



## **Manuherikia Catchment Study: Stage 3**

### **Implications of a "Do Minimum" Option**



Prepared for the Manuherikia Catchment Water Strategy Group

# Manuherikia Catchment Study: Stage 3

## Implications of a "Do Minimum" Option



Ministry for Primary Industries  
Manatū Ahu Matua



Prepared By

Sue Scott  
Resource Engineering Consultant

Reviewed By

Mike Kelly  
Senior Resource Management Consultant

Opus International Consultants Ltd  
Alexandra Office  
Tarbert Buildings, 69 Tarbert Street  
PO Box 273, Alexandra 9340  
New Zealand

Telephone: +64 3 440 2400  
Facsimile: +64 3 440 2401

Date: September 2012  
Reference: 6-XI012.00  
Report No: 1059  
Status: Final

© Opus International Consultants Ltd 2012

## Contents

<b>Executive Summary</b> .....	<b>1</b>
<b>1 Introduction</b> .....	<b>3</b>
<b>2 Background</b> .....	<b>4</b>
2.1 Development of Central Otago Community Irrigation Schemes .....	4
2.2 Manuherikia Valley Irrigation Investigations .....	7
2.3 Refurbishment of Old Central Otago Schemes .....	7
2.4 Conversion to Community Owned Schemes.....	7
2.5 Liabilities Associated with Dam Ownership.....	8
<b>3 Risks Associated with Future Scheme Operation</b> .....	<b>9</b>
3.1 Scheme Intakes.....	9
3.2 Infrastructure Efficiency and Ageing Infrastructure.....	10
3.3 On-farm Irrigation Practices .....	10
3.4 Limits on Land Use and Levels of Production .....	11
3.5 Reduction in Opportunities to Improve or Extend Irrigation .....	12
<b>4 RMA Authorisations for Irrigation Activities</b> .....	<b>12</b>
<b>5 Water Measurement Regulations</b> .....	<b>13</b>
<b>6 NPS for Freshwater Management</b> .....	<b>13</b>
<b>7 Regional Plan: Water for Otago</b> .....	<b>14</b>
7.1 Water Quantity.....	14
7.2 Water Quality.....	15
7.3 Activities in Beds and Margins of Lakes, Rivers and Wetlands .....	16
7.4 Damming Water.....	16
<b>8 Central Otago District Plan</b> .....	<b>17</b>
<b>9 Replacement Resource Consents for the “Do Minimum” Option</b> .....	<b>17</b>
9.1 Taking Surface Water .....	17
9.2 Discharges.....	22
9.3 Works In and Adjacent to Waterbodies .....	24
9.4 Water Storage Dams .....	25
<b>10 Conclusion</b> .....	<b>25</b>

## References

## Executive Summary

There are six farmer co-operative irrigation companies operating within the Manuherikia Catchment. The irrigation schemes are based on open race infrastructure, some of which was installed for gold mining and dates back to the 1860s. The purpose built irrigation infrastructure was constructed in the period from 1912 to 1936. The schemes were a Crown-owned initiative to introduce irrigation to the low-rainfall Central Otago area. In 1988, the Government made a decision to pass the management and operation of Crown irrigation schemes to the irrigators.

In addition to the schemes, there are a number of individual farmer irrigators within the catchment who hold private water permits. Some of these private permits are used to supplement scheme water.

There have been many reviews of the operation of the Manuherikia Catchment schemes carried out by the government. Investigations have been carried out into a number of scheme options ranging from “status quo” through to whole of valley schemes. Most of these reports identified risks associated with continued “status quo” or “do minimum” operation of the schemes.

An element of the Manuherikia Catchment Strategic Water Study is to consider the implications of the “do minimum” option. The “do minimum” option consists of carrying out minimum maintenance and continuing to operate the irrigation schemes and private water takes at the same rates and locations as at present.

The risks associated with the continued operation of the schemes under a “do minimum” scenario relate to the physical condition of scheme structures and to the regulatory environment, which is demanding higher water quantity and water quality standards. These factors have financial implications that are not covered in this report.

The risks are summarised as:

- Ageing infrastructure with limited life expectancy due to deferred maintenance.
- High distribution losses.
- Low reliability of water supply and level of service.
- Limited opportunities for increased production.
- Traditional scheme operation provides no incentives to upgrade on-farm irrigation methods.
- The Resource Management Act has provided opportunities to significantly alter the regulatory requirements for taking and using water from those that existed when the schemes were implemented.

All scenarios require expenditure to ensure on-going operation of irrigations schemes. These factors will apply to private irrigation also but on a smaller scale.

An analysis of the risk factors concludes that many of these are necessitated by regulatory changes either directly or indirectly.

All water intakes will be required to include measurement of the water taken and many will require provision for fish exclusion or fish passage.

Many of the structures used for taking, storing and transporting water do not comply with modern safety standards; or require replacement or expensive on-going maintenance.

Traditional irrigation application methods use excessive amounts of water for limited financial gain. Excess water that is not taken up in the root zone is by-washed to surface water or, by soakage, back into the catchment. These return flows are unlikely to meet the most recent water quality standards.

The lack of reliability of water supply from the surface water resource has limited land use opportunities and levels of production.

Replacement of the existing consents to take and use water with water permits under the current regulatory requirements may limit any future opportunities to redevelop the schemes and extend the areas irrigated.

Most of the schemes and private water takes are authorised by mining privileges that collectively expire on 1 October 2021. New water permits will be required and these will be considered under the Resource Management Act 1991 (RMA) instruments that are current at the time that applications are made. National and Regional policy under the RMA now requires higher standards to be adhered to with respect to freshwater management. These include minimum flows and residual flows in watercourses, allocation limits, greater accountability for the quantity of water taken, water quality limits and limits on discharges back to the environment, and consideration of the proximity of the take to the use location.

The Regional Plan Water for Otago (RPW) promotes the establishment of Water Management Groups to assume the local management of the water resource for the benefit of the users and to ensure compliance with regulatory requirements. Water Management Groups require approval from ORC and can operate independently provided certain criteria are met.

For the irrigation schemes and private irrigation to continue to operate within the Manuherikia catchment, the “status quo” or “do minimum” approach will require authorisations to be obtained and upgrading works to be undertaken to meet safety and regulatory requirements.

No attempt has been made to identify in detail works required to meet the requirements and no cost estimates have been produced. Costs associated with upgrading the schemes and individual systems to meet the relevant requirements may result in irrigation becoming uneconomic for some areas unless changes to higher value production can be achieved.

After 100 years of irrigating at a “basic” level, a change in mind-set is required to continue to operate irrigation to meet current standards and good practice.

## **1 Introduction**

There are six farmer co-operative irrigation companies operating within the Manuherikia Catchment. Four of these share governance of the Falls Dam near St Bathans, utilising water stored in the dam to supplement late summer river flows. The two other schemes operate independently based on water from the Manor Burn and Pool Burn sub-catchments; and from the Ida Burn and upper Manuherikia catchment.

The irrigation schemes are based on open race infrastructure, some of which was installed for gold mining and dates back to the 1860s. The purpose built irrigation infrastructure was constructed in the period from 1912 to 1936.

There are a number of individual farmer irrigators within the catchment who hold private water permits. Many of these have their permits governed by the operation of Falls Dam.

An element of the Manuherikia Catchment Strategic Water Study is to consider the implications of the “do minimum” option. The “do minimum” option consists of carrying out minimum maintenance and continuing to operate the irrigation schemes and private water takes at the same rates and locations as at present.

