Report Prepared at the Request of Wairarapa Regional Irrigation Trust (WRIT) and Meridian Energy Limited

Draft Report to WRIT – Part Two

31st March 2009

Baker & Associates
(WAIRARAPA) LIMITED

Purpose of Report

Instructions and Purpose of Report

These were defined in the scoping letter to WRIT of 20 November 2008 for Meridian Energy.

Instructions:

- To report on the benefits from irrigation in Wairarapa by comparing current dry land use returns with post - irrigation returns.
- To undertake a broad review that will indicate the affordability of water over the different land zones that have been identified. (We have described these as A, B and C representing Ahikouka; Kokotau and Tauherenikau soil types respectively).
- To review the models we undertook in a study for Go Wairarapa in 2004:"Wairarapa Regional Irrigation Project" – Summarised in reports 2 and 3 of 30 April and 25 June 2004 respectively.
- Our new study has outlined and revised model assumptions for the farming options already completed and also looked at some new alternatives. These have regard to the current outlook for farmers' use of land by adopting best technology under prices currently anticipated.
- To consider current vs. potential land use.
- To analyse results to show sensitivity to changes in performance or prices.
- The request was to show the surplus that could be generated per ha before the cost of water is taken into account.

Purpose of Report:

This was to:

- Provide Meridian and WRIT with an indication of likely viability to farmers of using irrigation water for farming under different polices. This would allow Meridian to assess their likely return from investing in this Wairarapa Regional Irrigation Scheme.
- Indicate the level of annual charges that could be afforded (Based on no capital contribution to the supply of water to the farm gate).
- Provide information that could ultimately be made available to land owners for 'selling' the benefits from use of the water.

Reporting Process:

Following discussions with WRIT (Geoff Copps and Chairman Bob Tosswill) it was proposed that our report be prepared in two stages:

Stage 1 – Interim report for circulation to the WRIT committee for comment and discussion on any areas that required review or further elaboration. The target date for this was to be available by Feb 2009.

Stage 2 – Final, the date for this will be dictated by the instructions of WRIT.

Use of This Report – Stage 1

We note that in its current form, this report is intended for viewing by the WRIT committee and Meridian only.

While one of the objectives was to enable the benefit of water to be "sold" to farmers we believe that the manner in which this is presented will be very important and care will be required to ensure that interpretation is not taken out of context.

In the case of the dairy analysis we have produced considerable detail with graphs of pasture and production that would be of benefit when explaining benefits to farmers but which would simply clutter this report so they have been withheld. If it would be of benefit for the understanding of our approach, we could present this at our meeting with WRIT members when we discuss the Draft 1 report.

Team Members Who Contributed to This Project:

(Unless otherwise noted the team comprised Directors or Employees of Baker and Associates (Wairarapa) Limited, Registered Agribusiness Consultants.

David Baker	Team Leader, Project Co-ordinator
Jan Tatham	Assistant Project Co-ordinator and Viticulture Section
Chris Lewis	Dairy Section
Sully Alsop	Sheep, Beef and Arable Section
Sam Orsborn	PasturePro Data
Fergus Rutherford	Capital Value Review Section
Chris Garland	Final Editing
Delwyn Pringle	Report and Presentation
David Reid	(Aqua Design) Updated on-farm capital costs for farm irrigation systems.

Executive Summary

Scope of the Work:

This report has been completed following instructions confirmed on 20 November 2008. The instructions were agreed upon at a meeting with members of the Wairarapa Regional Irrigation Trust (WRIT) on behalf of Meridian Energy Ltd.

Benefits from irrigation in Wairarapa have been reported by comparing current dry land use returns with post - irrigation returns.

The capital (property value) considerations have also been reviewed as these are an important consideration to any investment decision as there should be benefits over and above the annual cash return.

Model Policies and Reporting Format:

- 100ha has been adopted for each policy that has been modelled and the policy assumptions for each of the soil types have been defined. These assume a status quo year once irrigation becomes fully effective. (In the case of viticulture, we have done this on an annual cash flow basis so that the accrued interest costs from the capital development involved can be calculated as it will be six years before the optimum returns are achieved).
- Models assume best practice such as would be achieved by the top quartileof farm managers.
- Tables show the annual operating profit both before and after servicing of the capital relating to the establishment of irrigation. We show farm operating profit available to cover water costs, management input, profit and risk and existing debt servicing.
- The annual cash-profit benefits are compared as the operating farm surplus per ha.
- Section F comments on possible impact on property value.
- Sensitivity to change in prices and performance are provided.
- For Dairy Class A soils we have assessed the production under irrigation will be very similar regardless of location. Around Masterton a little less irrigation water will be required as normal annual rainfall is higher.
- When assessing the cost of irrigation for all policies with the exception of viticulture, we have assumed a Centre Pivot system at a total installed cost of $300,000 including the cost of upgrading farm infrastructure. Interest @ 8% therefore equates to $24,000 pa. If alternative irrigation systems are used, such as would be required for cropping, the capital cost would be less but annual labour costs more. We are advised that the planned water pressure delivered to the boundary of each property will be 50psi which is sufficient for central pivot with no further pumping costs required.
- The operational cost of electricity has been based on 20c unit (Based on negotiated bulk rates).

Summary of Results:

Table 1- Increase in Operating Surplus - ($/ha) – All Farm Policies

	Dairy Intensification		Dairy Conversion	Sheep, Beef & Dairy Support	Arable Cropping	Viticulture
Soil Type	**Martinborough**	**Masterton**				
A	$1,643	$1,072	$3,700	$33	$856	-
B	$1,580	$1,238	$2,389	$102	$738	-
C	$2,746	$2,174	$3,868	$121	$1,153	$1,880

The results above indicate the increase in operating surplus for each policy compared with the current land use without irrigation. For dairy intensification two rainfall districts are modelled (Martinborough and Masterton).

Table 2 - Increase in Disposable Surplus - ($/ha) – All Farm Policies

	Dairy Intensification		Dairy Conversion	Sheep, Beef & Dairy Support	Arable Cropping	Viticulture
Soil Type	**Martinborough**	**Masterton**				
A	$967	$482	$482	-$357	$446	-
B	$872	$583	-$73	-$288	$348	-
C	$1,906	$1,481	$651	-$269	$763	$1,609

Table 2 highlights the disposable surplus which is the operating surplus after cost of debt servicing on new irrigation capital, depreciation on new capital and cost of capital due to increase in stock and/or dairy shares.

For every policy, with the exception of viticulture the capital cost of irrigation has been calculated at $300,000 at 8% ($24,000) plus depreciation over 20 years ($15,000/annum).

Sensitivities for each policy have been defined and are documented in each Policy Section. For example a change of 50 cents/kgMS results in a disposable surplus increase per hectare over non-irrigated land of $246 (Soil Type A), $263 (Soil Type B), $442 (Soil Type C).

A 1% reduction in interest rate takes $215/ha off the irrigation cost of capital for dairy conversion and $1,035/ha off the viticulture cost of capital.

Conclusion:

Water Affordability by Soil Class and Farm Policy

Table 3 - Per/Hectare $ for Water

	Dairy Intensification		Dairy Conversion	Sheep, Beef & Dairy Support	Arable Cropping	Viticulture
Soil Type	**Martinborough**	**Masterton**				
A	$580	$289	$289	Nil	$280	-
B	$523	$350	Nil	Nil	$209	-
C	$1,144	$889	$391	Nil	$458	$965

This table is the assessed affordable water value per hectare. This is calculated as being 60% of the net benefit from irrigation for each model available to meet the cost of water delivered to the farm property. The remaining 40% represents our assessment of the sum that a prudent farmer/investor would require to cover their management profit and risk.

Land Value Impact Summary

- The real estate market for irrigated rural land in the Wairarapa is immature.
- Sales of irrigated properties do not currently reflect a premium for irrigation above the capital cost of installing an irrigation system with on farm water source.
- Relatively available sources of irrigation water in most locations already give farmers options in terms of whether to irrigate or not.
- As consent to utilise these water sources becomes harder to obtain farmers will require guaranteed irrigation water and an irrigation culture will develop.
- Evidence from areas that have a developed irrigation industry shows that a premium in the market for irrigated properties. Premiums in these areas are between 5% & 10% of the land value.
- We would expect this premium to develop in the Wairarapa as irrigation awareness increases.
- There is a real opportunity to sell water from the scheme to lifestyle block owners for domestic and stock use. We envisage this would be for an up front capital sum plus an annual charge.

Editorial Overview

There is no question that the application of irrigation water to Wairarapa soils has the capacity to substantially increase farm production measured by volumes of output.

Whether this will be profitable to individual farmers will depend upon their motivation and ability to change and adopt farm practices that will achieve this.

This study looks at three representative soil types within the Wairarapa and shows that volume of outputs can be increased significantly while removing much of the seasonal risk. HortResearch figures indicate that seasonal variability can be also be halved from 40% to 44% down to 20%.
In the case of dairy intensification, our models show that volume of milksolid production can be increased by 30 to 83%, with the greatest lift being for Class C soils in the Martinborough rainfall area.

The viable benefits from water will only be realised if intensification of land use is undertaken and where a high level of management ability is available.

It will not be economic to utilise water as drought insurance for the maintenance of existing farm policies.

Under best sheep and beef farm policies the increase in returns will not cover the substantial on-farm capital investment required for irrigation.

