



Christchurch City Council  
**Water Supply Strategy**  
**2009-2039**

Ōtautahi/Christchurch and Te Pātaka o Rākaihautū/Banks Peninsula\*

\* These names have not been approved by the New Zealand Geographic Board. However, they are commonly used. For simplicity, the term Christchurch City Council District will refer to Ōtautahi/Christchurch and Te Pātaka o Rākaihautū/Banks Peninsula unless otherwise noted.

# Foreword



Our public water supply is a precious resource for current and future generations, which is why the Christchurch City Council has developed this strategy to ensure safe drinking water is available to all customers of the public water supply.

A sustainable water supply secures industrial and economic growth while safeguarding the enviable quality of life we enjoy in Christchurch and on Banks Peninsula.

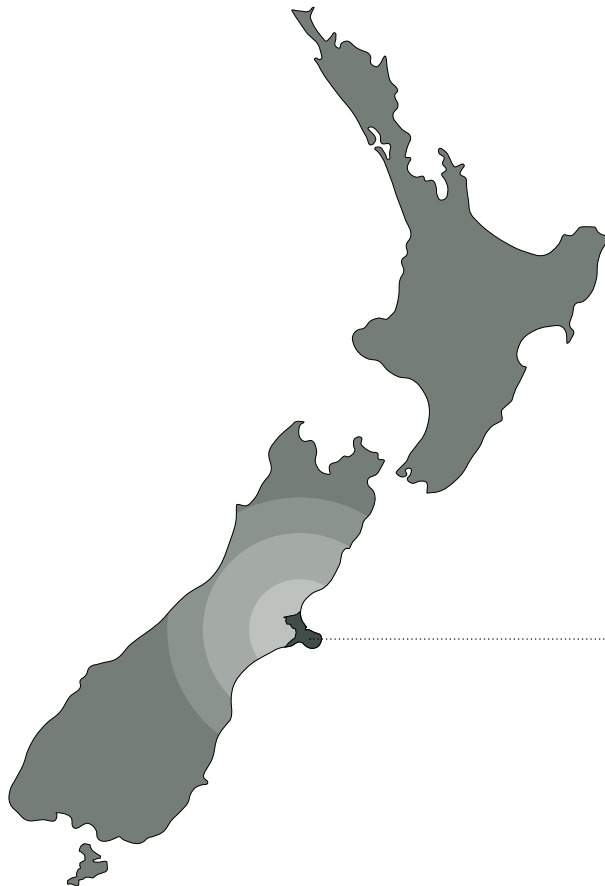
The Water Supply Strategy will guide future asset management and planning processes for the public water supply within the jurisdictional boundaries of the City Council, including urban Christchurch and Banks Peninsula.

The Strategy's aim is to ensure efficient, effective and sustainable management of the Council's water supplies for the next 30 years, in compliance with national and regional plans and standards.

By implementing the actions outlined in this document, the Christchurch City Council will continue to provide a high-quality, affordable and efficiently utilised water supply protected from contamination.

The Council will ensure sufficient quantities of drinking water sources are secured and/or identified for the future, for urban Christchurch and rural communities within the district.

Bob Parker  
Mayor



## CHRISTCHURCH CITY

A sustainable future for indigenous biodiversity is a responsibility that can only be provided for locally.

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OUR WATER: A PRECIOUS  
RESOURCE TOO GOOD TO WASTE.

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# Executive summary

The Christchurch City Council's Water Supply Strategy (the Strategy) will guide future asset management and planning processes for the public water supply. It will provide the framework for sustainably managing this valuable resource, to provide safe drinking water to all customers of the public water supply into the future.

The Strategy applies to the public water supply within the jurisdictional boundaries of the Christchurch City Council, including urban Christchurch and Banks Peninsula.

The Strategy's aim is to ensure efficient, effective and sustainable management of the Christchurch City Council's water supplies for the next 30 years, in compliance with national and regional plans and standards, to ensure that:

- the Council provides a high-quality, affordable and efficiently utilised water supply into the future
- the Council's public water supply is protected from contamination
- sufficient quantities of drinking water sources are secured and/or identified for the future, for urban Christchurch and rural communities within the district
- Christchurch City Council-managed community water supplies meet the Drinking Water Standards in line with timetables set out in current and future legislation.

The Strategy provides a strategic direction for the sustainable management of the district's public water supplies. This will in turn feed into the development of an inter-district water supply strategy for managing cross-boundary water supply issues, which will be developed as part of implementing the Greater Christchurch Urban Development Strategy.

This Water Supply Strategy also links to the Canterbury Water Management

Strategy programme developed by the Canterbury Mayoral Forum, and will reflect the particular strategic direction for providing a sustainable public water supply for district residents, within the wider regional water management context.

The Water Supply Strategy is one of several strategies developed under the Council's Healthy Environment Strategies Programme including:

- Sustainability Policy
- Energy Strategy
- Biodiversity Strategy
- Open Space Strategy\*
- Surface Water Strategy\*
- Climate Change Strategy\*.

The Water Supply Strategy also takes into account the Council's Wastewater Management Plan (2004).

The Strategy's vision and goals are as follows:

- *Vision:*  
We value and protect our public water supply as a precious resource for current and future generations.
- *Key goals:*
  - We have clean, safe water.
  - The sources of our water are protected from harm.
  - The Council's water supplies meet the public's reasonable needs.
  - Water is used efficiently and sustainably.

Four key issues that must be addressed to achieve these goals include:

- availability – is the 'bucket' big enough to service our needs now and in the future?
- quality – how do we protect what we have?
- demand – how can we make our water resources last into the future?

\* in development at the time of publication of the Water Supply Strategy

- service, costs and regulation – how do we provide a reasonable level of service, value water appropriately and respond to a dynamic regulatory environment?

Actions for achieving the goals of this Strategy include:

- assessing alternatives such as rainwater harvesting
- a strong education component focusing on valuing water
- providing better information to the public about how they are using water
- protecting the right for future water takes for public water supply
- better managing the existing water supply network (such as pressure management)
- considering a direct charge on the public water supply, based on actual use (most frequently suggested is a base allocation funded by rates, with an excess use charge depending on actual usage)

- providing incentives for efficient use, e.g. subsidies for water-efficient devices, grants for rainwater tanks, rebates for use below a base allocation
- better practices at Council facilities, such as drought-resistant plantings in public space and use of non-potable water where practicable
- controlling growth where water resources are already significantly at risk.

These actions are summarised in the table overleaf, with proposed time frames for their implementation. In the table, the actions that have been included for consideration in the *Christchurch City Council Long Term Council Community Plan (LTCCP) 2009–2019* are denoted with a **L** symbol, while those actions which are not yet provided for in the LTCCP are denoted with a **N** symbol. Actions under consideration in the Capital Programme budget, which is a portion of the LTCCP budget planning process, are denoted by a **C** symbol.

The extent to which the Strategy is implemented will depend on decisions made in the LTCCP process. The *Local Government Act 2002* requires the Council to prepare, consult on and adopt an LTCCP, which is reviewed every three years. In the intervening two years, the Council can adopt changes to their LTCCP via annual plans. The LTCCP sets out the activities and services it proposes to deliver over the next 10 years. It is through the LTCCP that the projects identified in this Strategy will be balanced against other Council projects and services. Some timings and funding may change, but the Strategy will remain as a clear Council commitment to achieving the goals and objectives stated.

Christchurch is in an ideal position to set the path for how its public water supply will be managed. The implementation of this Strategy will ensure that current and future generations have access to a safe, sustainably managed public water supply.

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“Till taught by pain,  
Men really know not what  
good water is worth.”

*Lord Byron, Don Juan*

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## EXECUTIVE SUMMARY OF STRATEGIC ACTIONS

Action #	Ranking	Action	Rough order cost (-20% -to +50%)	Preferred time frame
1a	M	<b>N</b> Benchmarking exercise to determine target economic level of loss	\$50,000–\$100,000	2009–10 to 2010–11
1b	M	<b>N</b> Enhanced water loss reduction programme (if benchmarked economic level of loss less than current level of loss)	\$unknown (depends on benchmarked level of loss – Action 1a)	2012–13, if needed
2a	H	<b>L</b> Pressure zone modelling to optimise equalised pressure management zones	\$150,000	2009–10
2b	H	<b>N</b> Infrastructure upgrades for new pressure management zones – feasibility study/cost benefit analysis	\$130,000	2011–12 to 2012–13
2c	H	<b>N</b> Infrastructure upgrades for new pressure management zones – Capital Programme	\$ to be determined (TBD); depends on results of Actions 2a and 2b	2013–14 onwards
3	H	<b>C</b> North West Zone – installation of UV disinfection systems (some locations in NW zone) and replacement of shallow wells with deeper wells (other locations in NW zone)	\$8,600,000 (Capex) \$80,000 (Opex, per annum)	2012–2015
4a	H	<b>L</b> Rainwater as additional source for households – Banks Peninsula subsidy – cost-benefit study	\$100,000	2009–10
4b	H	<b>N</b> Rainwater as additional source for households – Banks Peninsula subsidy	\$TBD depends on cost-benefit study (Action 18a)	2013–14
4c	M	<b>N</b> Rainwater as supplementary source for households – urban Christchurch subsidy	\$TBD depends on cost-benefit study (Action 4a)	2016–17
4d	M	<b>N</b> Promoting retention of existing rainwater tanks	\$TBD	As public water supply network introduced into new areas
5a	M	<b>N</b> Analysis of total system costs for water-efficient devices	\$20,000	2010–11
5b	M	<b>N</b> Water-efficient devices rebate scheme	Up to \$35,000 per year	2012–13
6a	H	<b>N</b> Valuing water campaign – research study	\$20,000–\$50,000	2009–10
6b	H	<b>N</b> Valuing water campaign	\$20,000–\$50,000 (development and rollout, yr 1) \$20,000–\$50,000/yr Implementation (subsequent years)	2011–12 2012–13 onwards
7	M	<b>N</b> Green Plumber	\$20,800/yr	2012–13
8	M	<b>N</b> Green Gardener	\$31,200/yr	2012–13
9	M	<b>N</b> Annual domestic meter feedback	\$200,000	2012–13 onwards
10	H	<b>N</b> Installation of water efficient devices in City Housing, as refurbishment and asset renewals occur	Included in City Housing asset renewal budget	2012–13 onwards
11a	M	<b>N</b> Comprehensive economic and legal review of charging for water	\$70,000	2011–12 to 2012–13
11b	M	<b>N</b> Volumetric charging (depends on outcome of review) (may require separating shared connections)	\$2,100,000 to \$2,700,000 above current costs (Opex; costs would be recovered through charging structure)	2017–18
12	H	<b>N</b> City Plan change to require rainwater system or rainwater/greywater combined system	\$TBD	2014–15
13	H	<b>L</b> Partnering and engagement, e.g. support for Variation 6 of the PNRRP	\$staff time	2008–09 and onwards



## EXECUTIVE SUMMARY OF STRATEGIC ACTIONS

Action #	Ranking	Action	Rough order cost (-20% -to +50%)	Preferred time frame
14a	H	<b>N</b> Securing rights to additional water takes	\$300,000	2009–10 to 2010–11
14b	H	Only if necessary, either development of Waimakariri River or Ellesmere well-field as new source  <b>N</b> Waimakariri River development of new source 40 MI/day (with treatment)  OR  <b>N</b> Waimakariri River development of new source 80 MI/day (with treatment)	\$67,000,000 Capex (based on 2005 data)  \$20,100,000 Opex (based on 2005 data)  OR  \$78,000,000 Capex (based on 2005 data)  \$36,700,000 Opex (based on 2005 data)	2013–14 to 2014–15 (development)  TBD (infrastructure)
14c		OR  <b>N</b> Ellesmere well-field (treatment costs, if any, not included)	OR  \$59,000,000 Capex (based on 2005 data)  \$8,600,000 Opex (based on 2005 data)	
15	H	<b>N</b> Acquire existing well rights as they become available	Up to \$4,000,000 (over 30 years)	2015–16 and onwards
16	H	<b>N</b> Water reuse as appropriate in new Council facilities or major refurbishments	To be integrated into project budgets where practical	Project by project basis
17	H	<b>C</b> Wastewater Reuse Demonstration Project – Capital Programme	\$3,200,000 (Capex) \$145,000 (Opex. per annum)	2018–19 to 2019–20
18a	H	<b>N</b> Rainwater as additional (adjunct) source for Council facilities – study for Council implementation	\$50,000	2012–13
18b	H	<b>N</b> Rainwater as additional (adjunct) source for Council facilities – Council rainwater use programme	\$TBD depends on results of study (Action 17a)	2014–15

### Notes:

- Each action has been given a priority ranking which is either high (H) or medium (M).
- The inclusion of a project within this document does not commit the Council to commence the project. All projects are contestable each time a new Long Term Council Community Plan is prepared.







# Part One: Technical and background information

# 01

## Introduction

### 1.1 BACKGROUND

Implementation of this Strategy will potentially allow urban Christchurch to move into the 22nd Century without the need to develop a new source of water. This will result in significant long-term savings for the city. To achieve this, the Strategy promotes a range of measures to protect water quality and reduce per capita demand for water.

#### 1.1.1 Why do we need a water supply strategy?

A safe, reliable public water supply is vital for the sustainable development of Christchurch. Growth and development will place greater pressure on demand and pose greater risk of contamination to the sources of Christchurch's drinking water. In addition, the potential effects of climate change can pose risks to the quantity and quality of water resources in the future.

In the past, the urban Christchurch area has been fortunate to have a seemingly unlimited supply of high quality groundwater from which to source its public water supply. The abundance of this source has meant that it has been relatively easy to expand the water supply system to bring in new wells and related infrastructure with a growing population. The situation in Bank Peninsula differs from the rest of Christchurch, as the surface sources of the public water supply are more limited.

The past pattern of consumption in urban Christchurch is not likely to be sustainable in the future, because conditions placed on abstractions from groundwater sources will serve to limit what is available to a growing city. It is important that the Council manage its drinking water resources in the most efficient and effective manner practicable, to provide for the community's current and future needs.

Drivers for a sustainable Water Supply Strategy include:

- » Protecting water quality – ensuring that public water supply sources are protected from degradation.
- » 'Walking the talk' – commitment to sustainability is demonstrated through adoption of a sustainable Water Supply Strategy.
- » Greater ability to remain under water allocation limits – stakeholders have consistently advocated that we should "live within our means".
- » Reduced costs to develop and operate new sources – if new water sources must be developed to meet future consumption needs, capital and operational costs will be incurred.
- » Reduced operational costs – reduced consumption can result in lower infrastructure renewals and replacements, as well as reductions in servicing and repairs.
- » Reduced capital costs – investment in new infrastructure can be expected to be delayed if the rate of consumption is reduced.
- » Reduced energy consumption and costs – reduced consumption means less water abstracted and pumped to users, resulting in lower energy costs. Reduced consumption in the home is also likely to result in lower water-heating costs.
- » Retaining water on site – by making better use of water on site, such as rainwater capture, demand per property on the public water supply can be reduced. On site water retention can also reduce stormwater runoff.

A Strategy for sustainable management of this critical resource is essential to address issues related to water resources and the efficient use of water to meet reasonable future demands.



PHOTO: MUCH OF CHRISTCHURCH'S WATER USE IN SUMMER IS DUE TO GARDEN IRRIGATION.

### 1.1.2 Integrated approach

The Water Supply Strategy takes into account previous water supply planning documents and policies. It adopts an integrated approach to water management planning, in concert with the Council's Sustainability Policy and the following strategies being developed through the Council's Healthy Environment Strategies Programme:

- » Energy (adopted September 2007)
- » Biodiversity (adopted July 2008)
- » Surface Water<sup>1</sup>
- » Open Space<sup>1</sup>
- » Climate Change<sup>1</sup>.

Of these strategies, the Water Supply Strategy links most closely with the Surface Water Strategy given that activities affecting groundwater will affect spring-fed rivers and streams such as the Avon and Heathcote rivers. In addition, a portion of the public water supply is sourced from streams in Banks Peninsula.

Use of water for irrigation of public spaces such as parks and sports grounds clearly links the Water Supply Strategy to the social and cultural amenities to be addressed in the Open Space Strategy.

Equally, consideration of how water is used for garden and landscape irrigation links to the Biodiversity Strategy and the potential to take advantage of native vegetation and climate-appropriate exotic vegetation.

Efficiencies in the public water supply network, such as reducing leakages, can result in reduced energy use, thereby contributing to the goals of the Sustainable Energy Strategy.

Overarching all of these strategies, including Water Supply, is the Council's Sustainability Policy, with a clear set of directions for sustainable use of our resources, including our drinking water.

The Water Supply Strategy also takes into account the Council's Wastewater Management Plan (2004).

Because of the inter-relationship between systems it is envisaged that a future integrated water cycle strategy will be developed, which will incorporate water supply, surface water and wastewater. This will likely occur after the adoption of the Surface Water Strategy and development of cross-boundary water and wastewater strategies as part of implementing the Greater Christchurch Urban Development Strategy (UDS).

## 1.2 SCOPE

The Water Supply Strategy will provide the Council's vision, goals and targets for sustainably managing public water supplies for urban Christchurch and Banks Peninsula over the next 30 years. In addition to integration with the Council's Sustainability Policy and other strategies as outlined previously, the Strategy also takes into account the social, environmental, economic and cultural aspirations for the community, therefore aligning with the *Christchurch City Council Long Term Council Community Plan (LTCCP)*. It is also intended to align with the City Plan, regional plans and policy, the UDS and other relevant policies and strategies.

### 1.2.1 Fluoridation

The scope of this Strategy does not extend to fluoridation as this is a public health matter, separate to the provision of drinking water. The focus of this Strategy is sustainable management of the public water supply.



“We never know the worth of water till the well is dry.”

*Thomas Fuller, Gnomologia, 1732*

<sup>1</sup>These strategies were under development at the time of this publication.



### 1.3 APPLICABILITY

The Water Supply Strategy applies to the Christchurch City Council District (the District) public water supply. 'Public water supply' applies to all water supplies provided by the Council's water reticulation system to households, public facilities and commercial and industrial customers. The geographical area to which this Strategy applies is the entire Christchurch City Council District area (see Figure 1).

The Strategy covers both the public water supply managed by the Council in the urban Christchurch area (sourced from groundwater) and the Banks Peninsula public water supply managed by the Council (groundwater and surface water sources). The Strategy acknowledges that there are differences between groundwater sources, which are of high quality, and surface water sources which must be treated prior to delivery to consumers.

The Strategy addresses sustainable use of the public water supply in the Christchurch territorial area for the next 30 years. The Strategy will be reviewed every five years over this period.

It should be noted that there are private community water supplies and private bores and surfaces water takes within the boundaries of Christchurch. Oversight and management of these groundwater and surface water takes are the responsibility of the regional council (see section 3.2).

