

Manuherikia Catchment Water Strategy Group INFORMATION PACK



August 2016

DISCLAIMER

The purpose of this Information Pack is to allow the Manuherikia Catchment Water Strategy Group to seek a non-binding indication from landowners within the Manuherikia Catchment as to whether they would be interested in receiving water and subscribing for shares in a company to be established. No offer of shares in the company are currently being made and there is no obligation or commitment to acquire the shares at this time. No money is currently being sought in respect of shares and when an offer is made, it will be made in accordance with the Financial Markets Conduct Act 2013. The only money that is being sought relates to a fee to the Manuherikia Catchment Water Strategy Group and is not in relation to the shares.

**"A thriving valley community that uses
its water resources in a sustainable and
cooperative way"**

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FOREWORD

"I am confident that there is a financially viable project for the catchment which will have a significant benefit not only to irrigators and farmers but also to the environment and the wider community"

Over the past 18 months the Manuherikia Catchment Water Strategy Group (MCWSG) have been working towards the completion of the feasibility study and options refinement process. Both of these bodies of work have now been completed. The catchment is at a crossroads; having to make a decision to proceed with an option 1. for formation of Newco, detailed design and consenting, or 2. not to advance further.

If farmers and irrigators decide not to support the advancement of the project the work of the MCWSG would be wound up and each individual/scheme would progress the future management of water for themselves.

There are significant benefits to be gained from advancing an option for the catchment. However, to enable farmers and irrigators to make a decision, the risks of the various options also need to be well understood.

Construction and distribution costs of the project have been estimated in the range of \$28 to \$80 Million for the various dam options and approximately \$100 Million for the largest distribution option. These total project costs do not at this point include the full costs

associated with securing land access or for undertaking environmental mitigation works, as these costs can only be more fully quantified once a decision has been made on the preferred option. Please bear this in mind when referring to these indicative costs.

To support this information pack, the MCWSG will also be embarking on a detailed consultation process including a series of meetings with farmers, irrigators, agribusiness professionals, irrigation companies, the wider community and other interested parties. We want to ensure as many people as possible are aware of the project and its findings to date.

We are also looking to hold a series of smaller group or one-on-one type meetings with farmers and irrigators in the catchment, so that we can answer your questions about the project and the forthcoming decision which needs to be made. This invitation will be extended to interested parties and community groups as well.

2021 and the expiry of existing deemed permits is advancing closer, which means that the timeframes around making a decision are critical, so as to not end up in a situation

where there is greater uncertainty around future use of water within the catchment.

To help determine the level of support in the catchment to proceed with the next phase of the project, the MCWSG is asking farmers and irrigators to complete a non-binding expression of interest (EOI) indicating the likely hectares of existing irrigation and new irrigation that you are interested in securing.

As part of this process we will also be asking you to make a commitment for a funding contribution for the next phase of the project of \$50 per hectare. The EOI responses are to be returned to the MCWSG by the end of October 2016.

Until the EOI process has been completed, responses analysed and consultation with community and interest groups undertaken, the MCWSG will not be able to make a decision on which option to advance.

It is at this point that the MCWSG would seek to formally call for the funding contribution from farmers and irrigators. We would expect it to be sometime in early 2017.

The next few months are expected to be very busy for everyone involved with the MCWSG project. I would like to take this opportunity to thank all those people who sit on our strategy group, especially those who provide their time on a voluntary basis. It has been a long process to get to this point. However, I am confident that there is a financially viable project for the catchment which will have a significant benefit not only to irrigators and farmers but also to the environment and the wider community.

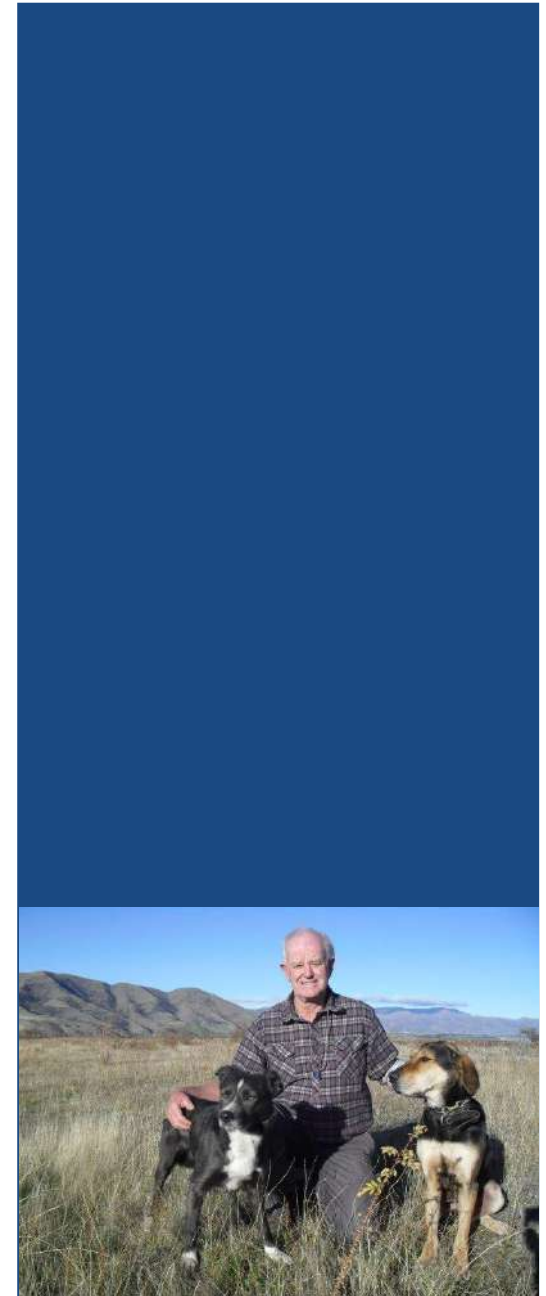
From our detailed work to date it is very clear to me that advancing options collectively rather than individually will be far more beneficial for the entire community.

I encourage you all to read the information set out in the information pack and to refer to the full body of work which is available on our website. www.mcwater.co.nz.

Please feel free to ask questions of myself and the other MCWSG members as you move towards considering your support to this project.

Allan Kane

Chairman





PURPOSE OF INFORMATION PACK

This information pack aims to summarise the findings of the work completed as part of the feasibility study and subsequent validation project. Providing a high level overview of the project options, as well as detailing the risks and benefits, quantifying the costs of the various options and to provide an overview of 'where to from here'.

This 'Information Pack' is intended to provide guidance for farmers and irrigators in a manner which is non-technical, to support you through the decision making process on whether you wish to proceed to the next phase of development.

The purpose of the 'expression of interest' is to allow the MCWSG to seek a non-binding indication from landowners within the catchment as to whether they would be interested in receiving water and subscribing for shares in a company (NEWCO) in the event that the project is to proceed.

PROPOSED TIMETABLE

The MCWSG will be circulating this information pack to all Landowners within the MCWSG Study Area from August 2016 with EOI documentation due back in October 2016.

Once these are received we expect that it will take a further couple of months to work through the responses before being able to advise the community of the option which will be advanced. Once this option is known by the MCWSG, work will commence on the next steps of the project, known as Phase 2.

