HenleyHutchings

Review and Summary

Tutaenui Rural Water Supply
Pre-feasibility

Prepared for:
Rangitikei District Council
Private Bag 1102
Marton 4741

8 December 2017

COMMERCIAL IN CONFIDENCE

Contents

Introduction

Purpose

Rangitikei District Council have commissioned pre-feasibility research on options for a Tutaenui Rural Water Supply Scheme (RWS) and reconfiguring the Hunterville RWS. The project has been supported by the Ministry for Primary Industries (MPI). This work has taken place in the period October 2016 to November 2017.

HenleyHutchings have been invited to review this 'pre-feasibility' research. The purpose of this review is to produce a summary report collating and interpreting the findings[1] in a manner that:

- Can be easily understood by various stakeholder groups.
- Provides externally-generated, high-level recommendations and groundwork for moving toward the next phase of work.
- Is suited to consideration by the:
    - Project Governance Group in the first instance.
    - Potential funding organisations including, but not limited to MPI in the second instance.
    - Public and interested stakeholders in the third instance.

Structure and 'problem statement'

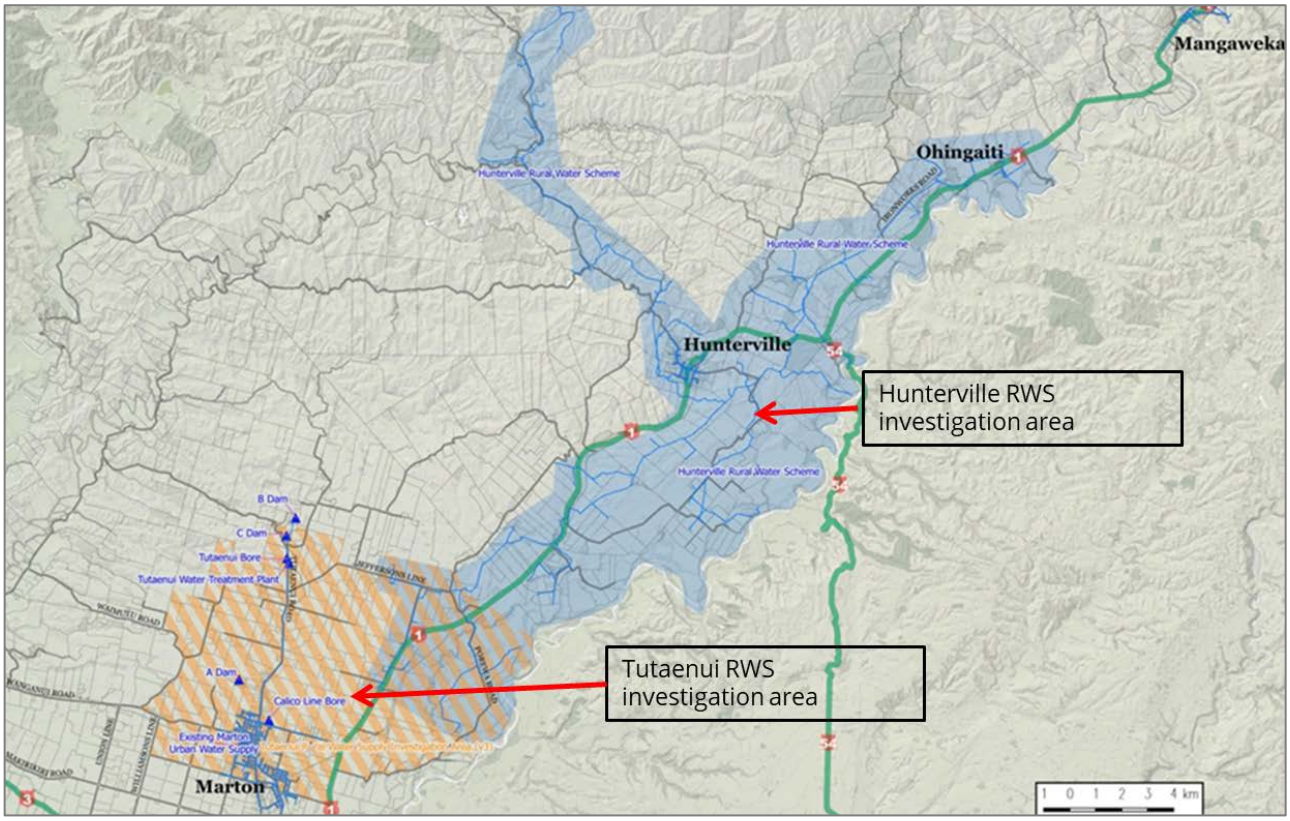
The report is focussed on the Tutaenui and Hunterville RWSs in the lower part of the Rangitīkei River basin (Figure 1). The report first reviews the soil and the land use of the lower Rangitikei River Basin (Figures 2 and 3). It then summarises economic development opportunities identified for the lower Rangitikei in the 2015/16 'Accelerate25' Manawatū-Whanganui Growth Study and Action Plan. The various feasibility studies carried out since the publication of the Accelerate25 reports are then reviewed (Figure 6).

In simple terms, these previous reports and the summary information provided in this report attempt to answer a set of questions about the merit and feasibility of making changes to the Tutaenui and Hunterville RWSs. These questions flow from the general to the particular.

1. Is there a general case for further exploring water storage and reticulation for stock water and irrigation in the lower Rangitikei (the reports completed by the Catalyst Group in 2014)?
2. Is water reticulation in the lower Rangitikei a 'top ten' development opportunity for the Manawatū-Whanganui Region (the Accelerate 25 reports, 2016)?
3. What advantages accrue for farmers from the supply of reticulated stock-water (the AgFirst report 2016)?
4. Are land owners interested in reticulated water for both stock-water and irrigation (the Voss Stage One report 2017)?
5. Where would the water for reticulation come from, what are the issues to be resolved in supplying this water and how would the water be best distributed (the Stage One Voss report 2017)?
6. What are the likely costs of establishing a Tutaenui RWS and making changes to the Hunterville RWS to deliver the requested water and how much water demand could be served (the Stage Two Voss report)?
7. How could land use change in the area covered by the potential RWS expansion and what are the financial outcomes for various land uses (the Stage One BakerAg report 2017)?
8. What are the likely returns from three potential high value land use options: brown onions, apples and kiwifruit (the Stage Two BakerAg report 2017)?

[1] The findings in this report are based on our interpretation of the background reports provided to us. While every attempt has been made to clearly understand these reports, decisions about future investment should not be taken solely on the information provided in this report.

Figure 1: Location of study area



Stated even more simply, the work carried out to date attempts to answer a 'problem statement' which may be described in the following terms: "*what's the demand for reticulated and irrigated water in the lower Rangitikei Basin, how would the water be best used, how could that water be supplied, what would it cost and what are the likely returns on investment for individual land owners in participating in new rural water supply schemes*?"

The final part of the report then posts some thoughts and recommendations about the next steps which may be taken to secure land-based economic development opportunities for the lower Rangitikei district.

Background and context

Land use capability

The lower part of the Rangitikei River basin has extensive areas of land with highly versatile land use capability, excellent silt and sandy loam soils and very capable farmers[2] (Figure 2 and Figure 3).

