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Project Summary, Opportunities and Recommendations

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)

Rangitikei
UNSPOILT...

Ministry for Primary Industries
Manatū Ahu Matua

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- the project Governance Group, whose members helped shape and guide this project over the last year.
- the various landowners, community members, agricultural sector consultants, specialists and academics that had input into this project in the form of advice, expertise, or by providing their properties as case studies to test ideas.

Report No 2014/018

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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 innovation. However, the district's water resource is coming under increasing pressure from irrigators, and the impacts of 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.

The following is the final report prepared as part of the Rangitikei Strategic Water Assessment. The purpose of this report is to:

- capture what was done during the course of the project
- summarise the project findings,
- discuss the implications of the findings,
- explore what opportunities exist for smart water use in the district, and
- recommend future courses of action for discussion and exploration.

Readers seeking additional information around any of the points contained within this report are advised to refer to the foundation reports prepared as part of this project.

2 The Rangitikei Strategic Water Assessment Project

The Rangitikei Strategic Water Assessment project started in October 2013 and concluded in November 2014. The project was initiated in response to: (1) a central government priority to identify and investigate opportunities to lift primary production, and (2) Rangitikei District Council's priority to explore economic development opportunities in the district. The project was jointly funded by Rangitikei District Council and Ministry for Primary Industries (via the Irrigation Acceleration Fund), and The Catalyst Group was engaged to undertake the project.

The project purpose was to 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.

It was intended that such information would be used by individuals, the district council, and the wider community to guide decision-making about the future smart use of the district's water resources for economic, environmental and social benefits.

During the course of the project, a series of 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 – these included investigations for the Chrystall, Marshall, McManaway, Robertson, Simpson, Totman and Williams properties.

These reports utilised a range of information sources, including:

- publically available data and specifically requested datasets
- existing reports and council documents
- interviews with experts – council staff, irrigation specialists, academics
- workshops involving landowners and other interested parties (20 and 25 March), and
- data collection and analyses undertaken by agricultural consultants

The project sponsors, interested parties, and the wider community were kept informed about the project through:

- monthly reporting to Rangitikei District Council's Assets and Finance Committee meetings, and regular presentations to Council
- regular Steering Group and Governance Group meetings
- creation and maintenance of a Facebook page dedicated to the project (https://www.facebook.com/pages/Irrigation-Rangitikei/1416448735256587) on to which all project progress updates and reports were uploaded
- 3 farm field days to present the property case study findings – 22, 23, 29 October
- presentation of project findings, implications and opportunities at community meetings – 3, 4 November
- regular media releases and articles, and
- extensive engagement with case study property owners

In terms of the Irrigation Acceleration Fund programme, this project should be considered a pre-feasibility study in which options for smart water use in the Rangitikei district have been identified. Identified opportunities that require a community response to proceed may be eligible for Phase 2 funding from the Ministry of Primary Industries (MPI). Phase 2 is where opportunities are more comprehensively investigated to identify those with the greatest potential for success. Third phase funding may then also be available from MPI to undertake detailed design and costing work for the preferred or selected options.

Beyond this is the financing and build phase. In January 2013 the Government established a company, Crown Irrigation Investment Limited, that can lend finance for the construction of regional-scale water schemes. The government considers this financing option as the option of the last resort, and instead wants to see the private sector, individuals and local government coming together to fund the construction of new water schemes.

3 Findings and Implications

As mentioned previously, a number of reports were generated during the course of the Rangitikei Strategic Water Assessment project. The key findings from each report are reproduced below, along with a discussion of the implications of those findings.

3.1 Rangitikei catchment surface water use and availability

Key findings from the assessment into the use and availability of surface water in the Rangitikei catchment are as follows:

- Surface water abstraction in the Rangitikei catchment has significantly increased (>100%) over the last fifteen years.
- Irrigation is the largest water use in the district (excluding hydroelectricity takes) and has undergone the greatest increase in recent years.
- Minimum flows and allocation limits have been set in the One Plan for all surface waters in the Rangitikei catchment to manage allocation between users and minimise adverse effects on instream values.
- Water use records suggest actual water use is generally much less than consented water allocated.
- Only one zone/sub-zone is currently over-allocated (Tutaenui), although several other zones/sub-zones have zero volumes available for allocation due to the Rangitikei Water Conservation Order, allocation for hydroelectricity generation, or because the waterways dry up in summer.
- Across the entire Rangitikei catchment, 39% (c. 110,000m^3/day) of the cumulative flow remains available for allocation, although the availability of this water is location dependent.
- Almost a third of current surface water consents in the catchment do not have minimum flow restriction conditions. That is, they are not required to reduce/cease their take once waterways fall below minimum flows. These consents will all expire prior before 2020. Minimum flow restrictions will be included on any new and renewed consents.
- Instream or in-line storage (damming) is not a viable option through much of the Rangitikei catchment due to prohibitions on damming on named waterways in the Rangitikei Water Conservation Order.
- On average, minimum flow restrictions occur between 3 and 8 days per annum. However, every 10 years, flow restrictions may be in place for 29-50 days during drier summers.

The implications of these findings are that:

- a number of existing irrigators are going to have minimum flow restrictions imposed on their farming operations for the first time when they seek to renew their consents as their current consents expire sometime in the next 5 years. This is likely to have significant impacts on these properties, unless appropriate planning and farm system change occurs in the next few years.
- while considerable volumes of surface water remain available for allocation within the Rangitikei catchment, as the volume allocated increases the certainty of supply to existing abstractors decreases. This is because the greater the volume that is allocated and abstracted from a waterway, the quicker it reaches its minimum flow threshold at which abstractors are cut off, and the longer a waterway will stay at or below the minimum flow threshold.
- given the restrictions on in-line damming, alternative options for improving surety of water supply for irrigators is switching to groundwater, improved irrigation efficiency to reduce water use (refer section 3.5 below), and off-line/winter water harvesting
- the minimum flow restrictions figures presented above are based upon the historic norm. What impact climate change will have on the frequency and duration of dry summers, and corresponding river flows, remains uncertain. This issue was not explored as part of this project.

3.2 Rangitikei catchment groundwater use and availability

The key findings from an assessment into the use and availability of water in the Rangitikei groundwater zone are:

- The Rangitikei groundwater zone is of considerable economic and ecological importance
- There are 97 consents for groundwater takes in the Rangitikei groundwater zone
- Agricultural irrigation is the greatest groundwater use by volume. At least 75% of agricultural irrigation consents relate to dairying.
- The One Plan annual allocable volume for the Rangitikei groundwater zone is set at 5% of the average annual rainfall across the zone, or 75,000,000m^3/year.
- The consented maximum annual volume for the Rangitikei groundwater zone is 68,600,00m^3/year, or 92% of the allocation limit.
- Actual consented water use in the Rangitikei groundwater zone is estimated at 18,000,000m^3/year, or 24% of the allocation limit.

- The theoretical near-full allocation of the Rangitikei groundwater zone is being addressed through the imposition of annual maximum volume and daily maximum volume limits on new and renewed consents.
- Increasing utilisation of groundwater along the coastal margin of the Rangitikei groundwater zone increases the risk of saltwater intrusion and impacts on significant wetlands and lakes.
- Groundwater levels in the coastal sand country near Santoft have not fully recovered after each irrigation season in recent years, leading to a 0.5-1m drop in groundwater levels in the area.

The implication from these findings is that:

- Despite its environmental and economic importance, the regional groundwater resource is still poorly understood. Admittedly, Horizons Regional Council has recently commissioned a stock take assessment of current knowledge of the groundwater resource. However, a major investment is required to better understand this resource, its sensitivity to use, and potential for future utilisation.

3.3 Barriers to irrigation

A relatively small number of landowners in the Rangitikei district have installed irrigation in the last decade, but there are many more that have contemplated installing irrigation for their properties. An investigation into the real and perceived barriers to the adoption of irrigation revealed the following:

- Landowners contemplating irrigation are largely motivated by a desire to reduce the financial, stock welfare and psychological impacts of dry periods and droughts.
- Non-barriers - landowners do not consider farmer age, securing finance to develop irrigation, profit margins following installing irrigation, peer reaction, or the effort required as barriers to the adoption of irrigation.
- Costs – irrigation installation and running costs can be significant, and the sums involved are sufficient to put many landowners off.
- Electricity – the quality and supply of electricity is a major consideration for landowners contemplating irrigation. The district's electricity network is near capacity in most areas, so any major draw on the power supply (i.e. irrigation) is likely to exceed the line capacity and/or adversely affect other users.