Modelling based on 100 hectares for different farm policies and systems will require a capital outlay of around $300,000 to install the most efficient medium-to-long-term system involving central pivot water application. This system can supply water at around 90% efficiency and once installed is the most cost effective in annual operation, requiring less labour and minimum pumping cost of water if the water can be supplied by pipe to the farm gate at a pressure of 50 litres per second.

To cover interest at 8% and depreciation over 20 years the $300,000 investment will require an increased income of $39,000 ($24,000 plus $15,000) per 100 hectares and our study assessed the annual operational cost for power, labour and repairs and maintenance at an additional $30,000 which equates to $690/hectare before the direct cost of water to the farm gate is provided for.

This study compares the level of production possible as dry land with that which should be achieved under irrigation adopting similar levels of management efficiency. The irrigation benefits are measured by the difference between the two.

Additional disposable profit from Dairy Intensification, Dairy conversion, Viticulture and Intensification of Arable/Cropping use will cover direct on- farm irrigation costs but other livestock systems including Dairy Support will not.

The surplus that can be generated will need to cover both the cost for water and provide a sufficient margin to cover a return to management plus profit and risk.

We have tabled (Table 3) our assessment of the water affordability for both farming policy systems and soil types. The lightest soils (Class C or Tauherenikau) have the potential to produce the greatest increase in returns.

The sensitivity to viability is the final level of farm gate prices. E.g 50 cents/kgMS either side of a $5.50kg/MS payout will substantially alter affordability.

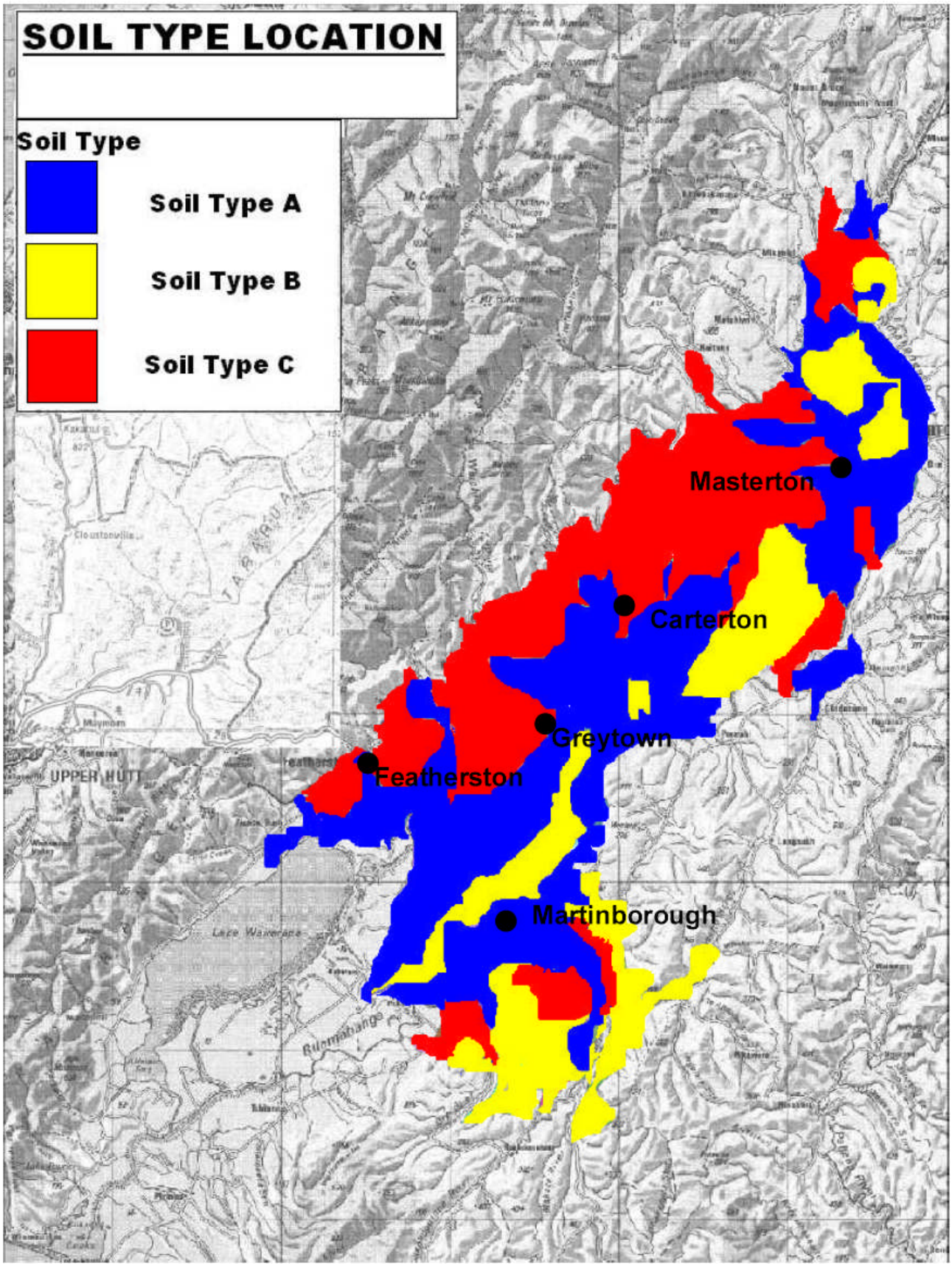
Any means of reducing the annual overhead cost of interest and depreciation on the irrigation investment will likewise significantly impact on viability. E.g. Interest rates reduced to 5% would save $90/ha pa.

At the end of the day farmer motivation to alter land use and upskill in irrigation management will be the key to success. A realistic margin to cover management profit and risk will be essential

New Zealand wide studies have shown that the benefits to the community as a whole are around 2.2 to 6 times greater than the additional on-farm gross returns that is achieved. This increased turnover filters down through to the community supplying goods and services.

We have made an indicative assessment based on 50% of the land area available for irrigation finally taking up the opportunity as being worth between $70 to $100 million annually, to the Wairarapa region.

In section heading “implications of model results “ we have provided points for discussion and outlined what we see as the new opportunities for specialist seed production that will arise. We have also advised on how information could be circulated to farmers.



Indicative Only – Based on soil classes in Beca Report.

Methodology - Overview

The farm model assessments have been based on the best science knowledge we can access.

Baker & Associates Limited (B&A) has a good data base of client information that we have also used.

For our intensively monitored clients this involves:

- For dairy, the use of the software programme :'Udder"
- For sheep and beef B &A have developed its own software known as "PasturePro" that incorporates the use of the AgResearch programme 'Stockpol" that has been incorporated into Farmax"

The information provided in the report "Irrigation benefits for pasture production in the Wairarapa" completed by HortResearch Report No 17964 dated November 2005, has also been used. This was a desktop review completed for Meridian but following discussions with the author (Steve Green) we understand this was based on 30 years of data and we consider it provides a fair comparative base.

This HortResearch report provided figures for seasonal grass production for three Wairarapa soil types.

A) Ahikouka silt loam soils. For our dairy modelling we have extended the figures under irrigation to be applicable to good alluvial soils that are well drained such as around Greytown and also similarly productive alluvial over clay. (Similar to Pirinoa)

B) Kokotau clay loam soils. These soils are silt or loess based with a pan and some drainage limitations in their natural state.

C) Tauherenikau shallow silt loam soils. These have very good natural drainage being over gravel. In their natural state these are naturally lower fertility highly drought prone stony soils that in places can have cultivation limitations due to boulders.

See the map on Page 7 that shows the indicative location for each Soil Type.

In our opinion, with adequate fertiliser and drainage, where required, all soil classes have a good productive ability with irrigation.

Our models assess production for each of these groups with and without irrigation and for our assessment of comparative pasture production we have adopted a reverse modelling approach.

Information Sourced and Used for our Assessments:

a) HortResearch Report No 17964 dated November 2005 as noted above.

b) The Irrigation Impact Report prepared by the AgriBusiness Group dated June 2004. - This provides comparative arable crop data for dry land compared with irrigated.

The Canterbury information has been interpreted as it would apply to the Wairarapa following consultation with cropping experts.

c) Baker & Associates data collected annually for our farm analysis benchmarking that involves in excess of 100 Wairarapa properties annually (FAB published data) Plus data collected for clients being intensively monitored

(Using PasturePro). Our analysis for Wairarapa finishing land equivalent to what could be irrigated has been used as base information.

d) For viticulture, we have reviewed the data models completed in 2004 that were prepared by Gibbs Consultants Ltd. Figures have been updated in consultation with vineyard owners who are part of the Wellington Wine Growers Association and after consultation with Alistair Scott who represents viticulture interests on WRIT.

e) Farm returns have been based on our assessment of the best realistic current information available.

- Because of the difficulty of predicting 'farm gate product prices' the impacts on product prices which are a combination of supply and demand, impact of the season and overseas prices as dictated by exchange rate, we have judged it best to work on the past 8 years actual monthly average schedule prices for livestock In doing this we have not made any assessment of the impact of inflation of farm costs so the relative position is fairly presented.

- Policy and price assumptions specific to each policy are documented in each respective section A to E.

Model Policies and Reporting Format:

- 100ha has been adopted for each policy that has been modelled and the policy assumptions for each of the soil types have been defined. These assume a status quo year once irrigation becomes fully effective. (In the case of viticulture, we have done this on an annual cash flow basis so that the accrued interest costs from the capital development involved can be calculated as it will be six years before the optimum returns are achieved).
- Models assume the use of technology that will achieve levels of production that the top quartile of farm managers should achieve.
- Tables show the annual operating profit both before and after capital servicing of the direct irrigation on-farm development costs. We show farm operating profit available to cover water costs and return to cover management input, profit and risk.
- The annual cash-profit benefit can be compared as the operating farm surplus per ha.
- Section F comments on the possible land capital value impacts and benefits.
- Sensitivity to change in prices and performance are provided for each policy.