This will involve establishing *Newco* (the new irrigation company) and undertaking detailed design work as well as consultation with the community and interest groups, on the preferred option(s). We expect to begin Phase 2 in early 2017.

TASK	DATE
Info Pack & Expression of Interest Distribution	August 2016
Consultation Program	August 2016 - November 2016
Expression of Interest Closes	25 October 2016
Commencement Phase 2 & call for funding	Early 2017

FUTURE OF WATER

Water Use Beyond 2021

The use of water within the Manuherikia Catchment is largely authorised by historic mining privileges, known as deemed permits. Deemed Permits are due to expire in 2021, beyond which, permit holders will be required to obtain a resource consent to authorise the abstraction of water.

This applies to both individual permit holders (private water rights holders) as well as Irrigation Companies. Overall the Manuherikia Catchment is considered by the Otago Regional Council (ORC) to be over-allocated; meaning that in the lead up to and post the 2021 deadline we can expect to see the volume of water (which deemed permit holders are currently authorised to take), decrease.

This reduction of the current available allocation, combined with implementation of residual flows on tributary takes and the review of the minimum flow on the main stem of the Manuherikia, means that the reliability of irrigation is going to decrease. In many cases, our modelling has indicated that those individuals or other permit holders with rights to take water from the smaller tributaries (in particular) are likely to be facing anywhere between a 10 - 20% reduction in water supply reliability or greater in some instances. This is likely to have a significant impact on the ability of the water user to efficiently irrigate the same areas currently irrigated.

The only way to overcome this potential shortfall of available water is to provide for storage, be it catchment wide storage or smaller on farm storage. The cost of storage on a per cubic meter of water stored basis for the various options ranges as set out in the table below:

OPTION	COST (\$/M ³)
High Dam	\$1.14/m ³
Low Dam	\$1.47/m ³
On Farm Storage	\$1.45/m ³ up to \$6-10/m ³

The Prefeasibility and Feasibility studies clearly showed that storage is the critical factor in any water development in the Manuherikia and Ida Valleys. Of the various potential off-farm storage sites assessed Falls Dam was concluded to be the preferred location based on; its water harvesting potential, the suitability of the dam site and the expected cost per cubic metre of storage (\$/m³).

The refinement process has confirmed that Falls Dam is the preferred location for storage but has also identified the existing large Ida Valley storages (Greenland, Manorburn and Poolburn reservoirs) as a potential opportunity for more efficient use of the available water resources.

Any new residual flow constraints are expected to reduce the reliability of supply to existing users. The burden of impact will be carried disproportionately across the users. Some will suffer a significant reduction in supply reliability which may threaten the viability of their irrigation. Tributary users who do not have access to stored water supplementing low summer flows are expected to be the worst affected.

Water Management - ORC Plan Change 1C (PC1C)

"If a catchment wide approach can be adopted and Newco is formed, it is expected that Newco would become the overall consent holding entity for the Catchment, holding all resource consents for the schemes: takes, discharges, and dams etc. as well as undertaking all consent compliance and reporting aspects, and by default becoming a water management group under ORC PC1C."

The Otago Regional Plan Water (RPW) deals with the issue of obtaining resource consents to replace deemed permits. These rules set the framework for the future taking and use of water, especially for irrigation.

This plan change recognised a strong community desire for local management of local water resources. By providing a transition process for deemed permit renewal through the formation of water management groups, to co-ordinate the take and use of water, manage rationing during low flow conditions and report to council.

As set out in PC1C the ORC is actively encouraging the formation of water management groups. If a catchment wide approach for water management is adopted for the Manuherikia Catchment, it is expected that Newco would manage the taking and use (including ongoing compliance) of water among the group members who own the new permits. With group managed consents it is possible to share the water, that would otherwise be inaccessible and provide opportunities for enhanced flow regimes.

It is expected that a group approach to water management will provide more certainty of supply. Water users may have to cut back on taking water during low flows but in a group managed situation it means there could be access to some water for longer as part of managing the minimum or residual flows.

The advantages of a single consent holding entity or management company will become more apparent as regulatory compliance

requirements continue to increase.

The ORC have also notified the commencement of the Manuherikia Minimum Flow Process (PC5C) with the first stage being a series of drop in sessions at the end of August. This will result in the notification of a plan change to provide for minimum flows in the catchment sometime towards the end of 2016.

KEY POINTS

- Deemed permits expire in 2021
- Minimum flows on the Main Stem and Residual Flows on Tributaries are coming (PC5C)
- Reduction in reliability of at least 10-20%
- Storage is only method for addressing water shortfall
- Community management of water resources encouraged by ORC (PC1C)



WHAT IS NEWCO

Newco is simply the holding name that the MCWSG have been utilising to describe the proposed future legal entity that would be formed to 'own and operate' the new catchment wide irrigation scheme.

It is expected that this company would encompass the existing irrigation companies and would be the consent holder and scheme operator for the new schemes. Newco would facilitate the construction aspects of the project and then undertake the day to day management of the water resource; encompassing all operational requirements of the scheme from water management, consent compliance, maintenance and administration. Newco would also provide an avenue for irrigators to facilitate community involvement with, benefiting from the project. As well as identifying, implementing and potentially managing possible environmental enhancement projects, including providing for flushing flows and the creation and implementation of Farm Environmental Management Plans.

Further work on the establishment of Newco is proposed as part of Option 1, should sufficient support for the scheme be determined through this expression of interest process.

OPTIONS FOR THE CATCHMENT

Overview

"The technical, environmental, economic and financial feasibility of five water development options aimed at developing and implementing cost effective, efficient and environmentally sustainable options for water users within the Manuherikia River catchment"

Three of the five options involve raising the impoundment of Falls Dam by 5.4 m, 15.2 m, or 27 m, through either building a new dam or raising the existing dam. The fourth option considers improving the efficiency of irrigation within the Manuherikia Valley by developing efficient water distribution systems. The fifth option is the construction of a new dam (the Mount Ida Dam) on the upper Ida Burn. In addition to the five main options a preliminary assessment has been completed on the proposed Hopes Creek Dam which would supply water to the Ida Valley.

The *Options Validation and Refinement* process has resulted in further development of the options summarised above and the associated costs of each. As a result of this work the MCWSG determined that a detailed costing assessment would be undertaken based on the development of a new Concrete Faced Rockfill Dam (CFRD) of various heights rather than roller compacted concrete (RCC) as detailed in the feasibility study.

An overview of the five main development options is detailed below. For more technical information associated with these options we suggest that you refer to the full feasibility studies which are contained on the MCWSG website, www.mcwater.co.nz.



Falls Dam - High Dam Option

Pre-feasibility work completed in 2012/13 indicated that the highest dam option which should be investigated under the feasibility study was the equivalent of a 27 metre raise of the existing Falls Dam. This option, known as the High Dam Option initially focused on a maximum reservoir volume of 110 Million Cubic Metres (110Mm³).

The High Dam Option aims to maximise the amount of water that can be reliably harvested at the Falls Dam site and maximise the potential for downstream irrigation development. Water balance assessments indicated that 114.1 Mm³ of usable storage, together with run of river takes, is sufficient to reliably irrigate approximately 25,000 ha of land within the Manuherikia Valley (Aqualinc 2014) at 100% supply reliability.