This report summarises the background of the existing operations and examines implications of the planning and other statutory obligations of the future operation of the schemes under the “do minimum” option.

The report should be read in conjunction with the Upper and Lower Valley distribution reports that summarise the financial implications of the “do minimum” option.

This study has been made possible by the generosity of the following who have contributed by way of direct funding or by in-kind contributions. The Manuherikia Catchment Water Strategy Group is grateful for this support and wish to thank the following:

- Ministry of Primary Industries with funding via the Irrigation Acceleration Fund
- The Otago Regional Council
- The Central Otago District Council
- The Manuherikia Community

## 2 Background

Irrigation in Central Otago commenced during gold mining days of the 19<sup>th</sup> century. An early amendment to the mining law enabled the use of mining water for irrigation and made it possible to obtain water rights solely for irrigation. The value of the existing mining rights and the ability of the Crown to obtain priority rights in perpetuity were recognised early in the development of the schemes. By 1954, it was recorded that 59,000 acres of new irrigation had been provided by the Crown's irrigation schemes in Central Otago. The Ministry of Works Report on Irrigation in Central Otago (Lindup and Watt, 1954) states that:

“The principle has always been the consolidation and more efficient use of the limited water available, and enlargement of the area irrigated and this has always been achieved.”

### 2.1 Development of Central Otago Community Irrigation Schemes

The first community irrigation scheme was developed in the early 1900s in the Ida Valley utilising stored water from the existing dam in the upper Manor Burn catchment and the Upper Bonanza Race. Based on this early infrastructure, the scheme was later extended by constructing a higher dam at the upper Manor Burn; enlarging existing mining races; and linking the race system to Moa Creek and Pool Burn to implement a scheme that was capable of irrigating 12,000 acres by 1917. The scheme was extended to include parts of Galloway utilising the Lower Bonanza Race and construction of the Lower Manor Burn Dam in 1920. The construction of the Pool Burn Dam followed in 1929.

The Galloway Scheme developed as an independent scheme utilising water from the Manor Burn via the Bonanza Race system and Dip Creek; and the Lower Manor Burn at the dam. The pumped intake from the Manuherikia River followed in the 1930s.

The Manuherikia Irrigation Scheme was the first that was not founded on the remains of a mining enterprise, although the scheme does incorporate some mining races and early water rights. The scheme was constructed between 1917 and 1922. Water is taken from the Manuherikia River in the Ophir Gorge to the Main Race, which was purpose built for the scheme. Water is also taken from Chatto Creek to the Borough Race, an old mining race that originally went to the Clutha River and was later taken over by the Alexandra Borough Council. Water is supplemented into both races from some of the tributary streams that are crossed.

The Hawkdun Scheme was originally based on the Mt Ida Race, an early mining race that took water from the upper Manuherikia catchment to Naseby and to Blackstone Hill. This race, approved under a Governor's Proclamation, was constructed from 1873 to 1877 and was not covered by the early Mining Act or the priority system. The East Ewe Burn Dam was added in 1902. The Idaburn Scheme was added in 1931 with the construction of the Ida Burn Dam near Oturehua. The public water supply for Naseby Township is still supplied via the Mt Ida Race.

The Omakau Scheme developed in stages from 1935. The Main Race was purpose built for the scheme followed by the construction of the Falls Dam. The addition of the

Matakanui, Lauder and Dunstan areas followed. The Matakanui County Scheme area was added later and was based around early mining races. The Blackstone Race was originally part of the Omakau Scheme even though it was operated independently.

The schemes are predominantly run-of-the-river schemes with some remote headworks and many kilometres of open races. The early development of irrigation allowed land use changes to occur with more intensive farming systems and the development of horticulture close to Alexandra and Clyde. Even though there were opportunities to amalgamate scheme operations, very little co-operative activity developed, apart from the distribution of the water from Falls Dam to the four schemes based on the Manuherikia River and the co-operation of private right holders in this water management.

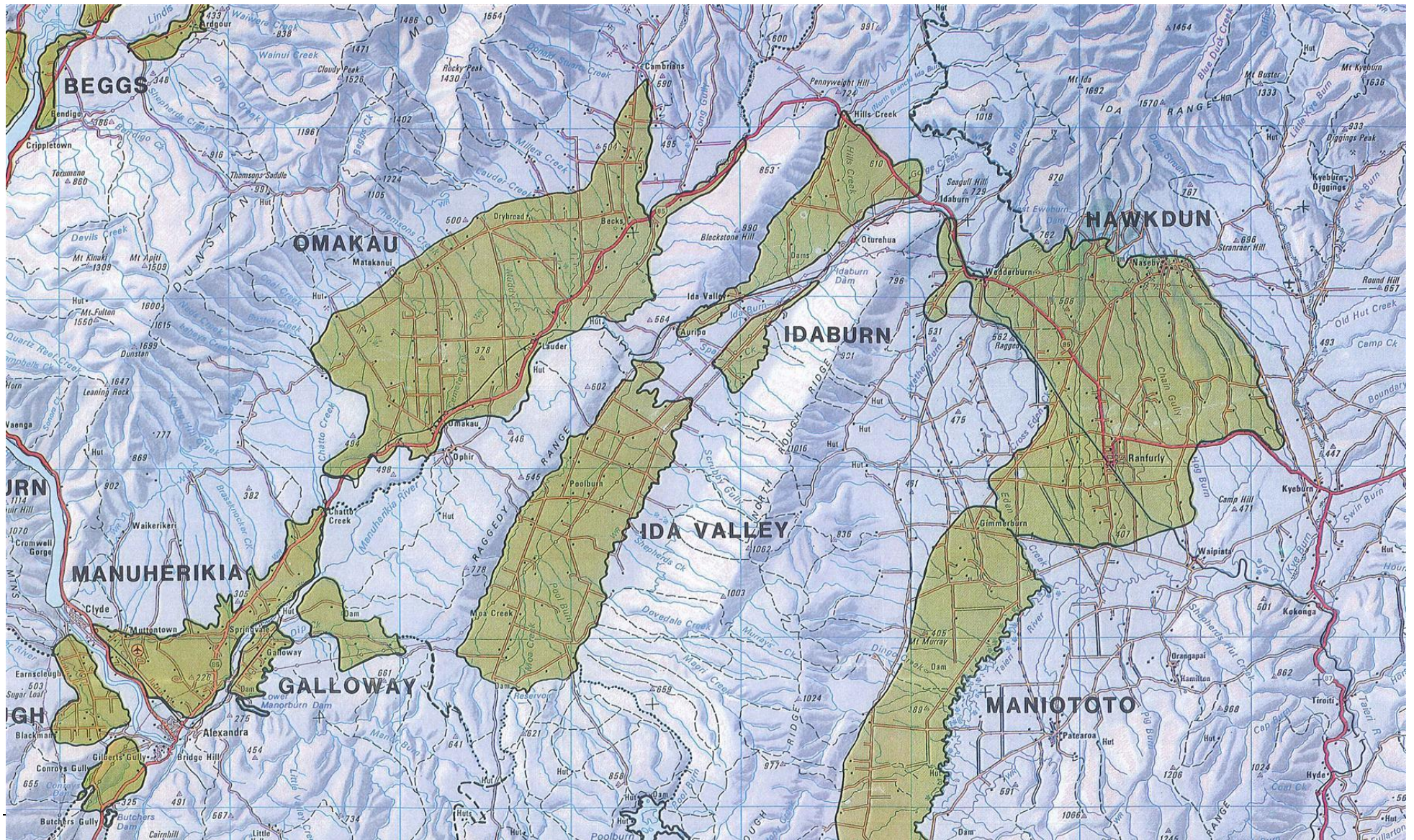
A review of the schemes that was initiated in 1979 commented on the disparity between the income from water charges and the costs associated with the operation of the schemes. It also commented on the lack of knowledge around the value of irrigation to the community which was brought about mostly because of the way the schemes had been developed in a piecemeal manner with no forward planning. The report noted that none of the existing schemes could support “full” irrigation of the properties they serviced and that only fully upgrading the schemes to provide efficient, adequate and reliable water supplies; reduction in overall costs; and the adoption of modern irrigation techniques would meet the ultimate objectives of the study’s findings.