- Advice/Assistance – most landowners contemplating irrigation for their properties have undertaken some initial calculations, but most did not know where to go to get further advice/assistance in order for them to take the next steps.
- Resource consents – landowners perceived the need to get a water take consent as a major barrier. However, the One Plan water management framework has greatly streamlined the resource consent processes for getting surface water and groundwater take consents.
- Water availability – landowners expressed concerns about the availability of water, and the surety of supply. Generally speaking, considerable volumes of surface water and groundwater remain available for allocation within the Rangitikei catchment.

The implications of these findings are that:

- the One Plan is not an impediment to gaining a water take consent, as long as the volume being sought fits within the water allocation framework
- the installation of irrigation on a property will trigger the need for a land use consent from Horizons Regional Council to manage the associated increase in nutrient losses.
- barriers to the adoption of irrigation by dairy farmers are more perceived than real – there are many sources of advice, finance is readily available, and there are reasonable rates of return on investment. The current state of the power supply network is a real barrier.
- there are considerable barriers to the adoption of irrigation amongst sheep/beef farmers, and cropping farmers to a lesser extent. The key sticking point is access to sector-specific information about the various steps, options, benefits and costs associated with irrigation development.

3.4 Hunterville Rural Water Supply Scheme

A review of the structure and operation of the Hunterville Rural Water Supply Scheme identified the following:

- 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 Ohingaiti, Rata, and Hunterville. Although never analysed, it is widely accepted the scheme contributes significantly to the economic and social wellbeing of the area it serves and the wider Rangitikei district.
- Overall, the scheme is achieving its purpose to supply water at an affordable rate for stockwater and town supply purposes.
- The scheme has a number of significant weaknesses including:
  - 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
- And a host of lesser issues include - the rural/Hunterville pricing differential, infrastructure replacement priorities, landowner awareness of assets and obligations, and water unit allocations between landowners.

The implication of these findings is that:

- Not addressing the identified weaknesses threatens the long-term affordability of the scheme and its ability to continue to meet the various purposes for which it was established.
- Similarly, not addressing these weaknesses prevents the exploration of opportunities to further enhance and broaden the scope and utilisation of the scheme.

3.5 Irrigation efficiency

An assessment of the availability and adoption of irrigation efficiency technologies within the Rangitikei catchment produced the following findings:

- There is a low uptake of irrigation efficiency technologies in the Rangitikei district, and adoption of these technologies is not seen as a priority by most landowners
- Adoption of efficiency technologies is likely to pick up in the future as water take consents are renewed under the One Plan, as existing irrigation infrastructure is replaced, as landowner knowledge increases, and as landowners begin viewing irrigation as an investment rather than just insurance against droughts.
- Irrigation efficiency technologies (soil maps, soil moisture probes, flow meters and telemetry, and variable rate irrigation), can add 30% to the initial costs of a basic irrigation set-up. Retrofitting irrigation efficiency technologies to an existing irrigation set-up is slightly more expensive.
- Irrigation efficiency technologies have an expected payback period of 3-4 years, with banks willing to offer finance on the basis of this short payback period.
- Irrigation efficiency technologies can produce water use savings of 20-30%, with savings increasing with water supply security.
- Irrigation efficiency technologies can improve on-farm profitability, productivity, management, and nutrient management.

The implications of these findings are that irrigation efficiency technologies have the potential to:

- free-up significant quantities of water for other users and/or to allow a greater area of land to be irrigated for the same amount of water within the Rangitikei district, and
- lift the economic performance of individual farms and the wider Rangitikei district, whilst ensuring sustainable use of the land and water resources.