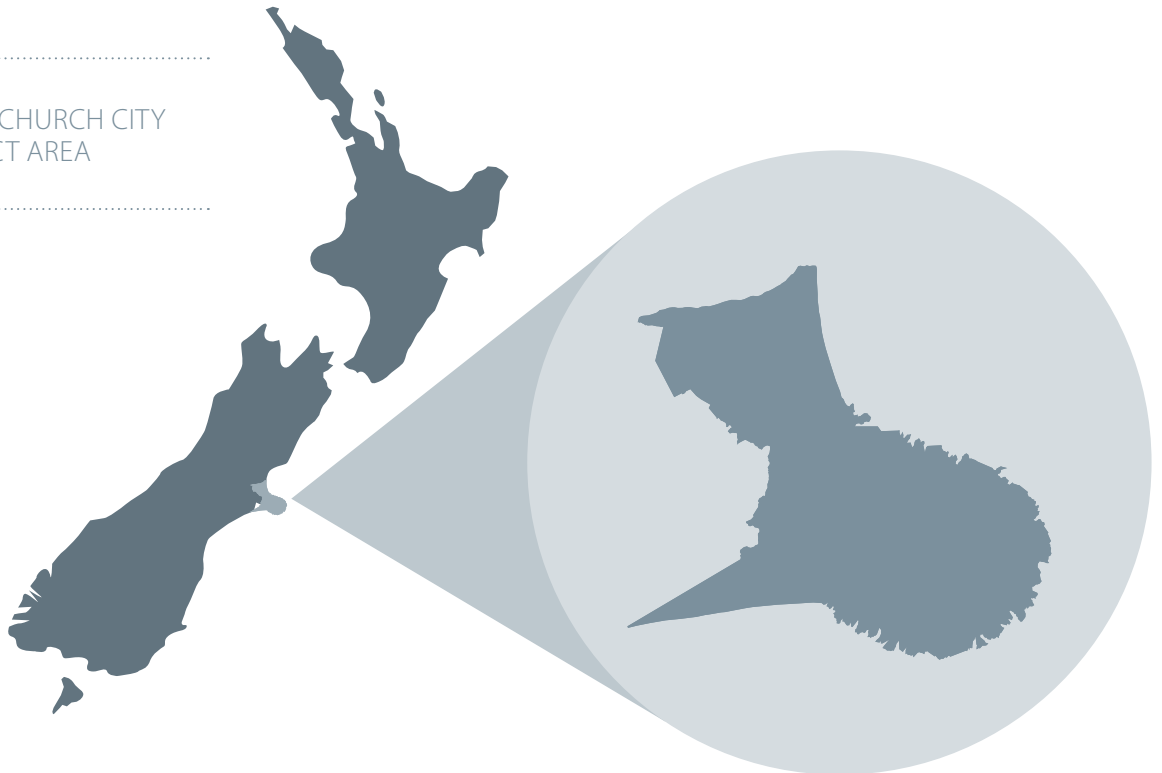
### 1.4 KEY ISSUES

Key issues that this Strategy considers are:

- » availability – is the 'bucket' big enough to service our needs now and in the future?
- » quality – how do we protect what we have?
- » demand – how can we make our water resources last into the future?
- » service, costs and regulation – how do we provide a reasonable level of service, value water appropriately and respond to a dynamic regulatory environment?

These are addressed in greater detail in Section 4.

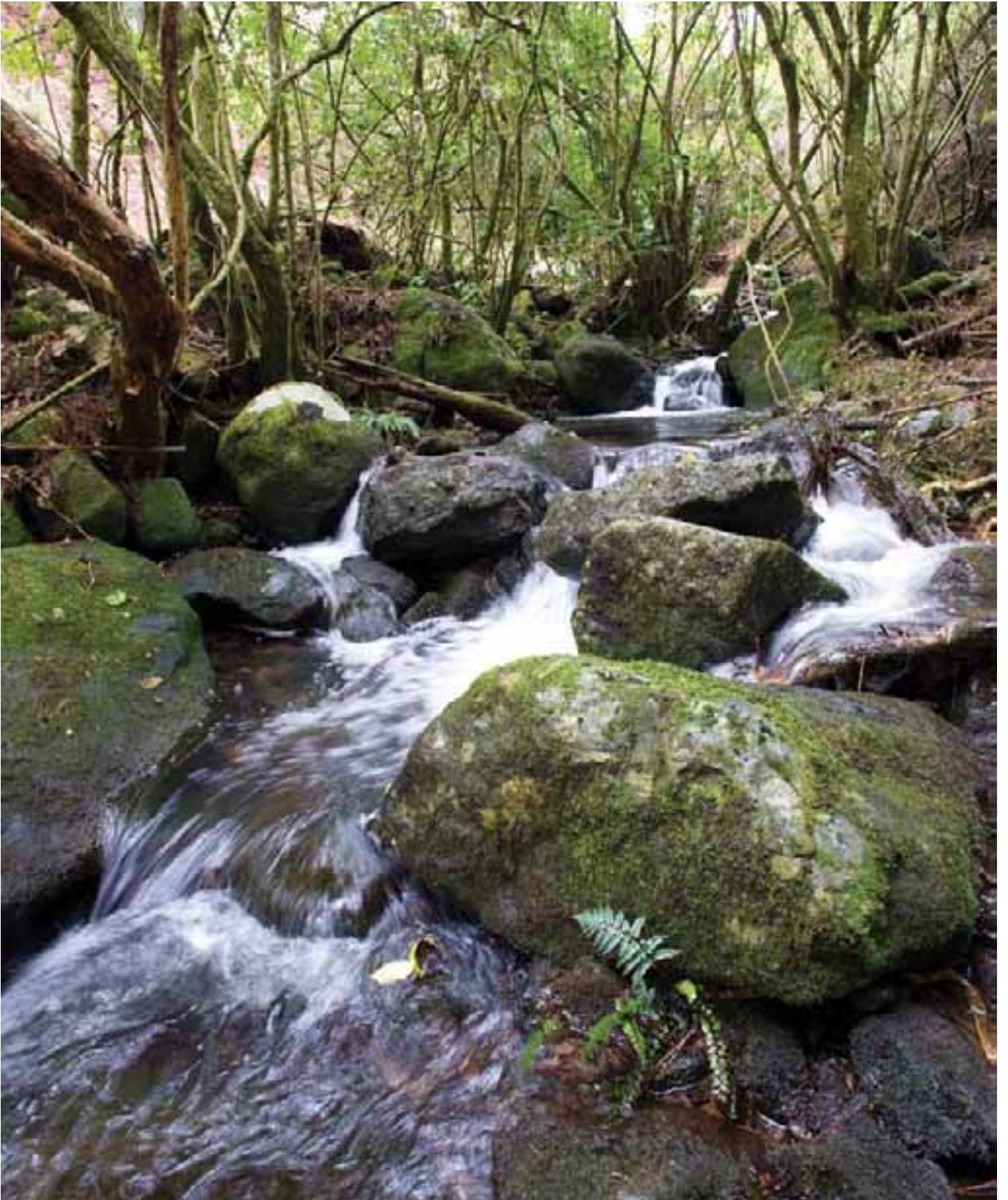
FIGURE 1. CHRISTCHURCH CITY COUNCIL DISTRICT AREA



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PHOTO: AYLERS VALLEY STREAM,  
ONE OF SEVERAL STREAMS THAT  
ARE SOURCES OF THE PUBLIC  
WATER SUPPLY FOR BANKS  
PENINSULA SETTLEMENTS.

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# 02

## Strategy development process

PHOTO: ARTESIAN WELL

### 2.1 RELATIONSHIP TO OTHER STRATEGIES

The Water Supply Strategy is one of the strategies being developed through the Council's Healthy Environment Strategy Programme (see Figure 2).

This Programme is aligned with the Council's four strategic directions for achieving the community outcomes that guide the LTCCP:

- » strong communities
- » healthy environment
- » liveable city
- » prosperous economy.

### 2.2 PROCESS

Work on the Water Supply Strategy began in 2006 and early 2007 to set the context and identify key strategic issues.

As part of the Healthy Environment Strategy Programme, a website was developed to provide contextual information<sup>2</sup>, and in 2007/early 2008 the project team completed an overview of then current state of public water supplies in Christchurch and Banks Peninsula (Christchurch City Council, 2008c).

In consultation with internal and external stakeholders, the team completed a report in 2008 to identify the issues facing the public water supply. This report considered various approaches to respond and identified a series of options to manage or mitigate these issues.

A short list of suggested options was developed which was subsequently incorporated into a Draft Water Supply Strategy later in 2008.

The Council approved the release of the Draft Strategy for public consultation at its 27 November 2008 meeting.

Following public consultation and the Hearings Panel process this draft of the final Water Supply Strategy was prepared.



<sup>2</sup> [www.ccc.govt.nz/Environment/HealthyEnvironmentStrategies/](http://www.ccc.govt.nz/Environment/HealthyEnvironmentStrategies/)

# Christchurch City Council's Strategy, Policy and Planning Framework for Key Healthy Environment Strategies

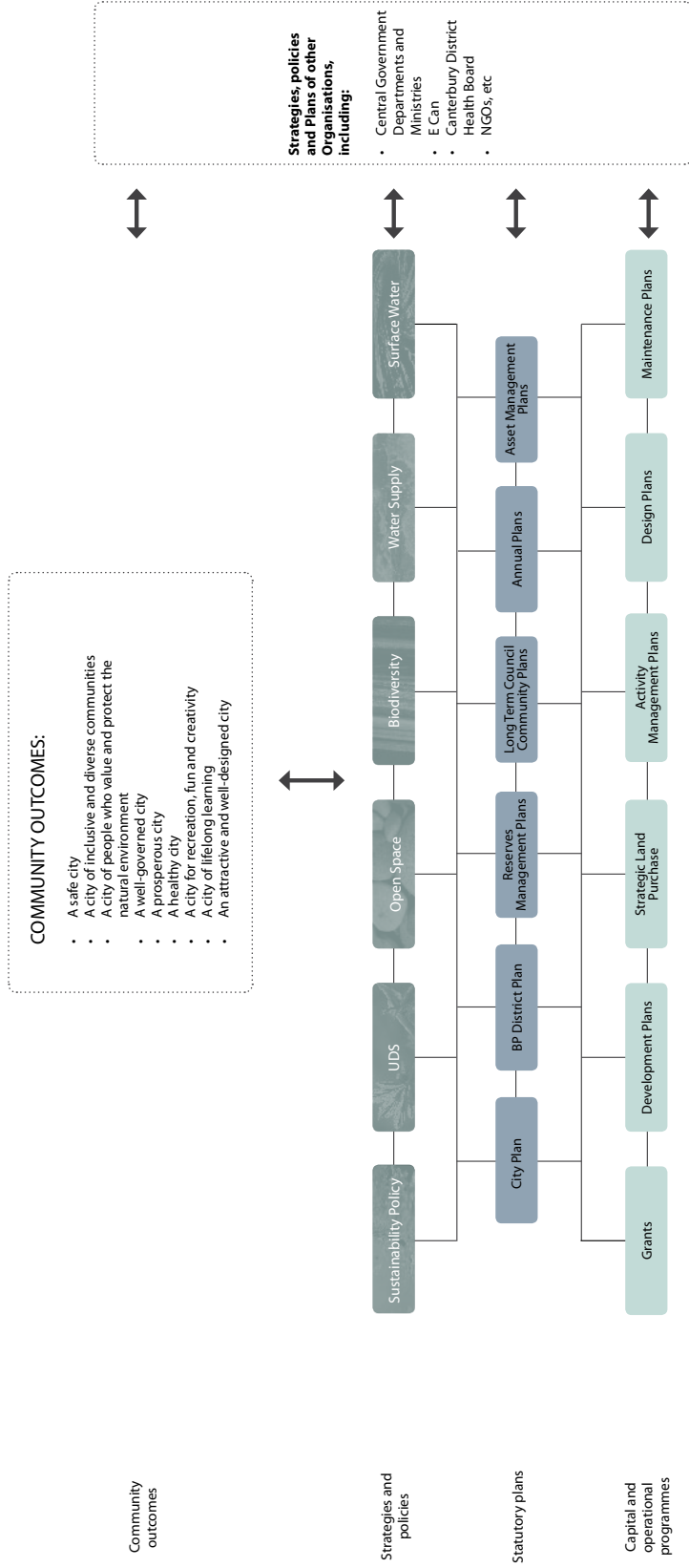


FIGURE 2. STRATEGY RELATIONSHIPS

## 2.3 CONSULTATION

In August 2007 a stakeholder workshop to introduce the Healthy Environment Strategy Programme contributed to development of a high level issues and options matrix for the Water Supply Strategy.

A project scoping meeting outlining the intent and direction of the Healthy Environment Strategy Programme and the Water Supply Strategy was held in early 2008 with Mahaanui Kurataiao Ltd (MKT).

Staff from Environment Canterbury (ECan) were consulted regarding elements of a proposed set of options, with a specific focus on provisions in the Proposed Natural Resources Regional Plan (PNRRP) and the Waimakariri River Regional Plan, regarding access to water resources by public water suppliers. ECan staff were also consulted regarding potential volumetric limits that may be set for public water supply abstractions.

Additional consultation was undertaken with representatives of ECan, Selwyn District Council and Waimakariri District Council regarding the UDS and cross-boundary water supply issues. The development of a cross-boundary water supply strategy is anticipated, subject to the UDS implementation plan.

Internal Council consultation has also been conducted to ensure the Water Supply Strategy aligns with other relevant Council strategies that have been adopted or are under development.

A Council seminar was held in April 2008 to inform Councillors of the state of water resources in Canterbury, with particular emphasis on groundwater sources of the Christchurch public water supply.

In September 2008, a workshop was held for a core group of stakeholders from a cross-section of the broader Christchurch community. This included representatives from government organisations, social welfare organisations, industry organisations and residents' groups. A draft set of options was presented, while the workshop focused primarily on an open discussion about approaches that could be taken to address each of the key issues.

Issues and options for the Christchurch public water supply were also presented and discussed at the September 2008 meeting of the MKT Board.

A Community Board seminar was held in September 2008, which included a discussion of key issues and options for the Water Supply Strategy. Also in September 2008, a Council seminar discussed the need for a strategic approach to provide a sustainable public water supply. The seminar also considered various issues and options. Feedback from these workshops and meetings contributed to development of the draft Strategy.

Councillors received a preliminary version of the draft Strategy for review in early November 2008, followed by an updated draft Strategy prior to the 28 November Council meeting. At that meeting the Council approved the release of the draft Strategy for public consultation.

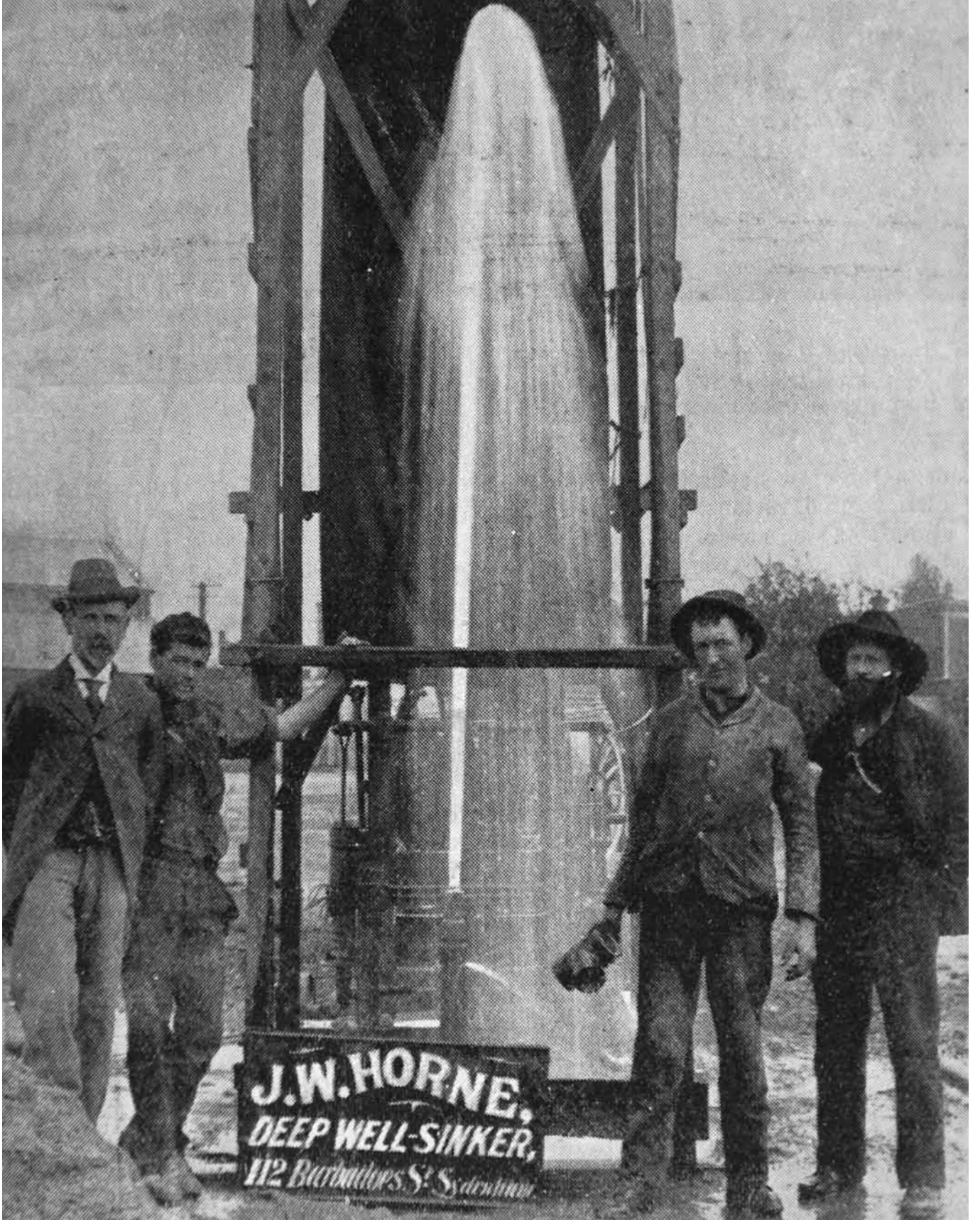
Public consultation took place between 10 December 2008 and 6 March 2009. Three public drop-in sessions were held in January and February 2009. A total of 111 submissions from 89 individuals and 22 organisations was received.

A Hearings Panel of seven Councillors was convened on 6 and 7 April 2009 to hear submissions on the draft Strategy; 28 submitters made oral submissions to the Panel.

A draft final version of the Water Supply Strategy, which took into account comments received through the consultation process and recommendations of the Hearings Panel, was presented to the Council at its 25 June 2009 ordinary meeting and was subsequently adopted.



PHOTO: WEEKLY PRESS PHOTO  
OF WELL IN NEW CCC YARD, 1900





# 03

## Strategic context

Supply of water is one of the core operational activities that the Council provides to the community. Public water supply sources must be protected to provide for both public health and sustainable development. Sustainable management of our water supply sources is required to support the future needs of a growing population.

There are a number of national and regional policies, strategies, plans and legislation that impact on the provision of this vital public service.

### 3.1 ROLES AND RESPONSIBILITIES

#### 3.1.1 Christchurch City Council

Under the *Local Government Act 2002* (LGA 2002), the Council is required to make provision for water supply to the community.

The Council's responsibilities include:

- » monitoring the quality of drinking water
- » operating the water supply system
- » maintaining pipes, pumping stations and other water supply infrastructure required for the provision of the public water supply

- » implementing infrastructure and operational changes to improve efficiency and provide for reasonable levels of service
- » promoting efficient use of water to households, businesses and other users of the public water supply
- » liaising with regional and central government on water supply issues
- » establishing rules for developments and subdivisions through the district plan.

The Council is also a water user. Through its Sustainability Policy, the Council is committed to providing leadership in sustainable and efficient use of water.

The Council contributes to sustainable water supply management by giving effect to the Natural Resources Regional Plan in its district plan rules.

