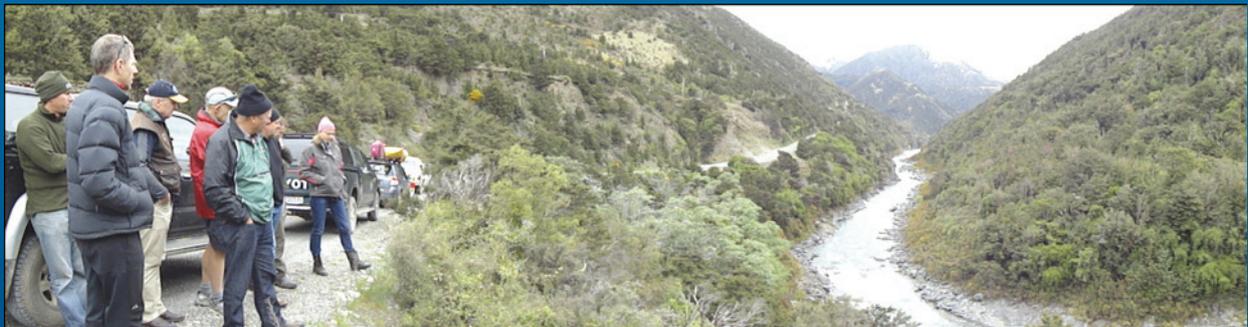


Hurunui Waiau Zone Implementation Programme

22 July 2011



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The Zone Committee thank those who contributed to the development of our ZIP, and we look forward to working with the local and regional community to achieve our vision – a thriving natural environment, healthy waterways, and a prospering zone.

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Toitū te marae o Tangaroa

Toitū te marae o Tāne

Toitū te iwi

*If the domains of Tangaroa (water)
and Tāne (land) are strong and vibrant;
So too will people be strong and vibrant*

EXECUTIVE SUMMARY

Since July 2010, the Hurunui Waiau Zone Committee, a joint committee of the Hurunui District Council and Environment Canterbury, has worked collaboratively and undertaken extensive consultation with, and received submissions from, Rūnanga, local communities, interested parties, industry groups, government and non-government organisations, scientists and advisory groups to develop the recommendations on water management presented in this Zone Implementation Programme (ZIP).

The Zone Committee and this ZIP are part of implementing the Canterbury Water Management Strategy (CWMS) in the Hurunui Waiau Zone. The CWMS sets as its first order priorities: environment, customary use, community supplies and stock water; with second order priorities as irrigation, renewable electricity generation, recreation and amenity. The Zone Committee recognizes that clean drinking water, land use, water quality and quantity, environmental flows and allocation for the rivers, biodiversity protection and enhancement, irrigation, hydropower development and water storage options, and the principles of kaitiakitanga are all (intimately) interrelated and must be considered as a whole rather than in isolation. This ZIP recommends actions and approaches for collaborative and integrated water management solutions to achieve the CWMS vision “To enable present and future generations to gain the greatest economic, recreational and cultural benefits from our water resources within an environmentally sustainable framework”. In accordance with the CWMS the Zone Committee has arrived at its recommendations through consensus.

The ZIP is a suite of water-management recommendations to Environment Canterbury, Hurunui District Council, developers and other parties. It is not a statutory plan under the Resource Management Act (RMA). However, the Zone Committee expects the Hurunui Waiau Environmental Flow and Allocation Regional Plan (Hurunui Waiau Regional Plan) to give effect to the recommendations of the ZIP through an integrated approach to the development and management of the district’s freshwater resources. This ZIP represents a “snapshot” of the position the Committee has reached with regard to recommendations after receiving and considering over 125 submissions to the Draft ZIP, together with feedback from meetings and communities of interest, including public meetings at Amberley, Omihi, Cheviot, Culverden, Hawarden, Hanmer Springs and Christchurch in total involving more than 300 people.

The Zone Committee recognizes that the future social and economic prosperity of the zone is largely dependent on utilization of its water resources, for agricultural and horticultural development through the expansion of irrigation, and tourism activities. The Committee’s vision is that this can be achieved while maintaining, but striving to enhance, environmental outcomes in order to achieve a “net gain” for the water resources and associated ecosystems as well as preserving cultural and recreational values. This will require effective and responsible economic and natural resource management of the land and rivers including the implementation of appropriate environmental flow regimes in the major rivers and their tributaries, the setting of nutrient load limits in catchments and the adoption of sustainable best practice audited self management programmes led by community/user-based land care groups and industry backed up by a regulatory framework.

THE KEY RECOMMENDATIONS IN THE ZIP ARE:

- Flow and allocation regimes must be set for the rivers and their tributaries to ensure the life supporting character of the rivers are maintained:
 - For Waiau River minimum flows can remain unchanged provided current water use remains unchanged and in-river values do not deteriorate;
 - For Hurunui River the Variation 8 minimum flows and A Block allocation are appropriate with minor changes.
 - Nutrient load limits must be set for the major rivers and their tributaries.
 - The water quality for Hurunui River at State Highway One should be at or about the same or better standard as present;
 - Current land users will need to improve nutrient management to allow new irrigation development to occur;
 - New irrigation development must have good nutrient management;
 - Implementing load limits should take a tributary- and land/water user-based approach.
 - More widespread monitoring of the major rivers and their tributaries and hapua needs to be established to ensure water quality standards are being achieved.
 - Implementation of sustainable best practice audited self management programmes, particularly for water quality, led by community/land user based land care groups and industry is essential (and has commenced) and be backed up by a regulatory framework.
 - Provision of “more water” for irrigation and augmentation of river flows (in Waipara River), preferably with associated hydropower development, but not for hydropower development on its own, will come from an integrated use of run-of-river takes and off-mainstem storage:
 - The Waitohi River catchment is the preferred location for major water storage in Hurunui catchment;
 - Water storage options in Lake Sumner or the Hurunui South Branch should be deferred until a Waitohi storage option has been determined to not be viable or for two years, whichever is shorter;
 - Isolated Hill appears to be one of the few viable options for off-river major water storage in Waiau River and is supported by the Zone Committee.
 - Immediate Steps Biodiversity funding over the next four years will be used in a more strategic manner for projects that optimize freshwater biodiversity outcomes and community involvement. Five priority areas are being considered:
 - North Pegasus Bay coastal wetlands;
 - Lower Waitohi wetlands;
 - Conway Flat to Waiau River mouth;
 - Braided River ecosystems;
 - Sumner lakes complex.
- Included in the appendices of this ZIP is an assessment of its coverage of the CWMS Targets and Goals and a list of the reports and presentations that have been provided to the Zone Committee.

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1: INTRODUCTION

1.1 ABOUT THIS ZIP

The Hurunui Waiau Zone Committee and this Zone Implementation Programme (ZIP) are part of implementing the Canterbury Water Management Strategy (CWMS) in the Hurunui Waiau Zone. This ZIP recommends actions and approaches for integrated water management solutions to achieve the CWMS principles, targets and goals encompassing economic, social, cultural and environmental outcomes.

This ZIP is not a statutory plan under the Resource Management Act. The Zone Committee expects the Hurunui Waiau Regional Plan to give effect to many of the ZIP recommendations. This Regional Plan will be notified by Environment Canterbury in September 2011.

The Zone Committee has worked in a collaborative manner to develop recommendations for water management solutions that are acceptable to a wide range of interests. Environment Canterbury and Hurunui District Council have been closely involved in preparing this ZIP, however the Zone Committee does not have authority to commit any Council to any path or expenditure, and this ZIP does not do so.

For more information on the CWMS, including principles and targets, the Zone Committee's role and membership, see Appendix 1.

A summary of how this ZIP addresses the CWMS first and second order priorities through all goals of the ten CWMS Targets is provided in Appendix 4. All recommendations in the ZIP contribute to achievement of the CWMS Targets. We have identified specific relevant targets alongside each recommendation throughout this ZIP.

The major water storage options for the Zone have been assessed in relation to the CWMS targets. This is a separate report done by Environment Canterbury staff and is expected to be finalised in September.

A reference list of reports and presentations that have been received by the Hurunui Waiau Zone Committee and informed this ZIP is found in Appendix 5.

1.2 GEOGRAPHIC SCOPE

This ZIP covers the Hurunui Waiau Water Management Zone. The boundaries of this Zone are contiguous with those of Hurunui District Council covering the area between Waipara River in the south to the top of the Hundalees (including the Okarahia River) just north of Conway River/Tutae Putuputa in the north from the coast to the Southern Alps.

The takiwā (geographical interests) of two Ngāi Tahu hapū (sub-tribes) straddle the Hurunui Waiau Zone; namely, Ngāti Kuri and Ngāi Tūāhuriri. Ngāti Kuri's interests extend from Te Parinui o Whiti (White Bluffs) in the north to the Hurunui River in the south, east from the Main Divide out to sea as far as the eye can see. Ngāi Tūāhuriri's interest extends from the Hurunui River in the north to the Hakatere/Ashburton River in the south (sharing an interest with Ngāti Huirapa/Te Rūnanga

o Arowhenua northwards to the Rakaia) east from the Main Divide and out to sea as far as the eye can see.

A snapshot of the Zone, including the water resources, demography, aquatic biodiversity, kaitiakitanga, recreation and tourism, drinking water, farming and irrigation, and regulatory context is provided in Appendix 2.

1.3 COLLABORATIVE, CONSENSUS APPROACH

The committee has operated in a collaborative manner and taken a consensus approach. The ZIP may therefore not be the ideal outcome for any single member of the committee but reflects a commitment by all members to achieve an agreed outcome that will deliver all the CWMS targets in the zone and that the committee can articulate with one voice.

1.4 TIMETABLE SET BY MORATORIA

The moratoria on applications for water use consents on the Waiau and Hurunui Rivers imposed during 2010 by Regional Council commissioners expire in October 2011. This has created deadlines within which the committee must deliver its initial ZIP if it is to have input into the statutory planning regime that will come into effect on the expiry of the moratoria. The committee believes it is essential that it delivers this input.

This initial ZIP is therefore a snap shot of the position the committee has reached in its deliberations and includes both recommendations for specific actions and recommendations for more work to be carried out before further actions can be undertaken.

1.5 WORK OF THE COMMITTEE TO JUNE 2011

The Hurunui Waiau Zone Committee held its Orientation Workshop in July 2010 and had seven Committee meetings in 2010 and six meetings in 2011 to the end of May. It meets about every three weeks in public at various locations throughout the zone. Members of the public attending the meetings contribute to the discussions. The Committee has also had four field visits.

1.5.1 Meetings with organizations, interest groups and communities January - February

During January and February 2011 the committee met individually with organizations and groups who responded to the invitation to meet with the committee, discuss their areas of interest, and offer solutions to the challenges confronting the zone. The committee also reported back during this period to community meetings throughout the zone on progress made to date and invited feedback as part of developing a draft ZIP.

1.5.2 Draft ZIP

The Committee released a draft ZIP at the end of April 2011. This was a work-in-progress with no clear recommendations on the key issues of land use and water quality, location of major water storage and flow and allocation regimes for Hurunui and Waiau Rivers.

1.5.3 Meetings with organizations, interest groups and communities May 2011

In May 2011 Zone Committee members met again with interest groups and organizations to hear feedback on and discuss the draft ZIP. Meetings were held with most of the parties who had met with the Zone Committee earlier in the year. Zone Committee members met with Kaikōura Rūnanga Board in mid June and Hurunui District councillors in mid May. A list of the parties involved in the meetings in January-February and/or May is provided in the table below.

The Committee held public meetings on the draft ZIP throughout the zone and in Christchurch. There was strong interest in the draft ZIP with about 80 people at the Hawarden and Christchurch meetings, and 40-60 people at each of the meetings in Amberley, Cheviot, Culverden and Omihi. Notes from these meetings are available on the Canterbury Water website.

Committee members also met with land and water users in Culverden and Cheviot to discuss the land and water quality section of the draft ZIP. The Culverden meeting was hosted by DairyNZ.

List of parties involved in meetings in January/February and May 2011

Rūnanga	Developers	Interest Groups and organisations	District Council Committees	Community/Public meetings
Mana Whenua Working Group Kaikōura Rūnanga Board	Meridian Energy Amuri Irrigation Company Ngāi Tahu Properties Hurunui Water Project MainPower DPML FraserGeologics	Whitewater Canoe Club Forest and Bird Water Rights Trust Community and Public Health, Canterbury District Health Board Department of Conservation Thrillseekers Adventures Canterbury Fly Fishing Club Fish and Game NZ Salmon Anglers Association Waipara River Group	Strategy and Policy	Culverden Omihi Amberley Cheviot Hawarden Hanmer Springs Christchurch

1.5.4 Submissions on draft ZIP

The Committee invited written submissions on the draft ZIP over a five week period. About 125 submissions were received. These can be viewed on the Canterbury Water website (www.canterburywater.org.nz).

Over 90% of the submissions focused on one or more of the key unresolved issues in the draft ZIP – land use and water quality, water storage and possible change to the minimum flows of Hurunui and Waiau Rivers. These issues had also been the focus of discussions at public meetings and in the meetings the Zone Committee members had with organizations and interest groups.

Zone Committee members considered the key issues from the submissions and meetings at a workshop in early June. Some members met again in mid June to further discuss issues raised in the submissions including revisions to the sections on Ecosystem health/biodiversity and braided river character, Kaitiakitanga and Recreation.

The Zone Committee did not hear submissions. The ZIP is not a statutory (RMA) document. The Hurunui Waiau Regional Plan that will give effect to some of this ZIP is a statutory plan. Submissions will be able to be made on this Regional Plan after it is notified in September 2011 and submitters will be able to be heard by independent hearing commissioners who will make recommendations to the Canterbury Regional Council on changes to the notified plan sometime in 2012. People who made submissions on the draft ZIP will be able to submit on the same issues in the Hurunui Waiau Regional Plan and have their submissions heard by the hearing commissioners.

1.5.5 Approval of ZIP

The ZIP was revised following consideration of submissions and feedback from meetings. The Committee discussed the revised ZIP at its June meeting before approving this ZIP at its 18 July 2011 meeting.

2.0 KEY OUTPUTS FROM COMMITTEE MEETINGS

2.1 VISION FOR THE HURUNUI WAI AU ZONE

Consistent with the long term outcomes sought in the CWMS the committee has developed a vision for the zone that accommodates the values that underpin the strategy. It draws strongly on the principles of kaitiakitanga where the natural environment and the people who live in it are seen as an integrated whole and where decisions are taken by the people that reflect both the need to prosper and the need to manage the natural environment so that it will serve future generations as well as it has served past and current generations. The order of the following paragraphs reflects the CWMS first and second order priorities. However, all three outcomes must be achieved for the Committee's vision to be achieved.

The committee envisages:

1. A thriving natural environment, safeguarded by protecting important ecosystems and biodiversity and by implementing appropriate environmental flow regimes.
 2. Healthy water ways that provide abundant mahinga kai and recreational opportunities, with the health of hapua on the major rivers reflecting effective and responsible economic and natural resource management of the land and rivers that flow into them so that the mauri of the rivers is maintained and enhanced.
 3. A prospering zone, economically and socially, built largely on the basis of environmentally sustainable irrigated food and fibre production and tourism, with irrigation water supplied through an innovative combination of run-of-river takes and off-mainstem-river storage, and managed by sustainable best practice audited self management programmes.
2. The collaborative approach that has been used in the development of the Canterbury Water Management Strategy and by the zone committee in developing this Implementation Programme must be carried through to the implementation and operation of the integrated solution recommended in this plan. This means that **community-of-interest-based management structures** (i.e. land and water users) will take responsibility for these functions, with the support of the zone committee. These should be modeled on the care groups that have been successful in delivering components of integrated solutions in the past.
 3. **The regulatory framework** that is developed to give effect to this ZIP **must institutionalize and enable the integrated solution management approach and the community/user-based management structures.** This will mean helping land and water users to work individually and together to improve land and water management in an economically viable manner. Any prescriptive rules and standards to be achieved and complied with should relate to the outcomes that are expected rather than seeking to control the inputs used.
 4. **Major water storage is required if the integrated management and associated collaborative approach are to be successful** in delivering solutions that addresses all community interests and are positively aligned to the final outcome that delivers all the targets of the CWMS.
 5. The principles of kaitiakitanga provide the CWMS with insight into traditional Māori resource management philosophies and practices¹. The Zone Committee recognises the holistic nature of kaitiakitanga and its relevance in delivering the Vision, Fundamental Principles and Targets of the CWMS. The Committee also recognises that the **principles of kaitiakitanga are not an "add-on" to the other elements of the ZIP and are best provided for by weaving them throughout the ZIP.** Finally, the Committee understands that the principles of kaitiakitanga will be recognised and provided for by:

2.2 KEY PRINCIPLES

There are five conclusions the committee have reached that shape the recommendations made in this plan. They form the principles that the recommendations have been tested against for consistency with both the vision for the zone and the principles that underpin the approach to water management articulated in the CWMS.

1. The targets in the CWMS will only be delivered in the Waiau Hurunui zone if the management of economic development, water usage and quality, community drinking water, land use, ecosystems, river management and kaitiakitanga are delivered as an **integrated solution** which focuses on the interrelationships they share within the zone and within river catchment areas. The ZIP takes an integrated approach and recommends the Hurunui Waiau Regional Plan and other relevant plans should also take an integrated approach that recognizes the relationship between water quantity, water quality and land use.
 - a. Adopting water quality standards, environmental flows and biodiversity targets that specifically recognise and provide for cultural uses including mahinga kai;
 - b. Premising consents to dam, divert, take, use and discharge water on responsibilities which ensure water quality standards, environmental flows and biodiversity targets are met and maintained;
 - c. Facilitating sub-catchment (i.e. tributary based) management of waterways;
 - d. Facilitating collective responsibility for the mauri of water within each sub-catchment;
 - e. Incorporating key objectives in recognized Iwi Planning Documents, especially the Ngāi Tahu Freshwater Policy (1999)² ;

- f. Strategically implementing the integration of mātauranga māori³ into the management of all waterways in the zone;
 - g. Working with Ngāi Tahu in respect of how to manage the mixing of any waters;
 - h. Ensuring meaningful participation by Tangata Whenua in the governance and management of water within their respective takiwā (districts).
- 8. Regional plans and other management plans that follow on from this ZIP will need to be based on geographic locations or areas where the interrelationship of land use, water quality and water usage are clear i.e. catchment-based plans covering one or more rivers and the land that provides water to them.
 - 9. In order to achieve the greatest number of CWMS targets, “more water” from storage and inter-catchment transfers is required. To be clear on this point more water is required to deliver the economic and social targets and some of the cultural, environmental and recreational targets.

2.3 ZONE COMMITTEE DECISIONS

The process followed by the committee has resulted in a number of decisions being made that support the Vision, shape the Key Principles and underpin and determine the scope of the recommendations included in this ZIP:

1. All the CWMS target areas must be advanced by the committee’s recommendations.
2. While the CWMS has prioritized some outcomes the committee has sought to ensure that all the community outcomes reflected in the targets regardless of priority are recognized in the recommendations thereby ensuring that all interest groups can see benefit in supporting the recommendations.
3. The recommendations represent a package that must be accepted as a whole and cannot be “cherry picked”.
4. While this ZIP focuses on the four largest rivers in the zone and their hapua and catchments, the Committee recognizes that their role is to improve water management for all the zone and will address other waterways in the zone in future ZIPs.
5. The ZIP will deliver an integrated approach to land and water management, with land use guidelines, water quality standards, environmental flows and the introduction of new water being directly related to each other.
6. As a result, the regional plans that will support the ZIP will need to integrate all these and related elements.
7. The committee does not see its role as determining the type of land use that will occur in the zone. It wants to ensure that water is available to support a range of land uses and that the land uses ensure water quality of the standard agreed is achieved and environmental flows maintained in rivers.
10. More water must be provided and used with safeguards that protect flows, water quality and associated ecosystems to deliver cultural, environmental and social (recreational and drinking water) values.
11. Seeking more efficient use of existing water is important but it will not provide sufficient additional water alone to meet all CWMS target areas.
12. In deciding on how “more water” will be provided the committee has agreed that its recommendations should include infrastructure and storage options and environmental flow and allocation regimes for Hurunui and Waiau Rivers that will have a strong element of “future proofing”. They will have the capacity to provide appropriate irrigation to all the potential irrigable land in the zone in the long term and to continue delivering environmental, social and cultural outcomes into the future.
13. The committee is not choosing which infrastructure should proceed but is recommending options that all members of the committee are able to support. In doing so it is reflecting the agreement of the committee members to endeavour to avoid storage options that significantly detract from the quality of existing recreational uses or natural values, where other potentially economically-viable options are available. This may mean that the options recommended are not the most viable in terms of financial returns and securing traditional funding may be challenging. In such a situation a “cost to the public” will be identified that is associated with delivering a resource use management regime for the zone that delivers the sustainable vision that balances economic outcomes with sustainable resource management and local, regional and national interests.

1. See Part 5 for a fuller explanation of the principles of kaitiakitanga.

2. <http://www.ngaitahu.iwi.nz/Ngai-Tahu-Whanui/Natural-Environment/Environmental-Policy-Planning/NgaiTahuFreshwaterPolicy.pdf>, See also, *Te Pōhā o Tohu Raumati – Te Rūnanga o Kaikōura Environmental Management Plan 2005* (ISBN: 0-476-01351-8), *Te Whakatau Kaupapa – Ngāi Tahu Resource Management Strategy for the Canterbury Region 1990* (ISBN: 0-473-01147-6), and the *North Canterbury South Marlborough Eel Management Plan 1999*.

3. Mātauranga Māori’ refers to traditional knowledge and systems that can be used to uphold traditional values and perspectives.

14. An assessment of a shortlist of possible infrastructure options against the CWMS targets has been carried out by Environment Canterbury staff and considered by the Committee. This will inform current discussions, shows the information discussed and debated by the committee about storage options, and can be used by interested groups at any time in the future.
15. The committee believes that the building of water storage and distribution infrastructure provides a unique opportunity to make fresh drinking water available to the rural communities of the zone. This will be at a cost to the community that will never be as low again and the committee therefore makes recommendations that require infrastructure providers to partner with Hurunui District Council to deliver this outcome in their proposals and plans.
16. The participation of Tangata Whenua in the Committee's decision making process has helped ensure that the principles of Kaitiakitanga are recognized and provided for throughout the ZIP.
17. The committee has agreed that the health of the hapua of the rivers of the zone will provide an important means of monitoring the success of the zonal implementation plan as the results of all land and water use find their way to the hapua. Monitoring of the hapua should start as soon as possible.
18. Initiatives to maintain and improve wetlands, riparian margins, biodiversity and hapua health must form a part of the integrated implementation plan for catchment areas.
19. While regional plans may not embrace all aspects of the ZIP due to statutory limitations, they must support the Zone Committee's wish to have resource management activities managed in an integrated manner to deliver the CWMS targets in accord with the requirements of the zone.
20. The regulatory framework that is established for the zone must focus on defining the outcomes that are to be delivered, and not on prescribing the scale or quantum of inputs. To achieve this, the regulatory framework will need to prescribe the design and operational mode of community management that is responsible for managing the relationship between economic activity and land and water use.

2.4 KEY RESOURCE MANAGEMENT CHALLENGE FOR THE ZONE

The need to ensure that economic development in the Hurunui Waiau zone is able to proceed at a speed that benefits both the community that lives there and the wider New Zealand economy while also protecting natural values is one of the biggest challenges the zone committee will have to resolve.

2.5 COMMUNITY- (LAND AND WATER USER-) BASED MANAGEMENT

The Committee believes that new collaborative approaches are required to better address some of the land and water management in the zone, particularly with respect to land management and water quality.

Our understanding of the interrelationship between the various elements of the natural environment and land management relies on scientific research and reliable monitoring. Without the empirical evidence science-based research provides there would be little chance that the community would reach any agreement on "the cause and effects" related to our use of the natural environment. Having agreed the facts and the science (both current and future requirements), the next task is to identify how actions will be taken to address the issues identified.