3.6 Case studies

A total of seven property case studies were completed as part of this project. Rather than repeat the findings from the individual case studies here (refer Annexes A and B), the common threads to emerge from the case studies are presented below:

- Irrigation should be viewed as an investment, and introduced in association with other farm system changes to maximise the benefits of that investment, rather than simply as drought insurance.
- Detailed analysis is required to determine if the investment required to establish and run irrigation is economically and environmentally viable. Such analyses will demonstrate there is considerable variation in viability between different farm types, farming systems, and locations within Rangitikei district. What works on one farm may not work for the neighbouring farm. For instance, the economic benefits of irrigation will likely be less for a top operator (as they are already operating at/near peak production), than for an average farmer whose farm has greater potential for production increases.
- Small-scale irrigation (<50 ha) of flats located in the district's hill country appears to be viable if water can be harvested on-site (i.e. dams and then gravity fed). Water stored in this way could also be used for stockwater purposed. Drawing water from the deeply incised waterways through this part of the district is prohibitively expensive and not a viable option.
- Medium-scale irrigation (>50 ha) of the flat to rolling country in the middle areas of the district is a viable option, but this outcome depends significantly upon the farming system (dairy, lamb finishing, maize, cropping) and the corresponding payout, irrigation development costs, and the cost of the water being irrigated. Certainty of supply needs to be considered if irrigating from waterways in this part of the district. In drier years, water for irrigation is unlikely to be available due to minimum flow limits in the Rangitikei River and its tributaries. As such, groundwater and water harvesting are more secure water sources.

- Large-scale irrigation (>100ha) in the coastal sand country area of the district is a viable option due to the significant lifts in dry matter production that are possible. Considerable land recontouring may be required to realise this potential. Outside of a relatively narrow band alongside the lower Rangitikei River where water will be sourced from the river, groundwater will be the primary water source through this area. The opportunities to store water in the sand country are limited due to the porous nature of the substrate, and lined storage areas are prohibitively expensive.
- Resource consents 1 – any farm irrigation proposal (irrespective of the area being irrigated) will require resource consents from Horizons Regional Council. Resource consent will be required to abstract water from either waterways or groundwater.
- Resource consents 2 - the introduction of irrigation to a farm triggers the need for a land use consent to manage the loss of nutrients. If the nutrient losses meet the limits set out in Table 13.2 of the One Plan, then the activity is treated as a Controlled Activity. That is, the consent is granted as of right, with a minimum number of conditions. However, most of the case studies showed the introduction of irrigation caused nutrient losses to exceed the values listed in Table 13.2 of the One Plan, triggering the need for a Restricted Discretionary Activity consent. Such consents are not granted automatically, and if granted will contain a number of conditions aimed at reducing nutrient losses over the term of the consent. There is still considerable uncertainty surrounding Horizons Regional Council's interpretation and application of the One Plan rules in relation to land use activities that exceed the Table 13.2 nutrient loss limits.
- Nutrient losses – generally the greater economic return from the introduction and/or expansion of irrigation, the greater the associated nutrient losses. This is because nutrient loss is driven by fertiliser application, stock numbers (and associated urine and faeces loads), and waste application (i.e. dairy shed effluent), all of which increase under an irrigated (and more intensive) farming operation.
- Building consents – the construction of water storage dams with a dam wall greater than 3m in height, and impounding a volume greater than 20,000m^3 currently triggers the need for a building consent, and involvement of a dam engineer. It is expected these criteria will be relaxed in the next 12 months, allowing significantly larger dams to be constructed without triggering the building consent process.

- The suitability of the power supply to support irrigation was not assessed as part of the property case studies. However, in most cases it was expected that some power supply upgrading would be required. Any such upgrading will add to the cost of installing irrigation.

3.7 Market barriers

The key findings from this assessment into the barriers surrounding the development of alternative land uses and crop types within the Rangitikei district are:

- The Rangitikei district has the potential to support a range of alternate land uses and crop types. However, what this potential is, and what alternative crops are best suited to the Rangitikei district requires further investigation.
- There are a number of significant barriers in the producer-to-market supply chain regarding alternative land uses/crops. These include:
    - how best to grow these alternative crops;
    - how to store, process and transport these products, and
    - developing and accessing markets for the produce
- These barriers are considered insurmountable for individual landowners. Fortunately, however, much of the infrastructure and systems necessary to support alternative land uses/crops already exists in the region or in neighbouring regions.
- Of the various barriers described, the most challenging is gaining access to, then selling into, international markets.
- Local government can assist with overcoming these barriers by providing opportunities for key players in the producer-to-market supply to come together to discuss opportunities.

