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*in the matter of:* the Resource Management Act 1991

*and*

*in the matter of:* Notices of Requirement by Central Plains Water Limited

and

Applications for resource consent by Central Plains  
Water Trust

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Supplementary Report of **STUART JOHN FORD**

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Dated: August 2008

## **QUALIFICATIONS AND EXPERIENCE**

- 1 My full name is Stuart John Ford.
- 2 I am a Director of The AgriBusiness Group and work as an Agribusiness Consultant based in Christchurch. I have spent over 20 years as a consultant in the agricultural industry, with the last few years specialising in agricultural and resource economics and business analysis.
- 3 Over the last 15 years I have undertaken a wide range of economic impact and cost benefit assessments of proposed water resource allocation and management regimes throughout New Zealand. These assessments have included assessing community scheme viability as well as modelling and reporting impacts at the farm, district, regional and national level. I have undertaken a number of research projects and authored reports and publications related to the economic efficiency of water use and allocation including the **MAF Technical paper "Economic and Social Assessment of Community Irrigation Projects"**. I have listed these in Attachment 1.
- 4 I have the following qualifications. Both a Diploma in Agriculture and a Bachelor of Agricultural Commerce degree from Lincoln University. In addition I have undertaken Post Graduate studies in Agricultural and Resource Economics at Massey University. I am a senior member of the New Zealand Institute of Primary Industry Management and a member of the Australian and the New Zealand Agriculture and Resource Economics Societies.
- 5 I am authorised to prepare this report on behalf of Selwyn District Council.
- 6 In preparing my report I have reviewed:
  - 6.1 The Code of Conduct for Expert Witnesses and agree to comply with the code in preparation of my analysis;
  - 6.2 Parts of the Applicant's **resource consent application and the Assessment of Environmental Effects** ;
  - 6.3 Relevant evidence of others, namely Mr Mcfarlane, Mr Donnelly, Mr Copeland, Mr Hazledean, Mr Brown, Mr Butcher, Mr Tipler, Mr Lewthwaite and a range of submitters including Mr Dennis.

## **BACKGROUND**

- 7 I have been requested by Selwyn District Council to provide this report to the hearing in an attempt to provide some clarity around some points of contention between aspects of **the applicant's economic evidence and information provided or views expressed by some submitters**. The specific areas that I have been asked to comment on are:

- A review of the applicants dairy budgets focussing on the major assumptions and financial model parameters used including consideration of whether the issue of reliability of irrigation water supply has been adequately incorporated.
- The value proposition of transition to scheme water.

I have also had Mr Dennis's evidence referred to me for comment.

8 My assessment will cover;

- The approach adopted by the applicant.
- A review of the Dairy Budgets used.
- The value proposition of scheme water.

### **Approach**

9 I believe that some of the confusion around the on farm financial models and their use in the economic impact evidence is caused by the approach used in the on farm modelling. These farm financial models are used not only in the impact analysis but also in the Cost Benefit Analysis presented by the applicant.

10 I was the principle author of MAF Technical Paper No 2002/13 "Economic and Social Assessment of Community Irrigation Projects". The purpose of this work was to *"determine socio-economic parameter values, established as being important in concurrent studies on the roles of central and local government, for previous irrigation schemes, and to establish an assessment framework and tools for determining parameter values in future ex ante studies of proposed irrigation projects"*. In doing so we established an appropriate assessment framework that assists decision makers to evaluate the worth of various community irrigation schemes from a wider view point. As part of that framework we suggested appropriate methods of measuring or expressing those parameters.

11 I have used the framework and methodology suggestions in this report as the basis of my review of the issues referred to me.

12 I have attached (attachment 2) a table that summarises the assessment framework that we developed. In summary we identified an assessment framework that reported assessment parameters for a range of viewpoints, the farmer who is interested in whole farm profitability, the irrigation company that is interested in scheme viability and Central and Local Government that are interested in wider economic and social impacts.

13 We also prescribed a number of important methodological issues related to assessments of the most significant parameters being;

- Land use Change
- Timing of Impacts
- Location of Impacts
- Basis of analysis and incorporating change.
- Community benchmarking.
- Averaging and
- Price series.