#### 3.1.2 Ministry of Health

The Ministry of Health oversees drinking water safety. The Ministry's key focus, of relevance to the Water Supply Strategy, is minimising risk to public health. The Ministry is the central government agency responsible for overseeing



PHOTO: ONE OF CHRISTCHURCH'S PUBLIC WATER SUPPLY RESERVOIRS

implementation of the *Health (Drinking Water) Amendment Act 2007*. It is also responsible for setting New Zealand drinking water standards, as well as for setting guidelines for public health gradings of community drinking water supplies.

### 3.1.3 Ministry for the Environment

Under the *Resource Management Act 1991 (RMA)*, the Ministry for the Environment sets national policy in areas of national significance, such as freshwater management. It also develops National Policy Statements and National Environmental Standards in areas of national importance for protection of the environment, such as protection of drinking water sources.

### 3.1.4 Community and Public Health

A part of Canterbury District Health Board, Community and Public Health is contracted by the Ministry of Health to deliver public health services for much of the South Island, including assessment of drinking water supplies mandated under the *Health (Drinking Water) Amendment Act 2007*. Among its roles, Community and Public Health approves public health risk management plans for public and private community water supplies within its service catchment.

### 3.1.5 Environment Canterbury

Environment Canterbury (ECan) is the regional council for Canterbury. ECan, under its authority in the RMA and LGA 2002, is responsible for promoting sustainable management of the region's natural resources. Key areas of responsibility are development of the Natural Resources Regional Plan and the Regional Policy Statement.

ECan contributes to sustainable management of the district's public water supply through:

- » objectives, policies and rules in the Natural Resources Regional Plan and the Regional Policy Statement

- » conditions imposed on resource consents, such as groundwater abstractions and surface water takes.

ECan also contributes to sustainable drinking water supply management by setting provisions to allow for future community drinking water supply requirements.

### 3.1.6 Community

The whole community – individuals, households, organisations, businesses, industries and other users of the public water supply – directly affects sustainable management of the public water supply by:

- » recognising the value of drinking water and the public water supply
- » adopting water-efficient practices to reduce potable water use (e.g. efficient landscape irrigation, efficient use in manufacturing, use of native and drought-tolerant plants, leak repairs, using alternative sources such as rainwater for non-potable uses, etc)
- » use of water-efficient devices such as dual-flush toilets, low-flow showerheads
- » land use activities.

Ultimately, how much water is used or conserved, and the long-term health of public water supply sources, is up to each user of the public water supply.



### 3.1.7 Tangata Whenua

The environment, the land and its natural resources, including water and air, are taonga to Ngāi Tahu. Water is of particular importance and significance as the life blood of Papatuanuku (the earth), as an essential element of the spiritual traditions of Ngāi Tahu, as an essential element of and for life, and as a highly significant place in the culture and traditions, e.g., for transport, mahinga kai, spiritual practices, of Ngāi Tahu in Christchurch.

Water is a taonga, a treasure, handed down from the tipuna (ancestors) to support and sustain life and the people. The health and wellbeing of the waters is a reflection of the health of the land and the Ngāi Tahu people. Protection and enhancement of the waters of Christchurch are central to the wellbeing and relationships with culture and traditions for Ngāi Tahu people today.

Given the special significance of water to Ngāi Tahu, staff sought direction from Mahaanui Kurataiao Ltd on what would be appropriate, and a consultation hui was held with representatives of the six Christchurch Rūnanga – Te Ngāi Tūāhuriri Rūnanga, Ōnuku Rūnanga, Te Rūnanga o Koukourāata, Wairewa Rūnanga, Te Hapū o Ngāti Wheke (Rāpaki) Rūnanga and Te Taumutu Rūnanga – in September 2008.

Given the Water Supply Strategy's focus on operation and supply, many of the issues for Ngāi Tahu in relation to water resources are more directly related to the Council's Surface Water Strategy. Representatives from Te Rūnanga o Ngāi Tahu and Mahaanui Kurataiao Ltd are part of the Council advisory group developing the Surface Water Strategy.

PHOTO: GIZMO TOILET WEIGHT HELPS REDUCE WATER USE IN SINGLE-FLUSH TOILETS

Ngāi Tahu understand the need for communities to be able to provide for their health and wellbeing and that this Strategy is a key mechanism to assist Christchurch City Council in the long term planning for community supply. The sustainable use of resources is a traditionally important concept, expressed through the term *kaitiakitanga* and Ngāi Tahu have traditional methods to protect and support the sustainable use of resources, including waterways.

It is of central importance to Ngāi Tahu that sustainable use of water resources in Christchurch is a fundamental and essential element of the Water Supply Strategy. In the context of *kaitiakitanga*, the Water Supply Strategy has a guiding principle to ensure the communities of Christchurch work within the limits of the water supply resources. This is a key principle that will also ensure Ngāi Tahu values for waterways are supported, by ensuring the use of water from natural waterways and groundwater does not compromise the mauri and life-supporting capacity of the waterways.

For Ngāi Tahu the following key points are vital elements of water supply management in Christchurch:

- » providing safe and secure supply to communities, with the traditional Ngāi Tahu *marae/kaika* recognised as communities that may need service improvements
- » water demand and use will not be provided to the detriment of the natural and cultural values of the source waterways
- » mauri and cultural values of source waters are protected
- » efficient use of available water is a key management tool
- » resource limits and sensitivity of Banks Peninsula will be identified and increasing water demand will not drive unsustainable abstraction from natural waterways on Banks Peninsula.

## 3.2 LEGISLATIVE AND POLICY REQUIREMENTS

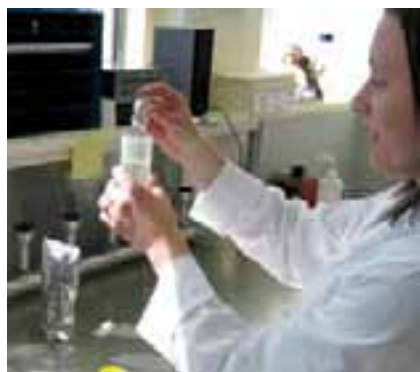
### 3.2.1 Local Government Act 2002

Sections 124 to 129 of the *Local Government Act 2002* (LGA 2002) require local authorities to assess water and sanitary services. A comprehensive Assessment of Sanitary Services for Water and Wastewater<sup>3</sup> was adopted by Council in October 2005, which covered the pre-amalgamation portion of Christchurch. A similar assessment was completed by the former Banks Peninsula District Council for Banks Peninsula.

Section 130 of LGA 2002 requires local authorities to maintain a water supply service to their communities. In addition, the LGA 2002 requires that councils take a sustainable approach to managing the public water supply in a manner that promotes the four wellbeings (social, environmental, economic and cultural).

Specifically, section 128(2) of the LGA 2002 requires that local authorities consider a range of options to meet current and future demands for water including but not limited to greywater reuse, stormwater use, and supply-side and demand-side strategies such as public education, pricing and regulation. The LGA 2002 also requires that councils prepare long-term plans that take community needs into account and promote the four wellbeings.

<sup>3</sup> Available online at [www.ccc.govt.nz/Water/Water-SanitaryServicesAssessment.pdf](http://www.ccc.govt.nz/Water/Water-SanitaryServicesAssessment.pdf)



### 3.2.2 Resource Management Act 1991

*The Resource Management Act 1991* (RMA) requires sustainable management of natural resources such as water. Under the RMA, a hierarchy of planning documents sets out policies and rules for regional resource management, such as the Natural Resources Regional Plan and the Regional Policy Statement.

### 3.2.3 Health (Drinking Water) Amendment Act 2007

*The Health (Drinking Water) Amendment Act 2007* requires water suppliers to 'take all practicable steps' to comply with drinking water standards. This Act makes mandatory the standards for drinking water that had previously been voluntary. See Appendix III for a compliance summary.

The Act also requires that water suppliers implement public health risk management plans for their supplies, along with assessments of drinking water supplies. Public Health Risk Management Plans for Christchurch's public water supply, including public water supplies in Banks Peninsula settlements, were prepared by the Council and approved by the Ministry of Health through the Community and Public Health drinking water assessment programme in 2007 and 2008. These plans are intended to assist the Council in managing risks to both public water supply sources and the infrastructure and network that make up the public water supply systems, including risks such as proximity of contaminated sites to source water, leakage of contaminants into source water, and catastrophes such as earthquakes or tsunamis.

PHOTO: ROUTINE TESTING OF DRINKING WATER, CHRISTCHURCH CITY COUNCIL LABORATORY



FIGURE 3.  
LEGISLATION AND POLICY  
INFLUENCING WATER SUPPLY



Local Government  
Act 2002



National Policy  
Statement for  
Freshwater  
Management  
(Proposed) (2008)



Christchurch City  
District Plan



Resource  
Management Act  
1991



Proposed Natural  
Resources  
Regional Plan



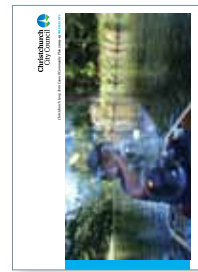
Water Related  
Services Bylaw 2008



Health (Drinking  
Water) Amendment  
Act 2007



Regional Policy  
Statement



Long Term  
Council  
Community Plan



National  
Environmental  
Standard for the  
Protection of  
Human Drinking  
Water Sources



Waimakariri River  
Regional Plan  
2004



Ministry of  
Health Public  
Health Grading  
of Community  
Drinking Water  
Supplies 2003



Drinking Water  
Standards New  
Zealand



Greater Christchurch  
Urban Development  
Strategy



Canterbury Water  
Management  
Strategy (in  
development)

### 3.2.4 National Environmental Standard for Human Drinking Water Sources 2007

The Ministry for the Environment, under its authority provided in the RMA, established a National Environmental Standard (NES) for Human Drinking Water Sources in 2007. The NES aims to ensure that land use activities do not pollute drinking water sources. The NES requires local governments to consider the effect of catchment activities on drinking water sources. It requires that new consents affecting drinking water catchments can only be granted if the proposed activity will not result in drinking water becoming non-potable or unwholesome following treatment.

### 3.2.5 Drinking-water Standards New Zealand

The most recent version of the drinking water standards (Drinking-water Standards New Zealand 2005, as revised in 2008) is now mandatory with enactment of the *Health (Drinking Water) Amendment Act 2007*. Prepared by the Ministry of Health, the drinking water standards set minimum acceptable values for microbial, chemical and radiological contaminants of health significance in drinking water, which are acceptable for public health.

### 3.2.6 National Policy Statement for Freshwater Management (Proposed) (2008)

The proposed National Policy Statement (NPS) for Freshwater Management includes provisions that require regional councils to include in their regional policy statements provisions to manage freshwater demands, 'in a manner which...provides priority for reasonably foreseeable domestic water supply over other competing demands'. The NPS also requires territorial authorities to give effect to the regional policy statement and provide rules in their district plans to include rules for land use and subdivision consents for the 'sustainable

management of demands on freshwater'. Freshwater includes rivers, lakes, wetlands and groundwater.

### 3.2.7 Canterbury Regional Policy Statement

The Canterbury Regional Policy Statement (RPS), required under the RMA, provides an overview of regional resource management issues. The RPS affects the manner in which the City Plan is managed as the Council must, under section 75 of the RMA, give effect to the RPS. One of the key areas addressed by the RPS concerns land use, in particular urban development. Proposed Change No. 1 of the RPS notes that 'inappropriate development can have adverse effects ... which could result in ... contamination of Christchurch City's drinking water as a result of inappropriate development over the unconfined aquifer to the west of the city'.

### 3.2.8 Proposed Natural Resources Regional Plan

A requirement under the RMA, the Proposed Natural Resources Regional Plan (PNRRP) is an ECan planning document that sets forth policies and rules for managing natural and physical resources in the region. Chapter 4 of the proposed plan covers water quality, while Chapter 5 covers water quantity. Variation 6 to Chapter 4 introduces provisions to protect the quality of groundwater in the Christchurch Groundwater Recharge Zones.

### 3.2.9 Waimakariri River Regional Plan (2004)

The Waimakariri River Regional Plan (2004) recognises the need to protect both water quantity and quality. Objective 5.1 of the Plan seeks to: 'enable present and future generations to gain cultural, social, recreational, economic, health and other benefits from the rivers, lakes and wetlands in the Waimakariri River Catchment, and from hydraulically

connected groundwater while: (a) safeguarding their existing value for efficiently providing sources of drinking water for people and their animals.'

Rule 5.1 allows for the taking of water for drinking water purposes as an exception to the cessation and restriction provisions related to 'A' and 'B' permits:

'a municipal or rural reticulated water supply for the purpose of providing drinking and cooking water and for hygiene purposes, of up to 250 litres per day for every person served by that water supply. For a surface take from the mainstem of the Waimakariri River or where a groundwater take is restricted by virtue of its hydraulic linkage to the mainstem of the Waimakariri River, 350 litres per person per day shall be exempted from restriction rather than 250 litres per person per day.'

### 3.2.10 Greater Christchurch Urban Development Strategy

The Greater Christchurch Urban Development Strategy (UDS) advocates development of a greater Christchurch Water Supply Strategy, along with an integrated 'three urban waters' approach (water supply, wastewater and stormwater). The UDS area includes the urban area of the Christchurch City Council, the Lyttelton Harbour Basin, portions of eastern Selwyn District and south-eastern portions of the Waimakariri District.

### 3.2.11 Christchurch City District Plan

The Christchurch City District Plan (City Plan) sets forth a policy for sustainable water supply in section 8.2.4 of Volume 2:

To achieve sustainability of the City's water supply by:

- (a) encouraging water conservation and the re-use and recycling of water
- (b) assessing land use proposals to determine likely impacts on water quality and quantity, and also on servicing efficiency for the community as a whole, as one of the factors that may lead to restricting development
- (c) ensuring that development is assessed on the basis of it being able to be serviced by the water supply system.

A water supply policy for subdivision and development is set out in section 10.4 of Volume 2 of the City Plan, along with rules for subdivision and development in section 8.0 of Volume 3.

The Council must also give effect in the City Plan to the Canterbury Regional Policy Statement, as well as other regional plans such as the Proposed Natural Resources Regional Plan.

PHOTO: MAIN PUMP STATION,  
URBAN CHRISTCHURCH PUBLIC  
WATER SUPPLY



### 3.2.12 Water Related Services Bylaw 2008 (Water Bylaw 2008)

The purpose of the Water Bylaw 2008 is 'to manage and regulate the Council's water supply, wastewater and stormwater drainage'. Objectives for the public water supply are:

- (a) define the obligations of installers, owners and the public in matters related to the public water supply
- (b) prescribe the conditions which shall apply to water distribution systems on private property, which must be designed and maintained to minimise the risk of infection or pollution of the public water supply to which they connect
- (c) ensure that all fittings and appliances connected directly or indirectly to the public water supply achieve optimum performance with a minimum of consumption of water and incorporate safeguards to prevent waste
- (d) promote the responsible use of water in the City
- (e) determine the volumes of water consumed on the premises for rating purposes or to locate leakage and provide for meters
- (f) protect reservoirs and headworks from damage or pollution; safeguard the public water supply from contamination to ensure a good supply of potable water and to prevent waste.

### 3.2.13 Long Term Council Community Plan 2009-2019

The *Christchurch City Council's Long Term Council Community Plan (LTCCP) 2009-19* identifies the following objectives for the public water supply:

- » to provide a reliable supply of quality water to properties through a network of underground pipes
- » to conserve and protect the long-term availability and quality of the city's water.

Community outcomes that were developed through public consultation are a key component of the LTCCP 2009-19. Community outcomes provided by the public water supply include:

- » safety – maintaining sufficient water for fire-fighting purposes
- » environment – conserving water and encouraging others to do the same
- » prosperity – meeting commercial water needs
- » health – providing drinking water to the community
- » recreation – providing water for swimming pools and gardens
- » city development – providing water for gardens and landscaping.

The LTCCP identifies which settlements will be connected to a public water supply in the future.

As part of the LTCCP planning process, activity management plans are prepared for each of the major areas of work undertaken by the Council. Two such plans are prepared for the public water supply: water supply and water conservation. The activity management plans describe the services provided including the reasons for Council providing such services, and identifies performance standards which are included in the LTCCP.

A comprehensive Water Supply Asset Management Plan was prepared in 2002, with a review completed in 2005. The Council adopted the updated plan in October 2006. The Asset Management Plan supports the activity management plan and LTCCP planning processes.

**3.2.14 Public Health Grading of Community Drinking-Water Supplies, 2003 (Public Health Grading)**

While not a law or regulation, this Ministry of Health guideline document assigns a grade to drinking water sources and a grade to drinking water delivery infrastructure, based on potential risk to public health. The purpose of the Public Health Grading is to 'provide a public statement of the extent to which a community drinking-water supply achieves and can assure a consistently

safe and wholesome product'. Public health risk assessments are conducted by Ministry of Health drinking water assessors and are subsequently provided to an online information system, Water Information New Zealand. Appendix II provides a summary of the Ministry's grading scheme.

**3.2.15 Canterbury Water Management Strategy (in development)**

The Canterbury Water Management Strategy is a region-wide initiative conducted through the regional Mayoral Forum. This project seeks to arrive at a future direction for water management in the region. From its start in 2000 (following the 1999 drought), the project has completed a round of technical assessments, which is being followed by stakeholder and public consultation.

Public consultation on approaches to a regional water management strategy was held in May 2009. The Canterbury Water Management Strategy is scheduled to be completed by the end of 2009.

