Pre-feasibility Report

Wairarapa Regional Irrigation Scheme

Prepared for Meridian Energy Ltd (Client) and the Wairarapa Regional Irrigation Trust

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Revision History

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1	Andrew Cowley	Draft – prior to WRIT workshop	12/9/08
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Document Acceptance

Action	Name	Signed	Date
Prepared by	Andrew Cowley		16/12/08.
Reviewed by	Graham Levy		16/12/08
Approved by	Richard Holyoake		16/12/08.
on behalf of	Beca Carter Hollings and Ferner Ltd		

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Executive Summary

Scope of this Study

Beca Carter Hollings & Ferner Ltd has been commissioned by Meridian Energy Ltd (Meridian), with the support of the Wairarapa Regional Irrigation Trust (WRIT), to undertake a pre-feasibility review and investigation into water storage and irrigation scheme layout options for the Wairarapa region.

This study follows on from a two stage study completed by Lincoln Environmental between 2001 and 2003 for the Masterton Business Enterprise and later for Go Wairarapa. This study builds on previous work and expands some areas, particularly the review of environmental and consenting issues.

The study is a desk top review that has not included any site surveys or investigations. The study estimates capital and operating cost. The potential economic returns and associated benefits from developing the scheme will be determined by Meridian/WRIT.

Hydrological

Meridian and the WRIT have advised that demand for irrigation in the Wairarapa is widespread and the area that can reliably be irrigated will likely be limited by the water sources available. This makes the investigation into storage locations and water resources critical to assessing what area can be reliably irrigated.

Potential irrigation schemes that have storage sites located to the north of Masterton at Te Mara, Kirirwhakapa and Black Creek (northern reservoirs) and to the south-east of Martinborough at Te Muna have been investigated in this study. Target irrigation areas have been selected based on environmental and landuse considerations, being the drainage properties of the soils and their proximity to rivers. Irrigation does currently and could occur outside of target areas however it is expected that irrigation in these areas will require more careful management to avoid environmental issues than irrigation undertaken within the target areas identified in this study

This study has considered the option of using rivers to convey irrigation water. The geography of the Wairarapa lends itself to a conveyance system that uses the major rivers (particularly the Ruamahanga River) to convey irrigation water from storages to down catchment irrigation areas. There is significant interaction between the region's surface and groundwater resources and Greater Wellington Regional Council (GWRC) is currently part way through an investigation into these resources. Guidance on the feasibility of river conveyance will not be provided by GWRC until their investigation is complete and they have reviewed the future allocation regimes. This work is expected to be completed in 2010.

Climate change is expected to result in higher temperatures and an increase in the frequency of droughts. This will increase the demand for irrigation and place a greater reliance on storages. Higher rainfall in the west may increase catchment derived and river flows but the effect of this is difficult to predict.

The irrigation schemes have been designed to achieve a Reliability Level 2 in accordance with the reliability approach outlined in ECAN report U01/1.

Hydroelectric power generation opportunities exist at some of the proposed reservoirs. PowerCo have advised that local power supply networks will need to be upgraded to accommodate both pump station demands and power generation. Further review is required to establish the extent of this work.

Geotechnical

From a desktop review of geological information it appears that materials suitable for construction of dams are present onsite however onsite geotechnical investigations are necessary to establish the nature, levels and quantity of material.

None of the northern reservoirs are located on active seismic fault lines however there are inactive faults through the Kiriwhakapa and Black Creek dams. This could be an issue both for dam stability and seepage. Concerns have been raised in the earlier study (MWH, 2003) over the potential for high seepage through the Te Muna reservoir. Onsite geotechnical investigations are required at all reservoir sites to investigate this issue.

The proximity of the northern dams to the main Wairarapa fault and the close proximity of the Te Muna dam to the active Huangarua or Dry River Fault requires more detailed geotechnical investigation. All storage dams have been assessed has having a medium to high Potential Impact Classification (PIC) and so will require site specific seismic assessments and design.

Environmental and Consenting

An environmental risk facing the scheme is managing the potential for increased diffuse pollution of groundwater and waterways due to an increase in nutrients and bacteria entering groundwater systems and rivers. Soil types vary across the Wairarapa and so site specific irrigation and drainage practices will need to be implemented to match soil type. More careful management will be required on certain soils (artificially drained soils, recent poorly drained soils with macropore flow, and yellow brown stoney soils located close to rivers), where nutrients and bacteria can pass quickly to ground and surface waters with limited treatment. It is possible to identify irrigation areas where soil types are expected to provide better treatment to irrigation water draining through the soil column. Irrigation schemes investigated in this study have focused on irrigating these areas in preference to others.

Any proposed irrigation infrastructure scheme, entailing the creation of a dam and associated pipe infrastructure will require various land use, discharge and abstraction consents from GWRC and land use consents from the relevant local authority. In this instance the key planning documents are the Regional Policy Statement, the Regional Freshwater Plan and the Combined Wairarapa District Plan. The Combined Plan is not yet operational but it is anticipated to be operational by the time any applications are able to be made in respect of the proposed schemes. The emerging Regional Policy Statement supports water harvesting schemes and, therefore, provides an important policy basis for the proposed irrigation development.