The antiquated state of much of the scheme infrastructure and difficult terrain were responsible for the high operating costs, which were labour intensive. This was a reflection of the times when the majority of the works were constructed. However it was becoming increasingly obvious that the schemes were not able to continue to operate in this way. One of the cost-cutting measures suggested was amalgamation of some schemes as well as automation of water supply structures.

The report from this study (Hinchey et al. 1981) recommended a number of measures to increase the income from water charges while continuing to operate the schemes at a “do minimum” level for 10 years while further investigations were carried out into upgrades for the schemes.

The map on the following page shows the locations of the schemes and is taken from the MWD “Community Irrigation Schemes” map of 1986.





6-XI012.00

September 2012





## 2.2 Manuherikia Valley Irrigation Investigations

At this time investigations had already been carried out into the possibility of a comprehensive irrigation scheme for the Manuherikia Valley. The first proposal included raising the Falls Dam at the existing site and constructing some new races. Ultimately this scheme would irrigate 16,500 hectares of the 30,000 hectares considered to be irrigable. This proposed scheme did not include any of the Ida Valley, Hawkdun or Galloway schemes.

Investigations in the early 1980s considered a range of options from a planned reversion to dryland farming through to development of a whole of valley scheme. The scheme options included utilisation of water from Lake Dunstan, raising Falls Dam and replacing Falls Dam with a higher downstream dam.

None of the schemes proposed by these investigations proceeded past pre-feasibility stage.

## 2.3 Refurbishment of Old Central Otago Schemes

There followed a series of investigations into the condition of the individual schemes and reports that presented rough order cost estimates for the “refurbishment” of the scheme off-farm works.

“Refurbishment” was defined as “the minimum measures necessary to ensure the original level of service at least cost for a minimum period of 20 years”. The measures were described as “status quo” and “do minimum”.

Very little of the upgrading works identified in the refurbishment reports was implemented. The general tenor of the reports was that the scheme infrastructure had a limited life expectancy, although some form of irrigation should continue.

One of the recommendations of the refurbishment report for the Manuherikia Scheme was that:

“Water management for the whole of the Manuherikia Valley should be researched with a view to maximising results from the limited water supplies”.

Also during the 1970s and 1980s, detailed inventories were compiled of the scheme infrastructure, including weirs, dams, intakes, gates, races, valves, culverts, siphons, pipelines, measuring devices, etc. The condition of the infrastructure was recorded in the inventory. These scheme inventories would later prove to be invaluable to the scheme owners.

## 2.4 Conversion to Community Owned Schemes

In 1988, the Government decided that the ownership of irrigation schemes should be passed to the irrigators. This was a nation-wide policy and was applied to all Crown-owned irrigation schemes. In Central Otago there were serious concerns around the condition of the scheme assets and the reluctance of irrigators to embrace more modern irrigation practices. Despite recent increase, water charges being levied were recovering only a

small proportion of the annual operating costs and the injection of large amounts of capital were required to bring the schemes to a more satisfactory standard for the future. There had been Ministerial promises to carry out improvements to the schemes, but the works were not coming to fruition. Irrigators began losing faith in the Crown's ability to continue to operate the schemes.

Many of the reports prepared during the 1980s referred to the social and economic importance of the irrigations schemes in Central Otago. The reports identified shortcomings in the management of the schemes that had led to significant shortfalls in the scheme accounts. It was becoming clear that it was beyond the ability of many farmers to pay the level of water charges that were indicated to recover even a portion of the costs required to carry out scheme upgrades.

The decision was taken in 1988 that schemes would be transferred to the irrigators and the Irrigation Schemes Act 1990 was enacted.

The Irrigation Schemes Act authorised the sale of the Crown irrigation schemes to the irrigators. The terms of the sale of each scheme was negotiated with the irrigators, who were required to form a legal entity to be the recipient of the scheme assets, rights and liabilities as determined in the agreement. At settlement, the schemes' new owners received a refund of the water rates that had been paid to the Crown for the year in which the sale was confirmed, as well as a payment to assist with the costs to carry out certain works and to establish the scheme entity. In the Sale and Purchase Agreements for some schemes, the Crown retained the liabilities associated with any upgrading requirements for the larger dams that may be required under dam safety legislation. These clauses generally gave the new scheme owners, the right to return the dam to the Crown and expired 10 years after the date of sale.

## **2.5 Liabilities Associated with Dam Ownership**

The inclusion of contingent liability provisions in the agreements were in recognition of deficiencies that had been identified by dam safety evaluations that were undertaken prior to the sale of the schemes. At that time there was no definite indication of the likely performance standards that would be included in future legislation. The dam safety evaluations carried out were in accordance with the New Zealand Society of large Dams (NZSOLD) Dam Safety Guidelines of the time, which were based on international practice.

The dam reports identified upgrading and repairs that would be required to improve the performance standard of the dams; potential hazard assessments; and recommended future monitoring of the structures. In general, the structural assessments recorded shortfalls in spillway capacities, seismic resistance, and risks associated with overtopping. Rough order costs were presented to cover maintenance, upgrading and partial decommissioning. Partial decommissioning related to the cost of modifying the dam and any associated structures to operate at a lower water level.

The cost of works associated with structural upgrades for the dams was estimated in 1999 to range from \$1M to several million dollars for the existing dams.

The Building Amendment Act that introduced the Dam Safety Scheme (DSS) came into force on 31 March 2005. By this time all of the “return” clauses in the sale and purchase agreements had expired, leaving the new owners to pick up Building Act responsibility for the dams.

The Dam Safety Scheme has been subject to many amendments and Regulations since 2005. The implementation of the DSS has been further delayed as it is currently subject to a further amendment to the Building Act.

### **3 Risks Associated with Future Scheme Operation**

Since the schemes were transferred to irrigator ownership some upgrading work has been carried out, but only some of the work identified as necessary “refurbishment” has been implemented. Much of the schemes’ infrastructure still suffers leakage, and some major structures, including dams are likely to require significant expenditure to continue safe and efficient operation. The implementation of the Resource Management Act 1991 (RMA) soon after the sale of the schemes and the inclusion of the Dam Safety Scheme in the Building Act have both added a layer of obligations on scheme owners, the full extent of which could not be foreseen by the scheme owners.

Many of the reports prepared during the 1980s noted that the continued operation of the schemes with limited maintenance, or to effectively “do nothing” was not a preferred scenario. Reasons for this scenario not being favoured were:

- Reliability of water supply and level of service could not be guaranteed.
- Opportunities for increased production would be limited.
- No incentives to improve on-farm irrigation methods.
- Continued race leakage.
- Limited life expectancy of some structures.
- Reluctance by Central Government to provide funding for identified upgrading works.

