11. CANTERBURY WATER MANAGEMENT STRATEGY: BANKS PENINSULA ZONE COMMITTEE AND CHRISTCHURCH - WEST MELTON ZONE IMPLEMENTATION PROGRAMMES

General Manager responsible:	SPG General Manager - Strategy and Planning, DDI 941 8281
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PURPOSE OF REPORT

1. The purpose of this report is to seek Council endorsement of:

   (a) The Canterbury Water Management Strategy (CWMS) Banks Peninsula Zone Committee (BPZC) Zone Implementation Programme (ZIP), and

   (b) The Canterbury Water Management Strategy (CWMS) Christchurch – West Melton Zone Committee (C-WMZC) Zone Implementation Programme (ZIP).

EXECUTIVE SUMMARY

2. The CWMS identifies Canterbury's water resources as important to the region and to New Zealand. The resource is used for a wide range of purposes including drinking water, agriculture, electricity generation, customary use and recreation. Over the last 15 years the water resource has come under increasing pressure.

3. The Council endorsed the CWMS in December 2009 subject to, amongst other matters, "that any future funding or governance issues associated with implementation of the Strategy would need to be considered as part of the 2012-2022 LTCCP or other process."

4. Since 2010 Council staff and Crs. Claudia Reid (Council representative on BPZC) and Sally Buck (Council representative on C-WMZC) have played an active role in the preparation of the ZIPs. The BPZC and C-WMZC are joint committees of Environment Canterbury (ECan) and Christchurch City Council (the Council).

5. Drafts of both ZIPs were released in late 2012 for public comment. Feedback was generally supportive. The BPZC ZIP was finalised on 19 February 2013 and endorsed by ECan on 14 March 2013. The C-WMZC ZIP was finalised on 21 March 2013 and endorsed by ECan on 4 April 2013.

Banks Peninsula Zone Committee ZIP

6. The ZIP is the tenth of eleven implementation programmes making a substantial contribution to implementing the CWMS. The ZIP, a living document, sets out an approach to further enhance and improve the value of streams, lakes, wetlands, estuaries, waterways, the coastline, biodiversity, water supply and wastewater management on Banks Peninsula. The ZIP will help engage, inform and enthuse Banks Peninsula communities and visitors about the opportunities they have and the potential there is in managing the water resource appropriately.

7. The ZIP has ten chapters, each with a priority outcome and recommendations on how to meet the priority outcome. The ZIP is the first of the eleven implementation programmes to include a chapter on coastal matters. The other nine chapters are kaitiakitanga, water quality, water quantity, biodiversity, erosion and sediment control, Te Roto O Wairewa, wastewater, climate change, and education and communication.

8. The ZIP contains 107 recommendations. There are 27 recommendations for ECan and the Council to work together on, with a further 23 led by ECan and 25 led by the Council. The remaining 32 recommendations involve runanga, the zone committee, and a range of other organisations.

Canterbury - West Melton Zone Committee ZIP

11. Cont'd

9. As for the BPZC ZIP, the C-WMZC ZIP takes an intended high level view of water management. The ZIP is the eleventh and final ZIP to be prepared as part of the CWMS for the Canterbury region. The ZIP recognises that there are well-developed strategies, plans and other programmes of work across a variety of organisations and community groups already active in water management in the Christchurch - West Melton Zone. A key goal of the ZIP is to ensure that the strategies, plans and programmes align with the CWMS and with local priorities. Alignment will lead to more catchment specific recommendations in future versions of the ZIP.

10. The recommendations in the ZIP address the following five priority issues:

    - Enhancing and managing waterways for recreation, relaxation and amenity;
    - Improving surface water quality and safeguarding surface water flows;
    - Enhancing ecosystems, indigenous biodiversity, valued introduced species and landscapes;
    - Safe guarding groundwater quality and flows for multiple uses; and
    - Making efficient use of water and managing demand.

11. The ZIP contains 93 recommendations, of which 51 involve ECan and the Council working together.

FINANCIAL IMPLICATIONS

12. There are potential financial implications for the Council in endorsing the ZIPs, however, many of the recommendations are being addressed through existing Council work programmes. Where existing resources cannot address all recommendations in the ZIPs within the timeframes specified, staff will work with the zone committees to prioritise, further develop and cost the actions.

Do the Recommendations of this Report Align with 2009-19 LTCCP budgets?

13. Generally yes. However, the detailed timelines and project scope for works to achieve and/or contribute to the recommendations in the ZIPs will need to be considered by the Council through its standard annual planning and other budgetary processes.

LEGAL CONSIDERATIONS

14. The ZIPs are non-statutory documents and the recommendations are not legally binding. The priority outcomes and recommendations of the ZIPs would be expected to be incorporated into the sub-regional chapters of the proposed Canterbury Land and Water Regional Plan. There are no new legal matters arising from the Council's endorsement of the two ZIPs. Legal issues covering a range of CWMS matters have been reported to Council previously.

Have you considered the legal implications of the issue under consideration?

15. Yes. Refer above.

ALIGNMENT WITH LTP AND ACTIVITY MANAGEMENT PLANS

16. The two ZIPs support a wide range of environmental, governance, prosperity, health and recreation community outcomes.

Do the recommendations of this report support a level of service or project in the 2009-19 LTCCP?

17. Yes. The ZIPs will support levels of service in the areas of water supply, "A reliable supply of water that is safe to drink" (2009-19 LTCCP, p.60.), waterways and drainage (p. 132), economic development (p. 144) and city development (p. 188).

11. Cont'd

ALIGNMENT WITH STRATEGIES

18. The ZIPs are generally consistent with and support the Council's Healthy Environment Strategies.

Do the recommendations align with the Council's strategies?

19. Yes. The priority outcomes and recommendations of the two ZIPs are generally consistent with the Surface Water Strategy 2009-2039, the Water Supply Strategy 2009-2039, the Biodiversity Strategy 2008-2035, the Climate Smart Strategy 2012-2025, the Public Open Space Strategy 2010-2040 and the Wastewater Strategy 2013.

CONSULTATION FULFILMENT

20. Thorough public consultation occurred during the preparation of the ZIPs. This included a submission process and public meetings. More than 400 suggestions for changes were considered as part of the consultation on the draft BPZC ZIP.

STAFF RECOMMENDATION

It is recommended that the Council endorse:

(a) the Banks Peninsula Zone Implementation Programme; and

(b) the Christchurch - West Melton Zone Implementation Programme.

Canterbury Water

Banks Peninsula /Te Pātaka o Rākaihautū
Zone Implementation Programme

Environment Canterbury
Regional Council
Kaunihera Taiao ki Waitaha

Christchurch City Council

The Banks Peninsula Zone Committee:

The Banks Peninsula Zone Committee is one of ten established under the Canterbury Water Management Strategy (CWMS).

Banks Peninsula Zone Committee Members:

Richard Simpson.....Chair (Community member)

Yvette Couch-Lewis.....Deputy Chair (Community member)

Iaean Cranwell.....(Te Rūnanga o Wairewa)

Steve Lowndes .....(Community member)

Pam Richardson.....(Community member)

June Swindells.....(Te Hapu ō Ngāti Wheke/Rapaki)

Kevin Simcock .....(Community member)

Claudia Reid.....(Christchurch City Councillor)

Wade Wereta-Osborn.....Te Rūnanga o Koukourarata)

Pere Tainui .....(Te Rūnanga o Ōnuku)

Donald Couch.....(Environment Canterbury Commissioner)

(see http://ecan.govt.nz/get-involved/canterburywater/committees/bankspeninsula/Pages/membership.aspx for background information on committee members)

With support from

Shelley Washington.....Launch Sept 2011 - Dec 2012

Peter Kingsbury .....Christchurch City Council

Fiona Nicol.....Environment Canterbury

Tracey Hobson.....Christchurch City Council

For more information contact fiona.nicol@ecan.govt.nz

Nā te Pō, Ko te Ao
From darkness came the universe
Tana ko te Ao Mārama
From the universe the bright clear light
Tana ko te Ao Tūroa
From the bright light the enduring light
Tana ko te Kore te Whiwhia
From the enduring light the void unattainable
Tana ko te Kore te Rawea
From the void unattainable, the void intangible
Tana ko te Kore te Tāmaua
From the void intangible the void unstable
Tana ko te Kore Mātua
From the void unstable the void endowed with paternity
Tana ko Mākū
From which came the moisture
Te Punawai o Te Ao
The source of all the water
Te Tōmairaki, te Hukarere, te Hukapapa, te Ua
Morning mist, snow, ice and rain
He aitaka nā Raki rāua ko Papa,
Descendants of Raki and Papa,
Koia te taru ka tupu ai i te raumati
The shoots from which life grows

Tīmata i kā mauka
From the mountains
Ko Te Poho o Tamatea, Ko Ōteauheke,
Ko Te Ūpoko o Tahumatā, Te Pōhue,
Ko Te Ahu Pātiki
Rere atu kā waipuna, kā maka, kā awa
The springs, creeks and rivers flow
Ki te roto, kā whaka, te moana
To the lake, to the harbours and the coastal area
Ki Uta Ki Tai
From the mountains to the sea
Ki Te Pātaka o Rākaihautū
On Banks Peninsula
Kia tiaki te wai, kia ora te wai
continue to protect, preserve and sustain life
Mō tātou, ā, mō kā uri ā muri ake nei
For us, and our children after us
Toitū te marae o Takaroa
If the domains of Takaroa (water)
Toitū te marae o Tāne
and Tāne (land) are strong and vibrant;
Toitū te Iwi
So too will people be strong and vibrant
Haumi e, Hui e, Tāiki e
Let all be in agreement!

Chairman's Comments

Banks Peninsula is blessed with a rich history and culture, fertile soils and an increasingly thriving and rich biodiversity, and presents many opportunities for the enhancement of Christchurch and its residents both economically and in their quality of life. It is part of Christchurch City yet is often unknown and unexplored by many Christchurch residents. It is seen by many as "a jewel in Christchurch's crown". However, in order to realise this potential, particular care must be taken of our streams, lake, wetlands, estuaries and waterways, our coastline, our biodiversity, our water supplies and wastewater management.

This Zone Implementation Programme (ZIP) sets out a plan to further enhance and improve this great asset for Christchurch City and the Canterbury region. It seeks to engage, inform and enthuse the communities of Banks Peninsula about the opportunities they have and the potential there is in caring for and about water. The exercise of the principle of Kaitiakitanga has been adopted, and the four local Rūnanga have been fully involved in the decision-making and will be to the forefront in seeing that the environmental outcomes are achieved.

With greater competition for water from both urban and rural communities efficient water use is more important than ever. This document promotes water use efficiency to protect this valuable resource for future generations while enabling people to benefit in the use of this resource in their daily lives.

This ZIP has been developed after consultation and collaboration with a wide group of stakeholders and members of our community. More than 400 suggestions for change were considered following the draft ZIP and many of these have been incorporated into the final ZIP. It is important to remember that this is a "living" document that will be modified regularly as recommendations are implemented and knowledge and priorities change.

The representatives on the Zone Committee reflect the diverse geographic area of Banks Peninsula by contributing their extensive knowledge of the Banks Peninsula water issues as well as their wide areas of interest and expertise. The representatives and employees of Environment Canterbury, the Christchurch City Council, local Rūnanga and the community have worked conscientiously and collaboratively with extensive community input to produce this Zone Implementation Programme. It has been a pleasure to Chair such a diverse, dedicated and capable group of people.

Richard Simpson (Chairperson)

Mā te mahi ngātahi i te ao kōwhai, ka eke tātou
The work will be successful through unity

Contents

1. Introduction

Canterbury Water Management Strategy

The Canterbury Water Management Strategy (CWMS) was initiated in 2005 by the Canterbury Mayoral Forum. Increasing water demand in the region was leading to problems in sourcing, storage; allocation of water and environmental effects. In response, there appeared to be no overview of problems at whole catchment (zone) levels. The philosophy of the CWMS is to create a format where solutions to these problems can be conceived and implemented by the community with support from councils, at a zone level.

The desired outcome of the CWMS 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."

and is designed with:

A) Fundamental principles to underpin the strategy.

These are designed to ensure that the water resource is managed sustainably.

First order priorities: environment, customary use, community supplies and stock water.

Second order priorities: irrigation, renewable electricity generation, recreation and amenity

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.

B) Targets. 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.

1. Ecosystem health and biodiversity
2. Natural character, processes and ecological health of braided rivers
3. Kaitiakitanga
4. Drinking water
5. Recreational and amenity opportunities
6. Water use efficiency
7. Irrigated land area
8. Energy security and efficiency
9. Indicators of regional and national economies
10. Environmental limits*

*More information about these targets are found in the Targets Booklet (listed in References within this publication).

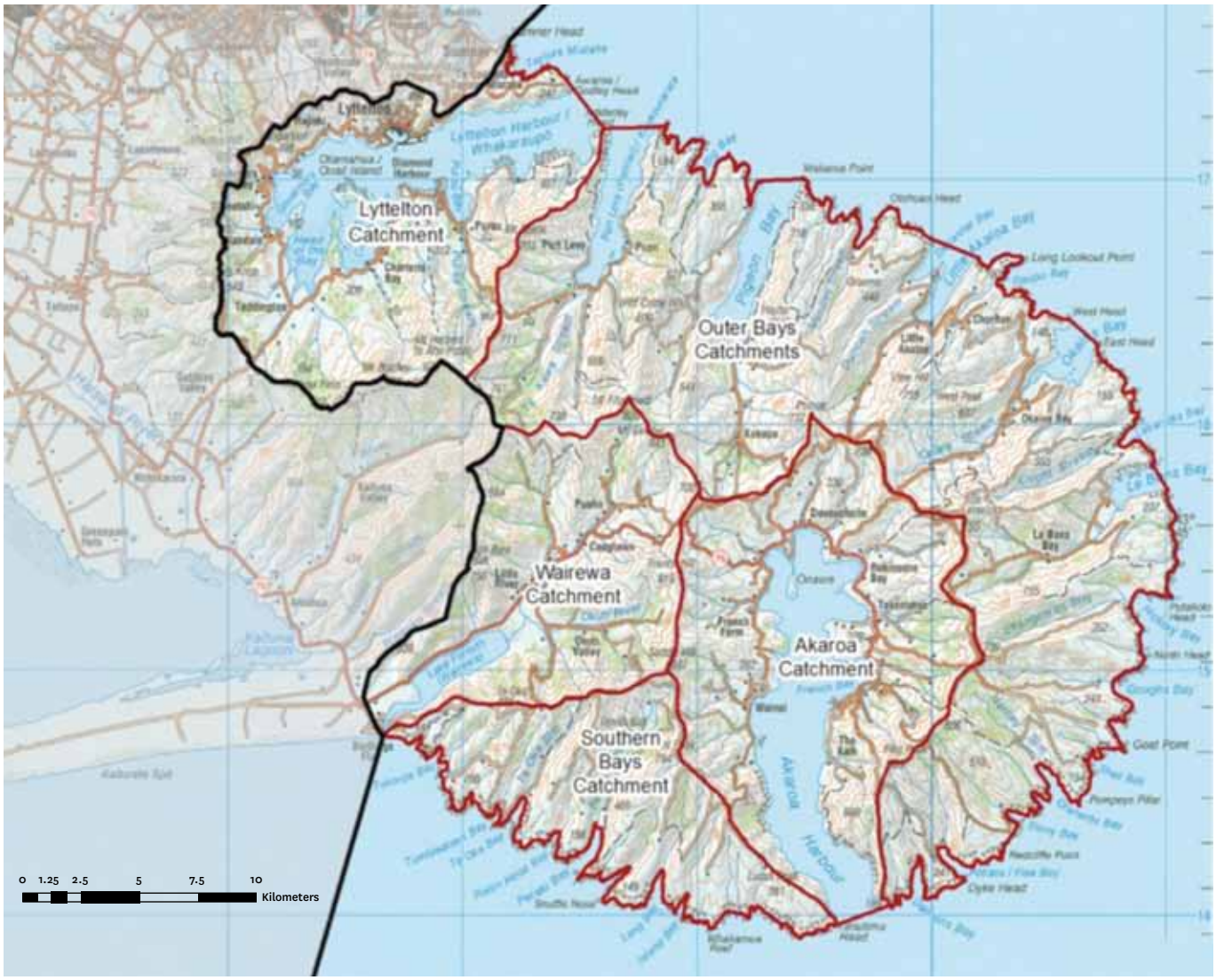
The CWMS region covers the whole of Canterbury and is broken into ten catchments (zones) of which Banks Peninsula is one. Each zone forms a **Zone Committee** (ZC) and must produce a **Zone Implementation Plan** (ZIP) which shows how they will address the above targets in their zone through Priority Outcomes (what they want to see) and Recommendations (how to get there).

This ZIP is not a statutory plan under the Resource Management Act and the Zone Committee does not have the power to commit any Council to any path or expenditure. However the ZIP carries the weight of the wide commitment to the CWMS of Councils, Rūnanga, a wide range of agencies, interest and industry groups, and individual community members. The ZIP recommendations are intended to be integrated into the planning process in relevant agencies and councils and to lend weight to future projects and spending in the zones.

As an example, ZIPs are used to guide the process of writing the sub-regional chapters of the Environment Canterbury Land and Water Plan, enabling the community-led recommendations to be integrated into the planning framework.

Also, money is set aside through the CWMS process to contribute to the achievement of the CWMS targets (particularly towards ecosystem health, biodiversity and braided rivers) through the funding of on-the-ground projects. Under the programme "Immediate Steps", each zone is provided with approximately $100,000 per year for five years and the Zone Committee is tasked with prioritising how these funds are best allocated.

Omaru Stream in flood



Banks Peninsula Water Management Zone

Sub-catchments, Christchurch City Council and neighbouring zones

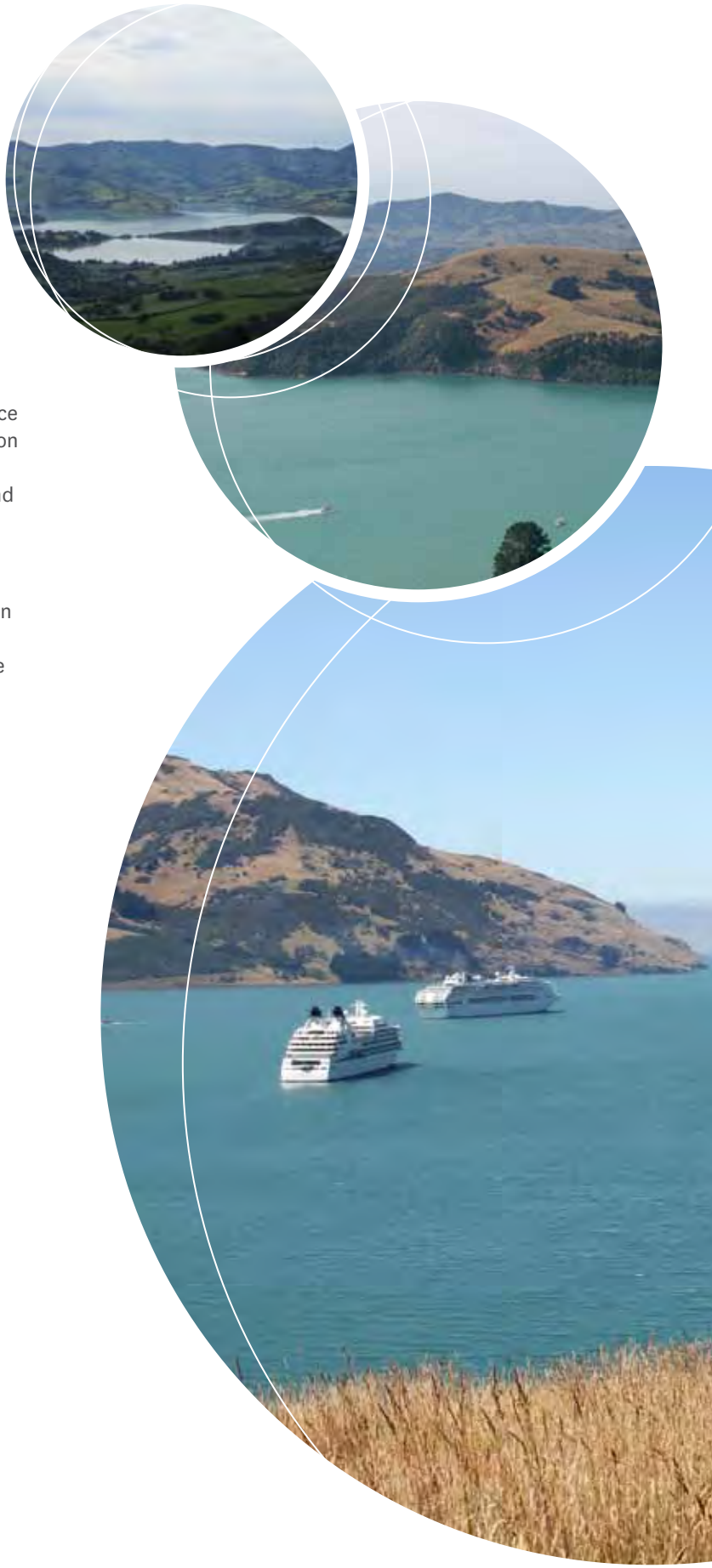
The Committee has broken up the Zone into five sub-areas:

- Lyttelton catchment
- Outer Bays catchment
- Akaroa catchment
- Wairewa catchment
- Southern Bays catchment.

Many of these catchments have established community groups focused mainly on conservation and improving stream and coastal water quality.

Christchurch City Council

The Banks Peninsula Zone falls under the Christchurch City Council boundary. In 2006 the Banks Peninsula District Council amalgamated with the Christchurch City Council. Since then increased resources have been available for greater investment in Council-owned and operated water and wastewater services, reserves, roading and rubbish collection on the Peninsula.



Crossover boundaries/zone boundaries

The Banks Peninsula Zone abuts two other zones:

1. **Selwyn - Waihora Zone**

The Selwyn - Waihora Zone's main areas of focus are the health of Te Waihora/Lake Ellesmere under the co-governance agreement with councils and Ngāi Tahu and possible irrigation expansion on the Canterbury plains. The Selwyn - Waihora Zone is within the boundary of the Selwyn District Council and Christchurch City Council.

2. **Christchurch - West Melton Zone**

The Christchurch - West Melton Zone's main focus is on urban waterways and protection of Christchurch drinking water aquifers under the plains, and works closely with earthquake recovery programmes. The Christchurch - West Melton Zone falls under the Christchurch City Council and Selwyn District Council.

History and Features

Te Pātaka o Rākaihautū/Banks Peninsula has a unique landscape with a combination of natural physical and cultural elements of both Māori and European. These elements embody the evolving relationship with the natural world as it has sustained generations of people who have lived on the land, and who have maintained a strong affinity with this unique landscape.

Geographically, the Peninsula is made up of a volcanic and coastal landscape. Its highest point is Mt Herbert at 920m above sea level. Almost surrounded by the Pacific Ocean, the Peninsula's extinct volcanic cones have created a steep landscape and many bays and deep valleys. The Peninsula contains over 100 streams where the catchments are all short (less than 10 km long) and very steep, with lowland stream reaches generally measuring only a few kilometres long. In pre-European times, upper headwaters flowed through densely clad totara and New Zealand cedar montane forests, and lowland streams would have run through tall tōtara, mātai, rimu and kahikatea podocarp (native pine) forests. The one main freshwater body in the Zone is Te Roto o Wairewa (Lake Forsyth), located in the western part of the Zone. Apart from the streams that flow into the lake, most flow directly into the harbours and sea, flushing naturally in high rainfull events. It is difficult for wetlands to form with the Peninsula's steep-sided valleys and limited flat land. Banks Peninsula soils comprise two different types; volcanic tephra and loess soil (including clays). The volcanic soils are high in iron and other minerals, giving them a strong reddish-brown colour. Loess soil, being blown by strong northwest winds from the plains and settling on top of the volcanic soil, is prone to erosion and sediment discharge in rainfall events.

Māori history goes back many generations to about 850 AD, when Rākaihautū (a Waitaha ancestor) came to Te Wai Pounamu (the South Island) from Hawaiki. After some earlier northern adventures, Rākaihautū carved out were Te Waihora (Lake Ellesmere) and Te Roto o Wairewa (Lake Forsyth). Overwhelmed by the magnificence of his artistic achievement Rākaihautū decided to stay, driving his kō (digging stick) Tūwhakaroria deep into the ground above Wainui where it became Tuhiraki (Mt Bossu). As a testament to his work and in recognition of the abundance and variety of food and other resources found on the Peninsula up until quite recently, the people named the area Te Pātaka o Rākaihautū, or the great food storage house of Rākaihautū.

By 1750, Ngāi Tahu occupied most of the South Island and had settlements in every bay on the Peninsula and on many of the headlands. They settled these areas in either hapū (sub-tribe) or whānau (family) groups. Ngāi Tahu settlement differed from the earlier more nomadic tribes in that permanent gardens were established. The gardening expertise of Peninsula Ngāi Tahu must have been well honed; kūmara were grown successfully on Te Pātaka o Rākaihautū despite it being 1,000 kilometres further south than kūmara grown in their native Chile.

At this time European explorers were discovering new lands. In 1769 Captain James Cook sailed past the Peninsula. Explorers and settlers soon followed and in 1800-1810 European sealers and whalers began to appear. In the early 1800s, records are held of trading between Ngāi Tahu and European sealers. Incidents of lawlessness involving British subjects, most notably at Takapuneke in November 1830, resulted in the appointment of James Bushby who instigated the signing of a Declaration of Independence which asserted Māori sovereignty over New Zealand.

As well as muskets, clothing, tobacco and alcohol, the Europeans brought with them a number of diseases. These diseases, combined with a ferocious civil war and raids led by Te Rauparaha from Kapiti, all took a huge toll on Peninsula Ngāi Tahu. A census conducted in 1848-49 estimated a population of only 300 Ngāi Tahu on the Peninsula, whereas before the war and spread of disease there had been thousands.

The Treaty of Waitangi was signed at Onuku by Ngāi Tahu chiefs Iwikau and Tikao on May 30, 1840.

In August 1840 Captain Owen Stanley raised the Union Jack in Akaroa just before the arrival of two French ships whose purpose was to establish a French colony. Akaroa was the first successful planned European settlement in the South Island and was for at least ten years predominantly a French village. In 1850 British settlers began to arrive in greater numbers.

From the 1850s until the late 1980s a population and farming explosion would occur on the Peninsula with new settlements, fishing, timber milling, cocksfooting and pastoral farming all becoming established. Shipping, rail and eventually road and refrigeration helped this expansion.

Between 1850 and 1900 there were at least 40 sawmill sites on the Peninsula, cocksfoot became a crop in its own right, and nearly 100 dairy farms and cheese factories were established.

Environmentally, this expansion began to take its toll. Deforestation for milling and farming saw once vast areas of podocarp removed, resulting in large amounts of silt washing down into the lakes, streams and harbours of the Peninsula.

Loess soil is particularly prone to erosion when native forest cover is removed. Movement of sediment is typical in many Banks Peninsula streams due to highly erodible soils and steep catchments. Mud and soil transported downstream is most often referred to as suspended sediment. Few species will withstand prolonged high sediment loadings. Banded kōkopu, for example, actively avoid streams with high sediment loadings and may in time disappear from such streams.

Along with this, the absence of treatment or minimisation of discharges from farming caused environmental pollutants to be washed down drains to creeks into rivers, lakes and the harbour. Although the farms were small compared with today, there were many of them with a number of cows, adding up to substantial quantities of dairy effluent entering the streams.

These farming practices were carried out well into the 1970s until New Zealand began supplying the newly formed EEC, which brought in stricter hygiene standards for milk collection. This resulted in a number of farms stopping milking as the expense to upgrade their equipment was prohibitive.

In the late 1970s and early 1980s New Zealand introduced subsidies on fertiliser applications with a subsequent significant increase in the aerial application of superphosphate around the hills. In the Little River area there were a number of now disused airstrips which would be busy through spring, summer and autumn. Superphosphate contains soluble phosphate which entered the streams and lake catchment through runoff and direct application to waterways. Anecdotal evidence suggests on occasions scores of dead fish (mostly perch) were washed up on the shoreline having succumbed to the poisonous nutrient build-up.

Since 1980, when the fertiliser subsidies stopped and the cost of dairy farming became prohibitive on the Peninsula, the water quality of the streams and lakes have begun to improve. Banks Peninsula has a number of localised areas with good forestry growth indexes that will make forestry worthwhile, but there is no real evidence of huge expansion.

Nowadays farming has become increasingly diversified as niche markets are identified. Less intensive farming and the avoidance of steep terrain has resulted in increased bush cover. Other more specialist horticultural crops are becoming more popular land-use activities for commercial and lifestyle purposes. Banks Peninsula is water-short and this will continue to be a limiting factor for agriculture.

Banks Peninsula has a small area of consented irrigation compared with many other zones in the region. The irrigation that is in place is used for a mixture of land uses, including pasture, horticulture and vineyards. According to the Environment Canterbury consent database the area currently consented to be irrigated is 190 ha within the Banks Peninsula Zone. Fifty-two hectares of this is supplied by groundwater and the remaining 138 ha has surface water supply. Ground water takes total 25 litres per second and surface water total allocation 101.5 litres per second. (Ecan data).

The population of Banks Peninsula has tended downward over the last half century because of the general migration to cities, mechanisation and the commercial pressure of tourism.

Tourism though has always been popular. Since the growth in motor car use after World War 1, Akaroa became known as the 'Riviera of Canterbury' and visitor numbers have steadily increased, with international tourism taking off in the 1980s. Today tourism and recreation have become one of the Peninsula's primary earners, with holidaymakers flooding into Akaroa and other Peninsula settlements over weekends and holidays.

Along with tourism, there is now strong community support for conservation projects to retain natural and historic features and to restore habitats once lost. Increasingly land is being purchased for conservation by private individuals, and at the same time long established farming families are protecting areas of high conservation value on their land. The combination of farming and tourist opportunities is showcased by the award winning Banks Peninsula Track along with other related farming/tourist activities.

In 1997 the crown, represented by the prime minister of the day, apologised to Ngāi Tahu for breaches of the Treaty at Onuku, and a Deed of Settlement was agreed. Modern Ngāi Tahu Rūnanga are working to implement various projects resulting from this Deed.

Today there is a fine balance between the relationship of the natural environment of waterways, coastline, mountains and hills, and that of human intervention including the traditional trail systems, urban spread, small communities, farming, horticulture and aqua farming, cleared land and open spaces combined. Banks Peninsula is a unique landscape made up of many "special places".

Earthquakes

Banks Peninsula was affected, along with the rest of Canterbury by the earthquakes of 2010 and 2011. This ZIP closely aligns with the Natural Environment Recovery Program (NERP) managed by Environment Canterbury which specifically deals with earthquake remediation.

The main areas of Banks Peninsula highlighted in the NERP are

- Lyttelton catchment priority
- Stabilising rock fall
- Te Wairewa base-level change investigation.

