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Hunterville Rural Water Supply Scheme: A Review

Report prepared as part of the Rangitikei Strategic Water Assessment project jointly funded by Rangitikei District Council and the Ministry for Primary Industries (Irrigation Acceleration Fund)

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Ministry for Primary Industries
Manatū Ahu Matua

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- The Hunterville Rural Water Supply Scheme committee
- Landowners within the Hunterville scheme area

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1 Introduction

The Rangitikei district is heavily reliant upon the primary sector for its economic and social well-being. This sector is founded upon the district's topography, soils, climate, water resources, and farmer investment and innovation. However, the district's water resource is coming under increasing pressure from irrigators and droughts.

In response to these challenges the Rangitikei District Council and Ministry for Primary Industries (via the Irrigation Acceleration Fund) are jointly funding The Catalyst Group to undertake a strategic water assessment for the district. This project will generate information about the:

- availability and certainty of water supply (surface and groundwater) in the district;
- 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.

Such an assessment is a priority for Rangitikei District Council as this project will provide guidance on what additional benefits and opportunities could arise through smart use of the water resource, and identification of the costs of capitalising on these opportunities at a district and individual level.

One of the tasks within the wider Rangitikei Strategic Water Assessment project is a review of the Hunterville Rural Water Scheme (HRWS). HRWS is primarily a rural water supply scheme, providing farms over a large area of the middle Rangitikei district with stockwater and water for dairy shed wash-down. The scheme also provides water to the settlements of Ohingaiti and Rata, and township of Hunterville. Although an analysis has never been undertaken, it is widely accepted that the HWRS contributes significantly to the economic and social wellbeing of the Rangitikei district, and in particular the area it serves.

The purpose of this review is to:

- identify opportunities to improve the effectiveness and efficiency of the scheme, and
- assess what potential exists to increase the area serviced by the scheme, and/or to utilise the scheme for irrigation purposes.

2 Scheme Overview

The Hunterville Rural Water Scheme (HRWS) is the largest such scheme in the Rangitikei district. It services approximately 150,000 acres between Ohingaiti south to Calico Line near Marton, and several towns/settlements located within this area. The scheme comprises two key components: (1) the rural water scheme, and (2) the Hunterville urban supply. The two components are described below.

The idea for a scheme in the middle Rangitikei district had been discussed for several decades, but it was at the urging's of key Hunterville families during the 1970s where the Scheme in its current guise gained significant traction. Over subsequent years the scope and design of the scheme were more fully developed. Eventually the scheme was constructed using funds from central government, and contributions from Rangitikei County Council and landowners. Ownership of the completed scheme was vested with Rangitikei County Council. Today, the HRWS is owned and administered by Rangitikei District Council, with day-to-day management delegated to the Hunterville Rural Scheme committee. All aspects of the HRWS from revenue setting, maintenance, and renewal expenditure are directed by the committee.

2.1 Hunterville Rural Water Scheme

The Hunterville Rural Water Scheme (HRWS) was built in the 1980s to provide farms in the area with a reliable stockwater system. There are currently 160 farms connected to the scheme, which also supplies water to Hunterville, Rata and Ohingaiti, and covers a total area of approximately 60,700ha. Hunterville (at 370m^3/day) and the Jim Bull properties (340m^3/day) are the largest users of water from the scheme.

Water for the HRWS is abstracted from the Rangitikei River via an infiltration gallery and well system. The water is then chlorine dosed before being pumped to a height of 330m in three lifts to the main reservoir. From this point the water is gravity-fed along four separate branches (Figure 1). The HRWS encompasses 110km of pressure mains, 41km of service lines, and 160 connections (properties). Each connection incorporates a flow restrictor. The flow restrictor corresponds to the number of water units the landowner has indicated they will use.

Water within the scheme is allocated on a unit basis. Every farm connected to the scheme must have at least 2 units. One unit equates to 365m^3/year, supplied at a rate of 1m^3/day. Landowners can have more units than they need, but must indicate the number of units they intend using (this will then be controlled via a flow restrictor). The landowners are charged on this agreed 'intended use' amount. The current (2013/14) cost of water to rural users is $250/unit (GST inclusive).

