Waimea Water Augmentation Committee

Preliminary Economic Assessment of Water Augmentation in the Waimea Catchment

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Corporate Finance

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1.0 INTRODUCTION

The Waimea Water Augmentation Committee ("WWAC") has commissioned Tonkin and Taylor to undertake a study of water storage in the upper part of the Wairoa/Lee catchments in Tasman District. The overall scope of the study was to address the recurrent water shortages experienced on the Waimea Plains and to investigate enhancing water availability for consumptive and environmental benefits downstream on the Waimea Plains and surrounds. The first phase of the study has gone through a staged process including investigation of storage site options, and WWAC has now identified Site 11 (Lee) as the preferred option for possible storage.

Crighton Anderson Corporate Finance ("Crighton Anderson") has been engaged to provide a preliminary economic assessment of the preferred water storage option. The assessment is based on input data that has been generated as part of the pre-feasibility level investigations and which is provided on an indicative basis only. The overall objective of the analysis summarised in this report is to assess the high-level economic feasibility of the proposed development on the basis of the following two factors:

- **Capital Cost of Augmentation** The capital cost of the proposed augmentation option is estimated on a per hectare basis. Using some standard assumptions for scheme funding and the repayment period, total capital costs are also expressed as an equivalent annual charge per hectare. Costs expressed on this basis can be used as a convenient benchmark for assessing the affordability of the proposed scheme.

- **Opportunity Cost of Non-Augmentation** Without an investment in storage for augmentation, any proposed future increases to the minimum flow requirements for the Waimea River will lead to a reduction in the security of supply for existing water users. For the purposes of this assessment, we have assumed that all existing irrigators would face water restrictions to maintain a minimum flow of 800 l/sec in the Waimea River at the Appleby Bridge. Indicative estimates of the economic cost of possible water restrictions for a number of land uses are determined using a series of high-level assumptions regarding the severity and frequency of the restrictions.

Under the Tasman District Council's present water management system, the Waimea River system provides irrigation water to approximately 3,800 hectares. It is estimated that a further 1,500 hectares within the Waimea Plains area is irrigable land. The augmentation scheme could also potentially support another 300 hectares in the lower Wai-iti Valley that is not covered by the existing Kainui scheme. This gives a total irrigable area of 5,600 hectares.

The existing irrigable area has a variety of soil types and supports a range of alternative land uses, with approximate areas as set out in Table 1.

Table 1: Current Land Use and Soil Types (Hectares)

	Soil Type (By Soil Moisture Holding Capacity)			
Land Use	**38 mm**	**78 mm**	**130 mm**	**Total**
Pasture	600	100	900	1,600
Apples, Kiwifruit	760	190	900	1,850
Grapes, Olives	200	20	130	350
Total	1,560	310	1,930	3,800

Water demand per hectare is a function of both soil type and land use. Lighter soil types obviously require a higher volume of water per hectare to support any particular land use, while pasture requires up to three times the volume of water compared to grape production. These differences between water demand per hectare are brought to account by determining "area equivalents" that take account of the estimated areas of differing soil types and by conservatively assuming that all of the irrigable area is in pasture production. Pasture production is assumed to require a water allocation of 35 mm/ha/week.

Area equivalents determined on this basis are presented in Table 2, along with the demand estimated by the Tasman District Council ("TDC") for existing and future urban / industrial uses.

Table 2: Assumed Water Demand (in Hectare Equivalents)

	Gross Area (Hectares)	Area Equivalents (Hectares)
Existing Irrigation Area	3,800	3,265
Potential New Irrigation Area	1,500	1,285[1]
Potential New Irrigation Area in Lower Wai-iti	300	255[1]
Existing TDC Urban and Industrial Use	NA	420
Allowance for Future Urban and Industrial Use (Tasman District)	NA	400
Allowance for Future Regional Need	NA	440
	5,300	6,065

[1] Conversion of gross area to net area for these components has been determined by applying the conversion ratio implied by the calculation for the 3,800 hectares that are currently irrigated. This approach assumes that the soil types and land uses on the new irrigable areas are broadly consistent with those on the existing irrigated area.

For this first stage of the feasibility analysis, indicative capital costs are allocated between potential users on the basis of the estimated number of area equivalents. As the investigations continue and more accurate data are available, the indicative costs for prospective users should be estimated on a basis more in line with the likely charging regime. We suggest that this will consider actual water usage, or if that is unavailable, the estimated soil and crop needs, rather than the area irrigated.