The challenge faced in taking up the land use options provided by these great land, soil and skilled farmer opportunities is the low levels of soil moisture experienced during the December to April months[3] (Figure 4). Fortunately, information provided by Horizons Regional Council indicates that some water is available to serve development needs on some of these premium soils (Figure 5).

[2] See land use capability maps and research held by Horizons Regional Council

[3] See the Tutaenui climate summary data held by the Manawatū-Whanganui Shared Services Group

Figure 2: Land use capability

Figure 3: Soil types

Figure 4: Soil moisture deficit

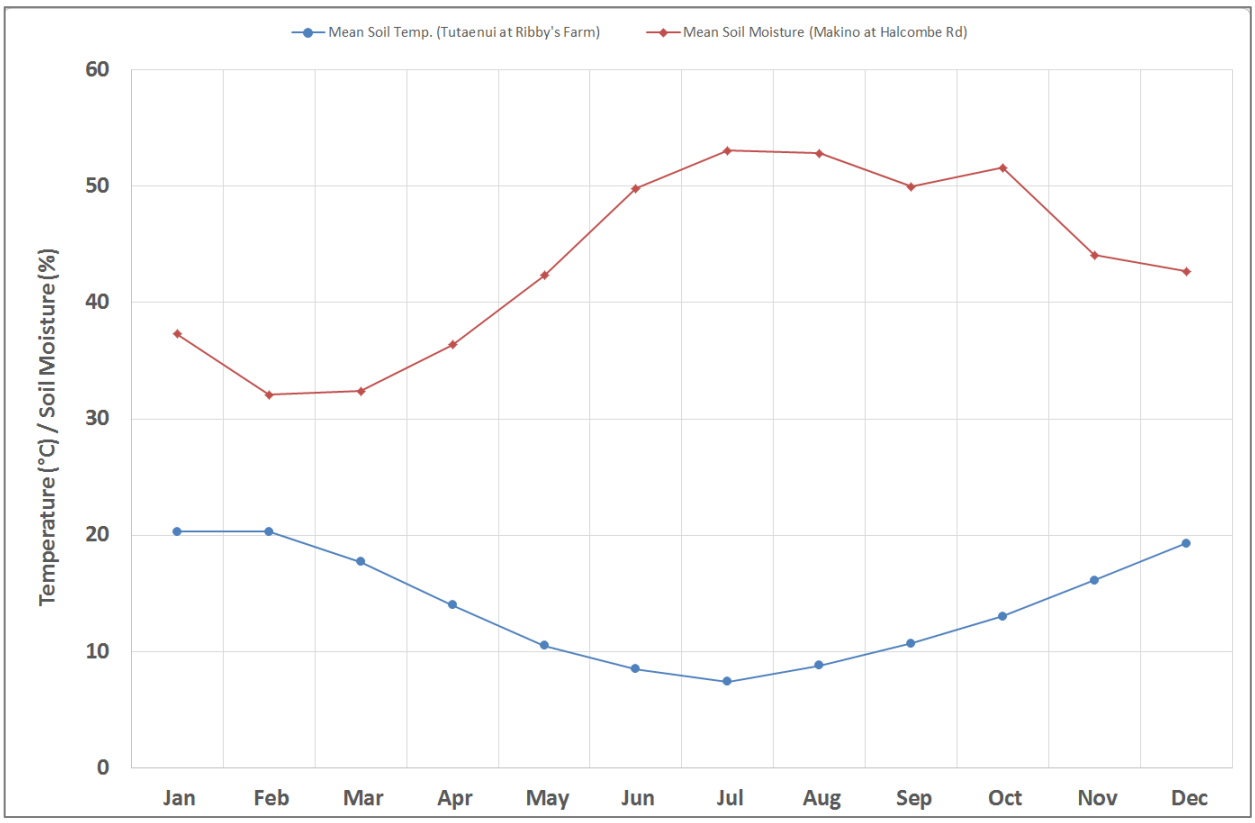
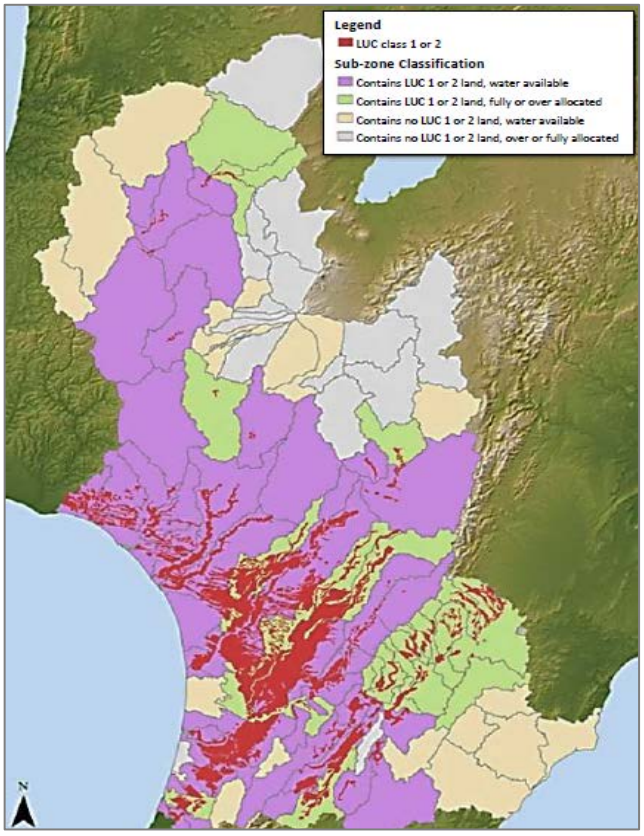


Figure 5: Water availability compared to land use capability



Land use change

In the period between 2002 and 2012[4], the following land use changes have occurred in the Rangitikei District[5]:

- ↑ Dairy cattle numbers have increased by 5%.
- ↓ Beef cattle have decreased by 1%.
- ↓ Sheep numbers have decreased by 4%.
- ↑ Arable and crop has increased by 1%.

With these numbers in mind[6], the challenge being considered is: what positive land use productivity, profitability and related community employment, servicing and food processing opportunities would arise if reticulated water was provided over an extended area in the lower Rangitikei basin?

Manawatū-Whanganui Growth Study

The potential for interventions to achieve land use optimisation in the lower Rangitikei basin was recognised as one of nine subject areas for focused attention in the Manawatū-Whanganui Growth Study Opportunities Report[7]. This report noted:

- The use of irrigation and the reticulation of stock water have been developing in the region for several decades.
- The expansion of small-scale water storage, reticulation and irrigation arrangements would improve the productive capacity of land and moderate the risks of more variable weather patterns.
- Expansion of water storage, reticulation and irrigation would increase revenue to the region.
- Jobs would be created to meet the servicing requirements arising from land use optimisation.
- There is an alignment between versatile soils and water availability in parts of the Rangitikei Basin.
- Nutrient losses from agricultural land need to be managed to avoid eutrophication of rivers, lakes and ground water (the 'One Plan'[8] defines the 'limits' to the volume of nutrients allowed to be lost from all parts of the region).
- The challenges associated with the use of irrigation would need to be overcome before the opportunities could be fully capitalised upon, including lack of information about establishment and running costs, the implications of farm system changes and uncertainties about the cost benefit of investment in particular land use changes.