The HRWS has resource consent to abstract up to 2500m^3/day, with consumption ranging from 952m^3/day (winter minimum) to 2123 m^3/day (daily peak), at an average of 1350m^3/day (AQUAS, 2006). To deal with scheme breakdowns and programmed

maintenance, landowners are required to install storage equivalent to 48 hours use on their properties.

Despite the water not being treated to a potable standard, many rural properties use the scheme water to supplement their roof supply for domestic purposes.

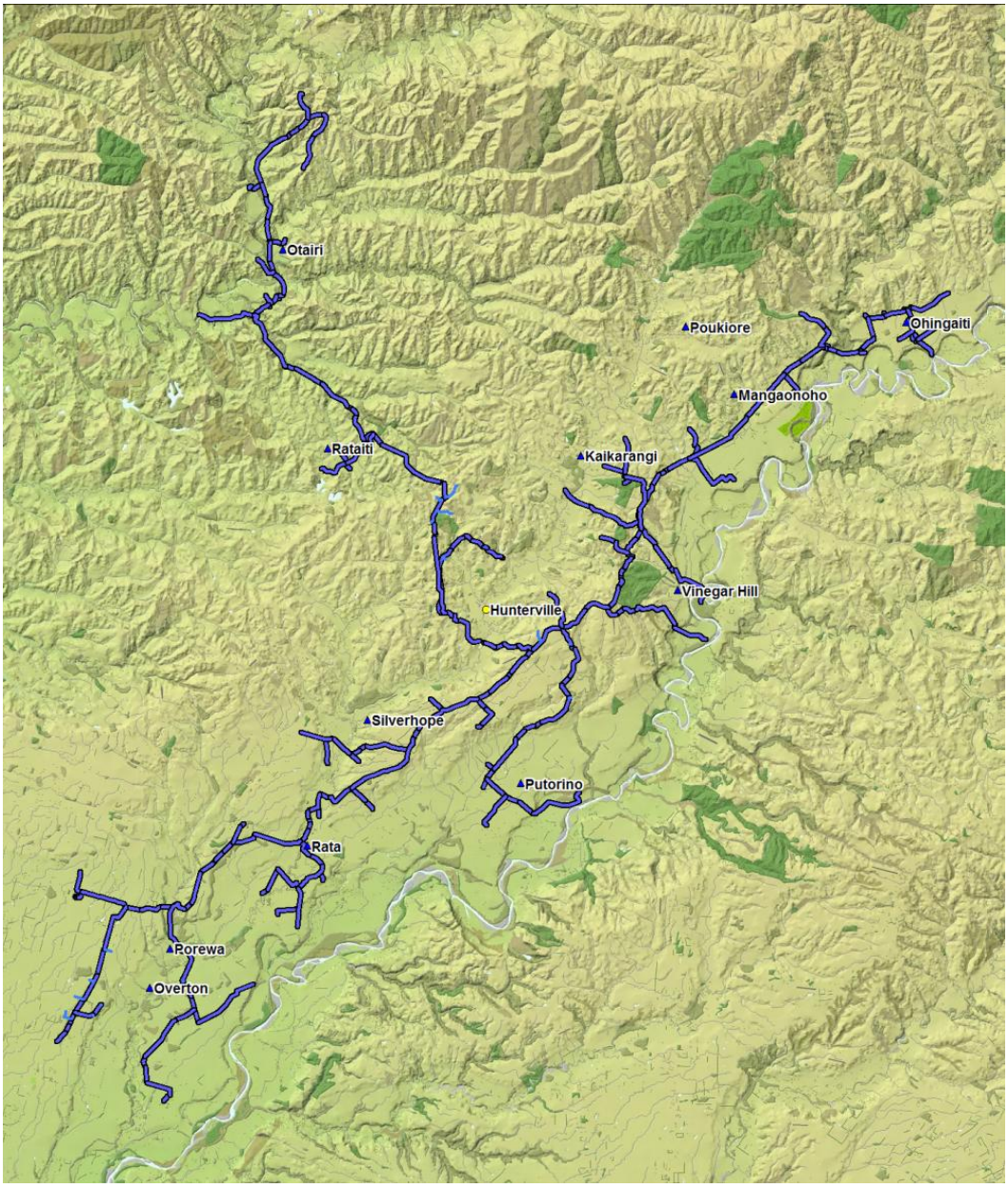

Figure 1: Hunterville Rural Water Scheme

2.2 Hunterville Urban Supply

The Hunterville Community Council agreed to Hunterville township purchasing water from the Hunterville Rural Water Scheme in 1984. Water received from the scheme is stored in two tanks, and then distributed to the town via 12.2km of mains and service connections (Figure 2). The scheme is gravity-fed. The water receives further chlorination, filtering, and UV treatment to bring it up to a potable standard prior to distribution.

There are 245 connections to the Hunterville urban supply, which includes residential, commercial and educational properties. The scheme supplies the resident population of 400-500 people with up to 370m^3/day. Consumption ranges between 96m^3/day (winter minimum) and 380m^3/day (daily peak), at an average of 140m^3/day (AQUAS, 2006). All connections are metered, and consumers are charged on an 'as used' basis. The current (2013/14) cost of water to Hunterville consumers is \$3.10/m^3 (GST inclusive).