PHOTO: ONE OF CHRISTCHURCH'S PUBLIC WATER SUPPLY RESERVOIRS

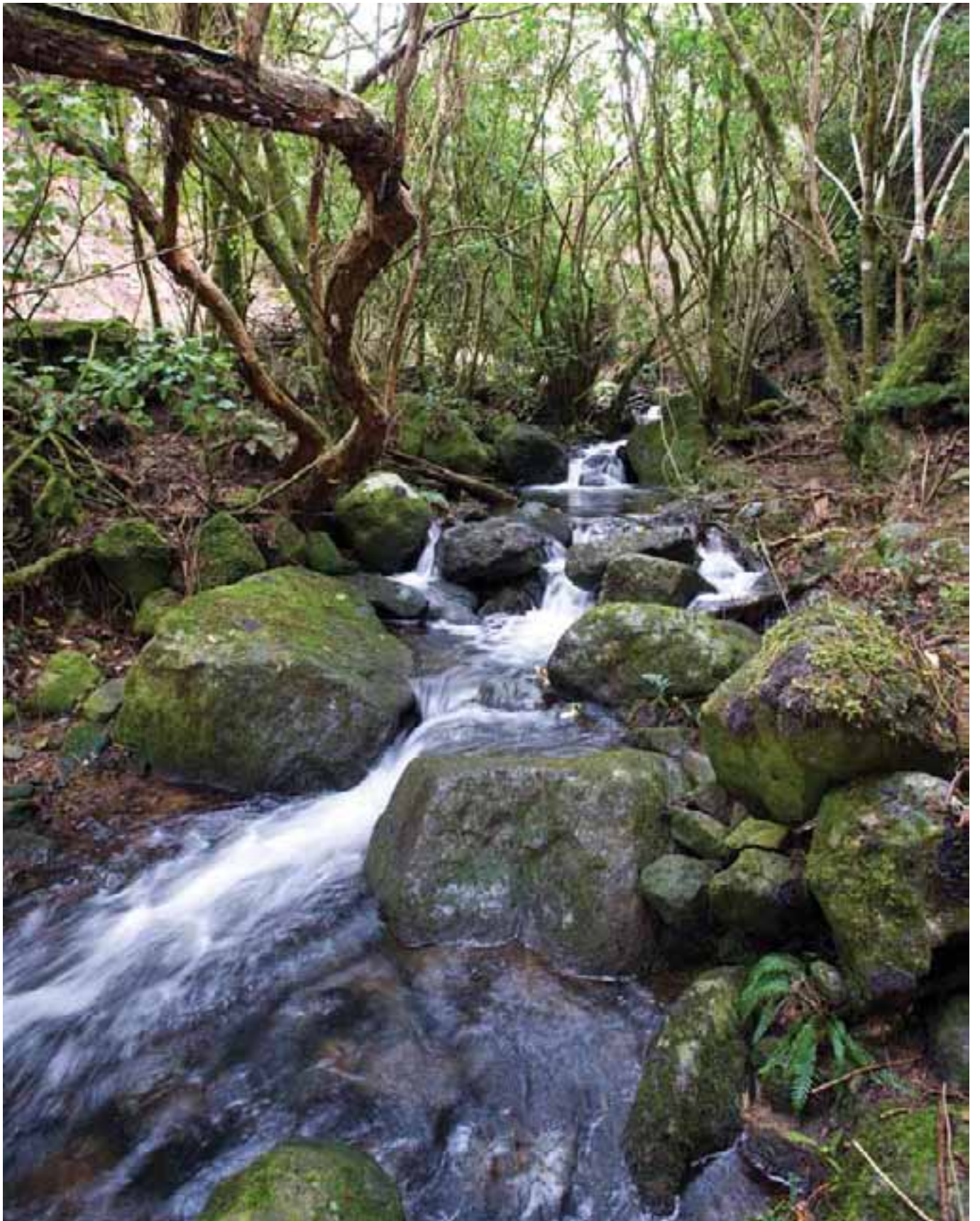




.....  
PHOTO:  
DROUGHT TOLERANT PLANTING  
.....







# 04

## The current situation

### 4.1 BACKGROUND

#### 4.1.1 Drinking water sources

Sources of Christchurch's public drinking water supplies include:

- » groundwater aquifers underneath urban Christchurch
- » surface streams such as Balguerie and Takamatua streams in Banks Peninsula
- » small bores in Banks Peninsula.

The Christchurch-West Melton aquifer system provides the bulk of water serving a majority of Christchurch residents, including residents in the Lyttelton Harbour Basin. The Christchurch urban area aquifers are fed primarily by seepage from the Waimakariri River (60 per cent) and from rainfall over unconfined aquifers on the lower plains (35 per cent), with a small but significant contribution from seepage from the Paparua stock water race system (5 per cent). Outflows occur as springs on the western edge of the confined aquifers (55 per cent); abstractions for

public reticulated supply and industrial wells (15 per cent); discharges to the seabed (10 per cent); groundwater flows south (10 per cent); and abstraction for irrigation (10 per cent) (Environment Canterbury 2000).

The situation in Banks Peninsula differs markedly from the rest of Christchurch, with the exception of the Lyttelton Harbour Basin. The public water supply in Banks Peninsula is derived primarily from surface water sources, such as Aylmers Valley Stream, reflecting the very different geo-morphology of this area compared to the Canterbury plains in which the urban area of Christchurch is located.

The Lyttelton Harbour Basin is served by water piped from the urban Christchurch public water supply via pipelines running through the Lyttelton road and rail tunnels.

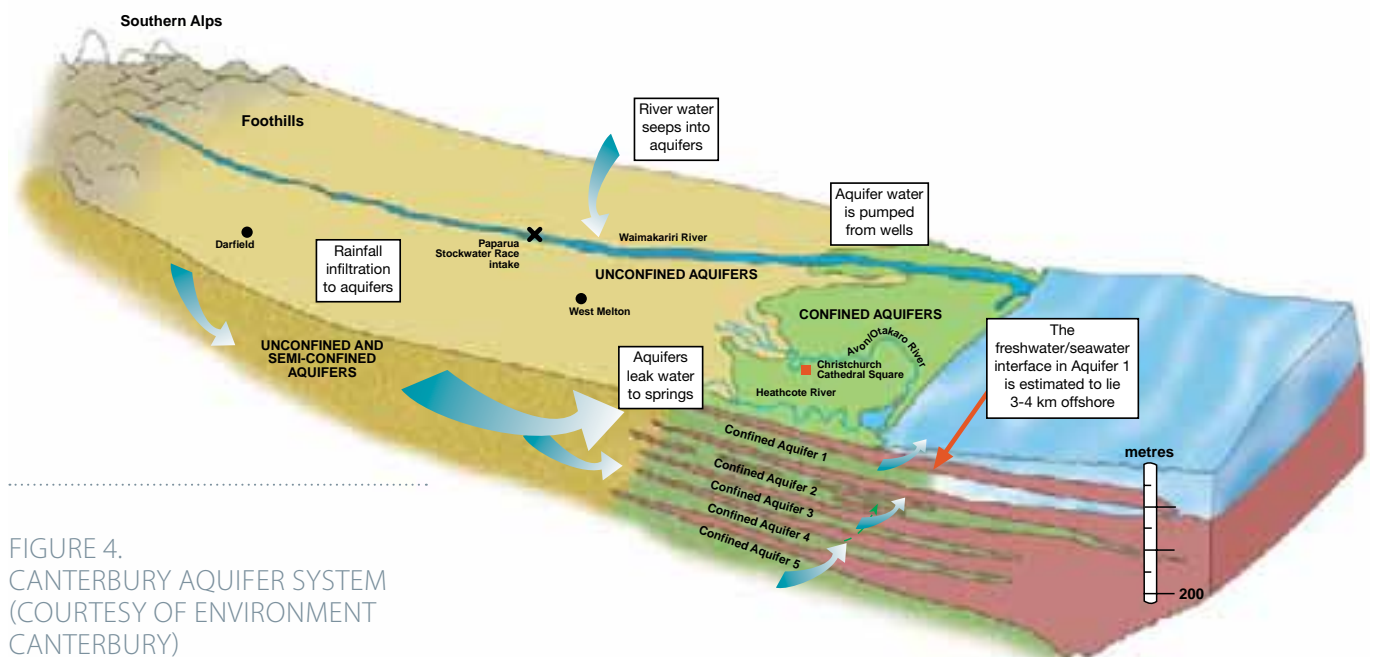


FIGURE 4. CANTERBURY AQUIFER SYSTEM (COURTESY OF ENVIRONMENT CANTERBURY)



**4.1.2 Infrastructure**

The public water supply system in the Christchurch urban area is based on a system of wells dispersed across the area, which distribute drinking water to customers via pumping stations and approximately 3000 km of pipes throughout the urban area.

Because the aquifers that serve as the urban Christchurch drinking water source are under pressure, pumping costs are low. Coupled with the fact that the high quality water does not need treatment, the result is drinking water that is relatively inexpensive to deliver to public water supply consumers.

The situation in Banks Peninsula, with the exception of Lyttelton and nearby settlements, contrasts sharply with that of urban Christchurch. In Banks Peninsula, there are several small

Council-operated public drinking water supplies, serving approximately 5000 people (depending on the number of holidaymakers in the area) in an area 2.5 times larger than urban Christchurch. Because the primary sources of drinking water for the public water supplies are surface streams which are subject to sedimentation and potential contamination from land use activities, public water supplies in Banks Peninsula include water treatment plants which remove sediment and contaminants prior to delivery to consumers.

**4.1.3 Consumption**

Christchurch has a relatively high per capita consumption of water from the public water supply. Over a recent five-year period, the public water supply had an abstraction rate averaging between 430 and 450 litres per person per day (l/p/d), with a median of 435 l/p/d.

The volume abstracted on any given day varies, with significant fluctuations depending on the season and climate, as shown in Figure 5. The lower line shows an average demand on a typical winter day, while the two upper lines show a high summer demand and a peak summer demand.

The increase in demand during summer is primarily attributable to garden irrigation. Reducing external household use is an obvious target area to reduce demand.

Households are the largest consumers of the public water supply (see Figure 6), using close to two-thirds of the total public water supply each year.

PHOTO: AYLMERS VALLEY  
STREAM INTAKE



## 4.2 COMMUNITY EXPECTATIONS

As part of the 2006 LTCCP process, the community identified nine community outcomes for Christchurch. The community outcomes (see section 3.2.13) relevant to water supply are listed in Table 1 along with measures and progress indicators developed to track how the Council is performing in respect to those outcomes.

Annual residents' surveys show that satisfaction with the water supply service is consistently rated very highly. These same surveys show that while most residents (more than 80 per cent) are aware of the Council's efforts to promote water conservation, a large proportion (averaging 40 per cent) felt that these efforts were ineffective. Surveys focusing on water supply which have been conducted annually since 2002 have found that, on average, at least 90 per cent of residents are consistently:

- » satisfied/very satisfied with the water supply
- » satisfied/very satisfied with the taste of the water
- » satisfied/very satisfied with the pressure of the water
- » satisfied/very satisfied with the appearance of the water.

FIGURE 5.  
PEAK SUMMER DEMAND AND  
HIGH SUMMER DEMAND VS  
WINTER AVERAGE DEMAND

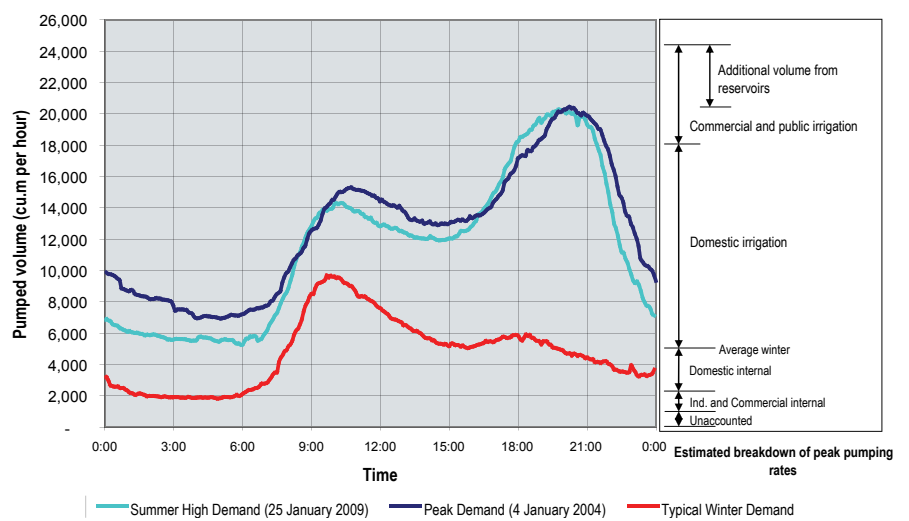
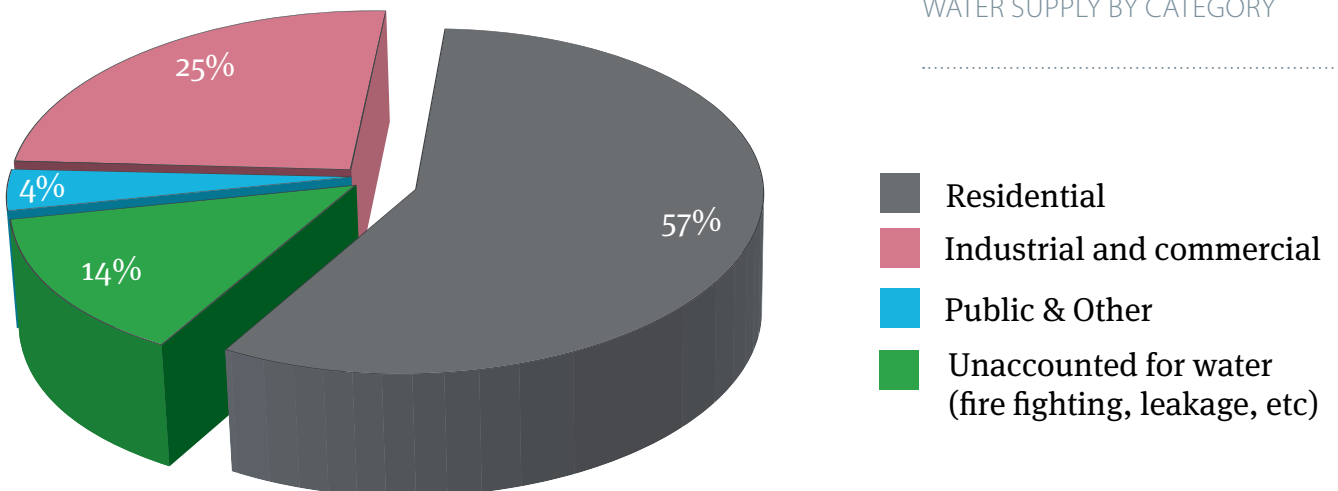


FIGURE 6.  
ESTIMATED ANNUAL PERCENTAGE  
OF WATER DEMAND ON PUBLIC  
WATER SUPPLY BY CATEGORY



### 4.3 INTERNATIONAL TRENDS

International trends in managing water supplies show a movement away from a heavy reliance on traditional engineering-based infrastructure approaches (building more pumps and pipes to deliver more water) to non-infrastructure solutions, in part due to a shift towards more sustainable approaches that can yield better social, economic, cultural and environmental outcomes.

These trends include but are not limited to:

- » Rebate/subsidy programmes promoting the use of water-efficient devices. Rebate programmes are not new. For example, the City of Santa Barbara, California, instituted a rebate programme in 1990 and 1991 to encourage the public to replace inefficient toilets with models that were more water-efficient, an initiative that resulted in 5000 high-volume toilets being replaced.

A number of other cities in the US offer rebates for purchases of low-volume/high efficiency toilets (1.6 gallons or less per flush) in states including Arizona, California, Colorado, Florida, Georgia, Hawaii, Massachusetts, Missouri, New Mexico, Oregon, Texas, Virginia and Washington.

Sydney began offering rebates for washing machines meeting water-efficiency standards in 2008.

TABLE 1.  
COMMUNITY OUTCOMES  
RELEVANT TO THE WATER  
SUPPLY STRATEGY

Community outcome	Standards of success <sup>4</sup>	Progress indicators <sup>4</sup>
A safe city		
A city of inclusive and diverse communities		
A city of people who value and protect the natural environment	We will know we are succeeding when: <ul style="list-style-type: none"> <li>» everybody takes responsibility for their impact on the natural environment</li> <li>» we manage our city to minimise damage to the environment.</li> </ul>	Headline indicator: groundwater extraction. Measure: total ground water abstraction. Key indicator: per capita ground water abstraction.
A well-governed city	We will know we are succeeding when: <ul style="list-style-type: none"> <li>» our decision-makers plan for a sustainable Christchurch.</li> </ul>	
A prosperous city	We will know we are succeeding when: <ul style="list-style-type: none"> <li>» our economic development prioritises future well-being.</li> </ul>	
A healthy city	We will know we are succeeding when: <ul style="list-style-type: none"> <li>» our city environment supports the health of the community.</li> </ul>	Key indicator: drinking water quality
A city for recreation, fun and creativity	(adequate water supply for recreation. e.g. pools)	
A city of lifelong learning	(adequate water supply for learning e.g. pools)	
An attractive and well-designed city	We will know we are succeeding when: <ul style="list-style-type: none"> <li>» we design our city to meet current needs and future challenges.</li> </ul>	

<sup>4</sup> Success measures, progress indicators and indicator monitoring are documented through the Community Outcomes Monitoring Programme ([www.ccc.govt.nz/LTCCP/CommunityOutcomes/Monitoring/](http://www.ccc.govt.nz/LTCCP/CommunityOutcomes/Monitoring/))

Running until 30 June 2010, the rebate programme offers Sydney households a \$150 rebate for purchasing washing machines that have a minimum 4½-star water efficiency rating.

- » Greywater re-use. In Japan, greywater reuse ranges from the use of simple hand basin urinals in residential properties that flush the urinal bowl using water from hand washing, to complex recycling systems in office blocks. In Tokyo, greywater recycling is mandatory for buildings with an area of more than 30,000 square metres or with potential reuse of 100 cubic metres per day.

In Australia, the national government is offering a rebate of up to AUD\$500 for households to install rainwater tanks or greywater systems.

- » Rainwater harvesting. For several years Sydney has promoted the use of rainwater tanks as supplementary sources of water for households. Sydney began offering rebates for rainwater tanks and water-efficient devices as early as 2002. The rainwater tank rebate programme offers rebates ranging from AUD\$150 for a 2000 litre capacity tank to AUD\$500 for tanks with a capacity equal to or greater than 7000 litres.

- » Leakage reduction. Sydney boasts that it has the most comprehensive leakage control programme in Australia, with savings of 58 million litres of water each day.
- » Efficient landscape irrigation. Xeriscaping (gardening and landscaping using vegetation appropriate to climates and soils) is promoted in Colorado through the Xeriscape Colorado programme of Colorado WaterWise, and includes the cities of Denver, Boulder, Fort Collins, Golden, Greeley and Colorado Springs.
- » Behavioural change through education and social marketing. In Durham Region, Ontario, a social marketing programme was initiated in the late 1990s to reduce water use in garden irrigation in an effort to avoid construction of a new water processing plant. Households that participated in the programme achieved decreased outdoor water use by 54 per cent. It was estimated that the achieved reduction in peak water consumption allowed 250 new homes to be serviced with savings in water plant development costs of CAD\$945,000.

- » Water pricing and metering. As noted in a recent OECD<sup>5</sup> report there is a growing trend internationally to install water meters and charge for water in some manner, as well as to fully-cost the provision of public water supplies. A study by the California Urban Water Conservation Council<sup>6</sup> found that, on average, metering with volumetric pricing reduced demand by 20 per cent.
- » Water-efficient requirements for new buildings. In Australia, the New South Wales Government introduced the Building Sustainability Index (BASIX). Effective from July 2005, every development application for a new home must be submitted to Council with a BASIX Certificate which includes methods aimed at reducing water usage, such as rainwater tanks, plumbed to toilet, garden and/or laundry; efficient showerheads, toilets, and tap fittings; use of indigenous garden species; and greywater systems.

There is also a trend towards a 'water cycle' approach, in which the supply of water is not considered in isolation from surface water, stormwater and wastewater, but rather a strategic approach is taken which considers the entire water cycle, including rainwater, stormwater, surface and groundwater, and wastewater.

<sup>5</sup> *Water: the Experience in OECD Countries*, Organisation for Economic Co-operation and Development, 2006 ([www.oecd.org](http://www.oecd.org))

<sup>6</sup> AB 514 (Kehoe): *Water Meters – Support Hearing: Senate Agriculture and Water Resources – July 1, 2003*, California Urban Water Conservation Council.

**4.4 KEY ISSUES**

Four key issues exist for the Council’s public water supplies:

- » availability of the Council’s water supply sources
- » water quality
- » demand for, and use of, water
- » service standards, cost and regulations.

**4.4.1 Availability**

The Christchurch urban area is exceptionally fortunate in having access to high-quality groundwater from aquifers beneath the District, predominantly in the Christchurch urban area. Water availability on Banks Peninsula is subject to variable stream flows and stream quality.