Manawatū-Whanganui Action Plan

The Manawatū-Whanganui Growth Study provided the base for the subsequent development of the Manawatū-Whanganui Economic Action Plan[9]. One of the actions identified in this report, for immediate attention, was commissioning a pre-feasibility study on the general potential of stock water schemes. A further action identified in the Accelerate 25 Action Plan was to research the feasibility or undertake pre-feasibility design work on a potential Tutaenui RWS.

MPI funded AgFirst to undertake nation-wide case study work to describe the first of these actions. Rangitikei District Council, again with funding support from MPI, has taken up the second of these actions.

---

[4] Rangitikei District Council may wish to consider seeking 2017 data to update the information reported by Voss and Co. about the land use change occurring since 2002.

[5] See Tutaenui RWS Prefeasibility Study, Stage One report 2017 – the 'Voss and Co. Report'

[6] These figures may need to be updated to reflect land use in 2017.

[7] Manawatū-Whanganui Growth Study, Opportunities Report, July 2015

[8] The 'One Plan' is the integrated land, water and air plan produced by the Horizons Regional Council to regulate land use

[9] Manawatū-Whanganui Economic Action Plan – Accelerate 25, August 2016

Research and studies

Overview

Assessment of the potential to expand the area served by reticulated water supply systems in the Rangitikei has been going on since the 1990s and probably earlier (Figure 6).

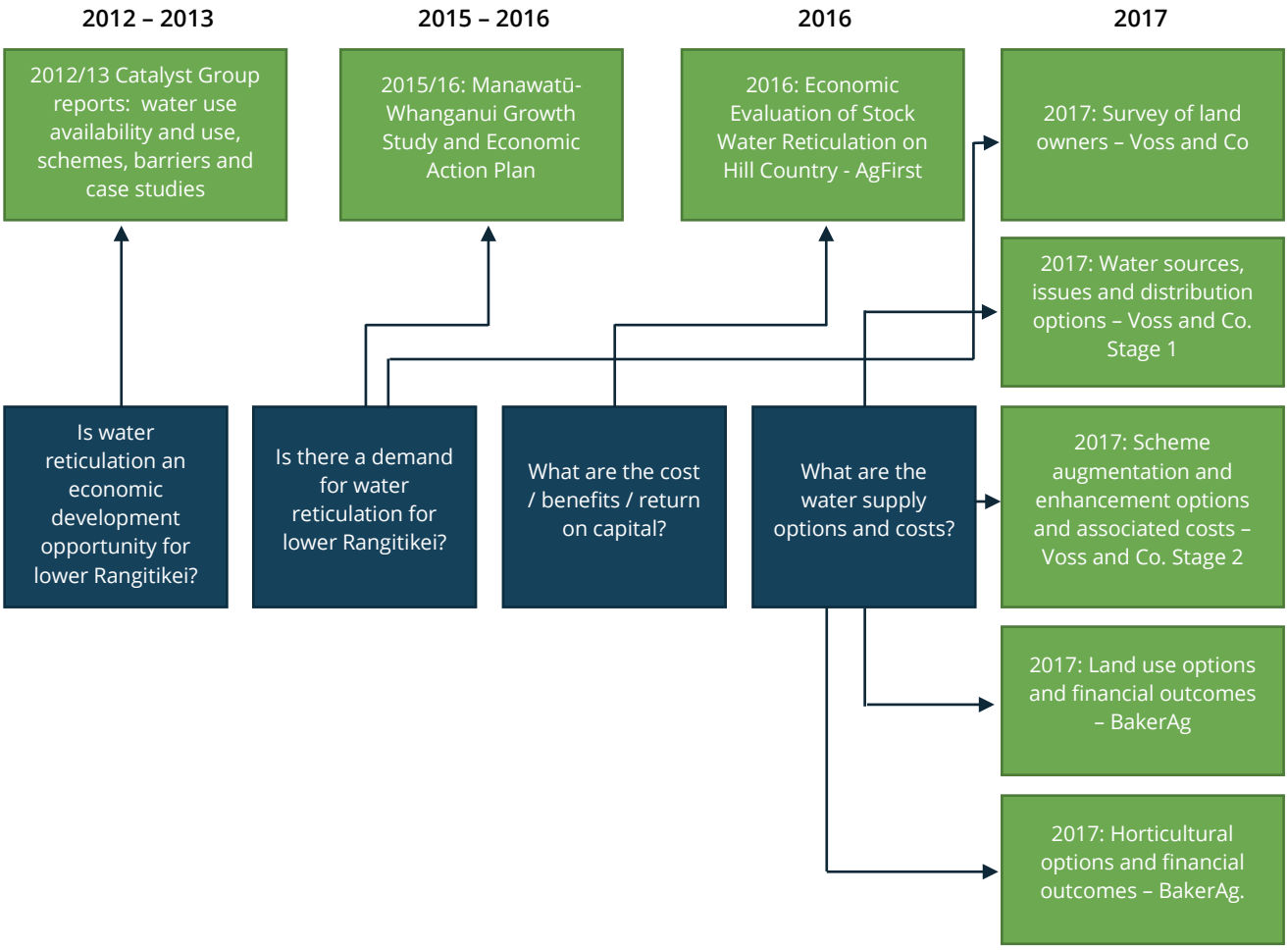
In 2012/13, the Catalyst Group provided high level information about land owner interest (demand) and supply options.

National case study work by AgFirst described the general benefits of stock-water reticulation schemes.

Rangitikei District Council and Voss and Co. took this work a step further by surveying the level of interest of lower Rangitikei farmers in reticulated water systems and by identifying and assessing various supply options.

BakerAg then provided more detailed information about the likely costs and benefits for land owners of reticulated stock-water and the land use changes which may be considered if irrigation water was available for three horticultural options. More information about each of these studies follows.

Figure 6: Sequence of feasibility studies and other research



Early Marton Rural Water Supply investigations

As early as 1996, various consulting engineering firms were commissioned by the Rangitikei District Council to explore options for improving Marton's town water supply. These consulting engineering firms were also invited to assess the potential to reticulate to various industrial users and rural water supply schemes of various sizes.

One of the earliest of the reports[10] found there were potential sources of water, including the Calico Line Bore and dam storage, suited to reticulate water supply for sheep and cattle use over 6,500 ha, but not for irrigated land use. Follow-up work[11] confirmed the viability of ground water sources for reticulated domestic, industrial and rural water supply in the area around Marton.

Early pre-feasibility work – the Catalyst Group reports

The broad flow of the current stock-water and irrigation assessment studies commenced with work commissioned from the Catalyst Group in 2013[12]. The Group were requested to undertake a 'strategic water assessment' for the district to generate information about the:

- Availability and certainty of water supply (surface and groundwater).
- Efficiency of current water use, and opportunities for improvement.
- Costs, benefits, on-farm implications, and regulatory and environmental considerations around irrigation and alternative uses for irrigated land.

During the course of the Group's work, seven reports were produced:

1. Rangitikei catchment: surface water use and availability assessment.
2. Rangitikei catchment: groundwater use and availability assessment.
3. Barriers to Irrigation.
4. Hunterville Rural Water Supply Scheme: A Review.
5. Irrigation efficiency in Rangitikei District.
6. Market barriers to alternative products.
7. Property-scale case studies x 6.