4 Opportunities

During the course of this project the authors have had the privilege of talking to a lot of people that are knowledgeable about, live in, and are passionate about the Rangitikei district. They have investigated many different farming systems, and their awareness of the district's special character and features have increased many-fold. The authors believe this has given them a unique perspective from which to contemplate the opportunities that exist for the district's rural sector to better utilise its valuable water resource.

Although this project was primarily set up to identify and evaluate opportunities for irrigation development within the district, stockwater has also emerged as an issue. In recent years, where the middle and northern parts of the district have experienced several dry summers/autumns, landowners have been forced to quit lambs early and sell capital stock, not because they have run out of feed, but rather because of a lack of stockwater. Similarly, many hill country farmers have reported poor pasture utilisation due to lack of an adequate stockwater system, as stock refuse to venture far from available water sources (troughs, dams and streams). On this basis we believe the provision of reliable stockwater has the potential to generate significant economic benefits for the district (see references in Beef and Lamb's Land and Environment Plan Guideline: Stock exclusion – managing stock around waterways).

A number of opportunities for smart water use have been identified for further investigation and discussion by the community. These opportunities extend beyond those which that are available to individual landowners to roll out on their own properties more or less immediately. That is, these opportunities require some form of collective response to their development and ongoing operation. The identified collective smart water use opportunities include:

- Water use efficiency – improved water use efficiency has the potential to 'free-up' water, thereby enabling a larger area of land to be irrigated with the same amount of water. This 'freed up' water could be used on-farm, or redistributed to other properties. Doing so would maintain the current surety of supply associated with each water source being utilised within the district, and would also delay/offset the need to develop alternate water sources (e.g. dams). The ultimate expression of water use efficiency involves the diversion of water to those land uses that generates the greatest volume of product or value, at the expense of less efficient land uses.

- Marton water supply 1 – the Marton water supply includes a feeder pipeline extending from the Water Treatment Plant on Tutaenui Road into Marton. This feeder pipeline is tapped by adjoining landowners for stockwater purposes. These stockwater takes are covered by a Council agreement following the loss of the Tutaenui Stream as a stockwater source when the Marton water supply dams were built. The stockwater takes are not metered or restricted, and landowners are not charged for the water. Landowners already taking water would like more, and those not connected would like access, but this cannot currently be done without impacting on the flow of water to Marton. The feeder pipeline is scheduled for replacement this financial year, which presents an opportunity to increase the capacity of the line and establish a stockwater supply scheme. In so doing, the Council could use existing infrastructure to meet a need for water and also generate an income stream. Making use of the Marton Water supply as described above (and also in the next two examples set out below) reduces several of the major cost items associated with the abandoned 2004 Southern Rangitikei Water Supply Scheme proposal i.e. water storage costs, power supply upgrades, pumping costs, and pipeline (distribution) costs.
- Marton water supply 2 – several years ago Rangitikei District Council developed a 600m deep bore alongside the Marton water treatment plant to provide security of supply into the future. The bore is not currently connected to the water supply, and is not forecast to be used to its full capacity when connected. This surplus water could be made available for other purposes e.g. stockwater (see above), or irrigation. The surplus water could be piped to users, but beyond a certain distance this becomes economically unviable. More distant landowners could be supplied by releasing water down the Tutaenui with the water being abstracted further downstream.
- Number 2 Dam – located a short distance north of Marton, this disused dam was once the Marton water supply dam. This dam could be made operational at relatively low cost to supply stockwater and irrigation water. The water could be distributed via pipeline or the Tutaenui Stream (refer above).
- Hunterville Rural Water Supply Scheme – the scheme's operation and management requires an overhaul to address mounting annual operating costs, and restrictions on where and how much water can be distributed. The fact that much of the infrastructure in the rural component of the scheme is coming to the end of its useful life presents an opportunity to reinvent the scheme. The possibility exists to decentralise the scheme so more than just the current water source is used (such as groundwater, stored surface water, and back-feeding water from the Marton water supply), which could open up opportunities to service a larger area, provide increased volumes of water, and in some

areas provide water for irrigation purposes. A range of cost-share arrangements exist to fund these opportunities.