**4.4.1.1 Limited sources**

Despite a common perception that water is an abundant natural resource in Christchurch and the Canterbury region, there are limits to the quantity of water that the Council can take sustainably. The aquifers supplying much of Christchurch’s water supplies are not an infinite source, and failure to sustainably manage these resources can adversely affect ecological values. Spring-fed rivers such as the Avon, Heathcote and Styx rivers are directly affected by the state of Christchurch’s aquifers.

Under the Proposed Natural Resources Regional Plan (PNRRP), a total allocation limit of around 75 million cubic metres per year (cu m/yr) is possible for groundwater abstracted for Christchurch’s public water supply. It is expected that the limit set for abstractions for the public water supply will be within a range, rather than an absolute value, as ECan is proposing an adaptive management scheme which will reflect the condition of the aquifers. This is expected to result in abstraction limits which are lowered

somewhat when groundwater levels are low, and somewhat higher limits when groundwater levels are higher.

Current abstraction in Christchurch is approximately 54 million cu m/yr for the Council’s public water supplies. The proposed allocation scheme would effectively cap water source availability for the public water supply.

Abstraction of groundwater for the public water supply is not the only use of groundwater within urban Christchurch. There is a large number of private bores in use within urban Christchurch. The takes from these bores would also be subject to rules under the PNRRP. It is expected that some limits would be placed on those consented takes under ECan’s proposed adaptive management scheme.

In addition to a probable allocation limit, another risk to the quantity of water available for the public water supply is source contamination. Contamination of a groundwater source is difficult to remediate and could be expected to create additional pressure on availability until treatment was in place or an alternative source developed.

Alternative new sources for the public water supply are limited. For urban Christchurch the most likely alternative sources, the Waimakariri River or an Ellesmere well field, are already under pressure from other uses. ECan has indicated that these sources are essentially fully-allocated.

In Banks Peninsula, the current surface water sources of the public water supply are subject to seasonal variations, with the highest demand in summer typically coinciding with reduced stream flows. Groundwater sources in Banks Peninsula are limited due to the geo-morphology of the area.



PHOTO: WATER RESTRICTION SIGN, AKAROA



**4.4.1.2 Impact of climate change**

Although there is debate about the extent to which the climate may be changing, projections by the National Institute of Water and Atmospheric Research (NIWA) and others suggest that drier than normal conditions may occur in future for Canterbury. Should drought conditions prevail with reduced available surface water, the quantity of water that is available from bores that are hydraulically connected to surface water will be impacted upon. Policy WQN8 of the PNRRP requires that bores with a high degree of hydraulic connection to surface water be managed the same as surface water takes, meaning that the amount of water that can be taken will be limited when river levels are low.

While there is uncertainty over future climatic conditions, it is anticipated that climate change may result in increased rainfall on the West Coast and in the Southern Alps<sup>7</sup>. Assuming that that this rainfall occurred within the catchment for the headwaters of the Waimakariri River, the recharge of Christchurch’s aquifers would not be expected to be adversely affected by climate change.

Demand for water may be higher if drier conditions prevail, due to increased landscape irrigation during dry periods. 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.

<sup>7</sup> Based on NIWA projections, as adopted by the Ministry for the Environment.

Sea level rise is also a potential outcome of climate change. A rise in sea level could impact on coastal wells by increasing the potential for landward movement of the freshwater/sea water interface. Policy WQN12 of the PNRRP requires that bores in coastal unconfined aquifers, such as those sources of the public water supply in parts of eastern urban Christchurch, must be managed to ‘(a) ensure no significant landward movement of the freshwater/seawater interface so as to prevent seawater contamination; and (b) prevent up-coning of seawater where it may cause progressive contamination of the aquifer due to saltwater intrusion.’

PHOTO: LAND SAILING ON A DRY LAKE ELLESMERE, SUMMER 2009. CLIMATE CHANGE IS EXPECTED TO RESULT IN WARMER AND DRIER THAN NORMAL CONDITIONS IN THE FUTURE.



#### 4.4.2 Water quality

Currently consumers served by the public water supplies within the Christchurch district receive clean, safe water. Most of these consumers are provided with high quality groundwater that requires no further treatment, affording them some of the best water in the world. Without treatment systems, however, this supply could be at risk in the event that there is contamination.

A portion of the source of the Christchurch urban public water supply is abstracted from the semi-confined and unconfined aquifers in the western portion of urban Christchurch (see Figure 8), which are characterised by thin permeable soils underlain by gravels. These soils provide little protection against contaminants, which can migrate into the underlying groundwater. There is existing land use over this area, including cattle and sheep grazing, residential housing, golf courses, quarrying and other commercial activities.

Variation 6 to the PNRRP aims to protect the quality of Christchurch's groundwater system by managing the effects of land-use in those areas, within the Christchurch groundwater recharge zone, where subsurface conditions mean that there is limited natural protection to prevent contaminants reaching groundwater. The Variation

manages activities in areas to the north and west of the city where there is no confining layer to prevent contaminants reaching groundwater (Zone 1 – high vulnerability), or where the confining layer is thin or patchy (Zone 2 – transitional). Areas on the eastern side of the city where the confining layer is at least 3 metres thick (Zone 3 – low vulnerability) are managed at a lower level (see Figure 7).

In areas of Banks Peninsula where the public water supply is sourced primarily from surface streams, there is a risk of contamination from soil disturbance, stormwater runoff, agricultural chemicals and stock grazing. The PNRRP includes a provision (Rule WQL22) that requires protection of surface water upstream from the point at which water is abstracted for human drinking water. It is ECan's responsibility to ensure compliance with PNRRP rules, including the requirement for land owners to comply with the requirements of Rule WQL22 relating to areas that drain towards a community drinking water source.

Another risk to Christchurch's public water supplies comes from backflow contamination. When backflow occurs, water can flow in the opposite direction from customer premises back into the public water supply network, which can result in back-siphoning or injection

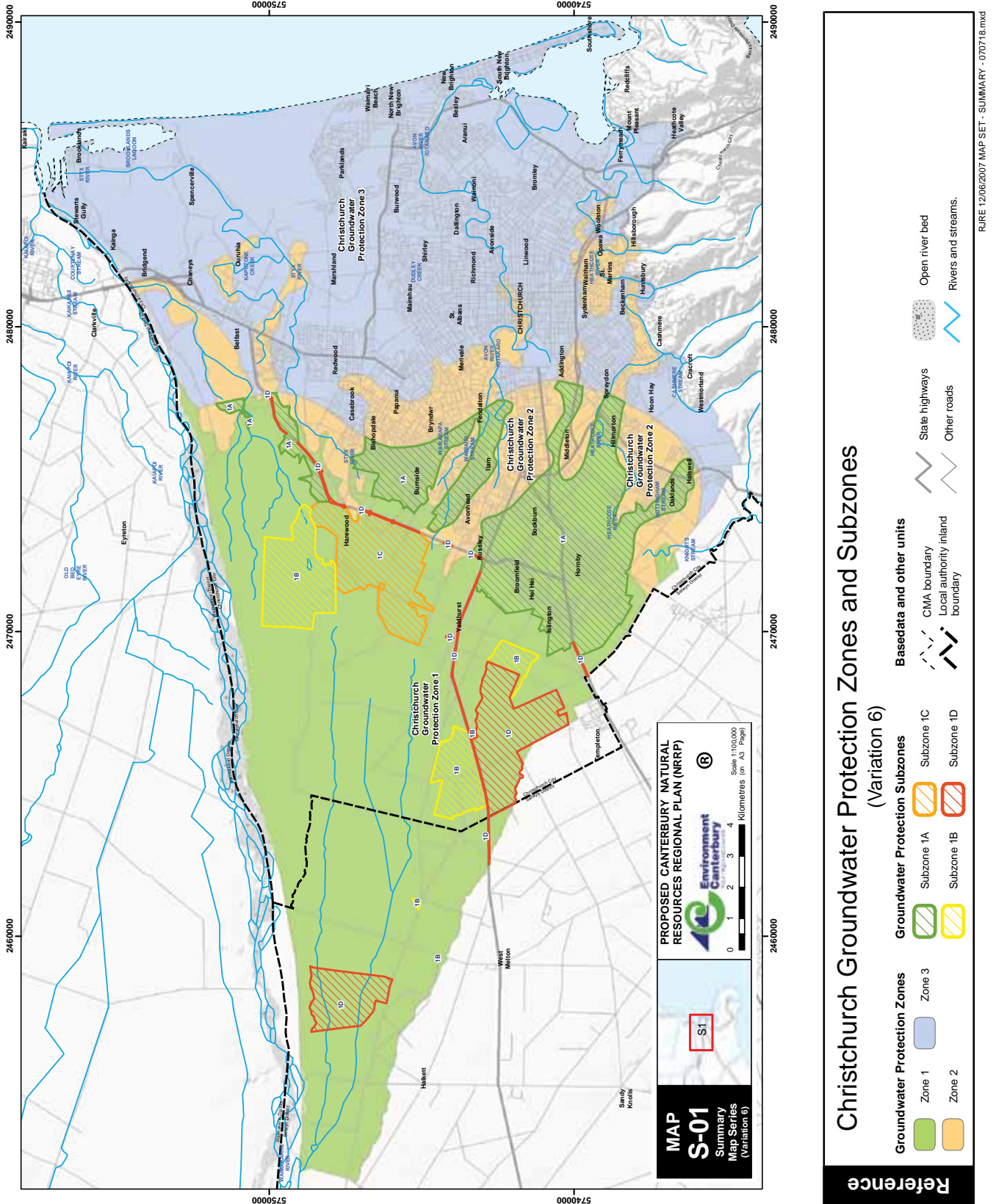
of contaminants into the public water supply. Because both domestic and commercial customers of the Council's public water supplies use chemicals and other potential contaminants, backflow can be a major public health threat.

Factors that influence a change in the salt water/freshwater boundary, such as over-pumping wells close to the coastline, can shift the boundary inland resulting in salt water intrusion within these wells.

An additional issue, one of well 'security', exists for a portion of Christchurch's groundwater sources. The scheme used in the Ministry of Health's Public Health Grading of Community Drinking-Water Supplies assigns minimum acceptable gradings for communities of varying sizes. Public health gradings of public and private community water supplies is based on 'a measure of confidence that a drinking-water supply system will not become contaminated, rather than an absolute indication of quality at a specific time'<sup>8</sup>. Ministry of Health gradings have two letters: the first denotes the source and treatment grading, while the second represents risk posed by distribution network (see Appendix II for additional information on the Ministry's grading scheme).

<sup>8</sup> *Public Health Grading of Community Drinking-Water Supplies 2003, Ministry of Health, September 2003.*

FIGURE 7.  
 CONFINED AND UNCONFINED  
 AQUIFERS (VARIATION 6,  
 GROUNDWATER RECHARGE  
 ZONES, PNRRP, ENVIRONMENT  
 CANTERBURY



R:\RE 12\06\2007 MAP SET - SUMMARY - 070716.mxd



The majority of Christchurch’s aquifer-sourced drinking water has been graded at Ba, conforming to the Ministry of Health grading scheme for large public supplies. However, earlier in 2008, the Ministry amended the grading designation for a major water supply zone in the city, the North-West Zone, and subsequently assigned it a new grading of Da, which does not conform to the grading guidelines. The Da grading indicates the groundwater sources are deemed “insecure”. The North-West Zone, which serves north-western urban Christchurch, is supplied by 37 bores, many of which are in a shallower aquifer. While this zone does meet the minimum grading for the distribution network (the ‘a’ portion of the Ministry of Health grading), it does not meet the minimum for source/treatment.

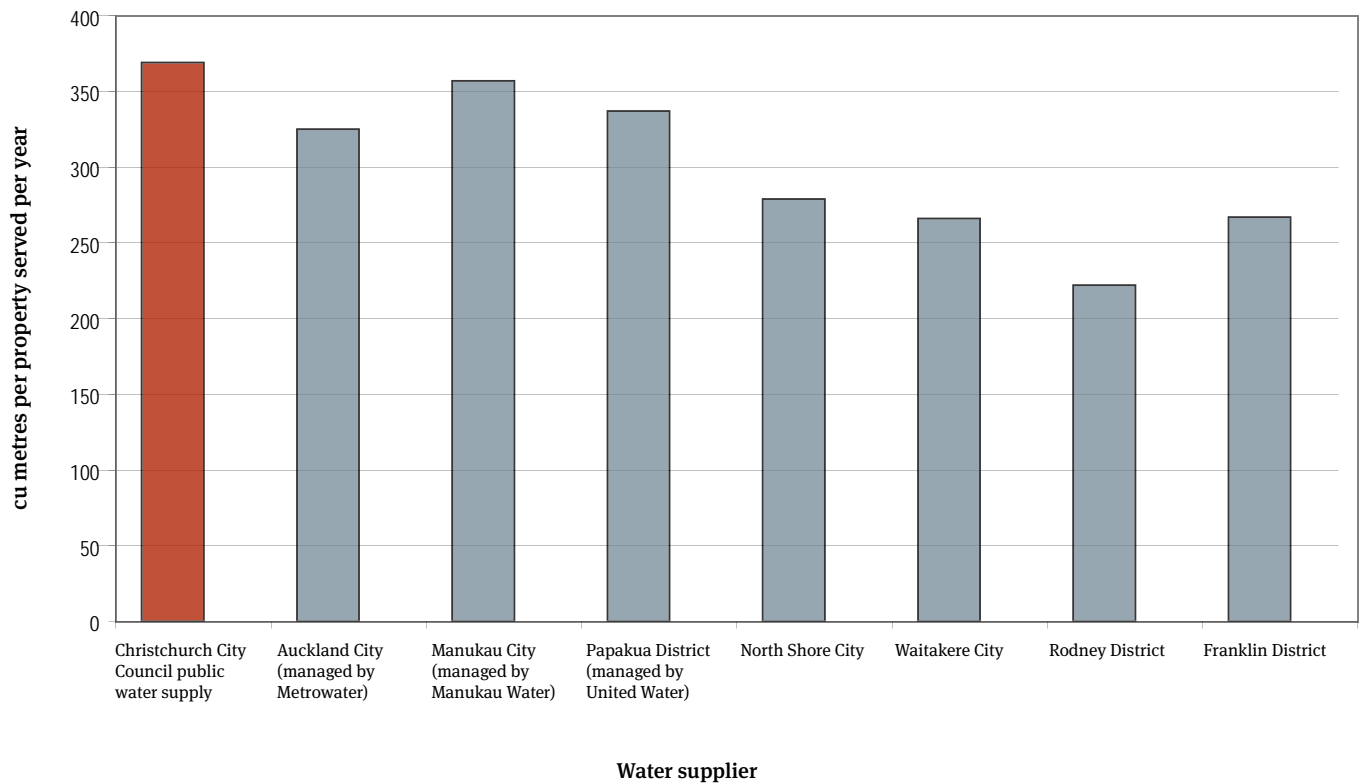
The source/treatment grading (the ‘D’ portion of the grading) was based on the assessment that the source of drinking water is at risk of contamination due to its young age and the fact that the water is not treated.

As noted in section 3.2.5, compliance with Drinking-water Standards New Zealand, revised in 2008, was made a legal requirement under the *Health (Drinking Water) Amendment Act 2007*.

The water sourced from the Christchurch-West Melton aquifer system requires no treatment as it already falls below the thresholds for microbial, chemical and radiological contaminants set forth in the Drinking-water Standards New Zealand.

With the exception of a number of settlements around the Lyttelton basin which are supplied with groundwater piped from the Heathcote Valley, most Banks Peninsula area settlements are reliant on local streams, which can meet the requirements of the drinking water standards after treatment.

FIGURE 8.  
ANNUAL CONSUMPTION  
BENCHMARKING COMPARISON



### 4.4.3 Demand for water

Christchurch has a relatively high per capita consumption of water, with an average rate between 430 and 450 l/p/d over the last five years and a median average of 435 l/p/d.

As a comparison, annual consumption rates for a number of New Zealand cities, in cubic metres per property served, is shown in Figure 9. These are cities against which the Council is benchmarking consumption as part of the LTCCP planning process. To ensure consistency, the units of measure in Figure 8 are in cu m per property served per year.

In comparison, annual consumption figures for some major Australian cities, expressed in cu m per property served per year, are as follows:

- » Sydney, 296 cu m/property served/yr
- » Melbourne, 251 /cu m/property served/yr
- » Brisbane, 260 cu m/ property served/yr
- » Perth, 246 cu m/property served/yr.

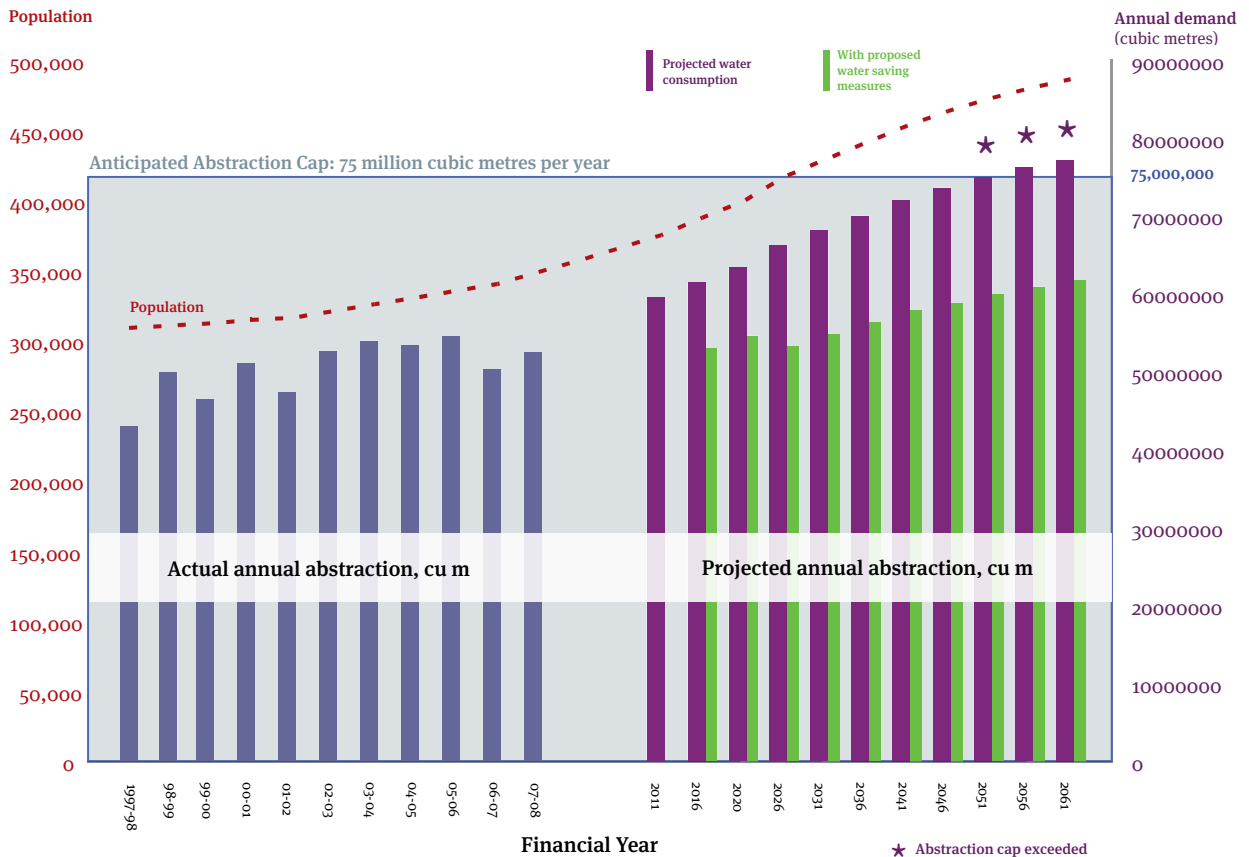
As Christchurch continues to grow the current rate of consumption will put greater pressure on our drinking water sources as well as on the public water supply network.