The above reports may be described as 'pre-feasibility' in nature. Their benefit was in laying the ground for the work which followed. Some of the more pertinent findings arising from this work included the following:

- Actual water use is much less than the volume for which consents for use have been granted (noting however, that the one in ten-year frequency dry years is when interest in reticulated water will peak)[13].
- The 'One Plan' provides additional water for allocation if demand can be proven and environmental limits are adhered to.
- The Rangitikei groundwater zone is of considerable economic importance and is approaching the limit of allocation.
- There are various sticking points slowing adoption of irrigation by land owners.
- The Hunterville Rural Water Scheme provides 160 farms (c. 61, 000 ha of farmland) in the middle Rangitikei district with stock-water and water for dairy shed wash-down. It also provides water to the Ohingaiti, Rata, and Hunterville communities. The Scheme has a number of challenges including capital replacement and pumping costs.
- Irrigation efficiency opportunities are being taken up incrementally by water users.
- Irrigation is most effective when accompanied by farm system changes.
- Medium-scale irrigation (>50 ha) on the flat to rolling country in the middle areas of the District is a viable option.

---

[10] Royds Consulting, 1996, Marton Rural Water Supply Pre-feasibility Study Report

[11] MWH, 2008, Marton Alternative Water Supply – Risk Issues

[12] Project Summary, Opportunities and Recommendations,' Catalyst Group, Report prepared as part of the Rangitikei Strategic Water Assessment project, November 2014

[13] This is a critical statement. It is not until after a particularly dry year or a succession of dry years that farmer interest in reticulated rural water schemes peaks.

- The Rangitikei district has the potential to support a range of alternate land uses and crop types. The potential and suitability of these alternative crops requires further investigation.
- There are opportunities to expand stock-water reticulation by:
    - Making better use of the Marton water supply feeder pipeline.
    - Making further use of the District Council's 600m bore located alongside the Marton water treatment plant (the 'Calico Bore').
    - Upgrading the original Marton water supply dam.
    - Overhauling the Hunterville RWS.
    - Further exploring the potential for groups of landowners to work collectively to develop small-scale stock-water schemes, where the water is stored on one property and from there distributed to neighbouring properties.

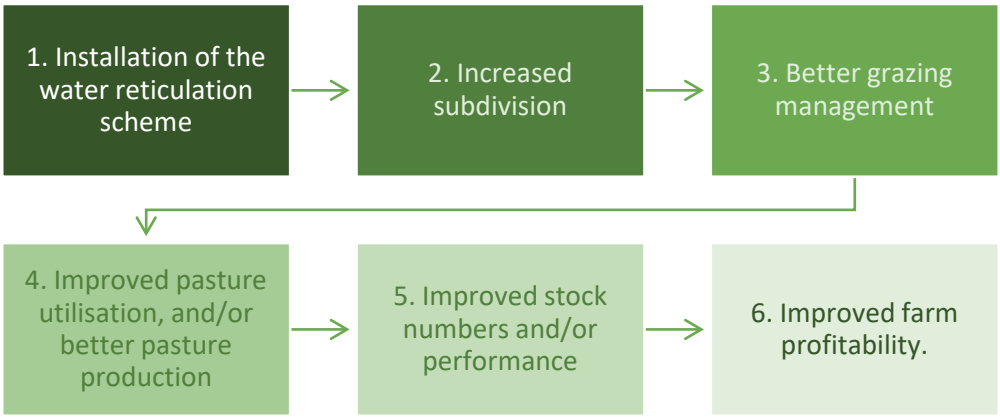
Economic Evaluation of Stock Water Reticulation on Hill Country – the AgFirst report

This report outlines the economics of reticulating stock water on hill country. It was compiled by examining 11 case study farms selected from throughout New Zealand. Five of these farms were in the Manawatū-Whanganui region.

The report did not investigate or report on the technical/engineering aspects of stock water supply. Rather, the focus was on the economic returns arising from a change from a natural water source for stock water (usually a combination of creeks/streams and dams with variable water quality and reliability), to a reticulated system of good quality, reliable water.

The results of the analysis showed significant internal rates of return on investment. Across the five Horizons hill country farms, these ranged from a low of 14% to a high of 52%. The pay-back period for these farms ranged from a low of 7.5 years to the best example case of 2.25 years. Post the installation of the water reticulation schemes, stocking rates had increased by 0.5 SU/ha, and lambing by 12%. Most farmers significantly increased the proportion of animals sold 'prime' versus 'store', as well as increasing the weight of animals finished.

Importantly, the AgFirst report also noted that establishing reticulated stock water systems are not on their own, the recipe for increased productivity/profitability. The general sequence of events leading up to improvements in stock numbers/performance is:



AgFirst recommend the cost of applying each and all of these steps needs to be factored into the base capital and operating cost of participation in a rural water scheme.

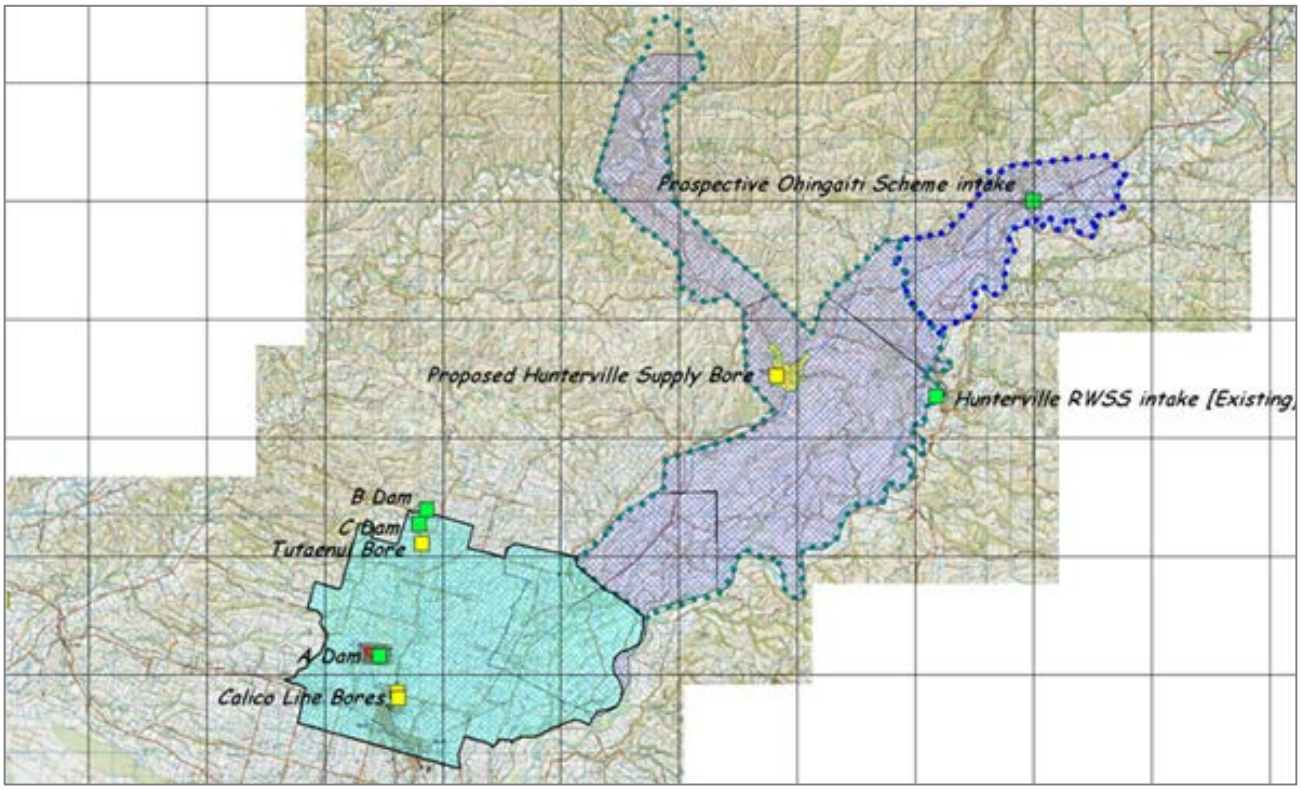
While the title of this prefeasibility report implies it is focused on the Tutaenui RWS, the report actually covers both the Tutaenui and Hunterville RWS's. This is because potential solutions involve a degree of integration between the two Schemes.