The committee believes that community-based management structures (i.e. land and water user groups) will be the best vehicle for delivering the integrated solutions required. Such an approach places on-the-ground management decisions with the people who use the water and work the land – the individual land and water users. This requires land and water users to take shared- and individual-responsibility for activities that impact on land and water outcomes. The committee acknowledges that incentives, education and resourcing will be required to improve land and water management and facilitate this collaborative approach.

Community-based structures currently function successfully in a number of locations and deal with a range of issues in which the relevant community of interest shares a common interest. Examples include river rating district committees, pest committees, community-owned irrigation providers, coastal protection groups and rivercare groups. The regional council has provided technical and facilitation support to many of these groups.

Examples in the zone include the Lower Conway Landcare Group, the Pahau Enhancement Group (that addressed P loads in Pahau River) and the Waiau and Hurunui Flow Plan Community consultation groups. The Amuri Irrigation Company (AIC) is also a community-based scheme.

These groups are generally outcome focused with a specific area of interest. They embrace all people and organizations who share that interest. They create positive incentives for all to work together to develop and deliver shared goals, regardless of the diverse origins of their initial interest. They work collaboratively.

The CWMS was developed by bringing together a wide range of interest groups who all shared an interest in using water. They became a "community" that developed a set of targets that involved each group seeing that what they value most can be delivered without other members of the "community" being denied the delivery of the different outcomes they value.

The CWMS in turn set up Zone Committees made up of individuals able to represent a wide range of water "users"

or “communities of interest” in each zone. The committees have been given a set of targets that they must share and are charged with collaboratively delivering an outcome that sees all targets delivered, so that all interests “win”.

The committee believes that these successful models should be adapted in developing community-based management structures (land and water user groups) that are charged with delivering integrated solutions in each catchment area in the Zone.

The committee believes land and water user groups should be a key part of improving nutrient management in Hurunui Basin. These nutrient management groups would be made up of all land and water users in a (tributary) catchment and provided with incentives and help to meet nitrate (N) and phosphorous (P) load limits for tributaries in Hurunui Basin.

The land and water user groups proposed are voluntary. The Zone Committee recognizes that there will be individuals who are reluctant to participate and or to change in the manner required to meet the collective catchment goal. There will need to be a regulatory backstop that comes into effect sometime in the future to deal with laggards.

This management model will need to be regulated for by the regional and district councils. This may include establishment of the structures, the scope of activity, the geographic area involved, and the outcomes that must be delivered and how these will be measured. These should reflect the recommendations of the zone committee.

3 ECOSYSTEM HEALTH/BIODIVERSITY AND BRAIDED RIVER CHARACTER

3.1 RATIONALE

3.1.1 Baseline information

The CWMS targets include goals for aquatic ecosystem health, intermontane basin and plains aquatic and dryland ecosystems, lowland stream ecosystems, and high country spring-fed foothill rivers/lakes. State of Takiwā monitoring (cultural assessment) of Hurunui River and tributaries was carried out in April 2011 and were reported to the Committee in May (Lenihan 2011). While the Zone Committee has gained a general understanding of biodiversity and ecosystem health in the Zone the Committee considers it needs further information on the current state of native ecosystems in the Zone and the significance of these in order to make well-informed recommendations on activities and approaches to achieve the CWMS goals.

As a first step the Committee requires a stock-take of natural assets, their current status and indicators that can be monitored over time, and that are reactive to management interventions.

3.1.2 Immediate Steps Biodiversity Funding 2011/12 – 2014/15

The Immediate Steps Biodiversity Funding process for 2010/11 focused on individual projects rather than being part of an integrated approach delivering on the CWMS Targets in a strategic way. This was because the Zone Committee was in “set-up” phase and had not the understanding or developed their thinking to the stage reflected in this ZIP. The projects funded in 2010/11 were fencing at Little Lake Mason, weed control and fencing at Smothering Gully Creek, fencing at Dawn Creek, weed control and fencing at Limestone Creek, weed control at Moelean Swamp and woody-weed spraying on lower Conway River.

The Zone Committee will take a more strategic approach for years 2-5 of the Immediate Steps Biodiversity programme, taking into account ecological priorities, cultural priorities, community input and the major water management solutions identified in this ZIP.

The following priority areas have been identified, based on ecological and cultural criteria and from consideration of the Committee’s wish to enhance environmental infrastructure:

1. North Pegasus Bay coastal wetlands
2. Lower Waitohi wetlands
3. Conway Flat to Waiau River mouth

4. Braided River Ecosystems
5. Sumner Lakes complex.

Area 1 - North Pegasus Bay coastal wetlands

- Waipara, Kowai and Mimoto Lagoons; Amberley Beach wetland; nearby springs, lowland streams and drains.
- Remnant wetland habitats in highly modified (“Acutely Threatened”) low plains land environment.
- Supports native birds, fish, vegetation, locally-rare plants.
- Includes Mimoto Lagoon and Waipara River mouth Canterbury Biodiversity Strategy Priority Areas.
- Strong cultural values and wāhi tapu sites along entire coast-line.

Area 2 – Lower Waitohi Wetlands

- Lower Waitohi River alongside State Highway 7 to its confluence with the Hurunui River – remnant wetlands in highly modified environment with willow, and other exotic infestation.
- Biodiversity - eels, salmon spawning etc.
- Strong cultural values.
- Offers the opportunity to address water flows, water quality, more water and land use intensification issues associated with development elsewhere in the catchment.
- Opportunity to have high visibility exposure to public of CWMS funded activities.

Area 3 - Conway Flat to Waiau River mouth

- Mouths of Conway and Waiau Rivers; small streams draining coastal hill country.
- Hill country stream gullies support highly significant native forest remnants; Conway lagoon has native saltmarsh vegetation; both river mouths are important wildlife habitat.
- Area includes examples of “Chronically Threatened” and “Critically Underprotected” land environments.
- Includes the “Conway River Mouth” Canterbury Biodiversity Strategy Priority Area.
- Strong cultural values and wāhi tapu sites at Conway and Waiau River mouths and hapua.

Area 4 - Sumner Lakes Complex

- High country lakes, wetlands, intermontane streams, upper reaches of braided rivers.
- Contains nationally significant high country lake and wetland habitats; whole area is of national importance for aquatic biodiversity.
- Lake Sumner is the largest in Canterbury (and one of the largest on the South Island's east coast), with unmodified lake margins and ecotone.
- Valley floors contain native vegetation and habitats on "At Risk" and "Critically Underprotected" land environments; remainder of area is relatively unmodified.
- Includes an area identified as high priority in the Canterbury Biodiversity Strategy — the upper reaches of the "Hurunui River" priority.
- Recognised as having high cultural values in the Ngāi Tahu Claims Settlement Act.

Area 5 - Braided River Ecosystems

- Major alpine braided rivers – Hurunui and Waiau Rivers.
- Hill-fed rivers with braided reaches – Waipara and Conway/Tutae Putaputa Rivers.
- Woody weeds are major problem.
- Populations of some threatened braided-river nesting birds are declining.

The committee has sought an indication from biodiversity experts of the on-the-ground actions that could be achieved in each of the priority areas for different levels of funding. Environment Canterbury will facilitate this process and it is expected to involve experts from DOC, QEII Trust, Fish and Game, Forest and Bird, Hurunui District Council, and Rūnanga. The Zone Committee will encourage landowners, interested parties and communities to identify projects that could be undertaken in the priority areas.

3.1.3 Ecosystem health, biodiversity and braided river character goals delivered through recommendations in other sections

While recommendations relating to environmental flows (Sections 6 - 9), water quality (Section 11) and more water (Section 12) are part of an integrated approach to delivering biodiversity, ecosystem health and braided river goals, it is also necessary to give an overview of these requirements. The main rivers of the zone are braided in nature and by definition are therefore highly unstable. It is this instability that gives these rivers their essential braided

river character – conversely it is changes that stabilize flows and the bed that most threaten such character and the values attached to that character. To this end braided rivers require a "natural" flow regime characterised by environmental flows incorporating flood flows (for sediment and bed movement), flow variability (including small to medium freshes, which flush periphyton, revitalise invertebrate food supplies, limit mammalian predator movement) and defined flow minima (fish habitat including for passage, food production and protection of nesting birds from mammalian predators). Linked to these elements of natural character is the cleansing role of riparian vegetation along the main stem of a river and along the banks of key tributaries. These riparian areas as well as the main stems of these rivers are also important for achieving indigenous biodiversity targets.

3.1.4 Hapua enhancement

Hapua and river mouths are highly valued for mahinga kai, biodiversity, and recreation, and are recognized as having significant landscape values. As the end point of the river they are excellent indicators of catchment ecosystem and the state of the mauri of the rivers. Recommendations in Sections 6 - 9 recognise the importance of flow regimes in maintaining the health of hapua. The Zone Committee believes additional actions, beyond setting river flow regimes, should be possible to achieve thriving culturally and recreationally attractive river mouths and hapua on the four rivers in the zone. The Committee wishes to be better informed on these activities, including their cost and how they might be implemented.

3.1.5 Wetland Protection

The CWMS recognizes that there is now less than 10% of the region's previously extensive wetlands remaining. The CWMS has the goal to prevent further loss of areas of naturally occurring wetlands. The Zone Committee recognizes that wetlands are cost effective long-term filters of water (important in managing nutrient loads) and key wāhi taonga (key ecosystems in the production and preservation of biodiversity) and aspires to prevent further loss of naturally occurring wetlands and achieve a "net gain" of high quality wetlands in the Zone.

Hurunui Water Project (HWP) has surveyed all farmers in the command area of their proposed irrigation scheme requesting information on existing wetlands. The Zone Committee is very supportive of this initiative by HWP and their desire to protect wetlands as part of irrigation development. The initiative should be extended to protection of other significant native ecosystems and wetlands throughout the Zone. The Zone Committee recognizes that these native ecosystems are on private land and the rights of landowners must be respected, however landowners should be encouraged to participate in wetland and ecosystem identification and protection programmes.

The Zone Committee has identified the key role that wetlands have in managing water quality. The enhancement of the wetland area at the confluence of Waitohi and Hurunui Rivers (see above) is an example of where wetland enhancement would provide biodiversity and water quality gains. The Committee is aware of other locations where similar joint gains could be made through wetland enhancement including at the confluence of St Leonards Drain and Pahau River and near the mouths of Lowry Peaks Drain and Hermitage Drain. The Zone Committee will encourage farmers and community groups to enhance such wetlands as part of addressing water quality in the Zone (see Section 11).

3.1.6 Freshwater fish

Native freshwater fish populations have substantially declined in many areas. The Committee's recommendations in Sections 6 to 9 seek to ensure that flows in Hurunui, Waiau, Conway and Waipara Rivers maintain native fish populations. The Committee's recommendation in Section 12 that augmentation of Waipara River flows be a component of major water infrastructure in Hurunui catchment should improve native fish populations in Waipara River.

Te Poha o Tohu Raumati (Te Rūnanga o Kaikōura Environmental Management Plan) and Ngāi Tahu Freshwater Policy include recommendations in relation to native fisheries. The Zone Committee understands a North Canterbury Eel Management Plan was prepared some years ago. Some of the key policies in these Plans will be considered for inclusion in future ZIPS.

The Zone Committee understands the University of Canterbury and other researchers have undertaken work identifying current (and historic) inanga spawning sites in the Zone. The Zone Committee wishes to know more about this work about spawning area targets and management actions.

The Zone Committee does not have sufficient information to make recommendations on native fisheries beyond those relating to river flows (Sections 6 to 9).

3.1.7 Braided river woody-weeds

Willows and other woody weeds (Buddleia, wattles and alder) are a problem in most of the major rivers in the Zone. They are a particular issue in the lower Waipara River and probably contribute to reduced summer flows in the river through transpiration. Willows are, however, an important part of flood protection in these rivers although their encroachment into the active river flood way may exacerbate flooding. The Zone Committee wishes to better understand the nature and extent of woody-weed

problems in the braided rivers in the Zone and promotes the strategic "control" of willows, woody and herbaceous weeds throughout the Zone without compromising flood protection. The Zone Committee considers that all future proposals to plant along riparian margins use native plants wherever possible.

3.1.8 Increasing the amount of funding available for biodiversity protection, enhancement and restoration

The current biodiversity funding is acknowledged by the Zone Committee as inadequate to make significant inroads into the remediation/protection work within the Zone. In the future, to more adequately meet the CWMS vision of community solutions and participation, the Zone Committee sees the potential of a new fund being a mechanism to further engage the wider community in biodiversity awareness and on-the-ground action.

The Zone Committee will investigate ways to increase the amount of biodiversity funding available for on-the-ground activity in the Zone. The Committee believes this should include a community consultation/application process for meeting biodiversity goals in the Zone. These goals would be principally driven by community needs, and the project's approval will be determined by the Zone Committee consistent with Zone Committee's and CWMS values and targets.

3.2 RECOMMENDATIONS: ECOSYSTEM HEALTH/BIODIVERSITY AND BRAIDED RIVER CHARACTER

Aspect	Action / Recommendation	Responsibility	Timetable	Key CWMS Targets recommendation contributes to
3.2.1 Immediate Steps Biodiversity Fund	<p>Target Immediate Steps Biodiversity Funding for 2011/12 through 2014/15 to some or all of the following priority areas:</p> <ol style="list-style-type: none"> 1. North Pegasus Bay coastal wetlands 2. Lower Waitohi wetlands 3. Conway Flat to Waiau River mouth 4. Braided River Ecosystems 5. Sumner Lakes complex <p>Seek Immediate Steps funding proposals from biodiversity experts and interested individuals/communities.</p>	Zone Committee, biodiversity experts and interested parties/communities	<p>Decide spread of funding across priority areas by August 2011</p> <p>Funding allocated by November 2011</p>	<p><i>Ecosystem Health/ Biodiversity</i></p> <p><i>Natural Character of Braided Rivers</i></p> <p><i>Kaitiakitanga</i></p> <p><i>Recreational and amenity opportunities</i></p> <p><i>Regional and National Economies</i></p>
3.2.2 River flows to protect aquatic ecosystems and braided-river processes	See sections 6 - 9	Environment Canterbury	<p>Hurunui Waiau Regional Plan notified by October 2011.</p> <p>Conway River Plan change notified September 2011.</p>	<p><i>Ecosystem Health/ Biodiversity</i></p> <p><i>Natural Character of Braided Rivers</i></p> <p><i>Kaitiakitanga</i></p> <p><i>Environmental Limits</i></p>
3.2.3 (a) Wetland protection & land use development	<p>Work with landowners (and potential developers) to identify significant wetlands throughout the Zone, obtain independent ecological assessment to identify and protect, maintain and enhance these wetlands. Where wetlands are impacted by land-use development ensure appropriate offsets are developed to ensure no “net loss” of wetlands.</p>	Local land care groups, Department of Conservation, Environment Canterbury, Developers	July 2011 onwards	<p><i>Ecosystem Health/ Biodiversity</i></p> <p><i>Natural Character of Braided Rivers</i></p> <p><i>Kaitiakitanga</i></p>
3.2.3 (b) Wetland protection target	<p>Set a target for wetland protection in the Zone (taking into account the CWMS target/ goals) and identify how this target would be achieved (including through 3.1.3(a)).</p>	Zone Committee with Department of Conservation, Nga Tūāhuriri, Ngāti Kurī, and others	By May 2012	<p><i>Ecosystem Health/ Biodiversity</i></p> <p><i>Natural Character of Braided Rivers</i></p> <p><i>Kaitiakitanga</i></p>

	Aspect	Recommendation	Responsibility	Timetable	Key CWMS Targets recommendation contributes to
3.2.4	Ecosystem protection and irrigation development	<p>Work with landowners to identify and prioritise for protection significant native ecosystems throughout the Zone and obtain independent ecological assessment to identify the most significant native ecosystems.</p> <p>Developers will ensure, as part of irrigation development, that the most significant ecosystems adjacent to the proposed development (including dam, reservoir, canals and irrigation command area) are protected and have a restoration plan as a first order priority or where affected, ensure appropriate offsets are developed.</p>	Local land care groups, Department of Conservation, University of Canterbury and other researchers, Developers	From July 2011	<i>Ecosystem Health/Biodiversity Natural Character of Braided Rivers Kaitiakitanga</i>
3.2.5	Protection of high-value conservation lands in upper catchments	<p>See Section 12.</p> <p>The Zone Committee does not support major water storage reservoirs in the any of the following locations:</p> <ul style="list-style-type: none"> • mainstems of Waiau River including Boyle and Hope Rivers; • all tributaries of Waiau, Boyle and Hope Rivers, above Hope-Waiiau Confluence; • mainstem of Hurunui River below the South Branch confluence. <p>The Zone Committee supports deferring South Branch and Lake Sumner water storages until Waitohi options are demonstrated not to be viable or for two years, whichever is shorter.</p> <p>The Zone Committee will work with developers and other parties to progress other more preferable water reservoir options.</p>	Zone Committee and developers	By July 2011	<i>Ecosystem Health/Biodiversity Natural Character of Braided Rivers Kaitiakitanga</i>
3.2.6 (a)	Hapua improvement	<p>Identify what is required, beyond river flow regime, for thriving culturally and recreationally attractive river mouths and hapua on the four rivers in the zone, including cost of activities and how these might be implemented.</p>	Environment Canterbury	Report with recommendations to Zone Committee by Nov 2011	<i>Ecosystem Health/Biodiversity Natural Character of Braided Rivers Kaitiakitanga</i>
3.2.6 (b)	Hapua as “ultimate” health measure	<p>Identify and prioritise the use of hapua to monitor the “ultimate” health of the contributing catchment, including advantages/limitations, current monitoring and cost of additional monitoring and how these might be implemented.</p> <p>This monitoring should start as soon as possible.</p>	Environment Canterbury, Ngāi Tūāhuriri, Ngāti Kuri	Report with recommendations to Zone Committee by Nov 2011	<i>Ecosystem Health/Biodiversity Natural Character of Braided Rivers Kaitiakitanga</i>

	Aspect	Recommendation	Responsibility	Timetable	Key CWMS Targets recommendation contributes to
3.2.7 (a)	Baseline assessment of aquatic ecosystem health	Provide baseline assessment (from currently available information including from cultural assessments) of aquatic ecosystem health of rivers/streams and lakes in the Zone and identify significant information gaps and how these will be addressed.	Environment Canterbury through Regional Biodiversity Strategy Group	Report to Zone Committee by Nov 2011	<i>Ecosystem Health/ Biodiversity Natural Character of Braided Rivers Kaitiakitanga</i>
3.2.7 (b)		Provide identification (from current information) of intermontane basin & plains aquatic and dryland (native) ecosystems, lowland stream ecosystems, high-country spring-fed foothill rivers and lakes ecosystems, and wetlands in the Zone (including relative significance of each site). Define ecosystems targets for valued ecosystems and the threats to achieving these targets.	Department of Conservation and Environment Canterbury through Regional Biodiversity Strategy Group	Report to Zone Committee by Nov 2011	<i>Ecosystem Health/ Biodiversity Natural Character of Braided Rivers Kaitiakitanga</i>
3.2.8 (a)	Freshwater fisheries: eel	Zone Committee be informed of North Canterbury Eel Management Plan and extract key policies for inclusion in the 2012 ZIP. Ministry of Fisheries provide Zone Committee with status of longfin eel in Zone.	Ministry of Fisheries, Ngāi Tūāhuriri, Ngāti Kuri, Department of Conservation and Zone Committee	By April 2012	<i>Ecosystem Health/ Biodiversity Natural Character of Braided Rivers Kaitiakitanga Recreational and Amenity Opportunities</i>
3.2.8 (b)	Freshwater fisheries: inanga	The Zone Committee encourage University of Canterbury (with links to Department of Conservation) to identify current (and historic) inanga spawning sites in the Zone and with DOC, Rūnanga and interested parties establish spawning area targets and management actions.	University of Canterbury, Department of Conservation, Rūnanga, NIWA, Zone Committee	By March 2012	<i>Ecosystem Health/ Biodiversity Natural Character of Braided Rivers Kaitiakitanga Recreational and Amenity Opportunities</i>
3.2.8 (c)	Other native fisheries	Zone Committee be informed about and develop recommendations for other native fisheries.	Ngāi Tūāhuriri, Ngāti Kuri, NIWA, Department of Conservation with others	By May 2012	<i>Ecosystem Health/ Biodiversity Natural Character of Braided Rivers Kaitiakitanga Recreational and Amenity Opportunities</i>

	Aspect	Recommendation	Responsibility	Timetable	Key CWMS Targets recommendation contributes to
3.2.9 (a)	Braided riverbed weeds	Identify the reaches of all (major) rivers in the Zone where the active riverbed is being invaded by standing trees (e.g. willow), woody and herbaceous weeds and to develop a control strategy.	Department of Conservation and Environment Canterbury with others	Presentation to Zone Committee by March 2012	<i>Ecosystem Health/ Biodiversity Natural Character of Braided Rivers Kaitiakitanga Recreational and Amenity Opportunities</i>
3.2.9 (b)		Develop policies and rules that facilitate river-bed weed control without compromising flood protection.	Environment Canterbury (River Engineers), Department of Conservation	Report to Zone Committee by March 2012	<i>Ecosystem Health/ Biodiversity Natural Character of Braided Rivers Kaitiakitanga Recreational and Amenity Opportunities</i>
3.2.10	Increasing funding for biodiversity	The Zone Committee supports a feasibility study and investigation of the development of an ongoing biodiversity fund (in addition to any funding from the CWMS) by way of public and landowner contribution as part of an integrated more water option.	Hurunui District Council, Developers, Ngāi Tūāhuriri, Ngāti Kurī, Environment Canterbury and Zone Committee	Results of study to Zone Committee by May 2012	<i>Ecosystem Health/ Biodiversity Natural Character of Braided Rivers Kaitiakitanga Recreational and Amenity Opportunities</i>

4 DRINKING WATER

4.1 RATIONALE

Improving drinking water is a key priority consideration for the Zone Committee and Hurunui District Council.

Hurunui District Council operates 13 water schemes, extracting water from 23 different water intakes (8 on boil water notices), providing drinking-water to between 50 and 1500 people per scheme. The majority of these water intakes are shallow bore or river gallery intakes, thus considered at-risk supplies.

Six of the 23 intakes are deep bore (>70m depth well bore). Deep bore wells are considered low-risk for contaminated drinking-water supply. However, the remaining 17 intakes are considered at-risk for micro-organisms. Shallow bore and river gallery intakes are most susceptible to contamination through groundwater contamination (leaking septic tanks, untreated sewage into river systems, agricultural and feral animal faecal waste to underground or surface water, intake backflow and resultant cross-contamination).

Central government has developed national standards for the quality of community drinking water supplies. These standards will not be met by many of the supplies provided by the Hurunui District council when they become operative over the next few years. Central government is reducing its funding for the enhancement of such schemes which places an even larger financial burden on small communities if they are required to fund improvements in drinking water quality on their own.

4.1.1 Protection of drinking-water takes

Sections 6 to 9 of the ZIP give priority for water takes for community drinking water supply. This includes the ability to continue to take even when a river is below minimum flow provided the District Council has a water-saving plan developed and implemented when minimum flows are reached.

4.1.2 Opportunity for drinking water supply from major water storage

Major water infrastructure (as outlined in Section 12) could provide a higher quality source of water for some community water schemes than that available from their present sources (river galleries and shallow bores). For example, a major storage reservoir in Waitohi River should be able to supply a high quality source for community schemes (including drinking water and stock water) currently sourced from Waitohi River, some schemes sourced from Hurunui River and possibly other schemes.

Community drinking water sourced from a major reservoir would need to be piped to users and would still require treatment though the cost of treatment would be less than for water sources from at-risk sources (rivers and shallow bores).

Hurunui District Council, like other councils with a relatively small but widely dispersed population, struggles to fund the improvements required to get community water schemes to the standard required to meet the New Zealand Drinking Water Standards. The Council recognizes that proposed major water storage reservoirs would provide increased water security to the Hurunui District for current and future community drinking-water supplies, as well as the numerous associated stockwater schemes, with an added benefit of potential water quality improvement (lowered turbidity).