Dairy Intensification

Key Point Summary

- Increase stocking rates - the UDDER model indicates stocking rate increases of between 0.8 and 1.5 cows per hectare for optimum performance in an irrigated environment as a consequence of reliable summer growth.

- Pasture species - irrigation will improve the retention of superior pasture species/cultivars, which enhances pasture production through both the irrigating and the non-irrigating period, i.e. all year round.

- Productivity - as well as a higher stocking rate, "per cow" production should improve through sustaining permanent ryegrass and white clover pastures, and maintaining higher average pasture quality through the summer months. In a non-irrigated environment pasture quality may fall below 65% digestibility, while 80%+ digestibility should be achievable with an irrigated pasture.

- Increased total milk production – with a higher stocking rate and higher per cow production inevitably total milk production is increased. Non-irrigated properties ranged from 810 kg MS/ha to 1250 kg MS/ha. These increase under irrigation to 1,334 and 1,620 kg MS/ha across the soil types.

- Operating surplus – with the gains in milk production the operating surplus will increase with irrigation. Gains for Martinborough location of soils were in the order of $1,600/ha for Soil Types A & B, while Soil Type C projects a lift of $2,740/ha.

- Disposable surplus - this has been calculated after cost of capital (extra cows and shares), debt servicing, and depreciation on the irrigation assets. This is before any provision for existing debt or cost of irrigation water supply to the farm gate. Gains for Martinborough location of soils were $967/ha for Soil Type A, $871/ha for Soil Type B and $1906/ha for Soil Type C. Gains for Masterton location of soils were $481/ha for Soil Type A, $583/ha for Soil Type B and $1,481/ha for Soil Type C.

Table 4 – Dairy Summary of Financial Outcome by Soil Type and Location

	Soil Type A		Soil Type B		Soil Type C	
	Martinborough $/ha	Masterton $/ha	Martinborough $/ha	Masterton $/ha	Martinborough $/ha	Masterton $/ha
Gross Income	$9,227	$9,227	$7,756	$7,576	$9,194	$9,194
Operating Expenditure	$5,104	$5,104	$4,799	$4,799	$4,947	$4,947
Operating Surplus	$4,124	$4,124	$2,776	$2,776	$4,237	$4,237
Interest	$ 557	$ 440	$ 559	$ 505	$ 689	$ 542
Cash Surplus	$3,597	$3,684	$2,217	$2,271	$3,548	$3,695
Depreciation	$ 150	$ 150	$ 150	$ 150	$ 150	$ 150
Disposable Surplus	$3,447	$3,534	$2,068	$2,121	$3,398	$3,545
Surplus as Dry Land	$2,480	$3,052	$1,196	$1,539	$1,492	$2,064
Marginal Increase of Disposable Surplus	**$ 967**	**$ 482**	**$ 871**	**$ 583**	**$1,906**	**$1,481**

Table 5 – Sensitivity Analysis

	Soil Type A $/ha	Soil Type B $/ha	Soil Type C $/ha
+/- $0.50/kgMS	$813	$667	$910
+/- 5% MS production	$	$	$445
+/- 10% operating expenditure	$	$	$49
+/- 1.0% interest	$30	$30	$30

Analysis of changes in the milksolids payout and interest rates suggest that in the current economic environment the viability of irrigation is most sensitive to changes in milksolids payout.

Dairy Modelling Assumptions

- 100 ha effective.
- $5.50 payout
- For livestock we have adopted the actual average prices received over the past eight years, on a month by month basis.
- 460 kg crossbred cows
- Spring calving from late July.
- 150 kg N/ha on non-irrigated properties.
- 200 kg N/ha on irrigated farms.
- Maintenance fertiliser 400kgs /ha superphosphate with 15% potash for dry land, 500kgs/ha superphosphate with 15% potash for irrigated.
- Grass silage – 35 cents per kg DM landed and covered on farm.
- Maize silage – 40 cents per kg DM landed and covered on farm.
- Hay - 35 cents per kg DM landed and covered on farm.
- Pasture harvested on farm was valued at 15 cents / kg DM.
- 50% of the mature cows were grazed off farm in the winter for eight weeks.
- Weaned calves were grazed off farm at five months of age.
- Yearlings were grazed off to July 1st – three weeks prior to start of calving.
- Operational costs are calculated per cow.
- Irrigation costs per annum of $30,000 (electricity and maintenance).
- Irrigation cost of $300,000 for a single centre pivot irrigating 100 Ha.
- Depreciation 20 years and interest rate of 8%.
- Tables 6,7 & 8 show both the physical and financial profit for each soil type and location.

Physical & Financial Profile

Table 6 - Soil Type A: Naturally poor drainage, clay based – but good artificial drainage.

Soil Type A	Irrigated	Non – Irrigated Martinborough Rainfall	Non – Irrigated Masterton Rainfall
Peak cows	375	286	320
Pasture eaten – t DM/ha	16.1	11.1	13.0
Grass silage – t DM / ha	-	126	98
Maize silage	116	-	27
Hay	57	54	66
Crop – ha	-	10 Ha	-
Supplement made – ha	-	10 Ha	10 Ha
Total Milksolids	162,608	113,407	125,205
Milksolids per cow	434	397	391
Milksolids per ha	**1,626**	**1,134**	**1,252**
Gross Income	$922,738	$645,464	$712,752
Operating Expenses	$510,378	$397,443	$407,562
Operating Surplus	**$412,360**	**$248,021**	**$305,190**
Debt Servicing - interest	$24,000		
Depreciation	$15,000		
Cost of Capital **- MBO** **- MSTN**	 $28,668 $19,974		
Disposable Surplus **- MBO** **- MSTN**	 **$344,691** **$353,386**	**$248,021**	**$305,190**
Difference/ha - MBO	**$967/ha**		
Difference/ha - MSTN	**$482/ha**		
Sensitivity /ha			
+/- $0.50/kg MS	$813/ha	$567/ha	$626/ha
+/- 1% interest	$300/ha		

Note: The assumption has been made that the production under irrigation will be the same in both locations. More water will need to be applied in the Martinborough area.

Table 7 - Soil Type B: Medium natural drainage, silt based – but no artificial drainage.

Soil Type B	Irrigated	Non – Irrigated Martinborough Rainfall	Non – Irrigated Masterton Rainfall
Peak cows	315	210	230
Pasture eaten – t DM/ha	12.9	7.8	8.8
Grass silage – t DM / ha	75	112	91
Maize silage	91	18	19
Hay	48	32	35
Crop – ha	-	10 Ha	10 Ha
Supplement made – ha	3 Ha	5 Ha	5 Ha
Total Milksolids	133,438	80,780	87,731
Milksolids per cow	424	385	381
Milksolids per ha	**1,334**	**808**	**877**
Gross Income	$757,564	$459,827	$499,870
Operating Expenses	$479,922	$340,191	$346,009
Operating Surplus	**$277,642**	**$119,636**	**$153,861**
Debt Servicing	$24,000		
Depreciation	$15,000		
Cost of Capital **- MBO** **- MSTN**	 $31,852 $26,509		
Disposable Surplus **- MBO** **- MSTN**	 **$206,790** **$212,133**	**$119,636**	**$153,861**
Difference/ha - MBO	**$872/ha**		
Difference/ha – MSTN	**$583/ha**		
Sensitivity /ha			
+/- $0.50/ kg MS	$667/ha	$404/ha	$439/ha
+/- 1% interest	$300/ha		

Note: The assumption has been made that the production under irrigation will be the same in both locations. More water will need to be applied in the Martinborough area.

Table 8 - Soil Type C: Very good natural drainage, stoney silt – no artificial drainage required.

Soil Type C	Irrigated	Non – Irrigated Martinborough Rainfall	Non – Irrigated Masterton Rainfall
Peak cows	375	225	280
Pasture eaten – t DM/Ha	15.7	8.8	10.3
Grass silage – t DM / ha	44	142	192
Maize silage	112	-	
Hay	57	34	43
Crop – ha	-	7 Ha	7 Ha
Supplement made – ha	-	21 Ha	
Total Milksolids	162,006	88,333	109,333
Milksolids per cow	432	393	390
Milksolids per ha	**1,620**	**883**	**1,093**
Gross Income	$919,427	$502,728	$622,514
Operating Expenses	$494,727	$353,600	$416,170
Operating Surplus	**$423,700**	**$149,128**	**$206,344**
Debt Servicing	$24,000		
Depreciation	$15,000		
Cost of Capital **- MBO** **- MSTN**	 $44,935 $30,236		
Disposable Surplus **- MBO** **- MSTN**	 **$339,765** **$354,464**	**$149,128**	**$206,344**
Difference/ha - MBO	**$953/ha**		
Difference/ha – MSTN	**$741/ha**		
Sensitivity/ha			
+/- $0.50/kg MS	$910/ha	$442/ha	$547/ha
+/- 1% interest	$300/ha		

Note: The assumption has been made that the production under irrigation will be the same in both locations. More water will need to be applied in the Martinborough area.

Further Considerations

- Dairy farmers with irrigation but subject to seasonal water restrictions due to low bore or river levels might find the partial irrigation via a regional scheme, to be of value to reduce the impact of restrictions.