The Banks Peninsula Zone Committee

As one of the ten committees under the CWMS, the Banks Peninsula Zone Committee has been formed with experienced, committed, knowledgeable and collaborative people including Rūnanga, farmers, small block holders and council members, representing the broad mix of the Peninsula population. Specifically the Zone Committee is formed with representatives of Canterbury Regional Council, Christchurch City Council, Te Rūnanga o Wairewa, Te Hapu ō Ngāti Wheke/Rapaki, Te Rūnanga o Ōnuku, Te Rūnanga o Koukourarata and community members.

Launched in September 2011, the Banks Peninsula Zone Committee has met at least once a month to work through various chapters of its ZIP. Formal meetings, site visits, presentations and stakeholder feedback meetings were followed by more informal workshop sessions to pull together a consensus of recommendations. Many members of the public have come along to the open meetings and presented their specific cases, educating and influencing the Zone Committee in their recommendations for water management in the Zone.

As a leader in the community, the Zone Committee is committed to the environment especially as it affects planning for the future development of the Peninsula, and the need to ensure that the maintenance of water quality and quantity is one of its paramount resource management issues.

The Banks Peninsula Water Zone Committee also has a role in influencing land-based planning so that urban expansion, rural aspects, areas of protection, including wāhi tapu and wāhi taonga, are undertaken in a way that avoids any negative impact upon the unique biodiversity values that make up the Banks Peninsula area.

The Committee's holistic approach is that they are part of the landscape and embrace the philosophy of Ki uta ki tai (from the mountains to the sea) from rain drops and springs, connecting together as streams, lake, estuaries, and wetlands, all leading out to the coast; all is one, each reliant on the other; all waterways on the Peninsula are significant.

The Banks Peninsula Water Zone Committee is committed to forming working partnerships with Peninsula communities, groups and individuals, to implement a 10 to 30 year project vision for all catchments that will provide a balance between the available water resources that users need. The committee will measure this through the ongoing accomplishment of the Banks Peninsula Water Zone Committee Targets.

Implementing The CWMS

Banks Peninsula ZIP Chapters

Under the CWMS each zone has freedom to structure their ZIP so that the unique features in the zone could be reflected. The table below details how the Banks Peninsula Zone Committee chose to organise its chapters to reflect the CWMS Targets.

BP ZIP Chapter No.	BP ZIP Chapter Heading	Reflects CWMS Target No. (Page 4)	BP ZC Comment
1	**Kaitiakitanga**	1,3,4,5,6,8,9,10	The Banks Peninsula Zone Committee is committed to the philosophy of Kaitiakitanga. The guardianship of the Peninsula's natural resources for the welfare and benefit of all is the responsibility of everyone. This responsibility is highlighted by Kaitiakitanga being chosen as the first chapter.
2	**Water Quality**	1,3,4,5,6,7,9,10	The Banks Peninsula Zone Committee aims to ensure that the water quality is healthy for both human and ecosystems needs on Banks Peninsula.
3	**Water Quantity**	1,3,4,5,6,7,8,9,10	Available water is limited within the Banks Peninsula Zone. The Banks Peninsula Zone Committee works towards a future where all users' needs are able to be met through good planning and water efficiencies.
4	**Biodiversity**	1,3,4,5,6,7,8,9,10	The Banks Peninsula Zone Committee aims to work with existing community groups and individuals to encourage and support current biodiversity work, and help to co-ordinate information and reporting on the Peninsula.
5	**Erosion and Sedimentation Control**	1,3,4,5,6,9,10	The Banks Peninsula Zone Committee understands that the soil types are unique to the Peninsula and controls are required to minimise erosion and discharge of sedimentation into waterways and harbours.
6	**Te Roto o Wairewa**	1,3,5,6,8,9,10	The Banks Peninsula Zone has only one lake, Wairewa, within its area that has significant importance to Manawhenua and the wider community. The Zone Committee is committed to supporting the good work of the community by identifying Te Roto o Wairewa as one of its flagship projects.
7	**Wastewater**	1,3,4,5,6,7,8,9,10	The Banks Peninsula Zone Committee has a preference for discharge to land rather than to water. Due to the unique soil types on the Peninsula the committee is committed to working with agencies to utilise better technology to upgrade the use and discharge management of wastewater.
8	**Climate Change**	1,3,4,5,6,7,8,9,10	The Banks Peninsula Zone Committee is committed to a 10 to 30 year vision. Therefore, climate change has an implication across all recommendations and deserves its own chapter.
9	**Education**	1,3,4,5,6,7,8,9,10	The Banks Peninsula Zone Committee considers education as being critical to the success of the CWMS and its achievements. As a leader within the community, the Zone Committee supports education initiatives and will work alongside communities to assist them in taking ownership for their water needs.
10	**Coastal**	1,3,5,6,8,9,10	The Banks Peninsula Zone Committee understands that the CWMS is driven by freshwater; however, the Banks Peninsula Zone is surrounded by coast line, which has a major impact on the wellbeing of the community. Activities such as aquaculture, recreation and tourism are heavily reliant upon a healthy coastal environment, which in turn is reliant upon healthy freshwater. This interrelationship is a demonstration of the concept of Ki uta ki tai (from the mountains to the sea) which the committee supports.

2. Chapters and Recommendations

The following ZIP chapters include:

Introduction

The introduction outline the topic as a reflection of the CWMS targets, the uniqueness of the zone and background information needed to understand the recommendations.

Priority Outcome(s)

The Outcomes the Zone Committee wishes to see for the chapter.

Recommendations

Recommended pathways to achieve the Priority Outcome(s).

A living document

The ZIP is a living document and will be updated as changes are reflected in the Zone. This ZIP has many recommendations around monitoring and research and changes in subsequent ZIPs will reflect the results of this. Under the CWMS the ZIPs are due to be reviewed every 3 years.

1. Kaitiakitanga

Introduction

Kaitiakitanga (guardianship; stewardship) is one of the three fundamental principles of the Canterbury Water Management Strategy (CWMS) which also notes (Annex G no.3) that "…. Exercise of Kaitiakitanga requires both a role in decision making and the achievement of environmental outcomes…" The Resource Management Act (RMA) (Part 1 section 2(1)) states that "… 'Kaitiakitanga' means the exercise of guardianship by the tangata whenua of an area in accordance with tikanga Māori in relation to natural and physical resources, and includes the ethic of stewardship…"

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. That said, the Committee recognises the following:

a) That the relationship between tangata whenua and freshwater is longstanding;

b) That relationship of mana whenua 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 fresh water, Ngāi Tahu have made it very clear that economic development is vital for the region and for the nation, and that in their role as kaitiaki, they need to be involved in all aspects of water management, including economic development. Tangata Whenua have been very clear that sustainable economic development is fundamentally dependent on sustaining healthy waterways. Poor water, poor economy! No water, no economy! Tangata Whenua consider that water quality is 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 wellbeing of waterways as a matter of first principle;

b) Ensure the continuation of customary in-stream values and uses; and

c) Satisfy development aspirations.

Mahinga Kai Water plays a unique role in the traditional economy and culture of Ngāi Tahu. The most direct physical relationship that Ngāi Tahu have with water involves the protection, harvesting, and management of mahinga kai. The term 'mahinga kai' refers to natural resources and the area in which they are found, Ki Uta Ki Tai (from the mountains to the sea). Mahinga kai has always been, and continues to be, at the heart of Ngāi Tahu culture and identity. It encompasses social and educational elements as well as the process of food gathering. This includes the way resources are gathered, the places they are gathered from, and the resources themselves. In the past, mahinga kai would have included seals, tītī (mutton birds), kererū, kaimoana (shellfish), tuna (eels) inaka (whitebait), trees for carving and waka, materials such as harakeke, and paru (mud) (used for dyes). These resources are considered taonga (particular treasures for food and cultural identity) because they sustained life and an industry for the area and those who resided there. Thus cultural use, traditionally and today, continues within a sustainable use framework. For Ngāi Tahu today, participation in mahinga kai activities is an important expression of cultural identity. This participation is reliant on Ngāi Tahu people having sufficient access to mahinga kai sites, resources and a healthy environment.

Toitū te marae o Tangaroa
Toitū te marae o Tāne
Toitū te iwi

Healthy Water, Healthy Land, Healthy People

Priority Outcomes

All streams, freshwater wetlands, Te Roto o Wairewa, salt marsh/estuaries, springs and harbours in the Banks Peninsula Zone have Kaitiakitanga as an overarching value and reflect Ki Uta Ki Tai, Mauri, Mahinga Kai to tangata whenua, Wahi Tapu and Wahi Taonga.

Recommendations

	Recommendations	To be carried out by
1.1	Restoration and maintenance of Mauri in all waterways to be of the highest priority.	All agencies and councils and community.
1.2	Ki Uta Ki Tai (catchment based planning from the mountains to the sea) to be integrated into all planning documents on the Peninsula.	All agencies and councils and community.
1.3	The coast, oceans and harbours not to be separated from the waterways leading to them.	All agencies and councils and community.
1.4	All Papatipū Rūnanga to be consulted and involved in the freshwater projects in their Takiwā.	All agencies and councils and community.
1.5	Tuia projects to be spread between the four Papatipū Rūnanga within the Zone.	Environment Canterbury.
1.6	Ways to measure Kaitiakitanga values including one measure in key biodiversity indicators for improvement to be identified.	Zone Committee and Rūnanga over 6 months.
1.7	Three main projects which focus on Mahinga Kai as the priority to be chosen.	Zone Committee within 1 year
1.8	Access to key mahinga kai sites to be discussed by tangata whenua and land owners and where possible provided for.	Rūnanga and Community 4 yrs.
1.9	Wahitapu and Wahitaonga sites to be identified for protection through the Ngāi Tahu cultural mapping project. Rūnanga to be consulted and involved in the environmental projects on the sites in their area.	Community ongoing.

2. Water Quality

Introduction

Maintaining and enhancing surface and groundwater water quality in the Banks Peninsula Zone is important as high quality water is important for the health of the community and ecosystems, for stock water and to sustain our tourist industry. Much of the Peninsula's drinking water is supplied via council-run community water supplies which are currently being upgraded. There are also many private small group and individual supplies which are operated independently. The council mandate for upgrading private systems comes from national policy and public health risk. The Zone Committee feels it is important that private supplies are prioritised for support and the local communities are fully briefed on the options for upgrading such systems in their areas.

A water quality monitoring programme is in place which regularly tests many of the streams on the Peninsula, but there is a need to review the programme and update as necessary.

Contaminants entering waterways are an important issue for the Zone Committee and are dealt with in specific recommendations.

Appendix 1 - Christchurch City Council Community water supply schemes and an explanation of gradings associated with these. Appendix 2 shows planned upgrades to the Christchurch City Council water and wastewater systems.

Priority Outcomes

People in the Banks Peninsula Zone have access to safe drinking water, as defined by the New Zealand Drinking Water Standards (NZDWS). Water quality in Banks Peninsula waterways is regularly monitored. Policies and rules are developed to maintain water quality and improve it where appropriate.

Recommendations

	Recommendations	To be carried out by
2.1	Christchurch City Council water supplies to be upgraded to at least Bb by 2015 in the following areas: Akaroa, Duvauchelle, Little River, Pigeon Bay, Takamatua.	Christchurch City Council in 5yrs.
2.2	Small group (and individual) private water supplies to be prioritised for outside support.	Zone Committee within 1 year.
2.3	Small group (and individual) private water supplies to be fully briefed on the options for increasing water quality in their catchments.	Zone Committee and Christchurch City Council within 5 yrs.
2.4	Water supply catchments to be prioritised for biodiversity enhancements and protection upstream of the takes.	Christchurch City Council and Community, DOC.
2.5	All stormwater to be controlled off hazardous sites with oil interceptors or similar technology.	Environment Canterbury within 5 yrs.
2.6	Stormwater catchment upgrades to be prioritised based on effects of water quality and quantity on the environment.	Christchurch City Council and Environment Canterbury within 5 yrs.
2.7	Planning rules around stock exclusion from waterways to be followed.	Environment Canterbury ongoing.
2.8	Fertiliser usage to be managed to minimise discharge of nutrients to waterways. A nutrient budget programme and Global Positioning System to be used for fertiliser management on farms.	All farmers.
2.9	Passive discharge from contaminated land to be investigated to determine its effect on the environment. Rules to require sufficient distance of contaminated passive discharge from waterways to be enforced.	Environment Canterbury within 5 yrs.
2.10	Birds that in large numbers have significant adverse effects on water quality in the Zone to be identified. Where required the effective management of birds to be implemented.	Environment Canterbury and DOC, landowners, ongoing.
2.11	Water trough and yard placement to be managed to minimise potential adverse effects resulting from surface runoff to water.	Christchurch City Council Environment Canterbury and others through community education.
2.12	Regulations to be reviewed and enforced for runoff water from such activities as boat and car washing, excavations, roadways, car parks and similar to improve the quality of water being discharged to the coastal environment.	Environment Canterbury and Christchurch City Council within 5 yrs.
2.13	Programmes be continued to establish good baseline data of water quality in all parts of the Zone, including harbours, ecosystem health, drinking water quality, stock health and recreational use. The data to be used to indicate improving or declining trends in water quality.	Environment Canterbury, DOC and Christchurch City Council ongoing.

3. Water Quantity

Introduction

Water availability for out-of-stream use, particularly for domestic and stock water requirements, is one of the key issues in the Zone. Most of the water sources are numerous small streams, with only a small proportion of water being sourced from groundwater. In the summer months in some communities there is not enough water to service all household and gardening needs. If the Peninsula is to grow, this issue will need to be addressed. It is recommended that all the existing minimum flows set for streams and rivers in the Zone (Appendix 3) are reviewed, including flow-sensitive catchments already listed in Environment Canterbury plans (Appendix 4). Adoption of measures to improve water use efficiency including re-use is recommended before sourcing additional water supplies.

Appendices 3 and 4 show low flows and flow-sensitive catchments for the Zone. Appendix 5 explains the interaction between surface water and groundwater

Priority Outcomes

There is enough water available in the Banks Peninsula Zone to meet the needs of daily living, stock water, and fire fighting storage as a priority, and allow allocation for other uses where these priority needs are already being met. Allocation of water required to meet these needs is subject to flow and allocation limits so that the unique values of the Banks Peninsula streams are protected.

Recommendations

	Recommendations	To be carried out by
3.1	For the purpose of sustainable management research, a project into how much Permitted Activity Water Takes influence the flows in the Peninsula streams to be undertaken.	Environment Canterbury within 1 year.
3.2	Minimum flows set for streams (including flow-sensitive catchments) to be reviewed and, if needed, new minimum flows to be set. The significance of low flow sensitive catchments effects on biodiversity to be recognised when assessing the future land usage for those areas.	Zone Committee and Environment Canterbury within 2 yrs.
3.3	Information on the interaction between groundwater and surface water to be taken into account when setting low flows for streams.	Environment Canterbury within 2 yrs.
3.4	Banks Peninsula to focus on the efficient use and re-use of water rather than an increase in supply.	Christchurch City Council within 20yrs. Milestones to be developed to support this.
3.5	Water use efficiencies on Banks Peninsula to be investigated, and once decided, recommended as changes to Christchurch City Council bylaws.	Zone Committee and Christchurch City Council within 2 yrs.
3.6	Christchurch City Council to carry out a cost-benefit study to investigate a system where water rates are reduced for people who adopt the water use efficiencies in the Christchurch City Council Bylaw.	Christchurch City Council within 10 yrs.
3.7	At the next District Plan Review, regulation to be included requiring rainwater recovery systems and best practice water efficiencies for all new homes and major building alterations.	Christchurch City Council within 2 yrs.
3.8	Water use to be measured and recorded and water metering promoted. Where this measurement identifies high water use, strategies to be developed and implemented to reduce use.	Christchurch City Council, Environment Canterbury and Community within 5 yrs.
3.9	Christchurch City Council to work through programmed works to fix leaky pipes in infrastructure as per Water Supply Strategy 2009-2039, and feed back to Zone Committee on a 6 monthly basis.	Christchurch City Council within 10 yrs.
3.10	Water storage options to be identified discussed and implemented for fire fighting or drought recovery. All property owners to be encouraged to develop a fire-fighting plan.	Zone Committee within 1 year. Christchurch City Council and Environment Canterbury.
3.11	The effects of high seasonal numbers of visitors to be taken into account when planning for water usage in Banks Peninsula.	Christchurch City Council ongoing.
3.12	Water supply strategies for small group and individual private water supplies to be established, encouraging the usage of reclaimed water, roof supply water and similar systems.	Christchurch City Council ongoing.

4. Biodiversity

Introduction

The Banks Peninsula Zone Committee considers the protection and restoration of biodiversity to be a priority within the Zone and this is reflected in the large number of recommendations within this chapter. The whole of Banks Peninsula is a regionally outstanding landscape (Daly 2004). The topography, geology and climate from such a uniquely formed landscape result in a biodiversity 'hotspot', with high rates of endemism, and unique ecology and biogeography for both freshwater and terrestrial insects and plants. The short and steep stream catchments of Banks Peninsula have high native fish and invertebrate diversity and provide rare 'source to sea' habitats for the flora and fauna that live in them. This is especially important for migratory native fish which spend at least part of their lifecycle at sea but return to the freshwater streams to spawn. The wetlands and salt marshes found within the Banks Peninsula Zone together with the estuaries and oxidation ponds found north of the Port Hills within the Christchurch - West Melton Zone, support nationally and internationally significant concentrations of a variety of bird species. The main lake present within the Zone, Te Roto o Wairewa (Lake Forsyth), is extremely important due to the biodiversity values that the lake and surrounding catchment support. Additionally, the Okana River delta that feeds into Te Roto o Wairewa is a 'nationally significant landform', being the best example of a cuspate delta in the South Island. It is important that these unique biodiversity values are protected to ensure that they survive for future generations to enjoy.
The Banks Peninsula community already shows a high level of interest in biodiversity and consequently has an impressive array of existing programmes, projects, groups and initiatives that help protect and restore the precious biodiversity values within the area. The committee wishes to ensure that these efforts are further supported and promoted while encouraging better coordination between all groups and agencies working to protect biodiversity, so that 'the whole is greater than the sum of its parts'.

Priority Outcomes

Banks Peninsula is recognised in the region for showcasing flourishing biodiversity. Protection and enhancement of biodiversity is promoted, supported and celebrated. Flagship Projects are showcased as examples of excellent biodiversity achievement.

Recommendations

	Recommendations	To be carried out by
4.1	Agencies to take a co-ordinated approach to biodiversity across the Zone.	All agencies' general philosophy.
4.2	Key biodiversity indicators to be selected and agreed upon. These indicators to be used to measure biodiversity improvement in (i) water quality (ii) flora and fauna regeneration (iii) water quantity (iv) mauri.	Christchurch City Council, Environment Canterbury, DOC, BPCT QEII Trust, All Rūnanga within 1 year.
4.3	All agencies to use the key biodiversity indicators to measure and communicate biodiversity on the Peninsula.	Christchurch City Council, Environment Canterbury, DOC, BPCT QEII Trust, All Rūnanga within 1 year.
4.4	One agency to agree to take the responsibility for co-ordinating all of the monitoring information from agencies and community groups, and create a computerised system of documentation including mapping.	Christchurch City Council, Environment Canterbury, DOC, BPCT QEII Trust decide within 1 year.
4.5	2-3 Flagship projects to be selected including one in the farming sector.	Zone Committee within 6 months.
4.6	Two wetlands to be chosen to protect and regenerate.	Zone Committee within 6 months.
4.7	The Banks Peninsula Ecological Study and Implementation programme to be supported.	Christchurch City Council over the next 5 years.
4.8	The Banks Peninsula Conservation Forum to be supported. At least one Zone Committee member to be nominated to attend the forum and report back to the Zone Committee.	Banks Peninsula Conservation Forum and Zone Committee within 6 months.
4.9	The Banks Peninsula Conservation Trust to be supported.	Zone Committee, Community and Councils ongoing.
4.10	Improved co-ordination to rationalise equitable access to available funding for smaller groups.	Christchurch City Council, Environment Canterbury, DOC ongoing.
4.11	Barriers to native fish passage to be investigated. A programme to be established to work towards removing these barriers to promote native fish passage.	Christchurch City Council, DOC and Environment Canterbury within 5 yrs.
4.12	Biodiversity to be highly valued and promoted and highly valued in all infrastructure upgrades.	Christchurch City Council ongoing.
4.13	Environment Canterbury and Christchurch City Council plans to be reviewed to ensure rules specifically support biodiversity.	Zone Committee within 5 yrs.

Recommendations continued...

	Recommendations	To be carried out by
4.14	Compliance with the Regional Pest Management Strategy (RPMS) to be supported. Pests that are significant risks to biodiversity but not covered by RPMS to be identified and strategies developed to address these.	Environment Canterbury, DOC and landowners within 5 yrs.
4.15	Alternative ways to prevent stock entering waterways other than fencing to be investigated.	Zone Committee and Community ongoing.
4.16	The remaining Immediate Steps Funding for enhancing biodiversity and maximising ecological health to be spread over the five catchments of the Peninsula. The following project criteria be a priority for application of Immediate Steps funding; • Projects that protect areas vulnerable to threats (development, weeds, animal pests etc); • Projects with good links back into the community; • Projects that have good connectivity and create habitat corridors throughout the Peninsula; • Projects that protect and contribute to Ki Uta Ki Tai – mountains to the sea protection and restoration of waterways; • Projects that can provide educational opportunities and visibility for the general public to become engaged with biodiversity (a 'working laboratory'); • Projects that support landowners who exceed the existing requirements (e.g. the stock exclusion rule in the NRRP and rules 5.133-5.137 in the Proposed Land and Water Regional Plan); • Projects where funding provides leverage to further funding from other organisations; • Projects where "buy in" and enthusiasm of the land owner is high; • Projects that will improve water quality, raise minimum flows and reduce sediment discharge in identified priority sub catchments.	Environment Canterbury immediate implementation
4.17	Salt marsh and estuary research to be carried out to provide advice and information on regeneration.	Environment Canterbury, DOC within 1 year.
4.18	Protection of whitebait spawning, other indigenous fish species and habitats at risk from climate change to be a priority in biodiversity projects.	Environment Canterbury, Christchurch City Council and DOC ongoing.
4.19	Priority areas for willow tree removal to be set taking into account the crested grebe habitat.	Environment Canterbury, DOC, Christchurch City Council within 5yrs.

5. Erosion and Sediment Control

Introduction

Sediment contamination into streams and coastal waters, including harbours and bays from unrestricted earthworks and other land use practices, is identified as a major issue for the Zone, as sediment build up in these waterways has been shown to negatively affect water quality, Mahinga Kai and Kai Moana. High risk areas for erosion and sediment runoff on Banks Peninsula have been identified in the Environment Canterbury Proposed Land and Water Plan (Appendix 6), and rules around vegetation clearance and earthworks will be based around this map. From these areas, sediment from road works is considered to have a high impact and in need of priority attention.

Studies have been undertaken to measure sediment discharge levels around the Peninsula, and the Zone Committee recommends that sediment budgets are developed as a means to quantify the issue. A sediment budget would provide an estimate of how much sediment entered the harbour and compare that to how much sediment was washed out, thus measuring the rate of sediment build-up or loss in the harbour. Many community groups on the Peninsula have been proactive over the past 20-30 years working to minimise sediment discharge into streams, lake and harbours. This work is congratulated, encouraged and supported.

Priority Outcomes

Sediment discharge into waterways is minimised. Sediment build-up in the harbours is managed sustainably to prevent damage to Mahinga Kai and Kai Moana from erosion and sedimentation.

Recommendations

	Recommendations	To be carried out by
5.1	All existing research material on sediment in the harbour to be collated and a harbour sediment budget devised, starting with the Whakaraupō catchment, to monitor changing sediment levels in the harbour.	Christchurch City Council and Environment Canterbury within 2yrs.
5.2	Priority for erosion and sediment control information to be readily available to roading planners and engineers building and maintaining roading cuts, fill batters, and associated works.	Christchurch City Council within 2yrs.
5.3	Enforcement to be prioritised for erosion and sediment discharge from roads on the Peninsula.	Environment Canterbury for 5yrs.
5.4	Subdivisions, new housing earthworks and quarries to be managed in construction and operational maintenance phases in accordance with strict erosion and sediment control guidelines to eliminate sediment discharge during, and after, rain events.	Environment Canterbury and Christchurch City Council Ongoing.
5.5	Christchurch City Council to prioritise Whakaraupō for an integrated stormwater management plan.	Christchurch City Council within 2yrs.
5.6	To prevent sediment discharge from exposed soil, stabilising vegetation to be established as a priority after any earthworks.	Environment Canterbury and Christchurch City Council and community for immediate and ongoing implementation.
5.7	Identified areas of erosion risk (Appendix 6) and any historical non-compliant sediment discharges from these areas to be clearly communicated to the community to encourage careful land use and roading planning.	Environment Canterbury ongoing.
5.8	The effects of potential extreme events as a result of climate change to be included in the evaluation of erosion and sediment control guidelines.	Environment Canterbury for immediate and ongoing implementation.

6. Te Roto O Wairewa

Introduction

Te Roto o Wairewa (Lake Forsyth) is a shallow coastal lake and is a tribal taonga. The lake is also one of only two customary lakes in Aotearoa (the other being Horowhenua). Te Roto o Wairewa supports a customary fishery; tuna (eel), pātiki (flounder), aua (yellow eyed mullet), kanakana (lamprey) and inaka (whitebait) are the primary species caught.

In the past, extensive forests in the catchment provided timber, fibre for building and weaving, as well as food and traditional medicines. Te Roto o Wairewa is a Statutory Acknowledgement site, recognising the mana of Ngāi Tahu with regard to the lake and guaranteeing tribal involvement in management. Schedule 71 of the NTCSA 1998 is a statement of the Ngāi Tahu cultural, spiritual, historic, and traditional association with the lake.

Thousands of years ago Te Roto o Wairewa was a hāpua, or estuary, but in the late 1800s alluvial drift caused the lake to close by the growth of a large shingle bar, known as Kaitōrete Spit. Over the past 160 years, the catchment has been dramatically modified and mahinga kai values severely degraded. The majority of native forest cover was removed between 1860 and 1890 to open up the land for arable and pastoral land use, resulting in massive reductions in native bird and plant species. Sedimentation in the Lake since then has increased due to forest clearance, wetland drainage, pest and weed incursion, and the intensification of land use, and this has had major effects on both terrestrial and aquatic environments.

The land cover and land use within the catchment has changed dramatically over the past 160 years. This has increased the nutrient content in the sediment, namely nitrogen and phosphates. This increase in nutrients along with a shallower lake has made the lake highly eutrophic, with extreme water quality problems. The most severe problem is the summer blooming of Nodularia spumigena (blue green algae). The cyanotoxin Nodularia R that is produced when this algae blooms is highly toxic to humans, livestock and pets.

The level of Te Roto o Wairewa has been controlled for flood protection since the 19th century. The lake is currently fresh to brackish, depending on freshwater inflows and on whether the lake canal is open to the sea. The lake is highly turbid due to high algal production and wind-driven sediment re-suspension. The mechanical opening regime was a stop gap measure initiated after the government decided that costs for the preferred option of creating some form of permanent opening were prohibitive. The Waitangi Tribunal recommended in respect of Te Roto o Wairewa that a management plan for the improvement of the water quality be prepared, involving Ngāi Tahu as part of the decision making process along with the Department of Conservation, Regional Authority and Ministry of Agriculture and Fisheries, with the Crown providing the same resources as recommended in respect of Te Waihora.

Appendix 7 explains the meaning of Trophic level Index (TLI) (Priority Outcome) and shows the full Te Roto o Wairewa background.

Priority Outcomes

(i) Te Roto O Wairewa is a nationally and regionally significant ‘Flagship Project’ showcasing outstanding environmental restoration. The lake has a Trophic level Index (TLI) of 4 within 20 years and can support Mahinga Kai and contact recreation within 15 years.

(ii) All streams that flow into Te Roto O Wairewa are flourishing ecosystems reflecting Mauri, Kaitiakitanga and Mahinga Kai values.

Recommendations

	Recommendations	To be carried out by
6.1	Wairewa Rūnanga to be recognised as the leader in the restoration and management of Te Roto O Wairewa, resolving issues in partnership with agencies and community.	Wairewa Rūnanga ongoing.
6.2	A nutrient, flow and allocation regime to be investigated and modelled for the Wairewa catchment.	Environment Canterbury and Community through sub-regional process within 2yrs.
6.3	A permanent opening for the lake to be investigated and modelled.	Wairewa Rūnanga, Christchurch City Council, Environment Canterbury, DOC and Research Organisations within 2yrs.
6.4	The existing mechanical opening regime to be supported by technology and information to provide more effective lake level control. Openings to take into account weather patterns, waves, fish recruitment and predictive flood control.	Wairewa Rūnanga, Christchurch City Council, DOC and Environment Canterbury immediate implementation and ongoing.
6.5	A sediment budget to be completed for the lake, then different methods of removing or managing sediment investigated.	Wairewa Rūnanga, Christchurch City Council, Environment Canterbury and Research Organisations within 5yrs.
6.6	A monitoring programme that gives the community confidence in the increasing health of the lake to be set up. This monitoring to include the lake, its surrounds and the immediate coastal environment.	Wairewa Rūnanga, Christchurch City Council, Environment Canterbury, DOC, and Research Organisations within 2yrs.
6.7	The lake and surrounding streams to be managed in such a way that flooding is minimised to a “1 in 100 year flood level” to Little River and SH1.	Christchurch City Council, Environment Canterbury ongoing.
6.8	Covenanting and fencing to be prioritised in the catchment.	Environment Canterbury, DOC, BPCT and QEII Trust ongoing.
6.9	Prioritisation to be given to geese and swan population management.	Environment Canterbury for immediate implementation.
6.10	Banks Peninsula and Selwyn - Waihora Zone Committee to meet annually to discuss inter-zone issues.	Environment Canterbury ZCs ongoing.
6.11	Annual updates to be given to the community on the progress of Te Roto O Wairewa.	Wairewa Rūnanga, Christchurch City Council and Environment Canterbury annually for immediate implementation.
6.12	Changing sea levels to be part of all modelling of Te Roto O Wairewa.	Environment Canterbury for immediate implementation.
6.13	All practicable steps to be taken to reduce the incidence of cyanobacteria in Te Roto O Wairewa.	Wairewa Rūnanga, Christchurch City Council, Environment Canterbury, DOC, and Research Organisations ongoing.

7. Wastewater

Introduction

Wastewater disposal in the Banks Peninsula Zone is generally via either Christchurch City Council reticulated systems or individual septic tanks. Since the amalgamation of the Christchurch City Council with Banks Peninsula District Council many upgrades have been possible for the council reticulated systems, and more are planned. In regard to individual septic tanks, due to the topography and soil types, the new Environment Canterbury Land and Water Regional Plan now requires resource consent (rather than it being a permitted activity) for all septic tanks. The Zone Committee has concerns about this proposed change, and hence some recommendations are included around investigating alternative types of septic tanks that may work more efficiently on Banks Peninsula soils. This may offset the need for resource consents.

The Zone Committee has a preference for no discharge of treated wastewater into harbours in the long term, to further improve the water quality of the harbours. Due to the relative scarcity of water on the Peninsula at times of low rainfall, there is a significant focus being promoted to innovatively re-use reclaimed wastewater for irrigation, fire fighting storage and other uses.