Hurunui District Council is concerned about the affordability (to ratepayers and users) of this option. An affordability assessment needs to be carried out.

4.1.3 Support for Hurunui District Council community water supply initiatives

While major storage provides an opportunity to supply higher quality source-water for some community water schemes this will not address drinking water issues in the Zone in the short term nor will it improve all community water supply schemes. The Zone Committee believes central and regional government should review the approach to the funding of community water schemes where small populations make it impossible for the user pay model to work or for a small district council like the Hurunui to fund them from their ratepayer base. The availability of clean drinking for all communities should be the top priority in the water strategy of a country that considers itself a part of the first world and we should all be prepared to contribute to achieving this through the application of funding derived from national taxation or regional general rates. The combination of local ratepayer or user funding, regional rates and/or national taxes funding and a contribution from the developers of major water infrastructure is the only way the Zone Committee can see drinking water quality targets being delivered in a time frame in the Zone consistent with national standard target dates.

4.2 RECOMMENDATIONS: DRINKING WATER

	Aspect	Action / Recommendation	Responsibility	Timetable	Key CWMS Targets recommendation contributes to
4.2.1	Ensuring drinking water supply	The Hurunui Waiau Regional Plan must include provision of water availability to meet future demand for community water supplies in volume, quality and location to align with existing schemes as identified by Hurunui District Council.	Environment Canterbury and Hurunui District Council	Plan notified by October 2011	<i>Drinking water Kaitiakitanga</i>
4.2.2	Cost of providing drinking water source	A whole-of-life cost assessment will be carried out of the provision of secure community drinking water (and stockwater) from a Waitohi water storage reservoir.	Hurunui District Council	August 2011	<i>Drinking water Kaitiakitanga</i>
4.2.3	Drinking water provided from major water storage	Provision of secure community drinking water (and stockwater) of a quality capable of being treated to New Zealand Drinking Water Standard should be part of an integrated “more water” project and developers will partner with Hurunui District Council to deliver this outcome in their proposals and plans.	Developer(s)	Include in all cost estimates from July 2011	<i>Drinking water Kaitiakitanga</i>
4.2.4	Partial funding for community supplies from regional and national government	In a first world country all citizens should be prepared to contribute to making clean drinking water available to communities that are not able to financially afford to meet the costs on their own. Support, as appropriate, Hurunui District Council initiatives to improve community water supplies to meet New Zealand Drinking Water Standard.	Zone Committee and Hurunui District Council to Regional Council and national government	Zone committee to develop a submission to central and regional government by March 2012	<i>Drinking water Kaitiakitanga</i>

5 KAITIAKITANGA

Kaitiakitanga is the traditional Māori philosophy of resource management. Some of its key principles are:

1. Whakapapa (Genealogies & Generations) – All elements of nature are related in space and time and therefore what happens “upstream” will effect what happens “downstream”;
2. Ki uta, ki tai (From Mountains to Sea) – Resource management based on “catchments” given that what happens “upstream” effects what happens “downstream”;
3. Mauri (life, health & vitality) – Mauri is the traditional measure of physical, spiritual and/or emotional wellbeing of people and places;
4. Wakawaka (Hunting & Gathering Grounds) – Traditional rights to access and use key resources (including water) were collectively managed and premised on one’s ability to uphold any associated responsibilities;⁴
5. Utu (Balance, Reciprocity) – Failure to uphold one’s responsibilities could result in the associated rights being removed or restricted.

As recognized previously (Section 2.2), the principles of kaitiakitanga are best provided for by weaving them throughout the ZIP – and, by extension, throughout any subsequent regional plans – and not by relegating them into a single, stand-alone section. Specific recommendations have therefore been included in most sections of the ZIP, such as:

- a) Section 3 (Ecosystem Health / Biodiversity & Braided River Character) with respect to wetlands, hāpua, native fisheries & biodiversity protection;
- b) Sections 6 & 7 (River Flows), Section 10 (Water Allocation & Water Use Efficiency) and Section 12 (Economic Development & the Provision of “More” Water) with respect to environmental flows;
- c) Section 11 (Water Quality) with respect to nutrient load limits and tributary based management.

The Committee recognises that the principles of kaitiakitanga will be recognised and provided for in regional plans which:

- a) Adopt water quality standards, environmental flows and biodiversity targets that specifically recognise and provide for Ngāi Tahu rights, interests, values and cultural uses including mahinga kai;
- b) Premise consents to dam, divert, take, use and discharge water on responsibilities which ensure water quality standards, environmental flows and biodiversity targets are met, maintained and, where necessary, enforced;
- c) Facilitate sub-catchment (i.e. tributary based) management of waterways;
- d) Facilitate collective responsibility for the mauri of water within each sub-catchment;
- e) Incorporate key objectives in recognized Iwi Planning Documents, especially the Ngāi Tahu Freshwater Policy (1999);
- f) Strategically implement the integration of mātauranga māori into the management of all waterways in the zone;
- g) Work with Ngāi Tahu in respect of how to manage the mixing of any waters;
- h) Ensure meaningful participation by Tangata Whenua in the governance and management of water within their respective takiwā (districts).

⁴ Responsibilities include such things as (a) harvesting resources sustainably (e.g. leave breeders so next generations are provided for); and (b) preserving healthy habitats (e.g. adhering to any rāhui imposed – i.e. temporary restrictions placed on a given area or resource so that the mauri (life supporting capacity) of that area or resource can be restored in the interests of present and future uses/users.

5.1 RATIONALE

5.1.1 Mixing of Water

Ngāi Tahu are cautious of “mixing” water from one catchment to another in case the natural characteristics of one waterway are undermined by introducing water from another source (e.g. alpine fed versus springfed waterways). The essence of this concern can be viewed in terms of contamination – physical or metaphysical/spiritual – and an underlying desire not to undermine the values of one waterway by “polluting” it with another.

The Zone Committee acknowledges these concerns and believes that Tangata Whenua should lead discussions and decisions as to if or how waters might be mixed in the future management of water in the Zone. The Committee notes that forms of “mixing” already occur in the Zone (e.g. Waiau water is irrigated in the Hurunui Basin and runs off into the Hurunui River) and believes that the realisation of an integrated water management solution for the Zone will inevitably include a transfer of Waiau River water into Hurunui Basin as well as a transfer of Hurunui River water (via major water storage reservoir) across to the Waipara River.

Ngāi Tahu representatives on the Zone Committee have advised that any proposed mixing of waters should be assessed on a case-by-case basis and may be acceptable if it is undertaken in the right way (i.e. waters are not directly mixed but pass through the land or wetlands first).

5.1.2 Mātauranga Māori

The Zone Committee recognises that high quality science and knowledge – including mātauranga māori (traditional knowledge and systems), social sciences and economics – are critical to effective water management, and are a vital element in its governance. Good science will lead to innovative land management tools and techniques which will strengthen our international brand and in turn our regional and national economy. The Committee believes that the science and knowledge we use should be:

- a) based on data consistently collected, archived and made available publicly;
- b) made integral to all of our freshwater and land use management;
- c) disseminated in an accessible form; and
- d) underpinned by research strategies which draw on the full range of related disciplines, including mātauranga māori.

The Committee notes that Ngāi Tahu have helped develop mātauranga māori based management and monitoring models that they have been using in the marine environment for some time (e.g. mātaimai and taiapure reserves). Similar efforts have been invested in respect of the fresh water environment and Ngāi Tahu are currently working with Environment Canterbury to see how best these can be incorporated into water management policies, plans and processes as we move forward.

The Committee notes that Ngāti Kurī intends to apply for a freshwater mātaimai reservation for the Conway River and it recommends that the results of any associated cultural monitoring be made available to the Committee so that they can then consider whether or not to support that application within the 2012 ZIP.

5.1.3 Tangata Whenua Rights & Interests in Water per se

The Zone Committee notes that the issue of indigenous rights to fresh water lies beyond the purview of the CWMS and is not a matter that the Committee can resolve. Indeed, indigenous rights to fresh water in Canterbury can only be resolved by Ngāi Tahu and Crown representatives as it relates to agreements reached by their predecessors under the Treaty of Waitangi (1840) and the Sale & Purchase Agreement for Canterbury (1848). That said, the Committee recognises the following:

- a) That the relationship between Tangata Whenua and freshwater is longstanding;
- b) That Tangata Whenua’s relationship with water is fundamental to their culture;
- c) That water per se is valued as a taonga of paramount importance; and
- d) That the obligations to protect and enhance the mauri of water are inter-generational and must apply to all those who benefit from the use of water.

It is worth noting that, notwithstanding the unresolved nature of their rights to freshwater, Ngāi Tahu have made it very clear that economic development is vital for the region and for the nation, and Ngāi Tahu representatives on the Committee have fully participated in discussions around how best to use water for regional economic benefit while protecting, maintaining or enhancing their wider social, environmental and cultural values in water. They have been very clear that sustainable economic development is fundamentally dependent on sustaining healthy waterways. Poor water, poor economy! No water, no economy!

Water quality should therefore be the paramount determinant governing all land and water use and development, ensuring that land and water users share relative responsibility to protect, maintain or enhance environmental values as a matter of first order priority so that the water can continue to uphold economic, social and cultural endeavour for generations to come.

Ultimately, Ngāi Tahu seek outcomes from water that:

- a) Sustain the physical and metaphysical health and well-being of waterways as a matter of first principle;
- b) Ensure the continuation of customary in-stream values and uses; and
- c) Satisfy development aspirations.

5.2 RECOMMENDATIONS: KAITIAKITANGA

	Aspect	Action / Recommendation	Responsibility	Timetable	Key CWMS Targets recommendation contributes to
5.2.1	Mixing of waters	The Hurunui Waiau Regional Plan will require all developers who seek to mix waters to engage with Tangata Whenua so that appropriate solutions can be identified on a case-by-case basis.	Environment Canterbury	Plan notified by October 2011	<i>Kaitiakitanga</i>
5.2.2	Te Rūnanga o Ngāi Tahu Freshwater Policy & other relevant Iwi Environmental Management Plans	The Hurunui Waiau Regional Plan will take into account the Ngāi Tahu Freshwater Policy and other relevant Iwi Environmental Management Plans including Te Pōhā o Tohu Raumati – Te Rūnanga o Kaikōura Environmental Management Plan (2005); Te Whakatau Kaupapa – Ngāi Tahu Resource Management Strategy for the Canterbury Region (1990), and the North Canterbury South Marlborough Eel Management Plan (1999).	Environment Canterbury	Plan notified by October 2011	<i>Kaitiakitanga</i>
5.2.3	Cultural Monitoring	The Hurunui Waiau Regional Plan will recognize and provide for cultural monitoring on all rivers in the zone.	Environment Canterbury	Plan notified by October 2011	<i>Kaitiakitanga</i> <i>Ecosystem Health/Biodiversity</i> <i>Natural Character of Braided Rivers</i>
5.2.4	Wāhi Tapu & Wāhi Taonga	The Hurunui Waiau Regional Plan will recognize and provide for all wāhi tapu and wāhi taonga within the Hurunui and Waiau catchments (e.g. spawning grounds and key habitats for native fish species are protected and maintained or enhanced to ensure the ongoing health and vitality of those species)	Environment Canterbury	Plan notified by October 2011	<i>Kaitiakitanga</i> <i>Ecosystem Health/Biodiversity</i> <i>Natural Character of Braided Rivers</i>

6 WAIAU RIVER FLOWS

PREAMBLE

- Environmental flows have been developed by Environment Canterbury through the collaborative Waiau Community Advisory Group Process (CAG) and from consideration of technical reports on flow requirements for in-stream uses (ecological and environmental) and out-of-stream (economic) benefits.
- Following the CAG process Environment Canterbury proposed a simplified minimum flow regime of 20m³/s for all months. Compared with the current minimum flow requirements the proposed flow regime has a lower minimum than that currently required from May through December (i.e. abstraction can occur at lower flows than presently) but higher than that currently required in February and March (i.e. abstraction will cease when flows reach 20m³/s rather than at 15m³/s). The increase in February and March is to protect the life supporting capacity of the river. The lowest ever recorded flow on Waiau is 19m³/s.
- Currently abstractors are grouped into a number of priority bands such that some abstractors face water restrictions before others. Environment Canterbury proposed to cap the A Allocation Block at 18m³/s even though it is recognized that the existing A Block, including stream depleting groundwater, is more like 20m³/s. As abstractors surrender consents or do not renew expired consents the A Block will be reduced to 18m³/s.
- Current abstractors believe the changes proposed to minimum flows and removal of priority bands would substantially reduce reliability of supply and add significant on-farm cost either through the need to purchase supplementary feed or to build on-farm storage.
- Following discussion with Environment Canterbury planners and some technical experts the Committee understands that the modeling underpinning the proposed minimum flow regime is based on a “worst-case” scenario where takes are fully utilized. This “worst-case” does not occur with the current use of water from Waiau River.
- The Committee understands that there is no evidence of in-river values being compromised in the last decade under the existing minimum flow regime and current water use from the river (except when recorder malfunction led to flow and allocations rules being breached).
- The Committee acknowledges concerns about the risk to in-river values should current A Block use change or more water be taken from the river, for example for storage or hydro generation.
- The Committee believes minimum flows for Waiau River do not need to increase in the short term but must

increase when storage or substantial B Block takes are added to the current use of water from Waiau River. This will retain reliability for current users. Should in-river values be compromised in the short term or if storage does not eventuate in the medium term the minimum flows should be increased.

- The Zone Committee understands concerns of farmers in the Parnassus area that they may miss out on new water if Waiau water is transferred to Hurunui Basin. The Committee supports transfer of Waiau water to Hurunui Basin but only provided sufficient water is able to be provided for new irrigation consents in the lower Waiau.

6.1 RATIONALE

The Waiau Community Advisory Group (CAG) process, with substantial technical input, considered how the following values should drive the selection of a flow regime:

A minimum flow to:

- provide for the life supporting capacity of the flora and fauna that live within the river;
- provide for salmon passage and jet boat passage;
- ensure that the river mouth does not close as a result of abstraction.

Flow variability to:

- Scour periphyton and reset the bed of the river (fresh flows of around 1.5 times the median flow);
- Keep the bed relatively free of invasive exotic vegetation to provide protection from predators for river bed nesting birds;
- Ensure the river is not at its minimum flow for long periods of time;
- Maintain existing recreation and amenity opportunities.

Allocation of water and consideration of reliability for:

- Supply of reliable water for irrigating large parts of the Emu /Amuri Plains and the Parnassus and Spotswood basin. This is an important contributor to the economic wellbeing of the Hurunui District;
- Amuri Irrigation Company – administers on behalf of its shareholders both the Amuri and Waiareka Irrigation Schemes;
- Irrigation of all irrigable land in the catchment.

Technical analyses informing the Waiau CAG process and Environment Canterbury planners developing the flow regime included:

- The 2D modeling (NIWA 2009) that was carried out

on the Waiau River indicated that 20m³/s of flow was needed to provide a water depth suitable for large fish and jet boat passage. The modeling indicated the number of islands did not increase in the braided reach as flows increased. As a large river, the Waiau has a significant number of islands even at lower flows.

- Anecdotal evidence suggests that the mouth can close but there have been no specific studies on the flow required to keep the Waiau River mouth open, however compared with the Hurunui River, which is known to close naturally, about 20m³/s is needed to ensure Waiau River mouth remains open.

Assessment of the reliability of Waiau irrigation (Aqualinc 2011) and impact on reliability of removing allocation bands (Brown 2011) indicated that change to a minimum flow of 20m³/s would have an average annual cost of \$6,000 - \$10,000 for a typical 200ha dairy farm. Current abstractors argued strongly in submissions and presentations to the Zone Committee that a 20m³/s minimum flow and removal of allocation bands would significantly reduce reliability supply and substantially increase farm costs. They indicated that reliability of supply would become similar to that for farmers supplied by Waimakariri Irrigation Company where many farmers have had to put in on-farm storage. The cost of on-farm storage for current Waiau water users was estimated as \$30 - \$50 million (Alan Hawkins, submission to draft Hurunui Waiau ZIP, May 2011).

The Zone Committee considered the impact of the current use of water from Waiau River on in-river values over the last decade and the likely impact of changes in reliability of supply and concludes there is no need to increase the minimum flow to 20m³/s in the short term provided current use and abstraction patterns continue. Provided minimum flows are not increased the removal of priority bands will have only a minor impact on some abstractors' reliability.

The Zone Committee is concerned that there is significant risk to in-river values if current use changes, for example with takes to storage, and if substantially more water is abstracted from the river, for example with substantial new irrigation development or takes for run-of-river hydro generation. The Zone Committee believes minimum flows must change should substantial changes occur to the current use of water from Waiau River.

The Committee understands there is a risk to in-river values with the proposed flow regime that does not change minimum flows. Should in-river values be compromised in the short term or if storage does not eventuate in the medium term the Committee would wish minimum flows to be increased.

Meridian Energy has briefed the Zone Committee on a proposal for hydro generation and irrigation based on a canal alongside the Emu Plains reach of Waiau River and

storage in vicinity of Isolated Hill. The Committee believes the proposed Waiau flow and allocation regime (with allocation blocks and gaps) may need revision should this proposal proceed beyond concept stage. Storage allows flows to be released to meet some in-river values. Meridian Energy has not provided an outline of water takes and releases to assess the likely impact on river flows. The Committee is open to their proposal provided in-river outcomes can be delivered including ecological, cultural and recreational values. Should the Meridian Energy or any other proposal proceed that requires large takes from Waiau River, the Committee would expect the following in-river outcomes to be achieved:

- Maintain or enhance river mouth and coastal processes;
- Maintain the extent of active floodplains;
- Maintain or enhance the mauri of the Waiau River;
- No net loss of braided river bird habitat;
- No net loss of natural high quality and large wetlands;
- No net loss of important indigenous plant communities;
- Maintain native fisheries and valued introduced fish species;
- Maintain or enhance mahinga kai access and resource;
- Maintain the diversity and quality of water-based recreation and amenity.

The Committee has concerns about how hydro generation may impact river flows particularly should hydro generation operation lead to rapid fluctuations in flows that could be a risk to the safety of in-stream users, the recreational experience and ecological values.

The Committee recommends water use proposals should avoid the following:

- Altering the flow regime of the main stems or significant tributaries of the Waiau in such a way that it would significantly reduce invertebrate food production;
- Changing daily patterns of flow in such a way so as to jeopardise the safety of recreational and others users of the above water bodies or their river mouths;
- Changing daily patterns of flow in such a way as to significantly reduce the recreational opportunities and experiences in the main stems, their river mouths or significant tributaries of the Waiau;
- Changing daily flow patterns in such a way that lead to native fish stranding.

The storage and hydro generation proposals would have to be consistent with the outcomes required for "more water" options as described in Section 12.

6.2 RECOMMENDATIONS: WAIAU RIVER FLOWS

Aspect	Action / Recommendation	Responsibility	Timetable	Key CWMS Targets recommendation contributes to
6.2.1 Environmental flows (minimum flows and flow variability)	<p>The Hurunui Waiau Regional Plan must include minimum flows and flow variability for Waiau River that provide for:</p> <ul style="list-style-type: none"> • in-stream river ecology (including native fish and invertebrates); • maintain mauri of river; • maintenance of river mouth and hapua; • mahinga kai; • protection of river-nesting birds during breeding season; • the needs for salmon and trout fisheries (including fishability); • maintenance of in-stream recreation opportunities (particularly whitewater kayaking and jet-boating (including commercial jetboating)); • maintain existing out-of-stream uses and allow for future growth in out-of-stream uses: <ul style="list-style-type: none"> - primarily, irrigation supply - secondarily, hydro-power generation. 	Environment Canterbury	Plan notified by October 2011	<p><i>This recommendation contributes to all CWMS Targets including Environmental Limits</i></p>
6.2.2 Tributary minimum flows	<p>The Hurunui Waiau Regional Plan must include minimum flows for key tributaries of Waiau River to protect in-stream values of these tributaries while allowing for out-of-stream use.</p>	Environment Canterbury	Plan notified by October 2011	<p><i>This recommendation contributes to all CWMS Targets including Environmental Limits</i></p>

7 HURUNUI RIVER FLOWS

PREAMBLE

- There has been considerable discussion and consideration of flow regimes for Hurunui River through the Variation 8 submission process of the Environment Canterbury Natural Resources Regional Plan (NRRP).
- Currently there are a range of flow regimes for the Hurunui River with different flow regimes applying to different users. Variation 8 was introduced to simplify the current situation while still providing the same reliability of supply to existing users. In some months, however, Variation 8 has a negative gap between the A Allocation Block and the B Allocation Block.
- The technical basis for minimum flows required for a range of in-river values is provided by the “2-D modeling” of a braided reach of the river by NIWA (2004). The Committee accepts the minimum flows identified in this report in relation to in-river values but has concerns that winter minimum flows (10m³/s) are insufficient to ensure the river mouth remains open. The Committee supports the winter minimum flows proposed in Variation 8 for consumptive takes.
- The Committee understands there is reasonable support for the minimum flows proposed in Variation 8 except for minimum flows proposed for January, and particularly April, as these may impact on the reliability of supply of existing users. The Committee recommends that minimum flows for April be 12m³/s (c.f. 15m³/s in Variation 8) to retain reliability of supply for current users but increase when storage or substantial B and C Block takes are added to the current water use from the Hurunui River, or if in-river values are compromised in the short term.
- The Committee supports capping the A Block Allocation at 6.2m³/s in the Amuri Plains reach. This is the amount of water that was allocated to consumptive use when the Variation 8 process commenced (c.f. current allocation of 6.9m³/s and 6.7m³/s in Variation 8).
- Technical investigations (NIWA, 2009) identified that a 10m³/s B Block Allocation with minimum flow of 26.9m³/s in spring, summer and early autumn protects bird nesting, recreational flows and maintains flow variability. The Committee supports a 10m³/s B Block Allocation.
- The “more water” options in Hurunui catchment will require substantial water takes (C Block Allocation for run-of-river irrigation, takes to storage and hydro generation) if they are to be economically viable. There are no technical investigations available to assess the in-river impacts of large (C Block) water takes from Hurunui River.
- The Committee prefers Waitohi River catchment for the location of major water storage in Hurunui River (see Section 12) and wants the flow and allocation regime for Hurunui River to enable such an option. The Committee supports large (C Block) takes provided in-river outcomes

can still be delivered including ecological, cultural and recreational values. The onus will be on developers to provide technical investigations that show how large C Block takes will not compromise in-river ecological, cultural and recreational outcomes.

- The Committee expects major abstraction associated with major multi-use Waitohi storage to be done in a manner that maintains whitewater recreation opportunity and amenity in the reach of Hurunui River downstream of South Branch confluence and upstream of Surveyors Stream.
- Hydrologic modeling of major water storage options has assumed that untaken (but consented) A and B Allocation Block water would be available to fill storage or for hydro generation (for example, in winter when consent holders are not using the water for irrigation). The ability to take this water is critical for the viability of the “more water” options. Either developers will have to negotiate with existing consent holders for access to this water or the statutory process will have to facilitate such access.

7.1 RATIONALE

Technical analyses include NIWA (2004), NIWA (2007), NIWA (2008) and Brown (2010). The Environment Canterbury planners and the Variation 8 process considered the following values in developing a flow and allocation regime form Hurunui River:

A minimum flow to:

- provide for the life supporting capacity of the flora and fauna that live within the river (see table below from NIWA, 2004).
- provide for salmon passage and jet boat passage. The 2D modeling work (NIWA 2004) indicated that the kayakers and jet boaters of average ability would be able to traverse the river at flows of 15m³/s however a flow of 10m³/s may be passable for jet boaters of above average ability. Flows of at least 60m³/s are required to ensure safe jet-boat passage through the Hawarden Gap above the Mandamus confluence (Andrew Harris pers. comm. see <http://youtu.be/q-6EjDOEzI> and <http://youtu.be/onNV23HLgQo>). The NIWA (2004) modeling indicated salmon may be able to traverse the river at flows of 10m³/s and could possibly traverse the study reach at 5m³/s but the water depth over some riffles would be less than ideal. Fish and Game (Tony Hawker pers. comm.) believe flows of about 15m³/s are required for salmon passage and at least 30m³/s for salmon angling in Hurunui River below Mandamus confluence are required (January – March).
- ensure that the river mouth does not close as a result of abstraction. The Hurunui River mouth does close on occasion, and the likelihood of this occurring increases when flows approach 10m³/s. To reopen the mouth once it has closed a flow of around 15m³/s is required.