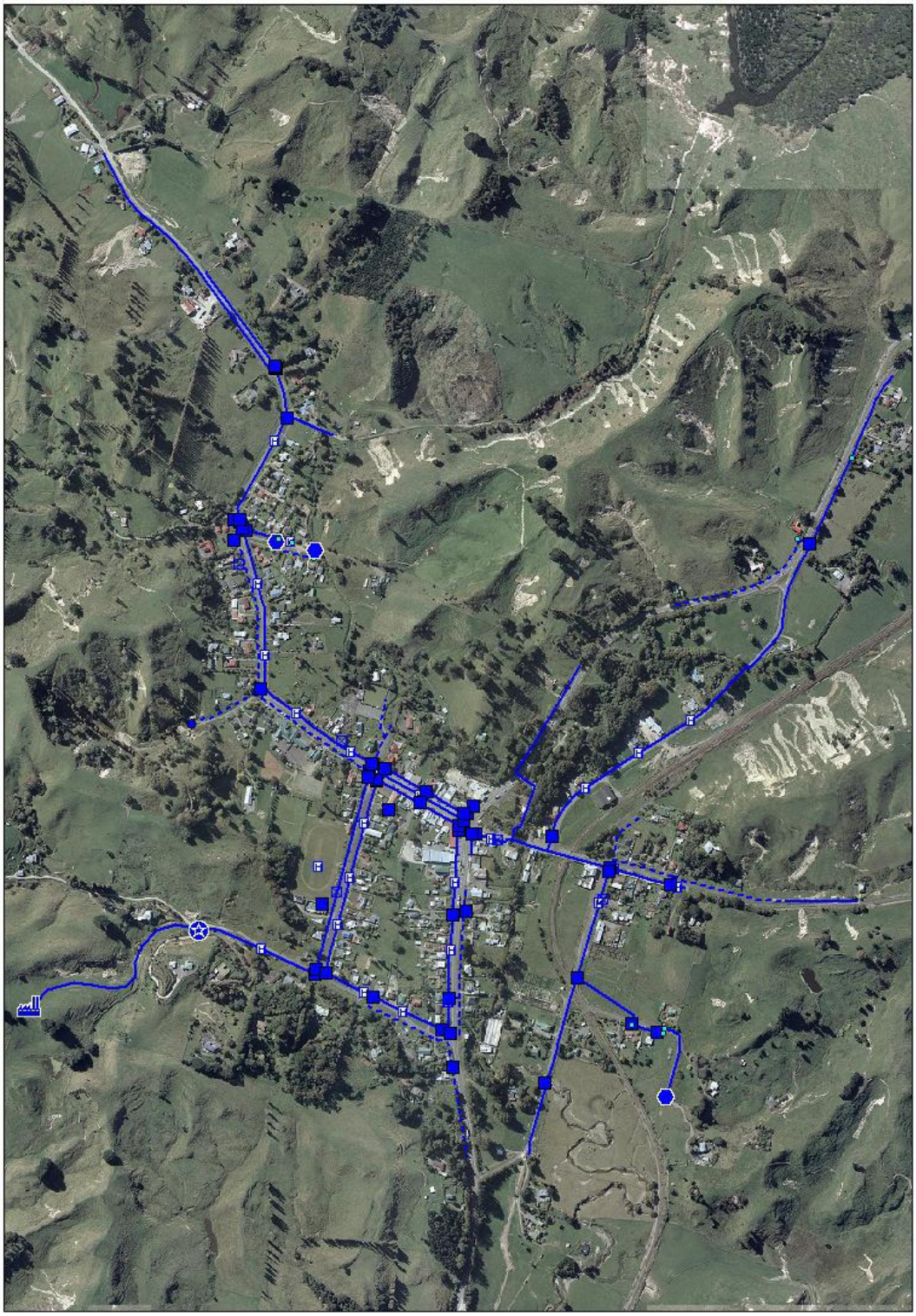

Figure 2: Hunterville urban water supply scheme.

3 Scheme Effectiveness and Efficiency

Despite the many presumed benefits the scheme generates, there are a number of significant weaknesses in the scheme's design and operation that should be addressed to ensure the scheme's long-term sustainability, including:

- The intake structure in the Rangitikei River
- The costs associated with lifting water from the Rangitikei River to the scheme's high point
- An operating deficit, and the costs of programmed new and replacement capital works into the future

3.1 Intake structure

The scheme relies upon an infiltration gallery placed within the bed of the Rangitikei River. Intercepted water drains into a well located on the true right bank of the river, where it is chlorinated and then pumped into the scheme. The river channel at the point the infiltration gallery is located is both horizontally and vertically mobile. As the infiltration gallery is not buried at depth, nor does it extend across the entire width of the channel, it can at times be left high and dry as the river channel moves to the opposite bank, or flows drop below the height of the infiltration gallery (as occurred during the 2013 drought).

The approaches taken to resolve these issues include reshaping the bed with heavy machinery to redirect flow across the infiltration gallery, or to install submersible pumps in the wetted part of the channel when river flows are low. Such approaches provide a temporary fix. Reshaping of the bed is a relatively low cost exercise, and the scheme has a resource consent allowing regular beach shaping to take place. The use of submersible pumps marginally increases pumping costs, because a fourth set of pumps is required.

Solutions for the river intake issue include the following options:

1. Regular beach shaping upstream of the existing infiltration gallery, including beach raking and maintenance of a side channel.
2. Redevelopment of the existing infiltration gallery so that it is set deeper in the mudstone substrate and extends across a greater proportion of the bed width.
3. Creation of a new infiltration gallery and well at a point approximately 1km further upstream where the channel is more stable.

Option 1 will involve the lowest cost to the scheme, probably less than $5k/annum. However, to be successful the works will need to be undertaken regularly. The installation of hard river engineering works to achieve the same outcome should not be contemplated as the costs of designing and installing a sufficiently robust engineering solution would be prohibitive, and may create issues for downstream landowners.

Option 1 will not address river levels dropping below the level of the infiltration gallery during dry periods when reliance upon the scheme, and the demand for water, is generally at its highest. To avoid the additional costs associated with the temporary installation of submersible pumps, the practicalities of Option 2 should be investigated. If the infiltration gallery was modified in this way, then the need to continue with option 1 would likely be negated.

Although a detailed analysis of the options has not been undertaken, Option 2 is preferred over Option 3, because much of the infrastructure is already in place.