Appendix 2 shows planned upgrades to the Christchurch City Council water and wastewater systems.

Priority Outcomes

Wastewater is not discharged to the harbours but reclaimed to land. Wastewater is treated to a high quality and promoted as an innovative water and irrigation source for the Peninsula.

Recommendations

	Recommendations	To be carried out by
7.1	The Christchurch City Council wastewater programme (Appendix 2) to be supported and completed.	Christchurch City Council LTP process ongoing.
7.2	Land based application and irrigation trials for Akaroa wastewater to be vigorously supported.	Christchurch City Council LTP process in 3yrs.
7.3	The new Wainui land-based reticulated system to be used as a trial for irrigation to land in other areas.	Christchurch City Council LTP process within 3yrs.
7.4	Un-reticulated areas to be prioritised for reticulation as follows: (i) Charteris Bay (ii) Wainui (iii) Little River (iv) Birdlings Flat (v) Takamatua (vi) Robinsons Bay (vii) Purau (viii) Okains Bay.	Christchurch City Council LTP process within 3yrs.
7.5	Alternative processes for reclaiming wastewater to be investigated. Reclamation and re-use of wastewater to be encouraged.	Christchurch City Council for immediate and ongoing implementation.
7.6	Wastewater capacity to become a priority for the future Christchurch City Council Small Settlement Studies.	Christchurch City Council for immediate implementation and ongoing.
7.7	Septic tanks to be managed up to current standards and plan rules.	Community, Christchurch City Council and Environment Canterbury ongoing.
7.8	Investigations into new technologies for septic tanks and wastewater reuse specifically suited to Banks Peninsula to be undertaken.	Christchurch City Council and Environment Canterbury within 5 years.
7.9	Ongoing efforts to be made to reduce the volume of wastewater to be managed by using, for example; low flush systems, grey water and composting toilets, and increasing the efficiency of the reticulation system. A programme including education to be developed to achieve this.	Christchurch City Council and Environment Canterbury within 10 years.
7.10	Freedom camping and visitor impacts to be managed so as not to pose unacceptable risk to community drinking water or waterways.	Christchurch City Council ongoing.
7.11	The Lyttelton wastewater plant to be maintained in a near ready-to-operate state to provide backup if the tunnel pipeline should fail.	Christchurch City Council within 10 years.

8. Climate Change

Introduction

The Zone Committee's thinking on climate change has primarily been influenced by NIWA's publication "Coastal Adaptation to Climate Change - Pathways to Change" (Nov 2011) and Christchurch City Council's "Climate Smart Strategy" 2010 - 2025. The "Pathways to Change" laid out in NIWA's publication involves four steps to guide planners toward the creation of communities resilient to climate change. The (1) first step is *awareness and acceptance* and the committee is firmly of the mind that climate change will have a significant impact on coastal communities on the Peninsula, while higher temperatures and less rainfall will impact on fresh water. Step (2) two is *assessment,* which is what we have set out to address in this document. The final steps are (3) three *planning a way forward and (4) four implementation, monitoring and review,* which will evolve as the risks and threats are better understood.

Climate change models for the East Coast of New Zealand predict less rain and warmer temperatures than at present in the decades to come. The rate of sea level rise, currently running at over 0.2mm per annum, is projected to increase significantly due to thermal expansion and polar ice melts. These incremental changes to our weather and to the marine environment are anticipated to be magnified by periodic extreme events.

The Banks Peninsula Zone with its extensive coastline and dependence on surface water will most likely be significantly affected by climate change during the life of this strategy. "Surface water sources of public water supplies in Banks Peninsula would be expected to be adversely affected by drier climate conditions, placing further stress on the sources when the demand tends to be highest": Christchurch City Council Water Supply Strategy 2009-2030.

Whilst overall rainfall is expected to decrease by about 10% it is predicted that there will be a higher occurrence of intense rainfall events resulting in the flooding of low-lying areas, and an increased risk of slips and road closures. At the other end of the extreme events scale the likelihood of drought is expected to double. This will impact on water supply and primary industry, and increase the risk of fire. Strong winds, predominantly from the West, combined with higher temperatures and low humidity would be likely to exacerbate the fire risk further.

In addition, the predicted sea level rise caused by climate change will impact negatively on the coastal margins of the Zone. Estimates of the rise in mean sea levels vary between 50cm and 80cm by 2090. In this scenario, low lying areas will be affected by erosion and inundation, and at times of high tides and storm surges these incursions will be increased.

The world's output of CO_2 (plus methane, nitrous oxide and CFCs) has resulted in over 400ppm of greenhouse gases in the atmosphere. These levels have not been experienced for 650,000 years. If we continue this high emission path we can expect a warming of between 4 and 6 degrees and a 1m to 2m rise in sea levels within 90 years. These figures are taken from the IPCC report of 2007 and it should be noted that actual measurements taken in the last five years exceed those predictions.

Priority Outcomes

Climate Change effects are taken into account in all infrastructure upgrades and planning on Banks Peninsula. As the climate changes there is adequate water available and flooding is minimised.

Recommendations

	Recommendations	To be carried out by
8.1	Statutory Planning processes take into account the predictions of generally drier conditions, and stronger winds, and more intense weather events for Banks Peninsula.	Christchurch City Council and Environment Canterbury ongoing.
8.2	Statutory Planning processes take into account the IPCC prediction of 10% higher intense rainfall events resulting in flooding and increased risk of slope instability.	Christchurch City Council and Environment Canterbury ongoing.
8.3	Statutory Planning processes take into account the prediction of sea level rise leading to possible 50-80cm rise by 2090.	Christchurch City Council and Environment Canterbury ongoing.
8.4	Statutory Planning processes take into account that coastal areas will be affected by erosion and inundation, salinity changes and other climate change effects.	Christchurch City Council and Environment Canterbury ongoing.
8.5	Climate change effects to be taken into account when culverts are designed and constructed, maintained or replaced.	Environment Canterbury and Christchurch City Council and Community ongoing.
8.6	A database to be set up for Banks Peninsula residents to upload their records of extreme weather events including floods, winds and droughts. This database will help councils to assess Peninsula weather patterns, including possible trends due to climate change.	Environment Canterbury and Christchurch City Council and Community ongoing.
8.7	The impact of climate change on the land and biodiversity to be considered when vegetation clearance is planned and undertaken for activities such as roading, forestry, farming or subdivisions.	Christchurch City Council, Environment Canterbury and landowners ongoing.
8.8	A study to be undertaken to assess if climate change is allowing new pests and diseases, that have a negative impact on water quality, to establish themselves. If so, then strategies to be developed to minimise their effects.	Environment Canterbury, DOC and Christchurch City Council ongoing.
8.9	The above climate change recommendations to be reviewed within 12 months of the release of the IPCC prediction data to ensure recommendations are kept current.	

9. Education and Communication

Introduction

Education is the key to gaining acceptance from the community to the principles and detail of the ZIP. It was agreed that an empowered community is one that is going to be engaged in positive environmental management. Many of the population of the Peninsula are motivated in conservation and biodiversity but not fully informed on all the water issues. The importance of working with and using the contacts and experience of existing organisations is also recognised. Such organisations are highlighted for support and where appropriate, funding. The committee is especially committed to achieving the long term goals by educating the young and has included recommendations with this focus. The Committee has proposed a pathway to encourage research and development.

Priority Outcomes

The Banks Peninsula community is empowered by education in environmental management. Environmental successes in the Zone are appropriately recognised and publicised.

Recommendations

	Recommendations	To be carried out by
9.1	The Zone Committee to investigate setting up catchment groups and other options as a means to interact with the community, report to the community and to develop community ownership of the water issues.	Zone Committee within 1 year.
9.2	Education to be supported in parallel with enforcement.	Christchurch City Council and Environment Canterbury immediate and ongoing.
9.3	Enviroschools to be adequately funded so youth are empowered.	Christchurch City Council and Environment Canterbury immediate and ongoing.
9.4	A Youth Hui is held in 2013.	Environment Canterbury within one year.
9.5	Education to be prioritised in the following areas (in order of importance): • Council set water quality and quantity limits, and explanations of what they mean; • Water efficiency information, including best practice in managing water in order to meet council limits; • Information on how to improve water quality to meet council limits; • Erosion and sediment control; • Biodiversity knowledge and monitoring; • Christchurch City Council sites of significance (SES); • Planning rules and consents; • Research and development; • Promotion of 'Flagship' projects; • Flood management; • Community involvement in monitoring; • Septic tank maintenance; • Reticulated system information; • Salt marsh protection • Regional Pest Strategy, and • Climate change.	Relevant agencies and Councils progressive implementation
9.6	The existing Peninsula groups and organisations including Rūnanga, Banks Peninsula Conservation Trust and Farm Discussion Group, to be used to educate about the issues in recommendation 9.5.	All agencies ongoing.
9.7	There is a focus on research and development in the Zone.	All agencies ongoing.
9.8	The Zone Committee to look for opportunities to promote achievements using media and resources available from Christchurch City Council and Environment Canterbury.	Zone Committee ongoing.

10. Coastal

Introduction

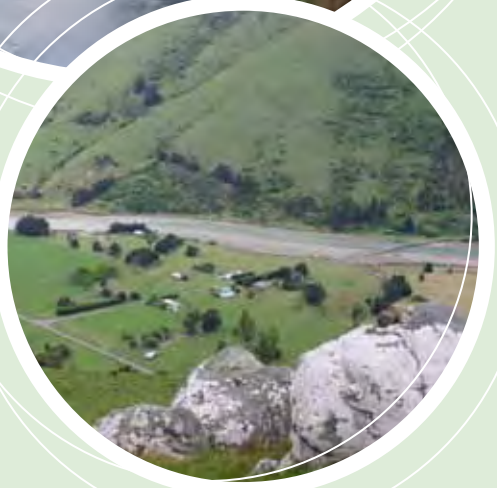
The planning framework for coastal issues is covered under 'The New Zealand Coastal Policy Statement' (2010), which is due to be reviewed in the Canterbury region starting in 2013. This review will result in an updated Regional Coastal Environmental Plan (RCEP). Even though this ZIP (under the CWMS) is outside the scope of this review, the Zone Committee considers it important to include a coastal chapter in the ZIP to provide a holistic, integrated approach to water management in the Zone. The majority of fresh water this ZIP relates to will end up in the coastal waters. There are many community and Ngāi Tahu philosophies of connectedness between mountains, rivers and the sea and the majority of Banks Peninsula tourism and recreation is focused around the harbours.

Priority Outcomes

The harbours are a natural extension of the rivers and streams. The marine biodiversity of the harbours is protected and restored.

Recommendations

	Recommendations	To be carried out by
10.1	Environment Canterbury to collaborate with the community through the Coastal Plan process beginning 2013.	Environment Canterbury in 2013.
10.2	A list of interested parties to be compiled, including the established Lyttelton Harbour/Whakaraupō Issues Group and Akaroa Harbour Issues Group that are involved in Coastal Management. Ways of working with these groups to enhance land to coastal management to be developed.	Environment Canterbury in 2013.
10.3	Water quality to be investigated and monitored for its impact on sustaining coastal harbours.	Environment Canterbury in 2013.
10.4	A cross-organisation ecological monitoring programme to be developed for the Peninsula along the lines of the healthy estuary/rivers of the city monitoring programme.	Christchurch City Council, Environment Canterbury, Rūnanga, Lyttelton Port Company, DOC, and Community Harbour Issues Groups within 3 years.
10.5	The list of Environment Canterbury's testing bathing sites to be reviewed, working with the councils to improve water quality, ensuring they are suitable for contact recreation.	Environment Canterbury, Christchurch City Council and Zone Committee within 3 years.



APPENDICES

1. **Drinking Water Grading Information**
   Christchurch City Council
2. **Planned upgrades to water and wastewater plants**
   Christchurch City Council
3. **Minimum and low flows for streams on the Peninsula**
   Environment Canterbury data
4. **Flow-Sensitive Catchments**
   Environment Canterbury data
5. **Explanation of surface and groundwater interactions**
   Environment Canterbury scientist comment
6. **Soil Erosion Map**
   Environment Canterbury Proposed Land and Water Plan
7. **Te Roto O Wairewa TLI explanation and History**
   Environment Canterbury scientist and Wairewa Rūnanga
8. **Ngāi Tahu Whānui History**
   Ngāi Tahu
9. **Continuation of the Zone Committee**
   Environment Canterbury

APPENDIX 1

1. Drinking Water Grading Information - (Source CCC)

1. Water Supply Systems

1.1 Public Drinking Water Supply Systems

Christchurch City Council provides reticulated public drinking water supply systems to several communities in Banks Peninsula:

- Akaroa.
- Birdlings Flat.
- Duvauchelle.
- Little River.
- Pigeon Bay.
- Takamatua.
- Wainui.
- Lyttelton Harbour Basin (extending from Lyttelton to Diamond Harbour and Governors Bay).

These systems include seven main pumping stations, six water treatment plants and over 130 kilometres of network infrastructure.

The City Council has consents to abstract from surface water sources and ground water sources to deliver this service. The sources for each of the public drinking water supply systems is summarised in Table 1 below.

Some of the public drinking water supply systems are on-demand (unrestricted) and others are restricted supplies. Table 1 indicates the status of each system.

Table 1. Public drinking water systems in Banks Peninsula

Water supply system	Drinking water source(s)	Type
	Aylmers Stream	On-demand
	Aylmers bore	
	Balguerei Stream	
	Grehan Stream	
	Settlers Hill Rd bore	
Birdlings Flat	Birdlings Flat bore	Restricted (1 m3/d)
Duvauchelle	Pipers Stream	Restricted (1 m3/d)
Little River	Police Creek	Restricted (1 m3/d)
Pigeon Bay	Dick Stream	Restricted (1 m3/d)
Takamatua	Takamatua Stream	On-demand
Wainui	Wainui bore	Restricted (1 m3/d)
Lyttelton Harbour Basin	Groundwater ()	On-demand

The City Council operates water treatment plants, where needed, so that the public drinking water supply systems meet Ministry of Health standards. Table 2 lists the public drinking water supply systems and the treatment used, where applicable.

Table 2. Treatment of public water drinking systems

Water supply system	Treatment used
Akaroa	L'Aube Hill plant (majority of water supplied): filtration plus chlorine disinfection
Birdlings Flat	Filtration plus UV disinfection
Duvauchelle	Settlement plus filtration plus chlorine disinfection
Little River	Filtration plus chlorine disinfection
Pigeon Bay	Settlement plus filtration plus UV disinfection
Takamatua	Settlement plus filtration plus chlorine disinfection
Wainui	Filtration
Lyttelton Harbour Basin	Not applicable

Appendix A shows the areas served by the public drinking water supply systems.

1.2 Private Community Supplies

In addition to the Council-operated public drinking water systems, there are nine privately operated community drinking water supplies in Banks Peninsula:

- French Farm Winery
- Governors Bay Preschool
- Koukourarata Marae
- Le Bons Bay Domain
- Little River School
- Living Springs
- Okains Bay
- Onuku Marae
- Takamatua Valley Vineyard

1.3 Rest Of The Peninsula

Human drinking water needs in the rest of Banks Peninsula are met by small individual privately owned and operated supplies. These include systems serving a single household as well as very small private communal systems serving less than 50 people per year.

2. Regulatory Framework

Under the Health (Drinking Water) Amendment Act 2007, community drinking water supply systems must meet certain standards by specified dates based on the population served by these supplies.

2.1 Public Health Risk Grading

Community drinking water supplies, which include both public drinking water systems such as Akaroa and privately operated systems such as French Farm Winery, are graded against Ministry of Health (MoH) standards. The MoH grading is intended to indicate level of confidence that a drinking-water supply system will not become contaminated, rather than being an absolute indication of quality at a specific time.

There are two grades applied to community drinking water supplies:

Treatment Plant: A zone receives water from one or more treatment plants. If there is no physical treatment, for example the "urban" Christchurch public drinking water supplies, a nominal treatment plant is still defined. The grading ranges from A1 to U and is based primarily on the likely health risks to the community arising from bacteria, protozoa and chemical substances in the source water, and how effectively the treatment plant can act as a barrier to such contaminants.

A1 - Completely satisfactory, negligible level of risk, demonstrably high quality

A - Completely satisfactory, extremely low level of risk

B - Satisfactory, very low level of risk when the water leaves the treatment plant.

C - Marginally satisfactory, low level of microbiological risk but may not be satisfactory chemically.

D - Unsatisfactory level of risk

E - Unacceptable level of risk

U – Ungraded

Note that for an untreated system such urban Christchurch, the highest grading possible is a B, because the water is not treated.

Distribution Zone: A zone comprises all or part of a town or community that receives similar quality water from its taps. If different parts of town have different water sources or conditions, then the community will be divided into two or more zones. Zone grading ranges from a1 to u, and is based upon the microbiological and chemical quality of the water, along with the condition of the reticulation system and the quality of its care, and related factors.

a1 - Completely satisfactory, negligible level of risk, demonstrably high quality

a - Completely satisfactory, extremely low level of risk

b - Satisfactory, very low level of risk

c - Marginally satisfactory, moderately low level of risk.

d - Unsatisfactory level of risk

e - Unacceptable level of risk

u - Not yet graded. (Not yet required if less than 500 people)

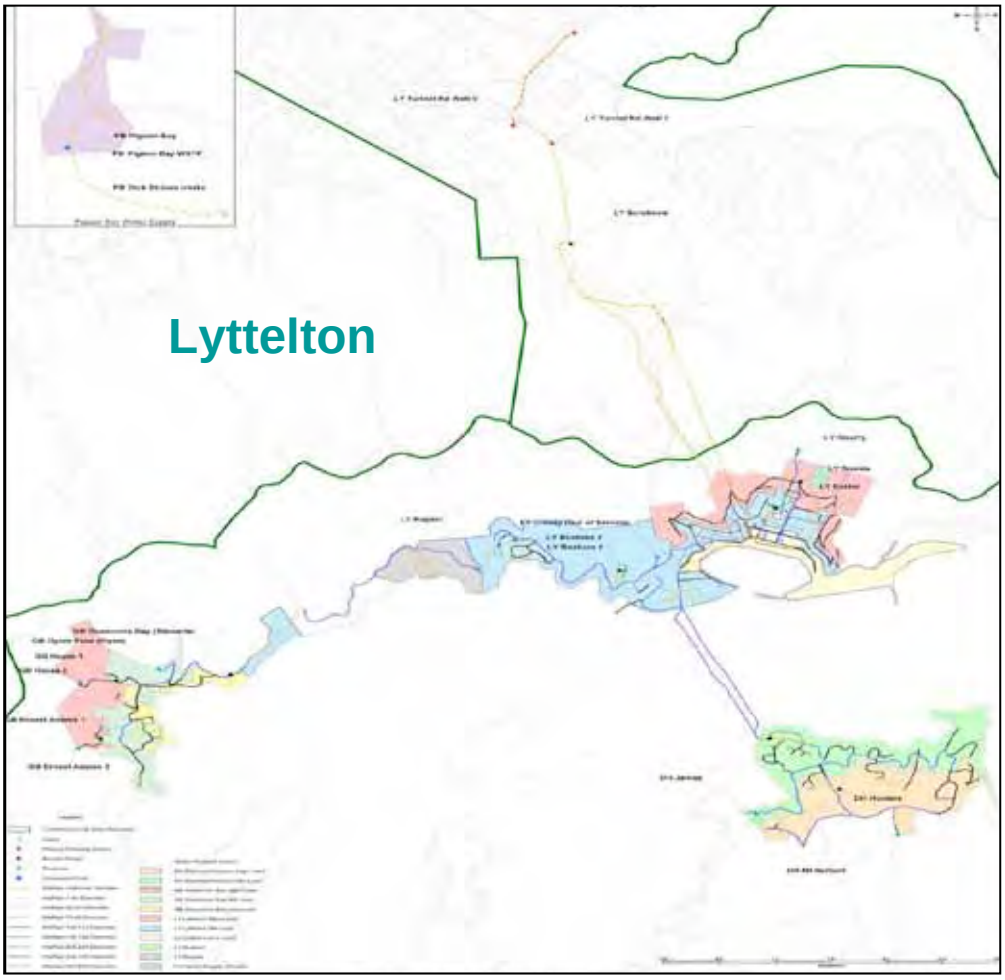
There is a minimum grade for a community water supply system, based on the size of the community served by the system. Table 3 lists the most recent grading for each system as well as the minimum grading required based on the population served. Note that many of the Banks Peninsula public drinking water supply systems have not been graded.

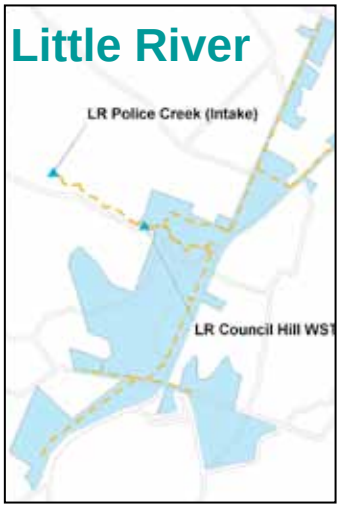
**State calculated using regression with Jollies*

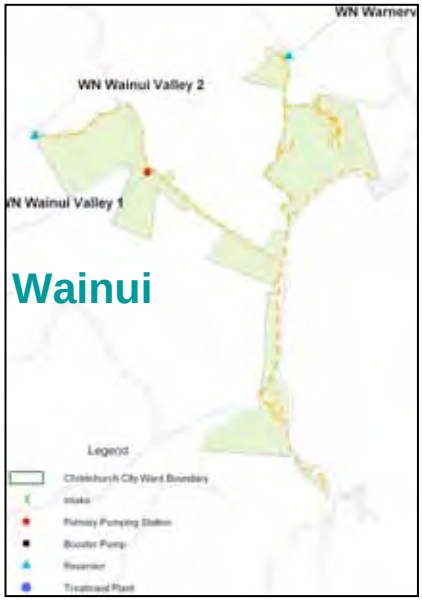
Table 3. MoH gradings - Public drinking water systems

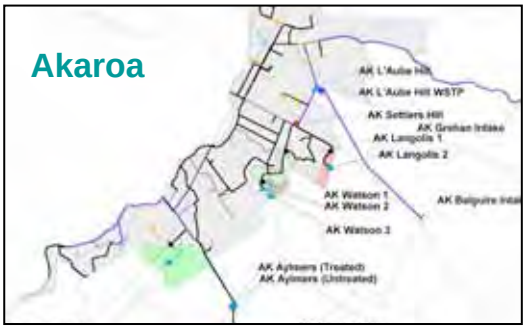
Water supply system	MoH Grading	Minimum Grading
Akaroa	Aylmers Zone: Ue	Cc
	L'Aube Hill Zone: Uc	Cc
Birdlings Flat	Birdlings Flat Zone: Uu	Cc
Duvauchelle	Duvauchelle Zone: Uu	Cc
Little River	Little River Zone: Uu	Cc
Pigeon Bay	Pigeon Bay Zone: Uu	Cc
Takamatua	Takamatua Zone: Uu	Cc
Wainui	Wainui Zone: Uu	Cc
Lyttelton Harbour Basin	Diamond Harbour Zone: Bb	Bb
	Governors Bay Zone: Ba	Bb
	Lyttelton Zone: Bb	Bb

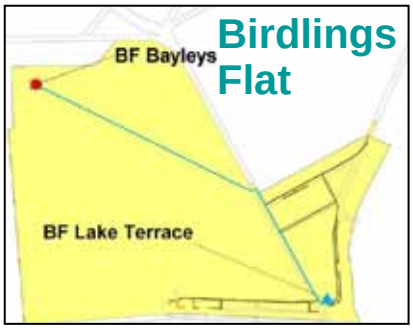
Appendix A. Areas served by City Council drinking water supply systems

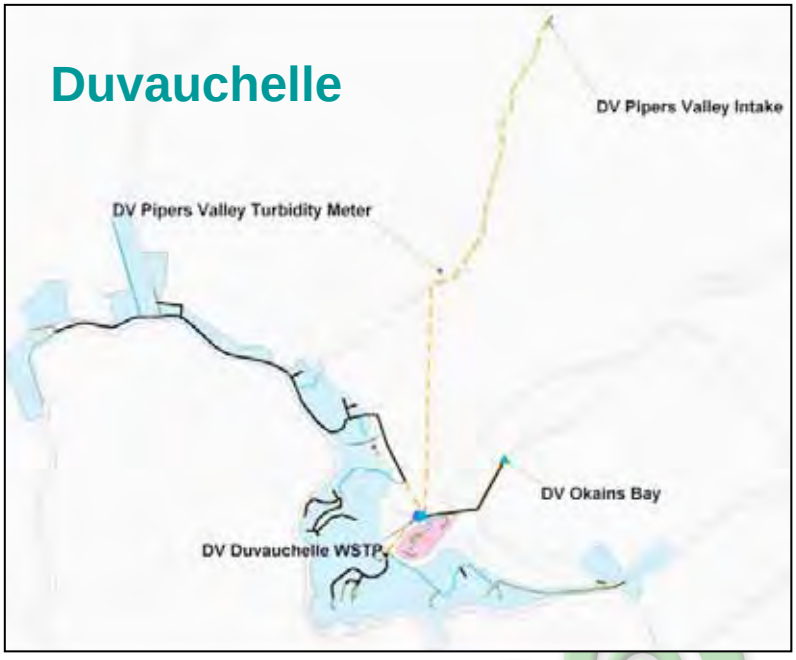






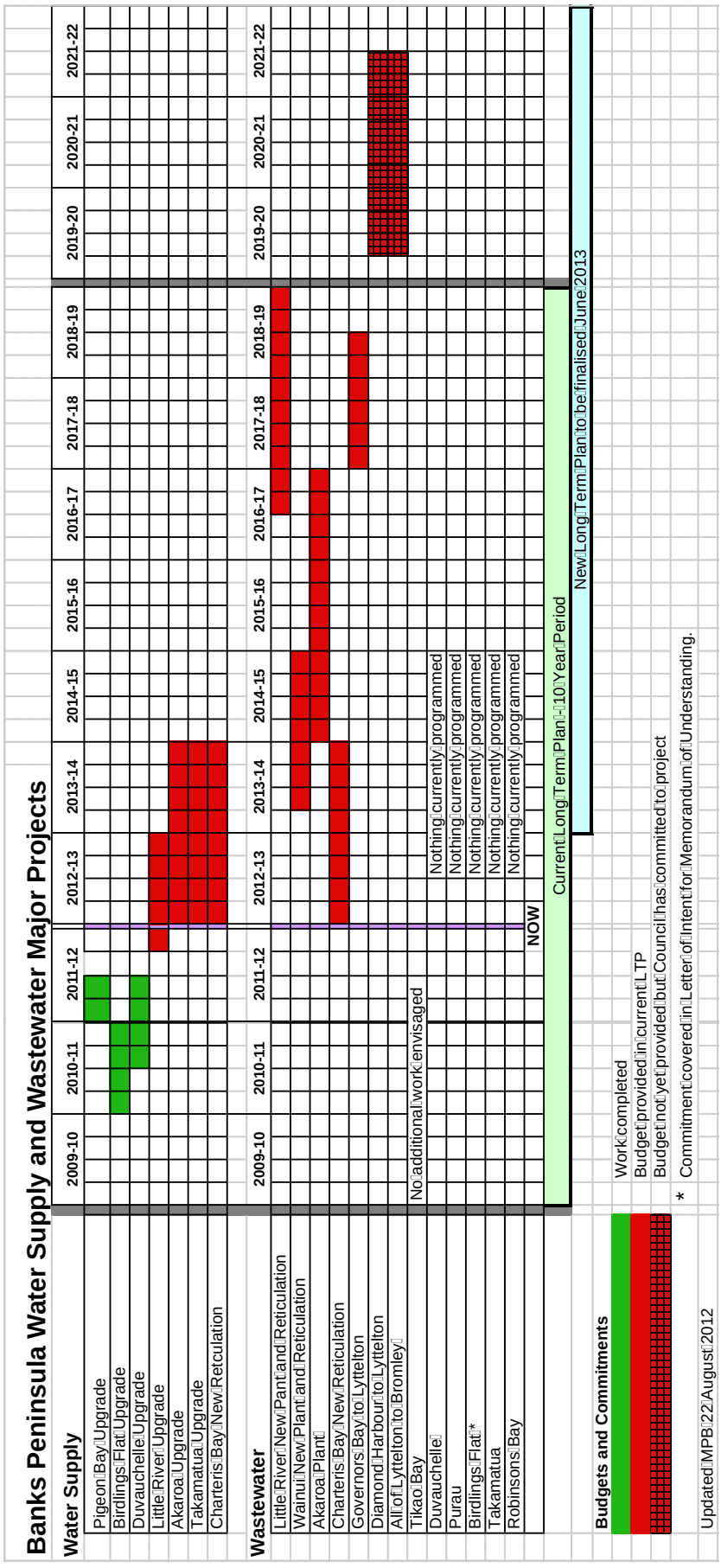






APPENDIX 2

Supply And Wastewater Upgrade Projects



APPENDIX 3

Peninsula Streams Minimum Flows (Source Environment Canterbury)

Site	Catchment	Min flow or residual	Min l/s	Allocation	No of consents in allocation	MALF 7d l/s	Mean Flow l/s
Barrys Bay Stream at Lower Rd Bridge- Cheese Factory	Akaroa	Min flow	38	18.84	3	19	138
Pawson Valley Stream at SH75 Bridge	Akaroa	Min flow	15	11.3	2	9	67
Pipers Valley Stream at d/s of BPDC Take-Craw Property	Akaroa	Residual	3	5.5	1		
French Farm Stream at French Farm Valley Rd	Akaroa	Min Flow	18	10.7	5	15	111
Pipers Creek at Chirstchurch- Akaroa Rd Bridge	Akaroa	Min Flow	11	5	1	9	47
Aylmers Stream at d/s BPDC Intake	Akaroa	Residual	0.5	19.2	1	7	41
Balguerie Stream at d/s BPDC intake	Akaroa	Residual	0.5	13.2	1	7	38
Grehan stream at d/s BPDC Intake	Akaroa	Residual	0.5	14.5	1	6	43
Smarts Rd Drain at d/s of dam-Flatman property	Lyttelton	Residual	0.2	0	1		
Charteris Bay Stream at Teddington/Purau Rd	Lyttelton	Min flow	22	10	1	21	177
Pigeon Bay Stream at Port Levy /Pigeon Bay Rd	Outer Bays	Min flow	32	15	1	37	342
Dick Creek Stream at BPDC Intake	Outer Bays	Residual	0.08	0.35	1		
Waterfall Creek at Little Akaloa Rd Bdg	Outer Bays	Min flow	6	3	1	5	17
Little Akaloa Stream at Little Akaloa Rd Bridge	Outer Bays	Min flow	16	8.3	1	42	176
Holmes Stream at Port Levy Pigeon Bay Rd	Outer Bays	Min flow	30	0.5	1	28	145
Okuti River at Kinloch Rd Bridge	Wairewa	Min Flow	45	10	1	66	342