To distribute the irrigation water under a High Dam scenario a new high race is proposed, which extends to the Matakanui Station boundary, plus upgrading much of the existing distribution network. However, through the course of the feasibility study the costs of the 27 metre option were found to be economically unviable, resulting in the MCWSG agreeing that a lower maximum dam height option of around the equivalent of a 20 metre raise was more appropriate, and likely to be more financially viable.

The work completed by the validation project has since confirmed that a dam height equivalent of a 20 metre raise would be sufficient. This would enable the irrigation of 25,000 hectares of farm land at a water supply reliability that is consistent with other recently developed irrigation schemes; without the costs associated with building a dam which is providing a 100% supply reliability.

The High Dam Option (20m equivalent raise) provides approximately 70 Million Cubic Metres (70Mm³) of water for irrigation purposes. Which would provide for a supply reliability by volume of at least 96% on average and at least 90% during a 1 in 10 year drought event.

Indicative costings for a new CFRD high dam has been identified as being around \$80 Million Dollars, which high level contractor assessments indicate is a realistic figure based on other similar fully costed projects. This excludes distribution costs.

SUMMARY OF DAM OPTIONS	High Dam Option	Medium Dam Option	Low Dam Option
Raise Equivalent Height above existing Falls	20m	12-15m	5.4m
Volume of Storage (Mm ³)	70Mm ³	51.6Mm ³	20.6Mm ³
Total Irrigable Hectares (ha)	25,000	20,000	12,500
Indicative Dam Construction Cost (\$)	\$80 Million	\$65 Million	\$28 Million

Falls Dam - Medium Dam Option

The Medium Dam Option has focused on the option of raising the impoundment of Falls Dam by approximately 12-15m (or a new dam of equivalent height) to a full supply level of 580.4 m (15.2 m option). At this level Falls Dam is estimated to store approximately 51.6 Mm³ of which approximately 50 Mm³ would be potentially useable.

This option represents an approximate mid-point between the High and Low Dam options. It aims to provide reliable water to most existing irrigators, while allowing a considerable expansion i.e. 10-12,000 ha of new irrigation (compared to 14.5-16,000 hectares of new irrigation under a high dam scenario) based on an average supply reliability by volume of 96%.

Water balance assessments indicate that 50.0 Mm³ of usable storage, together with run of river takes, would be sufficient to potentially irrigate as much as 20,000 hectares of land within the Manuherikia Valley.

To distribute irrigation water under a Medium Dam Option a new high race is required and would extend to Lauder Creek, plus upgrading much of the existing distribution network. The indicative total capital costs for a Medium Dam Option have been estimated at \$65 Million excluding distribution.

Falls Dam - Low Dam Option

The Low Dam Option considered by the MCWSG, looked at the issues of raising the existing impoundment of Falls Dam by 5.4 m, to a height of 570.6 m above sea level, by either building a new dam or raising the existing dam. At a full supply level of 570.6 m Falls Dam is estimated to store approximately 20.6 Mm³ of which approximately 19.0 Mm³ would be potentially useable.

Through the feasibility study it was considered that the building of a new low dam would be economically unviable, therefore efforts associated with the low dam have been focused on raising the existing dam. A 5m raise would enable the reliable irrigation of around 12,500 hectares in the Manuherikia Valley of which approximately 8,820 hectares is existing irrigable area, and 3,680 hectares is new irrigable area.

Falls Dam - Minimum Investment

As a minimum (and regardless of the options outlined above that are being considered by MCWSG), the existing Falls Dam requires remedial and upgrade work estimated as costing around \$17.5 Million dollars, which will be required to be undertaken to meet dam safety regulations.

The costs associated with this work will be borne by all existing irrigators who receive water from Falls Dam. This remedial work would not result in any increase in irrigable area or improvement of supply reliability compared to the approximate 5m raise. In terms of the estimated costs associated with raising the existing Falls Dam by approximately 5m, Opus (2015) have indicated that these costs would be around \$28 Million dollars. Further refinement of these costs will be required once a more detailed geotechnical assessment of the existing dam can be made.

An important matter which requires careful consideration when assessing the low raise option, is the cost to irrigators of not being able to irrigate for some or all of an irrigation season. This would only happen if the work is unable to be completed outside of the irrigation season or if its required to be empty to enable works to be completed.

Distribution From Falls Dam

For all three storage options, work will be required to provide an operational distribution system which can service both existing and potentially new irrigable areas.

This will involve both the upgrade of existing distribution networks, and the development of a new primary (high race) and secondary distribution network, including the potential to provide a pressurised distribution network in some locations. Feasibility studies have indicated that any property located 40 meters below both new races and existing races may

irrigated due to insufficient water supply. Within the Manuherikia Valley (assuming sufficient water supply) it is expected to be possible to irrigate up to approximately 18,500 ha through expanding the existing distribution infrastructure including some pumping to areas above the races and from the Manuherikia River directly. Irrigating a larger area will require significant new distribution infrastructure, namely the proposed Manuherikia Valley High Race.

The proposed High Race provides the potential

Components of the distribution system could be staged to spread development cost and risk. For example, temporary pumped supplies which utilise existing infrastructure may provide a lower capital cost alternative until such time that there is sufficient uptake from irrigators further down the valley to offset the higher capital construction costs.

Overall costs for the distribution scheme have been identified through the feasibility study, at \$101M for a 20 m raise with piping to all areas, 40 metres (in height) or more below the race.



potentially be able to receive pressurised supply. Supplying pressurised water has significant on-going operational cost advantages as well as having the benefit of being easier to operate, ensuring less leakage, less by-wash, and encouraging spray irrigation on-farm. This approach does however come at a higher initial capital cost, but this cost should be considered in the context of on-going higher on farm pumping cost.

