09

- Post C.P.I capital Investment per hectare

Farm number	4	6a	6b	7	*	Total
Area (ha)	32,000	5,000	14,000	25,000	0	76,000
Farm Class	Mixed	Arable & proces	Arable	DairyNon Eff		
Land	\$19,625	\$24,500	\$24,500	\$22,000	\$0	\$1,644
Off farm development	\$1,434	\$2,867	\$2,866	\$2,866		\$172
On farm development	\$1,500	\$4,000	\$3,500	\$3,900		\$215
On farm water storage	\$1,500	\$0	\$3,000	\$360		\$99
Associated	\$475	\$550	\$550	\$650		\$42
Dairy Specific				\$6,880		\$172
Plant & Equipment	\$500	\$1,500	\$1,500	\$640		\$61
Livestock	\$596			\$6,192		\$174
Fonterra Shares				\$7,335		\$183
Working capital	\$775	\$1,700	\$1,700	\$664		\$74
Total per hectare:	\$26,405	\$35,117	\$37,616	\$51,487	\$0	
Total Investment (\$m)	\$844.96	\$175.59	\$526.62	\$1,287.18	\$0.00	\$2,834
Total/ha (excl Land)	\$6,780	\$10,617	\$13,116	\$29,487	\$0	
Tot Inv (\$m excl Land)	\$216.96	\$53.09	\$183.62	\$737.18	\$0.00	\$1,191