- Drainage – by virtue of the soil type description for soil types A and B, a difference is expressed for drained versus un-drained status of heavy soils. The data suggests an advantage to drainage in the order of

$137,901 or $1,379/ha in disposable surplus for Martinborough rainfall and $141,253 or $1,412/ha. Which suggest drainage offers a priority return over irrigation. Drainage is not an issue for soil type C.

- Environment/Resource requirements – as stocking rates are significantly influence by irrigation, and a risk remains for soils to be wetter going into higher rainfall periods (mainly winter), there will be an increased risk of nutrients leaching. This analysis does not provide for this risk or the mitigating strategies that may have to be implemented to manage this.

- Cowshed size – no provision has been made in this analysis for cowshed size. As the herd size increases the cowshed may need to be expanded.

- Payout impact on systems – as the dairy payout changes relative to supplementary feed input costs the opportunity to change supplementary feed inputs will change stocking rates and farm systems. This analysis has restricted the use of supplements to maize silage on the shoulders of the season and grass silage in the summer months. Feeds such as grain and palm kernel are examples of supplementary feeds used in the Wairarapa to intensify the dairy farm.

- Operating costs under irrigation have been adjusted and increased to arrive at the 'disposable surplus'.

- Irrigation will require a step-up in management skills to achieve optimum performance. i.e. Pasture management, feed planning, animal health, logistics under higher stocking rates etc.

- Per cow production is first influenced by husbandry and cow quality. We have assumed good husbandry and above-average cow quality. The non-irrigated models produce 380-390 kg MS/cow and the irrigated models are at 424 to 434 kg MS/cow. This should not be seen as an upper limit of per cow production but a level that is achieved under straightforward supplementary feeding regimes.

See Appendix I for the full financial detail for each dairy model.

Dairy Conversion

Key Point Summary

Assumption: A property could be converted from dry-land dry stock to dairy and then, within a reasonable period (3-5 years), perform at a sustainable level comparable to the irrigated properties demonstrated for established dairy farms.

- Table 11 shows that the capital cost for conversion will range according to the standard of development from $2.15M (modest standard of improvements) to $2.79M (high end specifications). Costs include livestock and shares but excludes provision for housing. The interest only debt servicing cost is $171,725 and $223,240 respectively.

- Based on the results below soil types A&C would be prospects for dairy conversion with irrigation. Soil type B is unlikely to deliver sufficient advantage.

Table 9 – Summary of Financial Outcome by Soil Type (all irrigated)

	Soil Type A $/ha	Soil Type B $/ha	Soil Type C $/ha
Gross Income	$9,227	$7,576	$9,194
Operating Expenditure	$5,104	$4,799	$4,957
Operating Surplus	$4,124	$2,776	$4,237
Interest	$2,572	$1,957	$2,572
Cash Surplus	$1,551	$819	$1,665
Depreciation	$645	$505	$645
Disposable Surplus	$906	$314	$1,020
Surplus as Dry Land	$424	$241	$369
Marginal Increase of Disposable Surplus	**$482**	**-$73**	**$651**

Table 10 – Sensitivity Analysis $/Hectare for Dairy Conversion

	Soil Type A $/ha	Soil Type B $/ha	Soil Type C $/ha
+/- $0.50/kgMS	$813	$667	$810
+/- 5% MS production	$447	$367	$446
+/- 10% operating expenditure	$510	$480	$496
+/- 1.0% interest	$322	$245	$322

Given the current economic environment the viability of conversion would be most sensitive to changes in milksolids payout.

Dairy Conversion Assumptions

- 100 Ha effective.
- $5.50 payout
- For livestock we have adopted the actual average prices received over the past eight years, on a month by month basis.
- 460 kg crossbred cows
- Spring calving from late July.
- 150 kg N/Ha on non-irrigated properties.
- 200 kg N/Ha on irrigated farms.
- Maintenance fertiliser 400kgs /ha superphosphate with 15% potash for dry land, 500kgs/ha superphosphate with 15% potash for irrigated.
- Grass silage – 35 cents per kg DM landed and covered on farm.
- Maize silage – 40 cents per kg DM landed and covered on farm.
- Hay - 35 cents per kg DM landed and covered on farm.
- Pasture harvested on farm was valued at 15 cents / kg DM.
- 50% of the mature cows were grazed off farm in the winter for eight weeks.
- Weaned calves were grazed off farm at five months of age.
- Yearlings were grazed off to July 1st – three weeks prior to start of calving.
- Operational costs are calculated per cow.
- Irrigation costs per annum of $30,000 (electricity and maintenance).
- Irrigation cost of $300,000 for a single centre pivot irrigating 100 Ha.
- Depreciation 20 years and interest rate of 8%.

See Appendix II for full financial details on this model.

Table 11 – Capital Costs

Dairy Conversion - Capital Costs								
Area	**100**	**Ha**	**Basic**				**Five Star**	
Cowshed- rotary			$650,000				$900,000	
Power to site			$30,000				$30,000	
Effluent			$30,000				$60,000	
Fencing			$50,000				$50,000	
Water			$50,000				$50,000	
Capital fertiliser			$17,500				$26,250	
Regrassing			$40,000				$60,000	
Races			$75,000				$100,000	
House(s)								
	Capital Livestock	**Cows/Ha**	$0					
Mixed Age Cows	$ 1,500	3.15	$472,500			3.75	$562,500	
Replacements	$ 750	65	$48,750			80	$60,000	
Plant & Equipment			$75,000				$150,000	
Fonterra Shares	133,000	4.57	$607,810		162,308	4.57	$741,748	
Total Development			**$2,146,560**				**$2,790,498**	
Existing Debt			**$0**				**$0**	
Interest Cost		**8.00%**	**$171,725**				**$223,240**	

Further Considerations

- Cash flow – this analysis makes no provision for the time frame taken to achieve status quo. This could take three to five years, during which the potential drain on cash flow would add significant interest costs to the project. Full cash flow analysis of specific individual situations is strongly advised.

- Capital gain or loss – consideration should be given to the change in capital value of the property. The conversion process is often done with capital gains in mind, i.e. the original cost of the land plus the conversion costs being less than the expected value of the converted property, and/or cost of purchasing an existing dairy farm. Care is needed but analysis of dairy land values, indicate that higher production will generate a higher farm value.

- Converted price relationship might change depending on the cost of water.

Pastures

Key Point Summary

- A property would be $357, $288, and $269/ha worse off under irrigation on soil type A,B, and C respectively after taking into account interest costs, running costs, and depreciation associated with the irrigation. This is before any provision is made for existing debt or the cost of irrigation water supply to the farm gate.

- Gross farm revenue increases by an average of $620/ha however costs associated with irrigation equate to $690/ha (running costs, servicing of capital, and depreciation).

- Pasture yield increases by an average of 3.3tDM/ha but this is not the only advantage to having irrigated pasture. Two other advantages of the higher summer pasture growth are increased pasture quality and increased efficiency of feed utilisation.

- The Farmax model suggests an increased pasture quality through the summer of up to 10%. By having animals growing faster the systems are more efficient. The irrigated models on average required 16.8kgDM to produce one kg product compared to the non-irrigated models requiring 19.5kgDM.

- Production per hectare increased from an average of 366kg product per hectare to 603kg product per hectare (+65%) which is attributed to higher pasture growth, better efficiency, and higher forage crop yields.

- The Soil type C model depicts going from a dairy support model in the non-irrigated state to a livestock finishing policy in the irrigated state. The change in policy was needed because with the increased efficiency of the livestock finishing dairy support enterprise could not compete economically.

- Under a dairy support system where the LWG targets and income are set there is far less scope to increase the efficiency of the system. The only way to improve profitability is to increase numbers.

Table 12 – Summary of Financial Outcome/ha Following Irrigation

	Soil Type A $/ha	Soil Type B $/ha	Soil Type C $/ha
Gross Income	$1,630	$1,667	$1,673
Operating Expenditure	$1,173	$1,179	$1,183
Operating Surplus	$457	$488	$490
Interest	$240	$240	$240
Cash Surplus	$217	$248	$250
Depreciation	$150	$150	$150
Disposable Surplus	$67	$98	$100
Surplus as Dry Land	$424	$387	$369
Marginal Increase of Disposable Surplus	**-$357**	**-$288**	**-$269**

Table 13 – Sensitivity Analysis

	Soil Type A $/ha	Soil Type B $/ha	Soil Type C $/ha
+/- 20c/kgCW schedule price	$235	$236	$279
+/- 20% pasture yield	$326	$333	$335
+/- 10% operating expenditure	$117	$118	$118
+/- 1.0% interest	$30	$30	$30

Assumptions

Table 14 - Store and Prime Stock Schedules

Lamb												
	July	August	September	October	November	December	January	February	March	April	May	June
Prime	$4.16	$4.37	$4.58	$4.76	$4.61	$4.20	$3.85	$3.74	$3.72	$3.76	$3.96	$4.09
Store	$1.84	$2.02	$2.10	$2.50	$2.06	$1.81	$1.74	$1.66	$1.66	$1.69	$1.81	$1.78
Bull												
	July	August	September	October	November	December	January	February	March	April	May	June
Prime	$3.43	$3.60	$3.73	$3.77	$3.46	$3.32	$3.17	$3.10	$3.14	$3.15	$3.22	$3.28
Store	$2.10	$2.25	$2.22	$2.47	$1.91	$1.86	$1.75	$1.65	$1.64	$1.59	$1.62	$1.59
Schedules are an average of prices from July 2001 to October 2008												

Land Area	100ha effective.
Wages and keep	$5.83/su (FAB Top 10%)
Animal health	$1 /lamb, $4 /18 month bull, $7 /yearling bull, ewes $4 /hd.
Fertiliser	1.8kg phosphate per 550kgDM (1su) grown. $350/t super. $80/t applic
Shearing	$1.50/ lamb
Crop/Regrassing	Winter crop - $655/ha. Summer crop - $550/ha. Regrassing - $600/ha.
Hay/Baleage	$39/bale cost to make.
R&M	$50/ha (FAB Top 10%)
Vehicle and fuel	$37/ha (FAB Top 10%)
Administration	$18/ha (FAB Top 10%)
Rates & Insurance	$50/ha
Irrigation running costs	$300/ha
Irrigation capital cost	Centre pivot $300,000. Includes re-aligning infrastructure.
Debt servicing	8% interest
Depreciation	Over 20 years.