SWAZ with no min flow	Catchment	Min flow or residual	Min l/s	Allocation	No of consents in allocation	MALF 7d l/s	Mean Flow l/s
Takamatua Bay	Akaroa	-	-	26.2	4	21	89
Wainui Valley Stream	Akaroa	-	-	3	1	44	202
Purau Bay	Lyttelton	-	-	5	1	14	230
Lebons Bay	Outer Bays	-	-	0.32	1	-	-
Okains Bay	Outer Bays	-	-	5	1	42	249
Menzies Bay Stream	Outer Bays	-	-	0.5	1	0	46
Police Creek	Wairewa	-	-	2.5	1	-	-

Low Flows

Southern Bays catchment	Mean Flow	MALF (7day)
Peraki Creek at Peraki Bay	288	41.7
Peraki Creek at Wrights Rd	16	3.3
Tumbledown Bay Strm at Te Oka bay Rd	61	5.2

Lyttelton catchment	Mean Flow	MALF (7day)
Allandale Strm at Allandale	16.5	0.7
Cass Peak Strm at Allandale	6.6	0.3
Charteris Bay Stream at Teddington/Purau Road	177.2	20.8
Charteris Bay Strm at Upper	174.2	20.3
Purau Bay Stream at Blakey Ford	300.7	7.8
Purau Bay Stream at Camp Ground	230	14.4
Waiake Strm at Teddington-Purau Rd	81.7	5.4

Low Flows

Outer Bays catchment	Mean Flow	MALF (7day)
Damons Bay Strm at Walking Track	24	3.4
Flea Bay No 1 at Flea Bay	108	19.8
Holmes Stream at Upstream Port Levy Pigeon Bay Road	144.6	27.9
Little Akaloa Stream at Little Akaloa Rd Bge	175.7	42.4
Menzies Stream at Menzies Bay	45.8	0.0
Opara Stream at Friesan Stud Farm (Recorder)	249	42
Opara Stream at Okains Bay Rd	137	15.4
Pigeon Bay Stream at Pigeon Bay Road	341.9	37.5
Pigeon Bay Strm at Kukupa	105	12.5
Stoney Beach Strm at Chorlton Okains Rd	84	14.5
Waterfall Creek (Little Akaloa) at Little Akaloa Chorlton Road	17.4	4.6

Akaroa Catchment	Mean Flow	MALF (7day)
Aylmers at Beach Rd Bge	67	17.9
Aylmers Stream at Upstream Council Intake (Recorder)	41	7.1
Balgueri Stream at Akaroa	91	21.6
Balguerie Stream at u/s Council Intake	37.8	6.5
Barrys Bay Stream at Cheese Factory	137.8	19.4
French Farm at French Farm Valley Rd (Recorder)	111	15
French Farm at Upper Bge Site	103	15.3
Grehan Stream at u/s Council Intake	43.3	6.2
Jubilee Stream at Jubilee Rd Bge	81	17
Jubilee Stream at Wainui	85	26.7
Kaik Stream at Top Crossing	8	2
Kaik Stream at Pa	55	9.9
Pawsons Valley Stream at Chch Akaroa Road	66.9	8.9
Pipers Stream at Chch Akaroa Road	46.7	9.0
Pipers Vlly Strm at Upper Bridge	11	4.2
Robinsons Bay Stream at CHCH/Akaora Road	113	24.7
Takamatua Ck at CHCH/Akaroa Rd	133	21.3
Takamatua Ck at Takamatua Vly Rd	89	20.6
Wainui Stream at 2nd Bridge	20	8
Wainui Stream at Wainui	202	43.5

Wairewa catchment	Mean Flow	MALF (7day)
Hikuika Strm at Opuahou Strm confl	150	17.8
Huka Huka at Lathams Br (Recorder)	217	34.3
Hukahuka Strm at Bachelors Rd Ford	68	11.6
Okana River at SH 75	763	108
Okuti River at Kinloch	399	66.3
Opuahou Stream at Hikuika Strm confl	212	36.9
Reynolds Strm at Brankins Bge	76	18.1

APPENDIX 4

Flow Sensitive Catchments (From Proposed Land And Water Plan)

Flow Sensitive Catchments (source Environment Canterbury proposed land and water plan)

Catchment (see Planning Maps)	Sensitive part of catchment	Monitoring site - lower boundary of catchment
Opara Stream	Whole catchment	Opara recorder site
Dick Stream	Whole catchment	Confluence with Pigeon Bay Stream
Pawson Valley Stream	Whole catchment	Christchurch/Akaroa Road (State Highway 75)
Pipers Valley Stream (Duvauchelle)	Whole catchment	Governors Bay/Teddington Road and Allandale
Allandale Stream (Smarts Road Drain)	Whole catchment	Christchurch /Akaroa Road (State Highway 75)
French Farm Stream	Whole catchment	French Farm Valley Road recorder above Christchurch/Akaroa Road (State Highway 75)
Te Wharau Stream	Whole catchment	Teddington/Purau Road
Takamatua Stream	Whole catchment	Christchurch /Akaroa Road (State Highway 75)
Okuti River	Whole catchment	Kinloch Road Bridge
Okana River	Whole catchment	Christchurch /Akaroa Road (State Highway 75)
Pigeon Bay Stream	Whole catchment	Pigeon Bay Road
Police Stream	Whole catchment	Christchurch /Akaroa Road (State Highway 75)

APPENDIX 5

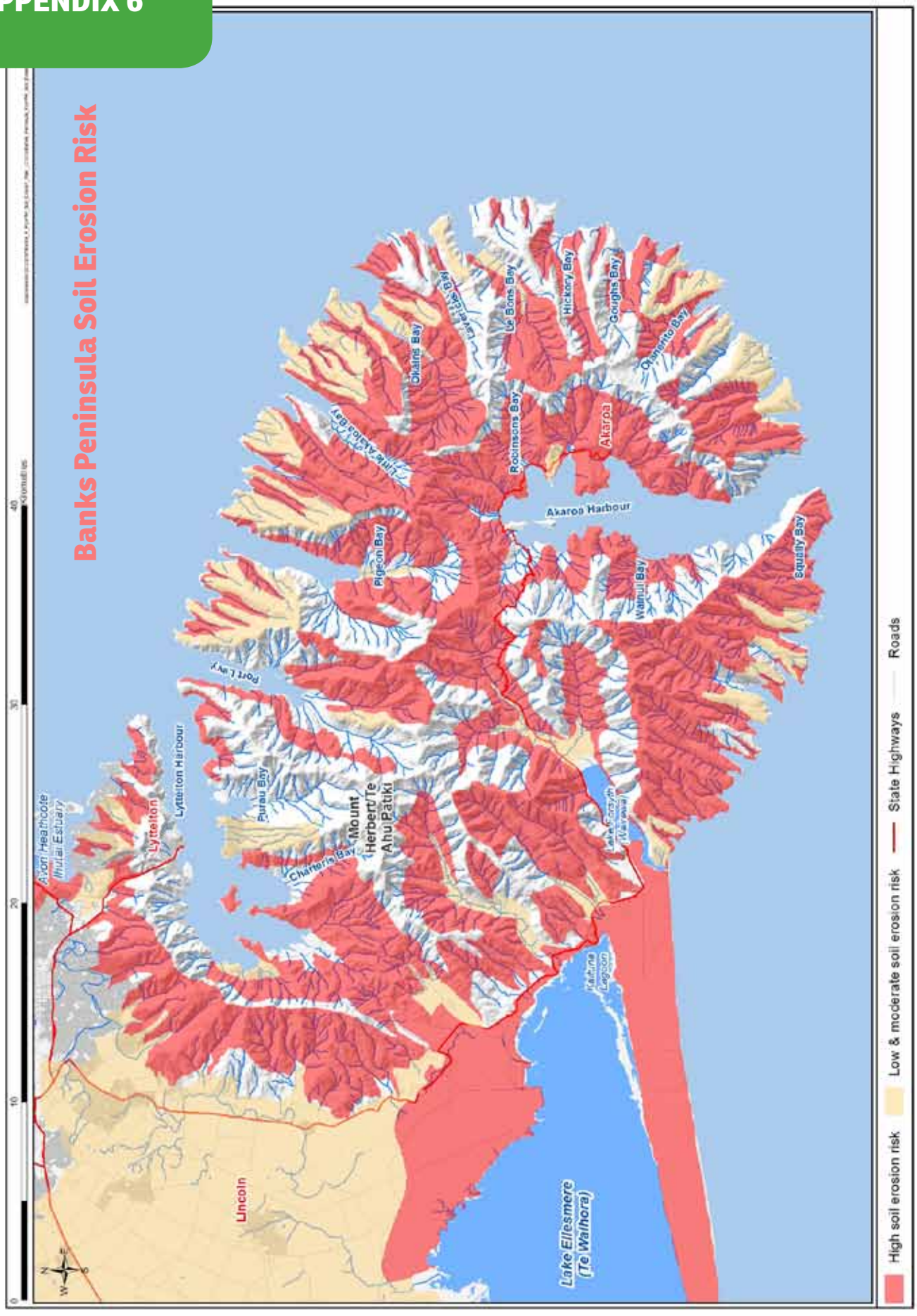
Groundwater-Surface Water Interaction On Banks Peninsula

The geology of Banks Peninsula is predominantly basalt and other volcanic rocks which contain deep fractures. These fractures are capable of storing groundwater derived from infiltrating rainfall above them. Although the volumes can be large they are nowhere near as large as the aquifers under the Canterbury Plains and they have no direct connection to the aquifers under the plains. There are two ways that the Banks Peninsula groundwater interacts with surface water.

It is common to have springs and seeps on hillsides; these often become small streams or are used for stock water sources. The springs and seeps are where the groundwater has moved downslope and reached either an easy discharge point (e.g. a large crack that reaches to the surface) or a point where flow is very difficult (e.g. an area with very few fractures). In the latter case the groundwater goes from flowing easily to a constriction and can therefore be pushed towards the surface.

The fact that many Banks Peninsula streams continue flowing during the summer after long periods without rain is because the stream flow is being fed by groundwater. The groundwater reaches the streams via springs on hillsides (e.g. as described above) or a multiple of small springs in the streambed. On the valley floor the water table is often close to the surface and groundwater can easily reach the surface in these springs.

APPENDIX 6



This indicative map is from the proposed Environment Canterbury Land and Water Plan which is currently progressing through hearings (March 2013). The finalised areas of high soil erosion risk will be managed through rules in the plan for activities such as vegetation clearance and earthworks and these activites may require resource consent.

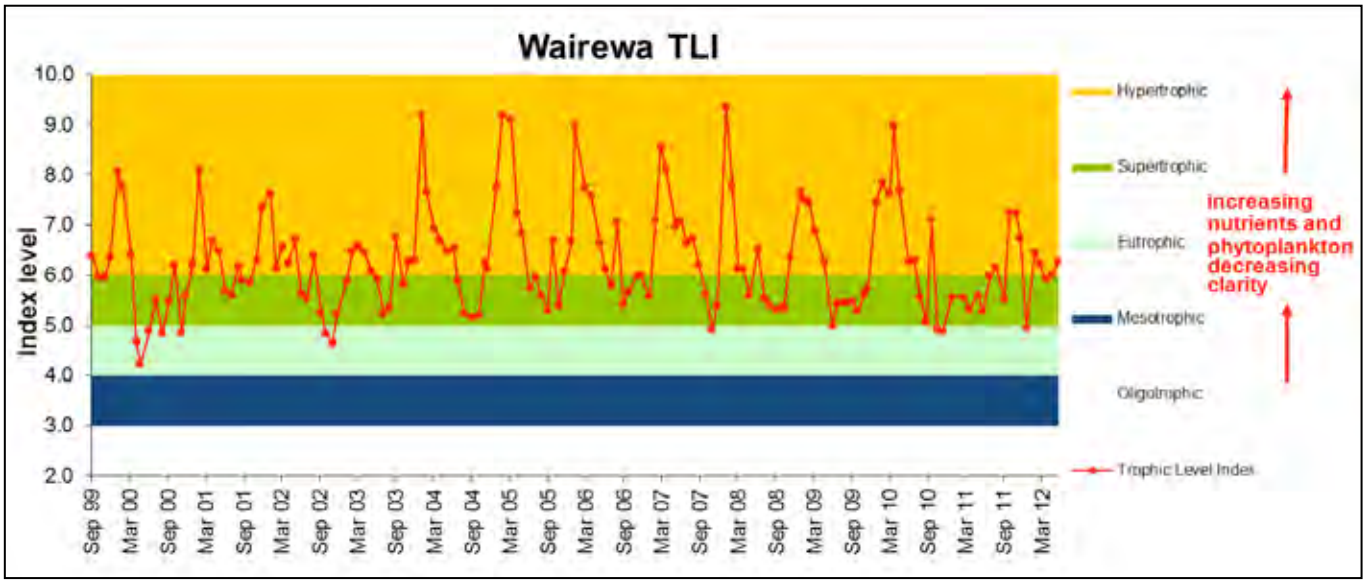
APPENDIX 7

Trophic Level Index (TLI)

Trophic level index (TLI) is a way of combining water quality information for lakes into a single number which describes the water quality in a simple way. In most Canterbury lakes[1] the TLI is a combination of total nitrogen, total phosphorus and chlorophyll-a, as measured in water samples.

The TLI number is then used in a classification of a lake's "trophic state". The trophic state of a lake indicates its biological productivity, i.e. the amount of living material supported within the lake, primarily as algae. The least productive lakes are called "microtrophic". These are typically cool and clear, and have relatively low nutrient contents. The most productive lakes are called "hypertrophic" and are characterized by high nutrient concentrations which result in algal growth, cloudy water, and low dissolved oxygen levels. In between these microtrophic and hypertrophic levels are the "oligotrophic", "mesotrophic", "eutrophic" and "supertrophic" levels.

The diagram below shows the TLI calculated from monthly measurements of water quality in Lake Forsyth (Te Roto o Wairewa); N.B. each red dot represents a separate monthly sample of water quality in the lake. The most notable thing about the TLI in Wairewa is the variability, with the lake moving between eutrophic and extremely hypertrophic levels. The nearby Te Waihora (Lake Ellesmere) shows a much steadier TLI of about 7 (hypertrophic) during a similar period of measurement. The extreme hypertrophic peaks are in the summer when large algal and cyanobacterial blooms are known to occur. During the winter the lake is generally in a supertrophic state (between 5 and 6).



1 In other parts of New Zealand water clarity may also be included in the TLI calculation. Water clarity is not used in many Canterbury lakes because of the affects of glacial flour suspended in the water column (e.g. Lakes Tekapo, Pukaki, Benmore and Ohau) and resuspended sediment (e.g. shallow coastal lakes like Wairewa), both of which are not linked to biological productivity.

Te Roto O Wairewa (Lake Forsyth)

Te Roto o Wairewa is a shallow coastal lake and is a tribal taonga. The lake is also one of only two customary lakes in Aotearoa (the other being Horowhenua). This means that only persons belonging to the Ngāi Tahu iwi can take eels from the lake. It has been home to a permanent settlement for many generations and was the last lake named by Rākaihautū. The lake has been also known as Te Pātaka Kai a Makō (the food basket of Makō) because it provided abundant mahinga kai all year round. It is central to Ngāi Tahu values, culture, and social order. This includes all the traditional systems, processes, rules, and regulations used to manage and protect the valuable indigenous resources. Te Roto o Wairewa supports a customary fishery; tuna (eel), pātiki (flounder), aua (yellow eyed mullet), kanakana (lamprey) and inaka (whitebait) are the primary species caught. Extensive forests in the catchment provided timber, fibre for building and weaving, as well as food and traditional medicines. Te Roto o Wairewa is Statutory Acknowledgement site, recognizing the mana of Ngāi Tahu with regard to the lake and guaranteeing tribal involvement in management. Schedule 71 of the NTCSA 1998 is a statement of Ngāi Tahu cultural, spiritual, historic, and traditional association to the lake.

Thousands of years ago Te Roto o Wairewa was a hāpua or estuary and in the late 1800's, alluvial drift caused the lake to close by the growth of a large shingle bar, known as Kaitōrete Spit. Over the last 160 years, the catchment has been dramatically modified and mahinga kai values severely degraded. The majority of native forest cover was removed between 1860 and 1890 to open up the land for agricultural and pastoral land use, resulting in massive reductions in native bird and plant species. Sedimentation in the Lake has increased due to forest clearance, wetland drainage, pest and weed incursion, and the intensification of land use, and this has had major effects on both terrestrial and aquatic environments. The land cover and land use within the catchment has changed dramatically over the past 160 years. This has increased the nutrient content in the sediment, namely nitrogen and phosphates. The increase in nutrients, along with a shallower lake has made the lake highly eutrophic with extreme water quality problems. The most severe problem is the summer blooming of Nodularia Spumigena (blue green algae). The cyanotoxin, Nodularia R that is produced when this algae blooms is highly toxic to humans, livestock and pets.

The level of Te Roto o Wairewa has been controlled for flood protection since the 19th century. The lake is currently fresh to brackish, depending on freshwater inflows and on whether the lake canal is open to the sea. The lake is highly turbid due to high algal production and wind-driven sediment resuspension. The mechanical opening regime was a stop gap measure initiated after the government considered that costs for the preferred option of creating some form of permanent opening were prohibitive. Since then this regime has been in place without recourse to cultural, social or environmental considerations.

Based solely on arbitrary trigger levels the lake is currently opened mechanically by diggers. This regime is unacceptable to Wairewa Rūnanga and Ngāi Tahu. The Waitangi Tribunal recommended in respect of Te Roto o Wairewa that a management plan be prepared, involving Ngāi Tahu as part of the decision making process along with the Department of Conservation, Regional Authority, Ministry of Agriculture and Fisheries, for the improvement of the water quality, with the Crown providing the same resources as recommended in respect of Te Waihora.

APPENDIX 8

Ngāi Tahu Whānui History

Te Waka o Aoraki

In the beginning all was darkness (Te Pō). Out of the first glimmer of light (Te Ao), long standing light (Te Aotūroa) emerged until it stood in all quarters. Encompassing everything was a womb of emptiness, an intangible void (Te Kore). This void was intense in its search for procreation. Finally it reached its ultimate boundaries and became a parentless void (Te Koremātua) but with the potential for life. And so Te Makū, moisture, emerged and coupled with Mahoranuiatea, a cloud that grew from the dawn. From this union came Raki, the heavens, who coupled with Pokohārua Te Pō the breath of life found in the womb of darkness. The first child in this chain of creation was Aoraki who stands as the supreme mountain of Ngāi Tahu.

In the beginning there was no Te Wai Pounamu or Aotearoa. The waters of Kiwa rolled over the place now occupied by the South Island, the North Island and Stewart Island. No sign of land existed. Before Raki (the Sky Father) wedded Papatūānuku (the Earth Mother), each of them already had children by other unions. After the marriage, some of the Sky Children came down to greet their father's new wife.

Among the celestial visitors were four sons of Raki who were named Aoraki (Cloud in the Sky), Rakiroa (Long Raki), Rakirua (Raki the Second), and Rārakiroa (Long Unbroken Line). They came down in a canoe which was known as Te Waka o Aoraki. They travelled around Papatūānuku who lay as one body in a huge continent known as Hawaiki.

Then, keen to explore, the voyagers set out to sea, but no matter how far they travelled, they could not find land. They decided to return to their celestial home but the karakia (incantation) which should have lifted the waka (canoe) back to the heavens failed and their craft ran aground on a hidden reef, turning to stone and earth in the process.

The waka listed and settled with the west side much higher out of the water than the east. Thus the whole waka formed the South Island, hence the name: Te Waka o Aoraki. Aoraki and his brothers clambered on to the high side and were turned to stone. They are still there today. Aoraki is the highest peak (Mount Cook, and his brothers are the next highest peaks near him).

The form of the island as it now owes much to the subsequent deeds of Tū Te Rakiwhānoa, the grandson of Aoraki, and his companions Marokura and Kahukura. Tū Te Rakiwhānoa raked up the best bits of Kā Pākihi Whakatekateka o Waitaha (Canterbury Plains) and formed Te Pātaka o Rākaihautū (Banks Peninsula).

Tū Te Rakiwhānoa called upon his companion, Marokura to do the work related to the sea. He scooped out inlets, bays, and estuaries. He then put all kinds of kaimoana in these places. Now it was the turn of Kahukura to cover Te Pātaka o Rākaihautū with native grasses, native trees, flax and raupō. In the hollows in Te Pātaka o Rākaihautū he made little lakes and swamps. It soon rained and these filled up making little streams and rivers flowing down the valleys to the sea. Kahukura is held responsible for filling the bush with birds and the swamps with ducks, eels, and inaka.

Present day Ngāi Tahu Whānui are of Rapuwai, Hāwea, Waitaha, Kāti Māmoe and Ngāi Tahu ancestry. Three waves of Māori settlement are recognised on Te Pātaka o Rākaihautū / Banks Peninsula.

Waitaha

The history of the Waitaha people in New Zealand goes back many generations to about 850 AD, when Rākaihautū (a Waitaha ancestor) came to Te Wai Pounamu (the South Island) from Hawaiki as the captain of the Uruao waka. The waka was beached at Whakatū/Nelson. While his son Rakihouia took some of the party to explore the East Coast, Rākaihautū led the remainder on an inland route over the Southern Alps or Kā Tiritiri o te Moana. With his famous kō (digging stick) Tūwhakaroria, Rākaihautū dug the southern lakes (Kā puna karikari o Rākaihautū). Te Rakihouia then proceeded south down the Canterbury Coast in the Uruao waka and met up with his father in the vicinity of Waihao.

The final two lakes that Rākaihautū carved out were Te Waihora (Lake Ellesmere) and Te Roto o Wairewa (Lake Forsyth), these are guarded by a taniwha kaitiaki (guardian monster), named Tūterakihuanoa. Te Waihora was originally named Te Kete Ika o Rākaihautū - the fish basket of Rākaihautū, acknowledging the abundant resources in the lake.

Waitaha then settled in Akaroa Harbour. Overwhelmed by the magnificence of his artistic endeavours Rākaihautū decided to stay driving his kō, Tūwhakaroria deep into the ground above Wainui where it became Tuhiraki (Mt Bossu). As a testament to his work and in recognition of the abundance and variety of food and other resources found on the Peninsula up until quite recently, the people named the area Te Pātaka o Rākaihautū or the great food storage house of Rākaihautū.

Kāti Māmoe

Generations later, the Kāti Māmoe people arrived from the North Island (Te Ika a Maui) and settled among the Waitaha people. A prominent man of this tribe was Tūtekawa, who in establishing his home at Waikākahi, declared Te Waihora as his own and the lake became known as Te Kete Ika a Tūtekawa. Until the late seventeenth century, Kāti Māmoe was the main tribe in the South Island. When Tūtekawa killed two senior Ngāi Tahu women, Ngāi Tahu warriors came from the north in pursuit of Tūtekawa and his people. They ransacked the major Kāti Māmoe pā Parakākāriki (at Ōtanerito) and Waikākahi, and from there Ngāi Tahu chiefs took control of key locations on the peninsula.

Ngāi Tahu

By 1750, prior to European settlement, Ngāi Tahu occupied most of the South Island. Ngāi Tahu had settlements in every bay on the peninsula and on many of the headlands. They settled these areas in either hapū (sub-tribe) or whānau (family) groups. Ngāi Tahu settlement differed from the earlier more nomadic tribes in that permanent gardens were established. The gardening expertise of peninsula Ngāi Tahu must have been well honed; kūmara were grown successfully on Te Pātaka o Rākaihautū despite it being 1,000 kilometres further south than kūmara grown in their native Chile. In the early 1800s, there are records of trading between Ngāi Tahu and European sealers. However, as well as muskets, clothing, tobacco and alcohol, the Europeans brought with them a number of diseases. These diseases, combined with a ferocious civil war and raids led by Te Rauparaha from Kapiti, all took a huge toll on Peninsula Ngāi Tahu. A census conducted in 1848-49 estimated a population of only 300 Ngāi Tahu on the peninsula, whereas before the war and spread of disease there had been thousands.

Papatipu Rūnanga

Papatipu Rūnanga are the modern day administrative councils and representatives of Ngāi Tahu hapū and whānau traditional marae-based communities. Each Rūnanga has its own takiwā (area) determined by natural boundaries such as mountain ranges and rivers. The four Rūnanga on the Peninsula are Te Hapū o Ngāti Wheke, Te Rūnanga o Koukourārata, Ōnuku Rūnanga and Wairewa Rūnanga.

Mahinga Kai

Water plays a unique role in the traditional economy and culture of Ngāi Tahu. The most direct physical relationship that Ngāi Tahu have with water involves the protection, harvesting, and management of mahinga kai. The term 'mahinga kai' refers to natural resources and the area in which they are found, Ki Uta Ki Tai (from the mountains to the sea). Mahinga kai has always been, and continues to be, at the heart of Ngāi Tahu culture and identity.

It encompasses social and educational elements as well as the process of food gathering. This includes the way resources are gathered, the places they are gathered from, and the resources themselves. In the past, mahinga kai would have included seals, tītī (mutton birds), kererū, kaimoana (shellfish), tuna (eels) inaka (whitebait), trees for carving and waka, materials such as harakeke, and paru (mud), which are used for dyes. These resources are considered taonga (particular treasures for food and cultural identity) because they sustained life and an industry for the area and those who resided there. Thus cultural use, traditionally and today, continues within a sustainable use framework. For Ngāi Tahu today, participation in mahinga kai activities is an important expression of cultural identity. This participation is reliant on Ngāi Tahu people having sufficient access to mahinga kai sites, resources and a healthy environment.

Toitū te marae o Tangaroa
Toitū te marae o Tāne
Toitū te iwi
Healthy Water, Healthy Land, Healthy People.

APPENDIX 9

Continuation of the Zone Committee Approach on Banks Peninsula

The Banks Peninsula Zone Committee (BPZC) recommends that the zone committee approach is appropriate for Banks Peninsula and recommends that it continue on the same basis as all other zones in Canterbury. The terms of reference for the BPZC ask the Zone Committee to include recommendations in its Implementation Programme on the continuation of the zone committee approach or on the adoption of an alternative water management system for Banks Peninsula.

From the outset of the CWMS, Banks Peninsula has been recognised for the high level of community and landowner engagement, particularly in relation to biodiversity and the Banks Peninsula Conservation Trust. There were concerns that there was little left for a zone committee to do. After a year of operation, the BPZC has considered whether the zone committee approach should continue on Banks Peninsula. It believes the approach is working well, can see a strong on-going role for the committee and sees no need to change.

The zone committee process results in co-ordinated advice and advocacy to Environment Canterbury and Christchurch City Council. The Zone Implementation Programme expresses in one place how the community wants to see water managed. It enables integration of legal/regulatory approaches with community and industry-led projects. The BPZC have appreciated the opportunity to discuss local issues in a context that includes Ngāi Tahu. The Zone Committee sees it has a strong on-going role in having an overview of all community projects and can work to co-ordinate, oversee and align the work of existing groups. It has the ability to make recommendations on the regulatory system and how it can encourage or incentivise community initiatives.

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GLOSSARY

Adaptive management	A structured process of decision making using system monitoring in order to respond to change or uncertainty.
Allocation	The volume of water that may be taken from a fresh water resource by resource consent holders.
Audited self-management	A process where collective groups manage their resource use and activities to verify their adherence to good practice to achieve set outcomes.
Biodiversity	Is short for biological diversity. It describes the variety of all biological life: the different species from micro-organisms to trees, animal and fungi; the genes they comprise; and the ecosystems they collectively form. This includes diversity within species, between species, and of ecosystems
Customary Lake	A lake where only people of a certain iwi (in this case Ngāi Tahu) have a customary fishing entitlement for lawful fishing and gathering of natural resources (in this case tuna/eel).
Earthworks	The excavation of, and/or filling with topsoil, subsoil, sediments, rock and/or other underlying materials on which the soil is formed. Earthworks include, but are not limited to, the construction of roads, tracks, firebreaks and landings, and ground shaping (re-contouring), root raking and blading. Earthworks exclude cultivation of the soil for the establishment of crops or pasture.
Ecosystem	Plants, animals, their physical environment and the dynamic processes that link them.
Groundwater	Water located underground in rock crevices and pores /layers of geological material, groundwater supplies wells and springs.
Hapū	Sub-tribe; section of a larger tribe.
Hazardous site	The Resource Management Act (RMA) defines contaminated land as land of one of the following kinds: (a) If there is an applicable national environmental standard on contaminants in soil, the land is more contaminated than the standard allows; or (b) If there is no applicable national environmental standard on contaminants in soil, the land has a hazardous substance in or on it that – (i) has significant adverse effects on the environment; or (ii) is likely to have significant adverse effects on the environment.
Intensity of land use	The concentration of the use of the land through activity or productivity.
Iwi	Tribe.
Kaitiaki	Guardians, custodians.
Kaitiakitanga	The exercise of guardianship by the Tangata Whenua of an area in accordance with tikanga Māori in relation to natural and physical resources; and includes the ethic of stewardship.
Ki uta ki tai	From the mountains to the sea.
Limit	The exercise of guardianship by the Tangata Whenua of an area in accordance with tikanga Māori in relation to natural and physical resources; and includes the ethic of stewardship.
Mahinga Kai	Food and places for obtaining natural foods and resources. The work (mahi), methods and cultural activities involved in obtaining foods and resources.
Mana Whenua	Those with traditional status, rights and responsibilities in an area, based on their traditional takiwā (area).
Mauri	Life supporting capacity; spiritual essence; life, health and vitality; Mauri is the traditional measure of physical, spiritual and/or emotional wellbeing of people and places.
Mātauranga Māori	Māori traditional knowledge and systems. Mātauranga takes many forms, including language (te reo), traditional environmental knowledge (tāonga tuku iho, mātauranga o te taiao), traditional knowledge of cultural practice, such as healing and medicines (rongoā), fishing (kai moana) and cultivation (mahinga kai).

GLOSSARY CONTINUED...

Natural character	The natural flow regimes, dynamic processes and biodiversity of rivers are still in place, and the interdependence of waterways, land and coastal systems are intact.
Ngāi Tahu	Iwi with Tangata Whenua status in Canterbury and the South Island, excluding the northern part of the island.
Riparian planting	Planting usually of indigenous plants on the banks of rivers or streams to reduce erosion, stock access and pollution run off into a waterway.
Papatipu Rūnanga	Planting usually of indigenous plants on the banks of rivers or streams to reduce erosion, stock access and pollution run off into a waterway.
Rangatiratanga	Chieftainship.
Seven Day Mean Annual Flow (7MALF)	Is determined by adding the lowest seven day low flow for every year of record and dividing by the number of years of record (in any year the seven day low flow is the lowest average flow sustained over seven consecutive days).
Surface water or surface water body	Water above the ground surface and within a lake, river, artificial watercourse or wetland, but does not include water in the sea, snow or rain or water vapour in the air.
Takiwā	Area.
Tangata Whenua	Those with traditional status, rights and responsibilities in an area, based on their traditional takiwā.
Taonga	Treasured possessions, both tangible and intangible.
Taonga raranga	Plants which produce material highly prized for use in weaving.
Te Rūnanga O Ngāi Tahu	The organisation that services the tribes statutory rights and ensures that the benefits of the settlement grow for the future generations. It was established by the Te Rūnanga O Ngāi Tahu Act 1996.
Thriving	To prosper, be fortunate or successful. To grow or develop vigorously; flourish.
Tikanga	Tikanga can be described as general behaviour guidelines for daily life and interaction in Māori culture. Tikanga is commonly based on experience and learning that has been handed down through generations. It is based on logic and common sense associated with a Māori world view.
Trophic Level Index	Trophic Level Index (TLI) is a way of combining water quality information for lakes into a single number which describes the water quality in a simple way. In most Canterbury lakes the TLI is a combination of total nitrogen, total phosphorous and chlorophyll-a, as measured in water samples.
Tuia Project	Joint projects under the CWMS with Rūnanga in each Zone.
Wāhi taonga	Places and resources of historical and traditional significance often linked to significant mahinga kai values.
Wāhi tapu	A place sacred to Māori in a traditional, spiritual, religious, ritual or mythological sense *(section 2, Historic Places Act 1993)*.
Wetlands	Areas that are intermittently or permanently wet; shallow water and land water margins that support plants and animals that are adapted to the wet conditions.
Whānau	Extended family.
Whenua	Land, country, soil.