- 14 I believe that this is relevant to your consideration as the assessment framework and methodology considerations are important as they assist with consideration of the proposal under the Resource Management Act, particularly in relation to the section 5 (*people and communities providing for their ... economic .... well being*) and section 7 (efficient use and financial viability) matters that impinge on economics. They prescribe a range of parameters and methodologies that enable us to establish the merit of a proposal in relation to the RMA economic tests.
- 15 Some of these issues are important considerations in reviewing the approach and methodology used by the applicant.
- 16 One of the most significant issues discussed in the report was the basis of the analysis and incorporation of change. I quote that discussion;

*"A number of assessments of the economic worth of irrigation schemes have been carried out on a "before and after" basis. What this technique does is assume that the present farming systems are static and that irrigation development would not occur without the community scheme. It also assumes that all change is as a result of irrigation. History has shown that dryland farming systems continue to progress in their productivity and profitability. Therefore it cannot be assumed that an area would remain static without the development of the community irrigation scheme. It may be true that in some areas irrigation development will not occur without the aid of a community irrigation scheme. However there has been exponential growth in the development of private irrigation capacity in New Zealand over the last 25 years. The majority of which has been based on the development of groundwater resources. Because of these two factors "before and after" analysis tends to overstate the potential growth in output due to community irrigation development and therefore overestimates the economic impact of the scheme.*

*It is more appropriate to carry out assessments on a "with and without" scheme basis. The "without" analysis should incorporate a degree of progress in terms of increased productivity along with an assessment of the potential for private irrigation development occurring in the scheme area. Neither scenario will be static. There will also be progress made in the irrigated area as farming and irrigation technologies develop. All of the assumptions made on the degree of development or progress made should be explicit in the reporting of the results".*

- 17 The goal is to identify the net benefits that would occur as a result of the specific proposal being in place. In other words the net benefits that would occur with the scheme minus

the benefits that would occur without the scheme. In doing so we are able to identify those changes that would occur specifically as a result of the scheme. It is only those changes that can be specifically attributed to the scheme that can be considered as being impacts of or benefits from the scheme.

- 18 The farm financial modelling presented by Mr Macfarlane in his evidence is on a **“before and after basis” through the adoption of a range of farm models pre and post scheme commissioning**. This approach can be appropriate for farmer and irrigation company viewpoint analysis as it accommodates profitability and affordability analysis over a relatively short time frame. However Mr Macfarlane reports very few of the profitability and affordability parameters that we suggest should be used. Other than return on marginal capital he does not report the financial returns for an individual farmer changing from one land use to another. He does not report any water affordability measures on an individual farm model basis before and after commissioning.
- 19 The before and after models are then used by Mr Macfarlane and Mr Donnelly to report a number of scheme wide impact parameters. As already discussed this is more **appropriately done on a “with and without basis”**. Therefore the analysis presented does not consider;
- the potential for dryland (or existing groundwater irrigation) and irrigated farming systems to improve or reduce profitability over time as a result of dynamic systems adjusting to new technology, innovation, input inflation, market and environmental pressures etc etc.
  - the potential for irrigation development in the command area of the scheme to occur through a range of alternative means including individual provision or community scheme provision in different forms or scales than that proposed by the applicants.
- 20 **I believe that a “without” scenario should consider issues related to the following possible outcomes or influences;**
- Dryland farming systems adapting and achieving productivity gains through the use of innovation, technology and genetics.
  - Limited land use options for dryland farms as international markets increasingly demand consistency and reliability of production and quality. These demands cannot be met reliably by dryland farming systems.
  - New water sources from groundwater precluded as a result of the ECan red zone restriction on further allocation.
  - Expansion of the irrigated area as a result of efficiency gains made within the existing allocation block of both surface and groundwater through both technical and allocative efficiency gains.
  - New irrigation development as a result of alternative options to access and utilise the potentially allocable resource in both Rivers.
- 21 **I believe that a “with” scenario should consider issues related to the following possible outcomes or influences;**

- Expanded land use options and opportunities to achieve optimum production and profitability as a result of both increased productivity and reliability of supply of farm and horticultural products.
- The opportunity to achieve an expanded area of irrigation at a high level of reliability as a result of the proposed community scheme structure.