One of the aspects of the future scheme operation that was not referred to in any of these reports was any possibility that existing authorisations to take and use water might change.

The first five bullet points listed above, along with the future authorisations required under the RMA and other statutes and regulations, represent the current risks associated with the continued scheme operation. Applications for RMA authorisations to take and use water will require examination of the operational short-comings identified above. The future RMA authorisations required are covered in detail below in Sections 4 to 9.

#### **3.1 Scheme Intakes**

Under the “do minimum” scenario, scheme intakes will be required to provide for fish passage or exclusion and for flow measurement.

At present many of the scheme races provide a habitat for sports fish however this may become restricted in future if race systems are run more efficiently without permanent connections to open water. Many new resource consents to take water require total exclusion of fish at intakes.

Regulations under the RMA require flow measurement for consumptive water takes exceeding 5 litres per second. Flow measurement equipment will include electronic data recording, and in some cases, telemetry.

At intakes where residual flows are required to remain in tributary water takes, flow monitoring sites may be required to establish compliance.

All of these intake modifications will require expenditure by the various schemes.

### **3.2 Infrastructure Efficiency and Ageing Infrastructure**

Many of the existing water races were constructed with minimal leakage prevention and are still subject to leakage. No attempt was made in the MWD refurbishment reports to define the extent of the leakage, although the reduction of losses was listed as a significant goal. Water losses can also occur at dams, siphons, culverts and pipelines.

Individual irrigation companies have carried out upgrading works to reduce leakage however losses still occur on all schemes. The extent of the losses has not been determined at this stage of the investigations.

Resource consent applications must now justify the volume and flow rate of the water taken against the intended end use. A reduction in infrastructure losses may be a prerequisite to obtaining resource consents to take and use water. Significant expenditure may be required to improve the infrastructure efficiency.

In addition, the age of the infrastructure is resulting in the deterioration of some structures and the inability to meet modern safety standards. Many of the repairs carried out since the MWD reviews were short term to tide over until a whole of valley scheme option could be investigated and implemented.

While a “do minimum” approach may be acceptable for the future operation of some structures, current safety and regulatory requirements will compel the implementation of upgrading works.

### **3.3 On-farm Irrigation Practices**

The purpose of modern irrigation is to improve crop production (quantity and quality) and therefore to increase farm profitability. It is recognised that there will be a cost associated with the supply of irrigation water to the property either by an irrigation scheme operator or by the individual irrigator from a private source. Modern irrigation application devices are capable of optimising the amount of water applied to the soil to replace soil moisture within the root zone that has been lost through soakage or by evapotranspiration from the crop. The amount and rate of water applied can be matched to the soil type and depth, the crop, the ground contour and the soil moisture level.

Traditional on-farm irrigation practices in Central Otago have been wild-flooding, contour flood irrigation and border-dyke irrigation. Wild flood and contour flood irrigation have been utilised on flat and on rolling ground and offers very little control over the rate at which water is applied and results in high run-off flows. Border-dyke irrigation requires ground levelling to control the rate of application of the water, but there is still runoff to surface water and sub-surface drainage of excess water. All of these methods have a high rate of 'wastage' where water drains away through the soil profile, or runs off the ground to surface water bodies.

Wild flood and border-dyke irrigation are suitable for use with the rostered water supplies available from the older schemes as they have high application rates and longer return periods. Farming practices had developed in the Manuherikia catchment to match this type of irrigation water supply and the fluctuations in the seasonal availability of the water. Very few of the properties have developed to 'full' irrigation because insufficient water is available during the drier seasons.

More recently low pressure gravity spray systems such as K-Line have been used on the schemes as well as low pressure pumped systems, such as centre-pivot. Traditionally horticulture has used higher pressure spray systems for irrigation and for overhead frost-fighting. These application methods generally require some form of on-farm storage. Modern spray irrigation systems have shorter return periods as the water is applied in a more targeted fashion.

For irrigation to continue under the current RMA provisions, on-farm practices may need to change to meet more stringent water quality and water quantity expectations.

Efficiency improvements on and off farm provide more certainty around when and where irrigation will occur and will support more profitable farming practices. These improvements are likely to incur increased costs that may act as a deterrent.

Improved on-farm irrigation practices will also result in less drainage water re-entering the environment from excess surface irrigation. At present this excess is returned to the Manuherikia catchment resource and is subsequently taken and used further down the catchment. Some of this return flow is enhancing stream and river flows, thus benefiting ecosystems and recreational activities.

With more intensive farming practices, the return of excess irrigation water to watercourses could result in concentrated rural contaminants degrading water quality. The potential adverse effects of rural activities on water quality has been the driver behind the formulation of national and regional policies aimed at halting further degradation of fresh water. These policies will require that irrigation is targeted to the root zone of crops with little or no return flow.

### **3.4 Limits on Land Use and Levels of Production**

Many of the MWD reports on the schemes refer to the lack of reliability of the water supplies from the schemes. Even the Ida Valley scheme, which is the only scheme based on water storage, is unable to provide a reliable water supply in drier years. This has resulted in farmers developing "strategic" irrigation, optimising the water that is available

when it is abundant (generally early in the irrigation season) and utilising targeted irrigation for the remainder of the season when the total water quota is less likely to be available.

It has been suggested that the use of more modern irrigation practices would reduce the need to irrigate strategically as the water supplied to the farm could be applied more efficiently over a larger area and for a longer period.

### **3.5 Reduction in Opportunities to Improve or Extend Irrigation**

The replacement of the existing mining rights with RMA water permits to continue to operate the existing schemes may limit future opportunities to redevelop the schemes or to expand the area of irrigated land. If the amount of water able to be taken is reduced at the time of re-consenting, or is tied to specific land parcels, there will be no opportunity to regain access to that water in the future and there may not be any ability to extend the area of land irrigated. If the “status quo” option was to be pursued, this scenario may be able to be partially overcome by forming a whole-of-catchment water management entity.

The implications of the future authorisations for the continued operation of the existing schemes are covered in the following sections.

## **4 RMA Authorisations for Irrigation Activities**

The continued operation of existing irrigation schemes and private irrigation activities within the Manuherikia catchment, after 1 October 2021, will require authorisations under the RMA that are consistent with the planning instruments in place at the time.

Planning documents that will apply will include, but not be limited to:

- Resource Management Act 1991 (RMA), including all relevant Amendments and Regulations. Current Regulations that are relevant to these activities are:
  - Resource Management (Measurement and Reporting of Water Takes) Regulations 2010;
  - Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

The Government is carrying out a major review of the freshwater provisions of the RMA that may result in further regulations.

- National Policy Statements (NPS) and National Environmental Standards (NES) prepared under the RMA that relate to the taking and using of water and activities in and around water bodies. Current NPS and NES documents that will be relevant to the activities are:
  - National Policy Statement for Renewable Electricity Generation 2011;
  - National Policy Statement for Freshwater Management 2011;
  - National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health. (This NES is unlikely to be relevant to the “do minimum” option.)