- Hautapu stockwater scheme – the Hautapu catchment stretches from the central plateau to the Rangitikei River at the 'meeting of the waters' near Utiku. Taihape is located within this catchment which has been particularly hard hit by droughts in recent years. Potential exists within the catchment to develop a stockwater scheme that services the middle/lower part of the catchment. Although the catchment is close to being fully allocated water could be 'freed-up' through pooling of permitted take volumes, tapping of springs, off-line water storage, and utilisation of spare capacity within the Taihape water supply (particularly if leakage and run-to-waste losses are reduced). The scheme design should be gravity-driven wherever possible to minimise pumping costs, and utilise multiple water sources to minimise distribution costs. The Erewhon scheme is a good example of some of these principles in action.
- Small-scale stockwater systems – many properties in the middle/upper Rangitikei catchment have limited stockwater source options e.g. waterways, springs, and constructed 'turkey nest' dams. Such water sources are not necessarily secure during droughts, and water quality typically declines as the water level drops. Many studies have proven the benefits of a reliable and high quality stockwater supply on pasture utilisation, stock health, and animal weight gain. Alternative stockwater sources may be unavailable or too expensive to develop. However, suitable conditions for creating water supply dams may exist on a neighbouring property. Potential exists for groups of landowners to work collectively to develop small-scale stockwater schemes, where the water is stored on one property and from there distributed to neighbouring properties. Adopting this approach would require landowners to develop various construction cost-share, land lease, annual payment, and scheme management arrangements. Depending upon the stored volume, small-scale irrigation may be a possibility within such scheme areas.
- Sand country – the production lifts achievable in the sand country following the introduction of irrigation and land recontouring is well documented. Similarly dramatic production lifts are possible in dryland sheep/beef systems following the introduction of a reliable stockwater system. In the sand country, the only reliable water source is groundwater. However, this resource is becoming more expensive to develop owing to the need for deeper bores and upgrading of the power supply. There are also question marks around the sustainability of this resource in the Santoft area. A possible method of supplying stockwater into this part of the Rangitikei district could be achieved using a system of bores, wind turbines, storage dams, and natural watercourses. Within this system, water would be lifted from bores located near State Highway 3 using wind turbines.

Abstracted water could be (1) reticulated to landowners, or (2) fed into the natural watercourses to flow downstream to storage areas located within the clay country adjoining the sand country. Water could be stored behind constructed dams, or in the existing wetlands/lakes through this zone. The stored water could then be released down the natural watercourses where it would be available for abstraction by neighbouring properties and distributed by pipeline to more distant properties. Under this proposal four of the most expensive elements of the abandoned 2004 Southern Rangitikei Water Supply Scheme proposal are minimised – water source/storage development, power supply upgrades, pumping costs, and pipeline (distribution) costs. Depending upon the size of the storage, it may be possible for a scheme such as this to supply water for small-medium scale irrigation.

- Sand country 2 – given the climate, soils, and availability of groundwater, the southern Rangitikei district lends itself to the development of small-scale (<40ha) horticulture blocks spread across a number of properties to provide sufficient land area to generate critical mass in production volumes. The development of separate bores and the associated infrastructure could not be justified on economic grounds. However, irrigation on the scale proposed could be supplied with water as per the proposal outlined above, or through a series of collectively owned, developed and shared bores. Such bores could be distributed throughout this part of the district. Given this is a collectively response to irrigation development, there is the possibility of central government funding to investigate and evaluate this response further.
- Sand country 3 – given the economic significance of the coastal sand country groundwater resource now and into the future, greater community involvement is needed in its ongoing management. At present Horizons Regional Council is the sole management agency, but its role is limited to RMA functions (e.g. research, setting policy and regulation), which adheres to a first come - first served approach when allocating the resource. However, this role does not allow for more comprehensive management of the resource i.e. what is the best use of the water, introduction of efficiency measures, sharing of the resource between users and through the irrigation season, and sustainable development of the resource to reduce impacts on existing users and avoid limiting opportunities for future development. The Santoft Groundwater Users Group is a good example of the wider community taking an active role and interest in the resource (stimulated by a small drop in groundwater level, and the need for further investigation), but the community's role could be broadened significantly from simply responding to an issue to one of proactive management across the entire groundwater system. If the coastal sand country was supplied by a water supply scheme, there would be much greater community involvement in its management. The

coastal groundwater resource should be thought of as a water supply scheme (just not a constructed one).