All proposed schemes will require discretionary consents from the regional and local authority. The least complex scheme from a consenting perspective is the Te Muna scheme because it entails least disruption to existing watercourses. The proposed canal that forms part of the Black Creek Scheme may entail a discharge to the Waiohine River (subject to detailed design) which would make the entire scheme a non-complying activity, unless consent for that part of the scheme was sought at a later stage.

The ‘water harvesting’ approach promoted for these schemes (capturing mid to high flows for use at times when river flows are low) needs to be tested with the consenting authority as its is potentially at variance with the current regional plan principles for allocation of river flows, which is that core allocation is only available above the minimum river flow, while further allocation is only available above the supplementary flow. This approach is pragmatic, and provides for good use of the total resource while protecting the river. There will be some effects on available supplementary allocation downstream but this effect will be minor. However, in the absence of specific provisions in the regional plans, the required release and therefore the available water for the dams remains uncertain. This can only be confirmed through the consenting process, at which time a more comprehensive analysis of effects on the river and other existing or potential users can be determined.

In terms of environmental effects, the Te Muna scheme appears to create the least effects, because it does not entail damming of an existing major water course. All other schemes do, and in so doing may cause adverse upstream and downstream ecological effects. Notably the Black Creek scheme is likely to have adverse effects on Brown Mudfish habitat. A detailed study is required to ascertain possible mitigation measures. Black Creek, Te Mara and Kiriwhakapapa all support trout and notably the latter two water courses are regionally important for trout spawning. Both the Black Creek and Kiriwhakapapa schemes entail substantial abstraction and also cause community severance issues. The canal component of the Black Creek scheme severs existing watercourses and will discharge into the Waiohine, creating complex aquatic effects. The Kiriwhakapapa will sever one of the 3 main entrances to the Tararua Forest Park, including a camp ground and access tracks to Te Mara.

Provisional advice from DoC is that the irrigation schemes will need to carefully consider loss of ecological habitats through damming and also the effects from intensification of farming practice. Viticulture practice is considered to have less effect than dairying or cattle / sheep farming.

After Te Muna the next least effect scheme is likely to be Te Mara because it does not entail abstraction from another water course and appears to have least community severance effects. All schemes will need to provide mitigation and all those other than the Te Muna scheme will need to contemplate offsetting, entailing creation of habitat offsite elsewhere such as at for example at Lake Wairarapa.

Before proceeding it is advised that at least a preliminary visual and landscape assessment of all schemes is undertaken and that detailed ecological assessments of all areas are undertaken to develop an understanding of the values of the environments that will be effected / lost and how they might be mitigated. This preliminary work should include an assessment of the effects of the proposal on downstream water levels and on current permitted abstractions.

With regards to strategy it is crucial that a consultation strategy is developed to facilitate development of the schemes in partnership with the councils (local and regional), DoC, Fish and Game, iwi and other relevant stakeholders. The first stages could involve choosing a preferred scheme and location using the work undertaken to date. Comprehensive schemes should be prepared, so that joint applications to the regional and local authority can be submitted.

Cost Comparison

The below table presents the key attributes of each of the irrigation scheme options investigated in this study. A risk category has been assigned to the non-financial factors. These are as follows:

H	High risk
M	Medium risk
L	Low risk

Comparison of Irrigation Scheme Options

Analysis	Black Creek	Kiriwhakapapa	Te Mara	Te Muna
Description ■ Area serviced ■ Storage type ■ Volume	 14000ha Dam 43.2Mm^3	 7700-11000ha Dam 35-47.2 Mm^3	 3000ha Dam 12.8 Mm^3	 6000ha Dam 7.7 Mm^3
Costs ■ CAPEX/ha ■ OPEX/ha ■ NPV/ha	 $13.5-13.8k $175 $14.0-14.5k	 $14.1-14.7k N/A N/A	 $11.2-11.8k $40-130 $11.0-12.0k	 $13.0-13.2k $355 $17.3-18.3k
Environmental ■ Fishery ■ Water Quality ■ Social	 H H H	 H H H	 H H M	 L L M
Engineering Risk ■ Seismic ■ Constructability	 H H	 H H	 H H	 H M-H
Consentability ■ Risk ■ Complexity of Studies	 M-H M	 H M	 M-H M	 L-M L

Recommended Scheme

The Te Muna Irrigation Scheme appears to face the least environmental and consenting obstacles and so it is recommended that investigations proceed into advancing this option.

The Te Mara Irrigation Scheme is the next preferred option. This option has the lowest CAPEX and OPEX and has fewer environmental and consenting challenges than the other northern schemes. This option also provides the opportunity for environmental enhancement of the Waipoua River as the reservoir storage will provide an increased minimum flow in the Waipoua River.

The Black Creek Irrigation Scheme is the next preferred option. It has the potential to irrigate a large area but for it's ultimate build requires abstraction from both the Waingawa and Waiohine Rivers. If only the Stage 1 works were completed (no river abstraction) then this scheme still presents greater consenting challenges than Te Mara and will likely cause greater community disruption.