22 Therefore it would appear to me that the net benefit approach for the proposed scheme would be different from those modelled by the applicant in the following key areas:

- A wider separation of land use options and profitability between the dryland and irrigated land use and financial models over time than those presented.
- Generally a nil difference in productivity and profitability (other than changes in water access and application costs) between existing groundwater and post scheme surface water irrigated land.
- Greater efficiency through higher returns to capital as a result of reliability of scheme water being achieved at a lower cost than alternatives.

23 In summary the approach adopted is appropriate for reporting individual farm and scheme profitability and affordability parameters yet this has not been done comprehensively enough for us to evaluate well being improvement and financial viability. The approach has been used for extensive reporting of scheme impacts and economic efficiency which are more appropriately reported on a "with and without" basis. On this basis and in balance I believe that there is potential for the applicant's analysis on the economic impact and Cost Benefit of the proposal to have *"over stated the potential growth in output due to community irrigation development and therefore overestimates the economic impact of the scheme"*.

#### **Dairy Budget Review – Model Assumptions.**

24 Another important parameter assessment issue is the issue of "averaging" where we concluded in the report that;

*"In order to create economic farm models for each of the land uses adopted in a scheme area it is necessary to establish an average level of farm performance or alternatively, model an expanded range of farm systems. It is necessary for this to be representative of a wide range of farming systems and levels of productivity."*

25 The farm level financial evidence provided by Mr Macfarlane admits that his modelling does not compare "apples with apples". This has led to a significant amount of confusion and to evidence to you about more appropriate productivity and profitability assumptions in the pre and post commissioning budgets and the impact these altered assumptions would have on the apparent economic efficiency of the project. I have only examined the pre and post commissioning dairy budgets as these are the most significant land use and have the greatest influence on the economic efficiency of the scheme.

#### **Dairy Budget Review – Productivity Assumptions**

26 There are a number of sources of guidance on the appropriate choice of productivity parameters (stocking rate, per cow and per Ha performance) that can be used for Dairy

Farms in the Central Plains of Canterbury. I have listed these in Table 1 alongside those used by Mr Macfarlane.

**Table 1: Dairy Farm Productivity Parameters.**

	<b>Macfarlane Pre Scheme Model 3</b>	<b>Macfarlane Post Scheme Model 7</b>	<b>MAFPolicy Canterbury Dairy Model 2007/08</b>	<b>LIC S D C 2006/07</b>	<b>LUDF 2007/08 Actual</b>	<b>Ritso 2004</b>
<b>Cows / ha</b>	3.5	3.75	3.4	3.2	4.2	3.5
<b>Kg MS/ Cow</b>	380	430	405	385	422	400
<b>Kg MS / Ha</b>	1,330	1,612	1,377	1,207	1,744	1,400

- 27 There are a number of potential justifications for adopting a differential in productivity between farms irrigating from groundwater and those irrigating from the scheme. The two most likely would be first, that the scheme water offered volumetric or reliability advantages that would allow for increased irrigation related output on farm and secondly that the conversion from groundwater to scheme water was accompanied by an upgrade of irrigation and farm systems that resulted in improved water use efficiency.
- 28 There is no evidence that the scheme water is superior to existing groundwater sources in terms of volume or reliability. The capital differences between the two farm models do not indicate that there is an assumption of a significant upgrade of the irrigation system accompanying the change of water source. Therefore I would conclude that there are not any physical reasons why pre and post scheme productivity assumptions should differ for dairy farm production.
- 29 The MAFP Policy Canterbury Dairy Model data is an estimate of the likely production from a representative Dairy farm in the Canterbury Region in the 2007/08 season at 1,377 kilograms of milksolids per hectare (Kg MS / Ha).
- 30 The Livestock Improvement Corporation (LIC) data reports the actual average production of dairy farms in the Selwyn District Council area for the 2006/07 season as 1,207 Kg MS / Ha. This data could be considered as providing an indication of production below that which we could expect to be achieved in the scheme command area as it incorporates a number of older less productive dairy farms in the sample.
- 31 Lincoln University Dairy Farm (LUDF) production of 1,744 Kg MS / Ha is the actual data **from the farm for the 2007/08 season. The farm was a new "Greenfields" conversion to dairying 5 seasons ago.** It was developed with state of the art dairy farming technology (pastures, plant, irrigation equipment etc) and is managed at top end levels of scientific and management knowledge and expertise with all the resources of the University and the South Island Dairy Development Centre partners (Ravensdown, Dairy NZ etc) at its call. It achieves its production with very little imported supplementary feed and is therefore seen

as being in the top 1% of dairy farms in New Zealand in terms of production from within the farms own pastoral resources. It is seen by the industry as an aspirational model for South Island dairy farm practice and productivity. As such it is achieving production levels that we would expect to be industry average, at the current rate of productivity growth, in 10 to 15 years time.