The demand for potable water is aggravated by the fact that this water is typically used for all water uses. This means that high-quality drinking water is sometimes used when lower quality water would suffice.

If the current pattern of consumption continues into the future at the expected rate of growth for the district, the possible total abstraction limit for the Christchurch public water supply could be exceeded before 2051<sup>9</sup> as shown in Figure 9.

<sup>9</sup> Assuming a continued average per capita consumption of 435 l/p/d and a rate of growth consistent with UDS projections).

FIGURE 9. FUTURE WATER DEMAND VS POPULATION GROWTH



#### **4.4.4 Service standards, costs and regulations**

##### **4.4.4.1 Variable service standards**

The water supply service varies between areas of Christchurch. Much of this variation is due to the City's variable geography (hilly versus flat areas) and land use (urban versus rural).

Pressure can vary from one area of the city to another, with some areas experiencing very high pressure, while in others the pressure can be relatively low.

Some rural areas are on a restricted supply in which customers usually receive 1000, 2000 or 3000 litres per day (through a restrictor valve) delivered into private supply tanks. Response time for repair services also varies for urban versus rural supplies because of the time it takes to travel to outlying supplied areas.

Related to this is the relationship between pressure supplied by the public water supply network and the needs and expectations for the provision of fire protection systems to premises.

##### **4.4.4.2 Inexpensive water**

Because the majority of the public water supply is sourced from underground aquifers that are relatively shallow, under artesian pressure, of high quality and networked through a system of wells and pumping stations, drinking water sources are easy to reach, inexpensive to pump, don't generally require treatment and have relatively short conveyancing distances. Added to this is the pricing structure that only takes into account direct costs of supplying water to customers; the result for the public water supply consumer is some of the least expensive water in New Zealand. However, inexpensive water that is not charged on the amount taken encourages excessive use, as there are little or no economic incentives to use this resource more efficiently.

##### **4.4.4.3 Dynamic regulatory environment**

Changes in legislation, such as enactment of the *Health (Drinking Water) Amendment Act 2007*, development of national environmental standards, requirements in the PNRRP and changes to the Drinking-water Standards New Zealand, make for an increasingly strict regulatory environment that affects how public water supplies and drinking water sources are managed.

##### **4.4.4.4 Fire fighting service standards**

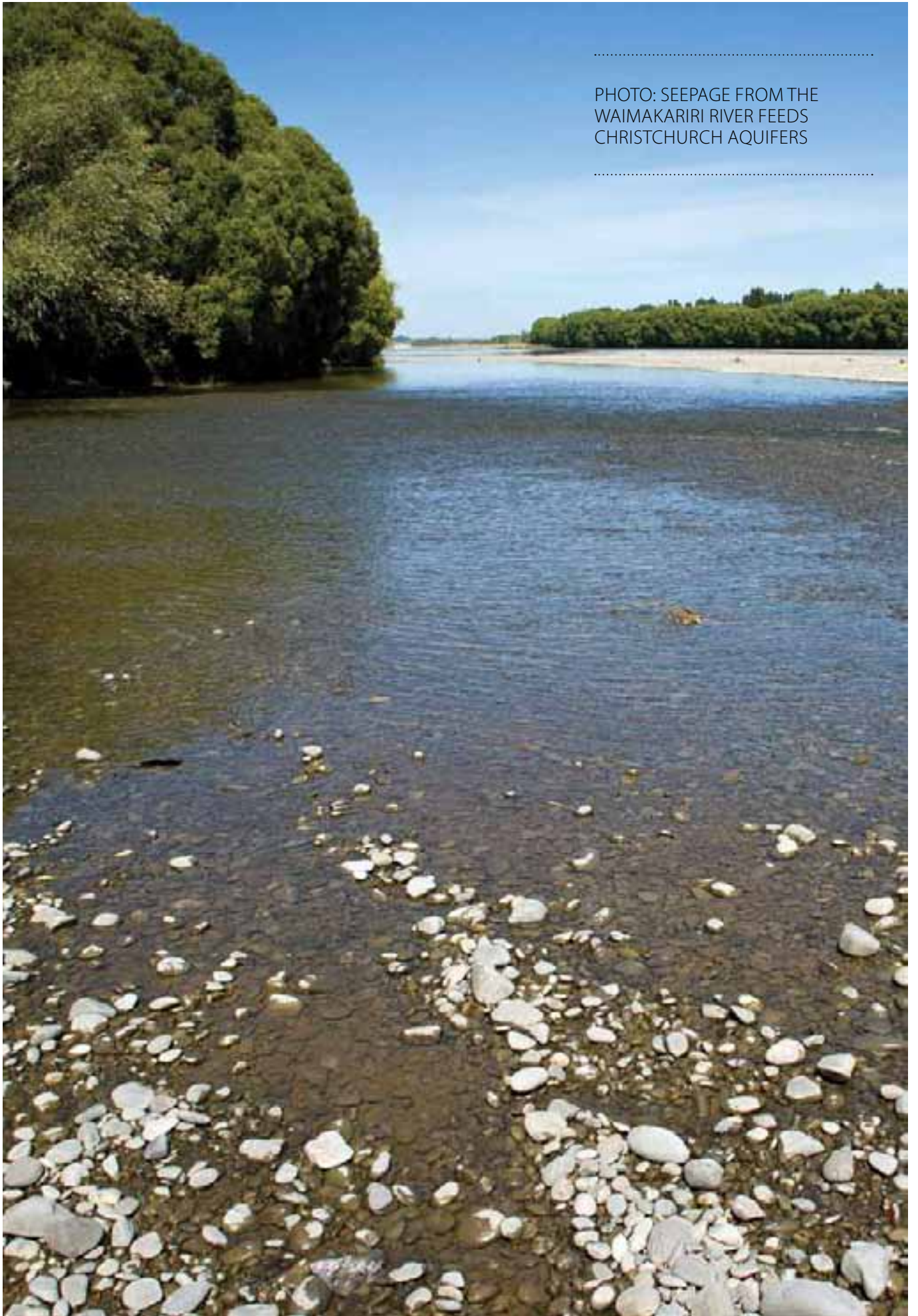
The Code of Practice for Water Supply, one of several codes developed by the New Zealand Fire Service to comply with requirements of the *Fire Service Act 1975*, established a minimum requirement of 100 kilopascals (kPa) at any hydrant. The Christchurch public water supply meets this standard in urban areas.

Existing fire protection systems are installed based on usual pressure of the existing water supply connection, which may differ depending upon the pressure zone or the local hydraulic conditions where the system is located. Rationalisation of the pressure zones, to address the issues of variable pressure noted in section 4.4.4.1, may affect the performance of some fire protection systems in some zones. An increasing number of people are inquiring about domestic fire sprinkler systems, which could also be adversely affected by major changes to the water supply pressure.

Installation of private residential fire sprinkler systems coupled with storage tanks will help reduce demand during peak periods and provide individual fire fighting capability irrespective of local pressure conditions.



.....  
PHOTO: SEEPAGE FROM THE  
WAIMAKARIRI RIVER FEEDS  
CHRISTCHURCH AQUIFERS  
.....









## **Part Two: Policy and strategy**

# 05

## Vision and guiding principles

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“It is wretched business to be digging a well just as thirst is overcoming you.”

*Plautus, Mostellaria, ca 200 BC*

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Water is a vital resource for human health. Christchurch boasts some of the best water in the world. The following strategic vision and guiding principles were developed with the Council’s vision for a future Christchurch and the Community Outcomes in mind.

### 5.1 VISION

We value and protect our public water supply as a precious resource for current and future generations.

### 5.2 GUIDING PRINCIPLES

- » We work together to provide safe, reliable water supplies that are managed sustainably for current and future generations.
- » The Council partners with communities, businesses and other stakeholders to achieve our water supply objectives.
- » Water supplies are essential, not only for the health of our residents but the health of our economy.
- » The Council is committed to the four wellbeing approach – social, economic, cultural and environmental – to managing the public water supplies.
- » Costs and revenue recovery to provide safe and reliable water supplies should be transparent.
- » There are limits to the water resources available for public water supplies and we seek to live within those limits.
- » We take a precautionary approach to future risks to the water supply, including the effects of climate change.



PHOTO: SITE OF THE FIRST PUBLIC WATER SUPPLY WELL, DRILLED IN 1864 NEAR THE CORNER OF TUAM AND HIGH STREETS



# 06

## Goals, objectives and targets

In keeping with the Community Outcomes, and the sustainable water supply vision and guiding principles, a set of goals and objectives was developed.

### **GOAL 1.** **WE HAVE CLEAN, SAFE WATER.**

#### **Objectives:**

- 1.1 The Council's water supplies provide our customers with water that meets New Zealand drinking water standards.
- 1.2 The Council's water supplies are actively managed to ensure cost-effective, reliable and sustainable water supplies.

### **GOAL 2.** **THE SOURCES OF OUR WATER ARE PROTECTED FROM HARM.**

#### **Objectives:**

- 2.1 The Council works with stakeholders to ensure the regulatory environment provides adequate protection from adverse effects on water resources.
- 2.2 The Council works with businesses and communities to protect the public drinking water supply from degradation.
- 2.3 The Council's operations and strategies recognise the importance of protecting water supplies.
- 2.4 Water resources are protected to avoid treatment of Christchurch urban water supplies.

### **GOAL 3.** **THE COUNCIL'S WATER SUPPLIES MEET THE PUBLIC'S REASONABLE NEEDS.**

#### **Objectives:**

- 3.1 Levels of service are met.
- 3.2 The public trusts and values the public water supply service.
- 3.3 Opportunities for alternative sources for various uses are researched.

### **GOAL 4.** **WATER IS USED EFFICIENTLY AND SUSTAINABLY.**

#### **Objectives:**

- 4.1 The Council actively promotes water conservation and water efficiency to our users.
- 4.2 The Council operates and manages its water supply infrastructure to minimise water losses.
- 4.3 Council-operated facilities use and manage water efficiently.
- 4.4 We explore options for discouraging excessive use of water including charging options.

### **TARGETS**

The following targets, if achieved or exceeded, will enable existing water sources to serve the community well into the next century:

- » reduce total per capita consumption to not more than 375 litres per person per day, beginning no later than 2016–17.
- » further reduce total per capita consumption to not more than 350 litres per person per day, beginning no later than 2026–27.

The 2016–17 target aligns with the 2016–17 target for water supply in the 2009–19 LTCCP.



.....  
PHOTO: USING NATIVE PLANTS  
CAN REDUCE WATER USE AS WELL  
AS ENHANCE BIODIVERSITY  
.....



# 07

## Delivering the strategy

### 7.1 IMPLEMENTATION PLAN

An implementation plan will be developed to identify actions needed to implement this Strategy. It is expected the implementation plan will be completed by the end of the 2009–10 financial year.

In order to implement the Strategy a cross-organisational approach is needed including, but not limited to, the following units and groups within the Council:

- » City Water and Waste
- » Asset and Network Planning
- » Transport and Greenspace
- » Community Services
- » Capital Programme
- » Strategy and Planning.

High-level support and input will be needed to ensure the strategic vision and goals can be realised.

The extent to which the Strategy is implemented will depend on decisions made in the Long Term Council Community Plan (LTCCP) process. The *Local Government Act 2002* requires Council to prepare, consult and adopt an LTCCP which is reviewed every three years. In the intervening two years, the Council can adopt changes to their LTCCP in annual plans. The LTCCP process is the means by which the services Council will provide to the community, and their costs, are agreed. It is through this process that the projects identified in this Strategy will be balanced against other Council projects and services. Some timings and funding may change, but the Strategy will remain as a clear Council commitment to achieving the goals and objectives stated.

### 7.2 RESOURCES AND CAPABILITIES

The Council is committed to providing safe drinking water to all users of the public water supply. The Council will:

- » adopt options intended to reduce consumption
- » continue to investigate ways to improve efficiency and protect sources of the public water supply
- » work with the regional council and Central Government to identify approaches to sustainable drinking water management.

Achieving the strategic vision and goals will require an investment in time and resources. All stakeholders – the Council, residents, ECan, businesses and industries, organisations, iwi and others – will need to participate and take responsibility for their actions.

The Council will need to ensure there is sufficient funding through the LTCCP and the Annual Plan planning processes to implement the Strategy.

The Council will also need to ensure there are sufficient staff resources to:

- » manage implementation of the Strategy
- » liaise with stakeholders
- » evaluate the progress and effectiveness of initiatives undertaken
- » assess and review the Strategy and subsequent implementation plans.



.....  
PHOTO: USING A TRIGGER GUN  
SPRAYER WHEN WATERING THE  
GARDEN CAN MAKE IT EASIER  
TO AVOID WASTING WATER  
.....



# 08

## Policy initiatives

A clear message from stakeholders is the desire to 'live within our means' – to make the best use of our existing drinking water sources.

Through residents surveys and stakeholder meetings it has been emphasised that approaches are needed including:

- » assessment of alternatives such as rainwater harvesting and greywater reuse
- » a strong education component focusing on valuing water
- » better information for the public about how they use water
- » protect the right for future water takes for public water supply
- » better manage the existing water supply network (such as pressure management)
- » review charging schemes based on actual use – the most frequently suggested approach is a scheme that provides a baseline allocation funded by rates, with an excess use charge depending on actual usage
- » provide incentives for efficient use, e.g. subsidies for water-efficient devices, grants for rainwater tanks, rebates for use below a base allocation
- » better practices at Council facilities, such as drought-resistant plantings in

- public spaces and use of non-potable water where practicable
- » control growth where water resources are already significantly at risk.

The Council can lead by implementing options that protect water quality, allow for 'living within our means' by adopting alternatives that reduce use of potable water, and retain reasonable service levels.

It is clear that unless action is taken we are likely to be faced with a water crisis in the future. By protecting what we have, and using it wisely, our public water supply will serve us into the future.

The following are actions for achieving a proactive sustainable public water supply. These actions are in addition to business-as-usual activities. A summary of the policy initiatives is provided in Table 3. The table provides indicative costs and time frames in which these initiatives will be implemented.

It should be noted that the inclusion of a project within this document does not commit the Council to commence the project. All projects are contestable each time a new Long Term Council Community Plan is prepared.



PHOTO: LEAK DETECTION, CHRISTCHURCH PUBLIC WATER SUPPLY

## 8.1 SUPPLY-SIDE ACTIONS

Supply-side actions can be taken to directly affect public water supply infrastructure and assets.

### 8.1.1 Leakage (water loss) control

One method to increase the amount of water available from current sources is through reduction of unaccounted losses in the water supply system. While there has already been progress in reducing water loss within the urban areas of Christchurch, it is expected that greater reductions are economically feasible. In addition, there is scope for significant reductions in losses within the Banks Peninsula public water supply.

Initiatives that have been identified to manage leakage loss are:

- » Action 1a. Benchmarking – a benchmarking exercise is needed to determine a target level for the Christchurch water supply based on industry best practice and economic level of loss. This will determine whether further improvements are needed to control leakage or whether the current level of performance is on par with best practice.
- » Action 1b. Enhanced water loss reduction programme – if the result of the benchmarking exercise demonstrates that an economic level of loss for the Christchurch water supply is less than the current level of loss, implementation of an enhanced water loss reduction programme, Action 1b, would be recommended.

Timeframes in which these initiatives, if required, are envisaged to occur are the 2009–10 financial year for Action 1a and the 2011–12 financial year for Action 1b.

These initiatives are not included in the LTCCP 2009-19.

### 8.1.2 Pressure management

Currently there are a relatively small number of pressure zones within the city. The Central Zone has the greatest proportion of connections and the highest average pressure of any of the existing zones.

High pressures in the water supply system result in inefficiencies with respect to water use, energy use and infrastructure reliability and maintenance. Excessive water pressure can lead to water main breaks and cause leaks in the public water supply system. It can also create problems for the public water supply customers. With excessive pressure, small leaks can become larger leaks.

Water pressure management aims to adjust water pressure levels in the supply system, in order to achieve more consistent pressure levels that:

- » will reduce the number of water main breaks
- » improve the reliability of the water supply system
- » conserve water.

Initiatives for this approach include:

- » Action 2a. Pressure zone modelling (2009–10 financial year) – modelling would enable the establishment of smaller, easier to manage pressure management zones. The information produced from this work would also identify any changes needed to the water supply infrastructure.
- » Action 2b. Infrastructure upgrade feasibility study (2011–12 to 2012–13 financial year) – pressure zone modelling (Action 2a) may result in the establishment of one or more new, smaller zones in addition to the current zones. This modelling may also identify changes that would be needed in order to meet the newly modelled pressures. A feasibility/cost benefit study to determine costs and benefits for any infrastructure changes would be required.
- » Action 2c. Infrastructure upgrades (2013–14 financial year onwards if required) – a programme of capital works to implement pressure zone changes may be required, pending the outcome of the cost-benefit analysis (Action 2b).

Only action 2a is included in the LTCCP 2009-19.



**8.1.3 Protection of surface water sources**

Protection of surface water sources of the public water supplies can be provided by fencing the margins of these streams. There is a requirement in the PNRRP (WQL22) that physical protection must be in place for a distance of 2 km from the point of abstraction, to mitigate potential adverse effects from farmed deer, cattle or pigs. Some protection around Banks Peninsula streams has already occurred. ECan will work with stakeholders to determine the means by which WQL22 will be implemented.

**8.1.4 North West Zone improvement**

Regular monitoring has demonstrated that water in the North-West Zone is of good quality and is being managed well, but has received a Ministry of Health Da grading as noted in section 4.4.2. It is proposed that ultra-violet (UV) disinfection systems are installed for a portion of the wells in the Zone, with the remainder of the affected 'unsecure' wells in this Zone replaced with deeper wells. This approach is intended to result in an improvement in the Ministry of Health grading of the North-West Zone.

- » Action 3. North West Zone programme (2012–13 through 2014–15 financial years) – in the North West Zones, shallow wells will be replaced with new, deeper wells where appropriate. In other locations, ultraviolet disinfection systems will be installed. The completion of this programme is expected to result in an improved Ministry of Health grading for this zone. The work for this action is included in the Capital Programme budget.

PHOTO: CATTLE GRAZING ALONG FENCED STREAM MARGIN IN BANKS PENINSULA





## 8.2 DEMAND-SIDE APPROACHES

These are initiatives that are focused on how the public water supply is used.

### 8.2.1 Water efficiency subsidies and rebates

Installation of adjunct water sources such as rainwater tanks can be encouraged in existing homes through a subsidy programme. In addition, programmes to encourage the uptake of water efficient appliances and devices in households (e.g. low-flow showerheads, dual flush toilets) can be achieved through rebate programmes that can have a very modest cost to implement.

The following initiatives are recommended:

- » Action 4a. Rainwater tank subsidy study (2009–10 financial year) – a preliminary study to develop an assessment model is being completed by the end of the 2008–09 financial year, as part of a work programme being undertaken for Akaroa Water/Wastewater Management Project. The modelling software will enable an analysis to

determine the water conservation benefits likely to be achieved compared to the cost of a rainwater subsidy programme for Banks Peninsula. That study will inform the decision whether to implement a subsidy scheme.