The Kiriwhakapapa Irrigation Scheme is the least preferred of the options considered in this study. It doesn't have a local target irrigation area (as the area is better served by Te Mara) and the construction costs are also higher per cubic metre of stored water than the adjacent Te Mara reservoir. As with the Black Creek reservoir it may result in significant community disruption.

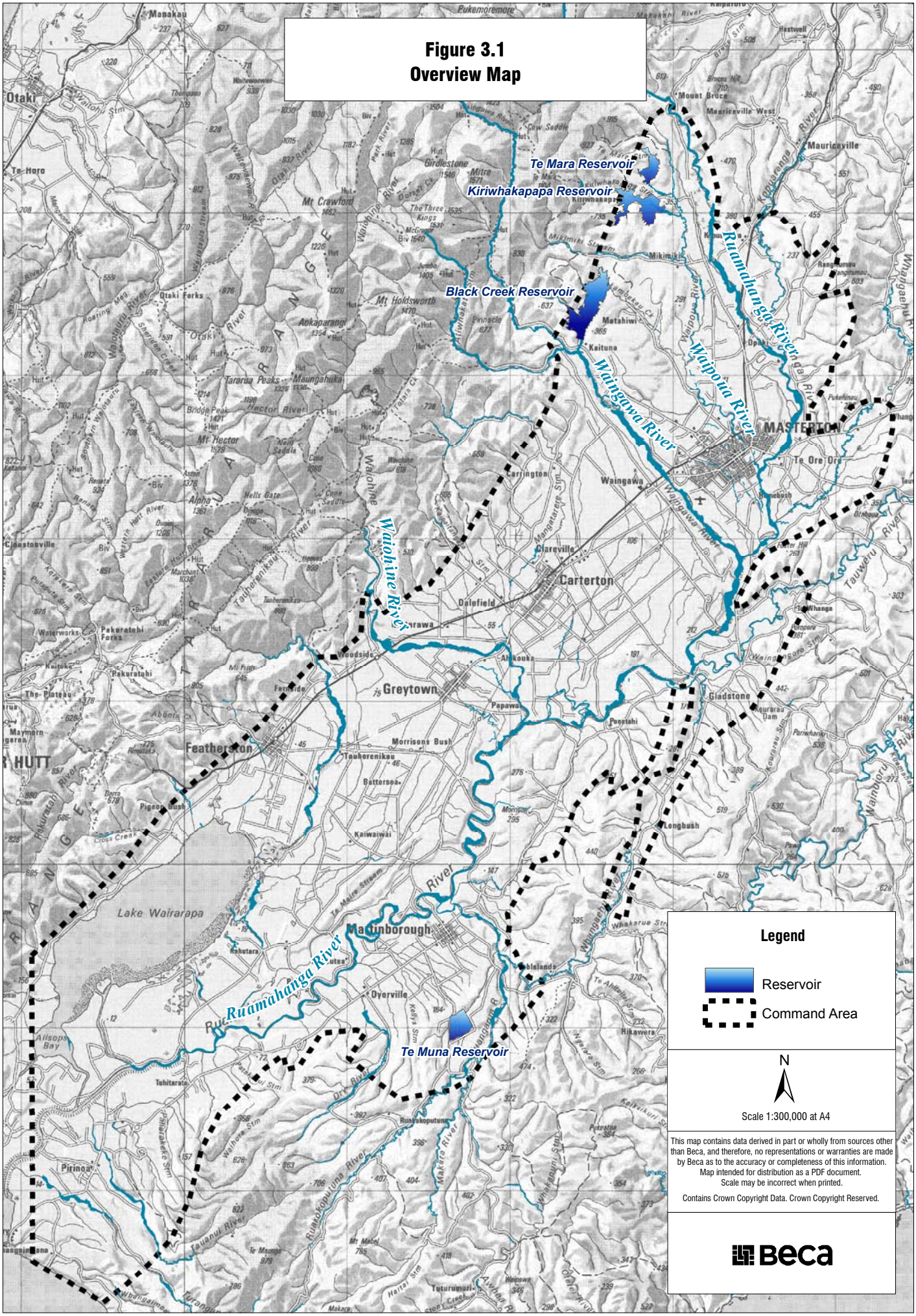
Figure 3.1
Overview Map
Te Mara Reservoir
Kiriwhakapapa Reservoir
Black Creek Reservoir
Te Muna Reservoir
Ruamahanga River
Waipoua River
Waingawa River
Waiohine River
Otaki
Te Horo
Mt Crawford
Mt Holdsworth
Mt Hector
Tararua Peaks
Otaki Forks
Mikimiki
Matahiwi
Kaituna
MASTERTON
Te Ore Ore
Waingawa
Carterton
Clareville
Dalefield
Greytown
Woodside
Featherston
Morrisons Bush
Battersea
Kaiwaiwai
Longbush
Gladstone
Martinborough
Dyerville
Lake Wairarapa
Ngaumu
Hikawera
Tuhitarata
Pirinoa
Ruamahanga River
Legend
Reservoir
Command Area
N
Scale 1:300,000 at A4
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