2.0 AN ECONOMIC ASSESSMENT OF PROPOSED AUGMENTATION OPTION

2.1 POTENTIAL OWNERSHIP STRUCTURES

The level of charges may be influenced to some degree by the chosen ownership structure for the scheme. A general summary of the ownership alternatives is presented in Appendix I, with a brief description of the main considerations for ownership by either a Local Authority or some other public entity, as well as a private entity.

Given the scale and nature of the proposed Waimea scheme, the council or private ownership alternatives are likely to be most appropriate in this case. Among the key characteristics that must be appropriately accounted for in the chosen structure are:

- **Public / Private Water Demand** It is proposed that the water storage will be used to both enhance the security of supply for consumptive users as well as allow for a provision of greater minimum flows within the Waimea River. Consumptive users are also split between private land owners and the TDC on behalf of the community (both for community consumptive water use, and other community benefits). One of the most important requirements of the chosen structure will be to allow for a fair and transparent allocation of capital and operating costs between the scheme participants.

- **Existing / New Irrigators** It is currently proposed that the scheme will not only improve security of supply for existing irrigators, but will also provide new supply to 2,380 area equivalents (1,540 hectares for irrigation, 400 hectares for future demand by urban and industrial uses, and 440 hectares for future regional supply). If a differential charging regime is deemed to be appropriate for the existing and new irrigators, then the ownership structure of the scheme must be capable of reflecting these differences.

2.2 INDICATIVE COSTS FOR WATER USERS

2.2.1 Base Case Results

Indicative charges for prospective users of the augmentation scheme have been determined using a series of high level assumptions. Key assumptions are outlined in Table 3.

Table 3: Base Case Assumptions for Economic Analysis

Assumption Name	Discussion	Adopted Value
Total Capital Cost	Preliminary estimates provided by Tonkin and Taylor and TDC. The adopted value is based on a pre-feasibility investigation level estimate between $20 and $25 million, plus an allowance for land purchase. Excludes any costs associated with piped delivery from dam or any other distribution infrastructure. For any given percentage change in capital costs, the indicative annual charges will change by about the same percentage amount.	$23,000,000
Construction Period	The assumed period between the commencement of construction and the commissioning of the scheme. Total construction cost is assumed to be evenly spread over the full period.	2 Years
Funding Method and Cost	Funding period set equal to the initial consent period for the dam, assumed to be 25 years. Because the maximum permissible consent period under the RMA is 35 years, the choice of a 25 year repayment period can be considered conservative. Total cost debt funded at an assumed cost of 100 basis points over 90-day Bank Bill rate (currently 7.7%).	8.70%
Taxation Treatment	We assume that the assets are owned by a separate tax paying entity subject to standard corporate tax. Company revenue is derived from annual payments paid by scheme participants, and tax liability is partially reduced by the standard depreciation claim. Tax losses at the beginning of the repayment period are carried forward and utilised toward the end of the period when the irrigation company generates positive taxable income.	
Cost Allocation for Environmental Flows	The proposed storage dam has been designed to meet environmental requirements via the imposition of a minimum flow in the Waimea River. Based on preliminary security of supply targets and some limited hydrological modelling, an initial estimate has been made of the proportion of the dam capacity that is needed to meet the environmental requirements. This can be used to determine the proportion of the total capital cost that should be met by the consumptive users, and the proportion that should be paid for by the wider community. The initial estimate of an appropriate split is 70% consumptive users / 30% environmental flows.	30%

Indicative charges are expressed on the basis of total capital cost per hectare as well as an equivalent annual charge per hectare. Initially, estimates have been determined for the following four charging regimes:

(i) **Existing Irrigation Users** Costs are assumed to be met by existing irrigators only. This is the equivalent of apportioning costs over an area of 3,265 hectares.

(ii) **All Existing Users** All costs are met by existing consumptive water users (existing irrigators (3,265 hectares) plus urban / industrial demand (420 hectares)). Total effective demand equals 3,685 hectares, when expressed on the basis of water demand equal to 35 mm/ha/wk.