Alternative minimum flow regimes from NIWA (2004).

The reason for the level of the minimum flow is given in brackets.

Month	Minimum flows to protect-life supporting capacity and passage for salmon, kayaking and jet-boating (m ³ /s)	Minimum flows if in addition to column 1, the objective is to maintain good protection from predators for birds nesting on islands (m ³ /s)	Minimum flows if in addition to column 1 the objective is to protect salmon angling amenity (m ³ /s)
Jan	15 (boats)	20 (birds)	20 (salmon angling)
Feb	15 (boats)	15 (boats)	20 (salmon angling)
Mar	15 (boats)	15 (boats)	20 (salmon angling)
Apr	15 (boats)	15 (boats)	20 (salmon angling)
May	10 (salmon passage)	10 (salmon passage)	10 (salmon passage)
Jun	10 (life support)	10 (life support)	10 (life support)
Jul	10 (life support)	10 (life support)	10 (life support)
Aug	10 (life support)	10 (life support)	10 (life support)
Sep	15 (boats)	20 (birds)	15 (boats)
Oct	15 (boats)	20 (birds)	15 (boats)
Nov	15 (boats)	20 (birds)	15 (boats)
Dec	15 (boats)	20 (birds)	20 (salmon angling)

Flow variability is provided to:

- Scour periphyton (Fresh flows of around 1.5 – 3 times the median flow). NIWA (2007) identified that after 30 days of low flows periphyton can become an issue in the Hurunui River and the level of periphyton increases exponentially. Analysis of the flow record indicates that periods of low flow of 40 days or more occur naturally once every two years. Like the Waiau it is estimated that a flow of 1.5 to 3-times the median (~60m³/s) is needed to flush periphyton from the river.
- Provide the optimum number of islands for nesting birds and keep the bed relatively free of invasive exotic vegetation to provide protection from predators for river bed nesting birds. The 2D modeling work (NIWA, 2004) undertaken on the Hurunui River indicates that unlike the Waiau River, the flow rate in the Hurunui River has a direct effect on the number of islands in the river bed utilized by river bed nesting birds because of the protection afforded against mammalian predators. It suggests that flows of between 30m³/s to 40m³/s provided the optimum number of islands and when flows dropped below 20m³/s

there was a significant reduction in the number of islands present in the river bed.

- Ensure the river is not at its minimum flow for long periods of time.
- Maintain existing recreation and amenity opportunities.
- Maintain braided-river character. Kayakers observe that bed mobilisation starts to occur at about 120m³/s with transport of cobbles occurring at 150m³/s (Ian Fox, pers. comm.).

Allocation of water and consideration of reliability for:

- Current allocation for irrigation of 8.2m³/s (6.2m³/s for the Amuri Plains reach and 2m³/s for the Cheviot reach). There is currently 6.9m³/s allocated in the Amuri Plains reach. Therefore there would be no reallocation of water that arises from surrendered or lapsed consents until the allocation in the reach is 6.2m³/s. This will not impact current users. Capping of the A Block at 6.2m³/s will retain reliability of supply for current irrigators.
- Allocation of water to storage (see below).

Summary of minimum flows – existing and proposed

Month	Status Quo		NIWA Op 1	Variation8	Proposed before Storage	Proposed after Storage*
	Balmoral	Other users				
Jan	12	10	15	15	15	15
Feb	12	10	15	12	12	15
Mar	12	10	15	12	12	15
Apr	12	10	15	15	12	15
May	12	10	10	12	12	12(10)
Jun	12	10	10	12	12	12(10)
Jul	12	10	10	12	12	12(10)
Aug	13	11	10	13	13	12(10)
Sep	15	13	15	15	15	15
Oct	19	17	15	15	15	15
Nov	18	16	15	15	15	15
Dec	13.5	11.5	15	15	15	15
Flow Sharing regime	No	Yes 1:1	No	No	No	No

Summary of proposed flow regimes for Hurunui River

(a) V8 Block And Gap Regime								
Month	Min Flow	A Block	B Block Gap	B Block Min	B Block Size	C Block Gap	C Block Min	C Block
Jan	15	6.7	5	26.7	10	3.3	40	5
Feb	12	6.7	5	23.7	7.5	8.8	40	7.5
Mar	12	6.7	5	23.7	7.5	8.8	40	7.5
Apr	15	6.7	2	23.7	10	6.3	40	5
May	12	15	-3.3	23.7	10			
Jun	12	15	-3.3	23.7	10			
Jul	12	15	-3.3	23.7	10			
Aug	13	15	-3.3	24.7	10			
Sep	15	15	-3.3	26.7	10			
Oct	15	6.7	5	26.7	15			
Nov	15	6.7	5	26.7	15			
Dec	15	6.7	5	26.7	15			

(b) Proposed Hurunui Block and Gap Regime – prior to storage								
Month	Min Flow	A Block	B Block Gap	B Block Min	B Block Size	C Block Gap	C Block Min	C Block
Jan	15	6.2	5.8	27	10	0	37	0
Feb	12	6.2	8.8	27	10	0	37	0
Mar	12	6.2	8.8	27	10	0	37	0
Apr	12	6.2	8.8	27	10	0	37	0
May	12	6.2	0.8	19	10	0	29	0
Jun	12	6.2	0.8	19	10	0	29	0
Jul	12	6.2	0.8	19	10	0	29	0
Aug	13	6.2	0.8	20	10	0	30	0
Sep	15	6.2	5.8	27	10	0	37	0
Oct	15	6.2	5.8	27	10	0	37	0
Nov	15	6.2	5.8	27	10	0	37	0
Dec	15	6.2	5.8	27	10	0	37	0

(c) Proposed Hurunui Block and Gap Regime – post storage									
Month	Min Flow	A Block	B Block Gap	B Block Min	B Block Size	C Block Gap	C Block Min	C Block	
	Where take is returned to river	All other takes							
Jan	15	15	6.2	5.8	27	10	0	37	33
Feb	15	15	6.2	5.8	27	10	0	37	33
Mar	15	15	6.2	5.8	27	10	0	37	33
Apr	15	15	6.2	5.8	27	10	0	37	33
May	10	12	6.2	0.8	19	10	0	29	33
Jun	10	12	6.2	0.8	19	10	0	29	33
Jul	10	12	6.2	0.8	19	10	0	29	33
Aug	10	12	6.2	0.8	19	10	0	30	33
Sep	15	15	6.2	5.8	27	10	0	37	33
Oct	15	15	6.2	5.8	27	10	0	37	33
Nov	15	15	6.2	5.8	27	10	0	37	33
Dec	15	15	6.2	5.8	27	10	0	37	33

The Zone Committee supports the flow regimes (b) and (c) above proposed by Environment Canterbury.

The Zone Committee understands concerns from farmers in Dommet-Spotswood area that they may miss out on water should Hurunui River water be used out of the catchment, such as proposed as part of a scheme based on large storage in Waitohi or South Branch. The Committee supports use of Hurunui River water out of catchment but only provided the reasonable needs of in-catchment users (including in lower Hurunui) can be met.

The “more water” options proposed for Hurunui River catchment, including in the Committee’s preferred location of Waitohi River catchment, will require large takes from Hurunui River (to fill storage, for run-of-river irrigation and hydro generation). The proposed flow and allocation regime includes a large C Block Allocation. There is little technical information available to assess the likely impact of large takes on in-river values. Managed releases from storage may be able to flush periphyton and deliver other in-river values.

Should a more water proposal proceed, the Committee would expect the following in-river outcomes to be achieved:

- Maintain or enhance river mouth and coastal processes;
- Maintain the extent of active floodplains;
- Maintain or enhance the mauri of the Hurunui River;
- No net loss of braided river bird habitat;
- No net loss of natural high quality and large wetlands;
- No net loss of important indigenous plant communities;
- Maintain native fisheries and valued introduced fish species;
- Maintain or enhance mahinga kai access and resource;
- Maintain the diversity and quality of water-based recreation and amenity.

The Committee has concerns about how hydro generation may impact river flows particularly should hydro generation operation lead to rapid fluctuations in flows that could be a risk to the safety of in-stream users, the recreational experience and ecological values.

The Committee recommends water use proposals should avoid the following:

- Altering the flow regime of the main stems or significant tributaries of the Hurunui in such a way that it would significantly reduce invertebrate food production;
- Changing daily patterns of flow in such a way so as to jeopardise the safety of recreational and others users of the above water bodies or their river mouths;
- Changing daily patterns of flow in such a way as to significantly reduce the recreational opportunities and experiences in the main stems, their river mouths or significant tributaries of the Hurunui;
- Changing daily flow patterns in such a way that lead to native fish stranding.

The storage and hydro generation proposals would have to be consistent with the outcomes required for “more water” options as described in Section 12.

7.2 RECOMMENDATIONS: HURUNUI RIVER FLOWS

Aspect	Action / Recommendation	Responsibility	Timetable	Key CWMS Targets recommendation contributes to
7.2.1 Environmental flows (minimum flows and flow variability)	<p>The Hurunui Waiau Regional Plan must include minimum flows and flow variability for Hurunui River that provide for:</p> <ul style="list-style-type: none"> • in-stream river ecology (including native fish and invertebrates); • maintain mauri of the river; • maintenance of river mouth and hapua; • mahinga kai; • protection of river-nesting birds during breeding season; • the needs for salmon and trout fisheries (including fishability); • maintenance of in-stream recreation opportunities (particularly whitewater kayaking and jet-boating (including commercial jetboating)); • out-of-stream uses: <ul style="list-style-type: none"> - primarily, irrigation supply - secondarily, hydro-power. 	Environment Canterbury	Plan notified by October 2011	<p><i>This recommendation contributes to all CWMS Targets including Environmental Limits</i></p>
7.2.2 Tributary minimum flows	<p>The Hurunui Waiau Regional Plan must include minimum flows for key tributaries of Hurunui River to protect in-stream values of these tributaries while allowing for out-of-stream use.</p>	Environment Canterbury	Plan notified by October 2011	<p><i>This recommendation contributes to all CWMS Targets including Environmental Limits</i></p>

8 WAIPARA RIVER FLOWS

8.1 RATIONALE

The Waipara River is a degraded river. Willows, 4WD vehicles and unreliable water takes are seen as major issues. Willows have a flood protection role, but have spread to cover much of the floodplain and are likely to be reducing flows (through transpiration of river water). There may be an opportunity to harvest willows for fuel (e.g. wood pellets).

The lower reach of the river (below State Highway 1) is important for native fish. The hapua is a valued location for mahinga kai and recreation.

The Waipara is the source of irrigation for many viticultural and pastoral businesses that are entirely dependent on water from the river to maintain their businesses and provide employment to hundreds of staff.

Submissions on the Waipara River Plan were heard in early 2011 and a decision from the hearing commissioners is expected mid 2011. The Zone Committee cannot influence this process but wishes to help facilitate actions and processes that will, in the longer term, improve flows in the Waipara River.

The Zone Committee met with the Waipara River Group in February 2011 and was impressed by their long-term vision for the river. The Zone Committee believe that this Group, along with the local Rūnanga and other key interests, should be able to form a “River Care” group for the whole river from source to sea and work with the Zone Committee and agencies to develop and implement ways to improve the river, particularly flows. The Waipara River Group currently only includes landowners below Waipara Gorge.

The Zone Committee acknowledges that forestry land use can have an influence on water yield in dry “hill-fed” rivers like the Waipara River. Policy WQN5 in the Canterbury Natural Resources Regional Plan (see page 5 – 59 of NRRP) addresses this issue. The Committee has not considered this issue and notes that this may be one of the many issues that an expanded Waipara River Group may have to address.

8.2 RECOMMENDATIONS: WAIPARA RIVER FLOWS

Aspect	Action / Recommendation	Responsibility	Timetable	Key CWMS Targets recommendation contributes to
8.2.1 Increasing Waipara river flows	<p>The Committee supports an increase in Waipara River flows.</p> <p>The Committee, supported by Environment Canterbury and Hurunui District Council, will work with water users, Ngāi Tūāhuriri Rūnanga and interest groups to establish and then support a Waipara River Care Group that includes all interested parties from source to sea that will:</p> <ul style="list-style-type: none"> • identify options for increasing river flows (including willow control and flow augmentation from outside of catchment); • identify other actions required to improve Waipara River. 	Zone Committee, Environment Canterbury (river engineering, Resource Care, technical support)	<p>Initial meetings with users and interest groups October 2011</p> <p>Waipara River Care Group formed early 2012.</p> <p>Initial recommendations from River Care Group to Zone Committee May 2012</p>	<i>This recommendation contributes to all CWMS Targets including Environmental Limits</i>

9 CONWAY RIVER/TUTAE PUTAPUTA FLOWS

9.1 RATIONALE

Minimum flows for Conway River were notified in 2007 as Variation 7 to the NRRP. Five submissions were received on this variation. Following further submissions and a pre-hearing meeting in November 2009 it was agreed that further research was required. The results of this research were discussed at a pre-hearing meeting in June 2010 and participants requested that Variation 7 be put aside to provide an opportunity for further discussion.

Through the process it has become clear that the hapua is the key environmental and cultural value of the catchment. Protection of the hapua and maintaining flow into it whenever possible has become the basis for setting minimum flows for the river. Environment Canterbury is

working with submitters on the revised minimum flows and allocation regime.

The Zone Committee supports the approach Environment Canterbury is taking with revising the minimum flows and allocation regime for the Conway River/Tutae Putaputa, particularly the emphasis on hapua health and river mouth opening.

Ngāti Kurī intends to apply for a freshwater mātaimai reservation for the Conway River. The results of any associated cultural monitoring will be made available to the Committee and the Committee will consider whether or not to support the mātaimai application within the 2012 ZIP.

9.2 RECOMMENDATIONS: CONWAY RIVER/TUTAE PUTAPUTA FLOWS

Aspect	Action / Recommendation	Responsibility	Timetable	Key CWMS Targets recommendation contributes to
9.2.1 9.2.1 Variation to Conway River/ Tutae Putaputa flow and allocation plan	<p>The variation to the Conway River/ Tutae Putaputa Plan be further developed through discussion with submitters to ensure that concerns on the following are addressed:</p> <ul style="list-style-type: none"> • value of the hapua; • river-mouth opening; • value as a bird habitat; • reliability of supply. 	Environment Canterbury	Plan change notified September 2011	<i>This recommendation contributes to all CWMS Targets including Environmental Limits</i>

10 WATER ALLOCATION AND WATER-USE EFFICIENCY

10.1 RATIONALE

There is about 100,000 ha (net) irrigable land in the Zone (see Hurunui Water Project 2011a for a breakdown of areas by location). The committee has agreed that its recommendations on environmental flow and allocation regimes for Hurunui and Waiau Rivers and on possible water management infrastructure needs to have a strong element of “future proofing” with the capacity to provide appropriate irrigation to all the potential irrigable land in the zone in the long term and to continue delivering environmental, social and cultural outcomes into the future. This does not mean that all of the irrigable land will be irrigated, only the possibility that it could be.

The Community Advisory Group (CAG) and Variation 8 processes, and subsequent work by Environment Canterbury, developing the Waiau and Hurunui River flow and allocation regimes have identified allocation approaches for the rivers based on A and B block allocations separated by a gap (with no allocation). The Zone Committee supports the allocation approaches developed through these processes and modified as indicated in Sections 6 and 7. These allocation regimes are able to deliver the Zone Committee goals for an integrated water management solution based on major storage, a transfer canal from Waiau River, more water from Hurunui catchment to Waipara River and improved water quality.

Significant improvement has been made in water-use efficiency in the last decade. AIC told the Zone Committee that farmers in their schemes had spent \$63 million on-farm to change from border dike to spray over the last 10 years. About 70% of the land in AIC schemes is currently irrigated with spray irrigation. The Zone Committee applauds this improvement in water-use efficiency and wishes to find ways that it can support AIC, Irrigation NZ and other parties in efforts to further improve water-use efficiency.

The Zone Committee expects all new irrigation takes to use efficient distribution and irrigation systems. When modeling new irrigation development for the Zone, Aqualinc (2011) has assumed very efficient irrigation together with a two-stage reliability criteria of mean irrigation-season average supply-demand ration is above 94% and periods of restrictions exceeding 10 consecutive

days will occur in no more than 10% of the irrigation seasons modeled. This equates to a supply-demand ratio of 97-98%.

Proposals for major irrigation development in the Zone are focused on the Hurunui Basin and adjacent areas (including in Waipara catchment). This appears to be the areas where demand for new irrigation is currently greatest. The Zone Committee wants to ensure that irrigation development in these areas does not preclude irrigation development lower in Waiau and Hurunui catchments (in Parnassus, Spotswood, Cheviot and Domett areas). There may be scope for smaller scale storages in the lower parts of the Waiau and Hurunui catchments.

The Zone Committee believes an integrated approach should be taken that includes transfer of water from Waiau River to the Hurunui Catchment. The Zone Committee also believes there is a need to improve flows in the Waipara River. One of the ways this could be achieved is through the transfer of water from Hurunui catchment via a major storage reservoir. Such transfers will “mix” waters. Rūnanga representatives on the Zone Committee have indicated that this is likely to be acceptable to tangata whenua provided it was done in the right manner (i.e. by discharges through the land). The Zone Committee believes the Rūnanga should make the decision on how waters are mixed should transfer of Waiau water to Hurunui catchment and Hurunui water to Waipara River be progressed (see Section 5). In making their decision it is expected that the Rūnanga will consider technical information and expert advice on ecological impacts, such as biosecurity issues.

Irrigation development is a significant driver of economic development. The Zone Committee believes that hydro-generation is likely to be an integral part of any major irrigation development in the Zone. Notwithstanding this, the Zone Committee does not wish the long-term irrigation development goals of the Zone to be compromised by the use of water for just hydropower generation (i.e. without associated irrigation development). Therefore the Committee believes the use of water for irrigation should have higher priority than the use of water for hydropower generation (without associated irrigation development).

10.2 RECOMMENDATIONS: WATER ALLOCATION AND WATER-USE EFFICIENCY

	Aspect	Recommendation	Responsibility	Timetable	Key CWMS Targets recommendation contributes to
10.2.1	Priority to drinking water & stockwater schemes	The Hurunui Waiau Regional Plan must give priority to takes for community drinking water and stock water schemes.	Environment Canterbury	Plan notified by October 2011	<i>Drinking water Kaitiakitanga</i>
10.2.2	Environmental flows	The Hurunui Waiau Regional Plan must provide environmental flows for Hurunui and Waiau rivers and their tributaries (see sections 6 and 7).	Environment Canterbury	Plan notified by October 2011	<i>Environmental Limits (and all other targets)</i>
10.2.3	Takes for water storage	The Hurunui Waiau Regional Plan must include provision for takes to major storage.	Environment Canterbury	Plan notified by October 2011	<i>Irrigated Land Area Regional and National Economies</i>
10.2.4	Irrigation vs hydro	The Hurunui Waiau Regional Plan should give priority to allocation for irrigation development (particularly for integrated irrigation and hydro-generation projects) rather than allocation just for hydro-generation.	Environment Canterbury	Plan notified by October 2011	<i>Irrigated Land Area Regional and National Economies Energy Security and Efficiency</i>
10.2.5	Inter-catchment transfers	The Hurunui Waiau Regional Plan must provide for transfer of water from Waiau River to Hurunui Basin and from Hurunui River to Waipara catchment. The River Plan should ensure local Rūnanga determine how the waters are mixed.	Environment Canterbury	Plan notified by October 2011	<i>Irrigated Land Area Regional and National Economies Kaitiakitanga</i>
10.2.6	Parnassus – Cheviot irrigation	The Hurunui Waiau Regional Plan will ensure water will be available to meet reasonable demand for new irrigation in Parnassus – Spotswood – Cheviot area.	Environment Canterbury	Plan notified by October 2011	<i>Irrigated Land Area Regional and National Economies</i>
10.2.7	Irrigable land target	The Hurunui Waiau Regional Plan should ensure water would be available (including through storage) to irrigate the approximately 100,000ha (net) irrigable area in the Zone.	Environment Canterbury	Plan notified by October 2011	<i>Irrigated Land Area Regional and National Economies</i>
10.2.8 (a)	Water use efficiency	The Hurunui Waiau Regional Plan will ensure new irrigation includes efficient distribution and irrigation systems and that water-use efficiency continues to improve in current irrigation.	Environment Canterbury	Plan notified by October 2011	<i>Water Use Efficiency</i>
10.2.8 (b)	Water use efficiency	The Zone Committee will work with Amuri Irrigation Company and Irrigation New Zealand to identify and then support activities to improve water-use efficiency amongst current irrigators in the Zone.	Zone Committee, AIC, Irrigation NZ	Identify activities by November 2011	<i>Water Use Efficiency</i>

11 WATER QUALITY

PREAMBLE

1. The Zone Committee supports the overall thrust of the recent Land Use and Water Quality (LUWQ) Pilot Project in Hurunui Basin and the view that intensive land use increases the nutrient load of adjacent rivers and tributaries.
2. The Committee considers that the water quality of Hurunui River should be maintained at or about its current state, or improved.
3. The key water quality outcomes for the mainstem of Hurunui River are for the river to be safe for contact recreation; achieve periphyton limits as identified in the NRRP most of the time (i.e. four out of five years); not produce toxic cyanobacteria that render the river unsuitable for recreation or animal drinking water; and for nutrients (particularly nitrate and phosphorous) and microbial contamination to decrease over time such that additional irrigation development can occur.
4. The LUWQ Project has developed tentative nutrient load limits for Hurunui mainstem and for its tributaries that are aimed at ensuring that the health of the river is maintained. The concept of a nutrient load limit for a river is important to all interested parties – it provides a target that is an incentive for appropriate management of nutrients by land users and also provides a level of confidence to those who are not landusers but users of the river, that a minimum water quality level is agreed and will be actively pursued.

In discussing the relationship between land use and water quality with various interest groups and community groups, it has become clear to the zone committee that trust needs to be built so that non land users gain the confidence that farmers will take water quality seriously and modify their farming practices if that is what is required to improve river water quality, and equally so that farmers are confident that they will be given the time and opportunity to understand the problem and how they can act to improve the water quality of the rivers while being able to economically sustain the costs involved.

5. While reliable water quality data is available for the mainstem of the Hurunui River, data is less reliable for other rivers in the zone. Setting accurate load limits for

other rivers is therefore more problematic. The zone committee believes that the absence of this data should not delay the encouragement of land users to take action to ensure farming practices are consistent with maintaining and enhancing water quality in the rivers that their land borders.

6. Based on the above points, the zone committee believes that the load limits need to be acknowledged regardless of whether they are given immediate statutory status.
7. The primary requirement (to start immediately) is to use the results of the LUWQ project to mobilize collective action by land users. This will involve development of farm and catchment management plans that focus on the inputs to land use that are likely to impact upon water quality in the rivers.
8. The zone committee has met with community and farmer groups in Amberley, Hawarden, Culverden, Cheviot and Omihi. Encouragement has been given to these groups to take a leadership role in developing a localized approach to ensuring water quality targets are accepted and achieved as an alternative to regulated load limits being established and enforced immediately. There has been a positive approach to this encouragement.
9. Time limits will need to be put in place to ensure action is taken promptly and the zone committee will provide clear direction on the type of initiatives community groups and farming groups should pursue.
10. The Zone Committee believes that existing good farm management practices and the adoption of future best practices by all land/water users can result in both future nutrient load limits being met and full irrigation development occurring in the Hurunui Basin in future years. For these outcomes to be achieved it is essential the rural community is fully engaged on improving water quality.
11. Wetlands filter nutrients and biological contaminants thereby improving water quality. Enhancement of wetlands in the lower reaches of tributaries could substantially improve water quality as well as providing biodiversity gains.