The 'Stage One' report focusses on water demand assessments, water source options and possible layouts of scheme pipe networks.

The thinking behind this prefeasibility study was on how to make better use of existing consented water sources in the first instance.

The preliminary thinking about the potential Scheme included assessment of potentially augmenting supply by raising A, B and C dams currently or previously associated with the Marton urban supply (Figure 7). Consideration was also given to water quality concerns.

Figure 7: Locations of sources for the Tutaenui RWSS and associated parts of the Hunterville scheme (NB Green markers indicate surface sources and yellow markers indicate groundwater (bore) takes).



Comments made in survey responses

An important input component of this Tutaenui pre-feasibility work was the results of a survey of local land owners. Farmers were surveyed across both the Tutaenui area and the Hunterville RWS area. The purpose of this survey work was to confirm: current land use; current stock numbers; current water sources[14]; reliability and security issues; current and desired irrigation areas; current and desired stock water areas and importance; price appetite and interest in irrigation and; other general matters.

The following selection of comments supplied by those surveyed provides an indication of the level of interest in reticulated water supply:

[14] We note that the capacity and quality of current on-farm water sources may be a significant factor affecting farmer's final decision to switch to a reticulated scheme – particularly if they have already sunk significant funds into their current systems.

- Get on with it – less talk, more action.
- Want to develop a more intensive fattening block.
- Good idea – pricing and apportionment of costs is the key.
- A guaranteed supply of good stock-water would be worth gold.
- Could convert all existing use to new reliable supply if it was available.
- An expanded scheme would give more security to the District.
- Quality of water is vital for stock health.
- More water would mean better and more extensive grazing of available land.

There is strong interest in a Tutaenui RWS

Tutaenui RWS

Introduction

The 10,550 area of land that could be served by the new Scheme is used in the following way: 78.5% grassland; 15% arable and; 5% in scrub / forest / bush.

The proposed Scheme area currently serves:

23  Sheep and Beef Farms

12  Dairy Farms

20  Lifestyle Blocks

12  Dairy Shed Water Uses

Stock-water demands are 1,575 cubic metres / day. Potable demands are 198 cubic metres per day. The combined demand total is 1,773 cubic metres per day. This demand requires 20 l/second of continuous flow.

Demand - Tutaenui

The positive comments from those surveyed (noted earlier) were re-enforced by the demand data and the area of interest information provided in the survey responses (Figure 8). The core conclusions about demand, as indicated by the survey results, were that:

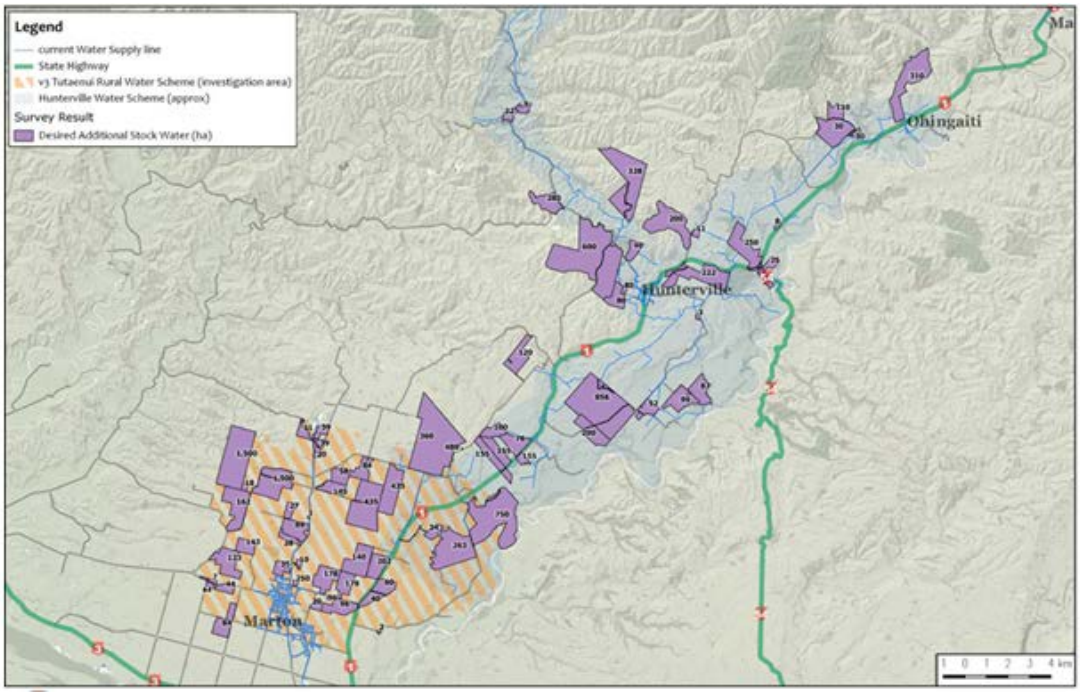
- Stock-water demands typically range from 140 l/ha/day to 190 l/ha/day (plus or minus 20%) depending on the land use mix of beef, dairy and sheep.
- By comparison, typical irrigation demands are around 58,000 l/ha/day.
- The area of interest in stock-water reticulation is approximately 5,000 ha or just under 50% of the total effective scheme area of 10,550 ha[15].
- Supply could be by means of a Tutaenui RWS.

[15] It should be noted this relates only to those surveyed. The level of interest could be larger. This figure is likely to be an underestimate.

- After estimated stock water reticulation interest is satisfied, existing systems could supply only 50 ha of the 129 ha of 'irrigation interest' displayed in the survey responses. Serving this area would require a continuous flow of about 34 litres / sec. In other words, interest in irrigation significantly exceeds the capacity of the Tutaenui scheme to meet supply[16].