(iii) **Existing Irrigation Users Plus New Irrigation** Costs are uniformly allocated between existing irrigators (3,265 hectares) and new irrigators (1,540 hectares). Total effective demand equals 4,805 hectares.

(iv) **All Potential Users** Annual charges are estimated on the basis that the capital cost is evenly allocated among all users listed in Table 2. Total effective demand equals 6,065 hectares.

Using the 70% allocation of total cost to consumptive users as a base case[1], the indicative capital costs are presented in Table 4.

Table 4: Indicative Costs for Base Case Cost Sharing Scenarios

	Existing Irrigation Users	All Existing Users	Existing Irrigation Users Plus New Irrigation	All Potential Users
Effective Hectares	3,265	3,685	4,805	6,065
Capital Cost per Hectare	$4,930	$4,370	$3,350	$2,655
Equivalent Annual Charge per Hectare	$565	$500	$380	$305

These results can be interpreted in a number of ways when attempting to determine the high-level feasibility of the scheme. Perhaps the most useful result to concentrate on is the estimated annual charge per hectare; this provides the cost benchmark against which to compare the economic benefit that water users will derive from access to a reliable water source.

While the average benefits of irrigation are reflected to some degree by the opportunity cost analysis summarised in Section 3.0, we suggest that some caution should be exercised when interpreting these results. Irrigation benefits can vary considerably from property to property on the basis of land use, soil type, and the intensity of the adopted farming system. It is also very difficult to fully incorporate into this analysis one of the main advantages of irrigation relating to the large reductions in year to year production variability. The economic feasibility of the scheme is ultimately a decision for each potential scheme participant based on their evaluation of the indicative scheme costs.

For comparison purposes, the next section briefly summarises the indicative annual cost of participating in two other irrigation schemes that we have been involved in recently.

2.2.2 Comparative Cost Data

Indicative charges for two new and proposed schemes in North Otago and South Canterbury are presented in Table 5. The North Otago Irrigation Company has recently commissioned the first stage of a two-stage scheme that will eventually irrigate 20,000 hectares. Stage I covers 10,000 hectares of land that is predominantly used for pastoral production. Hunter Downs is a scheme concept that was announced early in 2006 to irrigate up to 40,000 hectares in a catchment area between the north bank of the Waitaki River and Otipua, just south of Timaru. The proposed scheme is currently at the consenting stage, and the potential costs are therefore very preliminary in nature.

In both cases, participating farmers are assumed to contribute to the initial capital cost of constructing the schemes and this has an impact on the ongoing charges that need to be levied to meet debt repayment requirements. In order to make the indicative charges for these schemes comparable to the estimated charges for the proposed Waimea scheme, the figures presented in Table 5 have been recalculated on the basis that the full capital costs have been financed using bank debt (with no capital contribution from the scheme participants).

[1] The capital cost allocated to the provision of the environmental flows is approximately $6.9 million. If this cost was financed on the same terms as assumed for consumptive users, the annual servicing charge would be approximately $685,000 over a 25 year repayment period.

The other relevant benchmark relates to the Wai-iti water augmentation scheme. Payment for this scheme is made by water users through a TDC rate on the weekly water allocation on their water permit; for irrigators, this corresponds to a charge per hectare of water allocation for irrigation, as all users have the same per hectare allocation in the Wai-iti. Existing Wai-iti water permit holders are to be rated at approximately $250 (excl GST)/ha/year – increasing in years 4-30 to $280 - while new water users will pay this rate plus an up-front single capital contribution of $1,060/ha. These costs will repay a 30-year loan for scheme costs, plus the ongoing Operating & Maintenance costs.

Table 5: Indicative Annual Charges For Other Schemes (Per Hectare)

	Waimea (All Potential Users)		North Otago Irrigation Company[1]	Hunter Downs[2]	Wai-iti (Existing User)[3]	Wai-iti (New User)[4]
Annual Fixed Charge			$470	$560		
Recovery of Operating Expenses			$250	$100		
Total Annual Charges	$305		$720	$660	$280	$380

[1] Estimated costs based on information contained in the prospectus, issued prior to the commencement of construction.

[2] Based on capital costs assessed to a pre-feasibility level.

[3] Total charge includes repayment of capital cost and provision for operating and maintenance costs.