11.1 RATIONALE

11.1.1 Context

The recently released National Policy Statement for Freshwater Management requires Regional Councils to establish freshwater quality limits for all bodies of freshwater (<http://www.mfe.govt.nz/publications/rma/nps-freshwater-management-2011/docs/nps-freshwater-mgmt-2011.pdf>).

The Canterbury Natural Resources Regional Plan (NRRP) proscribes water quality outcomes for Canterbury rivers (Table WQL5) and for groundwater (Objective WQL2.1) that include limits for macrophyte cover (nuisance aquatic plants) for spring-fed rivers, periphyton (slimes) limits for all rivers, ecological health outcomes for all rivers, expected suitability for contact recreation for all rivers, and that toxin producing cyanobacteria shall not render a river unsuitable for recreation or animal drinking water and fish shall not be rendered unsuitable for human consumption by contaminants in a river.

11.1.2 Current state of water quality

The headwaters of most rivers in the Zone are of good quality but quality is fair to poor in lower reaches of some rivers and in some lowland streams. Groundwater quality is variable with some wells in Culverden Basin showing nitrate levels about half the New Zealand Drinking Water Standards maximum acceptable value (MAV) of 11.3 mg/L. (Abraham 2010). For an overview of current water quality in relation to rivers, streams and groundwater in Hurunui Basin see Ausseil (2009), Kelly (2010), Quinn (2010) and Environment Canterbury (2011). Freshwater bathing sites in the Zone are graded fair to good (<http://ecan.govt.nz/services/online-services/monitoring/swimming-water-quality/Pages/check-swimming-water-quality.aspx>).

Water quality has been monitored near the Mandamus confluence and at State Highway One on Hurunui River since 1988. Concentrations of both phosphorous and nitrogen increase downstream with dissolved nitrogen up to 20 times higher in the lower river (at State Highway One) and dissolved phosphorous 2-3 times higher (Environment Canterbury 2011). There has been a steady trend of increasing nitrate concentrations in the lower Hurunui River over the past 20 years and a pattern of increasing phosphorous concentrations up to around 2001 after which phosphorous concentrations reduced again. Correspondingly, the cover of filamentous algae (periphyton) was relatively high during summers of 2001-2005 but has since decreased.

Some hill-fed and spring-fed rivers in the Zone have poor quality. Reports have highlighted elevated nutrient levels and indicators of faecal contamination as major water quality issues in Culverden Basin streams (Environment Canterbury 2011).

11.1.3 Water quality outcomes

The Zone Committee, through information from the Land Use Water Quality Pilot Project in Hurunui Basin and discussions with a wide range of stakeholders, has identified the following water quality outcomes for the main rivers and their tributaries.

Water quality outcomes for mainstem of major rivers (e.g. Hurunui and Waiau Rivers):

- Achieve in most years periphyton limits as identified in NRRP (that is, four years in every five);
- Maintain or enhance the mauri of the river;
- Safe for contact recreation;
- Toxin producing cyanobacteria shall not render the river unsuitable for recreation or animal drinking water;
- Nutrients (particularly nitrate and phosphorous) will decrease over time at sufficient rate and to a level such that additional irrigation development can occur without compromising water quality outcomes for the river (i.e. reduce current loads to create “headroom” for new irrigation development).

Water quality outcomes for tributaries of major rivers (e.g. Pahau and Waitohi Rivers):

- Achieve in most years periphyton limits as identified in NRRP;
- Maintain or enhance the mauri of the tributary;
- Safe for contact recreation;
- Toxin producing cyanobacteria shall not render the river unsuitable for recreation or animal drinking water;
- Have nitrate concentrations that protect fish;
- Contribute to achievement of the mainstem water quality outcomes, in particular to reducing current loads where required to create “headroom” for new irrigation development;
- Achieve ecosystem health outcomes agreed for the particular tributary through a collaborative community-based process.

11.1.4 Key influences on water quality

River flows, water temperature and land use impacts are key determinants of water quality in rivers and streams (Brown 2011, presentation to Cheviot farmers). Periphyton cover at Hurunui River at State Highway One peaked in the 2001 drought. Flow and flow variability are important influences on water quality as these scour algae, dilute nutrient levels and limit increases in water temperature. Flushing flows and high summer minimum flows reduce the

risk of water quality outcomes not being achieved, all other factors being equal. There is currently limited ability to manage the Hurunui and Waiau Rivers to increase flushing flows. This could change with storage with flushing flows being able to be released in mid-late summer to scour algae and dilute nutrient levels. Releases from storage could also maintain summer minimum flows in the rivers.

Land use and land management practices are key influences on water quality including through fertiliser use, leaching of nitrate from urine patches and stock access to waterways (Environment Canterbury 2011). Nutrient (nitrate and phosphorous) losses to waterways vary with land use. Monaghan (2010) indicates the highest N and P losses in Hurunui Basin are from dairy and dairy support.

Nutrient losses vary from farm to farm depending on soil type, rainfall and farm practices. For example, the N leaching losses estimated by Monaghan et al. (2010) for farm enterprises in Hurunui Basin range from about 16 to 106 kg N/ha/yr. Losses of less than about 20 kg N/ha/yr are considered good practice. The Zone Committee is encouraged that some dairy farmers are achieving good nitrate management. The challenge is to ensure widespread adoption of good nitrate management. Good nutrient management practices are listed in Environment Canterbury (2011).

Phosphorous levels in Pahau River significantly declined in the last decade (Kelly 2010) primarily through the efforts of farmers in the Pahau Enhancement Group to improve management of irrigation by-wash. Phosphorous is primarily transported into waterways in surface runoff of soil. Therefore it is considered easier to manage than nitrate which is soluble and leaches to groundwater. Phosphorous losses can be reduced through riparian vegetation and conversion of border dike irrigation to spray.

Biological contaminants are also primarily transported into waterways in surface runoff or directly in effluent when stock are able to access waterways. Fencing waterways and management practices that reduce phosphorous losses to waterways are also likely to reduce the biological contaminant load.

The Zone Committee endorses the view that land use, including what is grown and grazed on it and how much water and fertilizer are applied to it, has a direct impact on the quality of the water in the rivers and groundwater adjacent to it. This has been confirmed by the Committee's understanding of the findings of the Land Use and Water Quality (LUWQ) pilot project undertaken in the Hurunui Basin starting in mid 2010.

There is general agreement amongst the scientists involved in this area of work on the findings about both how land use impacts on water quality and on the major points of measurement involved. As a result the Zone's Committee's recommendation is that action must be taken to ensure that current intensive land use and the growth of intensive farming (supported by further irrigation in the Hurunui

Waiau to potentially include 100,000 hectares (net) of irrigated land) must be managed in a manner that ensures that agreed water quality standards are achieved and maintained. It also recommends that the collaborative model that has been used in developing the CWMS and the development of this Zone Implementation Programme by the Hurunui Waiau Zone Committee be continued in implementing the programme with the establishment of land and water user groups in each community in the zone.

11.1.5 Nutrient load limits and guidelines

The zone committee believes nutrient load limit guidelines should be established for use by farmers in the zone. This would involve each farmer knowing what their existing nutrient load is and having the appropriate incentives to maintain it if it is acceptable or to improve it if it is not.

While it may not be appropriate to give these guidelines statutory force (since there will be significant differences from farm to farm, from one soil type to another and from one type of farming to another), statutory force should be given to the achievement of the water quality requirements for the Hurunui River at the key measurement point at State Highway One. There should also be a requirement that all farms have a nutrient management plan that meets criteria approved by the community land and water user group that has taken responsibility for the catchment or sub catchment.

The Zone Committee also believes that nutrient guidelines should be established for each tributary in the Hurunui Basin.

11.1.6 Implementing nutrient load limits from LUWQ Hurunui Basin project

Roles, responsibilities and timetable, including incentives for uptake and resourcing to support farmers and groups, need to be identified as part of the plan for implementing improved nutrient management in Hurunui Basin.

There is considerable anxiety (given the tributary load limit estimates and the recommendations of LUWQ Project) amongst intensive land-users in the Zone about the impact on their financial viability. The intensive farmers at the coal face in the Hurunui Basin who will be most impacted by the introduction of nutrient load limits must be involved in developing and refining an Implementation Plan (as they are key to implementation) as well as the primary sector groups (e.g. Dairy NZ) and others who have been closely involved with LUWQ Project.

11.1.7 Tributary- and farmer-based implementation

The Zone Committee believes implementation must be based on groups of incentivized and well-supported land and water users working together.

Users of the land need to have appropriate incentives to deliver the required outcome regarding water quality in the Hurunui River and tributaries. It seems appropriate

to the Zone Committee that the collaborative model that firstly delivered the CWMS and has subsequently driven the performance of the Zone Committee itself should be at the core of the implementation of its recommendations for the future. Land and water users who will impact on water quality and the productivity of the land need to take joint responsibility for the water quality outcomes recommended by the Zone Committee and that are required by regulation.

There are many examples of groups with a collaborative resource management role, including community irrigation schemes (e.g Amuri Irrigation Company), river rating committees, RiverCare groups, flow regime advisory groups, LandCare groups, the farmer group that improved Phosphorous run-off in Pahau River, and recreational groups like Fish and Game that have statutory roles.

The Zone Committee envisages farmers within a catchment/tributary (and others as appropriate) coming together to collectively manage all inputs in a catchment that have the potential to affect water quality. The regulatory framework they will work within should provide the incentives required such as continued access to or denial of access to water for irrigation depending on performance. The regulatory framework should also indicate what is expected in relation to nutrient plans/ budgets and independent auditing.

The tributary-based approach must include all land and water users that discharge nutrients or biological contaminants to the tributary. This includes municipal wastewater treatment systems and industrial users as well as irrigated and dryland farmers. It is likely that phosphorous contribution from dryland (hill country) farmers and nitrate leaching from wintering off dairy cows could be significant contributors to loads in some tributaries.

Following on from meetings with farmer and community groups in Amberley, Hawarden, Culverden, Cheviot and Omihi, the Zone Committee believes that land users in each of these areas must form management groups. These groups will take responsibility for the development and implementation of farm and catchment plans, and will provide specifications to land users in each area on how inputs to farming will be managed and monitored to ensure water quality in the rivers and tributaries will be maintained and enhanced.

In the Culverden area the Amuri Irrigation Company should take the lead role and in the Hawarden area the Hurunui Water Project is well placed to play a similar role. Farmers in the Cheviot area are taking steps to form a similar group and the zone committee will encourage the establishment of a Waipara River interest group that considers the health of that river from its source to the sea. Representatives from the recreational and environmental interest groups and Ngāi Tahu should be involved in these management groups.

Industry groupings, such as Dairy NZ, have a key role to play in providing their members with the information they

require to manage their farming activities in a manner which supports the water quality goals of their catchment (or tributary). Major players such as Fonterra are also in a position to influence the behaviours and farming practices of those who supply to them.

There may be individuals who are reluctant to comply with the actions that the wider community considers to be in its interests. A suitable regulatory framework needs to be developed by the regional and district councils that ensures these individuals are required to comply with the collaborative approach adopted by the wider community. The implementation of load limits and other regulatory requirements needs to provide sufficient time to allow for the collaborative development and implementation of community based nutrient management practices. Where community based initiatives are progressing satisfactorily, any regulatory based action should focus on the individuals who are not complying rather than on the majority who are supporting the goal of maintaining and improving water quality and maintaining and improving economic and social well being.

11.1.8 New intensive land users – new irrigation development

The Zone Committee expects new irrigation development to adopt good nutrient management practice and achieve the load limits for Hurunui River (and for other areas as these are established).

Where more water is available to land owners that will allow them to change their land use and farm more intensively, they will need to develop a farm management plan that demonstrates that they will be able to do so within the nutrient load limits for both their individual unit and the larger catchment they are a part of. This will require the statutory framework to provide the community based management structure responsible for the catchment to have the authority to review and approve the individual development plan prior to any action being taken. If the “manager” also has control over the supply of irrigation water this may be a simple control mechanism (such as through a community irrigation scheme).

11.1.9 Wetlands for water quality management

Wetlands filter nutrients and biological contaminants thereby improving water quality. Enhancement of strategically placed wetlands in the lower reaches of tributaries, such as in lower Pahau River, St Leonards Drain, Waitohi River, Lowry Peaks Drain and Hermitage Drain, could substantially improve water quality as well as providing biodiversity gains. Section 3 identifies the Lower Waitohi wetland area as a possible priority area for Immediate Steps Biodiversity Funding.

11.1.10 Load-limits for the Waiau River and other areas

The LUWQ Project only covered the Hurunui Basin. There are also large areas of intensive land use (and potentially irrigable land) in the Waiau catchment. The Zone Committee believes load limits for N and P should be established for the Waiau River mainstem. In addition, the LUWQ Project only developed load limits in the Hurunui River for the area above State Highway 1. Load limits should be established for the Domett area. Once load limits have been established for Waiau catchment and Domett area, limits should be established for the remainder of the Zone.

The Committee believes a collaborative approach should be taken to setting load limits. This should involve land and water users from the catchment as well as those who use and value the river in other ways including for recreation, biodiversity and its cultural values.

11.1.11 Water quality monitoring

Monitoring is essential if water quality outcomes are to be achieved. Firstly, information on water quality is essential to set load limits. Secondly, on-going monitoring at all scales is key to the “measure-to-manage” collaborative approach to ensure strong feedback to farmers and tributary-based groups on the results of land use and nutrient management on water quality including nitrate, phosphorous and faecal loads. At least some of the on-going monitoring could be done by farmers and community groups.

The Committee expects monitoring to be part of the LUWQ Implementation Plan developed by Environment Canterbury. The Committee has identified that monitoring at hapua is a current gap and expects this to be rectified as soon as possible.

11.2 RECOMMENDATIONS: WATER QUALITY

Aspect	Action / Recommendation	Responsibility	Timetable	Key CWMS Targets recommendation contributes to
11.2.1	<p>Water Quality Outcomes for Zone</p> <p>Water quality outcomes for mainstem of Hurunui and Waiau Rivers:</p> <ul style="list-style-type: none"> • Achieve in most years periphyton limits as identified in NRRP (that is, four years in every five); • Safe for contact recreation; • Maintain or enhance the mauri of the river; • Toxin producing cyanobacteria shall not render the river unsuitable for recreation or animal drinking water; • Nutrients (particularly nitrate and phosphorous) will decrease over time at sufficient rate and to a level such that additional irrigation development can occur without compromising water quality outcomes for the river (i.e. reduce current loads to create “headroom” for new irrigation development). <p>Water quality outcomes for tributaries of major rivers:</p> <ul style="list-style-type: none"> • As above for mainstems, and; • Achieve ecosystem health outcomes agreed for the particular tributary through a collaborative community-based process. 	Land and water users, Environment Canterbury, developers	From July 2011	<p><i>Ecosystem Health/ Biodiversity;</i></p> <p><i>Kaitiakitanga</i></p> <p><i>Drinking Water;</i></p> <p><i>Recreational and Amenity Opportunities;</i></p> <p><i>Environmental Limits</i></p>
11.2.2	<p>Nutrient load limits for Hurunui River</p> <p>The goal for water quality in the Hurunui River at the SH1 bridge will be at or about the same or better standard as present, in terms of nitrate and phosphorus loads.</p> <p>The Hurunui and Waiau River Plan will include targets for nitrate (N) and phosphorous (P) limits for the Hurunui River (mainstem) at Mandamus, State Highway 1 and the river mouth.</p> <p>These limits must be implemented and applied in a way that results in the wide uptake of best practices without diminishing the viability of current land users.</p> <p>This will require flexibility in the timing of their implementation where consequences arise that unreasonably impact on the wellbeing of the Hurunui community. This is not a get out of jail card for farmers but recognition of the need to provide reasonable time for change to occur in a manner that does not destroy existing economic value.</p> <p>The load limits will be reviewed in five years.</p>	Environment Canterbury	Plan notified by October 2011	<p><i>Ecosystem Health/ Biodiversity</i></p> <p><i>Kaitiakitanga</i></p> <p><i>Drinking Water</i></p> <p><i>Irrigated Land Area</i></p> <p><i>Environmental Limits</i></p>

	Aspect	Recommendation	Responsibility	Timetable	Key CWMS Targets recommendation contributes to
11.2.3	Implementation Plan	<p>Urgently develop a plan for implementing improved nutrient management in Hurunui Basin. This plan must identify roles, responsibilities and timetable, including incentives for uptake and resourcing to facilitate and support the tributary- and farmer-based approach. The direct involvement and leadership by community based land user groups will be critical to this approach being successful.</p> <p>Develop plan(s) for implementing improved nutrient management in other parts of the Zone.</p>	<p>Zone Committee, Hurunui land and water users,</p> <p>DairyNZ, Sheep & Beef, AIC, HWP,</p> <p>Environment Canterbury and others.</p>	<p>By July 2011</p> <p>From July 2011</p>	<p><i>Ecosystem Health/ Biodiversity</i></p> <p><i>Kaitiakitanga</i></p> <p><i>Drinking Water</i></p> <p><i>Irrigated Land Area</i></p> <p><i>Environmental Limits</i></p>
11.2.4	Tributary- and community-based approach	<p>Implementation of improved nutrient management to achieve the load limits should take a tributary- and land/water user-based approach.</p> <p>The Hurunui and Waiau River Plan should support a tributary- and land/water user-based approach to nutrient management.</p>	<p>Hurunui land and water users, Primary sector groups, Environment Canterbury, Hurunui District Council and others</p>	<p>Regular updates to Zone Committee from July 2011</p>	<p><i>Ecosystem Health/ Biodiversity</i></p> <p><i>Kaitiakitanga</i></p> <p><i>Drinking Water</i></p> <p><i>Irrigated Land Area</i></p> <p><i>Environmental Limits</i></p>
11.2.5	Zone Committee leadership	<p>The Zone Committee will take a lead role in communicating the need for and supporting improved nutrient management in the Zone based on a tributary and farmer-based approach. The nitrate (N) and phosphorous (P) guidelines for the tributaries of Hurunui River (Pahau, St Leonards, Dry and Waitohi) should be consistent with the water quality standards set in the Hurunui Waiau plan for the Hurunui river at State Highway 1.</p>	<p>Zone Committee with industry (Dairy NZ, Sheep and Beef), AIC and Environment Canterbury</p>	<p>From July 2011</p>	<p><i>Ecosystem Health/ Biodiversity</i></p> <p><i>Kaitiakitanga</i></p> <p><i>Drinking Water</i></p> <p><i>Irrigated Land Area</i></p> <p><i>Environmental Limits</i></p>
11.2.6	Farm-scale guidelines	<p>Implementation of improved nutrient management will include guidelines to land/water users on “good management” N and P loads for their land.</p>	<p>Industry with Environment Canterbury</p>	<p>From August 2011</p>	<p><i>Ecosystem Health/ Biodiversity</i></p> <p><i>Kaitiakitanga</i></p> <p><i>Drinking Water</i></p> <p><i>Irrigated Land Area</i></p> <p><i>Environmental Limits</i></p>
11.2.7	Regulatory backstop	<p>The Hurunui and Waiau River Plan should require land/water users in Hurunui Basin to adopt good nutrient management practices within a reasonable time if voluntary farmer-based approach has not achieved required uptake of good nutrient management practice. The Committee will engage with land users and others to determine what is a “reasonable” time.</p>	<p>Environment Canterbury</p>	<p>Plan notified by October 2011</p>	<p><i>Ecosystem Health/ Biodiversity</i></p> <p><i>Kaitiakitanga</i></p> <p><i>Drinking Water</i></p> <p><i>Irrigated Land Area</i></p> <p><i>Environmental Limits</i></p>

	Aspect	Recommendation	Responsibility	Timetable	Key CWMS Targets recommendation contributes to
11.2.8	New irrigation development	The Hurunui and Waiau River Plan will include a requirement for new irrigation development to adopt good nutrient management practice and achieve their own load limits for Hurunui River and other catchment load limits as these are set.	Environment Canterbury	Plan notified by October 2011	<i>Ecosystem Health/ Biodiversity Kaitiakitanga Drinking Water Irrigated Land Area Environmental Limits</i>
11.2.9	Waiau River & Hurunui below SH1	Set load limits based on NRRP targets, for N and P for Waiau River and for Domett area and then for other areas in the Zone including Conway and Waipara Rivers.	Environment Canterbury	by June 2012	<i>Ecosystem Health/ Biodiversity Kaitiakitanga Drinking Water Irrigated Land Area Environmental Limits</i>
11.2.10	Monitoring	Prepare and then implement a monitoring programme to provide the knowledge required to underpin improved nutrient management that achieves load limits for Hurunui and Waiau Rivers and main tributaries. This must include monitoring of water quality in hapua.	Environment Canterbury with other parties as appropriate	Monitoring programme prepared August 2011. Implemented from November 2011.	<i>Ecosystem Health/ Biodiversity Kaitiakitanga Drinking Water Irrigated Land Area Environmental Limits</i>

12 ECONOMIC DEVELOPMENT AND PROVISION OF “MORE” WATER

PREAMBLE

1. More water is required to deliver the economic and social targets and some of the cultural, environmental and recreational targets in the Zone.
2. More irrigation water will come from additional groundwater takes, efficiency gains and from use of small-scale storage. The additional irrigated area from these is likely to be minor.
3. The Zone Committee has agreed a list of desired characteristics for projects to deliver more water for the zone (see Appendix 3).
4. Environment Canterbury has undertaken an assessment of a short-list of “more water” options for the Zone against the ten CWMS target areas and three additional targets (economic viability, local community and multiple use). This assessment has used the substantial amount of information provided to the committee at meetings and in reports on the options. All options perform poorly against some targets. The information that the Environment Canterbury assessment is based on forms the basis for the Zone Committee’s recommendations on provision of “more water” including preferred storage location in Hurunui River catchment.
5. The Zone Committee supports an integrated approach that includes a major water storage reservoir in Waitohi River catchment. The integrated approach may also include major infrastructure for transfer of Waiau water to Hurunui Basin, storage of Waiau water, transfer of Hurunui water to Waipara area, and hydro-electric generation.
6. The Committee is uncertain whether major storage in Waitohi River catchment is affordable. Environment Canterbury will facilitate an independent review of the four Waitohi options proposed to identify one option that would seek Irrigation Acceleration Fund for further feasibility studies.
7. The Committee believes proposals for a dam on the South Branch (Hurunui River) and a weir on Lake Sumner should be deferred until a Waitohi option is shown to be not economically viable or for two years, whichever is shorter. This ensures a “Plan B” for major water storage in the Hurunui catchment. Plan B options would be required to meet clear environmental, recreational, and cultural outcomes at the reservoir location as well as flow-related outcomes for Hurunui River.

12.1 RATIONALE

12.1.1 Sources of “more water”

The primary “more water” sources in the Zone are groundwater, efficiency gains by current water users (irrigators) and through the use of small- and large-scale storage.

Riley Consultants (2010) assessed groundwater and likely efficiency gains in North Canterbury. They consider the groundwater resource offers limited opportunity for additional water and note that many existing wells have low yields (that are insufficient to drive centre-pivot irrigators). The Zone Committee supports additional groundwater takes, where appropriate, but believes this is likely to result in only a small increase in irrigated area in the Zone.

Riley Consultants (2010) estimate that efficiency improvement by current users could result in an additional 7,000 ha of irrigated land in the Zone. This estimate assumes substantial improvements in both distribution and on-farm systems. Hurunui Water Project (2011) and Amuri Irrigation Company (in discussions with Zone Committee in February 2011) provide more conservative estimates of 4,000 ha and 3,000 ha of additional irrigated area from efficiency gains. The Zone Committee expects current users and particularly the larger irrigation schemes to substantially improve irrigation efficiency, this will result, however, in only a moderate increase in irrigated area.