- A proposed National Environmental Standard on Ecological Flows and Water Levels discussion document was released in 2008. This process is currently on hold.
- The relevant Regional Policy Statement (RPS) prepared under the RMA. The current RPS is the 'Regional Policy Statement for Otago (1998)'.
- The relevant Regional Plans prepared under the RMA. The current RPW and the proposed plan changes are described in Section 7, below. Other current regional plans are not likely to relate significantly to the on-going activities of the schemes.
- The relevant District Plan prepared under the RMA. The current district plan is described briefly in Section 8, below.

Planning related documents that will directly affect the future operation of the schemes are discussed further in the following sections.

## **5 Water Measurement Regulations**

These regulations require the staged introduction of compulsory measurement and recording of water taken for consumptive uses where the flow rate exceeds 5 litres per second. Records of water taken must be reported to the regional council annually. By 10 November 2016 all water takes that exceed 5 litres per second will be measured and recorded. It is likely that the ORC will require automatic flow measurement and recording with telemetry.

Some schemes have or are implementing measurement and recording of water takes in accordance with the regulations. Because some schemes have multiple intakes that, in some cases, are for limited seasonal water, the cost of installing the water measurement is significant. Schemes and individuals are working with ORC to minimise the expenditure required to meet their obligations under the regulations.

## **6 NPS for Freshwater Management**

This NPS sets out objectives and policies that direct local government to manage water within set water quantity and quality limits. Water quality and quantity limits must reflect local and national values. The NPS encourages integrated management of land and water resources.

Based on the limits set, freshwater resources can be allocated to users while providing the ability to transfer entitlements between users to maximise the value gained from water. Over-allocation must be reduced over agreed timeframes.

The NPS took effect on 1 July 2011. Some of the policies in the NPS take effect immediately, while others are able to be implemented over time in consultation with the stakeholders.



## 7 Regional Plan: Water for Otago

The RPW became operative on 1 January 2004. The purpose of the RPW is to promote the sustainable management of Otago's water resources. To achieve this, the Plan has policies and methods, including rules, to address issues of use, development and protection of Otago's freshwater resources, including the beds and margins of water bodies. The RPW is the primary instrument that regulates the taking and using of water for irrigation and other rural purposes.

### 7.1 Water Quantity

Methods used in the Plan that are relevant to the future of irrigation abstractions include setting minimum flows and allocation limits for Otago's surface water catchments. Water taken and used for irrigation within the Manuherikia catchment is predominantly from surface water sources. The small amount of groundwater that is taken is hydraulically connected to surface water.

#### Water Use and Allocation

Plan Change 1C (PC1C) to the RPW introduced policies around the allocation and use of water and became operative on 1 March 2012. The new policies link the taking of water more closely to the purpose of use; promote shared water management; and give preference to local water for local use. These three principles are primarily for the purpose of avoiding wastage of water and to improve management of water infrastructure. PC1C also introduced a relationship between groundwater and surface water allocation where the resources are hydraulically connected.

Policy 6.4.0A requires consideration of local climate, soil, crop or pasture type and water availability when determining the water requirement. It also requires consideration of the efficiency of the water transport, storage and application system. The aim of the policy is to ensure that systems are designed, constructed and operated in a manner appropriate to the end use of the water and to avoid or minimise wastage. Minimising water wastage can increase the flow able to remain in the waterbody.

Policies introduced by PC1C will assist water users with the transition from mining privileges to water permits.

Currently much of the water taken from the Manuherikia catchment for consumptive use is authorised by mining privileges (Deemed Permits). Under the transitional provisions of the RMA, these collectively expire on 1 October 2021. Mining privilege holders will need to have applied for water permits for all water takes at least 6 months prior to the expiry date, or by 1 April 2021. Most water permits that are exercised in conjunction with mining privileges also expire on 1 October 2021. The water permit applications will be considered in accordance with the RMA provisions that prevail at the time applications are made.

Current water abstractions from the Manuherikia are all classified as Primary Allocation under Policy 6.4.2(b) of the RPW. Where the holder of a primary allocation permit from the Manuherikia catchment applies for a new water permit at least 6 months before the expiry date of the current permit, the permit retains its primary allocation status once the new

permit is granted. As the catchment is considered to be over-allocated, if a new permit is not applied for, and the permit expires, then the allocation associated with that permit is permanently deducted from the total Primary Allocation for the catchment.

The applications for new water permits will be assessed against the criteria set out in Rule 12.1.4.8 of the RPW. These criteria include a requirement to provide the records of the amount of water that was abstracted under the current permit during at least the 5 years prior to the application. If the amount of water taken over the previous 5 years has been consistently less than the amount consented, the amount authorised by the new permit will be reduced to reflect the actual volume and/or rate taken. Again, as the catchment is considered to be over-allocated, the balance amount will be deducted from the total Primary Allocation for the catchment.

### **Minimum Flows**

Minimum flows are specified for a number of catchments in Schedule 2A of the RPW. For the Manuherikia River, at monitoring site MS 8 in the upper Ophir Gorge, the minimum flow is set at 820 litres per second. The flow of water available for primary allocation for the whole catchment is 3200 litres per second. Under Policy 6.4.5, the minimum flow at MS 8 does not apply to water takes until a collective review is carried out of all water permits in the catchment. As the majority of water permits within the catchment are mining privileges, the minimum flow may not be applied without the agreement of the permit holders. The minimum flow conditions will apply to the new water permits to replace expired mining privileges.

No minimum flow has been set for the Manuherikia below MS 8. The ORC has carried out some preliminary investigations into 'management flows' and minimum flows and for residual flows on the main tributary catchments. Indicative residual flows have been developed and these will go through a consultation process before being implemented by way of a plan change. The ORC has a programme for introduction of the minimum and residual flows before applications are made to replace the expiring mining privileges in 2021.

## **7.2 Water Quality**

The RPW includes policies and rules for the protection and enhancement of freshwater quality. Proposed Plan Change 6A (PPC6A) was notified on 31 March 2012 to reduce the adverse effects of rural land use activities on water quality. It introduces water quality limits for inland surface water bodies and limits on the discharges applied to production land where they are about to enter water. Hearings are being held on submissions to the Proposed Plan, with decisions on the submissions due to be available by the end of 2012.

Under the RMA, because the rules in PPC6A relate to water, they have "immediate legal effect" (RMA s86B(c)). This means that the ORC must have regard to them, but must also have regard to the nature of the submissions made in opposition and the potential for the rules to be modified by the decision-making process.

For the Manuherikia catchment, the proposed target date for achieving good receiving water quality measures is 31 March 2012 for all except Nitrate-nitrite nitrogen, which has a

proposed target date of 31 March 2017. The measures specified in PPC6A reflect the pre-existing water quality values for water bodies that are of good or very good water quality. Measures with later achievement target dates are where there is potential for water quality improvement.

Discharge limits proposed for the Manuherikia catchment will apply from 31 March 2019 for Nitrate-nitrite nitrogen and from 31 March 2017 for other nutrients and for *Escherichia coli* (*E. coli*).

A number of discharges to water or to land where it is about to enter water are now prohibited throughout Otago under PPC6A.

The proposed plan limits the discharge of nitrogen from land to groundwater to 30 kilograms of nitrogen per hectare per year within the Manuherikia catchment.

The proposed water quality policies and limits will apply to irrigated rural land irrespective of the land use. Future management of irrigated land will need to include water quality management and self-monitoring to ensure compliance with these policies and rules.