- 32 Ritso production of 1,400 Kg MS / Ha is based on modelling of dry matter production over a range of seasons under irrigation of light soils in the Central Plains area carried out by AquaLinc. It was adopted as an average level of productivity in a report outlining the physical output parameters possible under conversion to irrigated dairying.
- 33 It would appear from this information that 1,330 Kg MS / Ha is an appropriate production assumption for existing irrigation properties in Model 3. However the model 7 (post scheme) production of 1,612 Kg MS / Ha could not be considered to be an appropriate assumption of average production over 30,000 ha of dairy farming. There are no apparent advantages to be gained from the scheme water that would suggest that this level of lift in production could be attributed to the scheme. It would be more appropriate to adopt production of say 1,400 Kg MS / Ha immediately post scheme commissioning with productivity increasing at the rate of industry productivity growth. If this were done then the assumed production of 1,612 Kg MS / Ha would not be reached until at least year 10 post commissioning. Existing dairy farms that do not convert to scheme water would increase productivity at about the same rate.
- 34 Hence the benefits of farms converting from groundwater to scheme water will only be the difference in pumping and maintenance costs (see section 3 of this report). In my opinion the 24,500 Ha of new dairy farms converting from dryland will have a benefit which is perhaps \$25 million per year<sup>1</sup> less than is assumed by Mr Macfarlane. The difference will reduce over time as dairy farm productivity rises, until by 10 years after commissioning the Macfarlane figures will be achieved, and subsequently may be exceeded.

#### **Dairy Budget Review – Financial Model Assumptions – Milk Price**

- 35 In the economic assessment Technical Paper we made the following comments on the choice of appropriate product price assumptions;

*“The choice of price series used in the economic farm models can have a huge impact on the farm gate and flow on impacts of the scheme. When predicting farmer behaviour it is more prudent to adopt a price series which reflects a similar planning horizon to the farmers in the scheme area. A longer term economic analysis may have a longer time horizon”.*

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<sup>1</sup> 24,500 Ha x 212kg / Ha x \$5.50 = \$28.6 million, less some small saving in costs at lower productivity

- 36 Because there is massive variability in product prices within and between years and very little guidance from industry as to medium term expectations I prefer to rely on the only **published medium term price projections available being MAF's predictions in their annual SONZAF report**. My preferred methodology is to assume a price based on the average of the last 4 years actual data and the four years of MAF projections for the future. This methodology tends to reflect product price trends at the same time reducing the variability impacts of high or low year values.
- 37 Mr Macfarlane has adopted a milk price value of \$5.50 / Kg MS in his budgets. If I were to **have used my methodology in December last year based on MAF's 2007 report then I** would have adopted a value of \$5.02 / Kg MS at that time. It is interesting to note that the same calculation **based on MAF's recently released 2008 report would have resulted in** the adoption of a value of \$5.51 / Kg MS. I believe that considering the apparent recent step change in international dairy commodity prices that \$5.50 / Kg MS could be considered an appropriate milk price assumption.

#### **Dairy Budget Review – Financial Model Assumptions – Costs**

- 38 I have compared Mr Macfarlane's financial models with those used in the MAF Canterbury Dairy Model in Table 2.

**Table 2: Farm Working Expenses Comparison**

	<b>Macfarlane Pre Scheme Model 3</b>		<b>Macfarlane Post Scheme Model 7</b>		<b>Canterbury Dairy Model 2007/08</b>	
	<b>\$ / Cow</b>	<b>\$/ Kg MS</b>	<b>\$ / Cow</b>	<b>\$/ Kg MS</b>	<b>\$ / Cow</b>	<b>\$/ Kg MS</b>
<b>Cash Farm Working Expenses</b>	1,400	3.68	1,256	2.92	1,231	3.04