3.2 Costs associated with lifting water

The biggest weakness and strength of the scheme is that water abstracted from the river is lifted (via three pumps) to a height of 330m, so that it can then be gravity-fed to users. The limited storage built into the scheme, particularly at its high point, means the pumps are required to operate for a large proportion of the day, with the following consequent impacts:

- The scheme cannot restrict its pumping to off-peak hours to capitalise on cheaper electricity prices, and instead must operate during peak electricity price periods
- As the pumps operate during the day the power supply can be interrupted by other large users (e.g. dairy farm milking or irrigating) on the same power line, causing 'brown outs' (intermittent cutting-out of the pumps), increasing pump and switch gear wear and tear, and pumping inefficiencies.

In combination, these factors impose significant operating and maintenance costs on the scheme just to get the water to a point where it can be distributed to users. In the 2013-14 scheme budget, electricity use is forecast to cost the scheme $125,000 - approximately 25% of the scheme running costs.

There are a number of options available to reduce the costs of pumping. The most obvious of which is to install more storage at the highest point in the scheme, which would allow the scheme to schedule its pumping to make greater use of off-peak electricity prices and to avoid other large electricity users. The scheme committee has repeatedly voted against this option because of the one-off costs associated with installing additional storage. A similar effect could be achieved by requiring landowners to install additional storage on their properties i.e. increase the current requirement of 48 hours storage to 72 hours[1].

A second option would be to reduce the amount of leakage/wastage within the system, so that the scheme was not drawing and distributing as much water. This would require improved leak detection, more rapid responses to detected leaks, and water conservation campaigns. A 2003 leak detection investigation, following the installation of meters,

[1] Landowners are currently required to provide storage equivalent to 48 hours use on their properties, to allow for scheme failures. Of this stored volume, a volume equivalent to 24 hours use must be secured in such a way that the landowner has to 'release' the water into the farm's water supply. This is a safeguard to prevent accidental drainage of the entire stored volume.

revealed Hunterville School was using excessive water, which could be traced back to the school's toilets which operated continuously, irrespective of school hours. The installation of meters within Hunterville has significantly reduced water use in the town. Water savings will be possible in the rural part of the scheme, but not at the scale described for the town supply part of the scheme.

Although helpful, the above options are unlikely to substantially reduce the considerable pumping costs of the scheme. As such, the scheme should consider a more radical approach, one in which the scheme's water supply is decentralised. Under this option, instead of all of the water coming from a single point on the Rangitikei River, alternative water supplies within the scheme area would be developed, and water distributed from these. For instance, the Ohingaiti branch could be supplied by water sourced from the Makohine Stream. The Rata and Porewa parts of the scheme could be supplied by one or more bores. Those parts of the scheme without ready access to alternative water sources would continue to be supplied with Rangitikei River water.

Reducing the volume of water removed from the Rangitikei River could significantly reduce the scheme's pumping costs, but this would depend upon the alternate sources of water being accessed. For instance, tapping springs and gravity feeding the water to users would reduce pumping costs, whereas supplying water from bores may not necessarily reduce pumping costs. The development of alternative water supplies would have a number of other potential benefits which are explored in more detail in Section 4 below.

3.3 Operating deficit

For a number of years the HRWS has been operating at a deficit. This is reflected in the deterioration of the 'cash position' of the scheme. At 30 June 2008 accumulated deficits from prior years resulted in a notional overdraft (or cash deficit) of approximately $129,000. This deficit was effectively offset by an amount of $169,000 in a dedicated fund for future capital works, even though these funds could not be used to cover operating costs.

From June 2008 to June 2013 this cash deficit increased by a further $129,000 to a total of $258,000, while the capital fund had reduced to $154,000. This represents an average cash deficit of close to $26,000 per annum. Continued deficits in this order threaten the long-term sustainability of the scheme.

During this time the HRWS committee had become increasingly frustrated with the cost of running the scheme, and their ability to manage these costs. Up until the 2012/13 financial year, attempts by the Scheme Committee to reduce scheme operating costs had been largely restricted to deferring critical scheme maintenance and upgrade works, whilst lobbying Council to reduce overhead costs charged to the scheme.