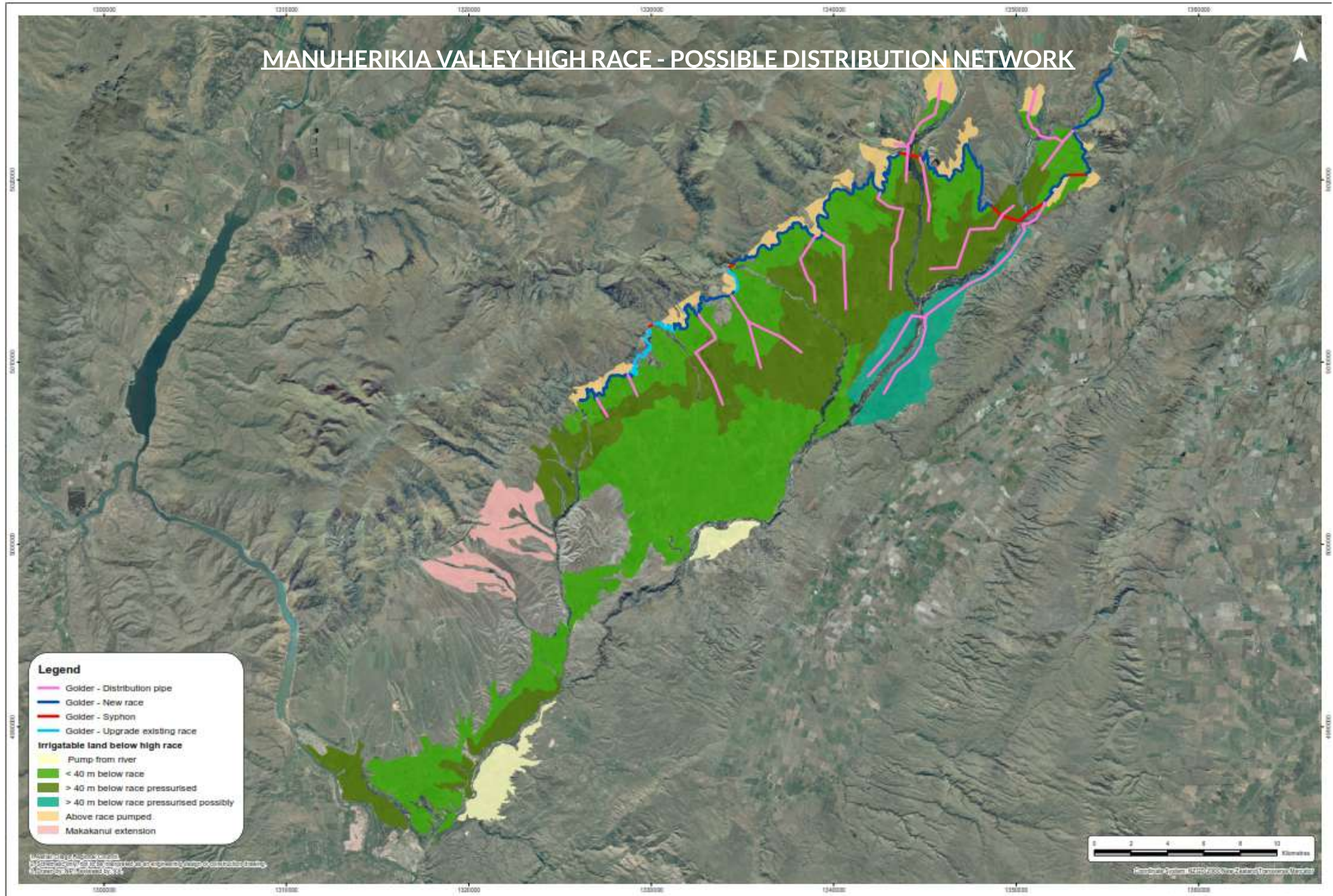
Existing infrastructure in the Manuherikia Catchment can deliver water to about 15,000 ha although not all of the area can be irrigated concurrently and much of this area is poorly

supply of a larger area of the valley with gravity pressurised supply. The Falls Dam Mid raise option does not require construction of the full length High Race, but rather a lesser scale race terminating at Lauder Creek. This is likely to be a similar (or higher) cost per hectare as the full length High Race.

For the Falls Dam High raise option, an alternative to the proposed Manuherikia Valley High Race is to provide for some pumping up from an expanded Omakau Main Race or construction of a large link to the Ida Valley with some secondary distribution pipes back under the Manuherikia River.

This is considered to be a conservative estimate of costs for the largest distribution network (high race options), with costs expected to be able to be refined significantly once detailed information on potential uptake is known and can be assessed relative to the proposed distribution network. For the lower dam options, the distribution costs are expected to be significantly less as works will be focused on upgrading existing infrastructure rather than the construction of new infrastructure.

MANUHERIKIA VALLEY HIGH RACE - POSSIBLE DISTRIBUTION NETWORK



Mt Ida Dam

"The initial cost estimates for the proposed Mt Ida Dam and associated distribution were considered to be cost prohibitive with indicative capital costs in the vicinity of \$12,000 to \$16,000 per hectare"

The Hawkdun Idaburn Irrigation Company (HIIC) have been investigating options for obtaining more reliable water for many years, and to date the work completed by the MCWSG has not identified any economically viable options in respect to the proposed Mt Ida Dam. Feasibility assessments (Hamilton 2006, Pickens 2005 and Raineffects 2006) proposed a new impoundment (Mount Ida Dam) with a 34 m high earth embankment on the upper Ida Burn near Seagull Hill. The Mount Ida Dam is estimated to store approximately 15.6 Mm³ of which approximately 14.6 Mm³ would be potentially usable (Hamilton 2006). The dam "*maximises the storage that can be achieved at the site*" (Hamilton 2006) and would harvest water from its upstream catchment with inflows supplemented by the Mount Ida Race.

To improve the dam's ability to refill, enlarging the current Mount Ida Race from the upper Ida Burn to Hills Creek was proposed. Water balance assessments indicated that 14.6Mm³ of usable storage is sufficient to reliably irrigate about 2,000 hectares of land in the Oturehua, Wedderburn and White Sow areas (Hamilton 2006 and Aqualinc 2013b). To distribute the irrigation water, both a piped and an open race network were considered under this option. The initial cost estimates for the proposed Mt Ida Dam and associated distribution were considered to be cost prohibitive. Indicative capital costs were in the vicinity of \$12,000 to \$16,000 per hectare, which resulted in the MCWSG in conjunction with the HIIC determining that the project at this level of cost was unlikely to be acceptable to farmers. Therefore the later aspects of the feasibility study considered options for improving reliability of the current scheme, and at this time no further works have been undertaken with respect to the Mount Ida Dam. The validation project has considered options of linking water from the Manuherikia Valley to the Ida Valley, including into the HIIC scheme area.

HOPES CREEK

The Feasibility Studies completed by the MCWSG undertook a high level assessment of the potential for a new water storage reservoir at Hopes Creek (a tributary of the Manor Burn which would provide for greater storage, servicing the Ida Valley Scheme). Investigations have shown that this option is economically unviable at the current time.

The desktop assessment resulted in the development of a conceptual design for a 41 metre high CFRD Dam at Hopes Creek, at an indicative cost of \$42 Million. Due to the very high level of costings and the further work required to refine this option a decision was made by the MCWSG in conjunction with the Ida Valley Irrigators to place this option on hold. It is possible that this option will be revisited at some point in the future by the Ida Valley Irrigators.

Ida Valley Link

As part of the Validation & Refinement Project, a high level review of the conceptual distribution network including an assessment of options for transferring water between the Manuherikia and Ida Valleys was assessed. This resulted in identifying four options for transferring stored water between the valleys.

Options:

1. Increased use of the Mt Ida Race
2. Pumping over Home Hills Saddle
3. A high race between the two valleys
4. Release of water from the Ida Valley storages into Moa Creek, Pool Burn and Ida Burn to supply parts of the Manuherikia Valley. Existing infrastructure within the Ida Valley Irrigation Scheme can achieve this so no further investigations were undertaken. At the time it was identified that the capacity of the existing infrastructure would need to be increased to cater for extra releases.

The main focus of these assessments was in getting water into the Ida Valley rather than removing water from it.

Options 2 and 3 were investigated via a high level desktop assessment (Golder 2015d). A potential race alignment was identified that is expected to be more cost effective than pumping over Home Hills Saddle. Integration and optimisation of the overall distribution network, in particular the proposed Manuherikia Valley high race, would need to be assessed if Option 3 is to be progressed further.