> *In other words, interest in irrigation significantly exceeds the capacity of the proposed Tutaenui scheme to meet supply.*

Figure 8: Areas of interest in additional stock water



Bore water quality - Tutaenui RWS

The water quality challenges associated with the Tutaenui bore are associated with its hardness and the comparatively high mg/l content of manganese. Further testing is required covering arsenic, boron, nitrite-N, nitrate-N, hydrogen sulphide, chloride, pH, LSI, electrical conductivity and organic determinants of health significance.

If the only issue is found to be elevated iron, manganese and turbidity, the water may benefit from treatment. No matter what, it appears some form of treatment will be needed to make the proposed reticulated water suitable for all its potential uses. This will in all likelihood include a requirement for domestic uses to have on-site treatment systems in order to satisfy the requirements of the New Drinking Water Standards[17].

---

[16] We could not find information to confirm whether information about the likely 'cost of irrigation' was provided to farmers as part of the survey. The 129 ha of displayed 'irrigation interest' may therefore be larger or smaller depending upon the exact costs of supply.

[17] See the Rural Agricultural Drinking Water Supply Guideline, Ministry of Health, 2015. In summary, this requires rural agricultural water that is used for human drinking, domestic or food preparation purposes to not exceed the maximum acceptable values in the Water Quality Standards set out in section 2 of the Drinking-water Standards for New Zealand. This responsibility may be fulfilled by the rural agricultural drinking-water supplier, or the building owners, or by any collective of these, as set out in the water safety plan for the supply.

Water storage options - Tutaenui RWS

Additional volumes of water could be accessed by raising the levels of Dam A and Dam B (Figure 8) but it is likely to be impractical to raise the level of Dam C. More particularly, the Voss and Co. report notes:

- Raising the present crest level of Dam A by 0.7m would require land acquisition up-stream because the tail water would encroach beyond the boundary of the current site. The resultant increased storage volume would support a take at an average of 583 cubic metres per day for 100 days, after evaporative losses are taken into account. NB additional pumping costs would also be incurred.
- Raising the present crest of Dam B by 2.5m would give rise to a net yield gain of 2,015 cubic metres per day after taking account of evaporative losses. Additional land acquisition would be required.
- Raising the level of Dam C is not possible without running the risk of affecting the integrity of the toe of Dam B to which it abuts.

Concept layouts – Tutaenui

Concept networks for scheme reticulation have been developed for the scheme area for two cases:

1. A fully reticulated area for stock water with no irrigation.
2. A fully reticulated area of approximately 50 ha of irrigation for selected horticultural areas.

A small reservoir at Mt Smart is proposed alongside a powerful submersible pump suited to the existing bore hole.

Hunterville RWS

Introduction

Voss and Co. undertook a number of assessments to determine the hydraulic properties of the current Scheme and then to assess options for reassigning supply into different parts of the served area. The first task was to establish the viability of the existing hydraulic models. The second major task was to re-examine the water demands in light of land use changes since the Scheme was originally designed. The third task was to investigate the possibility of reassigning supply from the reticulated desegregated areas from within the existing Scheme area to other areas where interest had been determined from responses to the farm surveys.

Hunterville RWS – current system

The 19,127h of land currently served by the Scheme is 83% grassland, 2% arable and 15% scrub/forest/bush.

The Scheme area currently serves:

61  Sheep and Beef Farms

26  Dairy Farms (inclusive of dairy shed requirements)

10  Lifestyle Blocks

Stock-water demands are 2,880 cubic metres/day and lifestyle property demands are 318 cubic metres per day. The combined demand total is 3198 cubic metres / days or a continuous flow of 37 l/second.

Demand - Hunterville RWS

There is significant interest from land owners in areas within and about the existing Hunterville RWS in joining the Hunterville RWS community scheme. This includes those with a demand for water for reticulated stock water as well as from existing domestic consumers[18] with an interest in additional water[19].

The new stock water and domestic demand interest would add 5,500 ha to the served area.

Irrigation demands within and about the Hunterville RWS scheme could not be met from the existing Hunterville RWS reticulated network or from existing consented water sources.

Supply - Hunterville RWS

As part of the desegregation model, Voss and Co. split the area served by the Hunterville RWS into three sub-zones:

- **A northern zone** separated at Vinegar Hill and supplied from a new source in the Makohine Stream.
- **A central zone** consisting of the existing network between Porewa and the northern side of Vinegar Hill, but excluding the supply to Hunterville with supply from the consented Rangitikei river extraction –noting this source has the ability to serve additional areas.
- **A southern zone** to the south and west of Porewa, as lying within the footprint of the proposed Tutaenui Rural Water Supply.

Concept layouts - Hunterville

Voss and Co. suggested the Hunterville RWS could technically be reconfigured to meet expanded demand by:

- Providing a separate source to the northern area of the scheme. For planning purposes this has been identified as the "Ohingaiti RWS Scheme." If this approach was applied it would free-up about 550 cubic metres/day – noting that treatment quality, pump size, pipes and storage tank changes would need to be addressed to accommodate this expanded area.
- Providing a separate source for Hunterville Township thereby freeing up 380 cubic metres / day and enabling an extra 2,000 ha of area to be served – noting that a new ground water intake bore for the township at a depth of 50m would first need to be proven as being effective and able to be consented.
- Incorporating the southern portion of the scheme with the Tutaenui RWS thereby freeing up 380 cubic metres to be redistributed into the Hunterville supply area – noting new pipework and sufficient head pressure would be required to make this option successful.

Tutaenui Rural Water Supply Scheme Prefeasibility Report – Stage 2

The Stage 2 report prepared by Voss and Co covered:

- Cost estimates of the scheme options for both the proposed Tutaenui RWS and the reconfiguration of the Hunterville RWS as described above.
- Comments on the potential of environmental flows being included within any scheme development.
- An assessment of the potential for flood detention as part of any dam raising options.
- A preliminary investigation into the Hunterville RWS scheme operations.
- The results of an assessment of the possibilities for any improvements into Scheme efficiencies.

[18] It should be noted there are no plans to upgrade the Scheme to meet the standards required of a potable supply.

[19] A matter for further exploration would be the demand for further units from existing users. A related question is whether they would have precedence over the interest from land owners seeking new connections.

Cost estimates – proposed Tutaenui RWS

Cost estimates for a future Tutaenui RWS were assessed for five options:

1. Original area (10,500ha) with 5x10 ha lots of irrigation.
2. Original area without irrigation.
3. Original area without the southern area of Hunterville RWS plus 5x10 ha lots of irrigation.
4. Original area without the southern area of Hunterville RWS and without irrigation.
5. Original area with single 50 ha irrigation at the junction of Tutaenui Rd and Jefferson's Line.

Capital and operating costs and the net present value (NPV at 6% over 30 years) were calculated for the above options. The detail of this data is not repeated here[20]. In summary terms:

- **T1: Option one** would have an indicative capital cost of $13.2m with two thirds of this being for stock-water.
- **T2: Option two** (without irrigation) would have an indicative capital cost of close to $9m.
- **T3: Option three** (without extension into the Hunterville RWS) would have an indicative capital cost of close to $11.3m.
- **T4: Option four** (without irrigation and without the Hunterville extension) would have an indicative capital cost of close to $8.2m.
- **T5: Option five** (with a single irrigated 50 ha property) would have an indicative capital cost of close to $11m.