Rangitikei District Council became fully aware of the scheme's financial situation following a detailed financial audit in 2012/13. In response, the HRWS committee and Council initiated a number of measures to address the annual operating deficit. These measures took effect in the 2013/14 financial year. The measures included increasing water use charges, and the

Council agreeing to offsets Council overheads to the scheme from general rates (i.e. shifted these costs onto the wider community). The combined effect of these measures will address the annual operating deficit for 2013/14.

However, the scheme still has many financial challenges in the years ahead. First, it needs to reduce its overdraft. Second, given the scheme does not 'fund' depreciation it has only a limited capital works fund with which to pay for future works. As such, any future capital works will need to be funded from increases in the water user charges and/or capital works contributions, to pay for the works directly or repay loans taken out to cover the cost of the works. Given the scheme has some significant new capital works programmed for the next 10 years, and a need to undertake extensive replacement works in the next 5-20 years, the cost of supplying water to landowners in the scheme will have to increase considerably into the future.

Accordingly, a serious effort is required to address the current operating deficit, and prepare for the projected future capital works programme, including:

- A review of the costs being charged to the scheme to determine they are fair and reasonable and represent best value for money
- Identification of opportunities to reduce costs (refer Section 3.4 for suggestions on reducing pumping costs)
- A plan to progressively increase water use charges to reduce the current operating deficit
- Exploration of opportunities for greater general rate contributions to the scheme as a means of off-setting scheme costs
- Development of a capital works programme to cover new and replacement infrastructure to smooth-out future cost spikes
- Determine the best means to pay for the capital works programme – via increases in water use charges, separate capital works contributions, loans, or a mixture of all three
- Identify opportunities to increase the uptake of water within the scheme by matching supply and demand within the scheme area, thereby increasing water utilisation and income to the scheme. It is recognised options are limited to achieve this because line size and arrangement may prevent the redistribution of units between landowners.

3.4 Other issues

Whilst undertaking this review a number of other issues were identified that the authors thought should be brought to the attention of the Rangitikei District Council and the scheme committee.

- The discrepancy between rural and Hunterville water costs – rural properties within the Scheme are charged a flat fee of $250 per unit. One unit equates to 365m^3/year, supplied at a rate of 1m^3/day. In Hunterville, a similar amount of water costs users $1131.50/annum ($3.10/m^3 of water). A typical household of two adults and two children would use approximately 1m^3/day. Granted this is not a totally fair comparison because Hunterville water is on an 'as used' basis, whereas rural users are

charged a flat rate whether they use the water or not (consumption in winter is approximately half of summer use). However, even this basic analysis highlights a significant pricing differential.

The Scheme supplies Hunterville township with 370m^3/day, at the standard rural unit rate. Rangitikei District Council then charges Hunterville residents a per cubic metre rate, based on actual water use (as assessed by meters). The Council sets this water use fee at a level that is sufficient to recoup the cost of the water supplied by the HRWS, additional treatment of the water, management/operation of the Hunterville town scheme, and repay the cost of originally installing the town distribution network infrastructure. It should be pointed out that the town pays a fixed charge for the volume of water received from the Scheme, irrespective of whether it uses it or not, even though residents are charged on an as-used basis. The upshot of all this is Hunterville residents are paying much higher water charges than elsewhere in the Rangitikei district and New Zealand.