To determine whether there is sufficient interest in the further investigation of this option, all irrigators within the Ida Valley and HIIC area will be asked as part of the expression of interest process. Providing an indication of whether this option (if made available at a reasonable cost i.e. not more than \$4,000/ha) would be something they would be prepared to support in terms of uptake of water.



ALLOCATION OF WATER

Methodology For Allocating Water

The allocation of water is underpinned by the two core concepts of “irrigation demand” and “supply reliability”.

Irrigation Demand is the amount of water required to meet optimum plant or crop growth and can be expressed as a daily application rate, i.e. 4.5mm/ha/day or as a seasonal allocation of water such as 600mm/ha/season. Irrigation demand will vary from area to area based on variables such as soil type, local climate and crop type.

Supply Reliability is how regularly and how much water will be received/delivered during an irrigation season and is usually expressed as a percentage of the optimum seasonal demand which will be available in any given year.

Scheme design, has been underpinned by a series of hydrological assessments so as to determine availability of water, ability to reliably fill a potentially bigger reservoir as well as providing useful information as to the actual and potential water demand characteristics - average rainfall, evapotranspiration rates and plant water demand. Whilst these characteristics vary throughout the valley, it is not economically viable to cater for the highest actual evapotranspiration rates as this would result in overbuild of infrastructure. We need to find a balance between the capital costs and certainty of supply.

In assessing how to allocate water the overall scheme has been refined to work on a target reliability (volume supply / volume demand) criteria of at least 96% on average and at least 90% during a 1 in 10-year drought. It has assumed supply rates of:

- 5.0 mm/day for areas below Ophir;
- 4.5 mm/day above Ophir; and
- 4.0 mm/day in the Ida Valley

These supply rates are expected to be sufficient to meet irrigation demand throughout the catchment and mirror current supply design capacities which have been implemented throughout the valley to date.

In terms of allocating water under the proposed catchment wide irrigation scheme, further work is required to refine the details of allocation. For the purpose of this expression of interest the costs of storage are proposed to be apportioned on a flat rate per hectare for existing irrigators, meaning there will be no differentiation of cost based on irrigation demand. One Share (1 share) in Newco will be the equivalent of 1 Hectare worth of water required over an irrigation season i.e. **1 Share = 600mm/hectare** and will include the right to purchase additional water.

For each share in the scheme an annual fixed fee will be payable which would entitle the shareholder to the fixed annual volume of water, i.e. 600mm. This fixed fee is paid irrespective of whether the water is taken or not. The fixed fee component of the annual charge is expected to cover the running costs of the scheme.

Where an irrigator would like more than 600mm of water this would be purchased on a per unit charge basis. It is expected that shareholders would be given preference for extra water over non-shareholders who would be expected to pay a premium for this ‘extra’ water. It is anticipated that the unit cost of water would be determined by demand and market rates and would reflect the potential benefit that can be derived from the water.

It would be a flat rate across the command area but may vary from year to year or timing within the season. i.e. if the dam is still full at the end of the season extra water might be quite cheap, but in dry year extra water is likely to be more expensive. Funds from extra water charges will be additional to normal operation and could be spent in various ways i.e. repaying debt quicker which benefits everyone, further improvement on services (i.e. upgrading some of the distribution network).

KEY POINTS

Targeted Reliability

- of at least 96% on average
- or at least 90% during a 1 in 10-year drought

Supply Rates

- 5.0 mm/day for areas below Ophir
- 4.5 mm/day above Ophir
- 4.0 mm/day in the Ida Valley

Future Allocation Proposal

- 1 share = 600mm/ha
- Fixed annual fee payable for all shares; expected to cover the running costs
- Extra water can be purchased with preference given to existing shareholders.



COST OF WATER

Costs Lie Where They Fall Principal

Since the inception of the MCWSG the group has operated on the principal of “costs lie where they fall”. Essentially this means that each group of users within the catchment will pay their anticipated actual share of costs, rather than everyone paying an equal share of the total actual costs. While this methodology may be reviewed in the future, for the purposes of the feasibility study and economic and cost of water assessments (see section below), this approach has been adopted. In general existing irrigators are expected to pay less than new irrigators, and enables the current irrigators to get the benefit of their existing infrastructure.

The MCWSG has also determined that those users who join the scheme later are likely to pay a higher cost for water so as to offset the ‘overbuild’ costs which may be borne by those who join the scheme at its inception.

In terms of the EOI and the request for irrigators to contribute up to \$50 per hectare for Phase 2 (formation of Newco and commencement of detailed design); where there may be future limitations to the scheme or its future reach, those landowners who have contributed to the funding of Phase 2 will be considered for inclusion within the command area in the first instance in recognition of their early support of the scheme. Those who choose to join at a later date will still be expected to pay a similar contribution.

KEY ASSUMPTIONS OF COST OF WATER

- Initial Share Uptake of 70%
- Equity Ration (portion of capex paid by equity) 50%
- Loan amortization period (non-equity period i.e. 50%) 35 Years
- Loan amortization period (non-uptake period i.e. 30%) 10 Years
- Loan interest rate 7%
- Dam Construction Length 2 Years
- Distribution Construction Length 1 Year



Cost Of Water Methodology

An assessment of the cost of water has been undertaken by *Rationale Limited* utilising specific economic modelling software. This has been based on the various cost estimates/inputs for constructing the dam and distribution system which have been identified through the course of the feasibility study and the optimisation project.

- Farmers will contribute 50% of the total capital costs of the project as their upfront cash contribution. The balance 50% will be covered as borrowings by *Newco*, based on a long term interest rate of 7%. In addition, *Newco* will also be required to pay interest on any dry shareholding (to fund overbuild), which has been assumed will be taken up over a 10-year period. The costs indicated in the EOI are based on this assumption, however the MCWSG is exploring ways that this can be reduced or removed.
- Capital costs include both dam and distribution costs.
- Annual operating costs in the first five years of the project are higher than expected, being in the range of \$240–\$790/hectare per year but over time will decrease to the range of \$120–\$470/hectare/year. This is primarily due to the assumption there will be a lower uptake of water occurring over the first few years of the project.

In terms of the costs detailed in the Information Pack and EOI, these do not include on-farm costs. There are also differences in the level of service provided by the distribution network, for example, some annual operational costs include scheme pumping, while for others they get gravity pressurised water whilst some will have to pump from a race.