- 39 It would appear from this comparison that the financial cost model assumptions for the pre scheme model 3 dairy farm are considerably higher than those indicated as average by the MAF model. However the model 7 costs are in line with those indicated as average by the Canterbury Dairy model. There is no apparent reason why farm working expenses under the scheme should be considerably less than those post the scheme unless those costs reflect lower water costs. I will deal with this issue later in my assessment.
- 40 Mr Dennis has identified some apparent discrepancies in expense assumptions between the two dairy models used. I have examined the two sets of financial models and have listed in Table 3 the following differences that appear to be counter intuitive;

**Table 3: Discrepancies in Budget Parameters**

<b>Differences</b>	<b>Pre Scheme</b>	<b>Post Scheme</b>
	<b>Model 3</b>	<b>Model 7</b>
Managers salary	100,000	90,000
Salaried Workers Costs	240,000	228,000
Casual Workers hrs	2,500	3,000
Casual Workers pay rate	18	15
Total Wages	385,000	364,000
Animal Health Costs \$ / hd	80	75
Maize Silage	300	400
Straw	200	220
Grass Silage cost \$/T	150	120
Feed Conservation bales	500	600
Sulphur super \$/T	265	280
Nitrogen \$/T	750	675
Seeds \$/ha	265	250

41 I referred this list to Mr Eaton who prepared the detailed budgets for Mr Macfarlane for comment. His response is as follows;

*"They are minor errors resulting from the number of revisions carried out due to delays in hearings, and transposing figures from a different budget format . . . The net increase in farm working expenses as a result of correcting the errors is 3.5% or 9.6c/kgMS i.e. relatively minor."*

42 Research at Canterbury University indicates that 98% of spreadsheets have errors in them, so I do not find these inconsistencies surprising, and therefore I cannot share Mr **Dennis's** view that they were some form of deliberate tweaking of values to influence the results.

43 Corrections to the figures would result in the EBIT of model 7 reducing by \$155 / ha this correction would not in itself materially affect the conclusions reported by Mr Macfarlane and Mr **Donnelly** therefore **I cannot share Mr Dennis's** view that they were some form of deliberate tweaking of values to influence the results. I should point out that a revision of this order would escalate to scheme wide changes in profitability of approximately \$7.2 m and a negative change to the NPV of the scheme of approximately \$55 million<sup>2</sup>.

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<sup>2</sup> Geoff Butcher Pers Comm

### **Value Proposition of Scheme Water**

- 44 There has been much evidence, debate and confusion around the value proposition of scheme water. This is particularly as a result of the fact that the applicants have presented evidence based on the assumption that 30,000 ha, or half, of the scheme area is currently irrigated from groundwater sources that will convert to scheme water. Effectively this is a transition from groundwater to surface water.
- 45 The applicants have assumed that half (15,000 ha) of the irrigation capacity from groundwater that is surrendered will be taken up by additional land outside the scheme and that this conversion from dryland to irrigation can be attributed as an impact of the scheme. I refer you back to my earlier comments on appropriate assumptions as to what can be considered as outcomes that can be attributed to the scheme. This assumption would need to survive a number of tests to be considered valid. It would seem to me that the number of applicants for surface water at present that also have groundwater consents would mean that the transition from groundwater to surface water will occur to some extent in the absence of the scheme proceeding therefore it may not be a valid **"with" assumption. The potential for surrendered groundwater to be reallocated for** abstraction as a result of the red zone classification would also cast doubt on the validity of this assumption.
- 46 The proposition that scheme water would be more attractive than existing groundwater depends on two key factors:
- The property right to scheme water is seen to be more secure or attractive.
  - The cost of accessing and applying scheme water was less than the cost of existing groundwater.
- 47 Water property right considerations revolve around issues of security, volume and reliability.
- 48 It is my understanding<sup>3</sup> that the command area of the Central Plains Scheme is currently **declared a "red zone" by ECan meaning that there can be no further allocation of** groundwater from the zone. However current consent rights are protected under the NRRP as they have priority over any new allocations and are automatically renewed if they are able to pass the reasonable use test. At renewal, consent conditions will be brought into line with standard consent conditions across all water users. Therefore I would consider that on the issue of security that scheme water would not be superior to existing water property rights.
- 49 Some irrigators may not have sufficient volumetric rights to irrigate their whole farm area fully and may therefore be constrained by the allocation restrictions in achieving that aim. This additional volume should technically be considered as new irrigation area however

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<sup>3</sup> J Glennie ECan Pers Comm

there may be some people that are better to surrender their existing partial irrigation capability in order to achieve full farm irrigation capability with scheme water.