- » Action 4b. Rainwater systems subsidy for Banks Peninsula – if cost-effective, based on the outcome of the cost-benefit study (Action 4a), a subsidy would be made available to Banks Peninsula residents who choose to install rainwater collection systems. Depending on results of Action 4a, this action is timed to begin in the 2013–14 financial year.
- » Action 4c. Rainwater systems subsidy for urban Christchurch – if cost-effective, based on the outcome of the cost-benefit study (Action 4a) and the experience from a subsidy programme in Banks Peninsula if implemented, a subsidy would be made available to urban Christchurch residents who choose to install rainwater collection systems. This action would begin in the 2016–17 financial year, pending the outcomes of Actions 4a and 4b.

- » Action 4d. Encouraging retention of existing rainwater tanks – where the public water supply is introduced into a new area, the public will be encouraged to retain rainwater tanks as a supplementary source of water, subject to ensuring that backflow is prevented. This action would be implemented as new areas are added to the public water supply network.
- » Action 5a. Cost-benefit study – water-efficient devices programme (2010–11 financial year); a cost-benefit study would be undertaken to determine water conservation gains that could be achieved through a rebate or subsidy scheme to encourage the purchase of water-efficient devices.
- » Action 5b. Water-efficient devices rebate/subsidy scheme – pending the outcome of a cost-benefit study (Action 5a), a rebate/subsidy scheme would be implemented in the 2012–13 financial year to encourage the use of water efficient devices.

Only action 4a is included in the LTCCP 2009–19.

IMAGE: LABEL FOR NEW ZEALAND WATER EFFICIENCY LABELLING SCHEME



**8.2.2 Education and outreach programmes**

Education and outreach programmes are necessary components to a sustainable water supply. This includes not only school-based initiatives but social marketing to raise awareness and promote behaviour change. Social marketing approaches include, but are not limited to, green plumber and green gardener programmes in which households receive in-home water conservation advice. This approach also includes feedback to consumers about the amount of water they're using based upon meter readings.

Promotion of native and drought-tolerant plants and methods such as permaculture and xeriscaping can contribute to reduced water use, while retaining Christchurch's garden city image.

Studies that examine how water is used, which water conservation programmes are effective and why could enable the Council to better target areas in which reductions could be achieved. This approach would generate information that would enable development of more effective water conservation programmes.

The following education and outreach programmes are recommended:

- » Action 6a. Valuing water campaign research study – the Council currently promotes water conservation during summer months, which in the past has tended to focus its message on reducing water use. Research by Beacon Pathway suggests that education and promotion initiatives that concentrate on valuing the resource is needed. This action entails research into how and why residents value water as a resource and is envisaged to begin in the 2009–10 financial year. Currently this action is not included in the LTCCP 2009–19.

- » Action 6b. Valuing water campaign – this initiative implements the results of Action 6a and is intended to enhance the effectiveness of existing education and promotion campaigns. It is intended as a broader educational initiative aimed at changing behaviours, adding to and distinct from advertising campaigns which are primarily intended to raise awareness. It is suggested to commence in the 2011–12 financial year but is not in the LTCCP 2009–19.
- » Action 7. Green Plumber programme – this is an approach that promotes water-efficiency inside the home. The Green Plumber programme is a service offered to households in which one or more plumbers are available to provide water conservation advice and in-home leakage control (e.g. simple maintenance services such as replacing leaking washers or tightening leaking valves or faucets).
- » Action 8. Green Gardener programme – this is an approach that promotes water-efficiency outside the home. The Green Gardener programme is a service in which one or more experts in water-efficient gardening provide consultation and advice to households on smart irrigation, permaculture and xeriscaping. A Green Gardener Programme not only promotes water efficient gardening but promotes biodiversity as well through the use of plants appropriate to soil and microclimate types.
- » Action 9. Domestic water meter feedback programme – this would provide households with feedback on water usage based on an annual meter reading. It would require domestic meters to be read annually rather than every two years as is the current practice.

Actions 7, 8 and 9 were targeted to begin in the 2012–13 financial year, however they are not included in the LTCCP 2009–19.

PHOTO: NO-WATER GARDEN. AN ATTRACTIVE GARDEN DOES NOT NEED TO BE WATER-INTENSIVE



### 8.2.3 Water-efficiency in City Housing

The Council can demonstrate and promote water efficiency through phased installation of water efficient fixtures and appliances in all City Housing units (Action 10), as refurbishment and asset renewals occur. This action is not included in the LTCCP 2009–19 but is intended to be launched in the beginning of the 2012–13 time frame.

### 8.2.4 Council as a leader

The Council should be modelling water efficiency and conservation. All new Council construction should include alternative water sources using third-pipe systems wherever possible, e.g. water reuse and/or rainwater capture, along with installation of water-efficient devices and appliances.

In addition, Council public spaces should employ water-efficient techniques, such as the public space watering scheme which control when and how much watering occurs; planting of native and/or plants appropriate for climate and soil types, where practicable; use of captured rainwater, such as the system being installed as part of the refurbishment of the new Civic Building. Other examples of rainwater capture can be found at South City and Riccarton libraries. The Council's leadership role also extends to promotion of water-efficient gardening at the Ellerslie International Flower Show and other appropriate venues.

Initiatives to implement this approach include Action 10 (described in section 8.2.3), as well as Actions 16, 17, 18a and 18b, described in sections 8.4.2 and 8.4.3.

### 8.2.5 Reviewing user-pays charging

Currently, domestic users of the public water supply pay a targeted rate for water supply based on the capital value of the rating unit. Commercial users and residential properties with three or more units pay for water in their rates and are invoiced for any excess water use above the calculated allowance for the reading period.

Volumetric charging for water is an approach used in a number of jurisdictions around New Zealand and overseas to help manage demand by applying a value to water supply. Experience has shown that a user-pays system of water charging can achieve a 10 to 60 per cent reduction in water use.

A comprehensive economic and legal review of charging for water and wastewater (Action 11a), to be undertaken in the 2011–12 to 2012–13 timeframe, is needed to determine:

- » whether shared connections must be separated prior to implementation of a volumetric charging scheme
- » whether a phased approach for new homes, as done in some other parts of the world, is feasible
- » a robust cost-benefit analysis to determine water demand reductions, compared to the cost of implementing the scheme.

A scheme that provides a baseline allocation funded by rates, with an excess use charge depending on actual usage, is the approach suggested most frequently at stakeholder meetings and during the public consultation process on the draft Water Supply Strategy, although methods outside of the *Local Government (Rating) Act* should also be assessed.

Action 11b, implementing a volumetric charging scheme, is an approach which can only be considered following the completion of the legal and financial review (Action 11a) and a full public consultation. A strong preference of stakeholders, submitters on the draft Strategy and the Hearings Panel is for consideration of a scheme in which only usage above a baseline allocation would be charged.

As there are other actions that can be taken first to reduce demand and improve water efficiency, any action with respect to a charging scheme that includes a usage-based component is not envisaged until the 2017–18 financial year or later. Neither Action 11a or 11b is included in the LTCCP 2009–19.

It is the Council's intention that, regardless of whether volumetric charging is introduced for domestic customers, the Council retains ownership of the public water supply.

## 8.3 REGULATORY APPROACHES

In addition to supply-side and demand-side approaches, regulatory changes will help to guide progress to a sustainable public water supply.

### 8.3.1 District plan changes

City Plan rules can serve to protect drinking water sources by setting standards for commercial buildings and development that include mitigation of risks of point source pollution, such as storage containers of hazardous substances.

Kapiti Coast District Council used its district plan to influence water consumption; the Council initiated Plan Change 75 as part of its approach to reduce the average peak demand. Plan Change 75 requires that new homes have either a 10,000-litre onsite rainwater collection system or a combined rainwater/greywater system (4500-litre rainwater tank with greywater sub-surface irrigation system).

A change to the Christchurch City Council City Plan to require installation of a rainwater system or a combination rainwater-greywater system in new homes, particularly in areas prone to summer water restrictions such as Akaroa, is another action that utilises a regulatory approach (Action 12). This could also be an appropriate action for inner city intensification development, where captured rainwater or greywater could be used for lower quality water uses such as toilet flushing. An additional benefit to rainwater collection is the diversion of collected rainwater from stormwater runoff volumes. It is proposed that this be undertaken in 2014–15 financial year timeframe; this action is not included in the LTCCP 2009–19.

### 8.3.2 Partnering and engagement

ECan has the statutory authority to set requirements that will ensure surface water and groundwater sources are protected from environmental harm. Because the bulk of Christchurch's public water supply is sourced from underground aquifers and is of such high quality that the water requires no treatment, it is critical that our water supply sources are protected from degradation.

The Council will seek to partner with ECan to identify ways in which our drinking water sources can be protected (Action 13). The Council will also seek to engage with national bodies, Ministries and other stakeholders so that practical initiatives to conserve water and protect public water supplies are implemented. This work is currently underway and will continue in future financial years.

### 8.3.3 Land use controls

As noted in section 4.4.2, Variation 6 to the PNRRP aims to protect the quality of the Christchurch groundwater system by managing the effects of land-use in those areas, within the Christchurch groundwater recharge zone, where subsurface conditions mean that there is limited natural protection to prevent contaminants reaching groundwater. The Council will support Variation 6 with respect to groundwater protection.

## 8.4 APPROACHES TO DEVELOP ADDITIONAL SOURCES

### 8.4.1 Securing rights to additional water takes

It is anticipated that implementation of the Water Supply Strategy will mitigate the need to find new, large sources of drinking water for a substantial period of time. However, because new large sources of drinking water are becoming

increasingly scarce, it is important the Council act proactively to secure rights to new sources for the public water supply (Action 14a). The Council should work closely with local and regional authorities to ensure there is provision for access to water for the purpose of public drinking water supplies in the future. This work is envisaged to be undertaken in the 2009–10 and 2010–11 financial years. This action is not included in the LTCCP 2009–19.

Depending on rights secured and future needs, development of either the Waimakariri River or the Ellesmere well-field may need to occur (Actions 14b, 14c). This approach is intended as a backup only in the event that additional sources of water are needed in the future. Preliminary scoping work could be undertaken in the 2013–14 and 2014–15 financial years. Currently neither Action 14b or 14c are included in the LTCCP 2009–19 or the Capital Programme budget.

An additional approach is the acquisition of existing water takes (Action 15). This could occur beginning the 2015–16 financial year. There is no certainty when, or if, existing water takes may become available and whether they would be cost-effective as either sources of the public water supply or as sources for non-potable water use; this action is not included in the LTCCP 2009–19.

### 8.4.2 Treated wastewater reuse demonstration projects

High quality drinking water is currently used for all types of water use, despite the fact that not all uses require high quality drinking water. Wastewater can be treated to a very high non-potable standard and can be suitable where non-potable water is appropriate. There may be opportunities for water reuse for toilet flushing, sub-surface irrigation or other water use, when new Council facilities are built or when major refurbishments of Council facilities are



undertaken (Action 16). Timing for implementing this action would be on a project-by-project basis. This action is not explicitly included in the LTCCP 2009–19 or Capital Programme budget, although implementation costs should be integrated into project budgets where practical.

An addition to the Christchurch Wastewater Treatment Plant to treat process water could provide quality non-potable water to the treatment plant thereby reducing the treatment plant's use of potable water and demonstrating the use of this resource. This demonstration project could also provide nearby irrigation (Action 17). The time frame for this action, which is included in the Capital Programme budget, is the 2018–19 and 2019–20 financial years.

#### **8.4.3 Rainwater systems in Council facilities**

Rainwater as a new source is more applicable to individual buildings or facilities than to a centralised reticulation system. Although not a source for the networked water supply system as a whole, rainwater could be used as an alternate source of water for individual Council facilities, particularly for landscape irrigation and toilet flushing. The installation of a rainwater irrigation system at the Botanic Gardens, for example, would not only reduce the City's own use of the potable water supply but could also serve an educational role for the benefits of rainwater use.

A feasibility study to examine how rainwater capture can be utilised in Council facilities is proposed (Action 18a in the 2012–13 financial year). The outcomes of that study would determine if/how a rainwater use programme for Council facilities could be implemented (Action 18b in 2014-15 financial year). Neither action is included in the LTCCP 2009–19.

PHOTO: RAIN WATER CAPTURE AT SOUTH CITY LIBRARY. RAIN WATER IS USED FOR FLUSHING TOILETS IN THE LIBRARY'S RESTROOMS.



## 8.5 SUMMARY OF ACTIONS

### 8.5.1 Current water supply operational expenditures

Table 2 shows the current programmed services in the 2008-09 Annual Plan, which are already in progress.

The current approach to fund these services is to charge for water on a capital value basis through Council rates. Domestic consumers pay the amount on the rates bill only. The Council does not charge domestic users for actual use, but does monitor and inform excessive users.

Commercial users and residential properties with three or more units pay for water through their rates and are invoiced for any excess water use above the calculated allowance for the reading period.

### 8.5.2 Summary of actions to implement the Strategy

Strategic actions outlined in section 8.1, 8.2, 8.3 and 8.4 are summarised in Table 3. The summary links the actions with one or more of the strategic goals and targets, and provides proposed timeframes in which the actions would be implemented. In Table 3, actions that have been included for consideration in the LTCCP 2009-19 are denoted with a **L** symbol, while those actions which are not yet provided for in the LTCCP are denoted with a **N** symbol. Actions under consideration in the Capital Programme budget, which is a portion of the LTCCP budget planning process, are denoted by a **C** symbol. Actions are ranked as either high (H) or medium (M).

Inclusion of a project within this document does not commit the Council to commence the project. All projects are contestable each time a new Long Term Council Community Plan is prepared.

TABLE 2.  
CURRENT WATER SUPPLY SERVICES

Activity	2008/09 Annual Plan (\$000's)
Activity operational cost:	
Water conservation	135
Water supply	22,961
Activity operational revenue:	
Water supply	3,238
Capital revenues	2,257
Vested assets	1,462
<b>Net cost of services</b>	<b>16,139</b>
Capital expenditure:	
Renewals and replacements	9,224
Improved service levels	1,551
Increased demand	2,446
<b>Total capital expenditure</b>	<b>13,221</b>

Note: See the 2008-09 Annual Plan for further details.

TABLE 3.  
SUMMARY OF STRATEGIC ACTIONS

- Notes:**
1. The number assigned to an action may differ from that used in the draft Water Supply Strategy (December 2008).
  2. Note the numerical and financial information provided in this report is approximate and should not be used as a basis for more detailed analysis without reviewing the background data from which it was sourced.

Action #	Ranking	Action	Goal(s) and target(s)	Issue(s) addressed	Preferred time frame	Rough order cost (-20% -to +50%)	Responsible party(ies)
1a	M	<b>M</b> Benchmarking exercise to determine target economic level of loss	Goal 1, Objective 1.2 Goal 4, Objective 4.2 Goal 4, Objective 4.3	Availability: » finite source » limits to alternative sources » seasonal variations in surface water sources. Demand and use: » high per capita consumption » population growth » risk of migration of customers from other supplies.	2009–10 to 2010–11	\$50,000–\$100,000	CCC (City Water and Waste Unit)
1b	M	<b>M</b> Enhanced water loss reduction programme (if benchmarked economic level of loss less than current level of loss)	Goal 1, Objective 1.2 Goal 4, Objective 4.2 Goal 4, Objective 4.3		2012–13, if needed	\$unknown (depends on benchmarked level of loss – Action 1a)	CCC (City Water and Waste Unit)
2a	H	<b>L</b> Pressure zone modelling to optimise equalised pressure management zones	Goal 1, Objective 1.2 Goal 3, Objective 3.1 Goal 4, Objective 4.2	Availability: » finite source » limits to alternative sources.	2009–10	\$150,000	CCC (City Water and Waste Unit)
2b	H	<b>M</b> Infrastructure upgrades for new pressure management zones – feasibility study/cost benefit analysis	Goal 1, Objective 1.2 Goal 2, Objective 2.1 Goal 3, Objective 3.1 Goal 4, Objective 4.2	Demand and use: » high per capita consumption » population growth. Service standards, costs and regulations: » service standards vary » fire protection requirements.	2011–12 to 2012–3	\$130,000	CCC (City Water and Waste Unit)
2c	H	<b>M</b> Infrastructure upgrades for new pressure management zones – Capital Programme	Goal 1, Objective 1.2 Goal 2, Objective 2.1 Goal 3, Objective 3.1 Goal 4, Objective 4.2		2013–14 onwards	\$TBD; depends on results of Actions 2a and 2b	CCC (City Water and Waste Unit)



SUMMARY OF STRATEGIC ACTIONS

Action #	Ranking	Action	Goal(s) and target(s)	Issue(s) addressed	Preferred time frame	Rough order cost (-20% -to +50%)	Responsible party(ies)
3	H	<b>C</b> North West Zone – installation of UV disinfection systems (some locations in NW zone) and replacement of shallow wells with deeper wells (other locations in NW zone)	Goal 1, Objective 1.1 Goal 2, Objective 2.3 Goal 2, Objective 2.4	Water quality: » risk of groundwater contamination » secure sources » plumbosolvency.	2012–2015	\$8,600,000 (Capex)  \$80,000 (Opex, per annum)	CCC (City Water and Waste Unit)
4a	H	<b>L</b> Rainwater as additional source for households– Banks Peninsula subsidy – cost-benefit study	Goal 1, Objective 1.2 Goal 3, Objective 3.3	Availability: » finite source » limits to alternative sources » seasonal variations in surface water sources. Demand and use: » high per capita consumption » population growth » risk of migration of customers from other supplies.	2009– 10	\$100,000	CCC (City Water and Waste Unit)
4b	H	<b>M</b> Rainwater as additional source for households – Banks Peninsula subsidy			2013– 14	\$TBD depends on cost-benefit study (Action 4a)	CCC (City Water and Waste Unit)
4c	M	<b>M</b> Rainwater as supplementary source for households - urban Christchurch subsidy			2016– 17	\$TBD depends on cost-benefit study (Action 4a)	CCC (City Water and Waste Unit)
4d	M	<b>M</b> Promoting retention of existing rainwater tanks			As public water supply network introduced into new areas	\$TBD	CCC (City Water and Waste Unit)
5a	M	<b>M</b> Cost-benefit study - analysis of total system costs for water-efficient devices	Goal 1, Objective 1.2 Goal 4, Objective 4.1	Availability: » finite source » limits to alternative sources » seasonal variations in surface water sources » climate change and sea level rise  Demand and use: » high per capita consumption » population growth » risk of migration of customers from other supplies.	2010– 11	\$20,000 CCC (City Water and Waste Unit)	CCC (City Water and Waste Unit)
5b	M	<b>M</b> Water efficient devices rebate scheme	Goal 1, Objective 1.2 Goal 4, Objective 4.1		2012– 13	Up to \$35,000 per year	CCC (City Water and Waste Unit)
6a	H	<b>M</b> Valuing water campaign – research study	Goal 3, Objective 3.2 Goal 4, Objective 4.1	Availability: » finite source » limits to alternative sources » seasonal variations in surface water sources. Demand and use: » high per capita consumption » population growth » risk of migration of customers from other supplies.	2009– 10	\$20,000–\$50,000	CCC (City Water and Waste Unit)
6b	H	<b>M</b> Valuing water campaign	Goal 2, Objective 2.2 Goal 2, Objective 2.3 Goal 3, Objective 3.2 Goal 4, Objective 4.1		2011– 12	\$20,000–\$ 50,000 (Development and rollout (yr 1))	CCC (City Water and Waste Unit)
					2012– 13 onwards	\$20,000–\$50,000/y Implementation (subsequent years)†	