Capital Costs To Existing Irrigators

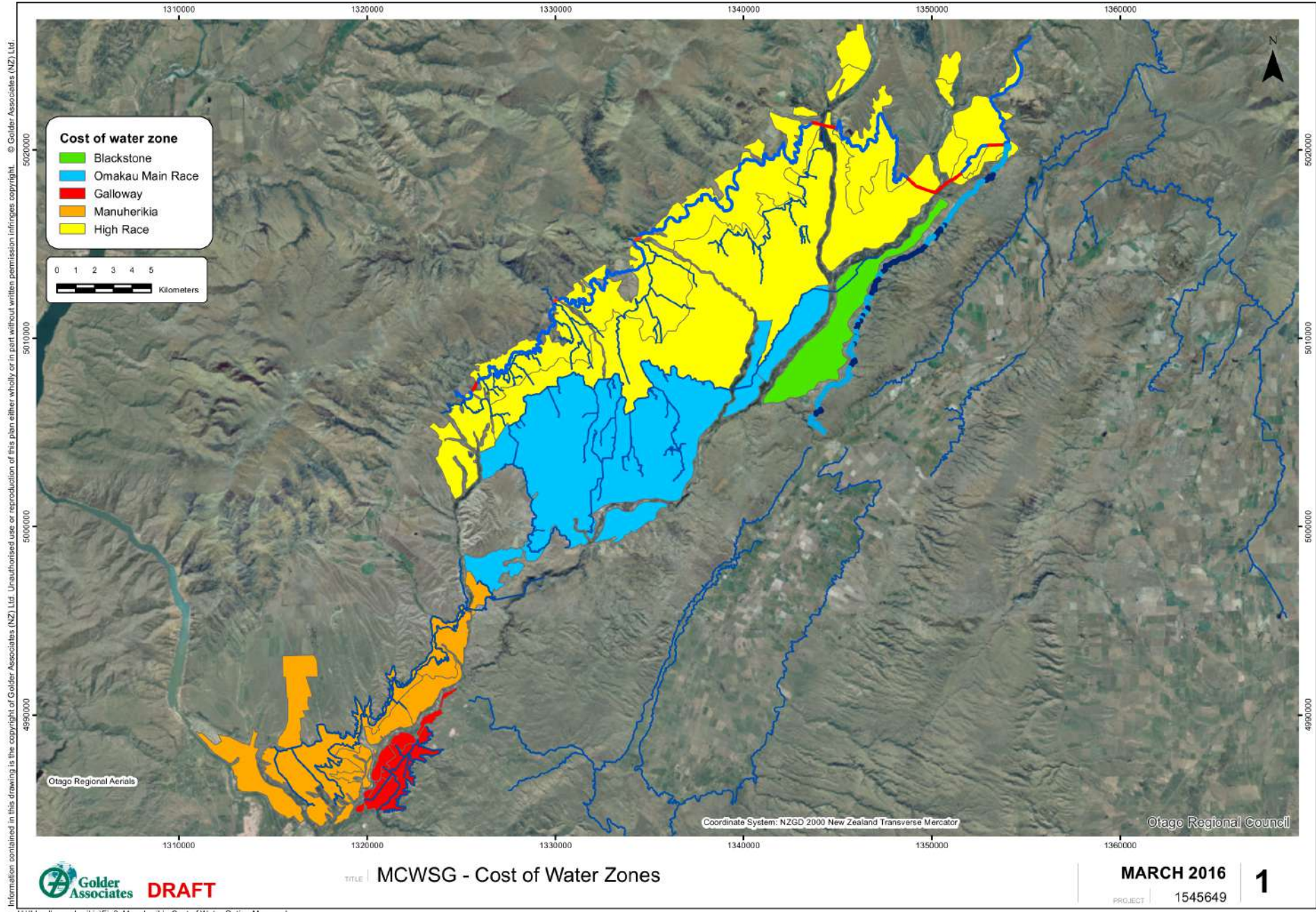
The capital costs to existing irrigators have been assessed based on a range of scenarios, and are made up of two parts; the capital cost of the dam option and the capital cost of the distribution. The cost analysis has been completed on the basis of the “costs lie where they fall” principal, and as such the overall cost to existing irrigators will be spread evenly between existing irrigators, i.e. they will all pay the same capital cost for the dam upgrade component. Depending on the location of irrigators and the state of existing distribution infrastructure, irrigators will pay for distribution on the basis of the actual cost to get water to them, i.e. the costs will vary between irrigators depending on which zone they are located in (as per the plan below).

Existing Irrigator Upfront Capital Cost Estimate		Zone 1 Galloway		Zone 2 Manuherikia		Zone 3 Omakau Main Race		Zone 4 Blackstone		Zone 5 New High Race	
Existing Irrigator	\$/ha capital	1,300		1,500		1,900		1,100		-	
Annual Charge (Initial Period/After Full Uptake)	\$/ha/year	Initial	Full Uptake	Initial	Full Uptake	Initial	Full Uptake	Initial	Full Uptake	Initial	Full Uptake
		680	430	280	140	300	140	240	120	-	-

The upfront capital costs (i.e. 50% of total capital costs) to existing users located in these zones varies from approximately \$1,100/ha for an existing irrigator within Blackstone Zone through to \$1,900/ha for an existing irrigator within the Omakau Main Race Zone. For existing irrigators there will be no difference in the total capital costs that they are required to pay under any dam height scenario, for example a Manuherikia Zone Irrigator would be expected to pay \$1,500/ha under either a High, Medium or Low dam option.

Annual charges for Galloway users are higher as this reflects the continued pumping for this scheme area. In terms of annual operating costs, these are expected to be higher in the first 10 years of the scheme, but once full uptake has been achieved these will decrease. The two numbers shown in the table above indicate the anticipated initial charges and the longer term (under full uptake) annual charges.

Existing Irrigator represents hectares which are currently irrigated using water drawn directly from the main stem of the Manuherikia River and which directly benefit from the current Falls Dam, i.e. existing scheme users.



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U:\Lloyd\manuherikia\Fig2_Manuherikia Cost of Water Option Map.mxd

Capital Costs to New Irrigators

The upfront capital cost (i.e. 50% of total capital costs) to new irrigators, or new irrigable areas has also been assessed on the basis of 'costs lie where they fall', which is why there is a significant variation in the cost to new irrigators depending on the zone in which their property is located.

New Irrigator Upfront Capital Cost Estimate		Zone 1 Galloway		Zone 2 Manuherikia		Zone 3 Omakau Main Race		Zone 4 Blackstone		Zone 5 New High Race	
New Irrigator	\$/ha capital	2,100		2,200		2,800		1,900		4,400	
Annual Charge (Initial Period/After Full Uptake)	\$/ha/year	Initial 790	Full Uptake 470	Initial 400	Full Uptake 190	Initial 420	Full Uptake 190	Initial 350	Full Uptake 160	Initial 620	Full Uptake 260

New Irrigators within the Galloway area will pay approximately \$2100 per hectare, while any new irrigable areas within the High Race Zone will be expected to pay upfront capital costs of around \$4,400 per hectare which is 50% of the full capital cost.

New Irrigator represents hectares which are either currently not irrigated or are irrigated using water which is drawn from tributary streams and which do not directly benefit from the current Falls Dam.

PRIVATE WATER RIGHTS HOLDERS

Private Water Rights Holders (PWRH) are an important component of the overall catchment, and broadly fall into two groups; those that only have private water, and those that have a combination of private water rights and access to existing irrigation company supplied water. In terms of the options available to this specific group of water users under the catchment wide approach proposed by the MCWSG they can elect to:

<p>(a) Remain as a PWRH and seek to renew their existing permits on an individual basis. Essentially under this option a PWRH would not be part of <i>Newco</i> or the MCWSG Catchment Solution. Where the PWRH and <i>Newco</i> may interact is in sub-catchment tributaries where individuals hold permits and <i>Newco</i> holds permits, and jointly they become a 'water management group'.</p>	<p>(b) Transfer all of their private water to <i>Newco</i> and take up shares in <i>Newco</i> which will provide them with all of the water that they require/choose to purchase*. If an entire sub-catchment or tributary were to transfer their rights to <i>Newco</i>, then a water management group would not be required as <i>Newco</i> would act as the default water management group.</p>	<p>(c) Supplement their private water with water supplied by <i>Newco</i>. In this instance the individual would retain their private rights but also receive supplementary water from Falls Dam. This could be used to either increase the area of irrigation or be used to improve reliability of the area irrigated by the existing private right. Once residual flows are set for tributaries this may be necessary to ensure that the same land area can continue to be efficiently irrigated.</p>
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In terms of PWRH, it is recognised that their existing rights are of value in terms of water allocation and overall catchment management and that this value will need to be considered in assessing what costs PWRH will have to pay to form part of the new scheme.