- One-stop advisory service – a significant barrier to the adoption of irrigation (and development of small collective stockwater schemes) by sheep and beef farmers is access to sound advice at an affordable price, particularly at the conceptualisation stage. A possible solution is to create a one-stop advisory service that assists landowners to progress their irrigation/stockwater proposals from concept to reality. This service could support landowners through the conceptualisation, investigation, design, consenting, and build phases of a project by putting landowners in contact with the right people at the right time, developing appropriate supporting documentation, and accessing third-party funding assistance (where available). Rangitikei District Council, MPI, and possibly Horizons Regional Council could contribute to such a service at appropriate industry rates.

5 Recommendations

A number of possibilities exist around the smart use of water in the Rangitikei district, as identified through this project. Some of these options could be given effect too immediately by individuals and groups, others are more long-term propositions. To assist decision makers and the wider Rangitikei community in where they should focus their efforts in the short-medium term (i.e. in the next 5 years), we recommend the following courses of action:

- Individual landowners explore irrigation and stockwater system options for their properties. There is no one solution that fits all circumstances, so these assessments need to be done on a property by property basis to determine economic and environmental viability.
- Rangitikei District Council approaches landowners that could be supplied with water from the Marton water supply and/or the No 2 Dam to discuss the possibility of rural water supply scheme. Depending upon the response from landowners, this could be advanced to a more detailed investigation of scope, design and cost.
- Rangitikei District Council initiates a comprehensive review of the Hunterville Rural Water Supply Scheme, with the priorities being a redesign of the intake structure, an investigation into the feasibility of developing alternate water sources, opportunities to expand the scheme, and an assessment of the costs to achieve the above. It is understood that early discussions have been held with MPI officials about the possibility of a central government funding contribution to such a review.
- Rangitikei District Council holds discussions with Powerco regarding their future plans to maintain/upgrade the local electricity supply network, and to advocate for upgrades to the network through the coastal sand country as a priority.
- Rangitikei District Council canvasses the rural sector and sheep/beef farmers in particular, about a one-stop irrigation and stockwater system exploration and development advisory service concept. If supported by landowners, then approach MPI about the concept and the possibility of central government funding.
- Rangitikei District Council undertakes a review of the Taihape Water Supply to: (1) what water could be freed-up through repairs to leaks and reducing running-to-waste losses and could then be made available to rural landowners for stockwater purposes, (2) the costs of making these repairs, and (3) the possible unit cost of any water supplied for stockwater purposes.
- Rangitikei District Council, possibly with central government funding, commission a study to identify what alternative land uses are possible in the district and are likely to be commercially viable.

- Rangitikei District Council establishes a forum to facilitate key players in a potential alternative land use/crop industry coming together to explore opportunities.
- Horizons Regional Council develops and implements a research programme to better understand the coastal groundwater system, and uses the results to inform a revised management framework.
- Horizons Regional Council confirms how it intends applying the One Plan nutrient management policies and rule framework as it relates to the application of Table 13.2 to provide clarity to landowners who have to make critical investment decisions in coming years as the common catchment expiry dates fall due.

Beyond these recommendations, all other opportunities identified as part of this project require considerable collaboration within communities of interest/benefit. Rangitikei District Council should not be expected to lead such initiatives. They can certainly support, facilitate, administer and help fund them, but it is inappropriate for the uptake of the identified broader opportunities to be led by Council. The leadership and coordination of these opportunities need to come from within the communities of interest/benefit. This is because the expertise, resources, and drive needed to turn these opportunities into reality typically exist collectively within the community. There is also a higher likelihood of success if the project is driven by those likely to benefit the most.

The authors are also aware of two further studies being undertaken in the region. The first is investigating opportunities for economic development within the region, with a focus on tourism and the primary sector. This study is being jointly funded by the Ministry for Business, Innovation and Employment (MBIE), Horizons Regional Council and district/city councils. The second study, being led by Horizons Regional Council, is focussed solely on agribusiness in the region.