On-farm small scale storage and particularly major water storage is considered key to the provision of “more water” in the Zone and is discussed below.

12.1.2 Integrated approach

The Zone Committee is very clear that “more water” is not just for irrigation development but must deliver environmental, social, cultural and economic outcomes, not just one at the expense of others (see Appendix 3 “Committee’s Desired Characteristics for Projects to Deliver More Water for the Zone”). Provision of more water must help achieve the CWMS vision and all of the CWMS targets. The Zone Committee believes that provision of more water including major storage will significantly help achieve goals relating to drinking water, protection of aquatic ecosystems including wetlands and environmental flows for Waipara River, as well as goals for irrigation development, electricity generation and economic development, and be a major incentive in achieving goals for water-use efficiency and nutrient management.

An integrated water management approach must be taken that uses water from both Hurunui and Waiau rivers in an integrated manner to optimize the area irrigated in total across the two river catchments, including the Cheviot area, and the Zone as a whole. Furthermore the provision of more

water should also address the need for increased flows in Waipara River, provide affordable secure drinking water and affordable stock-water supply for rural communities in and adjacent to new and existing irrigation scheme command areas, and protect significant native ecosystems (including wetlands) in the irrigation command areas.

12.1.3 More water for economic development

Hurunui District has a land-based economy. Irrigation is key to future economic development in the District. More water, including major water storage reservoir(s) is key to future land-based economic development.

Primary production in the Hurunui Catchment above State Highway 1 currently contributes more than \$80 million to the District and more than \$120 million to Canterbury. Most of the economic contribution is from dairying and from irrigated land. Irrigated land only makes up 8% of the Hurunui Catchment above State Highway 1 but produces about 70% of the economic contribution and employment.

Irrigation development will increase employment and grow the economy. Hurunui Water Project estimate that irrigation development of 37,000ha of currently unirrigated land would increase farm-gate output by \$190 million per year and increase Canterbury region's GDP by \$270 million/year. There would be an estimated increase of 470 jobs on farm, 870 jobs in the District and 2,350 jobs in Canterbury.

12.1.4 Development Proposals for Hurunui water

A proposal has been developed over recent years (the Hurunui Water Project - HWP) to develop water storage that will mostly service the south side of the Hurunui (water will be provided to some areas on north bank). As well as having farmer share holding, Ngāi Tahu property and MainPower have a financial interest in this development. HWP proposal is to irrigate about 40,000ha of which about 30,000ha would be land not currently irrigated. HWP has an application for a resource consent from the regional council to build storage on the South branch of the Hurunui and on Lake Sumner. This consent application is currently frozen by the moratorium on the Hurunui.

Ngāi Tahu Property, owners of the Balmoral forest and adjacent land, are potential developers of water storage and are investigating a number of options that will enable them to develop their land and increase income from that land.

During the Zone Committee process three new development concepts have emerged, all based on water storage in Waitohi River catchment (the HWP "Hurricane Gully", DPML and FraserGeologics options for Waitohi River). FraserGeologics has an integrated option that includes takes from Hurunui and Waiau River, storage reservoirs in Waitohi River and at Isolation Hill, and distribution to Hurunui Basin, Waipara, Spotswood, Cheviot and other areas in the Zone.

HWP previously had investigated an option of a reservoir in Waitohi River but considered this uneconomic. During the Zone Committee process they reconsidered the Waitohi and began pre-feasibility investigations of the Hurricane Gully location. In early work HWP had also considered a Mandamus River option.

12.1.5 Storage options for Waiau water

A report by Riley Consultants (2010) identified North Canterbury storage sites including 15 options in the Waiau catchment. The Waiau River has higher median flows than Hurunui River and storing Waiau water is an attractive option. Many of the possible Waiau storage locations are adjacent to the Hope Fault, on the mainstem of Waiau River or in the upper catchment. Only one suitable storage site for Waiau River water that is away from the Hope Fault and the high-conservation value upper catchment, can irrigate more than 10,000ha and is likely to be economically viable has been identified.

Meridian Energy and FraserGeologics have an option, at concept stage, for a reservoir with about 30 million m³ of active storage at Isolated Hill on the southern side of Waiau River. Water would be taken from Waiau River at or above the current Amuri Irrigation take to the reservoir by canal and pipe. The proposal combines irrigation and hydro generation. This is the only option the Committee knows of for economically viable major storage of Waiau River water that is not on the mainstem, not adjacent to Hope Fault or in the upper catchment.

12.1.6 Water from outside the Zone

A very large water storage in Lees Valley has been proposed. Water from such a Lees Valley storage could be transferred to Waipara River. The Zone Committee is not considering Lees Valley as part of "more water" solutions for Hurunui Waiau Zone because:

- There is considerable uncertainty over whether the Lees Valley option will proceed;
- It is likely that water from Lees Valley would go south (for irrigation development in Waimakariri, Selwyn and Ashburton Districts) rather than north for irrigation in Hurunui District;
- There are other options for more water in the Zone.

It has been suggested that water from the Clarence River could be transferred to Waiau River. The Committee is not considering Clarence River water as part of "more water" solutions for the Zone because:

- Rainfall in the upper Clarence catchment is relatively low and would not significantly add to the water resource in the Zone;
- The risk of transferring didymo from Clarence River to upper Waiau River (currently didymo free);
- There are other options for more water in the Zone.

12.1.7 Committee deliberations on water storage and assessment in relation to CWMS targets

The Zone Committee has made field visits to South Branch, Lake Sumner, Waitohi River and many of the Waiau potential storage sites. The Zone Committee has had presentations from all of the developers (HWP, Ngāi Tahu Properties, Meridian Energy, DPML and Fraser Geologics).

Environment Canterbury has used information presented and reported to the Zone Committee and additional reports to assess a short list of water storage options against the CWMS target areas and three additional target areas. The options assessed were:

- Status quo
- On-farm & small-scale storage
- Waitohi “HWP Hurricane Gully”
- Waitohi “HWP Seven Hills”
- Waitohi “DPML”
- Waitohi “FraserGeologics”
- South Branch
- Lake Sumner
- Mandamus River
- Pahau River
- Isolated Hill
- Hanmer River
- Waiau transfer “240m canal”.

The assessment covers the ten CWMS target areas: Ecosystem Health/Biodiversity; Natural character of braided rivers; Drinking water; Recreational and amenity opportunities; Water use efficiency; Irrigated land area; Energy security and efficiency; Regional and national economies; and Environmental limits, and three additional target areas: Local communities (community vibrancy and viability; direct social impact of development); Multiple uses; and Economic viability.

12.1.8 Waitohi River storage

The Committee supports a major water storage in Waitohi River as a key component of an integrated more water solution for the Zone because:

- The adverse impacts on environmental, conservation and recreation values are considered by conservation and recreation groups to be substantially less than other options for major storage in Hurunui catchment;
- The storage is well located to provide water for irrigation development on south side of Hurunui River and in Waipara, Omihi and Glasnevin;
- The dam is located relatively close to major electricity

transmission lines, increasing the attractiveness of hydro generation at the site;

- The storage is well located to be able to provide secure drinking water to some Hurunui District Council community drinking (and stockwater) schemes;
- The reservoir may provide a major recreation resource that was easily accessible for the local community and visitors from Christchurch and elsewhere;
- The reservoir would allow release of water to provide environmental flows, including increased summer flows, for Waitohi River and water to augment flows in Waipara River.

The Committee acknowledges the significant adverse impact of a dam in Waitohi River in the vicinity of Waitohi Gorge bridge on the people and their properties that would be flooded by the lake. Two of the Waitohi options have less impact on the Waitohi settlement.

The Committee notes that in meetings with Forest and Bird, Fish and Game, Department of Conservation and Whitewater Canoe Club there was support for major storage in Waitohi River. The Committee acknowledges that there is little information available on conservation values of the upper Waitohi River.

The challenge for the Waitohi storage options is that all proposals are at the concept stage and very limited investigations and analyses have been done. There are different opinions amongst the three proponents for Waitohi storage on economic viability and the Zone Committee is concerned that while Waitohi storage is attractive it may not be affordable.

Environment Canterbury is facilitating a process with all Waitohi developers to identify a single Waitohi proposal that would be the focus of further investigation. The process is expected to commence in July 2011 and use an independent expert panel to identify the preferred option. Following this process it is expected an application would be made to the Irrigation acceleration Fund for further investigation. The Zone Committee supports this independent evaluation of the four Waitohi options.

12.1.9 Lake Sumner managed water storage and South Branch dam

Managing Lake Sumner within its historical range as a water storage reservoir has been proposed by HWP and Ngāi Tahu Properties. The option is technically simple, low economic cost and would provide water for about 9,500ha of new irrigation. There are concerns about the adverse impacts on lake-edge native vegetation, whitewater kayaking, the trout and salmon fishery and the fishing experience in the highly-valued reach of the river below the lake to the South Branch confluence, jet-boat passage, and on Loch Katrine.

The Lake Sumner managed storage would require a concession from Department of Conservation. The

concession would be assessed against conservation-related criteria. DOC has concerns about the impact on lake-edge ecosystems (see Head 2010).

HWP has applied for a consent for a water storage in South Branch. Topographical and geotechnical factors make South Branch an economically attractive option for a major storage with the cost per cubic metre of water being significantly less than many other options in the Zone. There are concerns about impacts on the salmon fishery, significant wetlands that would be inundated, kayaking and on braided river processes, including impacts on braided river nesting birds and the river mouth and hapua.

The Committee prefers Waitohi as a location for major water storage in the Hurunui catchment. It wishes the Lake Sumner and South Branch proposals to be deferred until a Waitohi option is shown not to be viable or for two years (from October 2011), whichever is sooner. The viability (or not) of a Waitohi option would be determined by the Environment Canterbury facilitated independent panel (see above).

The Committee has taken this approach because it wishes to have a “Plan B” should its preferred approach not come to fruition. Should Plan B eventuate the Committee would expect a proposal for Lake Sumner, South Branch or another location would, as well as achieving the requirements for Hurunui flows as identified in the Hurunui Waiau Regional Plan, achieve the following:

- No impounding of water on the mainstem of Hurunui (and Waiau) River;
- Maintain the upper catchment of Hurunui River (and Waiau River) as largely natural ecosystems and landscapes;
- Maintain or enhance river mouth and coastal processes;
- Maintain the extent of active floodplains;
- Maintain or enhance the mauri of the Hurunui River (and Waiau River);
- No net loss of braided river bird habitat;
- No net loss of natural high quality and large wetlands;
- No net loss of important indigenous plant communities;
- Maintain native fisheries and valued introduced fish species;
- Maintain or enhance mahinga kai access and resource;
- Maintain the diversity and quality of water-based recreation and amenity.

The Zone Committee considered the opportunities and likelihood of the mitigation of the impacts of Lake Sumner and South Branch water storage proposals at its May 2011

Committee meeting. The minutes of this meeting record a wide range of possible mitigation.

12.1.10 Areas where storage reservoirs prohibited

The Zone Committee considers that dams should be prohibited on all mainstems of the Waiau River because of the importance of the braided river to internationally significant populations of black-fronted tern and black-billed gull, the recreational value of the river (fishing and jetboating) and the need to maintain braided river processes to ensure the health of the Waiau river mouth and hapua.

The Zone Committee considers that dams should be prohibited on the mainstem of Hurunui River below the confluence with South Branch because of the recreational value of the river (fishing, kayaking and jetboating) and the need to maintain the braided river processes and the health of the river mouth and hapua.

The upper Waiau River and tributaries above the Hope confluence, including Boyle River, have high biodiversity values, include significant salmon spawning sites and highly valued trout-fishing locations, and are highly valued as natural rivers and landscapes. The upper catchment is highly natural and is a key kayaking area. The upper part of the Waiau Mainstem and the key tributaries of the Hope, Boyle, Lewis and Doubtful are trophy trout fishing areas. The upper part of the Waiau is also a key salmon spawning area. The land holding in this area is primarily publically owned and administered by the Department of Conservation and is extensively used by hunters and trampers. The opening of the St James national cycleway trail has also resulted in this area being extensively used by mountainbikers. The river provides a key scenic backdrop for these activities. Recreational groups, including kayakers and fishermen have identified the unregulated nature of these flows as being important in this area. The Zone Committee considers that major water storage reservoirs should be prohibited in the Waiau River and tributaries above Hope confluence including the Hope and Boyle Rivers. The Committee notes that many of the potential water storage locations identified in the upper Waiau would provide only a small amount of storage (except for mainstem locations) and that some of the storage sites are close by the Hope Fault.

12.2 RECOMMENDATIONS: ECONOMIC DEVELOPMENT AND PROVISION OF “MORE” WATER

Aspect	Action / Recommendation	Responsibility	Timetable	Key CWMS Targets recommendation contributes to
12.2.1	<p>Integrated approach</p> <p>The Zone Committee will work with developers to bring forward an integrated “more water” proposal or proposals for the Zone that:</p> <ul style="list-style-type: none"> uses water from Waiau and Hurunui Rivers in an integrated manner; utilizes off-mainstem storage reservoir(s); provides more water for Waipara River and environmental flows for Waitohi River; includes hydro-power generation as part of an integrated approach with irrigation development; protects and develops wetlands and significant native ecosystems within the irrigation command area; will be capable of irrigating (with existing irrigation) most of the approximately 100,000ha (net) of irrigable land in the Zone; will adopt good nutrient management practices to meet their share of nutrient load limits for Hurunui River (and other areas as limits developed for all of the Zone); meets significant in-stream, cultural, environmental and recreational needs uses highly efficient distribution and irrigation systems; takes a community irrigation scheme approach; provides recreation opportunities, where possible. 	Zone Committee and Developers	Integrated More Water Proposal(s) to Zone Committee by September 2011	<i>This recommendation contributes to all CWMS Targets</i>
12.2.2	<p>Economic viability</p> <p>Zone Committee will work with developers and others to progress investigations, funding discussions and economic assessments of major water storage in Waitohi River.</p>	Zone Committee, Developers, Environment Canterbury	By August 2011	<i>Irrigated Land Area Regional and National Economies</i>
12.2.3	<p>Waitohi/Waiiau option</p> <p>The Committee supports an integrated option utilizing a major water storage in Waitohi River combined with or in conjunction with transfer of Waiau River water and storage of Waiau River water. The Committee regards this is an environmentally & recreationally attractive option but acknowledges that it is uncertain at this stage if Waitohi River storage is affordable.</p>	Zone Committee and developers	<p>Integrated option(s) by September 2011</p> <p>Indication of affordability by Nov 2011</p>	<i>This recommendation contributes to all CWMS Targets</i>

	Aspect	Recommendation	Responsibility	Timetable	Key CWMS Targets recommendation contributes to
12.2.4	Lake Sumner	The proposal to manage Lake Sumner as a water storage be deferred until a Waitohi storage option is shown not to be economically viable or for two years (from October 2011), whichever is sooner.	Environment Canterbury, Zone Committee, developers		<i>This recommendation contributes to all CWMS Targets</i>
12.2.5	South Branch	The proposal to dam South Branch for water storage be deferred until a Waitohi storage option is shown not to be economically viable or for two years (from October 2011), whichever is sooner.	Environment Canterbury, Zone Committee, developers		<i>This recommendation contributes to all CWMS Targets</i>
12.2.6	Excluded areas for major water storage reservoirs	<p>The Zone Committee does not support major water storage reservoirs in the any of the following locations:</p> <ul style="list-style-type: none"> • mainstems of Waiau River including Boyle and Hope Rivers; • all tributaries of Waiau, Boyle and Hope Rivers, above Hope-Waiiau Confluence; • mainstem of Hurunui River below the South Branch confluence. <p>The Zone Committee will work with developers and other parties to progress other water reservoir options.</p>	Zone Committee and developers		<i>This recommendation contributes to all CWMS Targets</i>
12.2.7	On-farm and small-scale storage	The Zone Committee supports on-farm storage and small-scale storage as part of an integrated approach. The Hurunui Waiau Regional Plan should make the consent process for on-farm and small-scale storage less onerous than at present.	Environment Canterbury	Plan notified by October 2011	<i>Water Use Efficiency Irrigated Land Area Regional and National Economies</i>
12.2.8	Regional Plan give effect to Zone Committee position	<p>The Hurunui Waiau Regional Plan will give effect to the Zone Committee position as above on:</p> <ul style="list-style-type: none"> • The scope and requirements in an integrated approach (12.2.1); • The “preferred option” (12.2.3); • Lake Sumner (12.2.4); • South Branch (12.2.5); • Excluded areas (12.2.6) • On-farm storage (12.2.7). 	Environment Canterbury	Plan notified by October 2011	<i>This recommendation contributes to all CWMS Targets</i>

13 RECREATION

13.1 RATIONALE

13.1.1 Consultation

The Zone Committee has had presentations on the salmon and trout fisheries and fishing, jet boating and whitewater kayaking in the Zone. The Committee has met with Fish and Game, New Zealand Salmon Anglers Association, Canterbury Fly Fishing Club, Canterbury Whitewater and Thrillseekers Adventures.

13.1.2 Existing recreational opportunities in the zone

The Hurunui Waiau Zone contains a rich recreation resource associated with its rivers and high country lakes. The Zone Committee recognises that maintaining the current diversity and opportunity is a desirable outcome and is consistent with the CWMS targets.

There may also be an opportunity to enhance recreation opportunities in the zone by utilising appropriate storage options. Recommendation 12.1.1 includes increasing flows in the Waipara and Waitohi Rivers. An appropriate increase in flows in these rivers could have significant benefit to salmonid and native fisheries. Planned flushing flows in these streams from storage could also create kayaking opportunities and will improve traditional swimming sites. It is also recognised that some storage options in section 12 have significant recreation challenges. If the preferred storage option of the Waitohi turns out to be unfeasible than development of alternative storage must meet a range of outcomes including protecting current recreation uses.

Angling

The Hurunui and Waiau Rivers are highly valued fisheries for both trout and salmon. Some reaches of the Hurunui are considered to be nationally significant (see table “National significance of the Hurunui” on Canterbury Water website compiled by Tony Hawker; e.g. report of the special tribunal in the matter of an application for a Water Conservation Order on the Hurunui River). There is limited angling in both the Conway and Waipara Rivers, but these have deteriorated over time as fisheries.

Kayaking

The Hurunui River from Sisters Stream to Surveyors Stream is considered to be of national importance for whitewater kayaking (see table “National significance of the Hurunui” on Canterbury Water website compiled by Tony Hawker; e.g. report of the special tribunal in the matter of an application for a Water Conservation Order on the Hurunui River). The Waiau, Hope and Boyle catchments also offer highly valued whitewater kayaking. Other streams in the zone offer limited kayaking opportunities during higher flood flows (Waipara,

Mason). Kayaking is not as popular on the mid to lower reaches of the Hurunui and Waiau Rivers, due to their more braided nature and safety concerns with willows.

Whitebaiting

There are three main areas where whitebaiting occurs in the zone. The Hurunui is the most popular with good mouth access and a camp ground. The Waiau is also a good whitebait fishery and the Conway can also offer some whitebaiting in the right conditions.

Jetboating

Jetboating is popular on both the Hurunui and Waiau Rivers. The majority of jet boat use is associated with salmon angling. However, the Hurunui right up to Lake Sumner is considered to be excellent adventure jetboating at the right flows. There is also a significant amount of commercial jetboating in the Waiau with operators based at the Ferry Bridge and at Waiau township.

Native fishery

Apart from whitebaiting there are also other forms of native fishery based recreation such as flounder fishing and eeling. Both of these occur at the Conway, Waiau, Hurunui and Waipara River mouths. Significant inland sites for eeling also include St Annes Lagoon and the Hurunui Lakes. Koura (freshwater crayfish) gathering is also identified as recreation in the zone. It is thought that Koura are present throughout the zone and prefer mild levels of nitrification.

Swimming/camping

Swimming (often associated with camping) is also a significant recreation activity in the zone. The Zone Committee has identified the following swimming sites in relation to the recommendations in this section of the ZIP. This list is not exhaustive.

- Hurunui River – Upper Hurunui River (Jollie Brook campsite to Maori Gully), Balmoral Campground at SH7, Cat Hill Gorge at SH1 and the Hurunui Mouth;
- Waiau River – Hanmer River confluence, Waiau township, SH1 and Waiau mouth;
- Waipara River – White Gorge (Laidmore Road), Stringers Bridge, Boys Brigade Camp pool and SH1;
- Waitohi River – Black Hut Bridge and lower Medbury Road bridge;
- Other areas – Conway River at State Highway 1, Hanmer River at State Highway 7A, Percival River (just above confluence with Hanmer River), Mandamus (lower bridge).

13.3.3 Significant areas for protection

The Zone Committee has identified the following areas as needing protection:

- Significant salmon spawning sites in upper reaches of Hurunui and Waiau Rivers (as identified in Schedule 14 of Chapter 5, NRRP);
- Significant trout fishing river reaches in the upper Hurunui and Waiau Rivers (including the reach immediately below Lake Sumner);
- Hurunui River from Sisters Stream to Surveyors Stream as a nationally important whitewater river-reach.

The significant salmon spawning sites already have a degree of protection in the NRRP by having specific rules in the Water Quality chapter. These sites were identified by NIWA (Unwin 2006) as being the crucial spawning sites to maintain regional salmon fisheries. Salmon have been known to spawn in tributaries such as the Waitohi and Mandamus, but they are not considered crucial to the fishery. Therefore only the most significant sites are recommended for protection as consistent with the NRRP and CWMS targets.

Trout fishing in the Waiau will be protected by the recommendation (12.1.6.) to prohibit damming in the upper catchment. The same recommendation also prohibits damming on the Hurunui up to the South and North Branch confluence. Since the most significant trout fishing reaches are above this point this recommendation will not necessarily offer the protection for trout fishing in this river. However, recommendations 12.1.4 and 12.1.5 ensures a short term deferment of major storage in the upper Hurunui. This is to ensure that the preferred option of the Waitohi storage is fully investigated. If the Waitohi is found to be feasible and economically viable then the upper reaches can be recommended for protection.

Recommendations 12.1.4 and 12.1.5 also have the same implications for whitewater kayaking on the Hurunui. If the Waitohi storage option is developed and the upper reaches of the Hurunui are protected then the current kayaking amenity in the Hurunui can be protected. It is noted that to fully offer this protection for kayaking values it would be preferable to have any large takes on the Hurunui River to occur below Maori Gully.

13.3.4 River flows for recreation

The Zone Committee considers that if salmon passage is provided for when flow setting, then all other fishery components (including native fisheries) will also be provided for by default. This is why the recommendation only concentrates on salmon passage.

The prevention of mouth closures has been signaled as an outcome for the Hurunui and Waiau Rivers. Setting a flow regime to prevent this will also benefit recreational activities associated with river mouths (whitebaiting, flounder fishing

and eeling). Prevention of mouth closures will also maintain salmonid fisheries and will go some way to prevent further decline of migratory indigenous species.

The Zone Committee notes that salmon angler flows and jet boating flows cannot be fully protected due to natural fluctuations in the rivers. However, it is important that the Hurunui and Waiau Regional Plan have regard to these values so that future abstraction has no more than minor effects. Having regard to these values will also benefit other activities by default (swimming, trout fishing).

13.3.4 Water quality for bathing sites

The Zone Committee considers that maintaining good quality bathing sites in the Hurunui and Waiau Rivers is a desirable outcome for the water quality section of the ZIP. Other sites also have been identified throughout the zone where bathing quality need to be maintained at current levels. Sites such as in the Waitohi and Waipara may be enhanced through the use of storage and setting water quality standards for those catchments.

13.3.4 Trout spawning monitoring

Trout require adequate flows and clean water and gravels for spawning. This makes trout spawning a very good indicator of stream health. It is also reasonably easy to monitor as trout redds are obvious and more practical to monitor than many other indicators of stream health.