[4] Based on the annual charge for existing users plus an additional charge of $100 / ha to service the capital cost of $1,060 per hectare (assuming a 30 year repayment term)

The annual charges for both North Otago and Hunter Downs are considerably higher than the indicative costs for the Waimea augmentation. Assuming the costs are met by all potential users of the Waimea scheme, the indicative annual charge of $305 is also reasonably consistent with the charges levied on existing irrigators using the Wai-iti scheme. While these simple comparisons help to place the cost of the proposed Waimea scheme in context, we also note that there are some significant differences between the schemes. We note that:

- The North Otago and Hunter Downs schemes will irrigate areas that were previously farmed as dryland with little or no previous access to water. We expect that dryland farmers will have a far higher propensity to pay compared to the consumptive users that currently have access to water on the Waimea Plains. Having said that, the more intensive land use on the Waimea Plains will almost certainly increase the ability of the existing Waimea irrigators to pay.

- The indicative annual charges for the proposed Waimea scheme do not include operating costs. We would expect however that the likely costs for the proposed scheme are relatively minor in comparison to the North Otago and Hunter Downs schemes, both of which are reliant on substantial pumping charges and electricity use.

- The Waimea scheme is costed on a run-of-river basis which means users may face additional on-farm costs for pumping and reticulation, even if water is piped to the mouth of Wairoa Gorge. New irrigators will definitely face the costs of establishing on-farm infrastructure.

2.2.3 Indicative Costs for Other Allocation Methods

The indicative base case costs presented in Table 4 are reliant on some relatively arbitrary assumptions relating to the assumed structure of the scheme. The most important structural assumptions, and the impact that each would have on the indicative costs are outlined below. In each case the cost comparison is limited

to the scenario in which all potential consumptive users are included in the cost allocation (i.e. an area equivalent total of 6,065 hectares).

Extent of Construction

Base case estimates for scheme costs only consider the capital cost of the storage dam and related structures. The cost of delivering piped water from the proposed dam site to the Wairoa Gorge / Waimea East Irrigation intake has been estimated at $6.5 million. Indicative scheme costs per hectare that incorporate the piped delivery option are presented in Table 6.

Table 6: Indicative Scheme Costs – Piped Delivery

	Capital Cost Per Hectare	Equivalent Annual Charge per Hectare
Base Case	$2,655	$305
Piped Delivery Option[1]	$3,405	$390
Incremental Cost	$750	$85

[1] Only costed to Wairoa Gorge / Waimea East irrigation intake, and excludes reticulation costs over the Waimea Plains.

Cost Allocation to Consumptive Users

High level modelling indicates that a reasonable split of the total cost of the scheme between consumptive users and environmental flows is 70% / 30%. This ratio represents the relative proportion of the storage capacity that is needed to meet the consumptive and environmental uses for a drought return period of 25 years. This estimate is based on limited modelling and is dependent on the methodology that is ultimately determined to be most appropriate for assessing a fair cost allocation between the two water uses.

Table 4 gave the indicative costs assuming consumptive users pay for 70% of the scheme. Table 7 presents the indicative costs of the scheme under the assumption that 100% of the initial capital expenditure is paid for by consumptive users (i.e. there is no community contribution for the environmental flow proportion).

Table 7: Indicative Scheme Costs – 100% Allocation to Consumptive Users

	Capital Cost Per Hectare	Equivalent Annual Charge per Hectare
Base Case (70% cost allocated to consumptive users)	$2,655	$305
100% Allocation to Consumptive Users	$3,790	$435
Incremental Cost to Consumptive Users	$1,135	$130

Depreciation

The taxation benefit derived from depreciating the capital invested in the scheme is not immediately available to the scheme participants. Instead, the depreciation claims are assumed to be made by the company that owns the assets. Because the company is not in a tax paying position until the end of the assumed 25 year repayment period, the tax benefits are delayed and the estimated annual charge is therefore higher than it would otherwise be.

Immediate access to the depreciation claims can have a significant impact on post-tax costs for schemes with high capital costs and significant investment in rapidly depreciating assets. For example, the annual effective cost for participants in the North Otago scheme will be reduced by approximately $60 per hectare if the

ownership structure is changed so that the large depreciation claims available in the early years of the scheme can be passed directly to the individual irrigators. This benefit is significant because of the large investment in plant and machinery (pumping equipment) that can be depreciated for tax purposes over a short period of time.