NOTES

Ki uta ki tai

From the mountains to the sea

Tell me and I'll forget. Show me and I might remember. Involve me and I will understand.

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Everything is connected

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Canterbury Water

Christchurch West Melton
Zone Implementation Programme (ZIP)
for the Canterbury Water Management Strategy

March 2013

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Selwyn District Council

Christchurch City Council

Zone Committee Membership:

Christchurch West Melton Zone Committee (the Committee) is a joint committee of Christchurch City Council, Selwyn District Council and Environment Canterbury Regional Council.

The members of the Committee as of the 21 March 2013 public meeting are:

Ian Fox Chair/Community member

Deidre Francis ..... Deputy Chair/Community member

Ann Winstanley..... Community member

Hugh Thorpe ..... Community member

Jon Harding ..... Community member

Robert Wynn-Williams..... Community member

Arapata Reuben..... Ngāi Tūāhuriri Rūnunga

Yvette Couch-Lewis..... Te Hapū ō Ngāti Wheke/Rapaki

Vacant ..... *Te Taumutu Rūnunga*

Councillor Debra Hasson ..... Selwyn District Council

Commissioner Rex Williams ..... Environment Canterbury

Councillor Sally Buck ..... Christchurch City Council

See http://ecan.govt.nz/get-involved/canterburywater/committees/chch-west-melton/Pages/membership.aspx for background information on committee members.

Previous members of the Committee are:

Herena Stone ..... Te Hapū ō Ngāti Wheke/Rapaki

Craig Pauling ..... Te Taumutu Rūnunga

With support from

Matthew Ross..... Environment Canterbury

Elizabeth Blayney..... Christchurch City Council

Diane Shelander ..... Christchurch City Council

For more information contact matthew.ross@ecan.govt.nz

Whakataukī

Ko o mātou whakaaro ki te whenua, ngā roto,
ngā awa, te moana hei here ia tātou.

O ngā tuputupunga o Te Aka o Tū Whenua

Hei whakatō whakatipu I ngā mahinga kai

Our thoughts are to the land, to the lakes, the rivers
and the sea that bind us together.

To preserve the well-being of the vines of
Tū Whenua (land and water)

That gave rise to the people's food gathering places

Chairman's Comments

"A consensus decision is one with which the majority agree, and the minority can at least live with" said a friend of mine a couple of years ago. With that definition firmly in mind, as the CWMS requires our decisions be arrived at by consensus, the Christchurch West Melton Zone Committee embarked on our journey about a year and a half year ago.

The destination, as far one goes, is a holistic management of water as embodied in the CWMS and specified in its Targets, although the people around this committee table probably won't be the ones who get there, as it's some distance away. Rather, our aim has been to provide the foundations upon which successive iterations of the ZIP can be laid in a way that can include prior learning and allow for new information as it comes to light. And, to give us something with which we can start to do things better than we have done before - right now.

Some thanks are due before I continue. Firstly, I have to say I'm proud to have been working with the people on and involved with this Committee. The Committee members are great and the effort they've put in to our deliberations has been eclipsed only by their forbearance for my (deliberately) bad jokes. Water management can, after all, be a somewhat dry subject at times. A large number of support staff from councils, particularly Environment Canterbury and Christchurch City Council, are due thanks too.

People from organisations outside Councils, along with community groups and members of the public, have contributed to this ZIP through the consultation process and so, the biggest thanks must go to those who took the time to make their voices heard; without public involvement the CWMS cannot achieve its goals. We received many helpful comments and points of feedback, which we have used to finalise the recommendations in this ZIP. Just as important are those ideas that relate more to the implementation of our recommendations, as they will help to guide us post ZIP.

Our task has been to produce a ZIP that reflects the values of local people as a set of recommendations to improve how your water is managed (bearing in mind that fish, birds, insects, plants, and future generations of people cannot speak for themselves, so I'm including all of them in "your" too). The CWMS is a public process, and water management is a public issue of such great importance that We, in the widest sense of the word, all need to take an active interest in it.

We think we've done well with this ZIP but we know we've a long way to go so that'll do for self-congratulations for now. It wasn't easy; frequently it was quite challenging. We have not included everything we think could possibly be included, as we've had to focus on particular aspects of water management (those that Earthquake Recovery Programmes could affect or effect) in order to fit with external timelines. That hasn't necessarily been a bad thing and we hope it provides the benefits we are expecting it to. Future versions of the ZIP will include more detail.

This ZIP contains a large number of Recommendations to Councils, and we've thought about them a lot over the 18 months. Considerable time, effort, and information gathering has gone into their drafting, along with significant debate, although very little of what could be called arguing as, generally, this Committee has been harmonious and unanimously focussed on the task at hand.

Unlike other parts of Canterbury this Zone is blessed, so far as a Zone Committee's harmony of deliberations is concerned, with having no looming infrastructure projects or agricultural expansion. This has made it comparatively easy to focus on issues such as the protection of our groundwater (a vital resource that provides NZ's second largest city's domestic and industrial water supply, and has a significant economic value), the arrest and preferably reversal of the decline of our waterways, the potential to provide increased opportunities for people to enjoy our waterways in a variety of manners, and, very importantly, the chances we have to utilise the knowledge of Tangata Whenua in managing our waterways and the life they hold in a manner that improves them for all and ensures that improvement for those coming after us.

We definitely do have our challenges here as we have some of the most polluted streams in the region thanks to 160 years of urban growth. Everything we do on land affects our waterways – from the simplest casual disposal of a cigarette butt into a gutter, to washing our cars on the street, to blasting off our newly laid stamped concrete driveways, to a huge industrial spillage or a sewage overflow - all that waste ends up in our steams. One of the biggest and most immediate challenges we face is continuing suburban development around our waterways and trying to find ways of at least arresting degradation of them while that growth continues. This will be a huge topic for this Committee to continue considering in the future. It won't be easy, but anything of real value seldom is, and we're up for it.

Ian Fox.
Chair, Christchurch West Melton Zone Committee

Executive Summary

This is the first Zone Implementation Programme (ZIP) for the Christchurch West Melton Zone (the Zone) to be produced under the Canterbury Water Management Strategy (CWMS). The ZIP has been developed as a package of recommendations that complement and support each other. To successfully implement the CWMS in this Zone, the entire package of recommendations will need to be adopted.

The ZIP has been prepared by Christchurch West Melton Zone Committee (the Committee) through a collaborative process and is a non-statutory document. The Committee is a committee of Christchurch City Council, Environment Canterbury, and Selwyn District Council. The ZIP will be formally submitted to the councils for consideration.

This first ZIP takes a deliberately high level view of water management. There are a number of well-developed local government strategies and plans and a variety of different organisations and community groups already actively involved in water management in the Zone. The key goal of this ZIP is to ensure that these strategies, plans, and programmes align with the CWMS and with local priorities. Alignment will lead to more catchment specific recommendations in future ZIPs.

The Committee has identified five issues that are a priority to address in the Zone and that must be tackled in parallel, and in an integrated way, to give effect to the CWMS. The "Priority Issues" are (not in any particular order):

- Safeguarding groundwater quality and flows for multiple uses
- Enhancing and managing waterways for recreation, relaxation and amenity
- Improving surface water quality and safeguarding surface water flows
- Enhancing degraded ecosystems, indigenous biodiversity, valued introduced species and landscapes
- Making efficient use of water and managing demand

Furthermore, there are five "Key Principles" woven throughout the ZIP, which must be taken into account when recommendations are being implemented. These Key Principles are (not in any particular order):

- Kaitiakitanga
- Better integration of plans and collaboration between agencies and groups
- Earthquake Recovery Programmes help to implement the CWMS in the Zone
- Local people are involved in improving water management
- The effects of improving flood management are beneficial to a spectrum of waterway values

It is important to note that the CWMS does not address flooding or the management of floods. As such, the provision of flood defences and stop banks are beyond the scope of the ZIP. Similarly, as the Committee is focussed only on the Christchurch West Melton Zone, implementation of the CWMS in other parts of Canterbury is also out of scope.

With the rapid rebuild in post-earthquake Christchurch, the Committee anticipates the need to produce an updated version of the ZIP within approximately 12 months.


save the whitebait mate!
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Contents

1. Introduction

1.1 Scope Of The Zone Implementation Programme

This Zone Implementation Programme (ZIP) is intended to guide the implementation of the Canterbury Water Management Strategy (CWMS) in the Christchurch West Melton Zone (the Zone). It aims to address all the CWMS targets, in so far as they are applicable to the Zone and contains 94 recommendations for Environment Canterbury, Christchurch City Council, Selwyn District Council, and other agencies.

1.2 Geographical Scope

The geographic area covered by the ZIP is approximately 510 Km2 and includes:

- The lower parts of the Waimakariri River
- Aquifers that are part of the Canterbury Plains groundwater system
- The catchments of the:
  - Ōtūkaikino Creek
  - Styx River/Pūrākaunui
  - Avon River/Ōtākaro
  - Heathcote River/Ōpāwaho
- The Avon-Heathcote Estuary/Ihutai
- The upper part of the Halswell River/Huritini catchment

The Zone includes a large part of Christchurch City Council's territorial area including all of urban Christchurch and parts of the Port Hills. The western part of the Zone is within Selwyn District.

See section 1.4. for a map of the Zone.

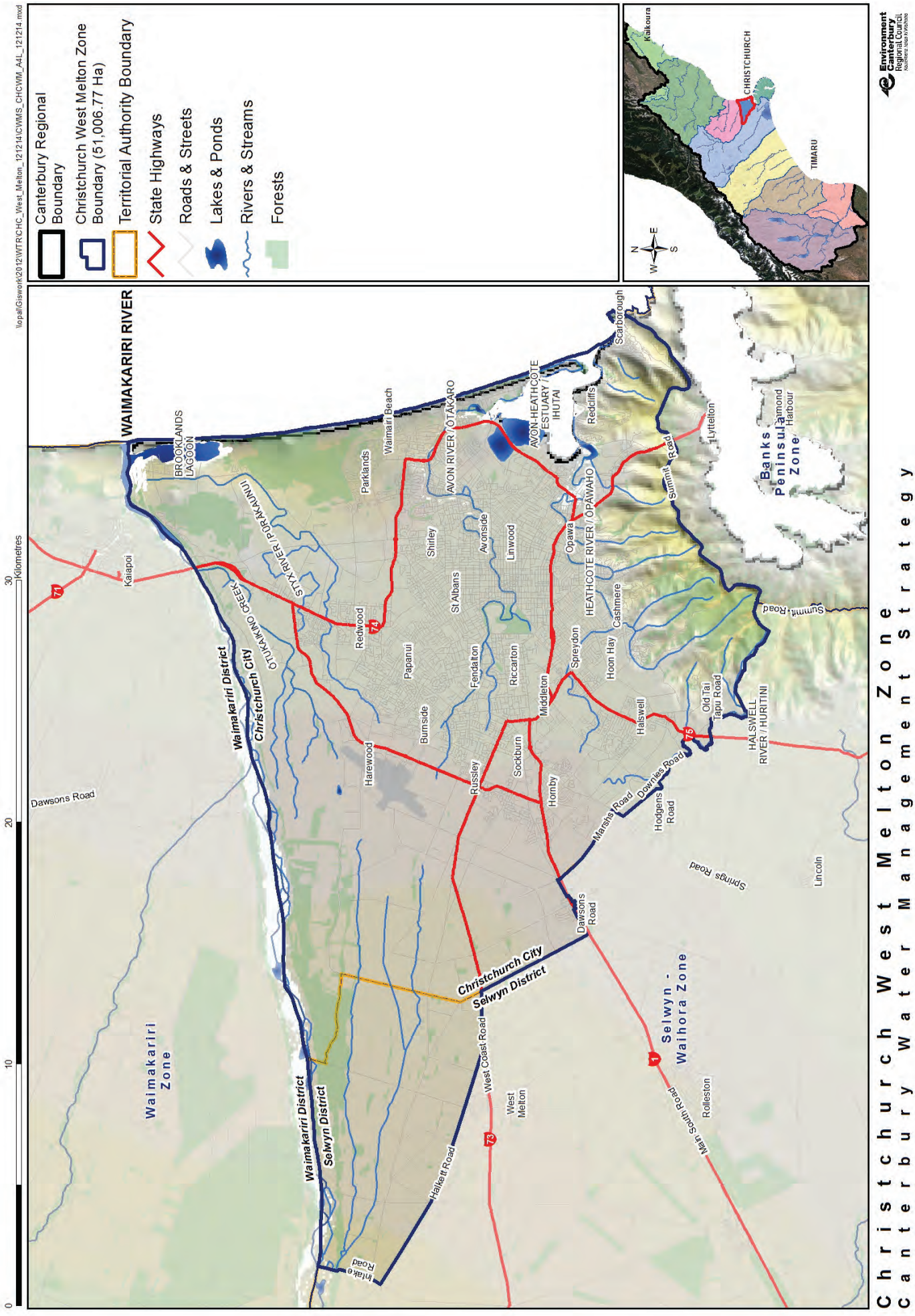
1.3 Boundaries With Other Water Management Zones

The Zone shares boundaries with Banks Peninsula, Selwyn-Waihora, and Waimakairiri Zones, with water moving into and out of the Zone:

- The Waimakariri River flows through the Christchurch West Melton, Selwyn-Waihora, and Waimakariri Zones
  - The Waimakariri upper catchment is in the Selwyn-Waihora Zone
  - Christchurch West Melton shares a boundary with the Waimakariri Zone along the lower parts of the catchment
- The aquifers in the Zone are part of a larger groundwater system on the Canterbury Plains, with water moving both into and out of the Zone
- The Halswell River/Huritini catchment flows from the Zone into Selwyn-Waihora Zone (towards Te Waihora/Lake Ellesmere)
- The reticulated public water supply to Lyttelton Harbour/Whakaraupō is supplied from groundwater in the Zone

In addition, there is a Regional Committee for the Canterbury Water Management Strategy (CWMS) that considers cross-boundary matters from a regional perspective. The Zone Committee will seek to ensure that an integrated approach to water management is taken that reflects catchments rather than administrative boundaries.

1.4 Christchurch West Melton Zone Map



1.5 Zone Committee Process

The Committee was established under the auspices of the Local Government Act 2002 in accordance with the Canterbury Water Management Strategy (2009). This is a joint Committee of Environment Canterbury (the Regional Council), Christchurch City Council and Selwyn District Council (the Territorial Authorities).

The Committee was set up in November 2011 to prepare and periodically review a Zone Implementation Programme (ZIP) giving effect to the CWMS in the Christchurch West Melton Zone. The collaborative CWMS approach and consensual decision making has been sought on all decisions.

The membership reflects the need for the group to work collaboratively, considering the implementation of the Principles, Priorities, and Targets of the CWMS in the Zone and includes:

- 1 member appointed by the Regional Council
- 1 member appointed by each Territorial Authority (Christchurch City Council & Selwyn District Council)
- 1 member appointed by each Rūnanga (Ngāi Tūāhuriri Rūnanga, Te Hapū ō Ngāti Wheke/Rapaki, Te Taumutu Rūnunga)
- Between 4-7 members from the community, chosen from a range of backgrounds and interests, jointly appointed by the Regional Council and Territorial Authorities

Community members were selected (both as individuals and in combination as a group of people) for their knowledge of water management, connections with the Zone, and their ability to work collaboratively. The selection process was open to all members of the public and included written applications and workshop sessions. The selection panel included representatives of Environment Canterbury, Christchurch City Council, and Rūnanga.

The Committee has held 15 public committee meetings, 2 public consultation meetings, and 11 informal workshops since orientation in October 2011. We have been briefed about surface and groundwater resources (including quality and quantity/flows); ecosystems and biodiversity; cultural values and aspirations; water and health; regional planning; wastewater management; stormwater management; water supply; water use; pollution incidents; flood management activities; recreation; earthquake impacts; public communications and awareness raising initiatives. We have discussed water issues with a number of community groups and government agencies. In addition, we have undertaken three fieldtrips.

Environment Canterbury provides the staff to facilitate the Committee process with Christchurch City Council providing the secretarial support, with access to technical support from Christchurch City Council, Environment Canterbury, and Selwyn District Council as necessary. Additional technical expertise has been sought where required.

1.6 Developing The Zone Implementation Programme (ZIP)

This ZIP has been developed in the context of the Principles, Priorities, and Targets of the CWMS as relevant to the Christchurch West Melton Zone. It has been developed as a package of priority outcomes and recommendations that complement and support each other. Because of this interconnectedness, to successfully implement the CWMS in this Zone, the entire package of recommendations will need to be adopted.

The CWMS established the importance of involving local people in the integrated management of water at a local level. The Committee acknowledges the significant contribution in time and effort that is already being made on water related issues by community groups and other organisations in the Zone. A list of organisations that we have had engagement with in developing the ZIP is included in the Appendix. Public comments and feedback on the draft ZIP have also been used to help inform the development of the ZIP.

The challenges and opportunities related to water management at a local level reflect the aspirations and concerns of local people. These include how water is used or not used, and the need to take the specific nature of the local environment and waterways (e.g. size of rivers, number of wetlands) into account. In line with the CWMS, the ZIP gives specific consideration to customary uses of water by manawhenua in parallel with reflecting the values of the wider community.

We have identified five Priority Issues that we believe need to be addressed urgently in the Zone in order to implement the CWMS (not in any particular order):

- Safeguarding groundwater quality and flows for multiple uses
- Enhancing and managing waterways for recreation, relaxation and amenity
- Improving surface water quality and safeguarding surface water flows
- Enhancing degraded ecosystems, indigenous biodiversity, valued introduced species and landscapes
- Making efficient use of water and managing demand

We have recommended specific actions to help achieve outcomes for each priority. Note that these five Priority Issues are a subset of the CWMS. An explanation of how the Priority Outcomes and Recommendations contribute to the CWMS is included in this ZIP.

In addition, we have identified a number of “Key Principles” that are woven throughout the ZIP, which must be taken into account when Priority Outcomes and Recommendations are being implemented. These Key Principles are:

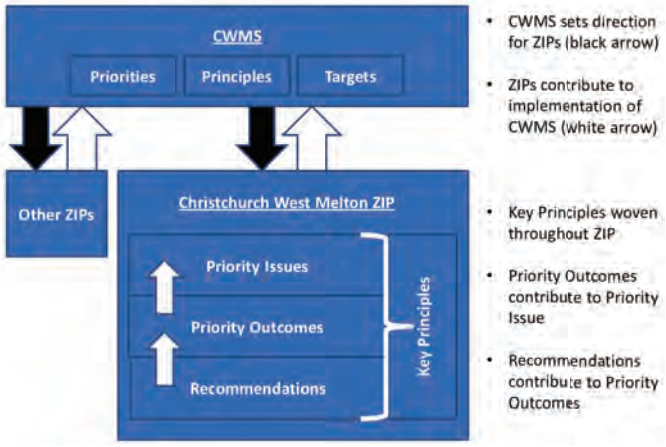
- Kaitiakitanga
- Better integration of plans and collaboration between agencies and groups
- Earthquake Recovery Programmes help to implement the CWMS in the Zone

- Local people are involved in improving water management
- The effects of improving flood management are beneficial to a spectrum of waterway values

A diagram illustrating the relationship between the CWMS and Key Principles, Priority Issues, Priority Outcomes, and Recommendations in the ZIP is included below. A more comprehensive cross-linking of our Priority Outcomes with CWMS Targets will be completed in due course, and made available on the Environment Canterbury website.

This ZIP is written to advise decision makers about the actions that we believe are needed to meet the CWMS Targets within the Zone. The CWMS Targets were agreed through the initial CWMS process and signed off by the Regional Council and Canterbury's territorial authorities. We have focused on what needs to be done to achieve the CWMS Targets within their stated time frames. We did not consider the level of resourcing available for achieving the Recommendations. This is because the CWMS has a 30 year vision and it is inevitable that budgets and resources will vary over this period.

Relationship between CWMS and ZIP



This first ZIP takes a deliberately high level view of water management. There are a number of well-developed local government strategies and plans and a variety of different organisations and community groups already actively involved in water management in the Zone. The key goal of this first ZIP is to ensure that these strategies, plans, and programmes align with the CWMS and with local priorities. Alignment will lead to more catchment specific recommendations in future ZIPs and in many instances, we have recommended as a priority, that a collaborative approach be established at a catchment level to facilitate this. Considering issues from a catchment level will encourage a flexible and focussed approach to improving water management. Furthermore, with the rapid rebuild in post-earthquake Christchurch, we anticipate the need to produce an updated version of this first ZIP within approximately 12 months.

For clarity, timeframes have been identified for individual recommendations. This is based on the:

- Timeframes for the relevant CWMS Target
- Type of action requested
- A reasonable period of time to achieve the outcomes
- The urgency with which we think the recommendation needs to be carried to a conclusion

We acknowledge that we have **not** considered whether this timeframe is achievable for the organisations named against Recommendations.

The Committee cannot commit the organisations or groups named in the ZIP to specific courses of spending, policy or operations. We however hope that those identified as being able to help implement the CWMS in the Zone will contribute where possible, towards achieving the priority outcomes and recommendations in the ZIP. As such, we have named suggested organisations that could lead or support the implementation of individual recommendations and anticipate that this will be further refined in due course.

The Committee does not have a direct governance relationship with, or an advisory role to, the Canterbury Earthquake Recovery Authority (CERA). Recommendations relating to earthquake recovery have thus been addressed to Christchurch City Council, Environment Canterbury, and Selwyn District Council to progress with CERA.

Finally, it is important to note that the sequence in which the Key Principles, Priority Issues, Priority Outcomes, and recommendations are included in this document, does not imply any order of relative importance or urgency.

1.7 Implementation

The ZIP is not the end point of the CWMS process. The Committee will monitor the implementation of the ZIP and engage with organisations where there is the need to reprioritise recommendations due to resource constraints or changing circumstances. Implementation of the ZIP will be a key focus for future public meetings of the Committee, and information will be updated periodically via the Environment Canterbury website http://ecan.govt.nz/get-involved/canterburywater/committees/chch-west-melton/Pages/default.aspx

We also look forward to having further engagement with community groups and organisations as we start to look in more detail at specific issues and catchments.

2. Christchurch West Melton Zone Overview

2.1 Waterways And Resources

Water is a taonga. It represents the lifeblood of the environment and is embodied in the traditional values, controls and spiritual beliefs and practices. The maintenance of water quality and quantity is of absolute importance for the historical religious practices that were carried out and for mahinga kai. Both surface and groundwater play an equal part in the well-being of the people.

Before drainage there was an extensive network of waterways and wetlands between the Waimakariri River, Lake Ellesmere/Te Waihora, and the Avon-Heathcote Esturary/Ihutai. Ngāi Tahu followed these waterways in its maintenance of the food-rich wetlands. Today the great wetlands are no longer evident. The people of the land had appreciation for the importance of the interconnection between both sources and the need to manage them collectively. A culturally holistic approach considers that all waterways above and below ground are significant. Ki uta ki tai, flowing from the mountains connecting the rivers, streams, estuaries, and wetlands, all leading out to the coast; all is one.

2.1.1 Groundwater

The Christchurch West Melton aquifer system is a segment of the extensive groundwater system of the Canterbury Plains. Groundwater occupies the pore spaces of the unconsolidated gravels, sands and silts that make up the plains. The aquifers of the Christchurch West Melton system are recharged by relatively constant leakage from the Waimakariri River, supplemented by seasonably variable rainfall on the land between the River and the City which filters down through the soil to the water table.

Groundwater flow is generally from west to east, from the mountains towards the sea. Some groundwater flows out underneath Christchurch at depth into the ocean, but a large proportion of the flow resurfaces as springs feeding groundwater-dependent streams. The volcanic rocks of the Port Hills form a barrier to groundwater flow, diverting the groundwater either side of Banks Peninsula i.e. eastwards underneath Christchurch towards the sea, or southwards towards Te Waihora/Lake Ellesmere. The southern boundary of the Christchurch West Melton Zone approximates a 'groundwater divide' between these two components of groundwater flow.

Changes in sea level over past cycles of glaciation have resulted in alternating layers of coarse river gravels and fine marine or estuarine silty deposits near the coast creating a vertical sequence of five or more distinct gravel aquifers beneath the city, sandwiched between finer-grained confining layers. In this coastal confined aquifer system, pressures are higher in the deep aquifers and there is a slow upward movement of water from any one aquifer into the aquifer immediately above it. When this water eventually reaches the top (Riccarton gravel) aquifer it flows coastwards and emerges at some point offshore. The deeper aquifers are presumed to be "blind" (i.e. water does not exit directly to the sea). The confining layers are not impermeable to flow and it is this upward flow as much as the fine-grained sediments that protect the deeper aquifers from contamination entering via the land surface near the coast. The confining layers thin towards the west. The margin of the top confining layer is highly irregular but broadly speaking it does not extend beyond Johns/Russley Roads. Still further west there is no confining layer and groundwater is vulnerable because contaminated water can move relatively easily down from the surface to the water table.

The Christchurch West Melton groundwater system has had a long history of abstraction for public water supply, industry and agriculture. It needs no treatment and provides almost all of the area's drinking water, valued by both the people and industries of Christchurch.

2.1.2 Waimakariri River

The Waimakariri River is one of the largest rivers in North Canterbury and originates in the main divide of the Southern Alps. The catchment is about 2600 square kilometres and flows are snow and rain fed with floods and freshes occurring mostly in north-west weather. The catchment provides water for multiple uses in the CWMS zones of Selwyn Waihora, Christchurch West Melton and the Waimakariri. The Waimakariri is one of the most heavily used rivers for recreation in New Zealand because of its proximity to Christchurch.

The extensive upper headwaters of the Waimakariri are little modified by human activity. The river leaves the gorge at Kowai Bush north of Springfield, crossing the Canterbury plains for the last 60 km of its course. At the river mouth there is an extensive estuary (including Brooklands Lagoon) of high biodiversity value.

The lower part of the Waimakariri River forms the northern boundary of the Zone. The western boundary is Intake Road. These lower reaches have been highly modified by stop banks, groynes, in-stream tracks, artificial channels and willow covered margins to manage flooding. The river berms and associated riparian wetlands also support high numbers of endemic, specialised river-bird species, invertebrates, fish and native plants. These areas are among the largest remaining in the Canterbury region.

Water leaks through the bed and banks of the Waimakariri River from Halkett downstream, recharging the riparian aquifers, contributing to a huge groundwater resource stored in the gravels beneath the plains. This groundwater flows towards Christchurch and is abstracted for multiple uses. Much of this groundwater re-surfaces in springs feeding the streams on the lower plains, including the Ōtūkaikino Creek (South Branch of Waimakariri), Styx River/Pūrākaunui, Avon River/Ōtākaro, Heathcote River/Ōpāwaho and Halswell River/Huritini.

The Waimakariri River catchment had and still has today an important role in the wellbeing of the local Ngāi Tahu. When the first European settlers looked out over the Waimakariri River catchment from the top of the Bridle Path they saw a swamp land that they planned to drain.

Ngāi Tahu saw the same swamp-land and enormous expanse of waterways as being a place full of mahinga kai. The catchment provided freshwater and saltwater fish species and shellfish.

There was an abundance of bird life for kai and raranga (weaving) material, numerous plant and natural materials for building whare, waka, and rongoā species. The estuaries and swamps provided raupō, harakeke and pingao, mud, soils, tree bark and berries for dyes, and plant seeds for oils. It was a place of significance. The abundance of natural resources ensured the welfare and future of the people. Those with resources flourished while those without perished. Therefore, the management and maintenance of resources was and is the foremost concern. This inter-dependent relationship with the environment is central to Māori creation stories, religious belief, and resource management techniques within the Waimakariri River catchment.

2.1.3 Ōtukaikino Creek

The Ōtūkaikino Creek arises from a system of spring-fed streams and wetlands between the Airport and McLeans Island. Prior to river control works that have confined the braided river to its current course it was known as the "South Branch" of the Waimakariri River. The catchment is primarily rural grazing land with some areas designated for residential development, such as Clearwater, and other areas used for recreation, such as the Groynes, and some used for gravel extraction.

The values within the Ōtukaikino Creek catchment of Ngā taonga tūku iho (Mauri, Mahinga kai, Wāhi Taonga, Wāhi Raranga, Hāpua, Waiora, Waipuna) are to uphold the water quality and quantity, protect the waterway margins and wetlands, and prevent destruction of wāhi tapu sites. In this catchment, Ngāi Tūāhuriri Rūnunga has significant unresolved concerns about the mixing of waters that resulted from the construction of the Northern Motorway.

The Ōtūkaikino Creek retains high aquatic ecological values, with native fish populations as well as a high value trout sports fishery. The invertebrate communities in the Ōtūkaikino Creek represent the healthiest aquatic ecosystem in the Christchurch area. Water quality is generally good due to the close connection with the Waimakariri River, but faecal contamination has been a problem for many years related to livestock access to waterways and large populations of waterfowl at the Groynes. The river and its associated wetland areas have high value for native birdlife, both wetland and forest species, and contain good remnants of native plants.

2.1.4 Styx River/Pūrākaunui

The Styx River/Pūrākaunui channel can be traced back as far as Nunweek Park where it is usually dry. It has a small flow at Sawyers Arms road but is boosted strongly by large springs before reaching Gardiners road, with more downstream, notably Redwood spring. Below Nunweek Park the Styx flows through a mix of residential, conservation, rural and lifestyle land uses before exiting into Brooklands Lagoon adjacent to the mouth of the Waimakariri River. Tide gates at Brooklands minimise the impact of high tides on water levels in the lower river, which is in an area of low lying land subject to flooding. Earthquake induced land subsidence around Brooklands suggests that flooding, erosion and sedimentation patterns in this area may change.

The Styx River/Pūrākaunui has two main tributaries, Smacks and Kaputone Creeks, with additional inflow from a series of land drainage channels that historically enabled the conversion of boggy peat land into market gardens and grazing land in the south and east of the catchment. There is a history of industrial land use along Johns Road and in the Belfast area, with discharges from the latter into Kaputone Creek that affected the water quality and ecology of this waterway. Further large residential development in the catchment is imminent but stormwater treatment systems have been mandated to minimise the impacts of stormwater on flooding, water quality and ecology of the river.