### **7.3 Activities in Beds and Margins of Lakes, Rivers and Wetlands**

The effects of human activities on the beds and margins of lakes, rivers and wetlands are managed by the RPW. Policies and rules cover the use, erection, alteration, extension, removal or demolition of structures; bed disturbance; the introduction of vegetation; the deposition of any substance; drainage or reclamation; and the removal of any plants. Many rural activities occur within or adjacent to water bodies. Apart from the effects of sediment runoff that is covered by water quality rules, there are the effects of bed disturbance that can be result from a number of activities. Some activities that have minor adverse effect are permitted by rules in the RPW. Some of the Rules relating to activities within the beds of lakes, rivers and regionally significant wetlands have been altered by PPC6A and Proposed Plan Change 2 (PPC2).

PPC2 introduced additional wetlands to the category of Regionally Significant Wetlands and clarified rules and policies relating to wetlands. PPC6A withdrew parts of PPC2. PPC2 increased the number of Regionally Significant Wetlands within the Manuherikia catchment.

Mining privileges authorise the maintenance of the water intake as well as the water take. Water intake maintenance usually includes the disturbance of the bed and bank of the watercourse in the vicinity of the intake. As for water takes, the authorisation for intake maintenance will expire on 1 October 2021. Consents may then be required for the on-going maintenance of some intakes.

### **7.4 Damming Water**

Existing dams within the Manuherikia catchment are authorised by mining privileges and by water permits. Mining privileges for damming include the maintenance of the structure and all incidental taking and discharging of water at the dam. Applications for replacement water permits for existing dams are restricted discretionary activities provided that the scale of the damming does not change.

The dam structures are covered by the Dam Safety provisions of the Building Act 2004.

## **8 Central Otago District Plan**

The District Plan provides for the integrated management and control of any actual or potential effects of the use, development or protection of land. The Regional Policy Statement for Otago and the RPW provide policy guidance to the District Council in their management of the effects of activities in riparian areas.

Currently most of the activities carried out by individuals and irrigation companies to maintain and operate irrigation are permitted under the Central Otago District Plan (CODP). Proposed Plan Change 5 (PPC5) included measures to more regulate effects on landscape and the external appearance of structures in rural areas. PPC5 decisions were made public on 28 May 2011. Some provisions of PPC5 are still under appeal.

The CODC Long Term Plan (LTP) notes that the CODP must be reviewed prior to 2018. Consultation on the plan review is proposed. The district plan review will therefore be underway before 1 October 2021. On-going operation and maintenance of irrigation will therefore be regulated by the second generation district plan.

## **9 Replacement Resource Consents for the “Do Minimum” Option**

If the taking and using of water for irrigation continues as at present after 1 October 2021, applications for water permits to take water as primary allocation at the existing rates and locations will be considered generally under the provisions described above in Section 7. The provisions of any proposed plan changes notified prior to 2021 will also be relevant.

### **9.1 Taking Surface Water**

#### **Applications to Take and Use Water**

The rules that prescribe the taking and using of water are set out in Section 12 of the RPW. As there is no spare primary surface water allocation available for taking within the Manuherikia catchment, the only water permits that can be granted are for the replacement of expiring permits.

At present most of the water taken from the Manuherikia catchment occurs from September to April, while winter flows are used to replenish storage in Falls Dam. Applications to take water outside of the irrigation season to replenish new out-of-channel storage will be considered to be Primary Allocation under the RPW if the ORC determines that the take can meet the restricted discretionary considerations set out in Rule 12.1.4.8. It is possible that there will be no record of this water having been taken outside of the irrigation season in the years preceding the application. The justification for granting consents for additional storage will require a rigorous assessment of the effects to be successful.

Further to this, applications to take water outside of the irrigation season for water harvesting and storage as supplementary allocation can be made, although no provisions have been made by the ORC under the RPW to for supplementary allocation. Supplementary allocation is made available on a 50:50 flow-sharing basis between

instream and out of stream uses. The minimum flows set for supplementary allocations must provide for existing primary allocation and for potential effects on instream values.

Rules 12.1.4.4, 12.1.4.5 and 12.2.3.1A of the RPW cover applications to take water from the Manuherikia Catchment as primary allocation from surface water or connected groundwater. Under these rules the taking and using are restricted discretionary activities, with the restricted discretionary activity considerations listed in Rule 12.1.4.8.

The restricted discretionary considerations in Rule 12.1.4.8 were reordered in March 2012, indicating that the considerations have a ranking. This reordering reflects the hierarchy of the water management policies in Chapter 6 of the RPW. On this basis, applications to take and use water under the rules noted above will be considered on the following basis and in the following order:

1. Establish that the take is primary allocation. This has been established.
2. The proposed rate, volume, timing and frequency at which water is to be taken and used are consistent with current good practice.

Currently, if water is to be taken and used for irrigation, these parameters are checked against the Aqualinc recommendations in the report: 'Water Requirements for Irrigation Throughout the Otago Region, October 2006'. Applicants must be able to demonstrate that the volume of water taken reflects the amount required for irrigation within the relevant geographic area.

Applications to take water that will exceed the current good practice guidelines will not succeed.

Water permit applicants will be required to provide accurate records of at least 5 years of water abstraction showing the rate at which water is taken, the duration of taking; and the annual amount taken. The amount of water authorised by any replacement water permit will reflect the amount and rate of water taken during the previous 5 years of record. The application will be assessed against the weather records for the recorded seasons to determine reasonableness of the seasonal amount applied for.

If water is to be taken to on-farm storage, this mode of taking will need to be already established prior to an application being made for a replacement permit.

3. The methods of taking, delivery and application of the water are consistent with current good practice. The applicant will be required to demonstrate efficiencies at each of the components of the infrastructure.

This will require identification of water losses at the intake and from the delivery infrastructure as well as utilisation of irrigation application methods that reflect current good practice.

Good practice irrigation methods are those where the design, operation and monitoring of the system are matched to the soils, climate, crop type and topography. Soil moisture monitoring will be in place and water will be applied uniformly to the soil at a rate that is matched to the water holding capacity of the soil.

Under current ORC consent processing, individual permit holders are unlikely to be able to make an allowance for infrastructure losses in a water permit application. Schemes applying for water permits may be afforded a small allowance for infrastructure losses, however we understand that there will be a requirement to take all reasonable measures to eliminate losses.

Applications that do not demonstrate good management of the infrastructure to avoid losses are unlikely to succeed.

4. The water source; the location of the water intake in relation to the use of the water; and any competing uses for that water. The RPW policies for integrated water management promote shared use and management of water and gives preference to the take and use of water from the nearest practicable source. These policies, when taken together, require consideration of collaboration within catchments and sub-catchments to ensure that the criteria listed in 1 to 3 above are applied in the best possible way.

There are examples of good co-operative water management occurring within the Manuherikia catchment. The RPW seeks to extend those examples so that the taking and using of water is managed more directly by water users within a discrete geographic area who can benefit from close collaboration around the management of the taking and using of the water.

The formation of a Water Management Group under Policy 6.4.12A would allow self-management of the taking and rationing of water within the group. Water abstraction record keeping could be managed by the group. If required, other regulatory requirements including enforcement could be delegated to the group. The RPW sets out the criteria for the formation of a Water Management Group.

Another aspect of the collaboration is the investigation and development of alternate water sources to replace the transportation of water over excessive distances to areas where an alternate source exists. An example of this is the area of lifestyle blocks to the north-east of Alexandra. The CODC has recently re-zoned previously Rural General land to Rural Residential, which allows smaller holdings. Irrigation water is delivered to this area via the Manuherikia 'Borough Race' from Chatto Creek. This may not be a "good" use for this water. Investigations and implementation of an alternate water supply would benefit water users further up the catchment; therefore a collaborative approach would be supported by the RPW policies.