Further Considerations

- A key assumption in this analysis is that farm performance could go from a top 10% level under a dry scenario to top 10% level under an irrigated scenario in one year. In practice this takes more like three or four years to adjust management practices. Animal health issues, stock mixes, marketing policies, and mastering the use of irrigation all result in a lag in performance.

- A big advantage of the reduced risk of seasonal variation in the dry stock scenario is that forward contracts could be entered into with more certainty. It has been well documented how better supply chain management between store farms, finishing farms, and meat processors would benefit the industry as a whole and the seasonal variation especially in the last two years is a major hindrance in achieving this.

- It appears obvious from this analysis that intensifying existing dry stock policies under irrigation is not likely to be profitable. It therefore suggests that existing land owners would have to entertain substantial changes in enterprise mix and land use in order to show a profitable outcome from irrigating.

- The imperative for land use change could become a limitation to the adoption of irrigation. Where the top quartile of farmers may embrace this requirement and see it as an opportunity, there will be a large degree of inertia toward change among a large sector of the potential users.

- As has been found in Canterbury irrigation schemes, they inevitably lead to a significant change in land ownership because of the above factor. The problem is change in land ownership takes time – which would potentially delay the adoption process.

- Sensitivity analysis around a schedule price shift of 20c/kgCW for lamb and bull gives a difference in disposable income on average of $119 of up to $15/ha non-irrigated and $250/ha irrigated. This net gain of $131/ha under an irrigated system is not however enough to produce a positive “break even”. There would have to be a 47c/kgCW increase (+11%) in the average schedule for the season, above the eight year average.

- On the basis of current prices the marginal disposable income would look more like $322/ha, $180/ha, and $694/ha for the three soil types.

- The increased crop yields and lower risk associated with these crops require no extra cost and are a direct financial benefit.

- One of the benefits of irrigation is less variation in yield of summer pasture production. The HortResearch report prepared by S. Green suggests the variation on a dry farm can be up to 43% where an irrigated farm up to 20%.

Arable

Key Point Summary

- An arable property would have $466, $349, and $763/ha more disposable income under an irrigated state on soil type A,B, and C respectively after taking out the interest costs, running costs, and depreciation associated with the irrigation. This is before any provision for existing debt or cost of irrigation water supply to the farm gate.

- Gross farm revenue increases by $895, $897, and $1,249/ha but irrigation costs (running costs, debt servicing, and depreciation) increase by $546/ha.

- The biggest differential in profitability comes on the Soil Type C where in a non-irrigated state there is virtually no scope for cash cropping. Under irrigation and with the good natural drainage the cropping potential becomes almost limitless.

- The obvious advantage under irrigation is an increased yield and reliability of yield. There has been little science information available in the Wairarapa recording the differences in yields of cash crops between irrigated and non-irrigated.

- The Irrigation Impact Report prepared by The Agribusiness group shows the differences in crop yields in Canterbury with increases of between 30-40%.

- In the Wairarapa there are factors other than irrigation that may reduce yields compared to Canterbury. These include, temperature, and how early machinery can get on to some soils such as the Kokotau. The assumption has been made that an average yield increase of 30% will be achieved, this being the lower end of the scale.

- Irrigation will eliminate downtime between crops. For example, rather than planting a winter forage crop in the spring, a short maturing crop such as Pak Choi (100 days) could be grown and then the winter forage crop planted in February with confidence that the irrigation would guarantee an optimal yield.

- The model has assumed that some small seeds production will take place with irrigation in the form of Pak Choi and rye grass seed.

- The Wairarapa has a unique climate that is similar to Canterbury which could make the growing and multiplication of speciality crops possible. Overseas buyers demand scale and certainty of quality and supply. Without irrigation this would not be possible. The ability to expand into this area will benefit growers and enable the development of a new sector in the Wairarapa which will benefit the wider community.

Table 15 – Summary of Financial Outcome by Soil Type (All Irrigated)

	Soil Type A $/ha	Soil Type B $/ha	Soil Type C $/ha
Gross Income	$2,072	$1,993	$2,261
Operating Expenditure	$684	$740	$739
Operating Surplus	$1,388	$1253	$1,522
Interest	$240	$240	$240
Cash Surplus	$1,148	$1,013	$1,282
Depreciation	$150	$150	$150
Disposable Surplus	$998	$863	$1,132
Surplus as Dry Land	$532	$514	$369
Marginal Increase of Disposable Surplus	**$466**	**$349**	**$763**

Table 16 – Sensitivity Analysis

	Soil Type A $/ha	Soil Type B $/ha	Soil Type C $/ha
+/- 10% crop revenue	$232	$95	$254
+/- 10% crop yield	$251	$114	$271
+/- 10% operating expenditure	$68	$74	$74
+/- 1.0% interest	$30	$30	$30

Assumptions – Schedule of Costs for Arable

100ha effective.

Wages and keep	$11.38/su (FAB averages)
Animal health	$1 /lamb, $4 /18 month bull, $7 /yearling bull, ewes $4 /hd.
Fertiliser	1.8kg phosphate per 550kgDM (1su) grown. $350/t super. $80/t application. On areas of farm in pasture only.
Shearing	$1.50/ lamb
Crop/Regrassing	Winter crop - $655/ha. Summer crop - $550/ha. Regrassing - $600/ha.
Hay/Baleage	$39/bale cost to make.
R&M	$50/ha (FAB average)

Vehicle and fuel	$3.06/su (FAB average)
Administration	$18/ha (FAB average)
Rates & Insurance	$50/ha
Irrigation running costs	$300/ha on area in pasture (assumes 400mm of water required). $50/ha on crop areas (assumes 25mm required three times)
Irrigation capital cost	Centre pivot $300,000. Includes re-aligning infrastructure.
Debt servicing	8% interest
Depreciation	Over 20 years.

Crop income is calculated net of direct costs.

The following table shows the yields that were assumed for each crop along with basic gross margin analysis.

Detailed gross margins are in Appendix IV.

Table 17 – Summary of Gross Margins

	Barley		Autumn Wheat		Peas		Maize Silage		Rye-Grass	Pack Choy
	Dry	Irrigated	Dry	Irrigated	Dry	Irrigated	Dry	Irrigated	Irrigated	Irrigated
Yeild (t/ha)	5	6.5	6	7.8	3.5	4.6	16	20	1.7	1.7
Income ($/T)	$380	$380	$400	$400	$750	$750	$250	$250	$2,000	$2,000
Straw ($/ha)	$300	$300	$300	$300	$240	$240			$322	
Total Income ($/ha)	$2,200	$2,770	$2,700	$3,420	$2,865	$3,690	$4,000	$5,000	$3,722	$3,400
Cost ($/ha)	$1,818	$1,901	$2,079	$2,134	$1,801	$1,937	$2,536	$2,536	$1,890	$1,504
Margin ($/ha)	**$382**	**$869**	**$621**	**$1,286**	**$1,064**	**$1,753**	**$1,464**	**$2,464**	**$1,832**	**$1,896**

Further Considerations

- Under irrigation a lot of the advantage will be in the timing of crop establishment in the spring because the need to get crops in early is reduced. This also allows for pasture to be grazed longer into the spring before areas are sprayed for cropping.

- There is a big advantage in the late summer. After harvesting cereals in February new grasses, winter forage crops, or annual rye grasses could be planted earlier with confidence and be utilised earlier taking advantage of the winter trade market.

- There is currently only a very small amount of seed crop (rye-grass, clover, or vegetable) grown in the Wairarapa. (Contracts are limited in the Wairarapa). These are higher risk crops to grow. We confidently believe interest will be generated by availability of water.

- Irrigation will remove a significant amount of the risk and as a result there should be a greater demand from growers for seed crops. This would have positive effects for the region in the sense that there will be the opportunity for increased infrastructure to process this seed leading to job creation in the wider community. This has been the case in the similar development in the Gisborne area.

- Specialist seed crops made possible by irrigation could include, green brassica seeds (kale, rape, pasja) oil seed rape, clover seed, vegetables seeds such as carrots and peas - multiplication for the Northern Hemisphere. These are high return crops for which no contract can be obtained unless certainty of supply can be assured. Adoption of these would significantly improve the modelled profitability for arable.

- Not all of the Tauherenikau soil series could grow crops. The soils with larger stones and extremely shallow soil depth have limitations other than water availability such as the ability to cultivate and drill and ability of soil to hold nutrients.