The potential benefit for the Waimea augmentation scheme will be lower because the majority of the capital investment relates to civil works and structures that are depreciated over a far longer period. The limited impact of this factor is presented in Table 8.

Table 8: Indicative Scheme Costs – Depreciation Claim Passed to Scheme Participants

	Capital Cost Per Hectare	Equivalent Annual Charge per Hectare
Base Case	$2,655	$305
Depreciation Claim Passed to Scheme Participants	$2,655	$290
Incremental Cost	$0	($15)

Implementation of an ownership structure that will allow users to directly access the depreciation claim is not straight forward. The additional complication of pursuing this ownership alternative is unlikely to be worthwhile based on the relatively minor financial benefits that will accrue.

3.0 INDICATIVE OPPORTUNITY COST OF NON-AUGMENTATION

This section presents a high level assessment of the potential economic loss that current irrigators may suffer if the augmentation scheme does not proceed. In this assessment it has also been assumed that at some time in the future the current minimum environmental flow is increased. The indicative values are based on analysis contained in the following two reports:

(i) **Modelling Water Rationing for the Waimea Plains** This report was prepared by Andrew Fenemor of Landcare Research and examines the likely water restrictions that would be imposed on existing irrigators for both an "average" summer and a 25 year drought. An abridged copy of the report is provided in Appendix II.

(ii) **Economic Impacts of Water Restrictions on Standard Crop Types** This report was prepared by John Bealing from Agfirst Consultants. It estimates the likely reduction in on-farm surplus that will occur for the main crop types grown on the Waimea Plains under the water restriction scenarios described in the Landcare Research report. The report is attached as Appendix III.

Given the preliminary nature of this study, the loss estimates are based on a simplified framework that is designed to provide the order of magnitude for the economic impact from non-augmentation. We have arbitrarily chosen to concentrate on just one drought return period, and it is not possible to easily extrapolate the estimated data to determine the potential impact of non-augmentation under different seasonal conditions.

Our analytical framework is based on the following key assumptions:

- **Minimum Environmental Flows** The original and currently operative minimum flow requirement in the Waimea Water Management Plan was 225 l/sec at the Appleby Bridge. Although the minimum flow was raised to 500 l/sec when the Tasman Resource Management Plan ("TRMP") water rules were notified in 2001, the 500 l/sec minimum flow target is still under contest by submitters. The TDC now has ecological data that suggests that this level is inadequate, and the Waimea water augmentation study has identified that more appropriate minimum flows may be as high as 1,300 l/sec. The water rationing modelling conducted by Landcare Research for this economic assessment adopts a minimum flow of 800 l/sec based on an objective assessment as to what could emerge as a realistic outcome under a Resource Management Act process to change the minimum flow requirements set out in the Tasman Resource Management Plan (i.e. in the absence of any Waimea augmentation scheme).

- **Water Allocation Response** The assumed allocation response in the event of a water shortage is that the security of supply to all existing permit holders will be reduced, rather than a reduction in the total volume allocated to water permits.

Landcare Research based its modelling of possible water restrictions on the river flow records for seasons that are thought to represent both an average summer (2004/05) and a drought with a probability of occurrence of 1 in 25 years (the 1982/83 and 2000/01 years[2]). Assuming a minimum flow of 800 l/sec was imposed, the water records were then used to simulate the frequency and duration of water restrictions that would be imposed on irrigators under the assumed hydrological conditions. Table 9 sets out the number of days that water rationing would have been imposed for each of the selected annual records.

[2] The definition of the drought return period depends on the timing, severity and duration of the water shortages. The 1982/83 year actually represents a 25-33 year drought and the 2000/01 season is described as a 27-85 year drought.

Table 9: Summary Results of Water Rationing Modelling (Restricted Days)

	Severity of Restriction			
Water Flow Scenario	**Step 1 (20% Cut)**	**Step 2 (35% Cut)**	**Step 3 (50% Cut)**	**Total**
Average Year (2004/05)	17	0	0	17
25-33 Year Drought (1982/83)	77	14	32	123
27-85 Year Drought (2000/01)	46	17	38	101

Agfirst Consultants used the water restriction data to estimate the likely reduction in net farm surplus (measured on an Earnings Before Tax ("EBT") basis) for the predominant land uses within the irrigable area. While the results of the relatively mild restrictions implied by an average season are expected to have a negligible impact on the profitability of all land uses, the impact of a 1 in 25-year drought is significant.