5. The requirement for a minimum flow and a residual flow restriction. As noted above, a minimum flow for the Manuherikia River above Ophir is listed in Schedule 2A of the RPW. Preliminary investigations have been carried out into a minimum flow for the lower Manuherikia River at Alexandra Camp Ground site. As noted in Section 7.1, above, the ORC has stated an intention to introduce a minimum flow for the lower Manuherikia catchment prior to 2021.

In addition to minimum flows on the main stem, ORC has also stated an intention to require residual flows on the main tributaries of the Manuherikia River at the points of take to provide for the needs of aquatic ecosystems.

Therefore the exercise of all replacement water permits from the Manuherikia catchment will be limited by minimum flows on the main stem and residual flows on tributaries. Note that takes from tributaries will be limited by the minimum flows and the relevant residual flow for that tributary.

6. Daily water measurement at the intakes is required under the RPW and the Water Measurement Regulations. Under the regulations, all water takes having a flow rate greater than 5 litres per second must be measured by 10 November 2016. Water permit holders must keep and maintain records of the amount of water taken each day. The ORC will require electronic recording that can be transferred by telemetry.

In some cases, the ORC has discretion to allow measurements to be taken weekly rather than daily. There is also discretion to allow a water measuring device to be installed away from the intake location. Approvals for non-standard water measurement will be considered on a case-by-case basis.

7. If provision does not already exist, to prevent fish entering the intake, or to avoid adverse effects on spawning sites, these provisions will need to be included in an application for a replacement water permit to take surface water, if relevant.

#### **Notification Provisions for Replacement Water Permits**

Rule 12.1.4.8 indicates that public notification is unlikely if the application is to take and use water from a river for which a minimum flow has been set.

#### **Suspension of Surface Water Takes**

Suspension of surface water takes may occur when river flows fall below the minimum flows set in the Water Plan. Currently a minimum flow limit has been set at the upper Ophir Gorge. Under the current management regime, the release of stored water from Falls Dam and the management of the irrigation takes have not caused the flow at Ophir to fall below the set minimum.

An additional minimum flow site is proposed for the Lower Manuherikia River that will be implemented under a plan change process. An approved Water Management Group may be able to regulate water use within the catchment to meet the minimum flow requirements.

#### **Prohibited Activities**

The taking of surface water as primary allocation is prohibited when the allocation of water within existing consents already exceeds or would exceed the allocation limit set for that catchment in the Plan. No new surface water permits are being granted for the Manuherikia catchment.

An application to take groundwater that is connected to the surface water resource, which is not primary allocation, is also prohibited.

In addition, an application to take water within primary allocation in the Manuherikia catchment by a person who does not hold an existing consent is prohibited. Therefore if the taking of water under a replacement water permit is to be operated by a Water

Management Group, the group would need to be established prior to an application being made and the permit transferred to the group as the holder.

### **Water Management Groups**

The relevance of water management groups to the Manuherikia catchment is referred to above. RPW Policies for shared use and management are 6.4.0B, 6.4.12A and 6.4.12B. Information on the formation and function of water management groups is set out in Appendix 2A to the RPW.

Current examples of co-operative water management in the catchment are the operation of the Falls Dam to optimise water availability and sharing further down the catchment and the management of the Ida Valley Irrigation Scheme where releases of water from the dams is managed to meet the needs of the scheme members.

Formal water management groups that have been approved by the ORC can operate independently of the ORC provided certain criteria are met. Primarily, the group must operate within the policies and rules of the RPW. The formation of a group would require an investment in additional infrastructure to ensure that the correct monitoring is in place. It also requires the formation of a legal entity to manage and administer the group. A water management group consists of and binds all consent holders within its defined area.

The key advantages of a water management group are:

- A suite of water permits can be held and managed by the group independently of the ORC.
- A water rationing regime can be established that has the agreement of the group and is managed independently of the ORC.
- Establishment of a water permit transfer regime may be possible within the group.

For the “do minimum” option to remain a viable option for the catchment post-2021, the formation of groups within the catchment will be essential.

### **Local Water for Local Use**

RPW Policy 6.4.0C requires consideration of whether the water source is the nearest practicable for the proposed location of use. Considerations would include efficient use of the resource; the location of alternate potential sources; and the economic, social, environmental and cultural effects of taking from the source compared to other sources that may be available. This policy prefers the use of local water where it is available and minimising transportation of water to the use location.

Within the Manuherikia catchment, preliminary investigations have been carried out into options for the taking and using of water from the Clutha River or Lake Dunstan for irrigation of the lower Manuherikia Valley. Currently the lower valley irrigation water is sourced from a gravity supply from the Manuherikia River and Chatto Creek. The supply of irrigation water from the Clutha River or Lake Dunstan requires pumping, which may not be



attractive to water users unless the costs are shared with water users who would benefit from having access to a more reliable water supply from the Manuherikia.

### **On-farm Storage**

Continuation of the existing schemes in their current configurations with rostered supply agreements is not compatible with some modern irrigation application methods that require continuous operation to achieve the design water application. Irrigators who do not wish to continue with a rostered supply, and cannot access a continuous flow from a water race, will require on-farm storage. The construction and operation of on-farm storage may require resource consent and/or building consent depending on the scale and location of the dam.

### **Water Harvesting**

Policy 6.6.2 of the RPW supports water harvesting, the storage of water during periods of high availability for later use.

Some existing primary allocation takes may not have the full allocation available as run-of-the-river during the summer months due to low flows. These takes could utilise water harvesting when there is excess surface water available that is stored in reservoirs for summer use.

In addition, Rule 12.1.4.7 provides for water harvesting where there is no supplementary allocation listed in Schedule 2B. There are currently no such takes consented within the Manuherikia catchment; and such a take may not be considered possible as the primary allocation is high.

Apart from the filling of Falls Dam, the predominant period for taking water from the catchment is during the irrigation season. Some tributaries may be able to be considered for water harvesting provided that the criteria of Rules 12.1.4.7 and 12.1.4.8 can be met.

## **9.2 Discharges**

Irrigation companies within the Manuherikia catchment discharge water to water at by-wash locations and at some scheme intakes. The discharge of excess irrigation water from individual properties to surface water is the responsibility of the landowner or occupier. PPC6A seeks to minimise or eliminate direct discharges of contaminants to water by encouraging appropriate land management practices.

Note that although the water quality rules and standards set out in PPC6A are still at the submission and hearing stage, the RMA has determined that these rules have “legal effect”.

Schedule 16 of PPC6A sets the proposed allowable limits on certain contaminants that may be discharged to water.

PPC2 increased the number of Regionally Significant Wetlands within the Manuherikia catchment. Discharges to these wetlands are now specifically included in PPC6A. Some existing irrigation infrastructure or irrigation runoff may now discharge to Regionally Significant Wetlands and will need to be checked against the following criteria.

### **Discharges of Water to Water**

The discharge of water to water is permitted in circumstances where the level of contaminants present is very low or where the effect on the receiving water is negligible and where there is no discharge to another catchment. Some existing discharges of water to water will continue to be permitted under PPC6A.

Discharges that cannot comply with the limits set in the permitted rules become either restricted discretionary or prohibited. A consent may be obtained to discharge Schedule 16 contaminants to land in certain circumstances, see below. A consent may also be obtained to discharge water from one catchment to another provided certain conditions can be met.