- The amount of cropping that can be undertaken annually is also limited not only due to crop rotations but also due to the structure of some soils which cannot handle long periods of continual cultivation without careful management.

- Direct drilling and other management practices can mitigate soil structure deterioration together with planned rotations.

- On soil types A and C we have assessed that a higher proportion of the farm will be cropped each year. Irrigation will not have an impact on soil structure but we believe that on these soil types one of the main reasons for not doing more cash cropping is the risk of crop failure due to the rainfall variability. With irrigation this risk is significantly reduced which is the key reason behind increasing cropped area in the models.

- Being able to plant and utilise annual ryegrasses earlier in the autumn post harvest means that trade lambs can be bought earlier at generally cheaper prices.

Viticulture

Key Point Summary

- Access to water will enable the viticulture industry within the Wairarapa to grow
- Change of water source - existing vineyards will be able to switch from current supply to water from the irrigation system therefore reducing the demand on the current system (e.g. the Martinborough town water supply)
- Soil type – viticulture will only occur on soil types similar to that of Soil Type C. Hence viticulture has not been modelled on Soil Types A and B.
- Access to supply - access to consistent supply of water will allow vineyard owners to build dams on their properties for use in frost protection.
- Operating expenditure – is approximately 45% of gross income
- Interest – is approximately 35% of gross income
- Marginal increase in disposable surplus – this has been calculated by deducting the disposable surplus for dry land pastoral farming on Soil Type C ($271/ha) from the disposable surplus calculated for viticulture of $1,570. The result being $1,609 marginal increase in disposable income.
- Cash flow of interest cost – it takes six full years for a vineyard to be built and subsequently reach it's optimum production levels, six years have been cash flowed to get to the status quo year. In year 6 the cost of capital has been calculated on the cumulative negative bank balance. A large portion of the development costs occur in the first two years when the vineyard is not producing any income.

Table 18 – Summary of Financial Outcome

	$/ha
Gross Income	$18,431
Operating Expenditure	$8,186
Operating Surplus	$10,245
Interest	$6,038
Cash Surplus	$4,207
Depreciation	$2,327
Disposable Surplus	$1,880
Marginal Increase of Disposable Surplus	$1,609

Note that the results in Table 18 above are based on a 100ha property of which 90ha is planted in grapes and the remaining 10ha is being used for infrastructure assets and a frost protection dam.

Table 19 - Sensitivity Analysis

	$/ha
+/- $100/t average grape price	$689
+/- 5.0% grape yield (Tonne)	$922
+/- 5.0% operating expenditure	$409
+/- 1.0% interest (Cummulative)	$1,035

The sensitivity analysis indicates the significance of grape yield on the disposable surplus results. Due to the high debt levels the disposable surplus is also very sensitive to interest rate movements. A 1% change in interest rates will change the surplus by approximately $103,500.

Operating and Capital Assumptions

Year six is assumed to be the first year of full production and as such is viewed as the status quo year.

Table 20 – Production Assumptions

Gross Area (ha)	100
Net Planted (ha)	90
Spacing	2.2 by 1.5m
Number of Vines	271000 (approx 3000/ha)
Pinot Noir	40.5ha
Sav Blanc	36ha
Chardonnnay	4.5ha
Reisling	4.5ha
Pinot Gris	4.5ha

Gross Income/Pricing Assumptions		average crop yield at an average price
Yield		
	Pinot Noir	1.6kg/vine
	Sav Blanc	3.6kg/vine
	Chardonnay	1.75kg/vine
	Reisling	3.6kg/vine
	Pinot Gris	2.5kg/vine
Price		
	Pinot Noir	$3,246/t
	Sav Blanc	$2,482/t
	Chardonnay	$2,464/t
	Reisling	$2,038/t
	Pinot Gris	$2,656/t

Price per Tonne has been calculated using the last five years actual sales prices as per the New Zealand Winegrowers Annual Statistical Report (refer to the Viticulture appendices for detailed income calculations)

First year of production is based on 50% of the above yields, the second year is based on 75% mature crop

Table 21 – Operating Expenditure Assumptions

Costs detailed below have been updated with actuals where available. Where actual costings were not available, best estimates have been used. It has been assumed that contractors are used for all aspects of the viticulture development and production, with the exception of an onsite manager	
Vine training	50c per vine based on contract rates
Wages	$60k for vineyard manager (all inclusive)
Canopy management	shoot positioning, trimming * 2 pass and leaf plucking ($0.4 per vine, $160 per ha (incl 2 passes) and $80 per ha costs respectively)
Crop spraying	$1000/ha from year 4 onwards once the crop is in full production, $544/ha for year 2 and $750/ha for year 3
Weed spraying	$500/ha
Mowing	$325/ha
Winter pruning	$1.00/vine
Harvesting	$120/t for hand harvesting until second production crop where a machine harvester reduces to cost to $50/t (with a small amount of hand picking for the premium grapes
Bird netting installation/removal	$250/ha
Materials	$12,500 miscellaneous materials
R&M (trellis and irrigation)	$25,000 per annum ($250/ha over 100ha once status quo year reached)
Fertigation	$504/ha (for 8 week season)
Vehicles	$12,500 per annum
Administration	$2,000
Professional fees	$60,000 consulting/project mgt fees in year of conversion, reduced to $20,000 thereafter
Rates	$5,500 per annum ($55/ha)
Insurance	$5,500 (Insurance for tractors, shed, specialised plant etc)
Financing costs	
OD interest	8%

Table 22 - Capital/Development Assumptions

Land Preparation		
	Deep Rip	$0.20/m
	Weed Spray	$75/ha
	Fertiliser	$600/ha
	Roll, Cultivation, Level	$250/ha

Trellis Assembly		
Marking Out - Strainers & row lengths		$120/ha
Posts	Strainers	$23.56 each
	Horizontal Stay	$10.49 each
	Inside Post	$12.49 each
	Intermediates (at 7.5m centres)	$8.50 each
Wires (2.5mm HT)	Fruiting Wires	$0.16/m
	Foliage Wires	$0.16/m
	Irrigation	$0.16/m
Wires (3.15mm HT)	End Assemblies	$0.35/m
Materials	Staples	$5.56/kg
	Wire Strainers	$2.75 each
	Nails	$6.75/kg
Labour	Strainers incl driving	$37.50 each
	Drive marker posts	$3.13 each
	Intermediates (at 7.5m centres)	$2.63 each
	Wire run out	$0.03 each
	Tie wires, crimp & strain	$12.50 each
	Run out irrigation lats	$0.25 each
	mark & staple wires	$0.20 each
	wire care clip	$0.13 each
Vineyard		
	Spray out Strip	$0.06/m
	Vines	$5.50 each
	Planting	$0.50 each
	Sprayguards	$0.94 each
	Makeup & install sprayguards	$0.04 each
	grass down & roll	$15/ha

Irrigation		
	Booster Pumps	$7,500 each
	Mainline to site	$31.25/m (for 1,500m)
	Electrical etc	$18,750
	Irrigation system	$4,531/ha
Equipment & Buildings		
	Frost Protection	$1,187,500 total cost
	Dam	$247,500 total cost
	Roads & Tracks	$125,000 total cost
	Drainage	$625/ha
	Farm Shed	$62,500 total cost
	Bird Netting	$5,500/ha
	On-farm irrigation	Dripline irrigation fed from an on-farm dam costing $225,000 for the dam and $950,000 a total coverage frost protection system
	General P&E	$2,000/yr initially, increasing to $5,000
Depreciation		
On farm irrigation system and new plant & machinery		15% DV

Sources of Assumptions:
New Zealand Winegrowers Annual Statistical Analysis (for years 2004 through to 2008)
Peter Willkins (Martinborough Vineyard, Martinborough)
Angus Thompson (Urlar Vineyard, Gladstone)
Ross Thompson, Goldpine Masterton

Further Considerations

- The last five years of grape prices from the New Zealand Wine Growers Statistical Annual show that the Wairarapa region receives a higher price than the average for all the main grape varieties grown in the region. It is second only to the Central Otago region. This highlights the quality of the grapes grown in the Wairarapa.
- Whilst the analysis indicates that viticulture is an extremely viable option, there is currently uncertainty in the world market due to the recession. The main growth area of exports is considered to be the US but expansion into the market may slow down in the near future.
- Capital costs to set up a large vineyard are high and the length of time until full production is six years hence the risk associated with a viticulture venture is also high and as such may deter significant further expansion.
- Compared to the Baker & Associates Ltd report prepared for Go Wairarapa in 2004 prices for grapes have increased by 25% whilst operating costs have increased on average by 35%, thus reducing the after tax profit margin.
- Interest costs account for 44% of total operating costs in the status quo year, a movement in interest rate is extremely significant for such a high capital input venture. If the model was re-calculated using 7% interest cost (instead of 8%) the resulting marginal disposable surplus would be $2,644/ha, an increase of $1,035/ha.

CAPITAL VALUE CONSIDERATIONS

EFFECTS ON RURAL LAND VALUES THROUGH INTRODUCTION OF IRRIGATION IN THE WAIRARAPA

Overview

The market for rural property in the Wairarapa has gone through an unprecedented buoyant period over the last four to five years.

This period has seen doubling and in some cases trebling of land values that have been primarily driven from better economic returns both in the sheep and beef and dairy sectors.

Ready access to bank funding has seen something of a "land grab" being experienced where purchasers have bought land in order to grow their business with the expectation of capital gain and with somewhat less emphasis on cash flow.