An increase of flows in the Waipara and Waitohi rivers through augmentation by storage should increase spawning habitat and provide trout fisheries in their own right as well as provide benefit to native fisheries.

31.2 RECOMMENDATIONS: RIVER FLOWS FOR RECREATION

	Aspect	Recommendation	Responsibility	Timetable	Key CWMS Targets recommendation contributes to
13.2.1	Protect significant recreation locations	<p>The Hurunui and Waiau Regional Plan must safeguard:</p> <ul style="list-style-type: none"> • Significant salmon spawning sites; • Significant trout fishing river reaches; • The Hurunui River from Sisters Stream to Surveyors Stream as a nationally-significant whitewater kayaking river-reach. • Upper Waiau and Hope catchments as a highly valued whitewater kayaking resource. 	Environment Canterbury	Plan notified by October 2011	<p><i>Ecosystem Health/ Biodiversity</i></p> <p><i>Natural Character of Braided Rivers</i></p> <p><i>Kaitiakitanga</i></p> <p><i>Recreational and Amenity Opportunities</i></p> <p><i>Regional and National Economies</i></p>
13.2.2	River flows for recreation	<p>The Hurunui and Waiau Regional plan will ensure that the flow regime will:</p> <ul style="list-style-type: none"> • Ensure salmon passage; • Prevent mouth closures. 	Environment Canterbury	Plan notified by October 2011	<p><i>Ecosystem Health/ Biodiversity</i></p> <p><i>Natural Character of Braided Rivers</i></p> <p><i>Kaitiakitanga</i></p> <p><i>Recreational and Amenity Opportunities</i></p>
		<p>The Hurunui and Waiau Regional plan will recognise:</p> <ul style="list-style-type: none"> • Flows needed for salmon angling; • Flows needed for jet boating. 	Environment Canterbury	Plan notified by October 2011	<p><i>Ecosystem Health/ Biodiversity</i></p> <p><i>Natural Character of Braided Rivers</i></p> <p><i>Kaitiakitanga</i></p> <p><i>Recreational and Amenity Opportunities</i></p>
		<p>The Zone Committee will work with developers to increase flows in the Waipara and provide flows in the Waitohi in a manner that will benefit recreation (swimming/fishing).</p>	Zone Committee and Developers	From July 2011	<p><i>Kaitiakitanga</i></p> <p><i>Recreational and Amenity Opportunities</i></p>
13.2.3	Quality of bathing sites	<p>The Hurunui and Waiau Regional Plan will include gradings to be achieved in bathing sites for the Hurunui and Waiau Rivers.</p>	Environment Canterbury	Plan notified by October 2011	<p><i>Kaitiakitanga</i></p> <p><i>Recreational and Amenity Opportunities</i></p>
		<p>The Zone Committee with support from Environment Canterbury will work with developers and interested parties to deliver enhancement opportunities for the bathing sites identified in the Waipara and Waitohi Rivers.</p>	<p>Environment Canterbury</p> <p>Zone Committee</p> <p>Developers</p> <p>Interested Parties</p>	From July 2011	<p><i>Kaitiakitanga</i></p> <p><i>Recreational and Amenity Opportunities</i></p>

	Aspect	Recommendation	Responsibility	Timetable	Key CWMS Targets recommendation contributes to
13.2.4	Toxic Algae	The Hurunui and Waiau Regional Plan will ensure there are no toxic algae outbreaks in the Hurunui and Waiau Rivers.	Environment Canterbury	Plan notified by October 2011	<i>Ecosystem Health/ Biodiversity Natural Character of Braided Rivers Kaitiakitanga Recreational and Amenity Opportunities</i>
		The Zone Committee with support from Environment Canterbury will work with developers and interested parties to ensure that toxic algae blooms do not occur in the Waipara and Waitohi Rivers	Environment Canterbury Zone Committee Developers Interested Parties	From July 2011	<i>Kaitiakitanga Recreational and Amenity Opportunities</i>
13.2.5	Increased trout spawning	Require monitoring in the Waipara and Waitohi Rivers to ensure increased flow is increasing trout spawning habitat.	Environment Canterbury Developers Fish & Game	From July 2011	<i>Ecosystem Health/ Biodiversity Natural Character of Braided Rivers Kaitiakitanga Recreational and Amenity Opportunities</i>

Kaua e rangiruatia te ha o te hoe
e kore to tatou waka e u ki uta

*Do not lift the paddle out of unison
or our canoe will never reach the shore*

Appendix 1	CWMS background, CWMS fundamental principles & targets, Zone Committee role, membership
Appendix 2	Snapshot of Zone
Appendix 3	Hurunui Waiau Zone Committee's desired characteristics for projects to deliver more water for the Zone
Appendix 4	(a) CWMS targets areas mapped to ZIP sections (diagram) (b) Identification of CWMS goals addressed in ZIP
Appendix 5	Reference List

APPENDIX 1

1.1 THE CANTERBURY WATER MANAGEMENT STRATEGY

1.1.1 Background and partners in development

The Canterbury Water Management Strategy (CWMS) has been developed over the past six years as a partnership between Environment Canterbury, Canterbury's district and city councils and Ngāi Tahu as well as key environmental and industry stakeholders.

The CWMS addresses critical water management issues in Canterbury. Issues include the declining health of both surface and groundwater, an ongoing loss of cultural value and recreational opportunities as well as the declining availability and reliability of water for agricultural and energy uses. Increasingly water management in Canterbury was becoming highly adversarial as sustainable limits of water availability were reached and the cumulative effects of water use reached environmental limits. This, more than anything, resulted in the breakdown of trust and confidence between the various interests in the context of unprecedented pressure on the water resource and the need for a clear strategic approach to water management.

The Canterbury Water Management Strategy (CWMS) provides a way forward towards improved management and use of Canterbury's water resources. The strategy will evolve and adapt, taking a regional approach to achieving collaborative and sustainable water management. The CWMS Framework Document (Mayoral Forum 2009) sets out the key challenges, vision, principles and targets for the integrated management of Canterbury's water. The desired outcome of the strategy is:

To enable present and future generations to gain the greatest social, economic, recreational and cultural benefits from our water resources within an environmentally sustainable framework.

1.1.2. Fundamental Principles and Targets

Fundamental principles have been developed to underpin the CWMS to ensure that our water resource is managed sustainably:

- **Primary principles** - sustainable management, regional approach and Tangata Whenua
- **Supporting principles** - natural character, indigenous biodiversity, access, quality drinking water, recreational opportunities, and community and commercial use.

Within the regional approach principle is a set of priorities for planning of natural water use. These are:

- o **First order priorities** - environment, customary use, community supplies and stock water
- o **Second order priorities** - irrigation, renewable electricity generation, recreation and amenity

A set of ten targets provides the strategy with a sense of direction and balance, and ensures that all aspects of the solution are advanced in parallel. The targets are:

- Ecosystem health and biodiversity
- Natural character, processes and ecological health of braided rivers
- Kaitiakitanga
- Drinking water
- Recreational and amenity opportunities
- Water use efficiency
- Irrigated land area
- Energy security and efficiency
- Indicators of regional and national economies
- Environmental limits.

1.1.3. Zone Committee and Council's role in implementation

Ten zones have been set up across Canterbury. Each zone has a committee that is a joint committee of local and regional councils. Committees operate under the Local Government Act, and their role is to co-ordinate the development and periodic review of Implementation Programmes that give effect to the CWMS. Each committee:

- Seeks to develop solutions for its zone
- Facilitates community involvement & debate
- Keeps relevant Councils (local and regional) and other committees informed during process – an iterative process
- Must work collaboratively with neighbouring Zone Committees and the Regional Committee.

The Regional Committee is a committee of the Regional Council, and has a focus on infrastructure associated with managing large scale storage and transfer of water across Canterbury, and with related issues such as energy generation and region-level biodiversity issues.

1.2 THE HURUNUI WAI AU ZONE COMMITTEE

The Committee is a joint committee of the Hurunui District Council and Environment Canterbury. The Committee are “local” people planning locally. The eleven members are:

- **David Eder** (Chairperson)
- **David Bedford** (Environment Canterbury)
- **Winton Dalley** (Hurunui District Council)
- **John Faulkner** (Deputy Chairperson)
- **Andrew Harris**
- **Michele Hawke**
- **Tony Hawker**
- **Mike Hodgen**
- **Ken Hughey**
- **Makarini Rupene** (Te Ngāi Tūāhuriri Rūnanga)
- **Raewyn Solomon** (Te Rūnanga o Kaikōura)

(See [http://www.canterburywater.org.nz/committees/Hurunui Wai au.php#members](http://www.canterburywater.org.nz/committees/Hurunui%20Wai%20au.php#members) for background information on committee members).

APPENDIX 2

A SNAPSHOT OF THE HURUNUI WAI AU ZONE

Demographics

The Hurunui District has a small and growing population, with some population decline in rural towns.

- Total population 11,010 (estimated growth since 2006 census), growing at about 50 people per year
- Some small towns decreasing in population (e.g. Hawarden, Waikari, Cheviot), while others have an increasing population (e.g. Amberley and Hanmer Springs)
- Median household income is less than the median for New Zealand

Rivers, hapua and wetlands

There are four main rivers in the zone, all of which are braided:

- Conway River (median flow: 2.6 m³/s)
- Waiau River (median flow: 72 m³/s)
- Hurunui River (median flow: 40 m³/s)
- Waipara River (median flow: 0.9 m³/s)

All of these rivers have highly valued hapua (coastal lagoons), that are important for cultural values, ecosystem health, river birds and fish. The zone has about 64 wetland sites, although there has been an approximately 98.7% loss in wetland area over time. The river catchments in the Zone contain a diverse range of habitats including braided reaches, gorges, lagoons, lakes, gravel beds, and mudflats.

Braided rivers in the Zone provide outstanding habitat for many rare birds, fish, plants and other species, as well as a wide range of recreational values. They are also a key source of the groundwater and surface water required for drinking-water and irrigation in the zone.

Birds, Fish, and Plants

All of the Zone's rivers and riparian margins provide important habitat for birds. The Hurunui and Waiau braided river beds are where the threatened black-fronted tern, black-billed gull, wrybill plover and banded dotterel breed. The black-billed gull population has declined since 2008, but other populations have remained stable.

Freshwater fishing for both indigenous and acclimatised fish is an important recreational activity in the zone. The Hurunui and Waiau Rivers support significant trout and salmon fisheries, with a nationally renowned trout fishery in the Hurunui. There are also some important native fish species, some of which are threatened, including the longfin eel, lamprey and Stokell's smelt.

A number of threatened plants grow in the zone, and there are some significant bush remnants, large rimu trees, beech forests, indigenous vegetation cover, and aquatic plant species. There are also substantial areas where weeds grow, causing problems for plants, animals and recreationalists. In many areas the riparian margins have been cleared, causing erosion, lack of shade/shelter for fish and bird species, and reduced nutrient filtering needed for maintaining water quality.

Six biodiversity projects have been funded by the Zone Committee under the CWMS Immediate Steps process involving stock fencing and weed control. A number of other organizations and individuals are also working on biodiversity-related projects throughout the zone. Goals and visions for biodiversity in the region are set out in the Biodiversity Strategy for the Hurunui District (2008).

Protection and enhancement of biodiversity and ecosystem health is needed and desired in the zone: a healthy environment is fundamental to life.

Kaitiakitanga

Manawhenua (those with traditional status, rights and responsibilities in their traditional territories) in the zone are Te Ngāi Tūāhuriri Rūnanga (centres on Tuahiwi and extends from the Hurunui to Hakatere Rivers and inland to the Main Divide) and Te Rūnanga o Kaikōura (centres on Takahanga Marae and extends from Te Parinui o Whiti to the Hurunui River and inland to the Main Divide and as far as the eye can see, seaward).

Both rūnanga have the responsibility, through kaitiakitanga, to protect natural and physical resources so they can provide for all the community's needs - fit for human consumption as well as sustain healthy resources, native fauna and mahinga kai.

For Ngāi Tahu, water is a taonga left by the ancestors to provide and sustain life. All the waterways and their associated tributaries, wetlands and springs in the zone are considered significant resources, of cultural, spiritual and historical importance to Ngāi Tahu. Significant cultural sites include:

- River mouths
- ara tawhito (trails)
- mahinga kai and places with indigenous biodiversity
- wāhi taonga and wāhi tapu (places that hold respect and sacred sites and places)

- repo raupō/wetlands and waipuna/springs
- nohoanga/seasonal occupation sites
- riparian areas

Water is central to the Ngāi Tahu resource management philosophy “ki uta ki tai” – from the mountains to the sea. For Ngāi Tahu this requires a holistic view of the world and integration and co-operation between agencies, legislation and management frameworks.

Recreation

The zone is well known for its water-related recreational opportunities and scenic values, for which visitors come from all over the world. They are also a draw-card for new migrants to New Zealand, with important economic implications for the region. Examples include:

- Whitewater kayaking in Maori Gully on the Hurunui River
- Jet boating, kayaking, and fishing in the Waiau and Hurunui Rivers and tributaries.
- Scenic and landscape values of the rivers
- Picnicking, swimming, mountain-biking, tramping alongside rivers in our zone

Recreational opportunities provide social, cultural, health and economic benefits to the people in the zone and to the Canterbury region. River flows, accessibility and water quality are important issues for recreationalists.

Water quality

Over the past 20 years rural land use in Canterbury has changed. The amount of nutrients reaching waterways has increased, and this has led in some areas to a decline in water quality. Some recent studies have shown that concentrations of nitrate nitrogen in groundwater in the Culverden Basin have not exceeded the Maximum Allowable Value for drinking-water (MAV, set by the Ministry of Health), but they are higher than natural concentrations. Concentrations in the Waipara area are highly variable over a short distance, probably related to the geology of the sediments. Nitrate concentrations in the Cheviot/Spotswood area are also variable, with the highest concentrations in shallow wells.

A land-use and water quality case-study is currently underway in the Hurunui Basin. The Land Use and Water Quality project is studying ways to manage the cumulative impacts of land use on water quality in Canterbury, especially looking at nutrients nitrogen (N) and phosphorus (P). The project is looking at developing nutrient limits using a collaborative process. Currently:

- Annual N and P loads for the mainstem of Hurunui River meet proposed limits

- Estimated P loads for tributary catchments do not meet proposed limits
- Estimated N loads do not meet proposed limits for St Leonard’s Stream, are close for Pahau River, and do meet the limits in the Waitohi and Dry Streams.

The next steps involve developing good management processes, establishing reliable monitoring, and setting out roles and responsibilities.

The LUWQ project recognises that a collaborative approach is essential, that environmental, economic, social and cultural issues all need to be considered, and that adaptive management and a learning approach are necessary given the uncertainties and complexities inherent in nutrient management.

Water quantity

Some parts of the zone are reaching the limits of sustainable water use. Waipara groundwater is a yellow zone, meaning effective allocation exceeds 80% of the allocation limit. More water is needed in the zone to deliver the CWMS social and economic targets and for some cultural, recreational and environment targets. There is a need to achieve greater water use efficiency in the zone, but this alone will not provide sufficient water to meet all CWMS targets.

Drinking-water

Most community drinking-water supplies in the zone will not meet New Zealand Drinking-water standards being implemented over the next few years. There is a need to ensure a secure drinking-water supply for our zone, as well as improve water quality. In the zone there are 13 council owned water schemes which extract water from 23 different water intakes:

- these provide water for between 50-1500 people per scheme
- Most (17) are shallow bore or river gallery intakes - at risk of contamination
- 8 schemes are on boil water notices

Under the Drinking-Water Standards for New Zealand 2005 (revised 2008), supplies are required to provide a certain level of protozoa treatment according to their raw water source type and the level of contamination in that water source. For example, a source supplying water from a bore in which bacteria are rarely found needs to provide a lower level of treatment than a surface water supply with regular bacterial contamination (e.g. e-coli).

Making sure people have clean water to drink is an important step towards public health. In the past, public health management of supplies relied largely on monitoring the quality of the water produced by individual water suppliers

to check that it complied with Drinking-Water Standards for New Zealand (DWSNZ). While monitoring (largely reactive rather than proactive) is always important, public health risk management plans (PHRMP) for drinking-water supplies provide the additional benefit of reducing the likelihood of contaminants entering the supplies in the first place. PHRMP's encourage the use of risk-management principles during treatment and distribution, so that monitoring is not the only water quality management technique used and thus reducing the risk of contaminated water supplies.

Of the 23 HDC water intakes;

Six (6) are "minor" schemes (Amberley (x2), Hanmer Springs, Waiau Rural, Cheviot and Hawarden/Waikari) and MUST comply with the legislation for an approved PHRMP by July 2014;

Nine (9) are "small" schemes (Amuri Plains, Mays, Racecourse Rd, Kowai, Balmoral, Culverden, Waiau Town, Leithfield Beach, and Waipara) and must comply with the legislation for an approved PHRMP by July 2015;

Three (3) are "Neighbourhood" schemes (Blythe, Parnassus, and Peaks) and must comply with the legislation for an approved PHRMP by July 2016;

Five (5) are "Rural Agriculture" schemes (Kaiwara, Hurunui No 1, Upper Waitohi, Lower Waitohi, and Waiau Rural) and the legislation is still to be determined as to the date for their PHRMP compliance.

HDC currently have four approved PHRMP's (2008). These are: Ashley – main; Waipara – mid depth bore; Hanmer Springs – river weir; and Cheviot – main. HDC also have six drafted PHRMP's (still to be approved by the local drinking-water assessor), these being: Amberley SH1 - deep bore; Amberley – gallery; Amberley – domain; Hawarden/Waikari – Bakers Ford; Hawarden/Waikari – Bishells Road; Waiau Town – shallow bore.

HDC is working towards having all at-risk water intake schemes ready in the timetable defined by the legislation with approved PHRMP's, attached Optimisation and Sustainability Plans, attached Project plans and budget costs, clearly defined community support through early consultation and demonstrated public health need.

Safe drinking-water, available to everyone, is a fundamental requirement for protecting public health.

Primary production, irrigation and economic development

The zone has a traditional focus on grass-fed food and fibre production, (dairying, sheep and mixed cropping) making an important contribution to the prosperity of local communities. More recently viticulture has become an important activity in the zone.

Primary production makes a significant economic contribution to the District and Canterbury. Socio-

economic information provided by Simon Harris Consulting to the Land Use and Water Quality Project indicates that the area of the Hurunui Basin above State Highway 1 contributes more than \$80 million to the District and more than \$120 million to Canterbury. The economic contribution is primarily from dairying and from irrigated land. The above study indicated that irrigated land, which is 8% of the Hurunui Basin study area, produces 65-73% of the economic and employment contribution. Dairy land, at 4% of the study area, produces approximately half of the revenue, cash farm surplus and GDP. Dairy is associated with half of the direct and indirect employment.

Dairying has a significantly wider economic impact than tourism. The dairy industry (including farming and manufacturing of dairy products) earns revenues per employee of more than \$500,000 while tourism delivers revenue per employee of \$77,000.

Irrigated land use has change in the last decade with conversion to dairying. In the Amuri Irrigation Company (AIC), which irrigates 20,000 hectares, less than 10% of the irrigated area was in dairy farms in 1990; now dairying is 60% of the irrigated area with an additional 25% of the area in dairy support.

Of an estimated 500,000 ha of irrigated land area in the Canterbury region, about 35,000 ha are currently irrigated in the Hurunui Waiau zone. There is significant potential for further irrigation to increase the productivity of agricultural and horticultural land with a total of about 100,000ha (net) irrigable land in the following areas:

- Waiau and Jed - approximately 51,000 ha (net)
- Hurunui - approximately 40,000 ha (net)
- Waipara - approximately 12,000 ha (net)

Substantial gains have been made in on-farm water-use efficiency with farmers in the AIC having spent \$63 million on-farm in the last ten years to change from border dike to spray. This has resulted in around a 30% gain in productivity.

Provision of reliable water for irrigation is a key driver of economic development in the Zone. It is estimated that 30,000ha of new irrigation, as proposed by Hurunui Water Project, would increase GDP by at least \$100 million (and significantly more if substantial dairy conversion occurs).

Increasing irrigated land area and reliability of water supply is a fundamental part of the CWMS, providing an important contribution to the national, regional and local economies.

Energy

North Canterbury energy requirements are currently met through the Waitaki hydro schemes or from the North Island. Consideration of options for energy generation in the zone will be important for ensuring a secure energy supply. Options for hydro-electricity development have been tabled by energy companies and consultants, often in conjunction with potential water storage options.

These developments sit within a wider energy development context which includes other options for generating electricity, such as wind.

Regulatory context

Environment Canterbury (Temporary Commissioners and Improved Water Management) Act 2010 - This legislation applies specifically to Canterbury, for a limited period (13th April 2010 until the Regional Council is re-elected but not later than the triennial local body election in 2013). The Act replaces the elected councillors with Government-appointed Commissioners; and it gives the Council additional powers and functions in resource management. The Act gives Environment Canterbury the power to impose moratoria on applications for consents for activities involving water or discharges, for specified periods, in specific catchments, and gives the council the new duty of making recommendations on Water Conservation Orders. Environment Canterbury is also required to have particular regard to the vision and principles of the CWMS in making decisions on regional plans and policy statements.

Moratoria

In conjunction with the Environment Canterbury Act, Environment Canterbury has placed moratoria on resource consent applications relating to water in the Hurunui River and its tributaries, and on the Waiau River and its tributaries. A moratorium is a prohibition on making or granting applications for resource consents for water or discharges. The moratoria apply to any activity which involves the taking, use, damming or diverting of surface water or stream depleting groundwater (known as hydraulically connected groundwater) where the activity involves water from the Hurunui River or Waiau River from source to the sea or any tributaries of the river; and where the activity would require a resource consent (under section 14 of the Resource Management Act 1991). The moratoria are in place until 1 October 2011, unless the Council decides to lift it sooner. It will affect any new applications for resource consent for the activities listed above, and any applications to change existing consents that fall into the category of specified applications.

Environmental flow and allocation plans

Environmental flows are the amounts and patterns of flow that remain in water bodies. They are set to protect environmental, cultural and community values, as well as to provide for out of stream uses (e.g. stock water and irrigation). The process of setting and reviewing flow and allocation plans is underway through regional plans prepared by Environment Canterbury. They will need to be consistent with the CWMS targets and principles. Flow plans in our zone:

River	Notify Plan	Operative Plan
Conway	Variation notified in 2007	Decision released 2011
Waiau	Planning framework notified in September 2011	Decision released 2012
Hurunui	Planning framework notified in September 2011	Decision released 2012
Waipara	Plan notified in 2010, submissions closed and hearings scheduled for April 2011	Decision released 2011

APPENDIX 3

HURUNUI WAIAU COMMITTEE'S DESIRED CHARACTERISTICS FOR PROJECTS TO DELIVER MORE WATER FOR THE ZONE

The following list was developed at the Committee meeting on 08 November 2010. The list was developed from consideration of the Committee member's critical values and the CWMS principles and targets.

List of desired characteristics

Provision of more water in North Canterbury must:

1. deliver environmental, social, cultural and economic outcomes, not just one at the expense of others (i.e. help achieve the CWMS vision and targets);
2. take an integrated approach recognising the need to manage water from Hurunui and Waiau Rivers together (noting the Waiau River has higher average flows and more reliable flows than Hurunui River);
3. be economically achievable
4. undertake a rigorous assessment of all options included in the integrated approach (linked to 2 above)
5. meet reliability parameters required by land managers;
6. be delivered through highly efficient distribution systems and highly efficient irrigation systems; and encourage current users to adopt highly efficient irrigation systems, allowing an adequate phase in time;
7. be for land uses and land management practices that meet nutrient load limits (for N, P and microbial limits);
8. help provide high quality potable water for community drinking supplies in the zone;
9. maintain environmental flows (including flow variability) for Waiau, Hurunui, Conway and Waipara catchments;
10. ensure the mauri of the rivers in the Zone is protected, maintained and enhanced;
11. support and fund biodiversity improvements;
12. be premised on the protection, maintenance and enhancement of environmental infrastructure (including wetlands, hapua and riparian margins);
13. help maintain and enhance the well-being of communities within the zone, thereby supporting thriving communities.