Some existing discharges of excess irrigation water will require monitoring to determine whether or not the discharge can continue under the PPC6A rules.

### **Discharge of Sediment**

The discharge of sediment to water is permitted (e.g. from cultivated or disturbed land) provided:

- Sedimentation does not occur after rainfall stops;
- More than one hour after rainfall stops, the turbidity of the discharge is below 40 NTU where it is about to enter water;
- More than 12 hours after rainfall stops, the turbidity of the discharge is below 5 NTU where it enters water.

Any other discharge of sediment to water where no sediment control measures have been taken is prohibited.

### **Discharge of Animal Effluent**

The discharge of wastewater from an animal waste system to land is permitted provided that it occurs 50 metres from a bore used for domestic water supply or animal drinking water; and there is no discharge to any other person's property without the other person's agreement.

Any other discharge containing animal waste to water, saturated land, a water conduit, or to the bed of a lake, river or regionally significant wetland is prohibited.

### **Discharge of Nitrogen and Other Contaminants**

The discharge of Nitrogen and other specified contaminants is restricted under PPC6A.

### **Discharge of Nitrogen**

The discharge of nitrogen from land to groundwater within the Manuherikia catchment is permitted providing that:

- From 31 March 2019, calculated nitrogen leaching by the Council using OVERSEER® Version 6.0 does not exceed 30 kg N per hectare per year; and
- The person responsible for management of the land must provide all necessary data to run OVERSEER® Version 6.0 if requested.

Other discharges that contain nitrogen are covered by the rules for Schedule 16 contaminants.

### **Discharge of Other Contaminants**

Other discharges to water or to land in a manner that it may enter water must not exceed the following limits:

- By 31 March 2017, Nitrate-nitrite nitrogen shall not exceed 0.075 mg/L;
- From 31 March 2012, the following limits apply:
  - Ammoniacal nitrogen shall not exceed 0.1 mg/L
  - Dissolved reactive phosphorous shall not exceed 0.006 mg/L
  - *Escherichia coli* shall not exceed 126 cfu/100 ml
  - Sediment shall not exceed Turbidity of 5 NTU.

The discharge of Schedule 16 contaminants to land is a restricted discretionary activity where the discharge existed prior to 31 March 2012 and attempts have been made to meet the limits; or where a short term activity will cause the limits to be exceeded.

### **Prohibited Discharges**

A number of discharges are prohibited by PPC6A. These include discharges:

- Having an odour, oil or grease film, scum or foam or floatable material where it is about to enter water;
- Increasing the colour; reducing visual clarity; developing an odour; or developing an oil or grease foam, scum or foam in the receiving water;
- That result in flooding, erosion, land instability, or property damage;
- That contain sediment and no measure has been taken to avoid sediment runoff;
- Of animal waste effluent to a water body; to saturated land; to a conduit to water, or to the bed of any lake or river or wetland; that enters water from land; that results in ponding.

Some of the discharge rules included in PPC6A are complex in that they inter-relate and so must be read in their entirety to comprehend their implications for rural activities.

## **9.3 Works In and Adjacent to Waterbodies**

Many irrigation scheme intakes within the Manuherikia catchment are run-of-the-river and require annual or more frequent maintenance to retain their effectiveness. This usually consists of bed shaping to train the main river channel into the intake. As noted above, this

maintenance is authorised by the mining privilege that also authorises the taking of water. While the RPW permits the maintenance or repair of an existing approved structure, bed disturbance associated with the maintenance and repair is covered by Rule 13.5.1.1 of the RPW that limits the duration and adverse effect of the bed disturbance. Activities within the bed of a waterbody that exceed the limits of the permitted Rule 13.5.1.1 require a resource consent as a discretionary activity.

The future maintenance of intakes will need to be checked against the relevant rules once the future configuration and use of intakes is known.

#### **9.4 Water Storage Dams**

Existing dams will require resource consents to replace the existing permits that expire in 2021. The damming of water that is currently authorised is a restricted discretionary activity. The application to continue damming must consider the downstream effects of continuing to operate the dam as well as the effects of the impoundment itself.

For many of the Manuherikia catchment dams, the downstream watercourse is used as a conduit to transport the water from the dam to the downstream abstraction point, which acts as a flow enhancement during dry periods.

Because the nature of an irrigation dam is to have a variable water level and exposed lake bed during summer, replacement dam permits may require consideration of the management of the lake margin to minimise the effects.

### **10 Conclusion**

For the irrigation schemes and private irrigation to continue to operate within the Manuherikia catchment, there is no “do nothing” option. The “status quo” or “do minimum” approach will require authorisations to be obtained and upgrading works to be undertaken to meet safety and regulatory requirements.

No attempt has been made to identify in detail works required to meet the requirements and no cost estimates have been produced. Costs associated with upgrading the schemes and individual systems to meet the current requirements may result in irrigation becoming uneconomic for some areas unless changes to higher value production can be achieved.

After 100 years of irrigating at a “basic” level, a change in mind-set is required to continue to operate irrigation to meet current standards and good practice.

## **References**

- Aqualinc Research Ltd, Manuherikia Catchment Study: Stage 1, March 2012.
- Aqualinc Research Ltd, Manuherikia Catchment Study: Stage 2, April 2012.
- Aqualinc Research Ltd, Manuherikia Catchment Study: Stage 3a, June 2012.
- Aqualinc Research Ltd, Lower Manuherikia Valley Distribution, Draft September 2012.
- Aqualinc Research Ltd, Upper Manuherikia Valley Distribution, Draft September 2012.
- Aqualinc Research Ltd for Otago Regional Council, Water Requirements for Irrigation Throughout the Otago Region, October 2006.
- Central Otago District Council, Central Otago District Plan, 1 April 2008.
- Central Otago District Council, Proposed Plan Change 5 to the Central Otago District Plan, Decisions 28 May 2011.
- Hinchey et al, Report of Working Party on Central Otago Irrigation, July 1981.
- Ministry of Agriculture and Fisheries, Sale of Crown-Funded Irrigation Schemes, Report to Parliament, Reports 1 to 5, March 1992 – March 2000.
- Ministry of Works, Report on Irrigation in Central Otago, March 1954.
- MWD, Irrigation in Central Otago, April 1984.
- MWD, Manuherikia Valley Irrigation, Feasibility Report, November 1979.
- MWD, Manuherikia Valley Irrigation, Prefeasibility Report on Civil Engineering Aspects of Irrigation Options, January 1984.
- MWD, Ida Valley Irrigation Scheme Reassessment, August 1979.
- MWD, Refurbishment of Hawkdun & Idaburn Irrigation Schemes, Prefeasibility Report, September 1985.
- MWD, Refurbishment of Old Central Otago Schemes, Manuherikia Scheme Report, Preliminary, November 1985.
- MWD, Refurbishment of Old Central Otago Schemes, Omakau Scheme Report, Feasibility, Part I, January 1988.
- New Zealand Government, National Policy Statement for Freshwater Management 2011, 12 May 2011.
- Opus, MAF Policy, Irrigation Dams, Contingent Liabilities arising from Return to Crown Ownership, April 2000 .

Otago Regional Council, Regional Plan Water: for Otago, reissued 1 March 2012.

Otago Regional Council, Proposed Plan Change 6A to the Regional Plan Water: for Otago, 31 March 2012.