Summary results are presented in Table 10 for the two data sets derived from the 1 in 25-year drought scenario. These show that, with the exception of pasture, the impact of the water restrictions is dependent on the timing of the water restrictions. For example, the impact of the simulated water restrictions on apple and grape profitability is considerably higher using the data from the 2000/01 season because the severe water shortages occur closer to the critical pre-harvest period. These impacts are especially evident for crops grown on lighter soils.

Table 10: Incremental Losses for 1 in 25 Year Drought (EBT / ha)

	25 – 33 Year Drought (1982/83)		27 – 85 Year Drought (2000/01)	
Crop Type	**Light Soils**	**Heavy Soils**	**Light Soils**	**Heavy Soils**
Pasture	$1,250	$1,250	$1,250	$1,250
Apples	$7,670	$5,186	$15,917	$7,670
Kiwifruit	$5,846	$4,516	$7,736	$4,516
Grapes	$1,903	$1,062	$7,382	$1,903

The total economic impact of a 1 in 25-year drought is estimated by combining the per hectare losses presented in Table 10 with the crop area estimates shown in Table 1. The results are set out in Table 11.

Table 11: Estimated Economic Losses (NZD 000's) of 1 in 25 Year Drought for Current Irrigable Area (3800 ha)

	25 – 33 Year Drought (1982/83 Data)			27 – 85 Year Drought (2000/01 Data)		
Crop Type	**Light Soils**	**Heavy Soils**	**Total**	**Light Soils**	**Heavy Soils**	**Total**
Pasture	$875	$1,125	**$2,000**	$875	$1,125	**$2,000**
Apples	$6,557	$4,201	**$10,759**	$13,609	$6,213	**$19,822**
Kiwifruit	$555	$407	**$962**	$735	$406	**$1,141**
Grapes	$419	$138	**$557**	$1,624	$247	**$1,871**
All Crops	$8,407	$5,870	**$14,277**	$16,843	$7,992	**$24,835**

The indicative aggregate costs of a 1 in 25 year drought implied by the test data range between approximately $14.3 million and $24.8 million. This is an estimate of the aggregate value of lost production from the 3,265 hectare equivalents that are currently irrigated using water from the Waimea River. The results are dominated by the impact of water restrictions on apple production and could vary significantly depending on the timing of the restrictions during the growing season. When expressed on a proportional basis, the potential losses are clearly significant. Given that the estimated aggregate earnings from the irrigated area in a normal year is approximately $32.3 million, the estimated losses represent between 45% and 75% of average earnings (based on current production costs and output prices).

While these results provide a high level indication of the cost of non-augmentation, the analysis is clearly subject to a series of assumptions and limitations. Some of the key considerations are as follows:

- The estimates relate to drought events that are relatively rare when considered in the context of historical water flow records. While we have considered the potential impacts of both an average season and a 1 in 25-year drought, the results cannot be easily extrapolated to determine the economic cost of non-augmentation for a season with water restrictions falling between these two points. The costs are certainly not expected to be linearly related to the level of water rationing; Agfirst Consultants suggest that significant economic costs may only be experienced for restrictions relating to a 1 in 15-year drought or worse. Assessing the likely economic impacts for these intermediate drought return periods is beyond the scope of the current phase of investigations.

- A relatively crude approximation of the aggregate economic cost of non-augmentation over a 25 year period can however be made on the basis of the available data. For this high level analysis we assume that the economic impact of water restrictions is negligible for anything less severe than a 1 in 15 year drought, and that the costs of a lower frequency drought can be linearly interpolated between zero and the estimated cost of the 1 in 25 year drought reported earlier. On this basis, the expected aggregate impact of non-augmentation over a 25 year period falls in a range between approximately $80 million and $135 million.

- This analysis shows that the timing of the water rationing can be just as important for irrigators as the frequency of the restrictions. A growing season with a relatively high number of restricted days may have a limited impact on the economic output from the irrigated area compared to a year in which a small number of restrictions are concentrated into a critical part of the growing season. The aggregate economic cost for any particular drought return period can therefore only be estimated within a large range.