The Styx River/Pūrākaunui has relatively high ecological values for an urban waterway, with a diverse fish community and healthy invertebrate populations in the upper wadeable reaches of the river. Remnant saltmarsh ecosystems can be found downstream of the tide gates. Water quality is generally good, although existing stormwater runoff increases sediment and contaminant loads in the river and livestock access to waterways are also a source of sediment and faecal contamination in some areas. Extensive macrophyte (aquatic weed) growth is periodically removed from the river to mitigate flood risk. Land subsidence in the middle and lower reaches of the river is indicated by higher water levels (relative to land) even in normal conditions. This will affect flood management.

2.1.5 Avon River/Ōtākaro

The Avon River/Ōtākaro is spring-fed and flows slowly from the northwest of Christchurch, through the central city and the eastern suburbs to the northern apex of the Avon-Heathcote Estuary/Ihutai. A dry channel crosses Russley Road, and the Ilam stream at Crosbie Park carries a small flow sourced from the Paparua stockwater race, but the first point on the Avon River/Ōtākaro proper at which water is usually present is at Balrudry Street. There are a number of tributaries, both natural streams and drains. The catchment is very flat and almost completely urbanised, with a mix of residential, commercial and agricultural land use. A small part of the catchment in the Cranford Street basin and north of QE II Drive remains in market gardens and grazing land. Some of the latter area drains to the Styx River/Pūrākaunui catchment.

The Avon River/Ōtākaro has high heritage, cultural, amenity and recreational values. Water quality is affected by the quality of groundwater in the shallow aquifers feeding the springs, which is very good at source but subsequently degraded by stormwater inputs, occasional wastewater overflows, and large populations of waterfowl. The catchment has been urbanised for many years and most of the stormwater discharged to the river is untreated. Water quality in some tributaries such as Addington Drain and Riccarton Stream is poor and unexplained fish kills (primarily eels) are occasionally reported.

Aquatic ecology values in the Avon River/Ōtākaro have declined in the last few decades, primarily as a result of fine sediment deposition, other contaminants (such as heavy metals) on the river bed and reduction in habitat diversity. Sediment deposition has been greatly increased by liquefaction processes associated with the 2010/11 Canterbury earthquakes. The lower river has a diverse fish community and good examples of inanga spawning habitats. The river and tributary streams in the upper catchment have good riparian plant cover but this reduces downstream as the river widens and becomes tidal in the lower reaches. Extensive macrophyte (aquatic weed) growth is periodically removed from the river to mitigate flood risk.

2.1.6 Heathcote River/Ōpāwaho

The Heathcote River/Ōpāwaho and its tributaries are in the south of Christchurch and approximately one-third of the catchment is on the Port Hills. The Cashmere Stream is a significant spring-fed tributary including both hill and flat land in its sub-catchment. The upper river is also spring-fed but receives flow from the Sockburn industrial sub-catchment of Haytons Stream before joining with the Cashmere Stream. Hendersons Basin in the upper catchment is very low-lying and is designated as a flood management area to mitigate flooding in the lower catchment. Flood risk is also managed by gates in the lower river at the Woolston Cut, which open to ease flood flows and reduce water levels upstream. Under normal conditions the gates are closed and flows follow the old channel. This prevents salt water flowing further upstream and damaging freshwater ecosystems.

The Port Hills land is covered by highly erodible loess soils. Development on the hills, combined with a reduction in vegetation, has resulted in considerable fine sediment input to the Cashmere Stream and the Heathcote River/Ōpāwaho over the years. Many of the streams draining the Port Hills are ephemeral. Apart from the upper Cashmere Stream water quality in the river system is poor. As with the other urban rivers it is affected by the quality of shallow groundwater feeding the springs, occasional industrial discharges (accidental and/or illegal), sediment-laden runoff from the Port Hills, stormwater from rural, industrial, commercial and residential land use, occasional wastewater overflows and large populations of wildfowl. Water quality in the Cashmere Stream is relatively good, while it is very poor in the industrial catchment of Sockburn/Wigram draining into Haytons Stream.

From early European settlement until the 1960s the lower Heathcote River/Ōpāwaho was used for discharging waste from a range of industries in the Woolston area. Despite the heavy historical human impacts the lower river in the vicinity of the Avon-Heathcote Estuary/Ihutai retains significant ecological values even though it is still greatly impacted. Further upstream, the Cashmere Stream has high aquatic ecological values indicated by the presence of freshwater mussel and crayfish (koura) populations. The ecological values of the mainstem have also been impacted by fine sediment deposition resulting in reduced habitat diversity. Extensive macrophyte (aquatic weed) growth is periodically removed from the river to mitigate flood risk.

The Heathcote River/Ōpāwaho has seen four centuries of fishing. The awa is susceptible to flooding within its catchment. With sufficient time and intensity the Heathcote River/Ōpāwaho will ultimately overflow its banks and flood the adjacent land. However, the floodplains were a good place to settle as they were flat and fertile and adjacent to a water supply, and means of transportation.

2.1.7 Avon-Heathcote Estuary/Ihutai

The Avon-Heathcote Estuary/Ihutai receives water from the Avon River/Ōtākaro, Heathcote River/Ōpāwaho, several smaller tributaries, and tidal input from Pegasus Bay. It is a recent geological feature that has formed over the last 1000 years and is roughly triangular in shape. At 700 hectares it is the largest semi-enclosed estuary in Canterbury[1]. The estuary supports a great diversity and abundance of bird and fish life, and over the past 150yrs, 113 bird species have been recorded[2]. The mudflats support a diversity and abundance of shellfish, worms, crabs, and shrimps that are an important food source for birds and fish, and help to maintain a healthy ecosystem. The estuary was however directly impacted by the 2010/11 Canterbury Earthquakes: The bed of the estuary tilted along a north/south axis by approximately +0.5m to -0.8 m whilst approximately 20% to 40% was covered by liquefaction[3]. What this means for the future of the estuary is an area of on-going investigation.

Ihutai and its catchment is of immense cultural and historical importance to Tangata Whenua, being a place of significant settlement and food gathering by Waitaha, Ngati Mamoe and Ngāi Tahu for over 600 years. Sites along both the Avon River/Ōtākaro and Heathcote River/Ōpāwaho, in and around the estuary, and on the coastline near the mouth of the estuary were known and used due to the availability and abundance of mahinga kai resources. Freshwater fish and shellfish, as well as numerous native plant resources, waterfowl and forest birds could be gathered from the network of springs, waterways, swamps, grasslands and lowland podocarp forests that made up the estuary catchment, much of which was still present at the time of European settlement (Tau, Goodall, Palmer & Tau 1990; Christchurch City Libraries 2006; Christchurch City Council 2007). The estuary provides important habitat for migratory freshwater fish species. In the lower reaches, the inanga come and spawn along the awa on the river grasses. The swamp forest around small streams such as Stream Wharf provided gathering grounds for water fowl and forest birds including pukeko, weka and tui.

The estuary and connecting rivers formed an important access route to early Christchurch for shipping and industries became established along the rivers, especially the Heathcote River/Ōpāwaho. Historically, Christchurch Wastewater Treatment Plant at Bromley discharged treated wastewater to the estuary. The oxidation ponds continue to treat wastewater which is now discharged 3kms out to sea, but the ponds also provide a valuable habitat for birds. The emergency discharge of untreated wastewater into the rivers and estuary as a consequence of the 2010/11 Canterbury Earthquakes elevated levels of micro-organisms and nutrients at the time.

The wide open space of the estuary contrasts with other urban waterways. It is a significant recreational resource for the Zone including water based activities like boating and windsurfing, and onshore activities related to surrounding parkland and reserves. Shellfish are also gathered by local people and fishing is a popular pastime.

2.1.8 Halswell River/Huritini

The upper Halswell River/Huritini lies within the Christchurch West Melton Zone while the remainder of the catchment is in the Selwyn Waihora Zone. It follows a meandering path through farmland from its spring-fed origins west of Oaklands and Halswell to the northern shore of Te Waihora/Lake Ellesmere. The upper tributaries of Knights Stream, Nottingham Stream and the Quaifes Road drain system are spring-fed and converge

1 *Exploring an Estuary (2012), Avon-Heathcote Estuary Ihutai Trust*

2 *http://resources.ccc.govt.nz/files/FactsheetAvonEstuary-walks.pdf*

3 *http://ecan.govt.nz/publications/Reports/eq-effects-estuary-topography-liquefaction-niwa.pdf*

just south of Halswell to form the mainstem. Ephemeral streams draining the Port Hills also flow into the upper river. The Nottingham Stream sub-catchment is almost completely urbanised, while the remainder of the catchment comprises largely rural and lifestyle land use. Very large residential development in the Wigram/Halswell area is underway and much more is planned over the next few decades. Best practice stormwater management and treatment systems designed to minimise the impacts of stormwater on flooding, water quality and ecology of the river have been mandated.

Water quality in the upper Halswell River/Huritini is generally poor. The quality of groundwater in the springs is very good but urban stormwater, runoff from rural land and rural land management practices combine to degrade river water quality. The aquatic ecological values of the river are variable. Some areas have high value, such as the Quaifes Road spring-fed drain system where freshwater crayfish and diverse invertebrate populations are found, while other areas have been affected by a reduction in habitat quality which has reduced ecological values. A diverse fish assemblage is found in the lower river, with some species likely to use the upper reaches as a spawning, rearing and/or refuge area. Extensive macrophyte (aquatic weed) growth is periodically removed from the river to mitigate flood risk.

2.2 Planning Framework

2.2.1 Manawhenua

Manawhenua

Traditional Māori rights to resources were founded on the manawhenua of a particular tribe which was based on the lands, waterways and all resources controlled by the tribe.

Manawhenua is described as the political and occupational authority over a particular area, usually defined by natural boundaries. The verbal expression of a Tribe's manawhenua typically refers to dominant physical features such as mountains, rivers and lakes.

Rangatiratanga

Rangatiratanga was traditionally embodied in the concepts of turangawaewae and manawhenua which centered on the status, role and authority of the rangatira (chief) of the group. He or she was the embodiment of the tribe and carried the practical, moral and spiritual focus of the community.

The rangatira obtained their tapu (spiritual protection) and mana (authority, influence) from a combination of their whakapapa, personality and ability. While the rangatira exercised their mana on behalf of the tribal group, that mana was dependent on the continued recognition and support of the tribal members both as individuals and as a group.

In this way land areas were, in practice, controlled by local hapu (sub-tribe) for their own benefit and the benefit of those other tribal members who had usage rights there. This also reinforced the philosophy that the welfare of the group as a whole was paramount to the welfare of any sub-group or individual within that group.

Ngāi Tahu Freshwater Policy

The Ngāi Tahu Freshwater Policy (1999), Te Whakatau Kaupapa (Ngāi Tahu Resource Management Strategy for Canterbury 1990) and soon to be released iwi management plan for the area contain information, objectives and policies of relevance to the Committee's work.

2.2.2 National Policy Statement On Freshwater Management

The National Policy Statement on Freshwater Management (2011) sets out the objectives and policies that direct local government to manage water in an integrated and sustainable way, whilst providing for economic growth within set water quality and quantity limits that reflect both local and national values. The CWMS, through the establishment of Zone Committees and the development of Zone Implementation Programmes, provides an opportunity for local communities to contribute to the identification of shared values at a local and regional level.

2.2.3 Recovery Strategy For Greater Christchurch/Mahere Haumanutanga O Waitaha

The Recovery Strategy for Greater Christchurch / Mahere Haumanutanga o Waitaha is the key reference document that guides and co-ordinates the programmes of work including Recovery Plans, under the Canterbury Earthquake Recovery Act. The six components of recovery are:

- Leadership and integration
- Economic recovery
- Social recovery
- Cultural recovery
- Built environment recovery
- Natural environment recovery

The Committee notes that there are synergies at a high level between the Greater Christchurch Recovery Strategy and the Canterbury Water Management Strategy. There may be opportunities for the Programmes being developed to implement the Recovery Strategy to also assist with the implementation of the CWMS (and Christchurch West Melton ZIP). Recovery Programmes such as the Natural Environment Recovery Programme have particular opportunities to progress the ZIP's recommendations. In addition, the Land Use Recovery Plan is also of relevance. We acknowledge that the scope of the Recovery Programmes is wider than water management alone, and that this may constrain the degree to which alignment is possible.

More information on the Recovery Strategy can be found at http://cera.govt.nz/recovery-strategy/overview

2.2.4 Regional And District Planning

The regulatory framework for managing water resources is through the Resource Management Act 1991 and the associated statutory plans at a district and regional level.

Environment Canterbury notified the proposed Land and Water Regional Plan (pLWRP) in August 2012. The pLWRP includes

regional level objectives, policies and rules that relate to the management of water in Christchurch West Melton Zone. In addition, the pLWRP includes a sub-regional chapter on the Zone. As the ZIP was still being developed at the point that the pLWRP was notified, we have had limited involvement with the development of the pLWRP to date. In due course, it is anticipated that this ZIP will help to inform the relevant sub-regional chapter of the pLWRP.

The sub-regional chapter of the pLWRP for Selwyn-Waihora is currently being developed. A small area of the Christchurch West Melton Zone is included in the scope of the Selwyn-Waihora sub-regional chapter to better reflect groundwater boundaries and surface water catchments. We will work with Environment Canterbury and other relevant CWMS committees to highlight cross-zone matters where appropriate and necessary as identified in the Christchurch West Melton ZIP.

The Christchurch City Plan is a document prepared under the Resource Management Act 1991. Its purpose is to provide a framework for managing the effects of land use and subdivision within the City. The geographic area to which the City Plan applies is those areas of Christchurch that pre-date the amalgamation with the former Banks Peninsula District Council in 2006. The Banks Peninsula District Plan applies to the geographic area of the former Banks Peninsula District Council. The City Plan consists of three volumes: Volume 1 - Statement of Issues, Volume 2 - Statement of Objectives, Policies and Methods, and Volume 3 - Statement of Rules. The City Plan was publicly notified on 24 June 1995 and made operative on 21 November 2005.

The Selwyn District Plan is also a document prepared under the Resource Management Act 1991 with the purpose of providing a framework for managing the effects of land use and subdivision within the District. The District Plan consists of three volumes: Townships, Rural, and Maps. The District Plan was publicly notified on 2 November 2000 and made partially operative on 10 June 2008.

2.2.5 Plans And Non-Statutory Strategies

There are a number of relevant local government and non-governmental organisations (NGOs) strategies and plans in the Zone that are relevant to the implementation of the CWMS and the ZIP. Many of these strategies and plans may already be working towards goals that would fulfil or help contribute to achieving Priority Outcomes in the ZIP. Identifying and reviewing the most relevant strategies and plans will be an important step in implementing many of the ZIP recommendations, especially where they guide or direct on-the-ground activities. As such, we intend to make recommendations in due course that are specific to individual strategies and plans as part of future updates to the ZIP.

There are community groups that have well established and developed, strategies and plans, for the management of water. In particular, we note that the Avon-Heathcote Estuary Ihutai Trust[4] and the Styx Living Laboratory Trust[5] already have established relationships with Christchurch City Council and Environment Canterbury, and management plans/strategies covering whole catchments and waterways. We hope that the ZIP will help to facilitate strong connections and support for both existing and new community groups where their activities will help to implement the CWMS.

4 *http://www.estuary.org.nz/*

5 *http://www.thestyx.co.nz/new-zealand/styxlivinglaboratorytrust/*

3. Key Principles

3.1 Overview

In developing the Zone Implementation Programme (ZIP), the Committee identified that there were some general principles to be considered when tackling many of the water management issues in the Zone. These principles are applied throughout the ZIP and have been woven into the Priority Outcomes and Recommendations as part of an integrated approach to water management. The Key Principles (not in any particular order) are:

- Kaitiakitanga
- Better integration of plans and collaboration between agencies and groups
- Earthquake recovery programmes help to implement the CWMS in the Zone
- Local people are involved in improving water management
- The effects of improving flood management are beneficial to a spectrum of waterway values.

3.2 Kaitiakitanga

Whakapapa o te Wai

Na te Po, ko te Ao

Tana ko te Ao Marama

Tana ko te Ao Tuaroa

Tana ko te Whiwhia

Tana ko te kore Rawea

Tana ko te kore Tamaua

Tanako te kore Matua

Tana ko Maku

Te Puna Wai o te Ao.

From eternity came the universe,

From the universe the bright clear light,

From the bright light the enduring light,

From the enduring light the void unattainable,

From the void unattainable, the void intangible, the void unstable,

From the void unstable, the void endowed with paternity,

From which came the moisture, the spring of eternal life.

Whakapapa is an integral part of Māori society. It is used both extra and intra-tribally to establish and maintain relationships between people, their speaking rights and leadership rights, and their environment. These relationships determine access to resources and the philosophies for their use, and also the responsibilities of people to others.

Whakapapa and turangawaewae (traditional land rights) establish a person's right to participate in tribal life, and constitutes a statement of identity, both genealogically and geographically.

As well as reciting their genealogical relationship with each other and with other tribal groups. Ngāi Tahu also recite the whakapapa which links humankind to the atua (deities) and to the earth, to the waters, forests, animals and birds.

Like other Māori tribes, Ngāi Tahu claim the same whakapapa through Rakinui (sky father) and Papatuanuku (earth mother) and see themselves as connected to the other descendants of Raki and his wives. Whakapapa, then, binds Ngāi Tahu to the mountains, forests, and waters, and the life supported by them. In this way, all things are considered to have mauri (life force) and to be living and to have a genealogical relationship with each other. People are therefore related to the natural world.

As all living creatures are born from Papatuanuku and all return to her on their death, Māori consider that they belong to the land and vice versa.

Wakawaka

Wakawaka is a named area of land, river or sea that is used by Māori as a harvesting area for resources. Hapū and Iwi rights to fishing areas were based on the same criteria as those to land and its resources. These rights were not general and open to all, any more than land was. This right to control water-based, and particularly sea-based resources is called manamoana and incorporates all of those principles included in manawhenua.

To Ngāi Tahu, fish were of great cultural, social and economic significance. Their collection was a communal task involving cooperation at a community level and they were traded for the delicacies of other areas, for example, potted birds from inland groups.

As well as developing extensive knowledge about the life cycle of each species, Ngāi Tahu developed the technologies to store excess catches for long periods of time.

Mauri

Life, health and vitality – Mauri is the traditional measure of physical, spiritual and emotional wellbeing of people and places: Healthy waterways, healthy kai, healthy people.

As kaitiaki, particular issues of concern within the Zone that manawhenua would like to see addressed are:

- Remediation of inappropriate mixing of waters

- Restoration of our waterways to enable culturally sustainable harvesting of our kai roto, kai awa and kai moana
- Discharges of raw sewage and contaminants to all waterways desist
- Wāhi tapu and wāhi taonga sites are recognized, respected and protected

These concerns are primarily about ensuring healthy ecosystems for the community and future generations: and that the mauri of rivers, streams, springs, the groundwater, wetlands and lagoons are restored and protected. They recognise the need for sustainable regional economic development and believe this is fundamentally dependent on sustaining healthy waterways.

Manawhenua goals for water management in the Zone are that the above four concerns are addressed with the utmost urgency.

3.3 Better Integration Of Plans And Collaboration Between Agencies And Groups

The Committee believes that implementing the CWMS in the Zone requires better integration of plans and collaboration between agencies and groups in the way that water is managed. The CWMS established the importance of having an integrated approach to water management that delivers multiple benefits in combination. In the Christchurch West Melton Zone there are already a number of plans and strategies in place (or being developed) in addition to the ZIP. Furthermore, there are organisations already involved in water management, including Ngāi Tahu, statutory organisations, businesses, and community groups. Ensuring that all of these different groups, plans, and strategies are working together in a way that helps to implement the CWMS is a key principle of the ZIP. Successfully applying this principle means that:

- The way water is managed and used enhances cultural, social, economic, and environmental well-being in the Zone
- There is a joined up and collaborative approach to managing water issues in the Zone:
    - From mountains (source) to the sea / "Ki uta ki tai"
    - Across and between rural and urban areas
    - Across and between Central Government, Regional Council, Territorial Authorities and with manawhenua
    - Understanding where our Zone receives water from, or transfers water to other zones
    - Involving local community groups in implementation

Earthquake Recovery Programmes may provide a unique opportunity to proactively rehabilitate and protect waterways sites of cultural and ecological significance[6] and be consistent with Ngāi Tahu values.

3.4 Earthquake Recovery Programmes Help To Implement The Canterbury Water Management Strategy

The Committee believes that it is important that earthquake recovery programmes help to implement the CWMS (where possible and appropriate). Successfully applying this principle means that:

- Opportunities created by the earthquakes to do things differently are taken, and;
- Efforts to tackle and address the water related impacts of earthquakes, are targeted in implementing the CWMS

In the context of implementing the CWMS, we recognise that recovering from the earthquakes presents additional water related challenges and opportunities, whether as a direct effect of the earthquakes themselves, or as a consequence of the decisions taken, in recovering and rebuilding. Some of the water related earthquake impacts have already been addressed (e.g. restoring water supplies to homes) however other impacts may be longer term or permanent (e.g. bed level of the Avon-Heathcote Estuary/Ihutai). Earthquake recovery is inevitably a key component of integrated water management that will need to be considered in tackling the water management issues and the priority outcomes identified.

3.5 Local People Are Involved In Improving Water Management

The involvement of local communities in identifying the priorities for water management at a local (zone) level is fundamental to the Canterbury Water Management Strategy. The Committee believes that this is a very important principle for the successful implementation of the CWMS in the Christchurch West Melton Zone. The large urban area in the Zone means that water management challenges have a different emphasis compared to more rural Zones. Stormwater is a more significant water quality challenge in urban waterways, whilst rivers and streams provide access to green space and "blue corridors" that are important for quality of life in an urban environment. Whilst some people are closely involved and interested in water management (e.g. participants in water based sports), others have a less direct connection with individual waterways and a strong focus on home use of water. Successfully accommodating this spectrum of interests means that:

- Local people have a sense of ownership and pride in the way water is managed in the Zone
- Local people are well informed about the steps that they can take as individuals to help improve the way we manage water
- Local community groups have opportunities to be involved in implementation of recommendations

6 *Sites of cultural significance include Ngāi Tahu and European cultural sites.*

3.6 The Effects Of Improving Flood Management Are Beneficial To A Spectrum Of Waterway Values

The CWMS does not address flooding or the management of floods. As such, the provision of flood defences and stop banks are beyond the scope of the ZIP. The Committee recognises however that some activities related to flood management may impact our ability to implement the CWMS. For example, dredging silt from waterways to maintain their flood carrying capacity may adversely impact on native biodiversity at least temporarily. We acknowledge that providing appropriate standards of flood protection will be the main priority for flood management activities.

There are significant flood management defences and activities in the Zone along the Waimakariri River and in urban areas. We believe that improving the effects of flood management activities on waterways is an important principle for the ZIP. Successfully applying this principle means that:

- Flood management strategies, plans, and activities (including urban and rural drainage systems) are aligned with the CWMS where possible, without compromising the overall level of flood protection provided

4. Priority Issues

4.1 Safeguarding Groundwater Quality And Flows For Multiple Uses

Background

In the Christchurch West Melton Zone, groundwater underpins the cultural, social, economic, environmental well-being and health of local communities:

- Our major urban streams and rivers are all spring-fed by groundwater, which is linked to the ecosystem health of surface waterways and associated cultural values
- Our untreated potable drinking water supply comes from the aquifers (public community supplies and private takes)
- Industry in our Zone has an economic advantage because of the ready availability of groundwater of suitable quality and quantity
- Groundwater is abstracted to support agricultural production, including market gardening that supplies fresh produce to shops in Christchurch
- The high pressure of water in the aquifers minimises the cost of pumping water around the Zone

The Committee notes that abstraction of groundwater for human use reduces the amount of water in the system that is available for the environment. This means that we will have to accept that supplying water for the needs of our society will inevitably impact on the environment. This is why we believe it is important to review the future water needs of our communities in the context of meeting water demands from the aquifers. This will enable us to make informed decisions about the consequences of our demands and to identify the best integrated approach for the future management of water.

The management of groundwater is further complicated as the aquifers we rely upon are part of a wider system under the Canterbury Plains. This means that we both receive groundwater from, and export groundwater to other zones. In order to realise our aspirations about groundwater, we will need to work with other Zone Committees in adjacent areas.

The Committee recognises that maintaining an untreated potable water supply in our Zone is a fundamental expectation of local people. In our Zone, we strongly support the on-going enforcement of "Groundwater Protection Zones" and the restrictive management of land-use activities over unconfined aquifers where the risk of groundwater contamination is greatest. We also note the significant work that has been done in recent years to indicate that there is little risk posed to water quality in our aquifers by new irrigation schemes (e.g. Central Plains Water) or land-use intensification outside of our Zone. This is the basis of the current planning approach being taken by Environment Canterbury in the Proposed Land and Water Regional Plan and the development of sub-regional chapters.

We acknowledge that for many people in our Zone, there are on-going concerns about the risk that land-use intensification poses to the water quality in our aquifers. As such, we believe that the CWMS process necessitates a general review of the currently available information by a panel of experts to jointly advise on:

- The spatial extent of groundwater flows and recharge areas that feed water into the Zone, and;
- The degree of risk posed by current land use, and likely scenarios of future land use, over un-confined aquifers
- A long term research programme to gain a better understanding of the three-dimensional nature of the Zone aquifers and the movement of groundwater through them

In the context of implementing the CWMS in our Zone, this approach will provide reassurance for the Committee (and wider public) that groundwater quality is being safeguarded and flows in the most effective way for the future. Once a joint position is agreed, statutory plans and enforcement activities (including Groundwater Protection Zones) can be amended if necessary.

The Committee has heard that the rate at which water seeps from the Waimakariri River into the aquifers in our Zone is considered to be relatively consistent across a range of flows. We are however concerned that any deterioration in water quality in the Waimakariri River could introduce additional contamination into the aquifers. We believe a precautionary approach to managing water quality in the Waimakariri should be adopted.

In addition, the groundwater systems in the Zone support populations of invertebrates that are endemic to New Zealand (possibly to Canterbury). The role of groundwater invertebrates in maintaining water quality in the aquifers, or their sensitivity to pollution, is not yet fully understood. We think that avoiding significant changes to groundwater quality and quantity would seem prudent until the invertebrate ecology is better understood, as a precautionary approach to maintaining water quality in our aquifers.

We are particularly concerned about activities in the Zone that could potentially affect water quality or flows in the vicinity of springs that feed our waterways. This is because structures that penetrate into the water table (pumped wells or drained pits) have the potential to divert groundwater flows away from springs and reduce stream flows. In addition, some activities have the potential to degrade water quality by introducing new contamination (e.g. CCA timber) or to disturb sediments. We are keen to ensure that all of these impacts are closely controlled as part of the post-earthquake rebuild, and in general to safeguard the future of spring-heads.

There have been two obvious groundwater related impacts resulting from the earthquakes: liquefaction and new springs.

The Committee acknowledges the effects of these impacts on people in the Zone however, considers that they are outside the scope of the ZIP as follows:

- Other than where silt has impacted directly on waterways, we consider the effects of liquefaction to be outside of the scope of the CWMS.
- Where new springs arise outside of existing water corridors and/or are affecting buildings or private land, we consider that these springs are best addressed in the context of earthquake recovery.

It is important to note that the reticulated public water supply in the Lyttelton Harbour/Whakaraupō area of the Banks Peninsula Zone is supplied from groundwater that is abstracted in the Heathcote Valley, part of the Christchurch West Melton Zone. This Committee will work with the Banks Peninsula Zone Committee to ensure appropriate alignment of CWMS implementation on this matter.

Our Priority Outcomes

The Canterbury Water Management Strategy (CWMS) has set a number of Targets that are relevant to groundwater management. Of particular significance are the Targets concerning "Drinking Water" as most drinking water in the Christchurch West Melton Zone is sourced from groundwater. "Water-use efficiency" Targets are also relevant for groundwater management. In this Zone water takes for urban parks and sports-field irrigation are sourced from groundwater, as are takes for industrial/commercial and community use. "Indicators of regional and national economies" are also relevant because of the value of access to an untreated water supply for both commercial and domestic use. Lower Waimakariri limits for environmental flows are relevant because of the contribution that groundwater makes to rivers and streams flows, especially during summer. Catchment load limits for nutrients are also relevant to groundwater because of the contribution that groundwater makes to stream flows and, in particular because of the risks of nitrate contamination in drinking water supplies.

We therefore believe that safeguarding groundwater quality and flows for multiple uses is the most important issue to be tackled to successfully implement the CWMS in the Christchurch West Melton Zone. In order to address this issue, we have identified Priority Outcomes.

These are (not in any particular order):

- Groundwater quality is safeguarded for multiple uses
- The quality of untreated drinking water from aquifers is safeguarded
- Groundwater resources are actively managed for multiple uses
- Water levels, quality and flows at spring-heads of spring-fed waterways are safeguarded
- Earthquake Recovery Programmes help safeguard groundwater quality and flows for multiple uses

Links to CWMS

The Committee believes that achieving our priority outcomes will contribute directly to the implementation of the following CWMS Targets:

- General contaminant risks and nitrate loads in relation to drinking water targets:
- Indicators of regional and national economies

We also believe that achieving our priority outcomes will contribute to achieving CWMS targets in other sections of the CWMS such as:

- Ecosystem health and biodiversity for riparian and in-stream ecosystems especially at the spring heads
- Achieving kaitiakitanga (instream flows, non-point source pollution, drinking water quality, wāhi taonga & mahinga kai)
- Improving water use efficiency (irrigation, community use, industrial/commercial use)
- Establishing environmental limits

Our Recommendations

The Committee have identified the actions that we recommend be implemented to achieve our Priority Outcomes (see table below). The 'Priority Outcome' column signifies the subject of the Recommendation and the 'Organisation(s)' columns suggest the most appropriate lead organisation(s) for delivering on the Recommendation. We acknowledge that there may be individuals and agencies who will be involved but who are not listed.