Provision of more water should:

14. generate electricity, if possible, and operate in an energy-efficient manner;
15. be affordable for a wide range of land uses;
16. maintain and enhance economic and social wellbeing across the zone;
17. maintain and, if possible, enhance water-related recreational activities in the zone;
18. identify and plan to provide water for all irrigable land within the zone (as part of long-term future proofing);
19. protect, maintain and enhance mahinga kai resources.

The location and operation of water storage reservoirs:

20. should maintain the trout and salmon fisheries of the Hurunui and Waiau Rivers and, if possible, of the other rivers in the Zone;
21. must maintain and enhance native fisheries in all catchments across the Zone.
22. must maintain the braided character of all braided rivers in the Zone, including maintaining the upper catchment alpine rivers as largely natural ecosystems and landscapes (wording from CWMS Target 2: 2010 Goal).
23. should provide recreational opportunities, if possible

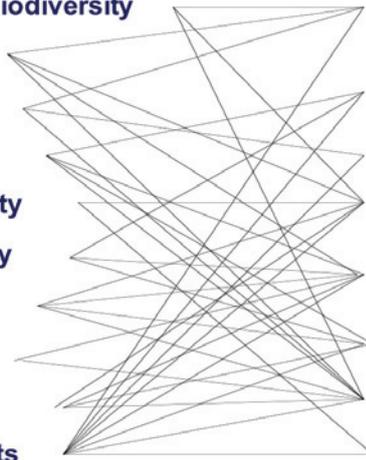
Kaitiakitanga outcomes will be achieved through achievement of the above.

A) RELATIONSHIP OF CWMS TARGET AREAS TO ZIP SECTIONS

CWMS targets & ZIP

CWMS Target Areas

Ecosystem health/biodiversity
 Braided rivers
 Kaitiakitanga
 Drinking water
 Recreation & amenity
 Water-use efficiency
 Irrigated land area
 Energy
 Economy
 Environmental Limits



ZIP Sections

Ecosystem health – braided rivers
 Drinking water
 Kaitiakitanga
 River flows
 Water allocation & efficiency
 Water quality
 More water
 Recreation

Indicative only – some ZIP sections contribute to more target areas than shown.
 Kaitiakitanga is delivered through achievement of all ZIP sections

B) IDENTIFICATION OF CWMS TARGETS ADDRESSED IN THE ZIP

Recommendations in all sections of this ZIP will contribute to meeting the CWMS targets and goals. We have attempted to show specific links between the targets and goals and ZIP recommendations in the series of tables below. Where a whole section relates to the specific goal, it is shown as s.x (referring to section x).

1. ECOSYSTEM HEALTH /BIODIVERSITY		Recommendation in ZIP that contributes to target
2010	Implement actions to correct the decline in freshwater species, habitat quality or ecosystems	s.3, s.6-9, s.11, s.12.1.1
	Prevent further loss of area of naturally occurring wetlands	3.1.1, 3.1.3 a & b, 3.1.7b
	Maintain existing high quality indigenous aquatic and dryland ecosystems in intermontane basins and on the plains	3.1.4, 3.1.5, 3.1.7b
	Identify and prioritise for protection lowland streams ecosystems in each zone	3.1.1, 3.1.4, 3.1.7a & b, 3.1.9b

1. ECOSYSTEM HEALTH /BIODIVERSITY		Recommendation in ZIP that contributes to target
2015	Protected and enhanced the ecological health of the best examples of lowland streams ecosystems in each zone	3.2.1, 3.2.4, 3.2.7a & b, 3.2.9a&b
	Improved ecosystem condition in at least another 10% of lowland streams in each zone.	3.2.1, 3.2.4, 3.2.7a & b
	Highlighted any high country spring-fed or foothill streams where ecosystem health is declining, and identified the cause with an action plan in place	3.2.4, 3.2.5, 3.2.7a & b
	Protected all and restored at least two significant wetlands in each zone	3.2.1, 3.2.3 a & b, 3.2.7b, 3.2.4
	Identified where environmental flows are not met or require change to meet ecosystem health and biodiversity outcomes and implemented actions to rectify	3.2.2, s.6-9, 10.2.2
	Identified areas where catchment load limits for nutrients are not met, prioritised areas and implemented actions to ensure there is no further enrichment	3.2.4, s.11
	Demonstrated, and included in implementation programmes, how land within the zone will be managed to achieve catchment load limits	3.2.4, s.11
	Achieved nutrient efficiency targets for the zone on all new irrigated land and 50% of other rural properties (and of properties within urban boundaries that apply nutrients over significant areas)	s.11
	Increasing annual trout spawning counts in identified important areas (based on a 5-year average) as an indicator of habitat availability for salmonid and indigeneous fish species	6.2.1, 7.2.1, 13.2.1, 13.2.5
	No further reduction in the number and areas of existing salmon spawning sites	s.6-9, 13.2.1
	Understood any emerging contaminant risks and identified any at risk areas for targeted management	11.2.9
	Accelerated the current riparian restoration and management programme for Waihora/Lake Ellesmere and tributary streams	N/A Not in zone
2020	Improved condition and water quality in at least 60% of lowland streams and 60% of lowland lakes in each zone	3.2.1, 3.2.2, 3.2.4, 3.2.7a & b, 3.2.9b, s.11
	All foothill rivers and high country rivers and/or lakes either in good ecological health or better, or showing upwards trends	3.2.1, 3.2.4, 3.2.5, 3.2.7a & b, s.11
	An upward trend in diversity and abundance of native fish populations	3.2.8a, b & c s.6-9
	Protected all existing wetlands	3.2.1, 3.2.3 a & b, 3.2.4, 3.2.7b
	A significant protection and restoration programme is in place on the most ecologically significant river mouth or coastal lagoon in each management zone	3.2.1, 3.2.4, 3.2.6a & b

1. ECOSYSTEM HEALTH /BIODIVERSITY		Recommendation in ZIP that contributes to target
2020	Increased the length of waterway with riparian management appropriate to aquatic ecosystem protection by 50% from 2010 figures	3.2.1, 3.2.4, 3.2.9b
	Achieved nutrient efficiency targets for the zone on all new irrigated land and 80% of other land in major rural land uses (pasture, major arable and major horticulture crops), and have 100% of rural properties working towards those targets (and of properties within urban boundaries that apply nutrients over significant areas)	s.11
	Made progress towards achieving environmental flow and catchment load limits	3.2.2, s.6-9, 10.2.2, s.11
2040	Achieved all environmental flow and catchment load limits	3.2.2, s.6-9, 10.2.2, s.11
	Examples of thriving coastal lagoons, and lowland or spring-fed ecosystems in each water management zone	3.2.1, 3.2.4, 3.2.9b, 3.2.6a & b, 12.2.1
	Protected all wetlands	3.2.1, 3.2.4, 3.2.3 a & b, 3.2.7b
	100% of lowland and spring-fed streams with at least good aquatic ecosystem health or showing an upward trend	3.2.4, 3.2.7a & b, 3.2.9b, s.11
	80% of other rivers/streams and lakes with very good aquatic ecosystem health	3.2.1, 3.2.2, 3.2.4, 3.2.5, 3.2.7a & b, 3.2.9 a & b, 3.2.10, s.11
	Maintained upland spring-fed streams and lakes in very good aquatic ecosystem health (no decline from 2010)	3.2.1, 3.2.2, 3.2.4, 3.2.5, 3.2.7a & b, 3.2.9 a & b, 3.2.10
	Achieved nutrient efficiency targets for the zone on all new irrigated land and 100% of other rural properties (and of properties within urban boundaries that apply nutrients over significant areas)	s.11
	Understood any emerging contaminant risks and identified any at-risk areas for targeted management.	11.2.9

2. NATURAL CHARACTER OF BRAIDED RIVERS		Recommendation in ZIP that contributes to target
2010	Maintain the braided character of all Canterbury's braided rivers by:	12.2.6
	Maintaining the upper catchments of Canterbury's alpine braided rivers as largely natural ecosystems and landscapes	
	No new dams on the mainstem of major alpine braided rivers	12.2.6
	Maintaining the extent of active floodplains, flow variability and sediment flow processes including when undertaking river protection works, land-use change or deliberate vegetation stabilisation	3.2.2, 3.2.4, 3.2.9a&b, s.6-9, 10.2.2, 12.2.1
	Supporting the dynamics of river mouths and coastal processes	3.2.2, 3.2.9a&b, s.6-9, 10.2.2, 12.2.1
	Implement actions to correct the decline in useable braided river bird habitat	3.2.1, 3.2.9a&b, s.6-9
2015	Identified where environmental flows do not include flood peaks, flow variability, flood periodicity, and channel forming flows and implemented actions to rectify	3.2.2, s.6-9, 10.2.2
	Protected the indigenous habitats in riparian wetlands, springs and the lagoons associated with braided rivers	3.2.1, 3.2.4, 3.2.9a,b
	Enhanced and protected of breeding population of indigenous braided river birds	3.2.1, 3.2.4, 3.2.9a,b, s.6-9
2020	Protected significant habitat for a full range of indigenous braided river flora and fauna	3.2.1, 3.2.4, 3.2.9a,b, s.6-9
	Protected and enhanced the habitats in riparian wetlands, springs and the lagoons associated with braided rivers	3.2.1, 3.2.4
	Made progress towards achieving environmental flows.	3.2.2, s.6-9, 10.2.2
2040	Achieved all environmental flows	3.2.2, s.6-9, 10.2.2
	Canterbury's braided rivers show the dynamic, braided nature typical of such rivers	3.2.9a,b, s.6-9, 10.2.2
	All indigenous braided river-dependent species are showing positive trends in abundance and health	3.2.1, 3.2.4, 3.2.8a,b,c, 3.2.9a&b, s.6-9
	Increase habitat area usable by all species of braided river indigenous birds.	3.2.1, 3.2.4, 3.2.9a&b, s.6-9

3. KAITIAKITANGA		Recommendation in ZIP that contributes to target
2010	Prevent further decline in the quality or quantity of water bodies used as a drinking water supply to marae & associated papakainga	4.2.1, 10.2.1
	Prevent further loss or degradation of Ngai Tahu nominated wahi taonga	5.2.3, 5.2.4
	Increase understanding in each zone of the customary values and uses associated with specific water-bodies or parts of water-bodies	3.2.8a,b,c
	Involve Papatipu Runanga in the Immediate Steps restoration programme and priorities	3.2.1
	Formally recognise Te Runanga o Ngai Tahu Freshwater Policy and, in each zone, and Work towards resolving issues related to Ngai Tahu policies on: - environmental flows that afford protection to instream values	3.2.2, 5.2.2, s.6-9, 10.2.2
	- direct discharge to point source contaminants to water	5.2.2
	- The unnatural mixing of water sourced from different water bodies	5.2.1, 5.2.2, 10.2.5
	- Addressing non point source pollution through a range of measures including regulatory control	5.2.2, s.11
2015	Protocols for the recognition & exercise of mana, including kaitiakitanga within the Ngai Tahu rohe, are implemented	
	All degraded wahi taonga and mahinga kai waterways nominated by Ngai Tahu have an active restoration programme in place that responds to cultural priorities	5.2.4
	A report on the health of all Ngai Tahu nominated water-bodies using Ngai Tahu Cultural Health Monitoring Tool	5.2.3
	Identified customary uses (current and potentially restored) for all waterways	3.2.8a,b,c, 5.2.2, 5.2.4
	Iwi Management Plans in place for all zonal areas	
	Institutional capability within local government to adequately recognise and provide for the principle of kaitiakitanga in water management	
	A formal co-governance arrangement (developed in partnership by Ngai Tahu, the Crown and Canterbury local government) for the active management of Te Waihora (Lake Ellesmere) and its catchment	N/A – not in zone
	A programme for identifying cultural preferences for river and stream flow agreed in each zone	5.2.3
	A system for appointing Ngai Tahu tangata tiakiwai (water guardians) that have formal recognition and support from local government is established	
	Work and research has commenced on establishing a mahinga kai food gathering standard	

3. KAITIAKITANGA		Recommendation in ZIP that contributes to target
2020	Increased the abundance of, access to and use of mahinga kai	3.2.1, 3.2.8a,b,c, 5.2.2, 5.2.3, 5.2.4
	Further co-governance arrangements (developed in partnership by Ngāi Tahu, the Crown and Canterbury local government) for the active management of a nominated waterbodies in North and South Canterbury	N/A to specific zone
	Integrated Ki Uta Ki Tai7 environmental management philosophies into zonal and regional management planning	s.2.5
	All marae and associated papakāinga have access to high quality drinking water	
	At least one Ngāi Tahu tangata tiakiwai is appointed within each zone	
	A mahinga kai food gathering standard is confirmed and implemented as a water quality monitoring tool.	
	2040	Protection, in accordance with Ngāi Tahu values and practices, of wahi taonga and mahinga kai waterways
	Kaitiakitanga is a normalised and an integrated practice of water management.	s.2.5

4. DRINKING WATER		Recommendation in ZIP that contributes to target
2010	For those communities that currently have access to untreated and safe drinking water, implement actions to ensure the source water quality remains high enough to meet the current Drinking Water Standards for New Zealand without treatment	4.2.1, 4.2.4
	Prevent further decline in source water quality for those communities that currently have to treat drinking-water, such that this requires increased level of treatment or monitoring requirements	4.2.1, 4.2.4
	No new activities in a drinking water catchment that reduce access to sufficient quantities of drinking water supplies	
2015	Set catchment load limits for nitrate consistent with drinking water quality targets for each zone, identified priority areas where targets are not met and implemented actions to ensure there is no further enrichment	s.11
	Demonstrated, and included in implementation programmes, how land within the zone will be managed to achieve catchment load limits	s.11
	Emerging contaminant risks are understood and any at risk areas identified for targeted management, and a remedial programme underway	11.2.10
2020	Achieved nutrient efficiency targets for the zone on all new irrigated land and 80% of other land in major rural land uses (pasture, major10 arable and major horticulture crops), and have 100% of rural properties working towards those targets (and of properties within urban boundaries that apply nutrients over significant areas)	s.11

4. DRINKING WATER		Recommendation in ZIP that contributes to target
2020	A demonstrable decrease in nitrate concentrations in shallow groundwater in priority areas is achieved	s.11
	There is an increase in the percentage of the population supplied with water that meets the New Zealand Drinking Water Standards for health based determinants	4.2.1, 4.2.3, 4.2.4, 10.2.1
	Understood any emerging contaminant risks and identified any at risk areas for targeted management and a remedial programme underway	11.2.9
2040	Average annual nitrate levels in all groundwater wells in Canterbury are below 50% of the maximum allowable value for drinking water	s.11
	Nitrate levels in community drinking wells are below the maximum allowable value of drinking water	s.11
	Achieved nutrient efficiency targets for the zone on all new irrigated land and 100% of other rural properties (and of properties within urban boundaries that apply nutrients over significant areas)	s.11
	Understood any emerging contaminant risks and identified any at risk areas for targeted management and a remedial programme underway	11.2.10

5. RECREATIONAL AND AMENITY OPPORTUNITIES		Recommendation in ZIP that contributes to target
2010	Maintain the existing diversity and quality of water-based recreational sites, opportunities and experiences	3.2.9a&b, s.5, s.6-9, 13.2.1
2015	At least 80% of river bathing sites graded as suitable for contact recreation	s.6-9, s.11, 13.2.3
	A positive trend in the availability and/or quality of fresh water angling opportunities. An increase in freshwater angler numbers (or catch rate) assessed over a 5 year average	3.2.8a,b&c, s.6-9, 13.2.1, 13.2.2, 13.2.5
	A positive trend in the availability and/or quality of recreational opportunities 12 in each zone	3.2.9a&b, s.6-9, s.13
	Identified where environmental flows are not met or require change to meet recreational outcomes and implemented actions to rectify	3.2.2, s.6-9, 10.2.2, 13.2.2
2020	Of the lake and river sites used for contact recreation, an increase in the percentage of them that meet recreational water quality guidelines	13.2.3
	A positive trend in the availability and/or quality of recreational opportunities in each zone	3.2.9a&b, s.5, s.6-9, s.13
	Made progress towards achieving environmental flows.	3.2.2, s.6-9, 10.2.2, 13.2.2
2040	Achieved all environmental flows	3.2.2, s.6-9, 10.2.2, 13.2.2
	Restored fishing opportunities in most lowland streams in each water management zone	3.2.8a,b&c, s.5, s.13
	Restored at least one major fresh water recreational opportunity in each zone that is not currently available in 2010.	s.13

6. WATER USE EFFICIENCY		Recommendation in ZIP that contributes to target
2010	No decline in the efficiency of water use	<i>10.2.8a,b</i>
	Initiate the development of models/benchmarks of reasonable and efficient use of water in irrigation.	<i>10.2.8a,b</i>
2015	Established and reported against a benchmark of current water use efficiency for irrigation, community (potable, industrial and commercial) and stockwater	<i>10.2.8b</i>
	60% of water used for irrigation is operating according to best practice water use	<i>10.2.8a,b</i>
2020	80% of water used for irrigation and stockwater is operating according to best practice water use	<i>10.2.8a,b</i>
	Reduced water used for community water supply by 10% (measured in litres per person per day) compared to that used in 2010	
	Increased the benefits gained per unit of water so that the volume of water beneficially used (used in production of crops, electricity, or commercial uses) in each zone as a proportion of the volume of water taken is, on average, 5% greater than that achieved in 2010.	<i>10.2.8a,b</i>
2040	Implemented best practice water use on all irrigation, stockwater and industrial/commercial use in Canterbury	<i>10.2.8a,b</i>
	Increased the benefits gained per unit of water so that the volume of water beneficially used (used in production of crops, electricity, or commercial uses) in each zone as a proportion of the volume of water taken is, on average, 25% greater than that achieved in 2010	<i>10.2.8a,b</i>
	Reduced water used for community water supply by 20% (measured in litres per person per day) compared to that used in 2010.	

7. IRRIGATED LAND AREA		Recommendation in ZIP that contributes to target
2010	No reduction in irrigated land area in Canterbury or in overall reliability with each zone.	<i>s.10</i>
2015	A system of regionally distributed rural water infrastructure for the storage and distribution of water that provides reliable water to all irrigated land has been designed, timetabled, costed and staged. The system has been demonstrated to align with the principles and targets of this strategy	<i>10.2.3, 10.2.5, 10.2.6, 10.2.7, s.11, s.12</i>
	Decided mechanisms for funding infrastructure and the ongoing operation of the strategy	<i>10.2.3, 10.2.7, s.12</i>
	Started on infrastructure (or reconfiguration of existing consents) that facilitates efficiency improvements and is linked into the regional storage plan	<i>10.2.3, 10.2.7, 10.2.8, s.12</i>
	Specified, for each zone, their infrastructure requirements consistent with the regional storage plan, and the principles and targets of the strategy	<i>s.6-9, 10.2.6, 10.2.7, s.12</i>
	Increased the area of irrigated land and/or reliability of irrigation.	<i>s.6-9, 10.2.6, 10.2.7, s.12</i>

7. IRRIGATED LAND AREA		Recommendation in ZIP that contributes to target
2020	Started construction of regional storage and improved reliability of supply for at least 50% of irrigated land	10.2.3, 10.2.6, 10.2.7, s.12
	Started construction of infrastructure identified in zonal implementation programmes.	10.2.3, 10.2.7, s.12
2040	A substantial increase in the reliability of supply and the area of land irrigated in Canterbury all of which has demonstrated high standards of riparian, nutrient and water use management, and has been shown to be consistent with the principles of the strategy. An indicative target is 850,000 hectares of irrigated land with at least 95% reliability	s.6-9, 10.2.3, 10.2.6, 10.2.7, s.11, s.12
	Improved reliability of supply for all irrigated land.	s.6-9, 10.2.3, 10.2.6, 10.2.7

8. ENERGY SECURITY AND EFFICIENCY		Recommendation in ZIP that contributes to target
2010	Maintain Canterbury's existing contribution to New Zealand's security of electricity supply	
	Seek opportunities, as part of design and planning for new infrastructure, to reduce electricity used in the use of water, to provide for multiple use, and to factor generation into existing irrigation infrastructure.	10.2.4
2015	Identified and implemented opportunities to reduce electricity used in the use of water	
	Started projects to generate electricity from existing irrigation infrastructure.	10.2.4
2020	Increased the productivity per unit of electricity – per hectare consumption for irrigation sector and equivalent measures in other sectors.	
2040	Factored efficient use of electricity in all irrigation infrastructure	
	Reduced the energy used per hectare for irrigation in Canterbury compared to that used in the 2010/11 season	
	Generate at least 40-45% of the power used by irrigation in Canterbury from irrigation infrastructure (including multi-use hydro and irrigation systems) within Canterbury ¹⁴ and other renewable on-farm sources.	10.2.4
	Maintain or increase Canterbury's contribution to New Zealand's security of electricity supply.	s.6-9, 10.2.4

9. REGIONAL AND NATIONAL ECONOMIES		Recommendation in ZIP that contributes to target
2010	No decline in the contribution water makes to Canterbury economy “as measured through value added” (economic impact)	
	Any assessment of regional economic value factors in externalities (e.g. water quality treatment costs, climate change emissions, changed recreational values) and the cost of environmental repair and restoration	
2015	Increased the “value added” and employment per unit of water	s.10, s.12
2020	Increased production through the direct application of water to agriculture contributes an additional \$0.4 billion per annum value-added to the Canterbury economy.	10.2.7
	Measures in place to assess the economic wealth benefits of freshwater biodiversity (and other ecosystem services) and recreational use of water.	
2040	Increased production through the direct application of water to agriculture contributes an additional \$1.7 billion per annum value-added to the Canterbury economy.	10.2.7
	Recognised and reported on the employment benefits (direct and indirect) that arose from the CWMS	
	Increased Canterbury’s contribution to national GDP from 15% to 20%, of which 2% is attributable to increased production and better water management	10.2.7
	A demonstrable increase in economic wealth due to biodiversity protection and improvement, and increased recreational use of water resulting from implementation of the CWMS.	

10. ENVIRONMENTAL LIMITS		Recommendation in ZIP that contributes to target
2015	Set environmental flows for surface streams, rivers and groundwater that are consistent with the fundamental principles of the CWMS and that: <ul style="list-style-type: none"> - are consistent with ecosystem health and biodiversity targets - for all braided rivers include flood peaks, flow variability, flood periodicity, and channel forming flows to maintain their braided character and ecosystems - afford protection to instream values identified in Ngāi Tahu policies - are consistent with the recreational uses of the water body; and - consider all the target areas of this strategy. 	3.2.2, s.5, s. 6-9, 10.2.2, 13.2.2
	Set catchment load limits for nutrients for each water management zone that are consistent with the fundamental principles of the CWMS and that: <ul style="list-style-type: none"> - are consistent with ecosystem health, drinking water and biodiversity targets - afford protection to instream values identified in Ngāi Tahu policies - are consistent with the recreational uses of the water body; and - consider all the target areas of this strategy. 	s.5, s.17
	Established and begun to implement a programme to apply environmental flows to existing consents.	N/A to specific zone

10. ENVIRONMENTAL LIMITS		Recommendation in ZIP that contributes to target
2020	Review of environmental flows and catchment load limits in response to changing monitoring information, new understanding and technologies, and if requested by regional and zone committees	8.2.1, 9.2.1, s.11
	Established and begun to implement a programme to review existing consents where such review is necessary in order to achieve catchment load limits.	<i>N/A to specific zone</i>
2020	Review of environmental flows and catchment load limits in response to changing monitoring information, new understanding and technologies, and if requested by regional and zone committees	8.2.1, 9.2.1
	Environmental flow and catchment load limits achieved in all waterbodies.	s.5, s.6-9, 10.2.2, s.11

APPENDIX 5: REFERENCE LIST

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