- 50 Existing groundwater supply can be considered as fully reliable other than the natural variability of seasonal aquifer recharge. Instances of low aquifer levels can be addressed by deepening the operating level of the pump and therefore should not be considered as compromising water reliability. The priority status of existing consents and halt on further allocation will protect the current level of reliability in the future.
- 51 There is some confusion over the reliability status of scheme water. Mr Tipler has given evidence that the scheme has been designed to provide a reliability of 97 to 98 %. He has also explained that the current shareholders have purchased a right to access water at 90% reliability and that those who wish to achieve higher reliability in dry years will be required to purchase the additional water either from the scheme or from other irrigators who are willing to sell. It is unclear as to what cost this additional reliability will come at or what value will be put on the additional water. Presumably it will have a marginal value well above that of the lower reliability water.
- 52 It does not appear that Mr Macfarlane has allowed for any additional cost related to achieving comparable reliability to existing groundwater in his analysis.
- 53 In summary it appears the security and reliability of the current property right to groundwater is high and is likely to be protected into the future. On these two issues the water supply options are comparable therefore the only motivation for existing irrigators to prefer scheme water would be to secure additional volume.
- 54 Costs of accessing and applying water are made up of capital costs and operating costs which are made up of equipment repairs and maintenance and energy. Existing irrigators face costs related to lifting the water out of the ground, the scheme will have costs related to delivery of the water to the farm gate and the capital equipment required to access and pressurise scheme water. The energy costs of applying the water at the surface will be the same. Therefore the issue becomes whether the scheme can deliver water at the farm irrigator cheaper than the cost of lifting it out of the ground.
- 55 AquaLinc in 2004 calculated the costs of delivering water to the surface across a range of well pumping depths in the Central Plains area which represented the major aquifers accessed by irrigation systems in the area. The results of those calculations are shown in Table 4 and indicate the range of costs experienced by existing irrigators.

**Table 4: Existing Groundwater Lifting Costs**

<b>Aquifer</b>	<b>Shallow</b>	<b>Mid</b>	<b>Deep</b>
<b>Pumping Level (m)</b>	60	95	170
<b>Cost (\$/ ha / annum)</b>	390	620	960

- 56 AquaLinc also calculated the costs related to the equipment operating and maintenance for scheme water access and pressurising. AquaLinc reported that the cost of surface pumping equipment and maintenance is \$40/ ha / annum. If we assume that scheme water costs are \$71 / ha / annum as reported by Mr Macfarlane and that the off farm scheme capital costs of \$6,826 are financed at 9.0% interest (\$614 /ha /annum) then annual scheme water delivery costs can be considered as being approximately \$725 / ha / annum.
- 57 I refer you to my earlier discussion on the possibility of further costs related to achieving comparable reliability to groundwater. If these costs are additional to those allowed for then the scheme water would increase in cost accordingly.
- 58 Table 5 indicates the sensitivity of the cost to the interest rate used and reports that over a range from 8 to 10 % the water costs would range from \$660 to \$795 / ha.

**Table 5: Scheme Costs Sensitivity to Interest Rate**

<b>Interest Rate</b>	<b>8%</b>	<b>9%</b>	<b>10%</b>
<b>Scheme Water Cost (\$/ ha / annum)</b>	660	725	793

- 59 From comparing Table 4 and Table 5 I would conclude that the option to convert from groundwater to scheme water would only be attractive to those existing irrigators that are accessing and lifting water from the deep aquifers in the upper plains.
- 60 Irrigators may prefer to convert to groundwater to protect themselves from increasing electricity charges in the future. It should be considered that both the scheme supply and surface pressurising costs utilise electricity so the transition would not completely reduce that risk exposure to increasing energy costs. It would appear from my analysis that energy charges could increase significantly before this made the scheme water more attractive than existing mid level groundwater access.
- 61 I would have to conclude that the assumption that there would be wide scale (30,000 ha) of conversion from groundwater to scheme water is unrealistic. It appears that the motivation for surrendering existing groundwater consents will come from those currently partially irrigating their properties wishing to access greater volumes of water and those pumping from the deep aquifers on the upper plains. These two groups will be less than the 30,000 ha assumed.
- 62 My conclusion on the issue of the value proposition of scheme water has reduced the **probability of the so called "released water" benefits over 15,000 ha of new irrigation** outside the scheme area that could be attributed to the scheme.