Priority Outcomes	Ref. #	Recommendations	Suggested Lead Organisation(s)	Suggested Supporting Organisation(s)	Timeframe
GW1 **Groundwater quality is safeguarded for multiple uses**	1.1	a) Review the effectiveness of statutory plans and enforcement activities to: • Manage land-use activities over un-confined aquifers on a precautionary basis • Maintain special provisions in relation to the Groundwater Protection Zones • Prevent new development and/or intensification/change of land use in the Groundwater Protection Zones unless it can be undertaken without risk to groundwater quality • Ensure that bore casings are installed to appropriate standards to protect groundwater quality b) Update plans where required	CCC ECan SDC	Manawhenua	1 .5yrs
	1.2	Continue to implement a co-ordinated groundwater quality monitoring programme to keep nitrate levels and other contaminants under surveillance against World Health Standards	CCC ECan SDC	CDHB Manawhenua	Ongoing
	1.3	a) Review the standards for private wastewater treatment systems in the Groundwater Protection Zones, taking into account the risk of contamination in emergency situations b) Update where required	ECan	CCC Manawhenua SDC	3 yrs
GW2 **The quality of untreated drinking water from aquifers is safeguarded**	2.1	a) Establish and facilitate an expert panel to review and jointly advise on the following points (using currently available information): • The spatial extent of groundwater flows and recharge areas that feed water into the Zone, and; • The degree of risk posed by current land use, and likely scenarios of future land use, over un-confined aquifers b) Where required, update statutory plans and enforcement activities		CCC CDHB ECan SDC	6 months
	2.2	Develop and initiate a programme of actions to improve drinking water supplied via the public reticulation system in north west Christchurch (to at least a Ba NZ Drinking Water Standards)	CCC	CDHB	2 yrs
	2.3	Develop and initiate a programme of actions to improve drinking water supplied via the public reticulation systems in Selwyn District	SDC	CDHB	2 yrs
GW3 **Groundwater resources are actively managed for multiple uses**	3.1	Update future demand projections for the community water supply, to ensure alignment with the following: • Earthquake Recovery Strategy • Greater Christchurch Urban Development Strategy • Christchurch West Melton Zone Implementation Programme	CCC SDC	ECan	2 yrs
	3.2	Develop future demand projections for all other takes from groundwater, to ensure alignment with the following: • Earthquake Recovery Strategy • Greater Christchurch Urban Development Strategy • The Zone Implementation Programme	ECan	Manawhenua	2 yrs
	3.3	a) Assess the extent to which the management of groundwater resources can give effect to the following outcomes in combination (not in order of priority): • Maintain and enhance flows at springheads of spring-fed waterways to sustain ecosystem health and cultural values, and; • Where possible reinstate flows from historical springs and; • Safeguard recharge and water quality of the deeper aquifers so that the resource is not depleted or degraded in quality and; • Meet projected future demand for community water supply and; • Meet projected demand of all other takes and; • Remain resilient in reasonably foreseeable climate change scenarios b) Work with the Committee to identify a preferred approach to managing and allocating groundwater resources c) Where required, update the Land and Water Regional Plan to give effect to the preferred approach	ECan	CCC SDC Manawhenua	3 yrs

Priority Outcomes	Ref. #	Recommendations	Suggested Lead Organisation(s)	Suggested Supporting Organisation(s)	Timeframe
GW4 **Water levels, quality and flows at spring-heads of spring-fed waterways are safeguarded**	4.1	a) Commence project to identify "sensitive" areas around the heads of spring fed waterways where activities could alter or vary groundwater quality, levels, and flows (this may require a detailed survey of springs) b) Review the effectiveness of statutory plans and enforcement activities taking into account: • A precautionary approach in sensitive areas • The design and construction of foundations for new and redeveloped buildings • Design and installation of new and replacement buried infrastructure (e.g. pipes, cables) • Design and construction of septic tanks c) Update plans where required	ECan	CCC SDC	1 yr
	4.2	a) Identify shallow groundwater takes in sensitive areas that are having a negative impact on spring-fed waterways b) Working with consent holders, develop and implement a co-ordinated programme of actions to retire	ECan	Consent Holders	5 yrs
GW5 **Earthquake Recovery Programmes help safeguard groundwater quality and flows for multiple uses**	5.1	Work with CERA to identify opportunities for Earthquake Recovery Programmes to assist with the implementation of the following recommendations, where appropriate: GW1.1, 1.3, 2.1, 3.1, 3.2, 3.3, 4.1	CCC ECan SDC	Manawhenua	6 months
	5.2	Seek guidance and advice from the Zone Committee on the implementation of Earthquake Recovery Programmes in the context of the CWMS	CCC ECan SDC		Ongoing to 2016

4.2 Enhancing And Managing Waterways For Recreation, Relaxation And Amenity

Background

Christchurch is known as the "Garden City" due to the quality and extent of the green spaces, which in part is linked to the European heritage of riverside parks and walkways that are valued and enjoyed by both residents and tourists. Perhaps generally less well known are the wāhi taonga and wāhi tapu that are important to manawhenua, as are the associated spiritual, relaxation, therapeutic and passive recreation opportunities.

Recreation, relaxation and amenity opportunities in the waterways of this Zone are of social, cultural and economic benefit. Recreation, relaxation and amenity can vary from active pursuits such as kayaking, kite surfing or jetboating to more leisurely activities such as gathering mahinga kai, fishing, walking, or picnicing. Waterways provide "blue corridors" that are valued and enjoyed by people in the Christchurch West Melton Zone for the recreation, relaxation and amenity opportunities they provide.

The Waimakariri River is one of the most heavily used waterways for recreation in New Zealand. In addition, the braided character of the river has intrinsic value. In the urban setting riverside parks and reserves, provide access to open landscapes, water scenes, wooded areas and the more natural world that are used by walkers, cyclists, and people taking some time out for quiet contemplation. Recreation and relaxation in this context have both direct and indirect benefits to local people and those from outside the Zone.

More people taking part in more activities will increase exercise levels, reduce stress, support local businesses, encourage the provision of better attractions for both local people and visitors, and help earthquake recovery. In some instances, the social and economic benefits will be more tangible and demonstrably connected to waterways (e.g. increased visitor numbers to an improved riverside park), whilst more indirect in others (e.g. a person feels happier because they walked beside the river at lunchtime).

Each of the major catchments in the Zone offers a different range of recreation, relaxation and amenity opportunities. Inevitably, there are sometimes conflicts between the different ways that people want to use and enjoy the same space. For example, a jet boat is not conducive to quiet contemplation. As such, we believe it is important to manage our waterway corridors to provide for multiple recreation, relaxation and amenity uses. We also believe that this will be most effectively achieved by involving local groups in identifying priorities for improving recreational and relaxation opportunities with easy access, i.e. close to their communities. We consider that increasing access to waterways is a priority if we are to enhance recreation, relaxation and amenity opportunities. More space beside the waterways means more space to provide for a variety of activities. In some instances, development has encroached on riparian strips and there may be opportunities to reinstate these as part of the post-earthquake rebuild. It is also important to encourage developers to go beyond the statutory minima for set-back provisions to help expand or enhance riparian strips. Connecting recreational opportunities along waterway corridors is also important in improving access and encouraging people to use riparian areas. We support the concept of a large multiple-use park along the Avon River/ Ōtākaro in a corridor from the central business district to the estuary.

The Committee also believes that culture and heritage education parks along waterways would improve recreation, relaxation and amenity opportunities by helping people to better understand the multi-values of their waterways. Interpretation stations are important components of an overall approach to making waterway corridors more accessible. In the same vein, ensuring that there are venues for events (e.g. meeting places, concerts) alongside waterways is an important element of designing waterway corridors that are used by a broad-cross section of the community.

In some locations, where space is available and it is appropriate, moving stop banks further away from the river to reinstate flood plains may help to increase the diversity of landscapes and associated scope for recreation, relaxation and amenity. Ensuring that there is a variety of wet areas is an important design feature as ponds, wetlands, streams, and rivers all provide different experiences.

Ensuring that water is clean and safe for contact is essential for enhancing water based recreation, relaxation and amenity opportunities. Contact water recreation standards are the benchmark. This topic is addressed by the Priority Outcomes and Recommendations related to the Priority Issue of "Improving surface water quality and safeguarding surface water flows."

The Committee recognises that the management of waterways for recreation and relaxation needs to give consideration to other values. For example, the breeding areas of braided river birds need to be protected from disturbance by vehicles, whilst water quality in stormwater retention ponds may not be good enough for contact recreation. This should form part of an integrated approach to catchment management.

For some water based sports, enhancing opportunities includes identifying ways to upgrade existing facilities or provide new venues within the Zone. This is particularly the case for white-water and flat-water sports in the Zone. We recognise that larger scale venues would be costly, with limited locations to establish new waterways for these sports (e.g. new artificial lakes). Furthermore, modification of existing waterways would potentially conflict with other priorities (i.e. straightening or widening rivers would have impacts on biodiversity and change flow characteristics). As such we believe that it is appropriate to investigate how enhanced facilities could be developed in the Zone, taking into account the following points:

- Preference for new artificial lakes over modification of existing waterways, where systems are put in place to ensure maintenance of water quality
- Accessibility of potential locations to encourage participation by younger age groups

- Supporting a variety of different recreation, relaxation and amenity activities (e.g. kayaking, rowing, swimming, sailing)
- Providing multiple benefits for enhanced water management (e.g. native biodiversity and habitat areas, stormwater retention basins, flood management)

Our Priority Outcomes

The Canterbury Water Management Strategy (CWMS) has set specific Targets for recreation and amenity opportunities. These Targets particularly focus on availability and/or quality of recreational opportunities in each zone, increasing angler numbers or catch rates, addressing environmental flows to meet recreational outcomes and, in areas used for water based recreation, improving water quality if appropriate guidelines are not already met. The water quality aspects of the recreational Targets are addressed in our water quality Recommendations. Our Committee has specifically highlighted relaxation and passive recreation to clarify that recreation is not limited to more energetic activities.

In order to address CWMS recreation and amenity Targets, we have identified Priority Outcomes that need to be achieved. These are:

- Waterway corridors provide for multiple recreation, relaxation and amenity uses
- Riparian strips are created, reinstated or expanded (in length and breadth) to improve accessibility for, and encourage recreation, relaxation and amenity
- Wāhi taonga and wāhi tapu are acknowledged
- Any adverse effects of flood management activities and other infrastructure in or near waterways, on the safety of water based recreation are reduced and eliminated where possible
- Earthquake Recovery Programmes help enhance and manage waterways for recreation, relaxation and amenity

Links to CWMS

We believe that achieving our Priority Outcomes will directly contribute to the implementation of the following CWMS recreation and amenity opportunities Target areas:

- Maintaining the existing diversity and quality of water-based recreation sites, opportunities and experiences
- A positive trend in the availability and/or quality of recreational opportunities in our Zone
- Restoring at least one major fresh water recreational opportunity in our Zone that is not currently available in 2010.
- Improving water quality in river bathing sites so at least 80% of these sites are graded as suitable for contact recreation

We also believe that achieving our Priority Outcomes will contribute to achieving CWMS Targets in other sections of the CWMS such as:

- Ecosystem health/biodiversity, through riparian management to improve habitat quality alongside and within waterways
- Kaitiakitanga through acknowledgement and better understanding of wāhi taonga and wāhi tapu as well as improved quality of mahinga kai through riparian management improvements
- Indicators of regional and national economies through increased recreational and tourism opportunities

Our Recommendations

The Committee have identified the actions that we recommend be implemented to achieve our Priority Outcomes (see table below). The 'Priority Outcome' column signifies the subject of the Recommendation and the 'Organisation(s)' columns suggest the most appropriate lead organisation(s) for delivering on the Recommendation. We acknowledge that there may be individuals and agencies who will be involved but who are not listed.

Priority Outcomes	Ref. #	Recommendations	Suggested Lead Organisation(s)	Suggested Supporting Organisation(s)	Timeframe
RR1 **Waterway corridors provide for multiple recreation, relaxation and amenity uses.**	1.1	a) Implement a collaborative process at a catchment level to involve local community groups in identifying priorities for improving recreational and relaxation opportunities b) Review and update statutory plans and enforcement activities to give effect to these priorities c) Develop and progress a co-ordinated programme of actions that are integrated into a catchment plan	CCC	ECan Manawhenua SDC	3 yrs
	1.2	Develop and enhance collaboration between community groups and waterway users for the Waimakariri River, Brooklands Lagoon, and the Avon-Heathcote Estuary/Ihutai, as waterways with multiple uses that are sometimes in conflict (e.g. boating, fishing, significant native biodiversity)	ECan	CCC Manawhenua Regional Committee	1.5 yrs
	1.3	Develop and progress a co-ordinated programme of actions to: a) Increase inter-connection and accessibility of relaxation and recreation opportunities in urban and rural waterway corridors b) Increase the number of safe, inviting areas for quiet contemplation c) Establish environmental, cultural and heritage parks, with appropriate signage, along waterways	CCC SDC	ECan Manawhenua	5 yrs
	1.4	Investigate a co-ordinated programme of actions to move flood protection banks further back from urban waterways to facilitate improved recreation, relaxation and amenity	CCC	Manawhenua	3 yrs
	1.5	In consultation with community groups develop a co-ordinated programme to establish a large multiple-use park along the Avon/ Ōtākaro River in a corridor from the central business district to the estuary	CCC	Manawhenua	3 yrs
	1.6	In consultation with community groups, progress the Mid-Heathcote River/ Ōpāwaho Linear Park Masterplan	CCC	Manawhenua	3 yrs
	1.7	(a) Investigate; (b) develop a co-ordinated programme to develop international standard flat-water and white-water courses, taking into account: • Potential for these facilities to benefit: o native biodiversity o stormwater management o flood management o other recreation and relaxation activities • Preference for new artificial lakes over modification of existing waterways • Accessibility of potential locations to encourage participation by younger age groups	To be identified	CCC ECan Local Community Groups Manawhenua	5 yrs
	1.8	Ensure that any new infrastructure in or near waterways does not adversely impact on the safety of water based recreation	CCC ECan SDC		Ongoing
	1.9	a) Engage with local community groups and possible affected parties, to identify any existing infrastructure that may pose a hazard to water based recreation b) Where possible, either remove hazardous infrastructure or alter it so that the risk is reduced to an acceptable level	CCC ECan SDC		3 yrs
RR2 **Riparian strips are created, reinstated or expanded (in length and breadth) to encourage recreation, relaxation and amenity**	2.1	a) Review the effectiveness of current set-back provisions to ensure that opportunities are taken as part of earthquake recovery to encourage recreation, relaxation and amenity in riparian areas. b) Commence a review and update statutory plans and enforcement activities where required	CCC SDC	ECan	6 months
	2.2	Where land is redeveloped or sub-divided, work with developers and landowners to implement actions that create, enhance and/or expand riparian strips	CCC SDC	ECan Manawhenua	Ongoing
	2.3	Work with interested land owners, to improve access for recreation, including mahinga kai harvesting, relaxation and amenity.	CCC ECan Manawhenua SDC		Ongoing

Priority Outcomes	Ref. #	Recommendations	Suggested Lead Organisation(s)	Suggested Supporting Organisation(s)	Timeframe
RR3 **Wāhi taonga and wāhi tapu are acknowledged**	3.1	Work with manawhenua to develop and progress a co-ordinated programme of actions to raise awareness, understanding, and engender a sense of shared pride in wāhi taonga and wāhi tapu	CCC ECan SDC	Manawhenua	3 yrs
RR4 **Any adverse effects of flood management activities and other infrastructure in or near waterways, on the safety of water based recreation are reduced and eliminated where possible**	4.1	a) Review statutory plans and flood management programmes to ensure that flood management infrastructure and activities do not adversely impact on the safety of water based recreation b) Update where required	ECan		Within 1 year
RR5 **Earthquake Recovery Programmes help enhance and manage waterways for recreation, relaxation and amenity**	5.1	Work with CERA to identify opportunities for Earthquake Recovery Programmes to assist with the implementation of the following recommendations, where appropriate: RR1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 2.1, 2.2, 2.3, 3.1	CCC ECan SDC	Manawhenua	6 months
	5.2	Seek guidance and advice from the Zone Committee on the implementation of Earthquake Recovery Programmes in the context of the CWMS	CCC ECan SDC		Ongoing to 2016

4.3 Improving Surface Water Quality And Safeguarding Surface Water Flows

Background

Good quality surface water and adequate flows are essential for the protection of natural ecosystems, and the health of those people gathering mahinga kai and using waterways for recreation. High levels of harmful bacteria or other disease-causing micro-organisms can affect people and animals that drink, gather food or undertake recreational activities in or on the water. Other contaminants that enter waterways through diffuse or point source discharges can affect ecosystems in a variety of ways. Aquatic ecosystems can be negatively influenced through direct toxic effects (e.g. metals and other harmful industrial substances), changes to habitat conditions (e.g. fine sediment), or changes to the balance of chemical and biological processes (e.g. nutrients that can stimulate excessive growth of aquatic plants which change the oxygen and pH levels in the water). Sufficient flows are necessary to provide wetted habitat for aquatic life, flushing and dilution of contaminants, and optimal temperature and oxygen conditions to sustain life in the water.

"Ngāi Tahu considers that its relationships with the waters of its rohe have been eroded over the last 150 years. Evidence produced by Ngāi Tahu to the Waitangi Tribunal documented numerous examples of the waterways within the Ngāi Tahu rohe:

- That are now severely polluted by discharges
- Where reworking of the hydrological regime of waterways has resulted in unnatural patterns of erosion, sedimentation, drying up of flows and damage to rich mahinga kai habitats on the riparian margins

The degraded state of many of the waterways is confirmed by the State of the Environment Report (1997). These adverse effects impact on the health and wellbeing of the waterways and the ability of Ngāi Tahu to access the life sustaining resources of the waterways."[7] Environment Canterbury's State of the Environment Report (2009) for fresh water confirms that generally urban lowland streams are of poor water quality. However, there are some exceptions such as spring zones.

In this Zone, water is not generally abstracted from rivers and streams for human drinking water but it is taken from the lower Waimakariri for stock water schemes.

Each of the major catchments in the Zone has a different combination of issues and opportunities related to surface water quality and flows. These issues and opportunities reflect the type and intensity of land-use in the catchment (i.e. urban or rural), land drainage systems, historical modification of naturally occurring waterways, and the various inputs into, and abstraction from waterways (e.g. stormwater input, agricultural abstraction). The ecosystem health, biodiversity, recreation, relaxation and amenity, cultural and heritage outcomes that local communities want for individual waterways will vary. The feasibility of achieving those outcomes and the resource implications for doing so will also vary between catchments. The Committee believes it is important to establish specific water quality limits at a catchment level that reflect these factors in an integrated and planned way. It is crucial that local communities are involved in the process of identifying water quality outcomes (and associated environmental flows and limits).

The Waimakairiri River is the only braided river in the Zone and retains significant and diverse values as a consequence of current water quality and flows. We believe that safeguarding these values in the way the river is managed is a very high priority. It is however important to recognise that the Waimakairiri River has been modified and constrained to its current channel by stop banks and gravel extraction, to provide flood protection to Christchurch and surrounding areas. We believe that these flood management activities should, where possible, be undertaken in a way that benefits the Waimakariri's braided character and associated ecosystems.

Water quality in our urban waterways is degraded by stormwater run-off from our streets, car parks, drives, and buildings. Making sure that stormwater does not flood our streets and houses is obviously important. Management of stormwater can be improved to minimise or eliminate the discharge of polluted water through either reducing the amount of contamination and/or reducing the volume or rate at which water is discharged. For example:

- Buildings can be built or retrofitted so that rainwater can be collected and used for flushing toilets or watering the garden. "Living" roofs and rain gardens can absorb more water to be released later more slowly
- Materials that increase levels of contaminants (e.g. copper cladding) in new or renovated buildings should be avoided
- Hard standing areas like car parks and drives should be surfaced with permeable materials (e.g. gravel, permeable concrete) that allow water to soak into the ground instead of running into drains
- Street design should incorporate green areas or swales to absorb and hold stormwater
- New developments and subdivisions should be required to minimise, detain or retain, stormwater in the most appropriate way
- Riparian strips should be created, reinstated or widened to improve the buffering of stormwater before it enters a stream
- Roads should be swept more frequently to reduce the build-up of pollutants and rubbish which would otherwise wash off into the drains and rivers
- Councils should work with community groups and media to raise awareness and understanding of stormwater management, so that individuals minimise their personal impacts, including, for example:
    - Picking up dog droppings when walking dog(s) to prevent them being washed into the river
    - Washing paint brushes on the grass rather than

7 *Te Rūnanga o Ngāi Tahu Freshwater Policy Statement (1999) pg 5*

pouring paint water down the drain, which is connected to the local stream

- Cleaning cars on a porous surface (e.g. lawn, loose brick) to prevent detergents washing into streams

The Committee believes that the post-earthquake rebuild of Christchurch provides a unique opportunity to retrofit and redesign the stormwater infrastructure of our city. This should be show-cased in the design and construction of the new central city. If excellent standards of stormwater management are achieved, this will be to the long term benefit of our waterways and future generations.

Our aspiration is that the discharge of wastewater into our waterways never happens. We recognise however that this may sometimes be necessary in emergency situations to protect human health, as was the case in the immediate aftermath of the recent earthquakes. Christchurch is built on swamp and marshlands. Cracks or breakages in the sewerage system allow shallow groundwater to infiltrate the pipes, especially during heavy rainfall, worsening overflows to waterways. We also recognise that this restricts the ability to eliminate the discharge of wastewater in extreme weather conditions, but strongly feel that this should be the goal in reasonably foreseeable circumstances. To this end, there is an opportunity to improve the performance and resilience of our waste-water systems as they are rebuilt.

The Committee acknowledges the significant improvements that have been made in recent years to public waste-water infrastructure (e.g. stopping discharge to the Avon-Heathcote Estuary/Ihutai) and the management of stormwater at a catchment level. Surface water quality and flows however remain an issue that needs to be further addressed if the long term vision of the CWMS is to be achieved in this Zone.

We also think that it is important to address industrial discharge in the Zone. Proactively working with industry and business will help them to exceed environmental standards specified in their consents, which will further benefit waterways.

Increasing surface flows and improving water quality is a fundamental issue in successfully implementing the CWMS in this Zone. Unless the water in our waterways is of a suitable quality and flows at the appropriate rates when needed, kaitiakitanga cannot be demonstrated nor can the social, economic, and environmental aspirations of local communities be met.

Water quality and flows are important so that:

- Healthy ecosystems and biodiversity can be maintained for their intrinsic value and our shared enjoyment
- Crops and pasture can be grown and drinking water can be provided for livestock
- Coming into contact with the water in our streams and rivers, or gathering food from waterways, will not result in illness
- The Mauri of waterways is safeguarded

There are a number of different benchmarks for what constitutes "good" water quality depending on the desired outcome(s):

- Drinking water attains excellent water quality by meeting the New Zealand Drinking water standards[8]
- Water that is used for contact recreation can be graded as very good[9]
- The level of toxic contaminants in our waterways don't exceed ANZECC 2000 Water Quality Guidelines[10]
- Health of waterways will be recognised when mahinga kai species are harvestable
- Food safety for species gathered from waterways can be measured according to NZ food safety guidelines and recreation water quality guidelines[11]

In our Zone, the quality and flows in the upper reaches of our spring-fed waterways are closely related to the groundwater quality and water table levels. Groundwater and surface water are intimately connected. Surface water flows depend upon the levels in aquifers which should be monitored at multiple locations and maintained according to an agreed management regime. The flows required to maintain desired amenity and ecosystems values of a waterway (e.g. the natural character of a braided river, or to maintain fish passage) should be established and used as a benchmark. All non-domestic water takes, whether groundwater or surface water, should be monitored, reported and analysed for trends.

Our Priority Outcomes

The Canterbury Water Management Strategy (CWMS) has set specific Targets for improving surface water quality for river bathing sites and lakes and rivers used for contact recreation under the "recreation and amenity opportunities" Targets. Water quality and flows are implicit in the "ecosystem health and biodiversity" Targets that focus on habitat quality, ecosystem health and improvement of lowland stream ecosystems. "Kaitiakitanga" Targets refer specifically to direct discharges of contaminants into water and to addressing non-point source pollution. The "natural character of braided rivers" Targets encompass the importance of flows, flooding, bird habitat and other indigenous habitats. "Environmental limits" that include setting environmental flows for surface streams and rivers plus setting load limits for nutrients are also CWMS Targets. At this stage we have insufficient information to be able to make specific recommendations for the environmental limits Targets.

8 *http://www.mfe.govt.nz/publications/water/nz-drinking-water-standards-00.html*

9 *http://www.mfe.govt.nz/publications/water/microbiological-quality-jun03/html/part-two.html*

10 *http://www.mfe.govt.nz/publications/water/anzecc-water-quality-guide-02/index.html*

11 *http://www.foodsmart.govt.nz/food-safety/hunting-collecting-fishing/ and http://www.foodsmart.govt.nz/food-safety/hunting-collecting-fishing/ and http://www.mfe.govt.nz/publications/water/microbiological-quality-jun03/html/part-two.html*

In order to meet the CWMS Targets, we have identified Priority Outcomes which are:

- Surface water quality and flows are improved
- Mahinga kai are safeguarded from declining water quality and flows
- The Waimakariri River is safeguarded from declining water quality and flows
- Stormwater impacts on surface water quality are reduced
- Riparian strips are created, reinstated or expanded
- Wastewater impacts on surface water quality are reduced
- Industrial impacts on surface water quality are reduced
- Earthquake Recovery Programmes help improve surface water quality and safeguard surface water flows

Links to CWMS

We believe that achieving our Priority Outcomes will contribute to achieving the following CWMS targets:

- Correcting decline in freshwater species, habitat quality or ecosystems,
- Preventing further loss of ecosystem health in river mouths and coastal lagoons (hāpua)
- Improving lowland stream ecosystems
- Maintaining the natural braided character of the lower Waimakariri River
- Kaitiakitanga targets are met for point source discharges, non-point source pollution, mahinga kai, customary uses, wāhi taonga, and Waimakariri river environmental flows
- Water quality targets for river bathing sites and rivers used for contact recreation are achieved
- Indicators of regional and national economies regarding the contribution water makes to the Canterbury economy through value added economic impact

Our Recommendations

The Committee have identified the actions that we recommend be implemented to achieve our Priority Outcomes (see table below). The 'Priority Outcome' column signifies the subject of the Recommendation and the 'Organisation(s)' columns suggest the most appropriate lead organisation(s) for delivering on the Recommendation. We acknowledge that there may be individuals and agencies who will be involved but who are not listed.

Priority Outcomes	Ref. #	Recommendations	Suggested Lead Organisation(s)	Suggested Supporting Organisation(s)	Timeframe
SW1 **Surface water quality and flows are improved**	1.1	a) Involve manawhenua and community groups in helping to develop catchment plans for stormwater quality improvements b) Review and update statutory plans and enforcement activities to give effect to these outcomes c) Develop and advance a co-ordinated programme of actions that are integrated into a catchment plan for each catchment including: • public communications and awareness raising • initiatives to involve students at schools and education institutions	CCC SDC	ECan Manawhenua	3-5 yrs
	1.2	a) Work with the Committee to agree a preferred approach for managing rural land-use in the Zone b) Update the proposed Land and Water Regional Plan where required	ECan	CCC Industry Groups Landowners SDC	3-5yrs
	1.3	Review the use and management of stock water races taking into account flows into naturally occurring waterways, and update as required	CCC SDC	Landowners Rural Fire Authorities	Every 3 years
	1.4	Review and monitor effectiveness of the 'Pollution Hotline' service and update where required	ECan		Annually
	1.5	Develop and initiate a prioritised programme of projects to rehabilitate flows in spring-fed waterways (including artificially enhancing flows and reinstating natural flows)	CCC Manawhenua SDC	ECan	3-5 yrs
	1.6	Work with the landowners to: a) Assess the impact of abandoned historical infrastructure (e.g. abandoned wells, dumps) b) Develop and progress projects to address significant issues as quickly as possible	CCC ECan SDC	DOC HPT	Ongoing
SW2 **Mahinga kai are safeguarded from declining water quality and flows**	2.1	a) Review Plans and Strategies to assess the effectiveness of provisions to safeguard mahinga kai values in all waterways, taking into account: a. water quality b. flows c. habitat for all life stages of mahinga kai[12] b) Update the Plans and Strategies where required	ECan Manawhenua	CCC SDC	
SW3 **The Waimakariri River is safeguarded from declining water quality and flows**	3.1	a) Review the effectiveness of the Waimakariri River Regional Plan, taking into account: o water quality o flows o braided river character o gravel extraction o flood management o endangered birds o recharge of groundwater o needs of water based recreation users o potential for Waimakariri River to be a future source of water for Christchurch's reticulated system b) Update the plan where required	ECan	CCC Manawhenua SDC	3-5 yrs
SW4 **Stormwater impacts on surface water quality are reduced**	4.1	a) Review statutory plans and enforcement activities to ensure that : • Stormwater infrastructure is upgraded or retrofitted where possible when building density is changed • Stormwater from all new developments and subdivisions is treated at/or near to source and not discharged directly into waterways b) Update where required	CCC SDC	ECan	6 months
	4.2	a) Review planned improvements to public stormwater infrastructure, taking into account: • Opportunities to speed up implementation • Minimising the direct discharge of stormwater to waterways (eliminating where possible) as quickly as possible b) Update where required and progress	CCC SDC	ECan	Annually

12 *All species utilised by people for food &/or other purposes need habitats for each of their life stages to be protected, if they are to thrive.*

Priority Outcomes	Ref. #	Recommendations	Suggested Lead Organisation(s)	Suggested Supporting Organisation(s)	Timeframe
SW4 **Stormwater impacts on surface water quality are reduced**	4.3	Identify and implement performance standards for the permeability of new and resurfaced car-parks/footpaths/drives to reduce run-off rates	CCC SDC		6 months
	4.4	Identify and implement performance standards for the design of new or redeveloped buildings, taking into account: • Best practice treatment at/or near source • Avoiding materials that increase levels of contaminants (e.g. copper cladding)	CCC SDC		6 months
	4.5	Develop and progress a programme of actions to ensure that new and retrofitted infrastructure in the new central city meets international best practice standards, with a view to Christchurch becoming an international exemplar of excellent urban stormwater management	CCC	ECan	6 months
	4.6	Review and update road sweeping operations to reduce contamination from polluted stormwater.	CCC	SDC	2 yrs
	4.7	Publicise and enforce existing sediment control and erosion regulations	ECan	CCC Manawhenua SDC	Ongoing
SW5 **Riparian strips are created, reinstated or expanded**	5.1	a) Review the effectiveness of current set-back provisions to ensure that opportunities are taken as part of earthquake recovery b) Update statutory plans and enforcement activities where required	CCC	ECan SDC	6 months
	5.2	Where land is redeveloped or sub-divided, work with developers and landowners to further enhance and/or expand riparian strips	CCC SDC	ECan Manawhenua	Ongoing
SW6 **Wastewater impacts on surface water quality are reduced**	6.1	Review and update public wastewater strategies and plans to ensure that: • there is no direct discharge to waterways in non-emergency situations (in as far as this is possible) • infrastructure is more resilient to natural hazards • alternatives to making emergency discharges directly into waterways are used where practical	ECan	CCC Manawhenua SDC	3 yrs
	6.2	a) Review the standards for private wastewater treatment systems in the Zone, taking into account the risk of contamination in emergency situations b) Update where required	ECan	CCC Manawhenua SDC	3 yrs
SW7 **Industrial impacts on surface water quality are reduced**	7.1	Work with industries to develop and progress projects to phase out direct discharge to waterways as quickly as possible	ECan		Ongoing
	7.2	Prohibit new industrial discharges direct to waterways in the Proposed Land and Water Regional Plan	ECan	CCC SDC	1 yr
	7.3	Develop and advance an enhanced programme of co-ordinated initiatives to encourage industry to go beyond the minimum required for compliance, prioritising areas with poor water quality (e.g. developing best practice guidelines)	ECan	CCC Manawhenua SDC	1 yr
SW8 **Earthquake Recovery Programmes help improve surface water quality and safeguard surface water flows**	8.1	Work with CERA to identify opportunities for Earthquake Recovery Programmes to assist with the implementation of the following recommendations, where appropriate: SW1.1, 1.5, 1.6, 3.1, 4.1, 4.2, 4.3, 4.4, 4.5, 5.1, 5.2, 6.1, 6.2	CCC ECan SDC	Manawhenua	6 months
	8.2	Seek guidance and advice from the Zone Committee on the implementation of Earthquake Recovery Programmes in the context of the CWMS	CCC ECan SDC		Ongoing to 2016

4.4 Enhancing Degraded Ecosystems, Indigenous Biodiversity, Valued Introduced Species And Landscapes

Background

The waterways in our Zone have been significantly modified since European settlement of Christchurch in the 1800's. The extensive network of swamps, marshes, and wetlands have been drained and built upon as Christchurch City expanded. The streams and rivers have been modified through:

- Constraining by stop banks
- Deepening and/or widening
- Introduction of new barriers (e.g. culverts, weirs)
- Changes in land-use (both rural and urban) reducing water quality and in-stream habitat
- Changed flow patterns
- Replacing indigenous riparian vegetation with non-native species
- Creating exotic style landscapes (e.g. parklands, pastureland)

These changes have profoundly altered the nature of the ecosystems and species in our Zone, with a particular impact upon wāhi tāonga and mahinga kai. Realistically, we need to recognise that waterway ecosystem restoration is not possible and aim for rehabilitation to the maximum extent practicable.

