

National Cost-Benefit Analysis of Proposals to Take Water in the Waitaki Catchment

MODEL SCOPING REPORT

- FINAL
- 30 October, 2003



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Contents

1.1	Purpose of Cost Benefit Analysis	1
1.2	Purpose of Scoping Report	1
1.3	Model Structure	1
1.4	Data Acquisition Activities	4
1.5	Data Collection Workshops	5
1.6	Consultation on the Draft CBA	6



1.1 Purpose of Cost Benefit Analysis

The government recently announced it will introduce special legislation to ensure that the most appropriate decisions are made about water use in the Waitaki catchment. The legislation will establish an independent statutory body to develop a water allocation framework for the Waitaki River and establish a panel of commissioners to decide on consent applications.

Sinclair Knight Merz (Australia) has been commissioned by the Ministry of Economic Development to undertake a cost benefit analysis of proposals to take water in the Waitaki catchment. This work will provide a national perspective to an enhanced Resource Management Act process for the Waitaki catchment. It will be one method of informing the development of a water allocation framework for the catchment and will also help the Panel of Commissioners who will be making decisions on the Waitaki consent applications. It is expected that a final cost-benefit analysis report will be completed in early February 2004.

The study aims to draw together information regarding the present economic, social and environmental characteristics of the Waitaki River catchment, and document anticipated changes that are likely to accompany water takes for different applications.

1.2 Purpose of Scoping Report

The Model Scoping Report is provided to confirm the direction for economic modelling, and the timetable for project completion.

1.3 Model Structure

The data research will be focused upon developing a spreadsheet model that draws relationships between the economic values of alternative uses of water, and their location within the catchment under different extraction scenarios. It is expected that the following options will be included in the analysis:

- Base Case: Existing (September 2003) hydro-electric power generation, and other diversions, with analysis of their tourism, recreation, environment and social outcomes.
- Additional Power Generation: Addition of more hydro-electric power generation to the Base Case (Sub-options would include singular inclusions of six major installations). The results would be based on Concept Consulting Report outcomes.
- Additional Irrigation: Addition of more irrigation diversion to the Base Case (Sub Options would include 5 major locations for diversion). It is assumed that the economic output per unit area for agriculture would be similar for all regions, however the costs of installation, water demand, environmental and social impact would be expected to vary with the location of the diversion.



- Three combinations of additional irrigation and power generation infrastructure will also be considered, which indicate highest overall production value from water.

Due to the broad nature of the modelling and limits to available input data, some important assumptions will be made. These are listed below:

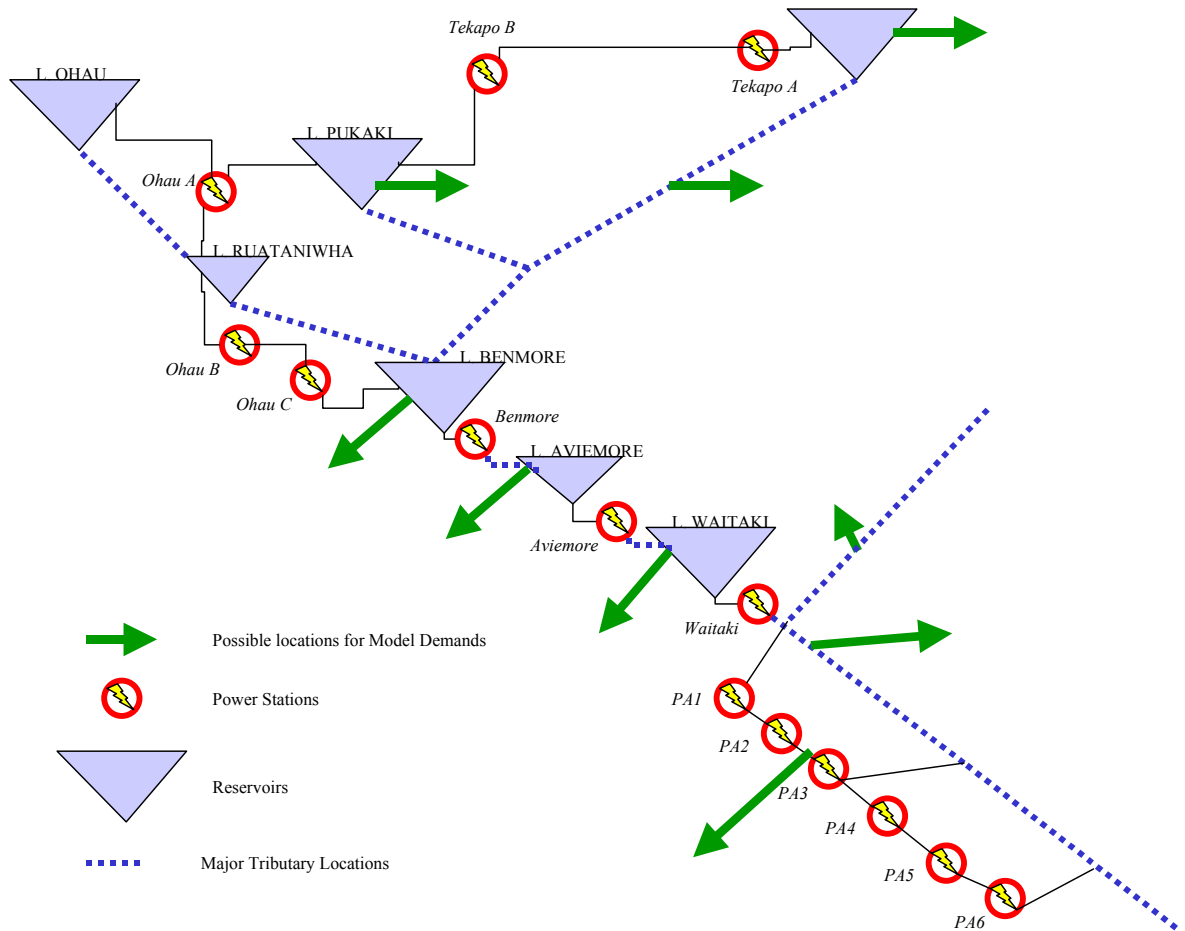
- Assumptions for extractions will be limited to average annual demands. The impact of seasonal variability of demands will be assessed quantitatively where possible, however in the cases where data is unavailable/insufficient, a qualitative assessment will be made.
- A broad set of assumptions will be applied consistently throughout the catchments that will enable analysis of the most critical variables (eg. water demand) and their influence on overall economic values to be assessed.
- Where appropriate linkages can be developed, the project team will assess economic benefits/costs of environmental and social impacts via benefit transfer from a range of applicable case studies. Methods used to value environmental and social impacts within these existing case studies may include contingent valuation, travel cost, hedonic pricing, and choice modelling. In instances where no suitable case studies can be found, environmental and social impacts will be quantified, or where this is inappropriate, they will be described qualitatively.