- Significant land use changes may be contemplated if the estimated costs outlined in this report are experienced (or are perceived to be possible) within a short time period. We note that the severity

of the possible water restrictions modelled for the 25-year drought situation assume that the TDC will relent on the minimum flow requirements in extreme drought conditions and limit the restrictions to 50% reductions. Under prolonged drought conditions, the hydrological modelling indicates that cuts of up to 100% may be needed to strictly enforce the 800 l/sec minimum flow. Economic impacts on consumptive water users may therefore be more significant than indicated by this preliminary modelling.

- This high level analysis does not consider the potential regional economic opportunity cost of non-augmentation in relation to residential and industrial development. In our view there is insufficient information available to allow a meaningful estimate. However, we note that the allowance for future urban and industrial use (in both the Tasman District and the region as a whole) amounts to a total of 840 hectare equivalents, based on expected demand for approximately 15,000 new residential allotments and some 65 hectares of new industrial development. Economic growth associated with this anticipated development over the 40-50 year planning period is clearly significant for the Tasman District.

4.0 SUMMARY AND CONCLUSIONS

This report summarises two main aspects of the preliminary economic analysis that has been applied to the proposed Waimea augmentation scheme. The analysis is based on a high level assessment of the total capital costs required for the preferred storage site and makes a number of critical assumptions relating to the potential scheme users, ownership structure, and capital structure.

The two main conclusions that can be drawn from the preliminary analysis are as follows:

- **Affordability of Augmentation** The likely costs of the scheme for each user are dependent on which groups of consumptive users are included in the charging base, and the extent to which the costs of meeting the enhanced environmental minimum flows are met by the community as a whole (via the TDC). Assuming that 70% of the capital costs are evenly allocated among all potential future users of the scheme (with the remaining 30% covered by the Tasman District community at large), the annual charge will be approximately $305 per hectare. It is important to emphasise that this indicative charge is based on a preliminary estimate of the total capital cost for the scheme ($23.0 million including land). Any change in the estimated capital costs will result in about the same percentage change in the indicative annual charge.

  However, based on the information available to date, the preliminary estimate of the annual charge for this scheme compares favourably to other schemes that have been initiated recently, and is relatively consistent with charges for existing irrigators using the Wai-iti augmentation scheme.

- **Opportunity Cost of Non-Augmentation** A limited set of hydrological data has been used to determine the possible impact of non-augmentation on agricultural and horticultural production in the event that minimum flows in the Waimea River are increased. Based on current land use and return levels, the indicative cost of a 1 in 25 year drought is estimated between $14.3 million and $24.8 million, depending on the timing of the water shortages. These estimated losses represent between 45% and 75% of aggregate net earnings from the irrigated land during an “average” year. Given the significance of this potential economic impact, non-augmentation may well lead to considerable changes to the existing balance of land use.

APPENDIX I – ALTERNATIVE SCHEME OWNERSHIP STRUCTURES

Table 12: Ownership Structure Comparison

	Council	Private	Public
General Description	Owned and operated by the local District Council similar to urban water supplies. Construction and operation funded by rates from the area of benefit. The security of cash flow provided by the Council's ability to levy rates results in a relatively low cost of capital.	The irrigation scheme would be owned and operated by a distinctly 'closed' entity that serves to benefit a defined group of people. The aims and objectives of ownership in the entity would be very similar for all shareholders and the direct benefits would accrue to the private owners of the entity. This closed entity can be in the form of: • A Co-operative Company • An Incorporated Society • A Partnership Under the co-operative structure the shareholders in the entity are also the consumers of the service provided. Owners and participants in the scheme are generally easily identified. This results in a very simple organisational structure with a very distinct irrigation community.	The irrigation entity would be a public company and shares could be owned by the public at large. As a result, ownership can extend beyond the irrigation community that receives the direct benefits from the scheme. There tends to be greater emphasis on achieving a competitive return on the capital invested by the shareholders. It therefore becomes important that the entity is profitable. The key benefit of this type of structure is that capital is sourced from a wider pool than just the consumers of the irrigation service.
The assets owned by the entity Land and Earthworks Plant and Machinery Water Rights	Council ownership of assets is straightforward. The tax advantage of depreciation of the plant and machinery cannot be used.	The co-operative structure is ideal for owning assets that are used solely for the scheme. Transfer of existing water rights is more straightforward to a cooperative as the existing owners can see that they will be used solely for their benefit. Appropriate compensation can still be an issue.	A public company can easily hold assets for a number of purposes. This can mean that assets for use of the scheme can become confused with assets used for other purposes. Transfer of existing rights is more difficult than to a cooperative as the existing owner may have concerns about how the rights will be used.