The Committee believes that we must protect and increase indigenous biodiversity in our Zone. There has been a general decline in the health and abundance of native ecosystems and indigenous biodiversity especially since European settlement. For example, according to Environment Canterbury, more than 98% of wetlands in the Zone have been lost. In some places, spring-fed waterways have dried up or disappeared in their higher reaches as the water table has been affected by abstraction and land use changes. Many populations of native species have been lost from our waterways as a consequence of declining water quality, changed river morphology, and competition from non-native species. Some of the change has been recent. For example, we know that 30 years ago koura (the freshwater crayfish) was found in a number of streams throughout the central city. Today, it is very rare and only found in a few waterways on the city boundary. On the flip side, there are still small high quality native habitats and indigenous biodiversity that are worth protecting. For example, Travis Wetland is a natural wetland being rehabilitated; there is a population of Bluegill Bully's at Horseshoe Lake, and inanga spawning habitats on the tidal reaches of all the urban rivers.

The Committee has not located all the natural wetlands in our Zone. It is important to identify these wetlands so that they are protected for their intrinsic and biodiversity values. In addition, many of these wetlands provide a natural environmental service by removing nutrients and sediment and providing storage to reduce flooding. While we do not advocate for naturally occurring wetlands to be managed solely for these extra benefits, we think these additional benefits increase the importance of wetlands. Similarly, wetlands that are specifically constructed for these latter purposes should be designed to enhance biodiversity and other values wherever possible (e.g. native plantings, amenity & recreation).

Some non-native species and landscapes related to waterways are valued by local communities. For example, salmon and trout are valued as game fish by anglers and make good eating. Specimen trees in parks are key features of the landscapes, valued by many people as part of our European heritage. It is important that these valued introduced species and landscapes are safeguarded were appropriate as part of a healthy ecosystem. We however acknowledge that in some circumstances, introduced species are "pests" which affect our ability to protect and enhance indigenous biodiversity. For example, removing barriers to fish migration may help the populations of migratory native fish species, but also increase predation of native fish by introduced species.

The Committee considers a pest to be an organism which causes damage to native ecosystems, or that predates on, or competes with, indigenous species. In some situations, we may wish to manage our waterways to support non-native species that are valued by people. For example, salmon and trout predate on native fish species, but are valued as a game fish. For this reason, we believe that it is important to identify what constitutes a pest species at a local level (i.e. individual waterways or catchments) in pest management plans. This approach will ensure that pest management activities are targeted to managing the species that conflict with the desired biodiversity outcomes for a particular waterway.

Pest management has the potential to become a significant issue in the red zone land if pest populations are uncontrolled where people move out. We believe that a co-ordinated approach is required in these areas to avoid significant negative impacts on the indigenous biodiversity and valued species in our waterway corridors.

The Waimakariri River is unique in the Zone for its braided river ecosystem and the native species that it supports. We are keen to ensure that the important indigenous biodiversity (e.g. fish species, braided river birds) and valued introduced species (i.e. salmon and trout) are protected by enhancing the health of the whole ecosystem. Similarly, the Avon-Heathcote Estuary/Ihutai has highly significant indigenous and migratory species (especially birds and fish) that we believe need to be appropriately protected.

The extensive flood management activities in our Zone have the potential to impact adversely on indigenous biodiversity, valued introduced species, and landscapes. For example, dredging, weed cutting, gravel extraction, need to be undertaken in a way that is sensitive to the organisms of our waterway corridors wherever possible. Flood protection activities need to be reviewed regularly and continuously improved. Where ecosystem damage by such activities is unavoidable remediation should be the norm. Such review should include re-naturalising waterways whenever possible, for example, opening up box drains.

We think that enhancing waterway corridors by reinstating, rehabilitating, or expanding riparian strips is a priority outcome

and making more space for a greater variety of habitats will provide greater scope for this.

There were extensive dryland ecosystems on the Canterbury Plains prior to the intensification of agriculture. In this Zone, fragments of native dryland ecosystems remain. We believe that these need to be protected from further loss or degradation, and opportunities to improve the overall health of this ecosystem taken.

Each of the major catchments in the Zone will have different issues and opportunities related to enhancing ecosystem health, indigenous biodiversity, valued introduced species and landscapes. Managing these sometimes competing priorities will be most effectively achieved by involving local community groups, ideally at a catchment level, in conjunction with providing suitable water quality and flows, and providing for recreation, relaxation and amenity.

Our Priority Outcomes

The Canterbury Water Management Strategy (CWMS) has set a number of Targets for ecosystem health and biodiversity. These Targets concern freshwater species, habitat quality and ecosystems, in general. There are also Targets focused on particular ecosystem types and on native fish, trout and salmon. Not all ecosystem types are found in our Zone. The Committee also acknowledges that there are introduced plant and animal species that are valued by the community, associated with our waterways. We have recognised the importance of valued introduced species in our recommendations.

In order to address ecosystem health and biodiversity Targets, and Targets related to the natural character of braided rivers, we have identified Priority Outcomes to be achieved.

They are (not in any particular order):

- Ecological health of all waterways is protected and rehabilitated
- Naturally occurring wetlands are identified and rehabilitated
- Effects of flood management activities on waterway biodiversity are minimised
- Riparian strips are created, expanded and/or enhanced
- Mahinga kai are enhanced
- Indigenous species diversity and abundance is increased
- The impact of pest species on waterways is reduced
- Dryland ecosystems are protected and rehabilitated
- The Avon-Heathcote Estuary/Ihutai ecosystems are more effectively protected
- Earthquake Recovery Programmes help enhance degraded ecosystems, indigenous biodiversity and valued introduced species

Links to CWMS

The Committee believes that achieving our priority outcomes will directly contribute to the implementation of the following CWMS Targets:

- Ecosystem health and biodiversity (Freshwater species, habitat quality, ecosystems; river mouth & coastal lagoons; dryland ecosystems; lowland streams; spring-fed streams; General including wetlands & riparian management; and native fish targets)

We also believe that achieving our priority outcomes will contribute to achieving CWMS targets in other sections of the CWMS, such as:

- Landscape values related to the natural character of braided rivers (braided river birds, indigenous habitat)
- Kaitiakitanga (wāhi tāonga, mahinga kai, customary uses)
- Recreation and amenity opportunities (improved catch rates for anglers)
- Indicators of regional and national economies (Increased wealth due to biodiversity protection and improvement)

Our Recommendations

The Committee have identified the actions that we recommend be implemented to achieve our Priority Outcomes (see table below). The ‘Priority Outcome’ column signifies the subject of the Recommendation and the ‘Organisation(s)’ columns suggest the most appropriate lead organisation(s) for delivering on the Recommendation. We acknowledge that there may be individuals and agencies who will be involved but who are not listed.

Priority Outcomes	Ref. #	Recommendations	Suggested Lead Organisation(s)	Suggested Supporting Organisation(s)	Timeframe
EB1 **Ecological health of all waterways is protected and rehabilitated**	1.1	a) Ensure statutory plans and enforcement activities: • Manage human activities which negatively impact on the ecological health of waterways • Protect/rehabilitate all remaining naturally occurring wetlands • Avoid or mitigate barriers to the movement of native stream fauna • Safeguard braided river bird habitats on the Waimakariri River from human activities	ECan	CCC DOC Manawhenua SDC	2 yrs
	1.2	Develop a co-ordinated programme of actions to improve the ecological health of waterways and ensure that it is integrated into a plan for each major surface water catchment	ECan	CCC DOC Manawhenua SDC	3yrs
	1.3	Continue to remove earthquake silt from waterways as planned	CCC		Ongoing
	1.4	a) Continue existing public communications and education initiatives to improve understanding of the many values of our waterways b) Develop and advance a co-ordinated programme of initiatives to engender a greater understanding of the value of set-back provisions, indigenous biodiversity and valued introduced and migratory species	ECan CCC	Manawhenua SDC	3-5 yrs
EB2 **Naturally occurring wetlands are identified and rehabilitated**	2.1	Identify all naturally occurring wetlands	DOC ECan	CCC SDC	3yrs
	2.2	Develop and implement a management plan for two significant wetlands, so that they are rehabilitated by 2015	ZC	CCC DOC ECan Manawhenua SDC	3 yrs
EB3 **Effects of flood management activities on waterway biodiversity are minimised**	3.1	a) Continuously improve work programmes and operations to: • Minimise the direct impacts of flood management operations on biodiversity • Rehabilitate waterways after modification to increase the diversity of in-stream habitats	ECan CCC	SDC	Every 3 years
	3.2	Ensure the Canterbury Regional River Gravel Management Strategy is implemented to minimise loss of diversity and abundance of indigenous and valued introduced species	ECan	Manawhenua	1 yr
EB4 **Riparian strips are created, expanded and/or enhanced**	4.1	Review the effectiveness of current set-back provisions to ensure that opportunities are taken as part of earthquake recovery to enhance waterway biodiversity and amenity. [This recommendation correlates with RR2.1]	CCC SDC	CCC ECan Manawhenua	6 months
	4.2	Where land is redeveloped or sub-divided, work with developers and landowners to implement actions to create or further enhance and/or expand riparian strips	CCC SDC	ECan	Ongoing
EB5 **Mahinga kai are enhanced**	*5.1*	Working with interested land owners, identify where culturally acceptable mahinga kai could be readily rehabilitated and accessed	Manawhenua	CCC DOC ECan SDC	1 yr
	5.2	Initiate and implement management plans to rehabilitate mahinga kai (e.g. contribute staff time/project funding)	Manawhenua	CCC DOC ECan SDC	3 yrs

Priority Outcomes	Ref. #	Recommendations	Suggested Lead Organisation(s)	Suggested Supporting Organisation(s)	Timeframe
EB6 **Indigenous species diversity and abundance is increased**	6.1	Immediate Steps funding is allocated to projects in the following priority areas and ecosystems: • Springheads of spring fed waterways • Wetlands • Waimakariri River mouth • Brooklands Lagoon • Avon-Heathcote Estuary /Ihutai[13] • Other projects that score highly on cultural and ecological assessment • As a first preference, support projects that are led by or involve community groups	ZC	ECan	Commencing Immediately
	6.2	a) Identify and assess the impact of barriers that restrict the movement of native in-stream and stream associated fauna for all waterways b) Except for barriers that protect native fish from introduced fish species, prioritise and progress a programme of work to remove barriers identified,	DOC ECan	CCC Manawhenua SDC	3-5 yrs
EB7 **The impact of pest species on waterways is reduced**	7.1	Implement a pest management plan for the residential red zone	ECan		6 months
	7.2	Develop and implement a co-ordinated pest (animals and plants) control programme for all waterways in the Zone	ECan	CCC DOC Manawhenua SDC	3-5 yrs
EB8 **Dryland ecosystems are protected and rehabilitated**	8.1	a) Assess the effectiveness of current statutory plans and enforcement activities in protecting remnant dryland ecosystems from changes of land use and/or new irrigation b) Update plans where required	CCC DOC SDC	ECan	3yrs
	8.2	Develop and progress a co-ordinated programme of actions as part of an integrated management approach to: • Identify all remnant dryland ecosystems • Improve the ecological health of drylands and; • Increase the total area of dryland ecosystems	CCC DOC SDC	ECan Manawhenua	5 yrs
	8.3	Work with landowners to develop and progress management plans to improve dryland ecosystems	CCC DOC ECan SDC		3yrs
EB9 **The Avon-Heathcote Estuary/Ihutai ecosystems are more effectively protected**	9.1	Review the effectiveness of the current statutory and non-statutory protection measures for indigenous biodiversity and valued migratory species	ECan	CCC DOC Local community Groups Manawhenua	3yrs
	9.2	Agree and implement a package of protection measures	ECan Manawhenua	CCC DOC Local community groups	3 - 5 yrs
EB10 **Earthquake Recovery Programmes help enhance degraded ecosystems, indigenous biodiversity, valued introduced species and landscapes**	10.1	Work with CERA to identify opportunities for Earthquake Recovery Programmes to assist with the implementation of the following recommendations, where appropriate: EB1.1, 1.2, 1.3, 4.1, 4.2, 5.1, 5.2, 6.2, 7.1, 8.1	CCC ECan SDC	Manawhenua	6 months
	10.2	Seek guidance and advice from the Zone Committee on the implementation of Earthquake Recovery Programmes in the context of the CWMS	CCC ECan SDC		Ongoing to 2016

13 This includes species that move between salt and freshwater environments and the up-stream habitat areas that are important in their lifecycle

4.5 Making Efficient Use Of Water And Managing Demand

Background

In the Christchurch West Melton Zone, we are very fortunate to have large aquifers (essentially natural reservoirs under the ground) containing vast amounts of good quality water for people to use. Whilst the total volume of groundwater is large, the rate at which water is replaced (or recharged) into the aquifers is dependent on two key factors; how much rain falls on the plains to the west of the city and; how much water flows out of the Waimakariri River into the ground.

The Committee is concerned that if water is taken from the aquifers at a rate which is faster than they are recharged, our underground reservoirs will be depleted. Over time, there may be less water available in the aquifers for us to use. In addition, possible variations in climate may affect the amount and timing of rainfall on the plains or flows in the Waimakariri River. In turn this may affect the availability of water in the aquifers.

The total amount of water taken by people from the aquifers in the Zone has increased over time. The aquifers providing for domestic, commercial, and industrial use also feed springs which create the urban rivers (e.g. Avon/Ōtākaro River) so valued by local communities. Taking water for people to drink, water gardens, flush toilets, clean cars, irrigate crops, and manufacture products, means that there is already less available for the environment.

The Committee believes that it is important to plan today for multiple uses and benefits. Everybody using water whether in urban or rural areas, for industrial, commercial, or domestic uses, must use water more wisely. This means reducing domestic use (e.g. re-using grey water, collecting and using rainwater), irrigating parks, sports fields, golf courses, farms and gardens more efficiently, economising in commercial and industrial processes, and reducing leakage from pipes. We note that minimising water use may not always be appropriate in emergency situations e.g. water used for fire fighting but this usage is infrequent and the volumes used miniscule compared to irrigation and for other purposes.

We believe that allocating domestic users an "equitable amount" of water is an important principle to encourage urban residents to use water more wisely. Domestic users who take less than this equitable amount could then be rewarded for using less water, while those taking more should contribute more to the costs of water supply. We note that the cost of delivering water to the Christchurch public is low compared to similar systems in other parts of New Zealand, and that the ability of Councils to recover costs is constrained by legislation. We also note that the per capita use of water in Christchurch is one of the highest in New Zealand.[14] The two facts may be related.

We accept that not everybody in the Zone will agree about the best way to encourage domestic users to use water more efficiently. We recognise that for the people of Christchurch, discussions about charging domestic users for the amount of water they use have historically been emotive. We emphasise strongly that any charge should not be for water as such but to cover the costs of constructing and maintaining the wells, pumps and pipes plus paying for the power. The charge would be for access to the water which in any case is paid for now as part of our rates. In order to implement the CWMS in our Zone, we need to reflect, debate, and decide as a community on the best mechanisms for encouraging more efficient water use.

In developing the ZIP the Committee notes and highlights the following points:

- The CWMS sets targets for the efficient use of water for irrigation, stock water, industrial use, electricity generation, and community water use [e.g. By 2020, 10% reduction in community water use (litres per day per person) compared to 2010]
- Whilst there is some agricultural irrigation and dairying in this Zone, the vast bulk is outside of this Zone and thus beyond the remit of this Committee. The vast majority of Canterbury's domestic water users are within this Zone
- Our recommendations are inclusive of agricultural, commercial, industrial, and domestic uses of water, in both rural and urban areas of the Zone
- As noted above, domestic water consumption in litres per head of population for Christchurch is amongst the highest in New Zealand[15]

Ultimately, we believe that if we are to realise the vision of the CWMS by 2040, we need to work out the best way for people in Christchurch West Melton Zone to use water more efficiently and manage demand both individually and collectively. It is essential that water continues to be available for community water supplies, industrial, commercial, and environmental uses. Agreeing a clear way forward on how to manage water demand is the first urgent step to take.

Our Priority Outcomes

The Canterbury Water Management Strategy (CWMS) has set specific Targets for water efficiency. These Targets particularly focus on irrigation, community, stockwater, industrial/commercial use and electricity generation in Canterbury. While electricity generation from hydro sources occurs in other zones, it does not occur in the Christchurch West Melton Zone.

The Committee believes that managing demand for water in this Zone, through encouraging, incentivising and improving efficient use of water is an important part of reducing pressure on the resource. Greater efficiencies and less demand will help to ensure that water is available where it is most needed. In order to address this issue, we have identified Priority Outcomes.

14 *http://www.qualityoflifeproject.govt.nz/pdfs/2007/Quality_of_Life_2007.pdf*
http://www.waternz.org.nz/Folder?Action=View%20File&Folder_id=89&File=110318_nationalperformancereview_finalreport.pdf

15 *http://www.qualityoflifeproject.govt.nz/pdfs/2007/Quality_of_Life_2007.pdf*
http://www.waternz.org.nz/Folder?Action=View%20File&Folder_id=89&File=110318_nationalperformancereview_finalreport.pdf

These are:

- Leakage from reticulated public water supplies is reduced
- Domestic water is used more efficiently
- Commercial and industrial use of water is more efficient
- Use of irrigation in both rural and urban areas is targeted and efficient
- Earthquake Recovery Programmes help to achieve efficient use of water and manage water demand

Links to CWMS

The Committee believes that achieving our Priority Outcomes will directly contribute to the implementation of the following CWMS Targets:

- Improving water use efficiency by encouraging best practice for irrigation; industrial/commercial and stockwater users
- Reducing the litres per person per day used for community water supply and Increasing benefits per unit of water used

We believe that achieving these Priority Outcomes will also contribute to achieving CWMS Targets in other sections of the CWMS such as Ecosystem health/biodiversity and Kaitiakitanga because more water will be retained for in-stream values.

Our Recommendations

The Committee have identified the actions that we recommend be implemented to achieve our Priority Outcomes (see table below). The 'Priority Outcome' column signifies the subject of the Recommendation and the 'Organisation(s)' columns suggest the most appropriate lead organisation(s) for delivering on the Recommendation. We acknowledge that there may be individuals and agencies who will be involved but who are not listed.

Priority Outcomes	Ref. #	Recommendations	Suggested Lead Organisation(s)	Suggested Supporting Organisation(s)	Timeframe
EU1 **Leakage from reticulated water supplies is reduced**	1.1	a) Continue and strengthen existing work programmes b) Ensure work programmes take into account: • The effects of earthquake damage • More resilient standards for water supply infrastructure c) Update programmes where required	CCC SDC		1 yr
EU2 **Domestic water is used more efficiently**	2.1	Support the Zone Committee in running a process to identify an "equitable level(s)" of domestic water use	CCC SDC		2yrs
	2.2	a) Continue existing public communications and awareness raising initiatives b) Evaluate existing public communications c) Where required, update work programmes and implement these in a coordinated way	CCC ECan SDC		2yrs
	2.3	Recommend the best mechanism(s) for encouraging more efficient use of water taken from Christchurch's community water supply	CCC		3 yrs
	2.4	Recommend the best mechanism(s) for encouraging more efficient use of water taken from Selwyn District's community water supply	SDC		3 yrs
	2.5	Develop and implement a programme of action to give effect to the recommendations in 2.2 and 2.3	CCC SDC		3-5 yrs
	2.6	Investigate and apply mechanism(s) to improve efficiency of water use from private domestic supplies	ECan		3-5 yrs
	2.7	Encourage the capture and use of rainwater for non-potable uses	CCC SDC	ECan	1 yr
	2.8	Investigate opportunities for greywater systems	CCC SDC		1 yr
EU3 **Commercial and industrial use of water is more efficient**	3.1	Require commercial and industrial users of water to demonstrate how they have implemented water efficiency plans	CCC SDC		Every 3 yrs
	3.2	Continue to charge commercial and industrial users for access to the water they use		CCC SDC	Ongoing
	3.3	a) Assess whether current statutory plans and enforcement activities require water efficiency plans to be established and implemented b) Where required, update statutory plans to achieve this	ECan		2 yrs
	3.4	Investigate and apply mechanisms to improve industrial and commercial water-use efficiency	CCC SDC	ECan	3-5 yrs
	3.5	Encourage the use of groundwater as a temperature exchange medium in heating and ventilating systems, provided that the water is returned to either groundwater or surface water in a way that avoids adverse effects and/or enhances the environment.	ECan	CCC Manawhenua SDC	Ongoing
EU4 **Use of irrigation in both rural and urban areas is targeted and efficient**	4.1	a) Assess whether current statutory plans and enforcement activities require managers of irrigation systems to implement water efficiency plans b) Where required, update plans and enforcement activities to ensure this happens	ECan	Manawhenua	2 yrs
	4.2	Identify and action best practice water use of publicly managed irrigation systems (e.g. sprinklers in parks)	CCC ECan SDC	Manawhenua	Every 3 yrs
EU5 **Earthquake Recovery Programmes help to achieve efficient use of water and manage water demand**	5.1	Work with CERA to identify opportunities for Earthquake Recovery Programmes to assist with the implementation of the following recommendations, where appropriate: EU1.1, 3.5	CCC ECan SDC	Manawhenua	6 months
	5.2	Seek guidance and advice from the Zone Committee on the implementation of Earthquake Recovery Programmes in the context of the CWMS	CCC ECan SDC		Ongoing to 2016

Appendix

1. Summary Information On The Canterbury Water Management Strategy

The strategy (CWMS 2010) provides a way forward towards the improved management and use of Canterbury's water resources. The CWMS (2010) Framework Document (Mayoral Forum 2009) sets out the key challenges, visions, principles and targets for the integrated management of Canterbury's water.

The expressed 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."

The principles that underpin the CWMS (2010) will help 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 is a set of priorities for planning of natural water use. These are:

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

The strategy focuses on delivering a set of quantified and time constrained targets the following areas:

- 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

The CWMS identified the need to establish Zone Committees to develop Zone Implementation Programmes that will implement the CWMS at a local level.

For more information on the Canterbury Water Management Strategy please refer to:

http://ecan.govt.nz/get-involved/canterburywater/key-documents/Pages/CWMS (2010).aspxx

2. Zone Committee Progress To Date

For a record of the Committee's discussions in developing the ZIP, please refer to http://ecan.govt.nz/get-involved/canterburywater/committees/chch-west-melton/Pages/default.aspx

http://www.ccc.govt.nz/thecouncil/meetingsminutes/agendas/index.aspx

3. Organisations And Community Groups

The Committee have engaged with the following organisations and community groups during the development of the ZIP:

- Avon Corridor Users Working Party
- Avon-Heathcote Estuary Ihutai Trust
- Avon-Otakaro Network
- Beca
- Canterbury District Health Board
- Cashmere Residents Association
- Canterbury Earthquake Recovery Authority
- Canterbury Rowing Association
- Christchurch City Council
- Christchurch Estuary Association
- Christchurch International Airport
- DairyNZ
- Department Of Conservation
- Environment Canterbury
- GNS Science
- Heathcote Ōpāwaho Coalition:
  - Beckenham Neighbourhood Association
  - Roimata Community Incorporated Society
  - Friends of Ernle Clark Reserve
- Kennedy's Bush Neighbourhood Association
- Landcare Research
- Okeover Stream Care Group
- Ngāi Tūāhuriri Rūnunga
- Network Of The Ilam Streams
- Network Waitangi Otautahi
- New Zealand Salmon Anglers Association
- North Canterbury Federated Farmers
- North Canterbury Fish and Game
- Regional Water Management Committee
- Selwyn District Council
- Silver Fern Farms
- Sport Canterbury
- Styx Living Laboratory Trust
- Sustainable Otautahi Christchurch
- Te Hapū ō Ngāti Wheke/Rapaki
- Te Taumutu Rūnunga
- Travis Wetland Trust
- University of Canterbury, Waterways Project
- White Water Canoe Club Inc
- Whitewater NZ

Glossary and Acronyms

Abstraction	The taking of water from a water body or the diverting of water outside of the bed of a river, lake or artificial watercourse.
ANZECC	Australian and New Zealand Environment Conservation Council.
Awa	River.
Biodiversity	Biodiversity is short for biological diversity. It describes the variety of all biological life – the different species, from micro-organisms to trees, animals and fungi; the genes they comprise; and the ecosystems they collectively form. This includes diversity within species, between species, and of ecosystems. (International Convention on Biological Diversity)
Blue corridors	Waterways and the associated riparian zone.
Braided River	Any river with multiple successively divergent and re-joining channels separated by gravel islands.
CCC	Christchurch City Council.
CDHB	Christchurch District Health Board.
Confined aquifer	An aquifer overlain by a low permeability or impermeable layer where the water in the aquifer is under pressure.
Contact Recreation	Recreational activities that bring people physically in contact with water, involving a risk of involuntary ingestion or inhalation of water.
CWMS	Canterbury Water Management Strategy.
DOC	Department of Conservation.
ECan	An abbreviation of Environment Canterbury, the Canterbury Regional Council.
Ecosystem	A system of interacting terrestrial or aquatic living organisms within their natural and physical environment.
Endemic species	An indigenous species which breeds only within a specified region or locality and is unique to that area.
Ephemeral	Lasting a very short time.
Freshes	A short duration flow event that raises river levels slightly.
Grey water	Domestic waters from a bath, shower, basin, laundry and kitchen but excluding toilet and urinal wastes.
Groundwater	Water beneath the surface of the earth contained within the saturated zone, but excludes the water chemically combined in minerals.
Hāpua	A shallow lake at the termination of a river, separated from the sea by a bank of sand or shingle and includes coastal lakes which may be in the coastal marine area.
Harakeke	Flax
Hapū	Sub-tribe; section of a larger tribe.
HPT	Historic Places Trust

Glossary and Acronyms Cont...

Inanga	Whitebait species
Indigenous species	A plant or animal species which occurs naturally in New Zealand. A synonym is “native”.
Interpretation Stations	Often associated with signs that provide information about what people are seeing at a particular place, its history, and other facts/stories that may enhance the experience/appreciation of a site.
Iwi	Tribe
Kai	Food.
Kaitiaki	Guardians, custodians.
Kaitiakitanga	The exercise of guardianship by the tangata whenua of an area in accordance with tikanga māori in relation to natural and physical resources; and includes the ethic of stewardship.
Mahinga Kai	Food and places for obtaining natural foods and resources. The work (mahi), methods and cultural activities involved in obtaining foods and resources.
Mana	Integrity, respect, prestige, authority.
Manawhenua	Customary authority exercised by an iwi or hapū in an identified area
Mauri	Means essential life force or principle; a metaphysical quality inherent in all things, both animate and inanimate.
Non-point source discharge	Run-off or leachate from land onto or into land, a water body or the sea.
Papatuanuku	Mother Earth.
Pingao	Golden sand sedge; a coastal grass.
Point source discharge	A discharge from a specific and identifiable outlet onto or into land, a water body or the sea.
Raranga	Weaving
Raupō	Bullrush
Reticulated water supply	Water made available through a network (reticulation) of pipes, as in most urban areas.
Riparian planting	Planting on the banks of a waterway to reduce erosion, and pollution to improve habitat and amenity.
Riparian zone	In relation to a river or lake the riparian zone is the area of land within their beds and adjacent to the beds where direct interaction occurs between aquatic and terrestrial ecosystems. The riparian zone includes the banks of a river, the margin of a lake and the relevant parts of any wetlands or islands contained within their beds, and all aquatic areas with the beds. Riparian zones typically contain vegetated areas adjacent to and within the beds.
Rongoā	Medicine, antidote, drug (medicinal).
Rūnanga	Assembly; Council.
Set-back provisions	The minimum prescribed distance between a building or structure and the boundaries of its site in relation to any nearby waterways.

SDC	Selwyn District Council
Spring fed waterways	Waterways that are fed by groundwater from springs.
Spring head	Source of a spring fed waterway.
Stormwater	Runoff that has been channelled, diverted, intensified or accelerated by human modification of the land surface or run-off from the external surface of any structure as a result of precipitation and includes entrained contaminants and sediment including that generated during construction or earthworks.
Surface water	Surface water or surface water body means water above the ground surface and within a lake, river artificial watercourse or wetland, but does not include water in the sea, snow, or rain or water vapour in the air.
Takiwā	Area. District or region within which a particular hapū or iwi is recognised as holding manawhenua /manamoana.
Tangata Whenua	In relation to a particular area, Tangata Whenua refers to the iwi, or hapu that holds manawhenua over that area. Taonga; Treasured possession, material or abstract (e.g. language); Māori interest in these is protected by the treaty of Waitangi and New Zealand statute and common law/lore.
The Committee	The Christchurch West Melton Zone Committee
Tuna	Eel
Turangawaewae	A person's right to stand in a particular place and speak on matters affecting them or their whānau. Home, sense of place, belonging, connection.
Unconfined aquifer	An aquifer that lacks an overlying layer of fine sediment, and is not under pressure.
Urupā	Burial place, cemetery, places where Māori bury their dead, often enclosed.
Waiora	Waters used for healing by tohunga (expert). These waters were pure and fresh running.
Waipuna	Important springs
Wāhi raranga	Sources of weaving material
Wāhi taonga	Sacred places.
Wāhi tapu	Places of sacred or extreme importance.
Waka	Canoe
Wastewater	Liquid waste (and liquids containing waste solids) from domestic, industrial or commercial premises including, but not limited to, toilet wastes, grey water, waste from household sinks, showers, and baths, and trade wastes and excludes stormwater
Waterway	A river, channel or other surface route that allows a flow of water.
Whānau	Extended family units. The essential building block of Traditional Māori society. Whakataukī: Proverbial saying.
Whanaungatanga	Relationship, kinship.
Whare	House
Whakataukī	Proverbial saying.
Wetlands	Includes permanently or intermittently wet areas, shallow water, and land water margins that support a natural ecosystem of plants and animals that are adapted to wet conditions.

Environment Canterbury Regional Council
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