A description of the model schematic is presented in Figure 1 (below). The major reservoirs are marked, along with the location of existing and proposed power stations (and transfer canals). The locations marked with arrows represent the potential additional extraction demands upon the system. Early investigations will seek to identify those demands that represent the range of economic 'trade-off' within the system, and five locations will be used to present the results of the investigations.

The critical environmental indicators will be identified from the investigation in this process. It is possible that these could occur anywhere within the system and the constructed model will include these as required.



■ **Figure 1 Basic System Schematic with Possible Demand Locations**



The modelling work will draw upon the mean annual flow calculations provided within the hydrology report of the Meridian submission, and underlying hydrology work completed for the Concept Consulting report.

SKM will aim to construct the model in a way that allows scenarios to be constructed relatively easily, although the short timeframes will not represent time to incorporate flexibility for every demand location and aggregation may be used where the reduced accuracy of the results is not significant.

The modelling for any future development will emphasise accurate capture of the direct economic impact associated with various diversion proposals:

- capital costs
- recurrent costs
- asset replacement costs



- costs of continuing mitigation activities (environmental management activities etc.)
- costs of removing existing land use (acquisition)
- costs of removing existing water use (environment)
- benefits of offsets (eg. recreational lakes)
- benefits of increased value of production (irrigation)
- benefits of avoided cost (electricity generation) by comparison of price paths if power generation capacity were to remain at existing levels.

The indirect benefits will be incorporated where reasonable approximations can be made of the value added by affected industries downstream. Some of this information is available from Meridian Energy data. It is expected that Statistics New Zealand and The Treasury will also be consulted during the review to support development of assumptions. The project team will also hold internal discussions to determine the applicability of data that supports wider economic implications of changes in key production inputs and outputs across the economy.

A qualitative assessment of the *location* of various benefits and costs will also be undertaken, if the modelling data is considered robust to the point where conclusions can be drawn.

SKM would welcome suggestions on the modelling structure, or flexibility that might be required of the modelling outputs in the future.

1.4 Data Acquisition Activities

Data has been, or will be acquired from the following sources:

- Consent Applications
- MAF to ensure assumptions with regard to potential irrigated agriculture within the Waitaki and surrounding catchments can be applied in the modelling
- ECan and Otago Regional Council once a review of the consent information is complete. The project team will seek requests that extend upon data provided by consent applicants, and co-ordinate with MfE consultants assisting them with other investigations

An initial data search of Contingent Valuation case studies has been undertaken. A major database for this material exists at Lincoln University. Initial contact with the manager of this information (Dr Geoff Kerr) has been completed. A review of the ENVALUE and ENVI databases will also be completed to source additional information where applicable.



All parties contacted by the project team are keen to supply information. The project team is ensuring that available information (eg Aqua Resource Consent application, government agency publications, others) does not already contain useful summaries for application in the analysis.

It is expected that more detailed requests to Meridian regarding the energy side of the analysis will occur on reviewing the Concept Consulting report, and discussions to be held at the Energy Workshop in Wellington (10/11/03).

The key requests for information that have the potential to delay the project team, appear to be manageable within the revised timelines:

- Concept Consulting report – due in Early November
- MAF Statistics specific to the Waitaki Basin
- A summary of Consent Information (existing/proposed) that has been requested from Ecan / Otago Regional Council

1.5 Data Collection Workshops

A series of technical workshops are scheduled to support the investigation and enhance the data collection process. The workshops will provide a forum to discuss the range of available data, identify where gaps exist in this information, and comment on the quality of the various data sets. The information from the workshops will be used to refine assumptions applied in the economic analysis, and develop an understanding of the possible variation in key assumptions. The workshops also provide an opportunity to gauge the important issues that are concerning particular sectors, and how the proposals affect the likely outcomes for each sector.

The proposed agenda for the workshops will be circulated to the steering committee one week before the first workshop commences. The workshops will focus on the following sectors:

- Environmental (1 Workshop to be held at Oamaru 6/11/03)
- Irrigation (2 Workshops: Kurow, and Fairlie, 5/11/03)
- Social / Recreation (2 Workshops, Kurow 7/11/03 and Oamaru 6/11/03)
- Energy (1 workshop to be held in Wellington, 10/11/03)

The following email address has been set up to receive RSVP's and general queries from workshop participants:

waitakicba@skm.co.nz



1.6 Consultation on the Draft CBA

A round of presentations is also planned that will include representatives from all sectors. It is proposed to hold these in Kurow and Fairlie.