	Council	Private	Public
Effect on take up	Payment for the scheme via rates may result in a take or pay situation for the potential users of the scheme. This will result in high take up. Inefficient use of the water can result unless there is a usage charge consistent with the marginal cost of supply.	Potential users of the scheme have a strong incentive to join the company, either to secure water rights or to protect their existing interests. Forfeiture of existing water rights on joining the scheme can be a disincentive. Uncertainty in the schemes likelihood of proceeding and ongoing viability can also affect take up in the co-operative's shares.	Potential users of the scheme have less incentive to join the company, but the same incentive to use the scheme's services as a cooperative.
Financing - Equity raising - The ability to obtain debt financing.	Significant equity can be provided by the Council for reasonably sized projects. As the Council can use the rating system to guarantee cash flow, loan finance will tend to be cheaper.	Equity will need to be raised from the users of the scheme. This can be difficult for some potential users who must meet on farm commitments as well as the cooperative's requirements. Debt can be difficult to raise for a cooperative. Underwriting of the debt by Council has been used, as in the case of the Waimakariri Irrigation Scheme	The key advantage of this structure is the potential to raise equity from a wider base. Lending institutions may favour this structure over that of a cooperative.
The ongoing financial viability of the entity	There would be no issue with ongoing financial viability of the entity.	Because of the long term nature of the physical assets of the entity and the substantial level of debt finance that will require servicing it will be very important for the entity to maintain financial stability and liquidity. By linking ownership in the scheme to the land in the scheme command area the entity can ensure that long term commitment to the scheme is maintained, despite changes that may occur to the land ownership and land use over the years. The use of a supply contract would further help to create certainty by maintaining a continuity of equity and involvement in the irrigation scheme.	The degree of risk would vary according to the nature of supply agreements and the nature of the physical assets. Under this structure there is a defined need for entity to be profitable and maintain a competitive return on shareholders funds. The pricing structure for the user charges needs greater consideration to ensure they adequately reflect value.

	Council	Private	Public
Taxation issues	As Council's do not pay tax there are few tax issues. Schemes with relatively high plant and machinery cannot receive the benefit of the depreciation tax shield.	The principle objective would be for the entity to break-even, although this would be subject to any decision relating to building up reserves. An issue may be the distribution of rebates to company members. Such rebates are generally deductible to the company and assessable to the shareholder.	Taxation issues are most prevalent under this structure, mainly because there are many more options to the structure. More care is required in the company's structure and dealings.
Ownership and control	The Council maintains both ownership and control, subject only to the normal influences on Council operation. The lack of direct control by scheme users can be seen as a negative by the scheme users.	Ownership of the entity remains with a pre-defined set of landowners within the command area of the irrigation scheme. Such a strong link between the ownership and control of the entity provides security for those involved in the scheme as they have the ability to maintain a security of supply and manage the day to day operations of the scheme in a manner consistent with their community objectives. Generally landowners find this structure suitable because it allows them to achieve their goals of controlling the costs of supplying the water and ensuring the security of supply.	This entity structure has the ability to incorporate as many possible landowners within the command area of the irrigation scheme, whilst still allowing for outside investors by allowing potential irrigators the right of first refusal on the shares being offered. The ownership is therefore much broader and encompasses a much wider variety of shareholders. As raised earlier, the establishment of first right of refusal or preferential share rights can maintain a control structure suitable to the needs of the shareholders, taking into account the need to include as many potential irrigators in the scheme.
Future opportunities and development within the scheme and its owners	Subject to Council decision processes expansion or change to the scheme is easily accommodated.	Under this entity structure concerns for how to incorporate future expansions of the scheme, a transfer of landholdings or the subdivision of land within the irrigation command area must be dealt with in advance. Given the closed and restricted nature of the co-operative entity, changes that will affect land holdings will in turn affect the shareholding in the company where the rights to receive water are based on the area of land held. The eventual entity structure must therefore enable flexibility for shareholders to come and go as well as allowing for an increase in the size of the shareholding.	This structure is amenable to change and can easily accommodate expansion of the scheme in the future.