## CONCLUSIONS

- 63 The purpose of my assessment has been to attempt to provide some clarity around some **points of contention between aspects of the applicant's economic evidence and** information provided or views expressed by some submitters.
- 64 An appropriate net benefit approach for the proposed scheme would be different from those modelled by the applicant in the following key areas; land use assumptions, productivity and profitability assumptions, area of new irrigation enabled. In my opinion assumptions in relation to these factors would be more conservative than those presented by the applicant therefore reducing the net impact and cost benefit of the proposal.
- 65 The model 7 (post scheme) production assumption of 1,612 Kg MS / Ha could not be considered to be an appropriate assumption of average production over 30,000 ha of dairy farming. There are no apparent advantages to be gained from the scheme water that would suggest that this level of lift in production could be attributed to the scheme. It would be more appropriate to adopt production of say 1,400 Kg MS / Ha immediately post scheme commissioning with productivity increasing at the rate of industry productivity growth. If this value were used then scheme impacts and cost benefit would decrease accordingly.
- 66 I believe that considering the apparent recent step change in international dairy commodity prices that \$5.50 / Kg MS could be considered an appropriate milk price assumption.
- 67 The assumption that there would be wide scale (30,000 ha) conversion from groundwater to scheme water is unrealistic. It appears that the motivation for surrendering existing groundwater consents will come from those currently partially irrigating their properties wishing to access greater volumes of water and those pumping from the deep aquifers on the upper plains.
- 68 My conclusion on the issue of the value proposition of scheme water has reduced the **probability of the so called "released water" benefits over 15,000 ha of new irrigation** outside the scheme area that could be attributed to the scheme.
- 69 The approach adopted is appropriate for reporting individual farm and scheme profitability and affordability parameters yet this has not been done comprehensively enough for us to evaluate well being improvement and financial viability considerations. The approach and methodology has been used for reporting of scheme impacts and economic efficiency **which are more appropriately reported on a "with and without" basis. On this basis and in balance I believe that there is potential for the applicant's analysis on the economic impact and cost benefit of the proposal to have "over stated the potential growth in output due to community irrigation development and therefore overestimates the economic impact of the scheme".**

Stuart Ford

12 August 2008

## **Attachment 1: Relevant Projects**

**Environment Waikato Plan Change No 5 (2007):** Preparation of a financial and economic assessment of the value of Waikato River Water for agricultural use in comparison to alternative use options.

**Ashburton District Council Stockwater Consent Renewal (2008):** Preparation of a cost benefit analysis of the alternative option to either pipe the stockwater supply or revert to alternative means to supply stockwater needs with the water saved being available for alternative irrigation use. This report was as background to the consent renewal application and the NRRP considerations of Environment Canterbury.

**Selwyn Rakaia Consent Application (2006):** Preparation of a financial and economic assessment of the application of a group of over 70 individual applicants to take water from groundwater within the Rakaia Selwyn zone and presentation of expert evidence to the hearing convened by Environment Canterbury.

**Hunter Downs AEE (2006):** Preparation of an assessment of environmental effects (economic) of a consent application to take water from the Waitaki River and irrigate 40,000 ha of farmland to the North of the river under a range of water reliability scenarios.

**Lynton Dairy Limited (2005):** Preparation of a financial and economic assessment of the application of Lynton Dairy limited to take water from groundwater within the Rakaia Selwyn zone and presentation of that report as evidence to the Environment Court.

**Waitaki Catchment Water Allocation Regional Plan (2005):** Preparation and presentation of evidence for the Waitaki Allocation Board on:

- The importance of irrigation to agriculture in the Lower Waitaki Catchment.
- The economic impact of the Draft Waitaki Catchment Allocation Plan on existing irrigators in the lower catchment.
- The economic impact of the Draft Waitaki Catchment Allocation Plan on future irrigation options in the lower catchment.