This behaviour is not uncommon in real estate and land markets. Land is a peculiar commodity in that at times, it is not invested in on the strength of an economic return but rather for capital gain over time. The owner of an appreciating asset has the ability to leverage off that increase in asset value or to sell to realise their "investment".

The fact that there is no capital gains tax on land in New Zealand has seen farmers farming for capital gain while being satisfied with cash losses if the value of their farm is increasing.

Over the last 12 months in sheep and beef properties, and latterly in dairy, this boom in property prices has dissipated and we would not expect a significant increase in capital gain in properties over the next four to five years.

It then must be considered whether the availability of irrigation to land throughout the Wairarapa would enhance capital values in the future.

The value/price of any rural land is most importantly a function of its location. Land in well-regarded areas that have potential for a diverse range of agricultural uses, will tend to maintain its value in harder times compared to more remote land that isn't as versatile.

The irrigation scheme for the Wairarapa has been proposed for some of these better location areas and therefore analysis of the land values in these areas must take this location effect into account.

Another effect that is evident when the market is buoyant is the premium that neighbours are prepared to pay for land adjoining their existing operations.

If for example the owner of a dry land property adjoining an irrigated dairy farm purchases the irrigated property at a premium above other market derived rates, is this premium attributable to the presence of the irrigation on the farm or the neighbouring premium or the location factor?

Analysis of such influences is fraught with difficulty. However, we would suggest a combination of all three may attribute to a premium sale price.

When assessing the effect of irrigation on farmland as opposed to farmland without irrigation in the Wairarapa, it must be recognised that the market is relatively immature in the value it places on irrigation as a feature of farm properties.

This is primarily due to the fact that irrigation does not have a big presence in the Wairarapa and purchasers looking to buy irrigated properties generally are not willing to pay a premium over and above the capital cost of installing an irrigation system on a property.

This is in direct contrast to the experience in Canterbury which shows that there is a significant premium for irrigated properties over non-irrigated, and information we have received suggests that this is because the irrigation services and businesses centred around irrigation are mature in this location and purchasers recognise this.

This is not yet the case in the Wairarapa and market evidence indicates that a large proportion of any capital gain is primarily attributed to market factors and other premiums for the soil, and pasture rather than for the presence of irrigation. We believe it will take time for the Wairarapa market to recognise the benefits and reflect this in property prices.

Current Wairarapa analysis of sales of irrigated farms indicate that purchasers are only willing to pay the capital cost of installing an irrigation system, over the bare land value, with perhaps a very slight premium.

Another reason for this is that in general terms there have been other sources of water available on good quality land throughout the Wairarapa where irrigation is being contemplated.

Deep well bores or access to surface water from rivers and streams have up until now been relatively easily obtained via resource consent and therefore purchasers looking to buy land that is already irrigated weigh up the quandary: “If I were to buy a dry land farm and install my own irrigation system it would cost X. Why would I be willing to pay more than X to purchase an existing and established irrigated farm?”

Again this is in direct contrast to the experience in Canterbury and mid-Canterbury which indicates that the value differential between dry land and irrigated properties is expressed as the dry land value plus development costs of irrigation plus a margin/premium that reflects the risk in having sought and gained a consent, undertaken the irrigation and increased production associated with the irrigation.

This margin/premium has not been experienced to date in the Wairarapa. However, this in our opinion is something that could be expected to occur once the irrigation culture has been established.

After reviewing financial analysis completed on the four sectors within this report, namely sheep and beef, arable, dairy and viticulture we hereunder provide comments as to possible capital value changes that may be expected after installation of the proposed irrigation scheme.

Dairy

The financial analysis completed by Chris Lewis shows increased marginal returns for both irrigating existing dairy farms and converting dairy farms from dry stock use. The cost of water will finally dictate attractiveness.

The figures provided show increases, in round figures, of 60,000kg milk solids per annum per property as per the parameters set out.

A strong feature of the market for dairy properties is that they sell on a dollars/kg of milk solids basis.

That is: The more kilograms of milk solids produced multiplied by a dollar rate the more valuable the farm is.

Therefore if a production lift of circa 60,000kg milk solids were able to be achieved from a dairy property, this would translate to a 60,000 x $/kgMS immediate increase in capital value of the property.

However in our opinion the market is relatively naïve in that they do not place significant account on the cost of production on these properties.

Significant increases in production can be achieved for a dairy farm, either by irrigation or by significant use of bought-in feed in the form of palm kernel or grain. It is finally a question of cost effectiveness. I.e. the cost of water versus the cost of purchased feed.

In our opinion the potential increase in capital value attributable to the introduction of irrigation is likely to be solely related to the increase in production able to be achieved from the property.

The irrigation does provide a significant effect on this increased production; however management factors, location, quality of staff etc also impact on the production able to be achieved.

Properties within an acceptable production range of say 900 to 1,100kg milk solids/ha on dry land are currently selling at a rate of between $40 - $45/kg milk solids.

This dollar range can also be applied to properties within production parameters of the 900-1,600kg milk solids/ha and this does not appear to change unless the property is severely under-producing, in which case making the dollar/kg milk solids appear higher.

This feature is unique to dairy properties in the fact that they do sell on the basis of profitability. This is not so much the case with sheep and beef properties as noted above.

Sheep, Beef and Dairy Support

After review of the figures analysed by Sullivan Alsop it is apparent that sheep and beef farmers will be worse off after installing irrigation than farming on a dry land basis.

This is primarily due to the increased debt servicing and depreciation commitments.

This is borne out in our experience in sales of irrigated sheep and beef properties which indicate that purchasers are unwilling to pay anything above the bare land figure for the irrigation due to the fact that they receive no economic return from utilising irrigation.

There are very few irrigated sheep and beef properties throughout the Wairarapa, which is primarily due to the poor profitability reflected in our analysis

Those sheep and beef properties that are irrigated are generally on a very small scale and ones that largely sell to dairy interests who may use such properties for run-offs for making supplements etc. In short they involve a change of land use.

The fact that most irrigated properties are in well-regarded locations which have potential for subdivision or lifestyle development also confers a premium on these properties which in our opinion is greater than that which would apply because of the existence of irrigation.

Therefore in summary we would expect a very limited if any premium in the value of sheep and beef properties (short term) from installation of irrigation under current market conditions, unless it was associated with a wholesale change in land use. Again, this is in direct contrast to what is experienced in Canterbury and mid-Canterbury where differentials of up to double from dry land as opposed to irrigated land values of similar types. It may take time for this to reflect in the Wairarapa.

Arable/Cropping

The arable/cropping sector within the Wairarapa is currently very small.

The figures provided in our report indicate that returns from intensive irrigation of arable operations are significant. Tapping this potential will require people with the requisite skills to manage an intensive cropping operation and these skills are scarce in the Wairarapa at present.

Any land suitable for intensive cropping generally has sold to dairy interests either for milking platforms or dairy run-offs and we would expect this market trend to continue unless the irrigation culture around arable and cropping is developed over time.

The availability of water will open up the possibility of a wide range of options for specialist crops and small seed production. The positive financial returns from these enterprises should raise the demand for and value of land that is suitable for arable cropping.

Viticulture

The availability of reliable water for irrigation or frost protection on viticulture properties greatly enhances the security of the grape crop and productivity of the vineyard.

The market for viticulture properties shows that purchase prices are primarily related to the variety, age and quality of the grapes and grape crop and the fact that they are established rather than the fact that for viticulture there have traditionally been other sources of water available and also alternative forms of frost control. These come in the form of windmills; helicopters etc and are far less capital intensive and cheaper for the vineyard operator than installation of a dam for water frost control.

The market for wine growing properties is extremely soft at present with economic returns in the industry being very low.

This has led to vineyards selling primarily for lifestyle purposes or larger vineyards being offered on the market are being traded at very low levels, only slightly above land value plus the discounted added value of the improvements etc. This is a symptom being experienced throughout the Hawke's Bay and Wairarapa with the viticulture industry being in the doldrums.

Therefore the presence of water either for irrigation or for frost control in our opinion would not add a significant premium to the capital value of any viticulture operation under current market conditions.

One factor however that may be considered is that a number of vineyards in the Martinborough area currently utilise the Martinborough town water supply for their irrigation. If an alternative source of irrigation were able to be provided there would be considerably less pressure on the Martinborough town water supply which as we understand is at full capacity.

The South Wairarapa District Council may therefore be willing to support an irrigation scheme to take the pressure off their domestic town water supply.

Lifestyle Properties

It is our opinion that the availability of irrigation water will have no discernible impact on the value of lifestyle properties from 1ha – 10 ha in size.

This is because holdings of this size do not have the scale to utilise irrigation water. Blocks over 10 hectares in size may have use for irrigation water depending on specialist crops or horticulture that may be undertaken.

However lifestyle properties do have demand for domestic and stock water. A guaranteed source of water is an attractive feature and selling point for a lifestyle property.

This is due to the fact that many lifestyle block owners may have limited experience of rural living and not be used to having to restrict water use in the summer months. A water scheme supply can remove this worry and it is our experience that significant capital sums can be paid to access guaranteed water.
A good is example is the Wainuioru water scheme which services lifestyle and farming properties east of Masterton.

The scheme is sourced from an aquifer on Watsons Road at Te Ore Ore then pumped and gravity fed to the scheme end users.

When first set up in the 1980s the scheme was designed for use by farmers for stock water and units in the scheme (1000 litres per day) sold for $500-$1,000 per unit.