We are currently working through options for valuing these rights, but expect that there will be a mechanism for those PWRH who wish to proceed on the basis of options (b) or (c) to receive water for their existing irrigated areas.

In the interim however the cost of water to PWRH should be considered on the basis of the costs being somewhere between the costs of an existing irrigator and a new irrigator so as to account for the yet to be determined discount mechanism. Should a PWRH choose not to be involved in the Manuherikia Catchment solution, there is no guarantee that at any time in the future, *Newco* will be able to supply under options (b) and (c), and if able to at what cost this will be.

*Allowing for *Newco* to manage all consenting and monitoring ORC may require

ENVIRONMENTAL FACTORS

One of the key elements of the feasibility study was to consider the environmental aspects of a proposed project (looking at each of the five options), including identifying both potential positive effects and negative effects of a project on the environment. This included terrestrial and aquatic ecology and landscape values.

The reason for undertaking this 'assessment of effects' was to enable the values of the catchment to be identified, as well as providing advice on the potential risks and opportunities which might arise, and to highlight if there were any matters which might create challenges to a project progressing.

The environmental assessments of the five proposed water development options have identified a number of issues (particularly those associated with endangered species or trout fisheries). These will require very careful management, especially given that inundation will cause effects and losses on braided river habitat, including alpine galaxias that cannot be fully avoided, remedied or mitigated. However, it is anticipated that suitable management and mitigation options could be developed that would allow the proposed water development options to progress.

Further work is required to be undertaken once a preferred option is identified to develop options to avoid, remedy or mitigate potential environmental effects associated with the project. This work will be completed as part of the next phase of work and will be required to form part of any application for resource consent.

The Upper Manuherikia River valley supports a significant array of indigenous plants, insects, birds, lizards and fish including threatened

species. The braided river habitat in the upper Manuherikia River valley provides the only habitat for the Manuherikia alpine galaxias and habitat for a number of threatened braided river birds. Additionally, the Manuherikia River gorge immediately downstream of Falls Dam and gullies to the east of Falls Dam provide good habitat for a range of threatened plants, insects and lizard species.



All options to raise Falls Dam will result in some loss of the braided river ecosystem, through inundation.. This habitat loss will have impacts on the Manuherikia alpine galaxias and the nesting area of the nationally critically threatened black-billed gull. A proportion of the nesting habitat of the nationally endangered black fronted tern will also be lost as will some threatened plants and a portion of high value lizard habitat around the reservoir edge.

The Mt Ida dam and reservoir site has been assessed as having lower environmental values than Falls Dam, but includes some threatened land environments (LENZ) supporting national priority ecosystems (wetlands), threatened and at risk flora, including a regionally (possibly, nationally) significant population of New Zealand mousetail plants (*Myosurus minimus* subsp. *novae-zelandiae*) estimated at 15,300 plants. Mitigation of effects on these values will be necessary as part of any resource consenting process.

The preliminary assessment of the Hopes Creek Dam "has not" considered environmental issues.

KEY ENVIRONMENTAL CONSIDERATIONS

The principal environmental concerns regarding the project (incorporating both irrigated areas and storage reservoirs) include;

- Ensuring that remaining areas of indigenous vegetation and high biodiversity are suitably protected.
- Flow regimes are developed for the areas waterways which suitably consider instream values.
- There are opportunities through new farm plantings (which could use irrigation water to be established and maintained) associated with property development to increase the area of indigenous cover and improve overall biodiversity.
- Land use intensification is managed to ensure existing water quality is maintained or enhanced.
- The highly modified valley floors of the Manuherikia and Ida valleys provide little indigenous species habitat. However, there are a few remaining areas of indigenous vegetation such as saline sites, spring annuals and dryland plants and grasses. It is recommended that for each farm this becomes part of an irrigation scheme Farm Management Plan (FMP) which would include a biodiversity assessment.





WATER QUANTITY

The water resources of the Manuherikia Catchment are very highly allocated and potentially over-allocated during summer. Increased water harvesting and storage of water is required to overcome the current allocation issues and potentially allow for environmental flows and increased irrigation. The larger the storage volume the more opportunity there is to address over-allocation issues and provide for improved environmental releases and minimum flows.

Water Quality

The current state of the Manuherikia River and its tributaries is varied. In general, the upper catchment has excellent water quality. However, in the lower reaches of the Manuherikia River the water quality has declined to 'good'.

In the tributaries, water quality declines downstream as each stream flows across the Manuherikia or Ida valley floor. Current irrigation in the catchment is dominated by flood irrigation practices. Large application depths are applied which cause saturation of the soil profile, runoff and significant drainage of water through the soil profile. Increased runoff leads to sediment and phosphorus being washed into the watercourses while increased drainage results in leaching of nitrogen. There is potential for algal blooms, although this is currently limited by low levels of nitrogen in the streams. Nutrient budget analysis undertaken using OVERSEER indicates that the Manuherikia catchment has a number of characteristics (e.g. a dry climate, deep soils with limited susceptibility to phosphorus loss and the ability to significantly reduce drainage

and nitrogen loss from existing flood irrigated areas by converting to spray irrigation). These all contribute to significantly reduce the risk of increased nutrient concentrations.



Based on the assumed future land use scenarios (AgResearch, 2015) at a catchment level the proposed irrigation development scenarios are expected to result in reduced nitrogen loss from the bottom of the root zone. A reduction in catchment scale nitrogen loss is expected to result in reduced nitrogen

concentrations in the area's waterways and potentially improve groundwater and surface water quality. At a catchment level the proposed irrigation development scenarios are

expected to result in increased phosphorus loss from the catchment's farms through probably land use intensification. Phosphorus loss is principally associated with runoff, overland flow and active soil erosion. Measures such as appropriate cultivation techniques, vegetation management to limit erosion, riparian strips, controlling stream bank erosion and preventing stock access to waterways will be required to control phosphorus concentrations in the waterways that drain the irrigated areas.

Farm Management Plans (FMP) which identify and address potential erosion "hotspots" and which require detailed on-farm nutrient budgeting will be an important mitigation measure to reduce the risk that future land use intensification poses to water quality. There is also the potential to develop and use wetland areas as water quality management tools.