It is hoped the observations and findings from the Rangitikei Strategic Water Assessment project are integrated within these two new studies.

Annex A: Property case study summary - financials

Property	Owner	Location	Type	Irrigation scenario	Irrigation development costs	Water Source	Associated costs*	Extra farm income/yr	Extra farm costs/yr	Return on Investment	Capital Value increase
Rihia Farm	Totman	Omatane	995ha, sheep & beef, hill country	160 ha, centre pivot, fodder crop for lamb finishing	$635,000	River take	Not calculated	$176,800	$223,900	-7.40%	Not calculated
Pencoed	Williams	Marton	200ha, cropping, sheep, beef, flat-rolling country	64ha centre pivot, cropping	$258,000	Marton water supply bore	Not calculated			5%	Not calculated
				84ha, conversion to dairying	$385,000	Marton water supply bore	$4,100,000			0.66%	$1,500,00
Rebell	Robertson	Bulls	238ha, dairy farm, partially irrigate, river terraces	73ha, centre pivot and pods	$345,000	Riparian bore	Not calculated	$158,373	$78,761	13.90%	Not calculated
Kaiangaroa	Marshall	Pukeokahu	1277ha sheep and beef hill country	82.2ha travelling irrigator and/or pods, fodder crops	$255,000-$345,000	Storage or bore	Not calculated	$23,000-$49,000	-$21,065-$15,545	-6%-6%	Not calculated
Kawhatau	Chrystall	Kawhatau	932ha, sheep and beef, hill country	38.3ha travelling irrigator, fodder crops	$150,000	Storage	Not calculated	$45,450	$13,244-$18,244	9-12%	Not calculated
McManaway*	McManaway	Porewa	165ha irrigated dairy	106 ha, centre pivot and lateral	$438,600	River and bore	Not calculated	$96,000-$100,000	N/A	approx 25%	Not calculated
Heaton Park	Simpson	Bulls	938ha, sand country, sheep and beef	199.6 ha, lateral irrigation system, fodder crops	$355,000	Bore	Not calculated	$346,455-$378,750	$211,174	35-43%	Not calculated

***-** this case study investigated the financial and environmental impacts accruing to a property that already had irrigation

Annex B: Property case study summary – nutrient management

Property	Owner	Location	Type	Irrigation scenario	N-loss limits (kg/N/ha)	Modelled N-loss (kg/N/ha)	Comments
Rihia Farm	Totman	Omatane	995ha, sheep & beef, hill country	160 ha, centre pivot, fodder crop for lamb finishing	Year 1 = 25, Year 20 = 19	33	Requires a restricted discretionary consent
Pencoed	Williams	Marton	200ha, cropping, sheep, beef, flat-rolling country	64ha centre pivot, cropping	Year 1 = 29, Year 20 =23	20	Meets the controlled activity criteria
				84ha, conversion to dairying	Year 1 = 29, Year 20 = 23	26	Requires a restricted discretionary consent
Rebell	Robertson	Bulls	238ha, dairy farm, partially irrigate, river terraces	73ha, centre pivot and pods	Year 1 = 26, Year 20 = 21	37	Requires a restricted discretionary consent
Kaiangaroa	Marshall	Pukeokahu	1277ha sheep and beef hill country	82.2ha travelling irrigator and/or pods, fodder crops	Year 1 = 18, Year 20 = 13	11	Meets the controlled activity criteria
Kawhatau	Chrystall	Kawhatau	932ha, sheep and beef, hill country	38.3ha travelling irrigator, fodder crops	Year 1 = 24, Year 20 = 18	31	Requires a restricted discretionary consent
McManaway	McManaway	Porewa	165ha irrigated dairy	106 ha, centre pivot and lateral	Year 1 = 27, Year 20 = 22	34	This case study investigates the impacts accruing to a dairy unit as a result of having already established irrigation
Heaton Park	Simpson	Bulls	938ha, sand country, sheep and beef	199.6 ha, lateral irrigation system, fodder crops	Year 1 = 24, Year 20 = 18	62	Requires a restricted discretionary consent