As lifestyle subdivision in the area increased the administrators of the scheme recognised that lifestyle block owners would pay for access to the scheme and began selling units to small block holders.
The minimum allowance was 2 units being 2000 litres per day but this has since been reduce to 1 unit per property.

In recent times excess units on the scheme have been tendered and sold on the open market. Most have been purchased by lifestyle block owners or developers who have attached them to developed blocks they are subdividing and placing on the market.

The most recent sales of such units (in mid 2008) were for $10,000 plus GST per unit though a recent tender in early 2009 commanded no interest.

The annual charge for use of the water is $233.81 plus GST per unit.

In our opinion the availability of water to lifestyle block holders is a real end use for the irrigation water. At a capital cost of $10,000 per unit (in today's dollars) it could be a lucrative source of funding to contribute to the scheme.

Summary

In summary the market for irrigated rural land throughout the Wairarapa would be described as immature.

In general terms purchasers contemplating buying land with irrigation in place are not willing to pay significant premiums to obtain it and the value they are willing to pay only translates to the quantum of capital cost with which to install an irrigation system.

There is not an irrigation culture throughout the Wairarapa as yet and until this develops it is our opinion that there will not be a significant premium in the market value of land between dry land and potentially irrigated properties.

There have traditionally been other sources of irrigation water either from bores or from surface take and although these are becoming less easy to obtain they are still available through the resource consent process.

This is apparent in the Canterbury and mid-Canterbury regions where a dry land property with no potential for irrigation is worth considerably less than one in the immediate vicinity that although does not have irrigation installed has the potential for, or access to water.

Once the irrigation culture and industry develops in the Wairarapa we would expect this perception to develop and the differential in land values should be very significant comparing dry land with no irrigation potential and dry land with irrigation potential.

As discussed the economics of sheep and beef farming under irrigation are marginal at best and therefore we would expect very little if any premium to be paid for irrigated sheep and beef land.

The market for arable land again is immature and generally underpinned by demand from the dairy sector.

Dairy properties as discussed are generally sold on the basis of production; however in our opinion there does not appear to be any real consideration made of costs of production. Therefore the cost to install irrigation or on-going capital needs would not be factored into a purchaser's decision when buying a dairy property. A purchaser would simply assess historical production levels and potential production levels which they perceive could be achieved from the property and multiply by a dollar/kg milk solids figure.

The viticulture industry is currently severely in the doldrums and even with the presence of water we would not expect there to be strong demand for viticulture conversion.

However the social impact of removing viticulture irrigation from the Martinborough town water supply is one that needs to be fully considered and factored into any decision as to the future of the scheme.

Implications of Model Results

Our Interpretation for Discussions

- **Farm Owner Reward:**

  Any investment into on-farm irrigation by farmers will need to reward them for their management input and provide a return for profit and risk. We have assessed this farm owner return as being 40 % of the increased surplus (return) that can be generated. This will leave 60% of the increased surplus to cover the actual cost of water. (We have assumed that all variable and fixed costs are being covered by the non-irrigated surpluses. This may be the case for some of the land owners, but many are not currently trading with a positive cash flow this will affect farm owner's over-all attitude toward investing in irrigation).

  The final cost of water will affect farmer decision-making.

- **Wairarapa Community Benefits**:

  Will arise directly from the increased physical production that water can provide.

  Our enquiries throughout NZ with economists and consultants involved with irrigation have produced a wide range for a factor relating to gross income that can measure the flow- on benefits to the community in the district.

  The range we have been given is 2.2 to 6 times the extra gross income that can be generated. The lower end applies to pastoral use while the intensive systems such as cropping are at the higher end. This reflects the significant level on inputs in off-farm infrastructure such as drying and seed dressing plants etc. Also the creation of new business and new jobs allied to increase agricultural output, as well as attracting a bigger population, with critical mass for new businesses and greater asset values in the community

  Rob Davison Director of the Meat & Wool Board of NZ Economic Service advises that based on work he completed for the Horizons RC that the benefit to the community should be in the range of 2.8X the increased gross income that can be generated, but less the direct cost of water.

  Bob Englebregt, a well regarded Canterbury Agribusiness consultant has advised that the multiple factor for arable should be 4.5 to 5 times the additional gross income achieved.

  We have viewed the analysis of the Opuha scheme in South Canterbury completed by Harris Consulting) and this outlines significant benefits to the community.

  Based on this research we provide an assessment of the possible benefits to the Wairarapa community calculated at 2.8x gross revenue as follows:

  Area that could be irrigated as per Page 20 in Beca report shows at 32,300ha

  Area in table 5.2 on Beca report page 34, the total area defined in the target irrigation zones = 30,078ha

  For our indicative assessment we have rounded this to 30,000ha

Table Shows:

The increased Gross Income by land use calculated for the average for all three land use classes (A,B,C):

	Av Increase Gross Income A, B, C	Water Cost	Net Benefit	For 30,000ha	X Multiple 2.8
Dairy	$2,927	$500	$2,427	$72.81M	$208.86M
Arable	$1,010	$500	$560	$18.80M	$47.04M
Sheep & Beef	$ 620	$500	$120	$3.6M	$10.08M

This table assumes that the cost of water to the farmer would be $500 per ha.

The table shows that the benefit to the region could be between $10 to $209M depending on which land uses adopt irrigation and on what land use change occurs. In reality not all the area would have a similar land use and the percentage of the area irrigated may initially only be around 50%.

The arable benefits could be significantly higher with the introduction of specialist crops and seed production.

Sensitivity

Working on a multiple factor for the arable industry of 4.75 with 20% of the total Wairarapa area at say 6000ha moving into intensive arable utilisation, the **Regional benefit could be $15.96M.** (Extra GI $560 X 6,000 X 4.75)

If 25% of the irrigatable area intensified into dairy = 7,500ha the **regional benefit would be just under $51M.** (Extra GI $2427 X 7500ha X 2.8.

Conclusion

Based on these figures It would not be unrealistic to expect the benefit to the **Wairarapa community to lie between $70M to $100M in total.** (After adding viticulture and allowing for a total of say 50% of the available 30,000ha taking up the water).

- **Cropping opportunities could be significant:** The weather pattern in the Wairarapa with high sunshine hours and a reliable dry summer that is condusive to crop and seed ripening provides a unique opportunity for expansion into speciality areas that are currently confined to Canterbury.

  The area in Canterbury available for specialist seed production has become limited. Without irrigation water to provide for reliable yields, overseas buyers will not be interested. They require both significant scale of land area and guaranteed yields. We have listed the crops that could be grown in the arable section. The Wairarapa could be very attractive for seed multiplication for northern hemisphere countries and be able to mitigate cross pollination issues that are arising in Canterbury.

- **Change of land use and ownership required.** As the points above indicate a change in land use will be required and most likely land ownership as well. We see it less likely that current owners will be attracted. This has implications of a lag phase if change of ownership has to precede adoption.

- **Use for intensification of current land use as sheep & beef -** will not be viable. This is a similar conclusion to that made for the Central Plains scheme in Canterbury.
- **Benefits from the application of water** - will be both annual cash return and wealth creation if land values respond as they have in Canterbury.
- **Dairy Economics:** The level of future MS payout will be a crucial factor in whether farms have the confidence to adopt irrigation.
  Dairy returns from class C soils are very significant. On the other soils, particularly B, soil drainage will be the first priority.
- **Soil nutrient levels:** Will need to be increased with land use intensification. Care will be needed in effluent disposal and nutrient budgeting for dairy.
- **Management & technology adoption** will become a crucial requirement for success.

  Note that the there will need to be a change in land use (as well as intensification) to achieve the full potential from the application of irrigation. This is clearly seen in the impact it will have for Soil Type C (Tauherenikau soils used for dairy.)

  Sundry Points:

- Irrigation will future-proof against climate change.
- One of the key benefits to the region is the reduced variability of pasture production and the reliability that water can give. Hort Research assessment in section 6 of their report.
- The affordability of irrigation by farmers is less critical for viticulture and marginally better for dairy and arable to what we reported in our 2004 study. – Key factors being improved product prices but now with a possible wider range of specialist crop options. Such as seed pea multiplication carrot seed and green brassica seed production.

Considerations for Circulating Information to Farmers

Farmers will be very influenced by the manner in which information is made available to them. We also note that many will not base their actions on a strict analysis of viability. There will be a need to inform and educate farm owners on the benefits to them.

The questions that arise are:

- What information should be provided to farmers?
- The timing of promotion or "selling" of benefits to both farmers (and the community): In our view this will need to have regard to:
  - Farming morale at the time.
  - Drought instance and impact at the time (or over the most recent seasons).
  - Farming returns Overseas Prices.
    Exchange Rate
  - Pressures from inflation of costs.
  - Overall farm viability
  - Relative costs of water to cost of growing crops (fuel cost impacts) etc.
- We would be concerned if figures are talked about without explanation of the assumptions and policies are being provided. Unless handled carefully this could produce an overly optimistic or negative reaction.
- We believe that an indication of likely water cost is required before generating too much enthusiasm.

Means of Releasing Information to Farmers: - We Recommend for Consideration:

- Taking high profile Wairarapa farmers to Canterbury to view the latest technology in irrigation use. Particularly with the central pivot programming that will significantly improve efficiency of water use.
- Running special courses at Taratahi
- Regular paper articles and releases
- Through Agletter and Milkline publications
- Farmer Field day (Key farmers such as Peter Smith)
- Monitor farm presentations.
- Country wide paper
- Flyers direct to farmers