In summary, the five options investigated for the Tutaenui RWS – with water sourced from the existing Tutaenui bore and associated dams, are all technically feasible. They would provide for up to 8300 ha of stock-water reticulation and 50ha of irrigation.

In summary, the five options investigated for the Tutaenui RWS – with water sourced from the existing Tutaenui bore and associated dams, are all technically feasible.

On an inflation-adjusted basis, the capital costs for the stock water component range between $1,100/ha and $1,300/ha. These costs are viewed as being consistent with scheme capital costs for previously investigated rural water supply schemes within the region[21].

The capital costs of the irrigation options range between $41,000/ha and $87,000/ha. These are viewed as being high compared to other community irrigation scheme off-farm capital costs of $10,000 to $20,000/ha[22].

Expanded irrigation opportunities - Tutaenui RWS

Voss and Co. also gave some thought to the additional stock water reticulation and irrigation opportunities arising from the raising of the crest of Dam A and Dam B as well as from the sourcing of additional water from two bore sources and from other existing private sources. They found the introduction of these elements into their thinking involved the resolution of complexities requiring further work to resolve which were beyond the brief they were working to.

They nevertheless concluded there was potential for extended stock-water reticulation and reserve-source options for the Marton water supply. They also concluded that any major irrigation development serving several hundred

[20] For details see page 6 of the Stage Two Voss and Co report

[21] It should be noted that these costs do not include the costs of the 'on-farm' system changes required to take full advantage of the new reticulated water supply.

[22] The work undertaken by BakerAg explores these implications more fully – this is referenced later in this report

hectares would need to be sourced from new large dams or from the Rangitikei River[23] rather than from existing consented supplies.

Environmental flows – Tutaenui RWS

Voss and Co. concluded environmental flows and flood detention did not appear to be practical under the proposed scheme. They noted both options depended on the raising of the crest heights on Dam A and Dam B. They also noted a supplementary flow source from either Calico Line or the Tutaenui Road bore could provide some limited augmentation for environmental flows[24].

Cost estimates - Hunterville RWS expansion

From the initial list of ten options, three options were pursued for modelling and costing purposes. These were:

- **H3:** The scheme reticulation extended within and around the existing scheme area to utilise the full Consent allocation of 2,500m3/day (no decoupling and coverage of an additional 2,000 ha.)
- **H7:** Hunterville Township decoupled (an additional 2,000 ha.)
- **H9:** Southern zone decoupled (an additional 1,000 ha.)

All three options were viewed as technically feasible.

The capital costs of the three options and various combinations of these three options are as follows:

Table E4 Hunterville RWS Scheme Extension Options: Capital cost estimates

Option	Additional area served ha	Intake upgrade $	Valves /fittings $	New pipelines $	Total $	Cost/ha $
H3	2000	100,000	30,000	344,000	474,000	237
H7	2000	Nil	50,000	920,000	970,000	485
H3+H7	4000	100,000	80,000	1,264,000	1,444,000	361
H9	1000	Nil	50,000	1,244,500	1,294,500	1295
H3+H7+H9	5000	100,000	130,000	2,508,500	2,73,8500	548

Option H3, which involves upgrading the intake and finishing the upgrade of the rising pump system, was viewed as providing the least-cost option for supply of additional water to approximately 2,000 ha located in middle of the Central subzone of the Scheme.

Option H7 would require the decoupling of Hunterville Township to provide the additional water source for stock water reticulation. This option also involves some pipeline duplication on the Otairi Line.

Option H9 requires the decoupling of the Southern subzone of the Scheme which would then be serviced by the new Tutaenui RWS as described previously. This would enable the additional areas in the Northern subzone, with reticulation upgrades, to be serviced.

Several areas for improved scheme efficiencies were also identified for follow-up action including the option of establishing additional tank storage to gain benefits from night-time pump electricity 'time of use' tariffs.

[23] The further exploration of these options was not within the terms of reference for the Stage Two report as the focus of that report was on existing consented water sources held by Rangitikei District Council

[24] All of these options were not been further tested and associated costs have not been estimated.

Tutaenui rural water supply pre-feasibility study – Stage One and Stage Two – the BakerAg reports

Introduction

The next part of this report draws on the work conducted by BakerAg to assess the additional returns to a land owner from the supply of reticulated stock-water drinking or irrigated water.

Two reports were produced by BakerAg. The reports overlap in their content. The second report provides more detail than the first about the returns from the supply of reticulated/irrigated water to brown onion, apple and kiwifruit crops.

BakerAg also made comment about some of the 'beyond the front gate' and other strategic implications of supplying reticulated water for both stock-water and irrigation.

Reticulated stock-water

The average internal rate of return (IRR) for development of stock-water schemes, as reported in the AgFirst report referenced earlier, was 53% or $165/h.

Both the AgFirst and BakerAg reports note that to take full advantage of the benefits of the reticulated stock-water, farms would also need to invest heavily into other areas of farm system development (fencing, forages etc.) alongside investment in their water reticulation scheme.

Stock-water reticulation in conjunction with subdivision, increased livestock and improved grazing management can deliver an operating margin of $121/ha/year.

The BakerAg work suggests that if water from the Tutaenui scheme was priced at $2.29/cubic metre the farms supplied by the proposed Tutaenui RWS could deliver a 48% return on total capital invested in the overall farm development associated with the water reticulation.

In comparison with existing on-farm water sources and on the basis of an example drawn from the Wairarapa stock-water scheme,[25] BakerAg suggests the Tutaenui RWS water cost per cubic metre would be relatively expensive at $2.29.

Nevertheless, they note that even at this cost, this will still allow for cost-effective development and provide good returns on investment for a dry-stock property.

BakerAg note that if investment is made in reticulated stock-water by these farms it will also bring other benefits to the district. This is because farm intensification requires more on-farm labour. Furthermore, the on-farm development will mean more money invested in the local service providers such as fencers and pastoral contractors.

BakerAg are also of the view that the average Marton dry-stock farm might require less water than is perhaps provided for in the Voss and Co. report. They suggest 60l/ha/day is a more likely level of demand rather than the 115/ha/day adopted by Voss and Co[26]. This implies a larger area of land may be able to be reticulated than initially envisaged, i.e. closer to 16,000 ha.

Irrigation

In their Stage Two report, BakerAg investigated three high-value land use options suited to irrigation under the assumptions described for option T5 of Stage Two of the Voss and Co Tutaenui RWS report - i.e. a contiguous 50 ha block at the junction of Tutaenui Rd and Jefferson's Line.

---

[25] The Wairarapa stock water scheme was constructed in the 1980s

[26] One of the factors underpinning the BakerAg thinking about the need for less water than postulated by Voss and Co. is the assumption t that most interest in the Scheme will come from existing dry-stock as opposed to existing dairy operators because most dairy farms already have secure water supplies.

BakerAg concluded that it would be physically feasible to grow brown onions, apples or kiwifruit as a single land use option on the 50 ha in the defined irrigation area of the Tutaenui scheme, but all three land uses are unlikely to generate sufficient return to support investment.