- Infrastructure age – whilst the Hunterville urban part of the scheme is relatively modern and constructed from similar materials, much of the rural component of the scheme is reaching the end of its useful life, and comprises a mixture of materials. In the near future the rural part of the scheme will encounter steadily rising maintenance costs or will need to embark on an expensive capital replacement programme. How this will be funded has not been addressed by the scheme committee. Such a replacement programme could be undertaken in conjunction with proposals to decentralise the scheme (refer Section 3.2).
- Landowner awareness – much of the scheme assets are laid within road reserve so are readily accessible and controlled by the District Council. Further, where assets cross private land the ability of District Council staff or their agents to access the assets and effect repairs is protected via a council bylaw. However, this bylaw was enacted some time ago, and as properties change hands there is a risk that landowner knowledge about where the assets are located is lost, which could lead to accidental damage to scheme assets. Scheme asset locations are shown on LIM (Land Information Memorandum) property searches, however, not all landowners request a LIM, nor does the LIM inform new landowners of their rights and obligations with respect to scheme assets. Options to increase landowner awareness should be explored.
- Unit allocation – the current allocation of units means that many landowners have more units than they need, certainly more than they use, and there are some users who potentially have less than they want. The process for quitting units or transferring units between landowners is not set out anywhere, requiring the scheme committee to make case-by-case determinations resulting in inconsistent decisions. These processes need to be better documented and then adhered to. If the option of decentralising the scheme is acted upon, then this may present an opportunity to do away with the unit-based approach altogether in preference to a 'take what you need, and pay as you go' system (refer Section 4)

- Economic assessment – operation of the HRWS currently attracts a significant annual subsidy from the wider ratepayer base of the Rangitikei district. This subsidy reflects the perceived importance of the Hunterville Scheme to the farming community within the scheme area and the economic benefit the scheme generates for the local and district economies. This is in all likelihood an accurate perception. However, to counter any criticism of the district-wide subsidy Rangitikei District Council could undertake an economic assessment of the Scheme. Such an assessment would determine the benefits versus the costs of the scheme, identify the scheme beneficiaries, and assess water use charges on a comparable basis with other water supply schemes.

Figure 3: Hunterville Township, looking East

4 Potential to expand the scheme area or provide irrigation water

The Hunterville Scheme is currently meeting the water supply needs of those landowners connected to the Scheme. However, in its current state there is limited/no potential to increase the scheme area, or for the scheme to provide additional water for stockwater or irrigation purposes. There are several reasons for this, including:

- the scheme is fully allocated in terms of units, so any new areas wanting to join or any existing users wishing to significantly increase their draw from the scheme would have to buy units off landowners already within the scheme. There may be no willing sellers of units.
- whilst there is still considerable room between the consented volume the scheme can abstract from the Rangitikei River and the daily peak demand, the cost of supplying any additional water would be prohibitively expensive to the scheme. This is because the scheme would have to pump for more hours per day, increasing the proportion of time the pumps would be required to operate during peak electricity prices.
- the scheme was not designed to provide the volumes required for irrigation purposes on an on-demand basis – it is gravity-fed and operates at low pressures. Landowners would be required to install significant on-site storage to hold the volumes required for irrigation purposes, and
- at present a large irrigation take would significantly affect the availability of water to downstream users in the scheme.

Further, for the scheme to provide water for purposes other than mainly stockwater seems unfair given the community's current subsidisation of the scheme.

In saying that, there is currently an unmet demand for additional stockwater from within the scheme's boundary. This demand is only likely to increase into the future if the district continues to experience dry summer conditions. Many landowners within the scheme area have indicated they have contemplated and would like to develop irrigation on their property, if water was available.

However, the concept of decentralising the scheme's water source (as mentioned at Section 3.2) is a likely game-changer that could address a number of the issues highlighted above if progressed. For instance there is potential to:

- reduce the scheme's running costs by not having to pump such large volumes of water to the highest point in the scheme
- forestall indefinitely the need to install greater water storage within the scheme, or redevelop the infiltration gallery
- upgrade infrastructure as the alternate water sources are developed
- restructure/remove the scheme's unit allocation framework,
- expand the scheme area, and perhaps most importantly
- supply water at sufficient pressures/volumes for irrigation purposes

Figure 4: Could the Porewa Valley, near Hunterville, be serviced by a bore if the scheme is decentralised?

Obviously, such an approach is not without cost or risk. Costs include the need to investigate each water source (i.e. surface water, springs, groundwater) to determine the security of supply, potential yield, and cost of development/management.