Flow Regime



Due to the catchment shifting from deemed permits to resource consents, there will be a need to consider residual and minimum flows within the catchment and its tributaries. This will result in less water being available for irrigation purposes, which is why storage becomes an important factor in enabling the reliable supply of water for irrigation purposes as well as maintaining or improving minimum flows. During the feasibility study a workshop was held to consider potential flow regimes for the catchment. Whilst this work was undertaken based on the 27m high raise option the following general principles were agreed as being important to any future flow regime for the catchment;

1. A development will be funded by those that benefit, in this case principally the irrigators in the catchment. To justify the economic cost a suitable level of water supply reliability is required. Currently the aim is to limit irrigation water restrictions to approximately one year in ten.
2. A larger storage volume is likely to provide more opportunity to address over-allocation issues, provide for improved environmental releases and minimum flows, allow increased irrigation, and provide the economic benefits necessary to

ensure the dam is economically viable. A maximum area irrigated of 25,000 ha in the Manuherikia Valley is considered achievable.

3. During dry seasons when the live storage of the dam had been used, the ability to access part (say up to 50 %) of the dead storage for environmental reasons (e.g., residual (minimum) flow releases or flushing flow releases) is considered advantageous.
4. The concept of “shared pain” between irrigators and the environment is supported. During extreme dry periods when live storage in the dam gets low and irrigation restrictions are being considered, reductions in environmental flow releases (residual (minimum) flow releases or flushing flow releases) should also be considered. In assessing the options for increasing storage at Falls Dam the concept of “shared pain” above environmental bottom lines is considered appropriate. An adaptive management approach which allows modifications and adjustments to the flow regime is considered more appropriate than an inflexible or fixed regime. The flow regime should therefore be considered as part of an overall adaptive management approach aimed at achieving optimum performance.
5. Flushing flows are considered advantageous to prevent/restrict excessive build up of periphyton and or macrophyte immediately below Falls Dam. The flushing would occur as required over the irrigation season (mid-September to end of April) with flushing flows triggered whenever the flow below Falls Dam is less than three times the median inflow for 30 consecutive days and the periphyton and/or macrophyte build-up has been assessed as excessive.

Once the preferred option has been confirmed further work looking at the details of a flow regime will be undertaken to confirm the principles agreed above and to identify likely residual flows and possibly minimum flows for the Manuherikia River and its tributaries. This may also form part of any ORC review of minimum flows within the catchment, including the Manuherikia Main Stem minimum flow (PC5C).

RESOURCE CONSENT PROCESS

Before a project such as this can be confirmed there will be a need to obtain all necessary resource consents for the project. This is likely to be a complex and challenging task, particularly in respect to securing all the resource consents to authorise the abstraction of water and specifically the renewal of deemed permits, which has to occur prior to their expiry in 2021.

A specific consenting strategy has not been developed to date as this will be dependent on the final option which is to be consented, however taking a broad catchment wide approach the MCWSG would envisage that this process would encompass all private water rights (those who wish to form part of the project), all irrigation company consents and permits, and all new consents required in association with the development of a preferred option.

It is expected that any consenting process will be undertaken via a publicly notified process and that extensive consultation with the wider community will be undertaken as part of this aspect of the project.



LAND ACCESS

To facilitate a project of this nature and scale, a significant amount of work will need to be undertaken in terms of securing rights to access land, which will be affected by both reservoir inundation and by the development and upgrade of distribution networks. To date we have not been able to undertake any detailed consultation with potentially affected landowners as it has been necessary to determine the key parameters of any project and whether it is viable in the first instance.

At this point we will be better informed to commence discussions with affected landowners. It is often the case of the “chicken before the egg” dilemma, as we cannot identify where a distribution network and potential high race will go in any detail until there is a commitment to a potential option. Yet at the same time we are unable to address any potential land access matters which might need to be factored into the distribution design.

The same situation applies when considering the raising of Falls Dam. We know that there will be a number of landowners who will potentially be significantly affected by inundation, but again until we have an indication of the size of the reservoir to be built we cannot provide any certainty to these landowners of the potential effects and associated costs of what this inundation might be. We are also unable to consider potential implications or benefits in regards to public access until a preferred option has been confirmed.

This uncertainty in respect to land access and the future ability to be able to in fact construct infrastructure on land which is not owned by the MCWSG or Newco means that this is a risk that needs to be factored into the project. For this reason the next phase of work, will include a more detailed program looking at land access. Particularly with respect to securing access over areas of land owned and administered by the Department of Conservation; any process of securing access over this

land is likely to be protracted due to the complexity of legislation which governs how conservation land is to be managed.



NEXT STEPS

For the next few months the focus of the MCWSG will be on consulting with the community in regards to the expression of interest and information pack. This will involve a wide variety of events including community meetings, pod meetings, one on one farmer/irrigator meetings and sessions with agribusiness professionals.

The purpose of this period of extended consultation is to enable those farmers/irrigators within the valley to consider the available information and to make a decision on whether they wish to support the next phase of the project. A detailed consultation program will be communicated to the catchment after the release of the Information Pack and EOI.

Expressions of interest will close on the **25th October 2016** at which point the MCWSG will take some time to work through the responses so that ultimately the degree of support for the project can be determined, and a decision on which option will be advanced to the next stage can be made.

At the same time as the analysis of the EOI is underway, the MCWSG will be working on completing an application to Crown Irrigation Investment Limited (CII Ltd) for funding contribution towards 'Phase 2'.

This will be an application for matched funding, with the other 50% of funds coming from the commitment made by Farmers/Irrigators in the EOI to contribute up to \$50/hectare for the next stage. Phase 2 of the project is expected to encompass;

- Establishment of *Newco*
- Preliminary land access assessments
- Preliminary resource consenting assessments
- Advanced geotechnical & engineering program
- Hydrology review

- Specimen design

Phase 2 has a total estimated cost of \$1,500,000 and is expected to take approximately 6 months to complete, giving an indicative completion date of June 2017.

Following the completion of 'Phase 2' it is expected that the pre-construction program (Phase 3) would commence which would include the completion of design works and a design and build contract, land access and resource consenting programs, financial and legal close, and development of the prospectus.

While details of this stage of the project are still to be defined, it is anticipated that the costs of the pre-construction program would likely be in the range of \$7 to \$8 Million and take 12 to 18 months to complete. Its anticipated that these costs would be met by both farmer/irrigator contribution and Crown Irrigation Investments Ltd contribution.

SUMMARY

The MCWSG has spent considerable time and resources looking at options for optimising the development of irrigation with the Manuherikia and Ida Valleys to secure access to water beyond 2021 and the expiry of deemed permits. The work completed to date has identified that catchment wide storage presents the most affordable solution for the management of the water resource.

It is recognised that irrigation and the associated storage of water is expensive and that deciding whether to support a catchment wide approach will be a very hard decision for farmers and irrigators to make.

The MCWSG is confident that the options outlined in this information pack are viable, and that there will be considerable benefits to undertaking a project of this nature and scale of the proposed. Whilst there are still some unknowns and some uncertainty around the project in its current form, the only way to reduce these risks is to complete the additional work set out in Phase 2.

The EOI attached to this Information Pack intends to ask landowners who wish to irrigate to pay a non-refundable fee of \$50/hectare to allow the project to proceed to the next stages. This funding contribution is non-binding and is not a commitment to taking up shares in *Newco*, and will only be called upon if the EOI process indicates sufficient support for an option to proceed.

The EOI is an important milestone for the project, and landowners are urged to consider the significance of their decision to support the project through to the next phase and the implications this will have in providing for the management of water in the catchment for the next generation.



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Gary Kelliher - Deputy Chairman

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