In more particular terms:

Costs:

- The guideline applied to the irrigation component of this part of the BakerAg work was that 34/l/second could be supplied and if this was applied at 325mm to 425mm per hectare per year, 50 ha of irrigation water could be supplied.
- This equates to a water supply charge of $1.12/cubic metre. This is expensive compared to other New Zealand (pastoral-based) irrigation schemes. These other schemes typically range in cost from $0.13 to $0.25 per cubic metre.
- The irrigation scheme, defined as T5 in the Voss and Co. pre-feasibility report stage II was calculated at a capital cost of $41,400/ha.
- To pay back this capital in 30 years at 6% interest would cost $2,975/ha/year.
- The operational cost of the irrigation scheme would be $2,080 per hectare per year.

Return on investments:

- A total irrigation cost to the farm gate of $5,055/ha/year reduces the range of marginal return to $550 - $3,545 per ha. This range reflects the varying returns on the horticultural option applied or selected.
- Using marginal analysis, the operating returns before the cost of water, but after the cost of interest (6%), was calculated to be $5,600/ha for kiwifruit, $7,086 for brown onions and $8,568 for Galaxy apples.
- The cash operating results of all three land use options is encouraging. Before the cost of water, but after depreciation, the three land use options reviewed provided a net return of $280,000 to $430,000 per annum.
- The return on capital, if 100% of that capital needs to be found, suggests all three land uses are unlikely to generate sufficient return to support investment. The return on capital if only 50% of that capital needed to be found moves the calculations into a range where investment might be considered[27].
- The return on capital (at 100% capital) is 5.9% for brown onions, 6.1% for apples and 6% for kiwifruit. The return on capital is 1-2% more than this if half the scheme capital is met.
- While pastoral farming will operate at a 3-5% return on capital, seasonal variations and other challenges generally associated with horticultural ventures requires them to more typically operate at 7-10%.
- The above results are based on operation at a mature state. A mature state is within 12 months for brown onions, but the apple and kiwifruit investments would take 5-7 years to reach a mature state. This has implications on the net present value of the investment.

Implications:

- A full feasibility study would need to be undertaken to consider the implications of such things as 'time to maturity' variations between the three assessed crops and the associated net present value or internal rate of return rates for the investment.
- The financial hurdle to make irrigation move profitable is exasperated by the infrastructure cost being spread over a relatively small, rather than a large, irrigation area.
- The capital costs (at 100%) of the irrigation options range between $41,000/h and $87,000/ha. Costs at these levels could only justify very high returning horticultural crops, compared to other community irrigation scheme off-farm capital costs of $10,000 to $20,000/ha, which can support broad-acre farming systems.
- Of the three horticultural options considered, brown onions are the best of the relatively poorly-performing options considered, because they have a low capital cost and high marginal returns.

[27] The moot point is whether a land owner would want to fully account for the cost of land before entering a horticultural venture. Existing land owners with an interest in horticulture may view land costs as sunk. If this was the case then the need to take into account returns on only 50% of the capital cost of the venture remains alive.

- In addition, the case for kiwifruit and apples is undermined because they benefit from being established at a location with strong supply chain support, e.g. packing houses etc. present at locations like Hawkes Bay but not present in the Rangitikei.

Conclusions

At the beginning of this summary report we reduced the 'problem statement' down to a set of simple questions. These are restated below together with our summarised conclusions:

What is the demand for reticulated and irrigated water in the lower Rangitikei Basin?	Interest in reticulated stock-water is strong. There are also pockets of interest in reticulated water for irrigation.
How would the water be best used?	Primarily for reticulated stock-drinking water.
How could that water be supplied?[28]	The water for the Schemes could be supplied from surplus water available at the B/C Dams. Although increasing the height of the dams is a possibility, this is a complex issue requiring further consideration/investigation. A small reservoir could be constructed at Mt Smart alongside a powerful submersible pump suited to the existing bore hole. Increasing draw-off from the Rangitikei River for the Hunterville RWS, to the maximum consented level, and introducing a new water source for Hunterville Township is a possibility. Supplying the Southern portion of the Hunterville scheme from a new Tutaenui RWS was possible but more recent information suggests this may not be considered desirable. A separate water source for the Northern area of the Hunterville scheme was also raised as a possibility but again more recent information suggests this is not feasible[29].
What would it cost?	Capital costs for a new stock water reticulation scheme would be about $11.3m. The cost of the water to land owners and farmers would be about $2.29 per cubic metre. Further work is required to assess the full costs for distribution of the additional water available as part of amendments to the Hunterville RWS.
What are the likely returns on investment for individual land owners?	The farms supplied by a new Tutaenui RWS could deliver a 48% return on total capital invested inclusive of the overall farm development costs associated with the water reticulation.

[28] We note the Tutaenui and Hunterville schemes currently operate as separate schemes. We note there may be some challenges to overcome to merge parts of these schemes because of historical cost and governance structures, especially for Hunterville. This may not be an insurmountable challenge.

[29] The more recent information referenced here is that supplied by the CEO of the Rangitikei District Council as part of the comments he offered on a draft version of this report.

The essential conclusions are:

- **Tutaenui**: Irrigation is too expensive and at 50 ha this size unit may be too small to be economic. BUT expansion of a range of reticulated stock-water options is a real opportunity worthy of further investigation.
- **Hunterville**: There is very limited opportunity for irrigation. Expansion of reticulated stock-water is possible for the current Hunterville scheme. There is clear farmer interest within the existing Hunterville scheme for more water to be made available. BUT any additional water would only become available if the Hunterville Township and the Northern part of the scheme can secure a separate water source.
- **Business case**: The business case to be assessed should be for schemes along the general lines described by Voss and Co.
- **Economic growth**: It is apparent that investment in expansion of the schemes will contribute to sustainable economic growth for the Rangitikei District and for the Manawatū Whanganui region generally.

Recommendations and next steps

With the above conclusions in mind, there is evidence to support Rangitikei District Council preparing an application for grant funding from MPI[30] for the development of a detailed business case for a new Tutaenui RWS and for expansion of the Hunterville RWS.

The application to MPI should seek funding assistance to help cover the cost of the further work required on:

- **Preferred design options** including consideration of the 'area of potential coverage' and the implications of including or not including dairy and horticultural supply into the Scheme.
- **Dam integrity implications** associated with raising the crest height on Dams A and B.
- **Land purchase questions** associated with raising the crest height on Dams A and B.
- **Water quality treatment** requirements and options.
- **RMA consent needs** including those related to separate water sources for the Northern part of the Hunterville RWS and for Hunterville Township.
- **Project management** including the cost of engaging someone to move all aspects forward.
- **Confirming** the cost benefit and financial feasibility of the preferred design option.
- **Preparing a prospectus** and facilitating the provision of further information to farmers to assist them to make investment and uptake decisions and to undertake related promotional and communication activities.
- **Developing governance arrangements** to enable the Tutaenui and Hunterville RWSs to be operated in the longer term.
- **Risk analysis** and the identification of options to mitigate any risks identified.
- **Construction** tender-related processes.

[30] The guidelines about grant funding published by MPI in July 2016 note that MPI have $2.5m to allocated to community irrigation schemes and strategic water management studies. The maximum funding MPI can invest is 50% of the cost of the programme.

Contact Us

Key Contact: John Hutchings
Partner, HenleyHutchings
john@henleyhtuchings.co.nz
Phone: 021 679 654

HenleyHutchings
Level 4, 276 Lambton Quay
Wellington CBD, 6011

HenleyHutchings