SUMMARY OF STRATEGIC ACTIONS

Action #	Ranking	Action	Goal(s) and target(s)	Issue(s) addressed	Preferred time frame	Rough order cost (-20% -to +50%)	Responsible party(ies)
7	M	<b>N</b> Green Plumber	Goal 4, Objective 4.1	<p>Availability:</p> <ul style="list-style-type: none"> <li>» finite source</li> <li>» limits to alternative sources</li> <li>» seasonal variations in surface water sources</li> <li>» climate change and sea level rise.</li> </ul> <p>Demand and use:</p> <ul style="list-style-type: none"> <li>» high per capita consumption</li> <li>» population growth</li> <li>» risk of migration of customers from other supplies.</li> </ul>	2012–13	\$20,800/yr	CCC (City Water and Waste Unit)
8	M	<b>N</b> Green Gardener	Goal 4, Objective 4.1	<p>Availability:</p> <ul style="list-style-type: none"> <li>» finite source</li> <li>» limits to alternative sources</li> <li>» seasonal variations in surface water sources</li> <li>» climate change and sea level rise.</li> </ul> <p>Demand and use:</p> <ul style="list-style-type: none"> <li>» high per capita consumption</li> <li>» population growth</li> <li>» risk of migration of customers from other supplies.</li> </ul>	2012–13	\$31,200/yr	CCC (City Water and Waste Unit)
9	M	<b>N</b> Annual domestic meter feedback	Goal 3, Objective 3.2 Goal 4, Objective 4.1	<p>Availability:</p> <ul style="list-style-type: none"> <li>» finite source</li> <li>» limits to alternative sources</li> <li>» seasonal variations in surface water sources</li> <li>» climate change and sea level rise.</li> </ul> <p>Demand and use:</p> <ul style="list-style-type: none"> <li>» high per capita consumption</li> <li>» population growth.</li> <li>» risk of migration of customers from other supplies.</li> </ul>	2012–13 onwards	\$200,000	CCC (City Water and Waste Unit)
10	H	<b>M</b> Installation of water efficient devices in City Housing, as refurbishment and asset renewals occur	Goal 1, Objective 1.2 Goal 4, Objective 4.3	<p>Availability:</p> <ul style="list-style-type: none"> <li>» finite source</li> <li>» limits to alternative sources</li> <li>» climate change and sea level rise.</li> </ul> <p>Demand and use:</p> <ul style="list-style-type: none"> <li>» high per capita consumption</li> <li>» population growth.</li> <li>» risk of migration of customers from other supplies.</li> </ul>	2012–13 onwards	Included in City Housing asset management budget	CCC (City Housing Unit)

## SUMMARY OF STRATEGIC ACTIONS

Action #	Ranking	Action	Goal(s) and target(s)	Issue(s) addressed	Preferred time frame	Rough order cost (-20% -to +50%)	Responsible party(ies)
11a	M	<b>M</b> Comprehensive economic and legal review of charging for water	Goal 1, Objective 1.2 Goal 2, Objective 2.1 Goal 4, Objective 4.4	Availability: » finite source » limits to alternative sources » seasonal variations in surface water sources. Demand and use: » high per capita consumption » inexpensive water.	2011–12 to 2012–13	\$70,000	CCC (City Water and Waste Unit)
11b	M	<b>M</b> Volumetric charging (depends on outcome of review) (may require separating shared connections)	Goal 1, Objective 1.2 Goal 2, Objective 2.1 Goal 3, Objective 3.2 Goal 4, Objective 4.4		2017–18	\$2,100,000 to \$2,700,000 above current costs (Opex; costs would be recovered through charging structure)	CCC (City Water and Waste Unit)
12	H	<b>M</b> City Plan change to require rainwater system or rainwater/ greywater combined system	Goal 3, Objective 3.3 Goal 4, Objective 4.1	Availability: » finite source » limits to alternative sources » seasonal variations in surface water sources » climate change and sea level rise.  Demand and use: » high per capita consumption » population growth » use of high quality water for all purposes » risk of migration of customers from other supplies.	2014–15	\$TBD	CCC (City Water and Waste Unit)
13	H	<b>L</b> Partnering and engagement, e.g. support for variation 6 of the Proposed Natural Resources Regional Plan)	Goal 2, Objective 2.1 Goal 2, Objective 2.2 Goal 3, Objective 3.2 Goal 4, Objective 4.1	Availability: » finite source. Water quality: » risk of groundwater contamination. Demand and use: » Population growth. Services standards, costs and regulations: » dynamic regulatory environment » fire protection requirements.	2008–09 and onwards	\$staff time	CCC (Strategy and Planning Group; City Water and Waste Unit; Asset and Network Planning Unit; Enforcement and Policy Unit); ECan; Ministry of Health; Ministry for the Environment



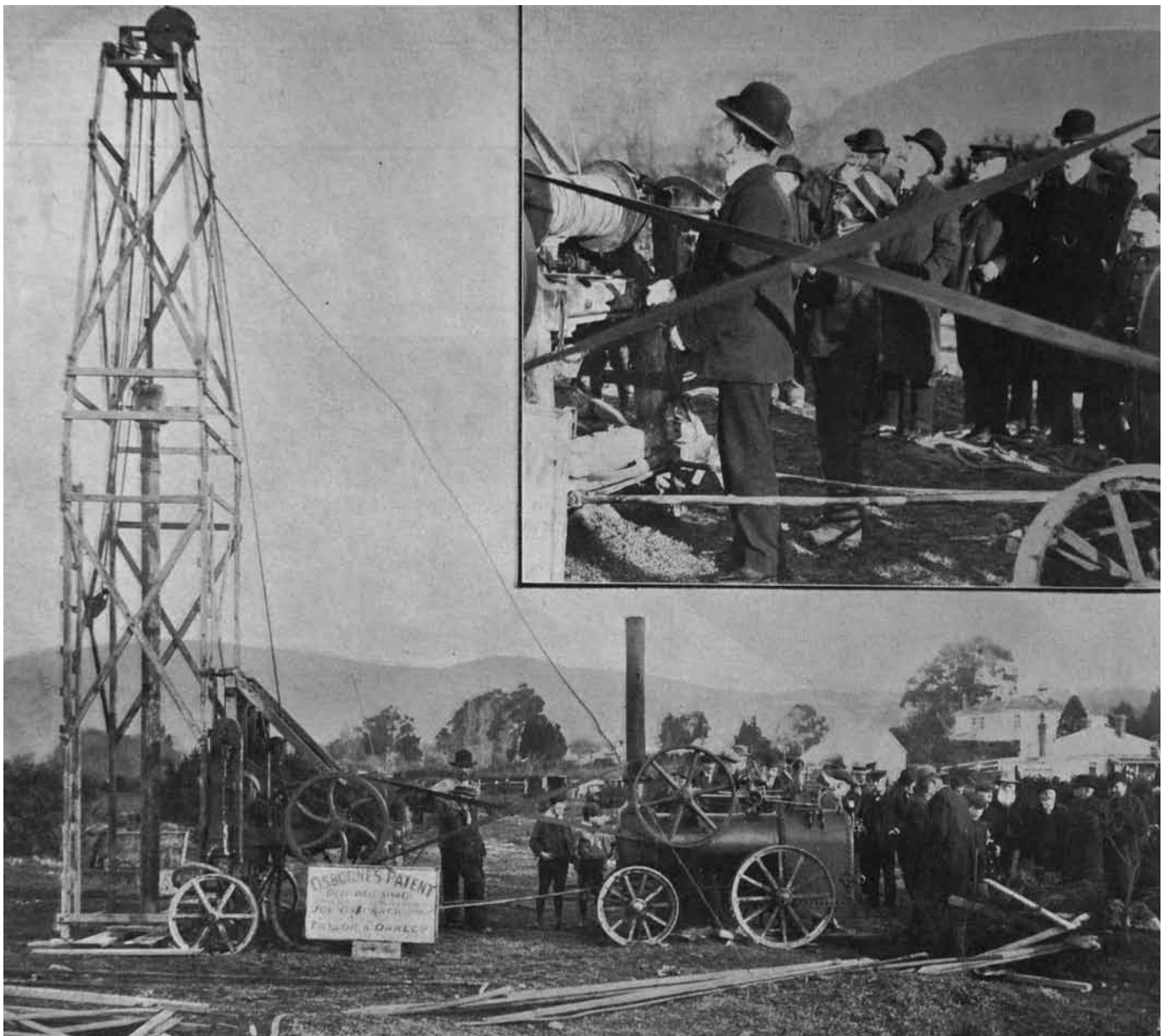
SUMMARY OF STRATEGIC ACTIONS

Action #	Ranking	Action	Goal(s) and target(s)	Issue(s) addressed	Preferred time frame	Rough order cost (-20% -to +50%)	Responsible party(ies)
14a	H	<b>N</b> Securing rights to additional water takes	Goal 3, Objective 3.3	Availability: » finite source » limits to alternative sources. Demand and use: » high per capita consumption » population growth » risk of migration of customers from other supplies.	2009–10 to 2010–11	\$300,000	CCC (Strategy and Planning Group)
14b		<i>Only if necessary, either development of Waimakariri River OR Ellesmere well-field as new source</i> N Waimakariri River development of new source 40 MI/day (with treatment)  OR  N Waimakariri River development of new source 80 MI/day (with treatment)	Goal 3, Objective 3.3	Availability: » finite source » limits to alternative sources » seasonal variations in surface water sources. Demand and use: » high per capita consumption » population growth » risk of migration of customers from other supplies.	2013–14 to 2014–15 (development)  TBD (infrastructure)	\$67,000,000 Capex (based on 2005 data) \$20,100,000 Opex (based on 2005 data)  OR  \$78,000,000 Capex (based on 2005 data) \$36,700,000 Opex (based on 2005 data)  OR  \$59,000,000 Capex (based on 2005 data) \$8,600,000 Opex (based on 2005 data)	CCC (City Water and Waste Unit)
14c	H	N Ellesmere well-field (treatment costs, if any, not included)	Goal 3, Objective 3.3	Availability: » finite source » seasonal variations in surface water sources. Demand and use: » high per capita consumption » population growth » risk of migration of customers from other supplies.	2015–16 and onwards	Up to \$4,000,000 (over 30 years)	CCC (City Water and Waste Unit)
15	H	<b>N</b> Acquire existing well rights as they become available	Goal 3, Objective 3.3	Availability: » finite source » seasonal variations in surface water sources. Demand and use: » high per capita consumption » population growth » risk of migration of customers from other supplies.	2015–16 and onwards	Up to \$4,000,000 (over 30 years)	CCC (City Water and Waste Unit)

SUMMARY OF STRATEGIC ACTIONS

Action #	Ranking	Action	Goal(s) and target(s)	Issue(s) addressed	Preferred time frame	Rough order cost (-20% -to +50%)	Responsible party(ies)
16	H	<b>N</b> Water reuse as appropriate in new Council facilities or major refurbishments	Goal 1, Objective 1.2 Goal 3, Objective 3.3 Goal 4, Objective 4.3	Availability: » finite source » limits to alternative sources » seasonal variations in surface water sources. Demand and use: » high per capita consumption » population growth » risk of migration of customers from other supplies.	Project by project basis	To be integrated into project budgets where practical	CCC (applicable Council units)
17	H	<b>C</b> Wastewater Reuse Demonstration Project - Capital programme	Goal 1, Objective 1.2 Goal 3, Objective 3.3 Goal 4, Objective 4.3	Availability: » finite source » limits to alternative sources » seasonal variations in surface water sources. Demand and use: » high per capita consumption » population growth » use of high quality water for all purposes » risk of migration of customers from other supplies.	2018–19 to 2019–20	\$3,200,000 (Capex)  \$145,000 (Opex. Per annum)	CCC (City Water and Waste Unit)
18a	H	<b>N</b> Rainwater as additional (adjunct) source – Feasibility study for Council implementation	Goal 1, Objective 1.2 Goal 3, Objective 3.3 Goal 4, Objective 4.3	Availability: » finite source » limits to alternative sources » seasonal variations in surface water sources. Demand and use: » high per capita consumption » population growth » risk of migration of customers from other supplies.	2012–13	\$150,000	CCC (City Water and Waste Unit)
18b	H	<b>N</b> Rainwater as additional (adjunct) source – Council rainwater use programme	Goal 1, Objective 1.2 Goal 3, Objective 3.3 Goal 4, Objective 4.3	Availability: » finite source » limits to alternative sources » seasonal variations in surface water sources. Demand and use: » high per capita consumption » population growth » risk of migration of customers from other supplies.	2014–15	\$TBD depends on results of study (Action 17a)	CCC (all units as applicable)

PHOTO: 1907 WEEKLY PRESS  
PHOTO OF PIPE DRIVING FOR  
FIRST HIGH-PRESSURE PUBLIC  
WATER SUPPLY IN CHRISTCHURCH



# 09

## Implementation risks and tasks

### 9.1 RISKS

Key risks to delivering this Strategy include:

- » failure of the Council to provide sufficient resources to address issues
- » failure of stakeholders to accept their respective responsibilities
- » deferral of actions to future councils and future generations
- » reliance on a single approach (silver bullet) to address issues
- » failure of the community as a whole to recognise impacts of individual actions.

### 9.2 TASKS

This Strategy will be delivered through an implementation plan. Resourcing will be determined through the LTCCP process. Key to this process will be recognition that budgetary priorities must include not only business-as-usual infrastructure renewals and replacements, but also proactive capital and operational projects to ensure long-term sustainability of the public water supply.



# 10

## Monitoring and review

The implementation plan should be reviewed annually to assess whether there are additional approaches that can be taken, or whether changes to current methods are required. It is intended that the Strategy is a living document that can be adjusted in the face of additional information.

The measures developed as part of the LTCCP process will be employed to review the progress of the Strategy, particularly those measures developed for water conservation activity.

The Strategy will be formally reviewed on a five-yearly basis, with the first formal review scheduled for mid-2014.

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PHOTO: AKAROA HARBOUR  
STREAM CATCHMENT AREA  
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# Appendices

## APPENDIX I GLOSSARY OF TERMS

Banks Peninsula	The area administered by the former Banks Peninsula District Council prior to amalgamation with Christchurch City Council in March 2006	Non-potable	Water suitable for uses other than drinking, such as industrial process water and landscape irrigation
CCC	Christchurch City Council	NPS	National Policy Statement
cu m	Cubic metres	PNRRP	Proposed Natural Regional Resources Plan
District	The area comprising the territorial boundary of the Christchurch City Council that includes Christchurch/ Ōtautahi and Banks Peninsula/Te Pātaka o Rākohaitū	Permaculture	A system based on core principles of care for people, care for the environment and sharing of resources, which seeks to apply a holistic integrated approach to human landscapes
ECan	Environment Canterbury (Canterbury Regional Council)	Potable	Water that is suitable for drinking
Greywater	Used water from sinks, washing machines, showers, dish washers and similar appliances, but not including any toilet wastewater. Water from toilet flushing is known as black water.	Public water supply	All water supplies provided by the Council's water reticulation system to households, public facilities and commercial and industrial customers.
l/p/d	litres per person per day	RMA	Resource Management Act 1991
LGA 2002	Local Government Act 2002	RPS	Canterbury Regional Policy Statement
LTCCP	Long Term Council Community Plan	TBD	To be determined
MKT	Mahaanui Kurataiao Ltd, a company owned by the six Papatipu Runanga of Christchurch and Banks Peninsula. MKT's role is to provide tangata whenua consultation and advisory services.	Treated wastewater	Refers to wastewater that has been treated through a treatment system to a specified standard.
NES	National Environmental Standard	UDS	Greater Christchurch Urban Development Strategy
NIWA	National Institute of Water & Atmospheric Research	Urban Christchurch	The area administered by Christchurch City Council prior to amalgamation with Banks Peninsula District Council in March 2006
		Xeriscaping	A method of gardening and landscaping using vegetation appropriate to climate and soils

## APPENDIX II MINISTRY OF HEALTH GRADING SCHEME

The Ministry of Health has developed a grading scheme which assesses the public health risk of public water supplies. The grading is not based on whether a drinking water supply meets Drinking Water Standards for microbial, chemical and radiological contaminants of health significance. Rather, 'the grading is a measure of confidence that a drinking-water supply system will not become contaminated, rather than an absolute indication of quality at a specific time' (Ministry of Health Public Health Grading of Community Drinking-Water Supplies 2003).

The grading system evaluates two components:

» Source and treatment

33 aspects of the drinking water source(s) and treatment are examined. The grade for this component is indicated by a capital letter, as follows:

- A1 – completely satisfactory, negligible level of risk, demonstrably high quality
- A – completely satisfactory, very low level of risk
- B – satisfactory, low level of risk
- C – marginal, moderate level of risk, may be acceptable in some small communities
- D – unsatisfactory, high level of risk
- E – completely unsatisfactory, very high level of risk
- U – ungraded.

» Distribution zone (reticulation, pumps, etc)

22 factors for the distribution system and final water quality are assessed based on reticulation condition, management and actual water quality. The grade for distribution is indicated by a small letter, based on the following scale:

- a – completely satisfactory, negligible level of risk, demonstrably high quality
- b – satisfactory, low level of risk
- c – marginal, moderate level of risk, may be acceptable in some small communities
- d – unsatisfactory, high level of risk
- e – completely unsatisfactory, very high level of risk
- u – ungraded.

The Ministry has established 'minimum acceptable gradings' for water supplies:

Community size	Source and treatment	Distribution
Greater than 10,000	A	a
From 5001 to 10,000	B	b
5000 or less	C	c

It should be noted that without treatment, the highest grading a non-treated supply such as urban Christchurch can receive is a B grade for source and treatment. The gradings are calculated using a complex algorithm using multiple tables.

The main urban Christchurch supply (which includes the Lyttelton Harbour Basin) is graded Ba. The North-West Zone supply, which is isolated from the rest of the urban Christchurch supply, has received a grading of Da. This is because the shallow wells in the unconfined/semi-confined aquifer zone are deemed to be at risk of contamination due to the absence of a protective confining layer and because the water is not treated. As the Ministry notes in their 2003 document 'it is important to note that even if the quality of the drinking-water is high, if there is a high risk of contamination the supply will receive a low grading'.

As at July 2009, gradings have not been completed for the smaller Banks Peninsula public water supplies, according to the online information system Water Information New Zealand.

### APPENDIX III HEALTH (DRINKING WATER) AMENDMENT ACT SUMMARY

The *Health (Drinking Water) Amendment Act 2007* requires community drinking water suppliers to meet New Zealand drinking water standards and to prepare public health risk management plans for their supplies.

The Act is applicable to both public water supplies, such as those managed by the Christchurch City Council, as well as private supplies that serve multiple properties. The smallest community water supply affected by the Act is one which serves between 25 and 100 people at least 60 days a year.

The compliance date depends upon the size of the community served by the supply, as follows:

Water supply designation	Population served for at least 60 days/yr	Compliance date
Large (e.g. Christchurch)	more than 10,000	1 July 2012
Medium	5001 - 10,000	1 July 2013
Minor (e.g. Akaroa)	501 - 5000	1 July 2014
Small (e.g. Duvauchelle, Little River, Birdlings Flat, Takamatua, Wainui)	101 - 500	1 July 2015
Neighbourhood (e.g. Pigeon Bay)	25 - 100	1 July 2016

### APPENDIX IV REFERENCES

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