**Economic Impacts of alternative minimum flow regimes on the Ashley River. (Oct 2002):** An analysis of the likely impacts of a number of proposed minimum flow regimes on the Ashley River on individual farming properties and at a regional level.

**Economic Impacts of alternative minimum flow regimes on the Ashburton / Hakatere River. (2003):** An analysis of the likely impacts of a number of proposed minimum flow regimes, and mitigation options, on the Ashburton / Hakatere River on individual farming properties and at a regional level.

**Economic Impacts of alternative minimum flow regimes on the Hurunui River. (2004):** An analysis of the likely impacts of a number of proposed minimum flow regimes, and mitigation options, on the Hurunui River on individual farming properties and at a regional level.

**Impacts of the proposed minimum flow regime on the Waipara River. (2005):** An analysis of the likely impacts of a proposed minimum flow regime, and farmer response and mitigation options, on the Waipara River on individual farming properties.

**A financial decision making framework for irrigation conversion. (2004):** Development of a financial decision making framework for farmers considering conversion to irrigated farming.

**The physical and financial impacts of conversion from dryland to irrigated farming. (2004):** Provision of background information on the likely production and financial gains to be made from conversion to irrigated farming.

**Central Plains Water Enhancement – Economic and Social Impacts of Proposed Irrigation Schemes. (Nov 2000):** An ex ante analysis of the likely impacts of proposed large scale (192,000 ha) Community Irrigation Schemes on the Canterbury Plains New Zealand.

**Central Plains Water Enhancement – Feasibility Study (Jan 2002):** An interim feasibility study of proposed large scale (84,000 ha) Community Irrigation Scheme on the Canterbury Plains New Zealand.

**Regional Economic Impact Analysis of References of the Proposed Regional Plan : Water for Otago (June 2001):** Full impact analysis, including regional flow on impacts, of changes in output caused by a number of proposed minimum flow regimes on the major Catchments in Otago province New Zealand.

**Rangitata River Conservation Order : Economic Impact Analysis (Oct 2001):** Full impact analysis, including regional flow on impacts, of changes in agricultural output caused by the proposed National Conservation Order on the Rangitata River in New Zealand.

**Irrigation Water Reliability Analysis (2004):** Understanding and quantifying the economic impacts at the farm gate and Regional level of providing different levels of reliability of irrigation water in Canterbury.

**Irrigation Scheme Development – Issues to consider when promoting a water resource scheme. MAF Technical Paper (Sept 2001):** A review of experience in the development of communal irrigation schemes in New Zealand of the previous 80 years and the recent commissioning of commercial irrigation schemes. Development of a project development framework.

**Economic Efficiency of Water Allocation - MAF Technical Paper No:2001/7:** A report to the New Zealand Ministry of Agriculture and Forestry which is part of a series of Sustainable resource development studies. It is an investigation of the means of allocating water in an economically efficient manner and the way in which this allocation can contribute to regional economic development.

## Attachment 2: Socio Economic Assessment Framework Parameters

**Table 6: Assessment Framework Parameters**

Parameter	Measure
<b>Farmer Viewpoint</b>	
Farm Profitability	Cash Farm Surplus
Return on Marginal Capital	% return on total development costs
Water Affordability	Water charge as % of Marginal Capital
Farm Asset Value	Net increase in asset value
<b>Irrigation Company Viewpoint</b>	
Scheme Viability	Annual profit / break even
Water Charge	Annual Water Charge per Hectare
Asset Value	Net Value of Irrigation Company
<b>Central and Local Government Viewpoint</b>	
Output	Total Output
Employment	Total Full Time Equivalents
Value Added	Total Value Added
Location of Impacts	All above by Location
Usually Resident Population	Number and % change over time
Population Age Structure	Percentage in each Age Groups
Age of Farmers	Percentage in each Age Groups
Dairy Farmers	% of Dairy Farmers
Dairy Farmer Age	Percentage of Age Groups
Educational Qualifications	% with or without educational qualifications
Employment by Industry	Employment by Sector
Occupational Status	Status of Occupations
Employment Status	Employees / Employers as % of population
Labour Force Status	Full time / Part time employment
Household Incomes	Median Household Income
Distribution of Incomes	% of household incomes by \$ range
Schools	Numbers/ Rolls / Ages / Facilities
Community Organisations	Number / Variety / Range