Then there are questions around who should foot the bill and retain ownership of these alternate water supplies. There are a number financial contribution/ownership models that could be envisaged, ranging from:

- the Rangitikei District Council or Hunterville scheme retaining 100% ownership and covering the full costs of development, through
- any number of ownership/cost share permutations involving the district council, Hunterville scheme, and landowners, to
- the scheme purchasing water from a landowner who has developed the water source and retains ownership over many of the associated assets (e.g. bore and pumps)

Depending upon the size of the community that will be serviced by each water source, and the end uses of the water, it may be possible to secure Irrigation Acceleration Fund support for the investigation and establishment phases (Stage 2 and 3 applications) of the alternate water sources.

Whilst there will be considerable efficiency gains in investigating all alternate water sources at the same time, the same cannot be said for the development phase. This being the case, the development phase for each alternate water source could be staged over many years. This would aid work and cash flows, minimise disruption to the scheme, and provide sufficient time to negotiate ownership/cost share arrangements.

5 Summary

The Hunterville Rural Water Scheme provides 160 farms (c.61,000ha of farmland) in the middle Rangitikei district with stockwater and water for dairy shed wash-down. It also provides water to the settlements of Ohingaiti and Rata, and the township of Hunterville. Although never analysed, it is widely accepted that the scheme contributes significantly to the economic and social wellbeing of the Rangitikei district, and in particular the area it serves.

The purpose of this review was to:

- identify opportunities to improve the effectiveness and efficiency of the scheme, and
- assess what potential exists to increase the area serviced by the scheme, and/or to utilise the scheme for irrigation purposes.

This review found that overall the scheme is achieving its purpose. In saying that, the scheme contains a number of significant weaknesses that need to be addressed to ensure the long-term survival of the scheme. These weaknesses include:

- The intake structure in the Rangitikei River
- The costs associated with lifting water from the Rangitikei River to the scheme's high point
- A considerable operating deficit, and the costs of future programmed new and replacement capital works
- Other issues - the rural/Hunterville pricing differential, infrastructure replacement, landowner awareness of assets, unit allocation

However, it may be possible to address many of these issues by pursuing a programme of developing alternate water supplies within the scheme area (decentralising the scheme). Doing so would allow expansion of the area serviced by the scheme, and its scope (i.e. supply water for irrigation purposes).

Central government funding (via the Irrigation Acceleration Fund) may be available to assist both investigation and development of these alternate water sources.

6 Recommendations

This review has generated a number of recommendations to address weaknesses identified in the scheme. For convenience, the recommendations are repeated below, grouped under the same headings used earlier in the report.

It is recommended that the Hunterville Rural Water Supply scheme committee and Rangitikei District Council:

Infiltration gallery

- Implement a programme of regular beach shaping upstream of the existing infiltration gallery
- Redevelop the existing infiltration gallery so that it is set deeper in the mudstone substrate and extends across a greater proportion of the bed width

Reducing pumping costs

- Install more storage at the highest point in the scheme
- Reduce the amount of leakage/wastage within the system
- Decentralise the scheme by developing alternate water sources

Operating deficit

- Review the costs being charged to the scheme to determine they are fair and reasonable and represent best value for money
- Identify opportunities to reduce scheme operating costs and increase scheme revenue (i.e. review the unit charging regime)
- Plan to progressively increase water use charges to reduce the current operating deficit
- Explore opportunities for greater general rate contributions to the scheme as a means of off-setting scheme costs
- Develop a capital works programme to cover new and replacement infrastructure to smooth-out future cost spikes
- Determine the best means to pay for the capital works programme – via increases in water use charges, separate capital works contributions, loans, or a mixture of all three

Other issues

- Address the pricing differential between rural and Hunterville water costs
- Implement an infrastructure replacement programme
- Explore options for increasing landowner awareness of scheme assets
- Review the unit allocation and transfer process
- Undertake an economic assessment of the scheme

Decentralise the scheme

- Investigate and develop alternate water sources within the scheme area. This will allow expansion of the scheme's extent and scope, and address many of the issues identified above.

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